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THE EFFECT OF INTERRUPTION ON EARNING AND LABOR FORCE PARTICIPATION OF MARRIED WOMEN

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THE EFFECT OF INTERRUPTION ON EARNING AND LABOR FORCE PARTICIPATION OF MARRIED WOMEN

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DOCTOR OF PHILOSOPHY

By

MASSOUMEH METGHALCHI DIBA

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LABOR FORCE PARTICIPATION OF

MARRIED WOMEN

A DISSERTATION

APPROVED FOR THE DEPARTMENT OF ECONOMICS

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THE EFFECT OF INTERRUPTION ON EARNING AND LABOR FORCE PARTICIPATION OF MARRIED WOMEN

CHAPTER I

INTRODUCTION AND OBJECTIVES

Introduction

Increased participation of women in the labor force in recent years constitutes one of the most important changes society has to accommodate. The influx of women into the job market is bringing about a fundamental change in social and economic conditions. It may be the major reason that the United States has emerged so much healthier than other countries from the economic shocks of the 1970s. While employment has declined in most industrial countries, the U.S. is creating jobs at remarkable speed--20 million in the past 10 years --and women have accounted for more than three-fifths of this increase.[1] Since a rapidly expanding labor force is a principal element in boosting economic growth, the importance of

[1] U.S. Department of Labor. Economic Report of the President (Washington, D.C.: Government Printing Office, 1984) p. 256.

increasing female labor force participation can be appreciated.

Diagram 1-1 shows the increasing trend of women's employment rate during the past decade. At present about 53.7 percent of the female population ages 16 and over works outside the home.[2] That constitutes a jump of 10 percentage points over the past decade. This exceeds the female labor force participation rate of almost all industrialized nations except Sweden, where this rate is about 75 percent.[3]

The increased propensity of women to work for pay is attributed mainly to the increased labor force participation of married women, who make up 56 percent of all women in the labor force.[4] According to the new Conference Board Report[5] on working women, if the U.S. middle class is alive and well, it is largely due to the unsung labors of American women who are bringing home paychecks. According to this study, about 60 percent of all family income is now earned by households where wives are working.

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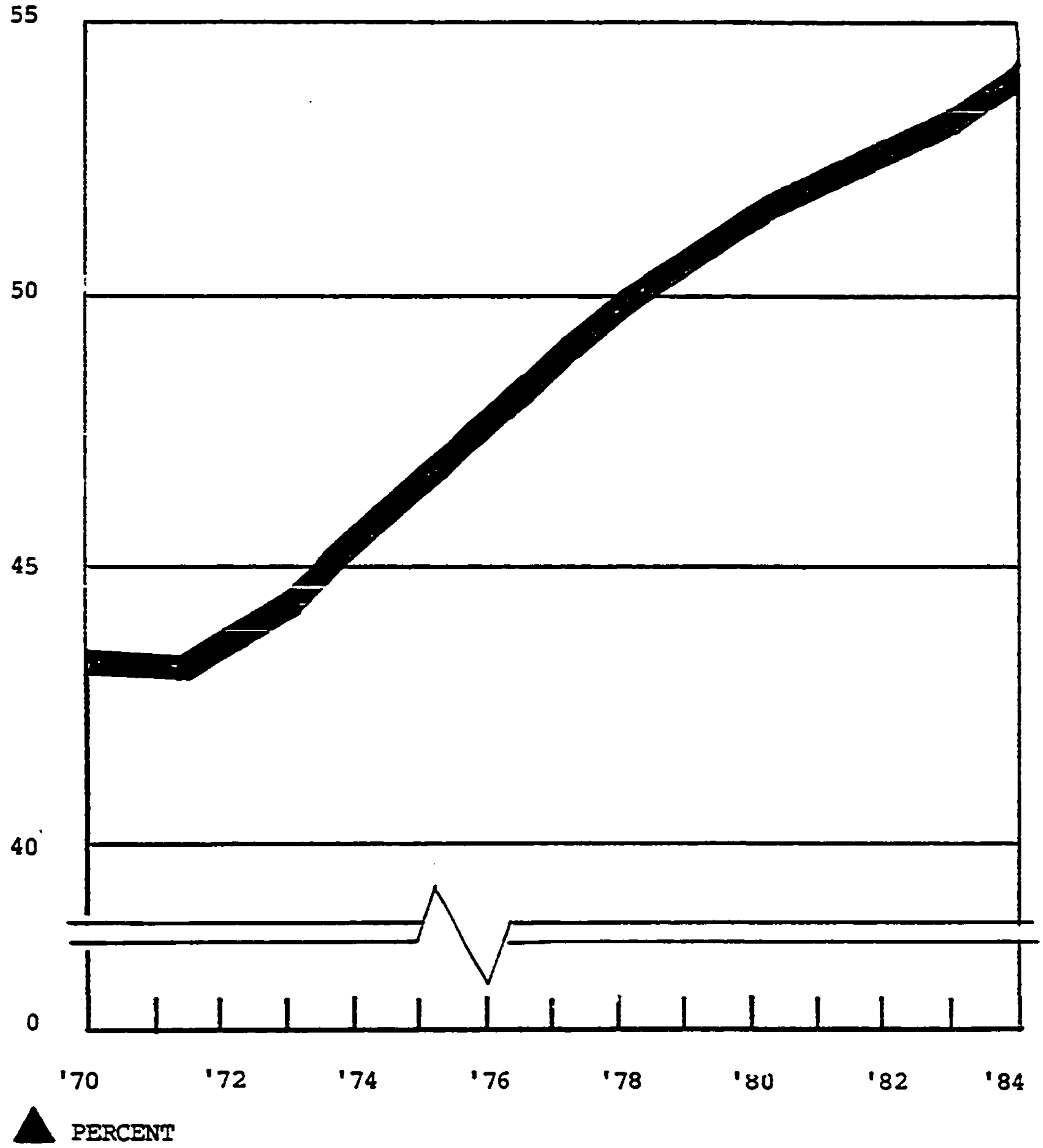
[2] U.S. Department of Labor, Employment and Training Report of the President (Washington, D.C.: Government Printing Office, 1984), p. 6.

[3] Gunther Schmid and Renate Weitzel, Sex Discrimination and Equal Opportunity, The Labor Market and Employment Policy (new York: St. Martin Press, 1984), p. 13.

[4] U.S. Bureau of Census, Statistical Abstract of the United States: 1985 (105th Edition, Washington, D.C., 1984) p. 399.

[5] Business Week, October 29, 1984.

Diagram 1-1. Women employed as a percent of adult females.



SOURCE: U.S. Bureau of the Census, Statistical Abstract of the United States, 1985 (105th edition), Washington, D.C., 1984, p. 392.

Women have always worked, of course. In the home and on the farm, their contribution to family income and well-being has been immeasurable--and unpaid. But it was not until the 1920s that women started to become a major measured factor in the economy. By then, technological breakthroughs lightened women's work load in agriculture and in the household. Freer from house work and better educated than their mothers, millions of young, single women were drawn into the expanding clerical sector. The Depression caused a discontinuity in the progress of women in the labor force, because jobs were simply unavailable. During World War II, however, women entered the labor force as they were hired for jobs in the manufacturing sector. But many of those women exited from the labor force after the war, and a post war rise in the birthrate kept many women out of the work force until the 1960s, when they began reentering the labor force. According to the government statistics, over the period 1961-81, the number of employed females has rised from 38 percent to 52 percent while the male labor force participation during this period was dropped from 85 percent to 79 percent.[6]

There are several factors which have contributed to the rapid growth of the female participation rate. To a large extent it can be attributed to the increase in job opportunities in the loosely-defined service sector which includes

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[6] U.S. Department of Labor, Employment and Training Report of the President, 1961-1983. Washington, D.C.: Government Printing Office.

everything from hairdressers to information companies. During the last two decades, due to the economy's restructuring away from manufacturing and toward services, there has been an increase in the number of service workers. And most service companies employ more women than men. Simultaneous with increases in the female working population, women's educational levels are rising and will continue to rise. Currently, more than half of all college students are women, and females earn 23 percent of all medical degrees and 30 percent of all law degrees.[7] The increases in educational attainment will increase the job opportunities and labor force attachment of women. Other factors which have contributed to the expansion of the female labor force are later marriages, declining birthrates, and liberalization of attitudes toward women working. But numbers do not tell the whole story. Although we know that more and more women are gaining access to entry-level jobs, they have made relatively little progress in the job market, as measured by their earnings and employment opportunities, at least according to the official statistics (Diagram 1-2). Until the beginning of this decade, women's wages seemed stuck at around 60 percent of what men make, on average. In fact, when women started flooding into the work force in the early 1970s, the gap actually widened to about 57 percent in 1977. However, since 1980, women's wages have risen to 64 percent of men's wages, from 60 percent.

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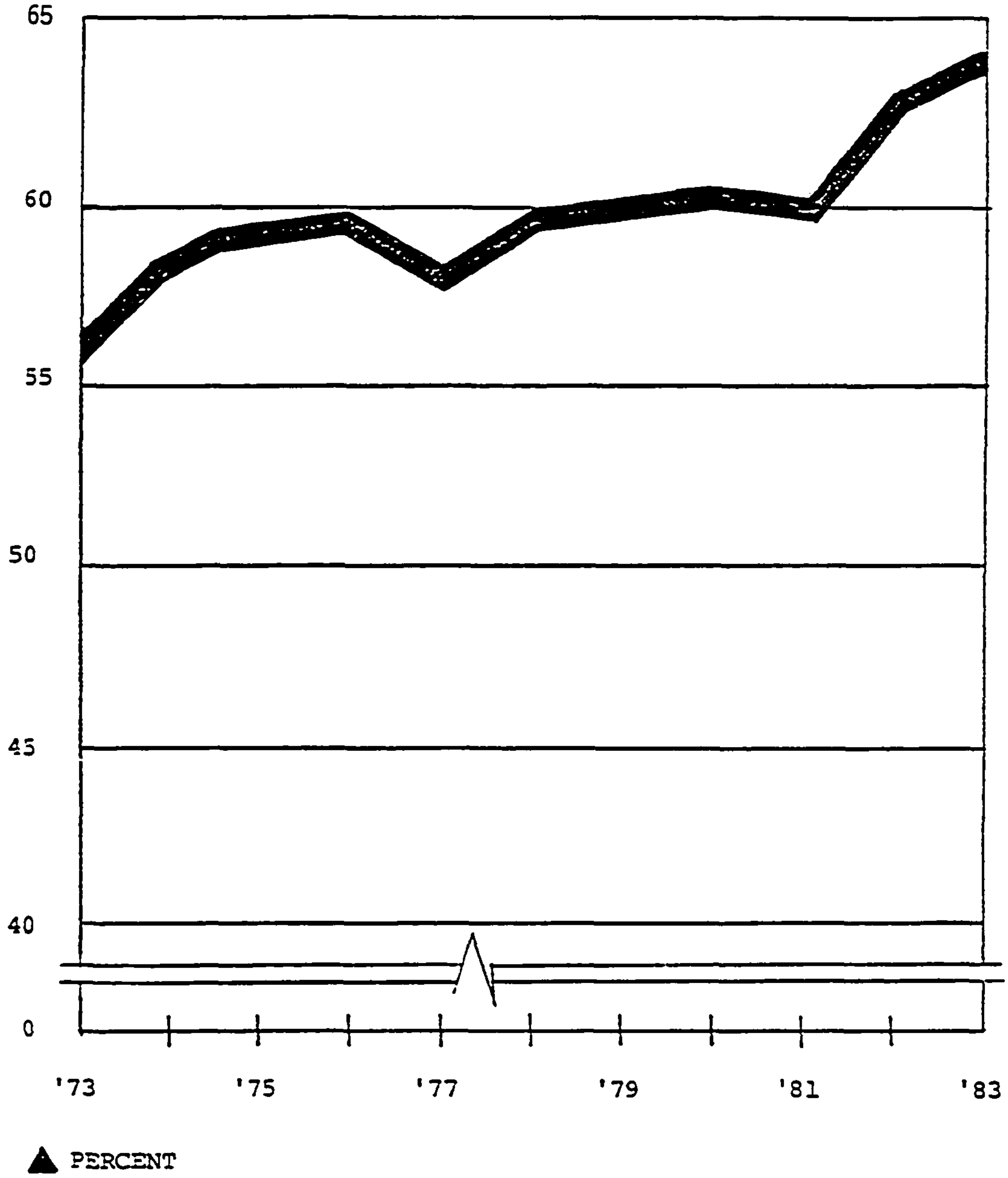
[7] Business Week, October 29, 1984

Diagram 1-2. Women's wages as a percent of men's wages.



SOURCE: U.S. Bureau of the Census. <u>Statistical Abstract of the United States</u>, 1985 (Washington, D.C.: U.S. Government Printing Office, 1984).

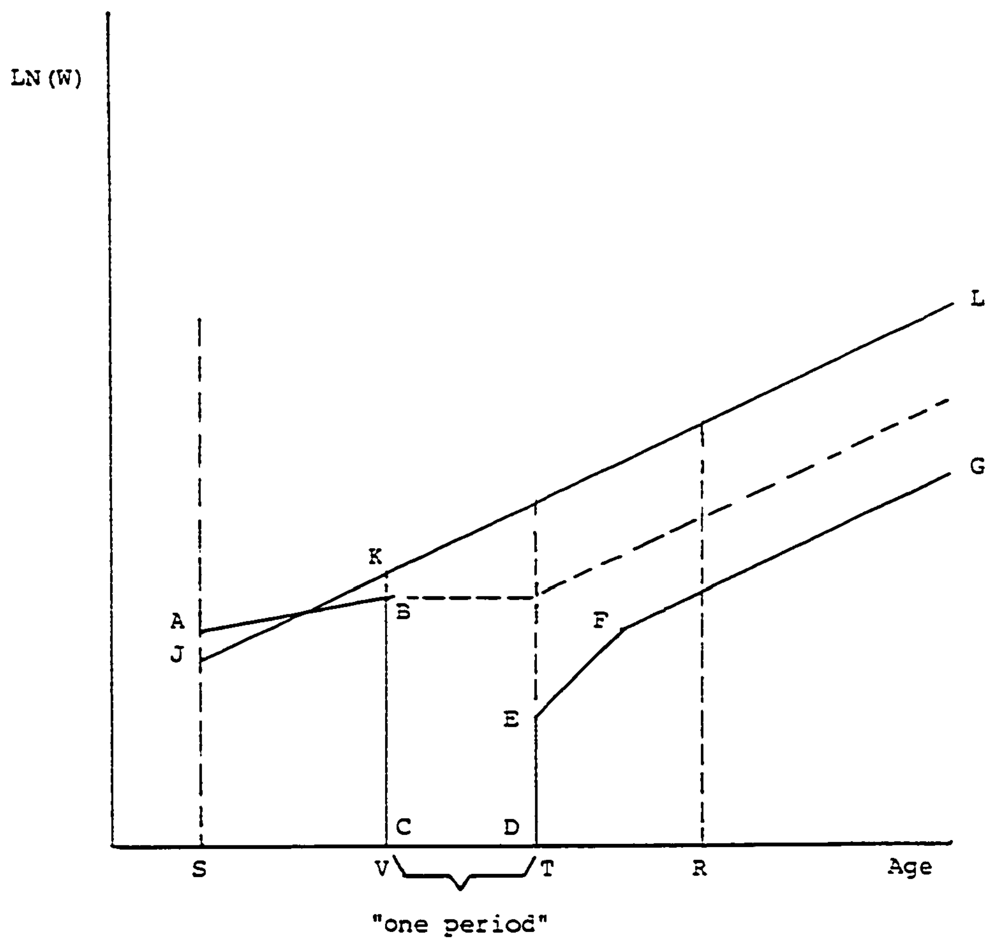
In addition to this sex-related earning gap, there also exists differences in occupational distribution between men and women. Many women entrants into the labor market have been absorbed mainly into the rapidly expanding female jobs, such as, clerical and service categories where women represent a large proportion of all employees in an occupation.

Human capital theory provides an important explanation concerning the relationship between female labor force behavior and the earnings and occupational distribution. According to human capital theory, individuals make schooling, training and other investment decisions on the basis of their expectation of future labor force participation. For example, individuals who expect to be in the labor force all of their lives have a stronger economic incentive to invest in education and job training than those who do not. According to this theory, better educated workers will receive higher wages than less educated workers, and more experienced workers will get paid more than less experienced workers. A woman, it is assumed, plans her future on the premise that she will become a member of a household and the main part of the household work will be her responsibility. Based on this future expectation, she will choose an education and an occupation that makes it possible to combine home work and market work. Human capital theory, therefore, predicts that women will acquire less schooling and less training than men. Furthermore, periods of absence from the labor force could result in the depreciation of skills that are relevant for her future employment. Thus, a woman chooses to take up a job requiring lower skills and being paid less.

Objective

There are certain events in the life of a female worker such as marriage, child bearing, following a husband to a different region, divorce, etc., which may cause her to interrupt her career. This fact makes the work history pattern of women different from that of men. A typical male pattern is to complete formal education and then stay continuously in the labor force. The married female's pattern is often characterized by discontinuity and interruption. They tend to enter the labor force after completing school, leave upon getting married or when the first child is born, and return in later years or leave and reenter employment several times in response to the needs of their families. As a result of these interruptions, not only do women experience different rewards but their future participation itself would also be influenced by it. This difference between work patterns of men and women can be summarized in Diagram 1-3. The straight line JKL is age earning profile of a continuous worker. This represents a work pattern of a typical male. Because men view their careers in long-term perspective, they are more likely to invest early in education and on-the-job training that pay off later in higher earnings. The kinked line ABCDEFG is the

Diagram 1-3. A graphical representation of interrupted career.



NOTE: This diagram is based on Figure 1 in J. Mincer and H. Ofek, "Interrupted Work Careers: Depreciation and Restoration of Human Capital," Journal of Human Resources 16 (Winter 1982), p. 6.

age-earning profile of an intermittent worker which could very well represent a work pattern of a married woman. As a young woman may expect to have future spells of interruption and thus fewer working years, she might initially invest less in education and training. Therefore, this individual will start at a higher-paying job but with lower training. The difference between the slopes of AB and JK is due to differences in the rate of investment in human capital. Expectation about future participation will determine the amount of current investment in human capital as well as the kind of human capital.

The interruption would normally reduce the earning power and thus the future participation of the individuals. Wages at the point of labor force withdrawal is equal to BC. Wages at the reentry point is equal to DE. DE is less than BC. Furthermore, the duration as well as the number of interruptions may influence the extent to which the earnings are reduced. By the same token, interruption also effects future participation through human capital investment which the individuals accumulate through experience. Labor force participation increases the amount of human capital by increasing the skill through on-the-job training. Thus, participation affects future wages which, in turn, affects future participation. After returning to the labor force, wages might grow similar to EFG. However, they will always be lower than the earnings of a continuous worker.

This research is an attempt to estimate the effects of employment interruption on the labor force participation rate as well as on the earning power and the earning growth of married females.

Methodology and Data

A survey of the few existing empirical studies of women's interrupted work patterns enables one to conclude that the current state of estimation technique is satisfactory in terms of estimation of changes in wages only. However, there exists an interdependence between lifetime plans of labor force participation and earning power. In order to estimate a reliable effect of interruption on earnings and work careers of married women, earnings and labor force participation must be treated simultaneously. Another important factor which has to be treated properly in this kind of estimation is heterogeneity. Individuals also differ in certain unobservable traits such as ability, motivation and propensity to work. Since all of these variables affect the person's market wages and labor force participation, they have to be controlled properly in the analysis. Any estimation technique which is based on the assumption that all women in a particular group are homogeneous, will fail to be accurate. Finally, the sample selection problem which leads to biased estimates must be dealt with.

In the absence of an existing model that analyzed wages and participation jointly with special attention paid to heterogeneity and selectivity bias, it became evident that in order to estimate accurately the effects of interruption on wages and labor force participation of the married female, a specific model had to be developed. Thus, the dynamic model specified in Chapter III was developed to deal with the simultaneous nature of the problem. This model is based on dynamic labor market theories. To estimate the model, the mature women cohort of the National Longitudinal Survey (NLS), from 1967-1979, was used and only married women were included. This sample was of 5,083 women who, in 1967, were 30 to 44 years of age. A large majority of these women have been re-interviewed nine times between the period 1967-1979.

Plan of Study

In Chapter II an overview of theoretical and empirical research on labor supply is presented. This is followed by a survey of literature about female labor force participation and related issues. The most recent existing research relevant to the issue of this study have been reviewed and comments have been offered. In Chapter III, the econometric model is presented. Chapter IV contains a description of the data which is used to estimate the model. Chapter V reports the empirical results and, finally, Chapter VI summarizes the research and outlines the major conclusion.

CHAPTER II

SURVEY OF LITERATURE

This chapter is divided into four major sections. The first section consists of a theoretical description of labor supply as well as an empirical survey. The second section provides an investigation of female labor supply. Recent trends in labor force participation of women, particularly in those of married females, have been analyzed and several explanations for these changes have been provided. The third section deals with two specific issues concerning working women: (1) male-female wage differentials and (2) occupational segregation. Statistical reports as well as empirical findings of other studies, confirm the persistence of these issues. The fourth section is concerned with the two different theories, discrimination and human capital, that are used to explain these specific issues. According to human capital theory, the most important factor influencing individual earning is the continuous acquisition of work skills on the job therefore a career which lacks continuous acquisition of work skills results in diminished individual earning. The remainder of the fourth section is devoted to an examination of all relevant published evidence on the issue.

Theoretical Analysis of the Labor Supply

The amount of labor supplied by a given population can be defined in two ways. The first is the number of hours people who are willing to work per week or year while they are in the labor force. The second is the labor force participation rate, or that part of the population employed or seeking employment.

In the United States, the information on the labor force is gathered through the Current Population Survey conducted monthly by the U.S. Census Bureau. In the survey, 60,000 households provide answers to questions such as whether any of the members were working, looking for work, or attending school during the survey week. Using data from such questions, the labor force is measured.

The labor force consists of all noninstitutional persons 16 years of age and older who are either "employed" or "unemployed." The term "employed" refers to persons who, during the survey month did any full time or part time work for pay or profit, or did 15 hours or more of unpaid work on a family farm or business, or "with a job but not at work." The latter refers to persons who did not work and were not looking for work, but had a job from which they were temporarily absent. The term "unemployed" refers to persons who did not work at all during the survey month but have been actively seeking work; were waiting to report to a new job within the next 30 days; or were laid off from a job. Table 2-1

TABLE 2-1

EMPLOYMENT STATUS OF THE NONINSTITUTIONALIZED POPULATION 16 YEARS AND OVER: ANNUAL AVERAGES FOR SELECTED YEARS (NUMBER IN THOUSANDS)

		Total Labor Forces Including Armed Forces		Civilian Labor Force						
					Employed			Unemployed		
Year	Total Noninstitutional Population	Number	% Non-Institutional Population	Total	Total	Total	Non-Agricultural Industries	Number	% of Labor Force	Not in Labor Force
1950	106,645	63,858	59.9	62,208	58,290	7160	51,752	3288	5.3	42,787
1955	112,732	68,072	60.4	65,023	62,171	6449	55,718	2852	4.4	44,660
1960	119,759	72,142	60.2	69,628	62,778	5458	60,318	3852	5.5	47,617
1965	129,236	77,178	59.7	74,455	71,088	4361	66,726	3366	4.5	52,058
1970	140,182	85,903	61.3	82,715	78,627	3462	75,165	4088	4.9	54,280
1975	153,449	94,793	61.8	92,613	84,783	3380	81,403	7830	8.5	58,655
1980	166,246	106,821	64.3	104,719	97,270	3310	93,960	7448	7.1	59,425

SOURCE: G. Moore and Randyle D. Elkin, Labor and the Economy (Cincinnati, Ohio: South-Western Publishing Co., 1983) p. 19.

presents the data relevant for this study on labor force.

A second concept used to measure labor supply is the labor force participation rate (LFPR). The labor force participation rate is usually broken into groups on the basis of sex, race, and age as shown in Table 2-2.

The usual theory of labor supply involves a process in which the individual worker allocates the time between labor and leisure. This process is often analyzed by using neo-classical consumer demand theory. According to this theory, an individual maximizes utility from both leisure and income by choosing the optimal allocation of time between these two sources subject to the constraints of one's earning capacity and total available time. It is assumed that income is not an inferior good. The Slutsky equations, derived from the first and second order conditions, are used to analyze the amount of labor the individual would supply as wages increase. A wage rate change has two opposing effects on the quantities of labor a person is willing to offer to the market: the "substitution effect" and the "income effect." The former, which is positive, means that a wage rate increase causes an increase in the value of additional hours of leisure relative to work. It thus induces the individual to take less leisure while substituting more work. The income effect on the other hand is negative. This suggests that the wage increase will increase the individual's affluence and result in an increase in purchase of all goods, including leisure.

TABLE 2-2

CIVILIAN LABOR FORCE PARTICIPATION RATES FOR PERSONS 16 YEARS OF AGE AND OVER: BY RACE, SEX, AND AGE ANNUAL AVERAGES FOR SELECTED YEARS

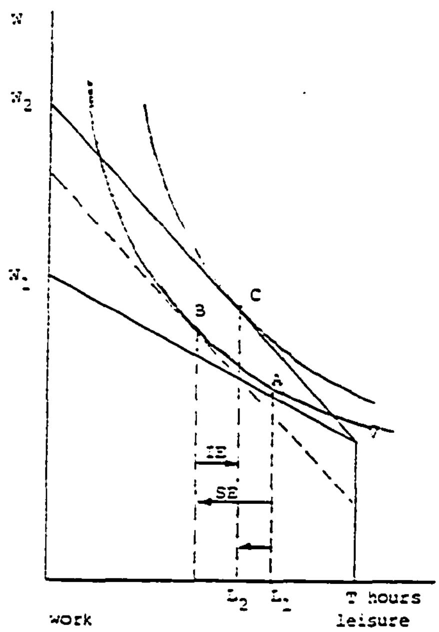
Race and Sex	Total	16-19 Years of Age	20 Years of Age and Over
Nonwhite			
Male			
1955	85.0%	60.8%	87.8%
1960	83.0	57.6	86.2
1970	76.5	47.3	81.4
1980	70.8	43.3	75.1
Female			
1955	46.1%	32.7%	47.5%
1960	48.2	32.9	49.9
1970	49.5	34.0	51.7
1980	53.4	35.9	55.8
White			
Male			
1955	85.4%	58.6%	87.5%
1960	83.4	55.9	86.0
1970	80.0	57.5	82.8
1980	78.3	63.8	79.9
Female			
1955	34.5%	40.7%	34.0%
1960	36.5	40.3	36.2
1970	42.6	45.6	42.2
1980	51.3	56.4	50.8

SOURCE: G. Moore and Randyle D. Elkin, Labor and the Economy (Cincinnati, Ohio: South-Western Publishing Co., 1983) p. 20.

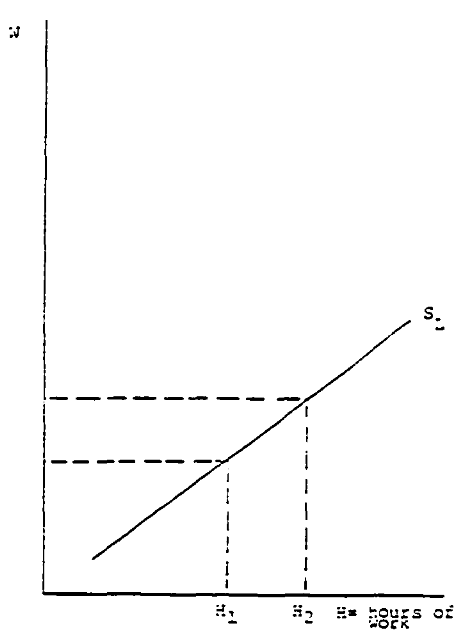
Normally, as wages increase, both the substitution and income effects will be present. The labor supply response to this wage increase will be the sum of these two opposite effects. The net effect depends on which effect is stronger. If the substitution effect dominates the income effect, the individual's labor supply curve will be positively sloped, i.e., the wage rate increase brings about an increase in the hours one is willing to work. On the other hand, if income effect outweighs the substitution effect, the labor supply curve will be negatively sloped, which suggests that the wage increase has resulted in a decline in hours of work. This theoretical framework is illustrated in Diagram 2-1 and 2-2. In Diagram 2-1, the substitution effect outweighs the income effect and supply curve of labor is upward. Theoretically, it can be expected that for individuals with lower levels of either participation or wages the labor supply curve will be positively sloped. In Diagram 2-2, the income effect dominates the substitution effect causing the labor supply curve to be downward sloping. This represents a case of an individual who has a high rate of participation or receives high wages. Nevertheless, the net impact of these two effects on labor supply is an empirical question which must be addressed to augment economic theory.

Historically, in the United States as general wage rates have increased the average hours worked per week have declined. This suggests that for the population as a whole

Diagram 2-1. The graphical representation of income and substitution effects of a change in real wage rate (Substitution effect outweighs income effect).

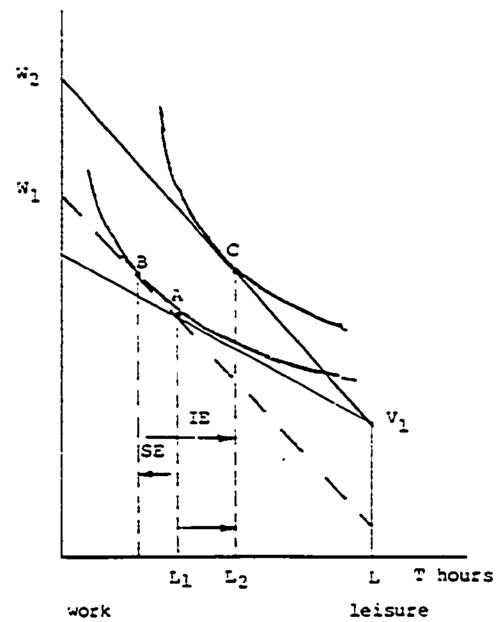


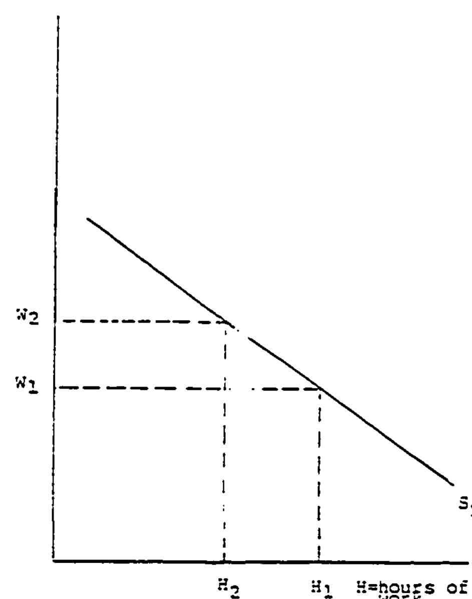
SE outweighs IE



LS curve is upward sloping

Diagram 2-2. The graphical representation of income and substitution effect of a change in real wage (income effect outweighs substitution effect).



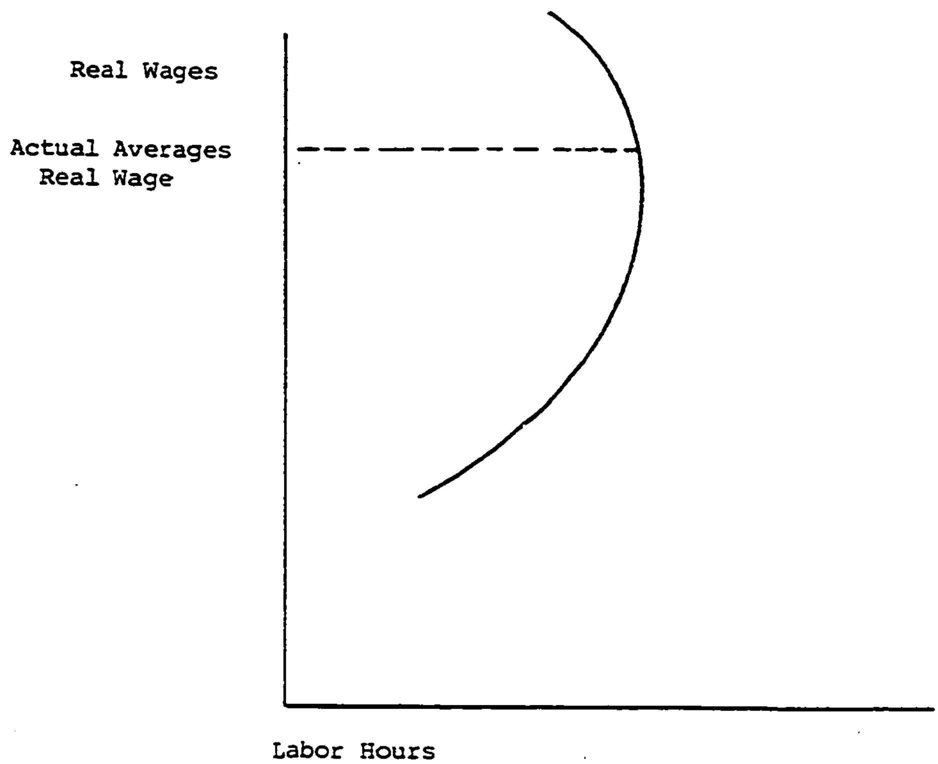


IE outweighs SE, thus LS curve is downward sloping.

the income effect has dominated the substitution effect which resulted in the development of the backward bending individual labor supply curve (Diagram 2-3). A backward bending labor supply curve suggests that at lower real wage rates, the substitution effect dominates the income effect while at higher real wage rates, the income effect outweighs the substitution effect. As mentioned before, these studies indicate that as real wages have gone up, the hours worked per week have decreased since 1900. This represents actual observation of behavior on the part of the population as a whole. However, for the female participants in the labor force, real wage rate increases have resulted in increases in the quantities they are willing to work. This tendency causes the economy-wide female labor supply curve to be upward sloping.

The above described approach to an analysis of labor supply was designed as a whole. Another dimension must be added for women in the labor market. The other choice for them is the opportunity cost of home work. This fact makes it clear that the usual static model will not provide an appropriate tool to estimate female labor supply. Although males also participate in non market work, choices regarding division of labor within the home usually places greater value on a female's home work than on the male. Consequently, the traditional static labor supply model was gradually expanded and reformulated in order to explain the labor force behavior of married women within a family context.

Diagram 2-3. The economy-wide backward bending labor supply curve.



In some early models which incorporate married women's participation decisions, the income of the husband is one of the determinants of the wife's labor supply and is, in effect, assumed to be regarded by the wife as a kind of property income. The husband's labor supply in these models is independent of the earnings of other family members. Killingsworth (1981, 1983), has labeled these models "male-chauvinistic models." Mincer, in a frequently cited article published in 1962 dealt with female labor supply, regressed the labor-force participation rates of married women on the husband's income, female wage rate, educational level attained, unemployment, and the presence of small children. This kind of treatment of the wife's income as a supplement to the family's earning was replicated with some variations by Cain (1966) and Kosters (1969). The approach used was partly based on the notion that women felt greater commitment to home and family life and were less attached to the work force.

Gradually, the assumption of the individual as the basic decision maker was replaced by one where decisions were made by a household. Thus, the traditional model was expanded into a household production model. It also seemed appropriate to add the dimension of time because certain activities which are not compensated by wages, such as education and work within the household, then cannot be regarded as leisure. In this broad framework, the theory of labor supply is expanded to the family as the basic choice maker between leisure, work in the market, and work at home. Leisure includes recreation and time for such personal needs as eating and sleeping. Work in the market will provide the individual the income to pay for food, clothing, shelter and child care. Work at home includes all the household production such as raising children, repairs, and preparation or even the raising of food in gardens. The choice of allocating one's time in household production activities is due to the fact that both consumption and production take place at home. Thus, one's labor supply behavior is, in part, a function of productivity at home relative to that in the market place (as reflected in one's wage rate). Labor force participation is a decision based on comparing the market wage offer and the value of home productivity time (the reservation wage). If the market wage is greater than the reservation wage, the individual may participate in the labor force. A participation rate of 40 percent of a particular group of population simply means that 40 percent of that population group have market wages which are greater than their reservation wages.

A Mathematical Presentation of Joint Husband-Wife Labor-Supply Model

A family is defined to consist of two equally decided to work individuals, a male and a female. However, there may be more working members in a family. The family maximizes utility from both leisure and market goods and services by choosing the optimal allocation of time between income generating activities (work in the market place) and nonmarket production and consumption (leisure). The key parameters of labor supply, the substitution and income effect, will be derived. A model of household labor supply can be expressed as the following:[1]

A family maximizes utility such that:

$$U = U(L_m, L_f, G) \tag{1}$$

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[1]Michael Keeley, Labor Supply and Public Policy (New York: Academic Press, 1981), Chapter II.

subject to budget constraint:

$$PG = W_m \times (T - L_m) + W_f \times (T - L_f) + Y_n \qquad (2)$$

Where:

P = price of goods

W_m = male's net wage rate

W_f = female's net wage rate

Y_n = nonwage income

T = total time available in the period

PG = expenditure on market goods as services

$$L_m \leq T \qquad L_f \leq T \qquad (3)$$

Equation (2) can be rewritten as:

$$PG = W_mT + W_fT - W_mL_m - W_fL_f + Y_n$$

or

$$PG = T\ (W_m + W_f) - W_mL_m - W_fL_f + Y$$

Where:

$$PG + W_mL_m + W_fL_f = (W_m + W_f)\ T + Y_n = F \qquad (4)$$

F = full income = income from wages + nonwage income

Full income = expenditures on goods and services + expenditures on leisure

or

= earnings obtained from working all available time plus nonwage income.

Thus:

Equation (4) is the budget constraint. In order to find the optimum solutions, Equation (1) is maximized subject to Equation (4).

$$L = U(L_m, L_f, G) + \lambda[(PG + W_m L_m + W_f L_f) - (W_m + W_f)T - Y_n]$$

The first order conditions assuming an interior solution are:

$$\frac{\partial U}{\partial L_m} = \lambda W_m$$

$$\frac{\partial U}{\partial L_f} = \lambda W_f$$

$$\frac{\partial U}{\partial G} = P\lambda$$

So:

$$\frac{\frac{\partial U}{\partial L_m}}{W_m} = \frac{\frac{\partial U}{\partial L_f}}{W_f} = \frac{\frac{\partial U}{\partial G}}{P} = \lambda \qquad (5)$$

λ = marginal utility of full income. If the market wage rate (W_i) is less than the reservation wage (W_{si}), person i will not work at all, so $L_i = T$.

Then the market wage is replaced by the reservation wage:

$$W_{si} = \frac{\left.\frac{\partial U}{\partial L_i}\right|_{L_i = T}}{\lambda} \qquad (6)$$

W_{si} = reservation wage = monetary value of time in the home when all time is spent at home.

In order for there to be an interior solution $W_i \geq W_{si}$

i = m or f

$$L_i = L_i(W_m, W_f, P, F) \qquad (7)$$

Where:

L_i = demand for nonmarket time = demand for leisure

Let:

p = 1, then

$$L_i = L_i\ (W_m, W_f, F) \tag{8}$$

Because:

$F = F\ (W_m, W_f, Y_n)$ and if $W_m = 0$

if wages are constant, $dF = dY_n$,

We can rewrite:

$$L_i = L_i\ (W_m, W_f, Y_n) \qquad i = m \text{ and } f \tag{9}$$

H_i = hours of work, since $T - L_i = H_i$

Thus:

$$H_i = H_i\ (W_m, W_f, Y_n) \tag{10}$$

Where:

$$\frac{\partial H_i}{\partial W_j} = \frac{-\partial L_i}{\partial W_j}$$

And

$$\frac{\partial H_i}{\partial Y_n} = \frac{-\partial L_i}{\partial Y_n} \qquad \begin{array}{l} i = m \text{ or } f \\ j = m \text{ or } f \end{array} \tag{11}$$

The Slutsky equation can be derived as:

$$\frac{\partial H_i}{\partial W_j} = \left.\frac{\partial H_i}{\partial W_j}\right|_u + H_j \frac{\partial H_i}{\partial Y_n} \tag{12}$$

Where:

$$\frac{\partial H_i}{\partial W_j} = \text{uncompensated wage effect}$$

$$\left.\frac{\partial H_i}{\partial W_j}\right|_u = \text{compensated wage effect} = \text{substitution effect}$$

$$H_j \frac{\partial H_i}{\partial Y_n} = \text{income effect}$$

Totally differentiating the labor supply function, Equation (10), and substituting Slutsky relation, we get:

$$dH_i = \frac{dH_i}{dH_m} \cdot dW_m + \frac{dH_i}{dW_f} \cdot dW_f + \frac{dH_i}{dY_n} dY_n \qquad i = m \text{ and } f$$

So

$$dH_m = \left.\frac{\partial H_m}{\partial W_m}\right|_u dW_m + \left.\frac{\partial H_m}{\partial W_f}\right|_u dW_f + \frac{\partial H_m}{\partial Y_n}$$

$$[\, H_m\, dW_m + H_f\, dW_f + dY_n] \qquad (13)$$

and

$$dH_f = \left.\frac{\partial H_f}{\partial W_f}\right|_u dW_f + \left.\frac{\partial H_f}{\partial W_m}\right|_u dW_m + \frac{\partial H_f}{\partial Y_n}$$

$$[H_f\, dW_f + H_m\, dW_m + dY_n] \qquad (14)$$

While:

$$\left.\frac{\partial H_m}{\partial W_m}\right|_u = \frac{\partial H_m}{dW_m}$$ i.e., own compensated wage effect = substitution effect

It is assumed:

$$\left.\frac{\partial H_i}{\partial W_i}\right|_u > 0$$ substitution effect is positive (15)

Equation (15) suggests that if income is held constant, an increase in the wage rate will reduce the demand for leisure and thus increase the hours of working.

It is also assumed that:

$$\frac{\partial H_f}{\partial Y_n} < 0, \quad \frac{\partial H_m}{dY_n} < 0 \quad \text{The income effect is negative} \quad (16)$$

Equation (16) suggests that since nonmarket time (leisure) is a normal good, if income increases, holding wages constant, hours of work will go down.

Empirical Findings on the Determinants of Labor Supply[2]

There have been numerous studies of labor market behavior. Different authors have used various approaches to estimate the theoretical labor supply function $H_i = H_i\ (W_m, W_f, Y_n)$. The most common approach has been to estimate the substitution and income effects by using a linearized model

$$H_m = \alpha_0 + \alpha_1 W_m + \alpha_2 W_f + \alpha_3 Y_n + U$$

Where:

U = random error term

α_1 = uncompensated own wage effect

α_2 = uncompensated cross wage effect

α_3 = income effect

the comparison of different studies involves comparing empirical

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[2]This section is substantially drawn from Micheal Keeley, Labor Supply and Public Policy (New York: Academic Press, 1981) and Mark Killingsworth, Labor Supply (Cambridge, Mass.: Cambridge University Press, 1983).

estimates of these effects. However, in the vast number of studies, one finds much confusion concerning the proper way to estimate these parameters. As a result, there exist considerable differences amongst the different studies regarding estimates of the parameters.

Killingsworth (1981, 1983) provided an extensive survey and comparison of numerous estimates of what were considered major labor supply models. He divided the literature into two groups which he labeled "first generation" and "second generation" studies. The "first generation" literature started with the works of Schoenberg and Douglas (1937) and covered subsequent work done to the mid 1970s. Primarily they utilized simple econometric techniques to derive income and substitution effects. These studies produced a vast range of empirical results which were summarized as shown in Tables 2-3 and 2-4. Most measures of the male uncompensated or gross wage elasticities were somewhere between 0.00 and -0.40. In contrast for women it is 0.50 or 0.60 which was fairly large. Substitution elasticities refer to substitution (compensated) effects of wage changes measured in elasticity form. For males, the own-substitution elasticity is usually between about 0.00 and 0.36. However, some studies find it either to be smaller or even negative. The same result for females was mostly significantly positive and ranged between 0.10 and 2.00. The main problem here was that such estimates were derived from samples only of working women. The estimates

TABLE 2-3

LABOR SUPPLY ELASTICITY ESTIMATES FOR MEN

Study	Wage Elasticity: Uncompensated	Wage Elasticity: Compensated	Total Income Elasticity
Ashenfelter & Heckman (1973)	-0.15	0.12	0.27
Atrostic (1982)			
Controlling for job characteristics			
Homothetic translog (OLS)	-0.05	-0.11	0.06
Homothetic translog demand system	0.25	1.26	-1.01
Basic translog demand system	0.34	0.97	-0.63
Boskin (1973)			
Whites	-0.29	0.12	-0.41
Blacks	-0.20	0.00	-0.20
Fleisher, Parsons, & Porter (1973)			
All	-0.19	0.04	-0.23
Excluding transfer recipients	-0.27	-0.19	-0.08
Garfinkel (1973a)	0.0	0.0	0.0
Greenberg & Kosters (1973)	-0.09	-0.20	-0.29
Hall (1973)			
Whites	-0.18 to -0.45	0.60	-0.24 to -0.51
Nonwhites	-0.22 to -0.38	-0.10	-0.12 to -0.28
Hill			
Whites below poverty line	-0.21	0.47	-0.68
Blacks below poverty line	-0.08	0.27	-0.35
Whites above poverty line	-0.34	0.52	-0.86
Blacks above poverty line	-0.32	0.56	-0.88
Kniesner (1976a)			
With working wife	-0.17	-0.16	-0.01
With nonworking wife	-0.06	<0.0	<0.0
Wales & Woodland (1976)	-0.11 to -0.12	n.a.	<0.0
Wales & Woodland (1977)			
With children	-0.22 to -0.27	n.a.	n.a.
Without children	0.00 to -0.07	n.a.	n.a.

TABLE 2-3-Continued

Study	Wage Elasticity		Total Income Elasticity
	Uncompensated	Compensated	
Masters & Garfinkel	-0.04	0.08	-0.04
H. Rosen (1978)			
Stone-Geary utility	-0.02	1.00	-1.02
CES utility	-0.42	0.14	-0.55
Dickinson (1979)	-0.09 to -0.12	0.14 to 0.38	-0.26 to -0.49
Brown, Levin & Ulph (1976, 1981)[a]			
All	-0.11 to -0.26	0.16 to 0.22	-0.30 to -0.46
Nonworking wife	-0.09 to -0.31	0.22 to 0.48	-0.35 to -0.73
Layard (1978)[a]			
Single-equation model	-0.13	-0.08	-0.05
Husband-wife model	-0.12	-0.09	-0.03
Atkinson & Stern (1980)[a]			
LES model	-0.15	-0.21	0.06
LES with time allocation model	-0.16	-0.09	-0.07
Atkinson & Stern (1981)[a]			
Single-equation model	-0.15	-0.16	0.01
LES model	-0.21	-0.29	0.08
Stone-Geary utility	-0.23	-0.30	0.07
Ashworth & Ulph (1981)[a]			
Family utility-family budget constraint model	-0.03	2.17	-2.21
Individual utility-family budget constraint model	-1.00	0.47	-1.47
Glaister, McGlone & Ruffel (1981)[a]	-0.02	-0.06	0.04
Gayer (1977) ("family heads")[b]	-0.45	-0.27	-0.18

SOURCE: Mark R. Killingsworth, Labor Supply (Cambridge, Mass.: Cambridge University Press, 1983), pp. 119-121.

NOTE: Unless otherwise noted, all estimates refer to data for United States.

n.a.: Not available

[a] Refers to data for United Kingdom

[b] Refers to data for Israel

TABLE 2-4

LABOR SUPPLY ELASTICITY ESTIMATES FOR WOMEN

Study	Wage Elasticity: Uncompensated	Wage Elasticity: Compensated	Total Income Elasticity
Boskin (1973)			
Whites	0.19	0.29	-0.10
Blacks	0.70	0.77	-0.07
Hall (1973)			
Whites	4.60	2.50	2.10
Blacks	1.66	0.26	1.40
Gramm (1974)	0.85	0.85	0.0
Gramm (1975)	0.68	0.68	0.0
Wales & Woodland (1976)	0.01 to -0.02	n.a.	<0.0
Wales & Woodland (1977)			
With children	-0.03 to 0.35	n.a.	n.a.
Without children	0.20 to 0.27	n.a.	n.a.
Masters & Garfinkel (1977)	0.43	0.49	-0.06
H. Rosen (1976a)			
Hours per year	1.90	n.a.	n.a.
Hours per week	1.30	n.a.	n.a.
H. Rosen (1978)			
Stone-Geary utility	1.06	1.52	0.47
CES utility	-0.16	0.26	-0.42
Leuthold (1978b)			
Whites	0.05 to 0.16	0.06 to 0.18	n.a.
Blacks	0.10 to 0.13	0.09 to 0.13	n.a.
Layard (1978)[a]	0.66	0.80	-0.19

TABLE 2-4--Continued

Study	Wage Elasticity: Uncompensated	Wage Elasticity: Compensated	Total Income Elasticity
Greenhalgh (1980)[a]	0.66	0.80	-0.19
All	0.72	0.80	-0.00
Paying standard rate of tax	0.64	0.72	-0.08
Ashworth & Ulph (1981)[b]			
Family utility-family budget constraint model	-1.18	-1.14	-0.04
Individual utility-family budget constraint model	-4.46	-5.02	-0.56
Glaister, McGlone & Ruffel (1981)[a]	0.09	0.09	0.00
Gayer (1977) ("spouses")[b]	-0.50	-0.27	-0.23

SOURCE: Mark R. Killingsworth, Labor Supply (Cambridge, Mass.: Cambridge University Press, 1983), pp. 122-123.

NOTE: Unless otherwise noted, all estimates refer to data for United States.

n.a.: Not available

[a]Refers to data for United Kingdom

[b]Refers to data for Israel

for elasticity of labor supply with respect to property income for males in most studies was usually weak, negative and in between 0.000 and -0.160, but in some studies it was almost zero. For females, this magnitude was generally negative and much greater. In general, it ranged between about -0.10 and -2.00. Again, the sample selectivity bias in the estimation of labor supply for women was evident. The estimates of this magnitude made it reasonable to suppose that leisure was a normal good.

Altogether, the results from the first generation studies showed that for the male participants of labor force, the labor supply was much less sensitive to wage changes than is female labor supply. This relative insensitivity to changes in the wage caused the male labor supply curve to become negatively sloped or gently backward bending at some wage levels. On the other hand, female labor force participation was more sensitive to changes in wages. On the whole, those studies suggested leisure was a normal good for both men and women.

Killingsworth, in pointing to the large range of estimates, raised the questions regarding the adequacies of the results, particularly whether or not they could be used as a firm basis for establishing analytical or policy decisions. He then discussed several problems as causes for this wide range of different estimates of elasticities found in the "first generation" studies. These are problems of (1) measurement of labor supply variables, (2) sample selection, and (3) simple econometric techniques.

Keeley (1981), by comparing the empirical estimates of the substitution and income effects obtained in several studies, concluded that the striking feature of the existing body of literature was the extreme diversity of their estimates of the two effects. After reviewing theoretical and empirical research on the determinants of labor supply, he also provided explanations for the diversity of existing estimates.

There were several reasons for such a wide range of estimates of parameters provided by different studies of labor supply. One reason was due to the fact that researchers have used different measures of labor supply. A problem arose because of the differences between "time" variable (hours worked) and the "participation" variable (the probability of being employed). Although the probability of employment function differed from the labor supply function, in some studies labor force participation had been used as the measure of labor supply. The estimates of wage elasticities obtained from studies based on labor force participation as a measure of labor supply will differ from the one obtained from studies based on hours of work. As a matter of fact, it would not be appropriate to use results designed from estimation of participation measures of labor supply to analyze the income and substitution effects, mainly because these effects are relevant to time measures rather than participation measures.[3]

The nature of the problem of measurement lay in the kind of data being used. A limiting factor in most early studies has been the usage of cross-sectional data instead of longitudinal information from panel data. Another general problem regarding the measurement of the quantity of labor supply is the fact that in the first generation models, an individual allocates the total time period between leisure and market goods while there is no specification of time. It could be any unit of time ranging from a day to the entire lifetime. But people are not actually indifferent between the type of leisure they consume and when it is consumed. Hanoch (1980) points to this important issue and shows that the different dimensions of labor supply are not interchangeable, i.e., weeks of work and hours of work are not perfect substitutes. Based on the argument that leisure during non-working weeks and working weeks are two distinct commodities, he developed a theoretical multivariate model of wages, labor force participation, and annual hours and weeks worked.

Some of the earlier models suffer from selectivity bias due to the fact that some researchers tend to exclude observation if the person is not working. Selectivity bias is shown graphically in the Diagram 2-4. An individual will

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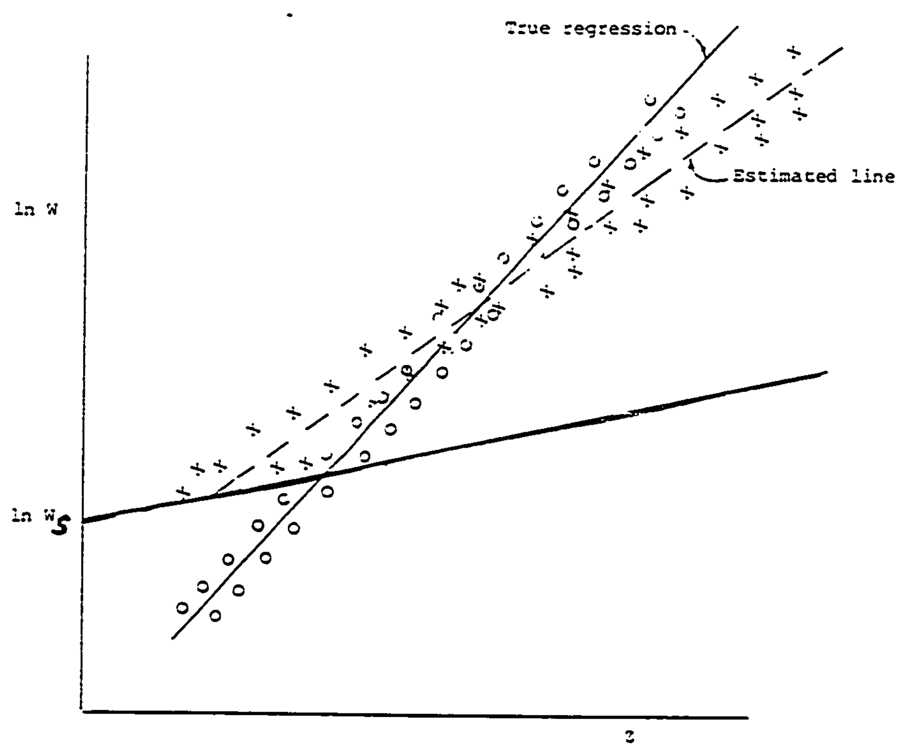
[3]For further detail on this point see Mark R. Killingsworth, Labor Supply (Cambridge, Mass.: Cambridge University Press, 1983) and Yoram Ben Porath, "Labor Force Participation Rates and the Supply of Labor," Journal of Political Economy 81:3 (May/June 1973), pp. 697-704(a).

Diagram 2-4. Selectivity bias.



participate in the labor force only when the market wage is larger than the shadow wage. In Diagram 2-4, W_s is the shadow wage. Thus, at wages above W_s, individuals will work. Restricting observations to those who are working and excluding nonworkers means that the sample is limited to persons who, in terms of Diagram 2-4, have data points that lie above the W_s line. All data points below W_s are excluded because they refer to persons who are not working. Now, simple regression involves drawing a line through the scattered data points. It can be seen in Diagram 2-4 that the line estimated by excluding the nonworkers will have a smaller slope than the true line which includes all the workers. This is due to selectivity bias. That is, the regression of a sample selected directly on the basis of dependent variables will result in biased estimates. In order to avoid this bias, persons with zero hours of work must be included in the analysis.

As a consequence of these problems, conventional models were extended and their simplified features were modified in order to be more representative of real life situations and to provide more reliable estimates. Gradually a variety of new models using more sophisticated econometric methods appeared and rapid progress was made in solving the existing problems surrounding the issue of labor force supply and its behavior.

More recent works (studies made after 1975), have a dynamic framework. Killingsworth (1983) labled them "second generation" models. Unlike the traditional models, in the second-generation literature, the individual's past histories and future possibilities of individuals are explicitly recognized. That is, all the decisions concerning labor force participation are taken with an eye to the future. Also, any decision concerning allocation of time between leisure (nonmarket) and market activity is distributed throughout the life cycle of the individual. Life cycle models have been developed by Heckman (1974b) Heckman and MaCurdy (1980), Ghez and Becker (1975), MaCurdy (1980), and others. Furthermore, the new models have incorporated human and nonhuman capital accumulation as well as occupational choice and mobility into the labor-leisure analysis. The central issue in human capital models is that individuals by investing in themselves and thus foregoing some expenditure, can increase their future wages. Human capital models have been developed by Becker (1975), Mincer (1974), Ben Porath (1967, 1973), Rosen (1972), Heckman (1974a, b) and others.

Labor Force Participation of Women

Generally speaking, the labor-force participation rates vary on the basis of sex, age, and race groups of the population. The participation rate is generally higher for men than for women, but within each sex group there is also variation by age. Perhaps the most striking change taking place in the labor market currently is the considerable increase in the number of female labor force participants, particularly married females. As a consequence, labor economists stopped treating the labor supply behavior of women in an unsatisfactory fashion. Instead, the labor force participation of married women has been analyzed more intensively than that of other population groups.

Table 2-5 shows the evolution of participation rates of women over the period of 1951-1981. What is striking at first glance is the increasing trend in the proportion of women working outside of the home.

TABLE 2-5

ANNUAL AVERAGE LABOR FORCE PARTICIPATION RATES

	1951	1961	1971	1981
Total	59.3	59.3	60.2	63.9
Men	88.2	85.7	82.1	79.0
Women	34.0	38.0	43.3	52.1

SOURCE: U.S. Department of Labor, Employment and Training Report of the President. 1951-1983, Washington, D.C.: Government Printing Office.

Along with the increase in rates of female participation in the labor force, there has been a corresponding change in the theoretical analysis of female labor supply, followed by an increasing tendency of researchers to estimate female labor supply. As a result of this new interest, certain issues concerning female labor force participation have been brought up. This change is clearly reflected in the econometric models developed by labor economists. In early models, the labor income of the husband is one of the determinants of the wife's labor supply and is, in effect, assumed to be regarded by the wife as a kind of property income. It was realized that the simple labor supply model based on the consumer utility optimization based on two goods (labor, leisure) theory may have been adequate to explain the determinants of labor force participation of men only. The basic assumption was a choice between work and leisure. This may be so for some men, but it may not be so for most women, especially for married women. Thus, it is not surprising that the first generation studies of women in the labor force, even though very few, were not quite accurate. As the problems were recognized regarding measurement of the determinants of labor force participation of women, techniques were improved. Thus, in second generation models, female labor supply was treated differently. However, there still exists considerable need for more empirical analysis to focus on women in the labor market.

Married Female Labor Participation Rate

Perhaps the single most important change taking place in the labor market since World War II has been the tremendous increase in the percentage of married women working. Table 2-6 shows this growth in the labor force participation of both single and married women since 1900. According to these figures, while the rate of labor force participation for all females increased from 20.6 percent to 51.5 percent since the turn of the century, the participation rate of single females increased by 40 percent while for married females it rose by about 80 percent. This is, indeed, a large change. It reveals the fact that amongst all categories of women the increased tendency of married women to enter the labor force has been the most important factor in the growth of the female labor force. Furthermore, according to government figures in 1983, 56.6 percent of women with children under age 18 were working outside of the home, compared to 48.0 percent of women with no children under 18.[4]

TABLE 2-6

LABOR FORCE PARTICIPATION RATES OF FEMALES OVER 16 YEARS OF AGE BY MARITAL STATUS, 1900-1979 (PERCENT)

Year	All Females	Single	Widowed, Divorced	Married
1900	20.6(100)	45.9(100)	32.5(100)	5.6(100)
1910	25.5(124)	54.0(105)	34.1(105)	10.7(191)
1920	24.0(117)			9.0(161)
1930	25.3(123)	55.2(120)	34.4(106)	11.7(209)
1940	26.7(130)	53.1(116)	33.7(104)	13.8(246)
1950	29.7(144)	53.6(117)	35.5(109)	21.6(386)
1960	35.7(173)	42.9(94)	38.7(119)	30.6(546)
1970	41.6(202)	50.9(111)	39.5(122)	39.5(705)
1979	51.1(248)	62.7(137)	43.1(133)	49.4(882)

SOURCE: Ronald G. Ehrenberg and Robert G. Smith, Modern Labor Economics (Glenview, Illinois: Scott, Foresman and Company, 1982), p. 143.

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[4]Elizabeth Maret, Women's Career Patterns, (Lanham, MD: University Press of America, 1983), p. 6.

Reasons Behind Rising Female Participation

There are several factors which have contributed to increases in the number of women who work for pay. One major reason is the rise in the level of education attainment of women. In 1950 the median years of education of women 25 years or older was 9.6. By 1979 this figure rose to 12.5.[5] The number of women who received bachelors degrees in male-dominated fields increased considerably during the period 1976-1982. There was a 531 percent increase in the number of women receiving degrees in computer sciences, 524 percent in engineering and 200 percent in business.[6] During this period, the proportion of degrees held by women in law grew from 7 to 33 percent, and in medicine from 9 to 25 percent. Obviously, the more education a woman has the greater will be the possibility she will work for pay. Furthermore, more education increases a person's access to more interesting and more pleasant jobs.

Another reason for the increased number of employed females is the change in attitude of women as well as that of their husbands towards working. As more women approve of women woking outside the home, the number of females in the labor force will increase too. This is also true as far as the importance of the husband's approval towards his wife's

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[5]Daniel Hamermesh and Albert Reese. The Economics of Work and Pay (New York: Harper and Row Publishers, 1984), p. 13.

[6]Carol Bodger, "Salary Survey" Working Woman, January 1972, p. 65.

employment is concerned. Naturally, as the husband feels more positive about his wife's career, the likelihood of her staying in the labor force will increase. This is true because most women take their husbands' attitudes into consideration when they decide to seek employment. As a result of the change in attitude, the attachment of married women to the labor force has increased.

Another factor is the decline in fertility and decreases in the number of children born to the families. In the period 1955-1959, the adjusted lifetime fertility rate per adult female was 3.7 children. By 1979, the fertility rate dropped to 1.9 children ever born.[7]

The proportion of married women working in the market is also effected by the advances in technology which could reduce the amount of time spent doing household duties. As Table 2-7 indicates, most housework is done by women and not by men. Thus, any kind of labor-saving equipment which would facilitate the performance of housework or even make it more pleasant will increase the likelihood of women seeking employment.

A large proportion of women enter the labor force in order to assist financially. During the last decade the two-income family has become the American norm. Women who lost their husbands will face the hardship of heading a family

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[7]Daniel Hamermesh and Albert Reese, The Economics of Work and Pay (New York: Harper and Row Publishers, 1984) p. 14.

TABLE 2-7

DAILY HOURS SPENT ON HOUSEHOLD WORK

	Men	Women: Employed	Women: Not Employed
All food activities	.2	1.6	2.3
Care of the house	.6	1.2	1.6
Care of clothing	--	.9	1.3
Care of family members	.4	.8	1.8
Marketing and record keeping	.4	.8	1.0
TOTAL	1.6	5.3	8.0

SOURCE: Bettina Berch, The Endless Day: The Political Economy of Women and Work (New York: Hartcourt Brace, Jovanovich Press, 1982), p. 92.

alone. Between 1971 and 1976 the number of divorced women heading families increased by 50 percent and the number of separated women by 12 percent, according to the U.S. Bureau of Census 1972 and 1977.[8]

Furthermore, the expansion of employment in the service sector has had considerable effect on rising trends in the female labor force participation rate and the decline of the male participation rate during the last decade.

Shapiro and Shaw (1983), by using data from National

[8]Lois B. Shaw, Unplanned Careers: The Working Life of Middle Aged Women (Lexington, Mass.: Lexington Books, 1983), p. 109.

Longitudinal Surveys of Work Experience, have estimated to what extent the different factors have contributed to the growth of married female participation rate from 40 percent in 1967 to 54 percent in 1978. Their findings indicate that changes in the characteristics--greater educational attainment, higher wages, smaller families, and reductions in the proportion of households with preschool children--are responsible for half of the increase in labor force participation of married females. The growth of husbands' income moderated this increase. The other fifty percent of growth was due to behavioral changes which were less quantifiable. These were due to greater social acceptance of women working, attitudinal changes, and improved opportunities for advancement.

Specific Issues Concerning Working Women

As more progress has been made in labor supply studies, labor economists in recent years have devoted considerable attention to the special issues associated with female labor participation. More specifically, the two most important issues which are the concerns of working women are (1) the existing male-female earning differential and (2) occupational segregation.

A firmly accepted assumption in the current discussions on economic status of women is the claim that substantial and significant differences exist between men and women in terms of their earning and occupations. A perusal of existing statistics and appropriate literature, particularly empirical research, provides a wide array of evidence to substantiate such sex-related differences. Mincer and Polacheck (1974) estimated the observed earning ratio[9] for married women as .66. Corcoran (1978) estimated the earning ratio as .62. Sandel and Shapiro (1978) reported their estimate of observed earning ratio to be equal to .66, using the longitudinal survey for white married women.

Statistics show how far women have or have not come. All of these numbers strongly indicate that the gender gap in employment is real. Women make up 52 percent of the work force, but they hold only 20 percent of the professional and managerial jobs.[10]

The figures in Table 2-8 reveal that although more women have entered the labor force during the last decade, the wage gap remains. Furthermore, as may be seen in Tables 2-9, 2-10, and 2-11, that while the problem of male-female wage gap remains acute, there appears to have been substantial segregation in the occupation distribution of male and female. Clerical and nursing occupations comprise the largest single female job category in the country today, as may be seen in Table 2-10.

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[9] The earning ratio F/M is the average earnings of women divided by the average earnings of men. A ratio of .50 implies that women earn only half as much as men do.

[10] Carol Bodger, "Salary Survey," Working Woman, March 1984.

TABLE 2-8

ANNUAL EARNINGS RATIO FOR FULL-YEAR
FULL TIME WORKERS

Year	Women's/Men's
1955	.65
1964	.59
1967	.58
1970	.59
1973	.56
1977	.58
1980	.60
1983	.64

SOURCE: U.S. Bureau of the Census. Statistical Abstract of the United States, 1985, Washington D.C.: U.S. Government Printing Office, 1984.

Upon an examination of information in the above tables there are indications that during the period 1960-1980, even though female workers progressed into white collar jobs, particularly professional and technical ones, over half of all female workers still remain in clerical, retail sales and service occupations. These occupations, which are called "female jobs," not only provide low wages but also provide very little job authority and very few other important rewards compared to the "male jobs," i.e., occupations where employees are predominantly male.

TABLE 2-9

SAME JOB, DIFFERENT PAY

Occupation	Weekly Earnings Men	Weekly Earnings Women	Earnings Ratio % Women to Men
Physicists and Astronomers	$674.18	$166.48	24.7%
Photographers	399.36	202.05	50.6
Designers	500.67	257.09	51.3
Judges	801.64	433.19	54.0
Economists	702.56	404.84	57.6
Dentist	672.80	403.60	60.0
Financial Managers	572.93	358.96	62.7
Buyers, wholesale and retail trade (except farm products)	404.93	259.23	64.0
Purchasing Managers	625.49	405.54	64.8
Underwriters and other financial officers	534.85	348.72	65.2
Sales Representatives, financial and business	466.89	305.14	65.4
Statisticians	507.39	335.32	66.1
Architects	507.05	349.38	68.9
Supervisors, Administrators, public	458.12	320.22	69.9
Officials and Administrators, public	510.22	360.65	70.7
Public Relations Specialists	452.46		
Urban Planners	524.96	388.14	74.0
Social Workers	397.84	394.70	75.2
Computer System Analysts and Science	581.89	308.08	77.4
Editors and Reporters	407.57	454.10	78.0
Computer Programmers	502.76	321.67	80.8
Engineers	604.19	499.68	82.7
Physicians	507.86	420.84	82.9
Teachers, except college and university	405.52	350.16	86.3
Occupational Therapists	402.78	353.71	87.8
Psychologists	417.60	366.53	87.8
Lawyers	656.15	576.46	87.9
Actuaries	551.19	501.47	
Registered Nurses	403.12	401.95	99.7

SOURCE: Working Woman, January 1985, "Salary Survey."

TABLE 2-10

OCCUPATIONS WITH HIGHEST PERCENTAGE OF FEMALE WORKERS[1] IN FULL-TIME WAGE AND SALARY WORK 1981 ANNUAL AVERAGES

Occupational Title[2]	Percent Female
Secretaries, medical	100.0
Secretaries, legal	99.4
Secretaries, not elsewhere classified	99.3
Receptionists	98.0
Dental assistants	97.9
Practical nurses	97.3
Child-care workers, private household	97.3
Teachers aids, except school monitors	97.0
Sewers and stitchers	96.7
Prekindergarten & kindergarten teachers	96.5
Typists	96.4
Registered nurses	95.8
Lodging quarters cleaners, except private household	94.9
Keypunch operators	94.8
Bank tellers	94.0
Telephone operators	92.3
Maids & servants, private household	91.8
Bookkeepers	90.6
Stenographers	87.3
Child-care workers, except private household	86.7

SOURCE: Nancy Rytina, "Earnings of Men and Women: A Look at Specific Occupations," in Monthly Labor Review, April 1982.

[1]Excludes self-employed workers.

[2]Occupations listed are those in which female employment was 50,000 or more in 1981.

TABLE 2-11

PERCENTAGE OF WOMEN IN DIFFERENT OCCUPATIONS IN 1984

Field	Number of People In the Field	% Women
Accountants and Auditors	1,105,000	38.7%
Architects	103,000	12.7
Attorney	612,000	15.3
Chemist	98,000	23.3
Dentist	126,000	6.7
Physical Therapist	55,000	77.0
Purchasing Managers	82,000	23.6
Sales Managers	2,958,000	28.4
Hospital Administrator	91,000	57.0
Nurse (Registered)	1,372,000	95.8
Nurse (Licensed Practical)	443,000	97.0
Pharmacist	158,000	26.7
Physician	519,000	15.8
Economists	98,000	37.9
Educator (College and University)	606,000	36.3
Engineer	1,572,000	5.8

SOURCE: Carol Bodger, "Salary Survey," Working Woman, January 1984, pp. 67-72.

Two Approaches to Analyze the Specific Issues

As a result of the persistent inequality in both earnings and occupational distribution among male and female, considerable attention has been paid recently to these issues and substantial attempts have been made to explain the existing differences in the earnings and employment patterns of male and female. A comprehensive survey of these various explanations will provide a list of economic as well as several noneconomic causes. However, from the economists' perspectives there are two approaches in explaining the sex-related differences in earnings and occupational distributions. The first approach attributes these differences to the existence of discrimination in the labor market. A large number of books and articles written on the theories of discrimination have contributed a great deal to our understanding of the nature of the problem as well as causes and its costs. The second approach utilizes human capital theory to explain these sex-related differences in wages and employment patterns.

The pioneering work of Becker (1957, 2nd ed. 1975) was the model developed to define labor market discrimination. In the model it was explained that racial discrimination existed because certain employers, workers and consumers have a "taste for discrimination." In the case of female workers, it was argued that the differences in living, earning and proportion between men and women were derived from the preferences of male employers to minimize or to avoid certain economic transactions with women. This model is based on the principle of a firm's utility maximization rather than profit maximization in a perfectly competitive economy. Based on this principle, market equilibrium was reached when workers' wages (W) equal their marginal productivity, MP. If employers prefer to hire males in high-paying jobs despite the availability of equally productive and qualified women, they will act as if the latter were less productive than the former. That is, the wage rate for a male, (W_m) is equal to its marginal product while the female wage rate (W_f) will not be equal to its marginal product and instead will equal their subjective value to the firm. This explanation can be shown algebraically as the following:

$$W_m = MP$$

$$W_f = MP - d$$

or

$$MP = W_f + d$$

Since it is based on the assumption that both individuals are equally productive, i.e., their marginal products are equal, then

$$W_m = W_f + d$$

or

$$W_f = W_m - d$$

where d is a positive number that Becker calls the employer's discrimination coefficient. According to this theory, because of competitive market forces all individuals with tastes for discrimination would find themselves at a competitive disadvantage relative to nondiscriminators. In the long run, competition would be less in competitive industries than in monopolistic ones. In competitive markets, employers who do not discriminate make more profits by hiring equally productive but cheaper workers, and are able to grow relative to their discriminating competitors. To achieve economic survival, discriminators would be forced to stop discriminating, and thus market forces would eventually end discriminatory practices.

In an alternative neoclassical model, Kenneth Arrow (1972), has suggested that imperfect information and employer uncertainty concerning the productivity of men and women could result in sex-related earning differentials. Because of the costly nature of gathering the needed job-related information about a job applicant, employers may rely on their perceptions of the groups to which these individuals belong. Thus, if the employer has the perception that females as a group are not as efficient and productive as males, he will not hire females. This approach is based on the concept of "statistical discrimination." Statistical discrimination can occur either on the purely erroneous ground of consistent underestimation of female productive capacities or if the average productivities of men and women are actually unequal.

Individual women may be typical or atypical. However, when judged and compensated on the basis of group averages, the result will be discriminating.

Another response to the Becker model was presented by Lester Thurow (1975). Like Arrow, he was also dubious about the ability of competition to eliminate discrimination. However, his explanation for the persistence of discrimination is different. He believes that as a result of the near-monopoly economic power of white males, these forces will persist. His analysis specifically relied, not on employer ignorance, but on a real difference in the cost of hiring women for an established employer with an originally all-male labor force.

An alternative theory which gained considerable support was developed by Bergmann (1974) and is called the "crowding hypothesis." It abandons the concept of competitive labor market and introduces the idea that discrimination takes place by limiting female access to male jobs. Basically, the idea is that women are crowded into a small number of occupations by the power and preferences of men. The excess supply in "female jobs" pushes down the wage rate while the restricted supply in "male jobs" raises the wages. Hence, male/female wage differentials appear and are related to the distribution of men and women in different occupations.

Several empirical studies have provided considerable information, although sometimes contradictory, concerning to what extent the labor market discriminates against females. These attempts to quantify discrimination are certainly of great value to the understanding of the nature of the still existing problems. The labor economics literature has benefited from a large number of studies suggesting a variety of estimation methods. The starting point to measure discrimination was Becker (1957). Economists have gradually tried to develop better methods to estimate discrimination. The most generally accepted approach to quantify discrimination is the one proposed by Oaxaca (1973) and Blinder (1973). They run separate earnings equations for men and women. The estimated relationships between earnings and various characteristics between men are then used to calculate what women would earn if they had male characteristics. It is assumed that, in the absence of discrimination, wages depend only on individual characteristics and thus, in the absence of discrimination, the two functions should be identical.

In order to estimate the wage gap, the earnings differential is divided into two components. The first component measures the wage differential which is due to changes in characteristics. The second component is called the residual difference and it measures the wage difference due to discrimination. This technique has been commonly used in studies of labor market discrimination. However, this approach has been frequently criticized for several reasons. One problem is that the relationship between certain characteristics, such as education, experience and marital status and earnings, may not be the same for both men and women. Another problem is which independent variables should enter the earning equation. These variables are used as proxies for measuring productivity because productivity is not directly observable. Thus, it is argued that these estimates are biased, since productivity is not accurately measured. The inaccuracy is due to existing possible errors in using the proper proxies or characteristic variables of the worker.

Table 2-12 shows a wide range of estimated male-female wage differentials presented in several valuable studies. These numbers suggest that female earnings range from 60 to 20 percent of male earnings, except among young and single people and professional workers for whom the gap is smaller. The net earning gap, unexplained after adjustment, was still found to be at least 20 to 25 percent of male earnings in most studies. However, it should be noticed that different studies have used different data sets, and different measures of earnings. Some studies use only a few variables, such as education and experience, while some other studies have used several other factors as well. Consequently, the estimated net gaps cannot be easily compared.

Butler (1983) argued that previous approaches used to estimate wage discrimination have not been sufficient to measure Becker's "tastes for discrimination" variable, and he

TABLE 2-12

SUMMARY OF EMPIRICAL WORK ON SEX DIFFERENTIALS IN EARNINGS

Author and Source Number	Population Group	Ratio F/M	Adjusted Earnings Ratio (F/M)[a]	Controls Used	% of Gap "Explained"
A. General					
Sanborn (1)	1950 Census: BLS Wage Structure Series and Occupational Wage Surveys. 1945-49	.58 (1949 median wage and salary income	.76	age, education, hours of work urbanness, race, detailed occupation	43
	employed civilian wage and salary workers		.82	above, plus more narrowly defined occupational classifications from BLS	
			.88	above, plus turnover, absenteeism, work experience	71
Fuchs (2)	1:1000 sample of the 1960 Census:	.60 (1959 average hourly earnings	.61	color, schooling, age, city size	2.5
	nonfarm employed persons		.66	above, plus marital status, class of worker,[a] length of trip to work	15
Fuchs (3)	1:1000 sample of the 1970 Census:	.605 (1969 average hourly earnings)	.64	age, schooling	9
	white nonfarm employed persons				
Gwartney and Stroup (4)	U.S. Dept. of Commerce, Current Population Reports, P-60 series; 1950 and 1960 Census:	.60 (1959 mean hourly earnings)	.60	age, education	0
	employed persons				
	full-time year-round workers	.56 (1969 mean annual income)	.56	age, education	0
	single (never married) persons	.98 (1959 median annual income)	.96	age, education, annual hours worked	-
	married (spouse present) persons	.33 (1959 median annual income)	.51	age, education, annual hours worked	27
Cohen (5)	Michigan Survey Research Center, 1969; persons aged 22-64, not self-employed, with a steady job and working 35+ hours per week.	.55 (December 1969	.73	hours of work, professional status, fringe benefits, absenteeism, seniority, education, unionization	50

TABLE 2-12--Continued

Author and Source Number	Population Group	Ratio F/M	Adjusted Earnings Ratio (F/M)	Controls Used	% of Gap "Explained"
Oaxaca (6)	1967 Survey of Economic Opportunity:	.65 (1967 average hourly earnings of whites)	.72	children, city, size, education, experience, health, hours of work, marital status, migration region, union membership	20
	urban white and negro persons aged 16 and over, who report an hourly wage for the week preceding the survey	.67 (1967 average hourly earnings of blacks)	.69		6
			.78 (whites)	above, plus industry, occupation, class of worker	37
			.80 (blacks)		39
Sawhill (7)	1967 Current Population Survey: employed wage and salary workers in the civilian labor force	.46 (1966 average annual earnings)	.56	race, region, age, education, weeks worked per year, hours worked per week	19
Binder (8)	Michigan Survey Research Center's "Panel Study of Income Dynamics": white persons, except household heads younger than age 25 or who did not work for money in 1967	.54 (1967 average hourly wage)	.54	age, region, parents' income, father's education, place of birth, number of siblings, health, local labor market conditions, geographic mobility, seasonal employment	0
			.69	age, region, education, vocational training, occupation, union membership, veteran status, health, local labor market conditions, geographic mobility, seasonal employment, time on job	33
Mincer and Polachek (9)	1967 National Longitudinal Survey of Work Experience: white married and single women aged 30-44; 1967 Survey of Economic Opportunity: white married men aged 30-44	married women: .66	.81	education, actual labor market experience, tenure in current job, home time following first child, other home time (2-stage least squares)	45
		single women: .86 (1966 average hourly wage rates)			7

TABLE 2-12--Continued

Author and Source Number	Population Group	Ratio F/M	Adjusted Earnings Ratio '(F/M)	Controls Used	% of Gap "Explained"
Sandell and Shapiro (10)	1967 Longitudinal Survey (corrected data): white married women aged 30-44; 1967 Survey of Economic Opportunity: white married men aged 30-44	married women: .66	.74	education, actual labor market experience, tenure in current job, estimated total home time (2-stage least squares)	23
Mincer and Polachek (11)	1967 Longitudinal Survey (corrected data): white married women aged 30-44; 1967 Survey of Economic Opportunity: white married men aged 30-44	married women: .66	.83	education, estimated experience, estimated tenure, estimated home time following 1st child, estimated other home time via instrumental variables (2-stage least squares)	49
Suter and Miller (12)	1967 Longitudinal Survey: women aged 30-44 unpublished data from the March 1967 Current Population Survey: men aged 30-44	.39 (1966 median wage or salary income)	.62	education, occupational status, work experience, hours of work	38
Kohen and Roderick (13)	Longitudinal Surveys: nonstudent men and women aged 18-25, employed full-time	white: .76 black: .82 (1968-1969 average hourly earnings)	.79 .81	family background, education race, mental ability, quality of education, potential labor market experience, health, region of residence.	12 --
Chiswick, O'Neill, Fackler and Polachek (14)	1:100 sample of the 1970 Census: white and black persons aged 25-54 who worked in 1969 and in the survey week in 1970	white: .65 black: .78 (1969 hourly earnings)	.75 .83	detailed occupation	white: 28 black: 22
Landes (15)	1967 SEO: whites, 14-65, employed in civilian labor force (aggregate in 96 occupations)	.71 (hourly wage)	.90	percent working full-time, percent who reported current job different from longest job in 1966, variance in weeks worked, growth in male earnings in occupation.	67

TABLE 2-12--Continued

Author and Source Number	Population Group	Ratio F/M	Adjusted Earnings Ratio (F/M)	Controls Used	% of Gap "Explained"
Corcoran (16)	1976 Michigan Panel Survey of Income Dynamics: white men and women, 18-64	.62	.76	years out of labor force since completing school, proportion of years worked full-time, years of work experience before present employment, years of job tenure, plans to stop work.	36
B. Specific Occupations					
Bayer and Astin (17)	NSF National Register of Scientific and Technical Personnel, 1964: natural and social science Ph.D.'s in full-time academic jobs, with 2-6 years of experience	.92 (1964 annual academic year (9-10 month) salary)	.97	experience, field of specialization, type of employer, rank	62
Johnson and Stafford (18)	NSF Register: 1970 Ph.D.'s in 6 disciplines (anthropology, biology, economics, mathematics, physics, sociology)	by years since doctorate		experience, field of specialization	
		0 .93	.93		0
		5 .88	.93		42
		10 .84	.93		55
		15 .82	.93		62
		20 .80	.93		65
		25 .79	.93		67
		30 .79	.93		67
Gordon, Morton and Braden (19)	full-time academic employees of a large urban university	.73	.90	age, race, years at the university education, rank, department	63
Hoffman (20)	Instructional faculty at U. of Mass./Amherst	.77	.84	education, experience	30
			.85	above, plus minority group, school of division	35
			.90	above, plus productivity in teaching, scholarship, and service	57

References:

(1) Henry Sanborn, "Pay Differences Between Men and Women," pp. 534-50.
(2) Victor R. Fuchs, "Differences in Hourly Earnings Between Men and Women," pp. 9-15.
(3) Victor R. Fuchs, "Recent Trends and Long-Run Prospects for Female Earnings," pp. 236-42.
(4) James Gwartney and Richard Stroup, "Measurement of Employment Discrimination According to Sex," pp. 575-87.
(5) Malcom S. Cohen, "Sex Differences in Compensation," pp. 434-47.
(6) Ronald Oaxaca, "Male-Female Wage Differentials in Urban Labor Markets," pp. 693-709.
(7) Isabel V. Sawhill, "The Economics of Discrimination Against Women," pp. 383-96.

TABLE 2-12--Continued

References--Continued

(8) Alan S. Blinder, "Wage Discrimination," pp. 436-55.
(9) Jacob Mincer and Solomon Polachek, "Family Investments in Human Capital," pp. S76-S108.
(10) Stephen H. Sandell and David Shapiro, "A Reexamination of the Evidence," pp. 103-17.
(11) Jacob Mincer and Solomon Polachek, "Women's Earnings Reexamined," pp. 118-134.
(12) Larry E. Suter and Herman P. Miller, "Income Differences Between Men and Career Women," pp. 962-74.
(13) Andrew I. Kohen and Roger D. Roderick, "The Effects of Race and Sex Discrimination on Early-Career Earnings."
(14) Barry R. Chiswick, et al., "The Effects of Occupation on Race and Sex Differences in Hourly Earnings," pp. 219-28.
(15) Elisabeth M. Landes, "Sex Differences in Wages and Employment," pp. 523-38.
(16) Mary Corcoran, "Work Experience, Labor Force Withdrawals, and Women's Earnings," pp. 216-56.
(17) Alan E. Bayer and Helen S. Astin, "Sex Differences in Academic Rank and Salary Among Science Doctorates in Teaching," pp. 191-200.
(18) G. E. Johnson and F. P. Stafford, "The Earnings and Promotion of Women Faculty," pp. 888-903.
(19) Nancy M. Gordon, Thomas E. Morton, and Ina C. Braden, "Faculty Salaries: Is There Discrimination by Sex, Race, and Discipline?" pp. 419-27.
(20) Emily P. Hoffman, "An Econometric Study of University of Massachusetts/Amherst Faculty Salary Differentials."
(21) Burton G. Malkiel and Judith A. Malkiel, "Male-Female Pay Differentials in Professional Employment," pp. 693-705.

The following two review studies were also used in preparing this table:

Andrew I. Kohen (1975), "Women and the Economy."

Harriet S. Zellner (1976), "A Report on the Extent and Nautre of Employment Discrimination Against Women."

SOURCE: Cynthia Lloyd and Beth T. Niemi. The Economics of Sex Differentials (New York: Columbia University Press, 1979), pp. 232-238.

[a]"Class of Worker" refers to whether the individual is self-employed, a private wage and salary worker, or a government employee.

offered a new empirical approach to measure it. In this paper he estimated wage discrimination against black and female teachers' overtime by use of data obtained from the annual reports of the Superintendent of Education of South Carolina. He estimated coefficients of discrimination that were larger than those of previous researchers, while the trend was fully in accord with the previous finding in that the levels of discrimination against females and blacks had been fàlling since World War II. His findings also showed that although the level of discrimination against blacks had fallen during the war, discrimination against white females remained unchanged.

Until 1963, women had no legal protection against discrimination in the job market. However, the Equal Pay Act of 1963 and the Title VII of the Civil Rights Act of 1964 prohibited discrimination in hiring, firing, promotion, training, fringe benefits, seniority and retirement, on the basis of sex as well as race, color, religion or national origin. The Act also established the Equal Employment Opportunity Commission (EEOC) to administer the provisions of Title VII. The 1972 amendments to the Act extended coverage to all state and local government employees. Probably the most aggressive federal antidiscrimination policy is the one applicable to employers operating under federal contracts and subcontracts. Executive Order 11246 (1965), as amended, established the Office of Federal Contract-Compliance Program (OFCCP) to monitor the hiring and promotion practices of federal contractors and subcontractors. OFCCP requires that contractors above a certain size had to develop Affirmative Action Compliance Programs. The programs were to include a statistical analysis of the number of people employed, the qualified workers and a planned utilization of women and minorities. If the analysis showed the contractors had failed to meet their goals and women were underutilized, they would be threatened with cancellation of their contracts and would become ineligible for future contracts. Nevertheless, as most experts agree, such drastic steps are rarely taken for non-compliance.

A question of considerable interest is to just what extent the federal antidiscrimination programs have been effective in eliminating market discrimination. It is not easy to answer this question, mainly because we don't know what the wage differentials would have been in the absence of these programs. Furthermore, there haven't been too many empirical studies of the effect of legislation on discrimination. Beller (1982) tests the human capital and discrimination explanation of occupational segregation. She found evidence that between 1967 and 1974 both Title VII of the Civil Rights Act of 1964 and the federal contract compliance program increased a working woman's probability of being employed in a male occupation.

Over the past few years the issue of equal pay for comparable work, the concept of comparable worth, has received a great deal of attention. This concept calls for comparing different jobs on the basis of such factors as effort, skill and responsibility, and compensating workers accordingly. Proponents of equal pay for comparable worth rely heavily on job evaluation as a means of measuring the value of a job and, thus, the differences in rates of compensation to men and women. They believe that the firms should compensate equally the jobs of comparable worth and that failure to do so constitutes discrimination under Title VII of the Civil Rights Act. Opponents say that a job is worth what it brings on the market and that the adoption of measures, such as job evaluation, would be expensive, arbitrary and subjective. Supporters, on the other hand, point out that job evaluations are used every day by many businesses in the private sector. They note, also, that even when education, job experience, responsibilities and similar attributes are considered, it remains clear that women are discriminated against and penalized financially because they don't work at the same jobs as men do.

The second approach to explain the existing different patterns of employment and earnings by race and sex is through the interpretation of human capital theory which was first suggested by Becker (1965). Based on this framework, the differences in productivity between males and females result in these observed earning and occupational differences. Investment by individuals in their human capital increases their productivity, which implies in generating higher income. Since women and nonwhites will usually acquire less investment than the white males, they will naturally earn lower income. Women, particularly, acquire less education and on-the-job training because they do not expect to participate in the labor force continuously in the future. Being less attached to the labor market, women make different decisions than men about the investment in education and skills. In this sense, then, women earn lower wages because they are less productive than the men. This lower productivity is the result of lower level of investment in their human capital, which they choose voluntarily.

Recently, there have been a number of studies which focus on analyzing these sex-related differences in the human capital theory framework. This theory, being a rich and powerful explanation for many questions which could not be answered through the neoclassical theory of labor, creates some problems when put into empirical test. The problem arises in quantifying the factors which are the measures of human capital accumulation. Specifically, factors such as experience, ability, taste and amount of on-the-job training, in addition to years of schooling, have large impact on the earnings and labor force participation of women. Thus, the richness of different studies lies in the ingenuity of researchers in using different variables which can best be a measure of human capital.

One of the essential factors affecting the earning ability of individuals, according to human capital theory, is the continuous acquisition of work skills on the job. Naturally, a job is not only a source of current income, it is also a place to learn new work skills or to improve the old ones. Thus, the acquisition of on-the-job training will result in increased productivity of the individual as well as enhancement of future earnings.

While the importance of acquiring on-the-job training is obvious, it may not be so obvious whether the occupations held by women offer the same opportunities for acquiring skills as those held by men. Therefore, one of the causes responsible for women's lower earning could be the fact that the jobs held by women provide less on-the-job training. With this question in their minds, Duncan and Hoffman (1979) use direct measures of on-the-job training available in the Panel Study of Income Dynamics (PSID) to study the interruptions from acquiring higher degrees. They found strong evidence that time spent in on-the-job training increases earnings equally for both men and women. It was also found that while more than a quarter of white men were currently training on-the-job, the corresponding figure was about 14 percent for white women. They concluded that the differences in male/female earnings are caused by the differential access to the on-the-job training.

Studying a more homogeneous sample, Corbal, Ferber, and Green (1981) found that women receive lower earnings than men because they are initially placed in a lower wage position and they are promoted less.

Human capital theory has been widely criticized for its explanation of this occupational distribution. Polachek (1981), using panel data, provides an answer to this criticism by incorporating the notion that earnings are related not only to the amounts of human capital, but also to the varying rental rates associated with different kinds of human capital. Polachek defines different kinds of human capital as having different rates of deterioration or atrophy when skills are not continuously used. He argues that since women plan to spend more time out of labor force they tend to be in occupations where earning loss associated with time out of labor force is less. Because of expected interruption in their lifetime careers, women will invest in less risky human capital, i.e., human capital with a lower atrophy rate and lower market rental rate.

A similar argument has been made by McDowell (1982) with respect to the choice of academic careers. He considers several disciplines measuring different atrophy rates or in this case the durability of a person's accumulated stock of knowledge by the average age of references cited in the professional journals. He concludes that high atrophy rates keep women who expect interruptions from acquiring higher degrees. Furthermore, a female recipient of a doctorate is twice as likely as a male recipient to have specialized in humanities and only one third as likely to have specialized in a physical science field, since accumulated knowledge in the humanities is more durable than in other fields.

Interruption in the work career of a person has a depressing effect on the individual's earning power. Several authors, including Mincer and Polachek (1974), Sandel and Shapiro (1978), and Corcoran and Duncan (1979), have studied the "Human Capital Depreciation Phenomenon."

Mincer and Polachek (1974), analyzing the human capital investment over the life histories of women, reported that after leaving school never-married women spent 90 percent of their lives in the labor force, while married women with children spent less than 50 percent of their lives in the labor force. They argued that withdrawal from the labor market for child-rearing depreciates women's human capital resulting in lower wages. In addition, women who anticipate leaving the labor force will invest less in on-the-job training than women who plan to work continuously. They found the interruption to be responsible for almost half of the observed wage gap between married men and women aged 30-44. They concluded that the 1967 wages dropped by 1.2 percent per year out of work for white married women, aged 30-44 with children, and since the initial differences in experience are necessarily small, the gap widens over the life cycle.

In another empirical study which was to some extent a response to Mincer and Polacheck's work, Sandel and Shapiro

(1978), examined the empirical specification of human capital models of earnings in the presence of discontinuous work experience over the life cycle of women. They found no evidence of greater investment in general training in the postmaternal years than the prematernal period. They also found the effect of "depreciation" of human capital on women's earning as a result of being out of the labor force to be of smaller magnitude than the one found by Mincer and Polachek. In addition, quite different from Mincer and Polachek, they concluded that difference in work experience explains only one fourth of the difference between male-female earning, while the major percentage of the wage gap can be explained as the result of labor market discrimination.

Corcoran and Duncan (1979) analyze the same issues, i.e., labor force attachment and sex-related earning differences by extending the previous works and using new data. They first described to what extent on-the-job training, interrupted work experience, absenteeism, and work hours differ by race and sex. As expected, white men generally had more education and training and less absenteeism than black men and women of both races. They then estimated the relationship between these factors and wages separately by race and sex. They finally concluded that higher wages earned by white men cannot be primarily explained by their higher level of qualification and lower absenteeism. Even after adjusting for differences in qualifications and attachment measures, white men earned substantially more than other groups, especially women. They suggest that time out may lead to a temporary reduction in wages because of temporary mismatches between worker skills and jobs. Women workers lack complete information about job opportunities when they do return to the labor force, and it takes time for them to discover jobs that are best matched to their skills. Thus, they found the evidence as confirmation of the fact that those who claim labor market treats equally productive workers "fair" are wrong.

These works, however, are largely cross-sectional and are limited to retrospectively reported duration of past interruption. Mincer and Ofek (1982) measured the quantitative effects of interruption, using the National Longitudinal Survey (NLS) panel data on wages of married women, ages 30-44 (for the period 1967-74). They revised the original Mincer and Polacheck (1974) model to account for "restoration" or "repair" of depreciated human capital. Using longitudinal rather than cross-sectional data distinguishes this study from the previous ones as it can distinguish life cycle variations amongst individuals. The authors established that real wages at reentry were lower than at the point of labor force withdrawal, and the decline in wages increases with the length of interruption. They also found a relatively rapid growth in wages after the return to work. The rapid growth appears to reflect the "restoration or repair" of previously "eroded" human capital. After the earning capacity of returnees is restored to its preinterruption level, earning profile slope becomes identical with the profiles of those who stayed.

Quantitatively, they find that immediately following an interruption, wages decline by 3.3 to 7.6 percent per year. This short-run loss is followed by a period of rapid wage growth (5.8 to 6.4 percent) and results in a long-run wage loss equal to 0.4 to 1.1 percent. The average interruption is estimated to be 2.7 years and the duration of interruption is found to be inversely related to the level of education.

Although Mincer and Ofek's study is path-breaking research which contributed considerably to our understanding of the effect of an interruption on earnings of married females, it does not provide a definitive answer to the problem due to several existing shortcomings. Their selected sample excluded women not working. Thus, their research is likely to suffer from selectivity bias. To avoid such bias, one has to include observation on those individuals who did not report to work at the time of estimation.

Another difficulty with Mincer and Ofek concerns the simultaneity of wages and participation. It must be recognized that current labor force participation is a proxy for permanent labor force participation, especially for married women. Individuals who have experienced an interruption in the past are more likely to have interruption in the future than are individuals who have worked continuously in the past. Considering that wages at present are influenced by previous participation and probability of present participation is affected by current wages, it became very clear that wages and participation should be treated as endogenous. In the Mincer and Ofek model, wages are exogenously treated and thus the usual simultaneous equation biases may be present.

Finally, Mincer and Ofek treat all the females in their data as if they are homogeneous with respect to their propensity to work. There are unobservable traits such as an individual's character, ability, etc., which will effect that individual's participation decision. This heterogeneity, when not properly controlled, will cause the error term to be correlated with the included explanatory variable. Heterogeneity bias is controllable with longitudinal data (Heckman, 1981), but Mincer and Ofek failed to do so.

Weiss and Gronau (1981) analyze the interaction between participation and wages. By recognizing the fact that one cannot separate the effects of past and future interruption on earning power, they provide a theoretical framework for the study of expected interruptions in labor force participation and sex-related differences in earning growth. The authors hypothesize that if productivity at home is constant, persons will choose either to work all of their lives or not to work at all. Thus, the exits and reentry patterns in married women labor force participation are generated by changes in value of home productivity over the women's life cycle. In other words, it is the changes in relative magnitudes of value of home productivity, value of market activity and the potential gains from investment in human capital as well as its rate of depreciation that causes the individual worker to choose between the two alternatives. Since the value of home productivity of men is comparatively low and constant throughout their lives, their labor force participation pattern is typically continuous. For married females, the value of home productivity may increase at early years with family formation and decrease later as the children age, resulting in an interruption of the career. The length of these withdrawals depends on the wages prior to the withdrawal as well as on the rate of depreciation of human capital. It is shown that a necessary condition for reentry is that the rate of decline of home productivity exceeds the rate of human capital depreciation. It is also noted that since discrimination against women in the labor force is a possible cause of their longer withdrawal, it can affect not only the level of earnings but also the pattern of investment and earning growth through its effects on the length of career interruption.

The distinguishing feature of this valuable work is that the basic assumption in the model differs considerably from the simple view of women as marginal workers, moving in and out of the labor force as new wage opportunities arise.

Instead, they have presented a model which is a modified version of Blinder and Weiss (1976) which views women as choosing one of two possible occupations. These two occupations are work at home and work at the market. There is an interaction between their participation decision and earning power through the accumulation of human capital.

Corcoran, Duncan, and Ponza (1983) present an empirical study regarding the human capital predictions about the effect of withdrawals, part time work experience, and working in "male" and "female" jobs on wages and wage growth for white women. They use 13 years of longitudinal data from the panel study of Income Dynamics to estimate a model which they have formulated based on Mincer and Ofek (1982). The sample consisted of white women who, in 1967, were 25 to 47 years old. Similar to the finding of Mincer and Ofek, they found that immediately following withdrawal (short run), wages drop substantially. However, their findings show that upon returning to the labor force, wages grow rapidly and almost make up for the wage loss resulting from withdrawal from the labor force. This rapid rebound of wages implies that the wage loss due to dropping out of market work by itself cannot explain the wage gap between men and women. The magnitude of their estimates of the short-run effects of depreciation is 3.5 percent and the long-run is 1.5 percent. They further estimated that full-time work is associated with substantial wage growth, while this was not true for part-time jobs. And finally, their findings show that there are few differences between the amount of the wage growth associated with "female" jobs and that of the "male" jobs.

CHAPTER III

ECONOMETRIC MODEL

This model is adapted from the model presented in Benham-Diba (1984)[1] based on human capital models of labor force participation and interrupted careers by Mincer and Polachek (1974) and Polachek (1975). These models introduce depreciation of human capital during periods of withdrawal from the labor force. As a result of depreciation, wages upon reentry to the labor market will be lower than the pre-interruption wage. This theoretical framework is augmented by noting the sequential nature of the woman's decisions. First the woman must choose to be employed. Once employed, the woman may then choose to interrupt her career.

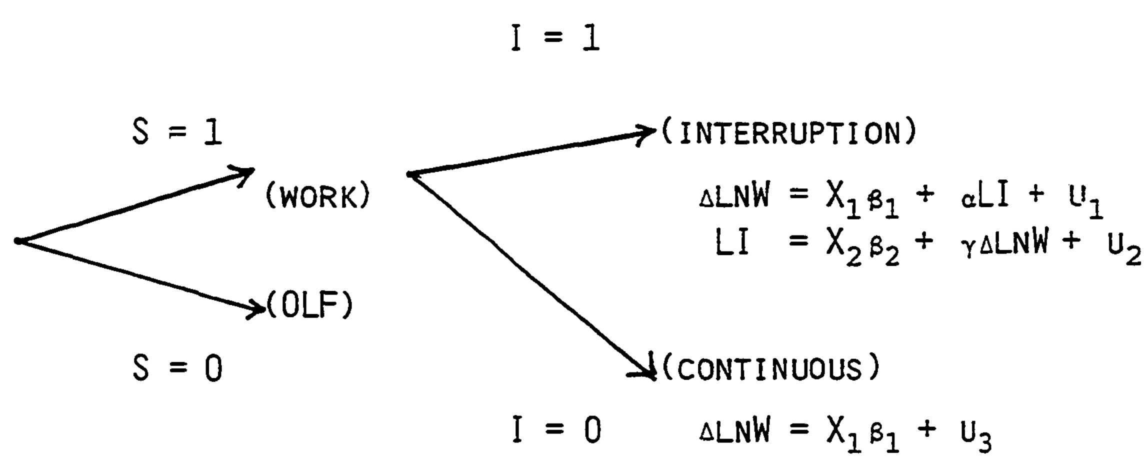
Description of the Model

If a woman decides to work at least two time periods with the confines of the NLS survey, 1967-1979, she is included in our sample, S = 1. Those women who work may interrupt their careers with time out of the labor force (I = 1)

[1] H. Benham and M. Diba. Wages and Interrupted Work Careers of Older Married Women, 1984, accepted to be presented in the Southern Economic Association Meeting, November 24-26, 1985 in Dallas, Texas.

or they may work continuously. A wage growth equation can be estimated for those women who work continuously. For those who choose to interrupt their careers, we must note that the length of the interruption, itself a choice variable, will influence the rate of wage growth. Further, since the woman can control the length of her interruption and knows that the interruption effects wage growth, she may adjust the length of her interruption, depending upon the wage penalty. Thus, for those working women with interrupted careers, wage growth and the length of interruption are simultaneously determined.

The econometric problem can perhaps best be presented diagrammatically as follows:



From this diagram, one can see that we have an initial sample selection problem of the type addressed by Heckman (1979) followed by a regression switching model of the type introduced by Lee (1978) only in our case we switch between a simultaneous system and a single equation.

Formally, one can begin to specify the model as follows. Let:

$$S^* = Z_1 \delta_1 - \varepsilon_1 \tag{1}$$

$$I^* = Z_2 \delta_2 - \varepsilon_2 \tag{2}$$

where the Z's are matricies of explanatory variables, the δ's are coefficient vectors, and we observe

$$S = \begin{cases} 1 \text{ iff } S^* > 0 \\ 0 \text{ Otherwise.} \end{cases}$$

Given S = 1, we observe

$$I = \begin{cases} 1 \text{ iff } I^* > 0 \\ 0 \text{ Otherwise.} \end{cases}$$

If S = 1 and I = 1, then we have the simultaneous system,

$$\Delta \ln W = X_1 \beta_1 + \alpha LI + \mu_1 \tag{3}$$

$$LI = X_2 \beta_2 + \gamma \Delta \ln W + \mu_2 \tag{4}$$

If S = 1 and I = 0, then we have the single equation,

$$\Delta \ln W = X_1 \beta_1 + \mu_3 \tag{5}$$

Estimation of the above model will depend upon the distributional assumptions made concerning ε_1, ε_2, and the μ's. Following Olsen (1980), one can assume that ε_1 and ε_2 follow a bivariate uniform distribution over [0,1]. Note that with a uniform distribution over [0,1].

$$Pr(S = 1) = PR\ (\varepsilon_1 < Z_1\ \delta_1) = Z_1\ \delta_1$$

so that the δ_1 vector can be consistently estimated using a linear probability model.

Estimation of δ_2 in equation (2) begins by noting that

$$
\begin{aligned}
E\ (I^* \mid S = 1) &= Z_2\ \delta_2 - E\ (\varepsilon_2 \mid S = 1) \\
&= Z_2\ \delta_2 - E\ (\varepsilon_2 \mid \varepsilon_1 < Z_1\ \delta_1) \\
&= Z_2\ \delta_2 - \tfrac{1}{2}\ \rho\ (Z_1\ \delta_1 - 1) - E\ (\mu)
\end{aligned}
$$

where μ has a uniform distribution on (0, 1).

Thus,

$$
\begin{aligned}
\Pr\ (I = 1 \mid S = 1) &= \Pr\ (\varepsilon_2 < Z_2\ \delta_2 \mid \varepsilon_1 < Z_1\ \delta_1) \\
&= \Pr\ [\mu < Z_2\ \delta_2 - \tfrac{1}{2}\ \rho\ (Z_1\ \delta_1 - 1)] \\
&= Z_2\ \delta_2 - \tfrac{1}{2}\ \rho\ (Z_1\ \delta_1 - 1) \qquad (6)
\end{aligned}
$$

indicating that δ_2 can be estimated with a linear probability model which has had a selectivity variable, $(Z_1\ \delta_1 - 1)$, added to the right hand side.

In order to estimate the remaining equations, Lee and Maddala (1984) is followed in using a conditional expectations approach. Assume that

$$
\begin{aligned}
\Delta \ln W &= X_1\ \beta_1 + \alpha\ LI + \lambda_1\ \varepsilon_1 + \lambda_2\ \varepsilon_2^* + \omega_1 \\
LI &= X_2\ \beta_2 + \gamma\ \Delta\ \ln W + \lambda_3\ \varepsilon_1 + \lambda_4\ \varepsilon_2^* + \omega_2 \\
\Delta \ln W &= X_1\ \beta_1 + \lambda_5\ \varepsilon_1 + \lambda_6\ \varepsilon_2^* + \omega_3
\end{aligned}
$$

where the ω's are normally distributed disturbance terms and

$$
\varepsilon_2^* = \begin{cases} \varepsilon_2 \text{ if } S = 1 \\ 0 \text{ if } S = 0 \end{cases}
$$

Note that

$$E\ (\varepsilon_2^* \mid S = 1, I = 1) = E\ (\varepsilon_2 \mid I = 1) \text{ and}$$

$$E\ (\varepsilon_2^* \mid S = 1, I = 0) = E\ (\varepsilon_2 \mid I = 0).$$

It follows that

$$E\ (\Delta \ln W \mid S = 1, I = 1) = X_1 \beta_1 + \alpha\ LI + \lambda_1 E\ (\varepsilon_1 \mid S = 1, I = 1)$$
$$+ \lambda_2\ E\ (\varepsilon_2 \mid I = 1),$$
$$E\ (LI \mid S = 1, I = 1) = X_2\ \beta_2 + \gamma\ \Delta\ \ln W + \lambda_3\ E\ (\varepsilon_1 \mid S = 1, I = 1)$$
$$+ \lambda_4\ E\ (\varepsilon_2 \mid I = 1) \text{ and}$$
$$E\ (\Delta \ln W \mid S = 1, I = 1 = X_1\ \beta_1 + \lambda_4\ E\ (\varepsilon_1 \mid S = 1, I = 1)$$
$$+ \lambda_6\ E\ (\varepsilon_2 \mid I = 0)$$

It can be shown that

$$E\ (\varepsilon_1 \mid S = 1, I = 1) = \frac{Z_1\ \delta_1\ [1 + \rho\ (4Z_1\ \delta_1 - 3)(Z_1\ \delta_1 - 1)]}{Z[1 + 3\ \rho\ (Z_1\ \delta_1 - 1)(Z_2\ \delta_2 - 1)]} \tag{7}$$

$$E\ (\varepsilon_1 \mid S = 1, I = 0) = \frac{Z_1\ \delta_1\ [1 + \rho\ (Z_1\ \delta_1 - 3)(Z_2\ \delta_2)]}{Z\ [1 + 3\ \rho\ (Z_1\ \delta_1 - 1)(Z_2\ \delta_2)} \tag{8}$$

$$E\ (\varepsilon_2 \mid I = 1) = Z_2\ \delta_2/2, \text{ and} \tag{9}$$

$$E\ (\varepsilon_2 \mid I = 0) = (1 + Z_2\ \delta_2)/2 \tag{10}$$

Consistent estimates of $Z\delta$'s are available. Further, Equation (6) provides a consistent estimate of the correlation coefficient, ρ. Thus, these expectations can be evaluated and "selectivity" variables constructed.

Estimating Equation Specifications

The previous section introduced Z_1, Z_2, X_1 and X_2 as matricies of explanatory variables. In this section actual variables are specified which comprise these matricies.

The Z_1 matrix will contain explanatory variables for the woman's labor force participation decision. Human capital theory suggests that this decision is based on the relative value of the woman's market and nonmarket time. Variables likely to be indicators of these relative values would be the woman's education level, her labor market experience, her accumulated time in the home, her health status, and the number of children in the home. Within a household context labor supply context, the husband's income would be expected to have a negative influence upon labor force participation. Thus, the following variables were used:

SEDUC: Starting (1967) Years of Education

SEXP: Starting (1967) Cumulative Years of Labor Market Experience

SHOME: Starting (1967) Cumulative Years in the Home

SHUBY: Starting (1967) Husband's Income ($1000s)

SBKIDS: Starting (1967) Children 6-18 Years of Age

SLKIDS: Starting (1967) Children Less than 6 Years of Age

RACE: Distinguishes Between Whites and Nonwhites

The matrix, Z_2, contains explanatory variables for the woman's decision to interrupt her career. It is argued that tastes and observed "commitment" to the labor market may partially explain the decision to interrupt one's career. Education is used as a taste indicator. "Commitment" to the labor force is measured by average tenure on the job and the percentage of time spent on part-time jobs. One would feel that women with lower average job tenure and women with part-time jobs are less committed to the labor market than those who work full-time and tend to accumulate tenure on the job. Gronou and Weiss (1981) argue that a woman will interrupt her career only if there is a change in the value of her non-market time. The most obvious source of a change in the value of non-market time is the birth of a child. Other sources of change could be a change of health status or a change in her husband's income. Positive and negative changes in the husband's income are distinguished between as the impact of such changes need not be symetric. The variables in Z_2 are the following:

- FEDUC: Years of Education at Time of First Wage Observation
- PT: Percentage of Part-Time Employment Prior to Interruption
- PTSQR: PT Squared
- ATENURE: Average Job Tenure Prior to Interruption
- PTTEN: PT - ATENURE Interaction Term
- BKID: Birth of Child Indicator
- PCHUBY: Positive Change in Husband's Income ($1000s)
- NCHUBY: Negative Change in Husband's Income ($1000s)
- RACE: Distinguishes Between Whites and Nonwhites

The squared part-time term and the part-time average tenure interaction term were included to increase the explanatory power of the interruption equation. Furthermore, in order to explore the possibility that RACE influences the labor market returns to experience, education and part time experience, the following set of variables are added:

RAEXP: RACE - DEXP Interaction

RAED: RACE - DEDUC Interaction

RAPX: RACE - PX Interaction

The wage change equation is developed since the data provides adequate information. By examining the 12 years of the NLS survey, one can identify the first (F) and last(L) wage observation for each woman. A human capital wage equation for time F would be

$$\ln W_{iF} = \beta_o + \beta_1 EDUC_{iF} + \beta_2 EXP_{iF} + \beta_3 HOME_{iF} + \beta_4 Y_{iF} + v_{iF}$$

where EDUC is years of education, EXP is years of labor market experience, HOME is years of nonmarket work, and Y contains both time invariant demographic, regional, and market variables and all unobserved heterogeneity variables. Similarly, at time L we would have

$$\ln W_{iL} = \beta_0 + \beta_1 EDUC_{iL} + \beta_2 EXP_{iL} + \beta_3 HOME_{iL} + \beta_4 Y_{iL} + v_{iL}$$

Observe that

$$EXP_{il} = EXP_{iF} + PIEXP_i + DEXP_i$$

where PIEXP is any labor market experience acquired after time

F but before the most recent interruption and DEXP is experience acquired after an interruption (or after time F if no interruption occured) and up to time L. Similarly,

$$HOME_{iL} = HOME_{iF} + PIHOME_i + LI_i$$

where PIHOME is any nonmarket experience accumulated between time F and the most recent interruption while LI is the length of the most recent interruption. The wage change equation is obtained by subtracting the expression for wages at time F from the expression at time L. Thus,

$$\Delta lnW_i = \Delta\beta_0 + \beta_1 EDUC_i + \beta_2 PIEXP_i$$
$$+ \beta_2 DEXP + \beta_3 PIHOME_i + \beta_3 LI_i + \Delta v_i$$

where we have assumed that the coefficients other than β_0 remain constant. Redefining the intercept, error terms, allowing the coefficients of PIEXP and DEXP to perhaps differ, and allowing the coefficients on PIHOME and LI to differ, the final estimating equation is derived:

$$\Delta lnW_i = \beta_0 + \beta_1 \Delta EDUC_i + \beta_2 PIEXP_i + \eta DEXP_i$$
$$\beta_2 PIHOME_i + \alpha LI + \mu_i$$

In the case of an observed continuous work career, the variables, PIEXP, PIHOME, and LI are dropped from the wage change equation as they are identically zero.

For the Length of Interruption equation, the variables that comprise X_2 should be similar to the variables in the labor force participation equation. Husband's income level, children, and health status are included to measure the value of nonmarket time. The specific variables were:

- IHUBY: Husband's Average Income During Interruption
- ILKIDS: Number of Children Less than 6 During Interruption
- IBKIDS: Number of Children 6-19 During Interruption
- IHLTH: Reported Health Status During Interruption
- RACE: Distinguishes Between Whites and Nonwhites

CHAPTER IV

DATA

To estimate the model, data are obtained from the National Longitudinal Surveys (NLS) for the period of 1967-1979, for married women ages 30-44 years. The NLS were born early in 1965 when the Office of Manpower policy, Evaluation, and Research of the United States Department of Labor contracted with the Center for Human Resource Research of the Ohio State University for Longitudinal Survey of the Work Experience of mature women as well as three other groups, men 45 to 59 years of age, young men and women 14 to 24.

The information in the data were collected from interviews with 5,083 women. This sample was designed to represent the civilian noninstitutional female population of the United States. At the time of the first interview, the ages of these women ranged from 30 to 44 years. The age distribution in 1967 is shown in Table 4-1. A large majority of these women have been reinterviewed nine times since 1967, the last interview being carried out in 1979.

Of the total number in the sample, 3,606 were white, 1,390 were black and 87 were of other races. Since the

TABLE 4-1

AGE DISTRIBUTION IN 1967

Age	Frequency	Percent
30	246	6.046
31	264	6.507
32	285	7.025
33	243	5.990
34	244	6.014
35	226	5.571
36	239	5.891
37	290	7.148
38	292	7.197
39	273	6.729
40	272	6.704
41	279	6.877
42	310	7.641
43	299	7.370
44	295	7.271

individuals who are central in the present research are married women, the never married women were excluded in the sample. However, a very small number of the women were excluded in the sample, 290 women, were never married in 1976 and by 1979, only 4 percent had never married.

The NLS provides a comprehensive data when analyzing determinants of labor market behavior and experiences of different age-sex groups of population. That is because, in contrast to the cross sectional data, in the NLS data, the individual is observed throughout a long period. At each interview which has taken place at certain intervals, information concerning their level of education, employment status, earning, marital status, family, their thoughts about current and future activities and labor force status is collected. From the labor force status, one can determine dates of labor force exit and re-entry as well as duration of a spell out of the labor force.

A close examination of the data provides very interesting and valuable information about the changes in women's work activities and how certain factors have affected the pattern of their labor market participation. Furthermore, the fact that during the period under study women's role and rights in the society has also changed a great deal, adds to the richness of the data. As has been mentioned previously, during this period the rate of participation of married women has increased considerably. This trend is also reflected in their attitudes towards working during the period under study. The majority of these middle-aged women grew up in the time that women did not anticipate returning to labor force after childbearing. Although many of them had not initially prepared themselves for the work place, they gradually did so and entered the labor market. During the 1967-1979 period, over 80 percent of white women and 90 percent of black women worked at some time. The factor which had the most profound impact on the economic role of women seems to be the changes in their attitudes towards working. In 1967, about 94 percent thought it was all right for a woman with school-age children to work if it was necessary to make ends meet and about 75 percent thought it was all right for such women to work if husband agrees. Nevertheless in 1967, 82 percent of the women in the sample disapproved of women working if the husband disagreed to her working. By the end of the period under study, while still the vast majority of women approved of working in the first two situations, the percentage of women who thought it was all right for women to work if she wanted to while her husband disagreed has increased. In 1967 approximately 46 percent of women thought that a woman's place should be in the home while by the end of the period only about 33 percent held this view.

It is not surprising that in 1967, the levels of education of the respondents were not high. As mentioned earlier, most of the women in the sample grew up in the time that marriage, child bearing and raising children were the main concern of most females and thus early school leaving was very common in the society. Consequently, these women did not anticipate to work, even if they were employed prior to becoming a parent. Whereas, education is an important requirement to enter the job market, the mature women had not acquired enough education since they did not expect to work in the future. During the 1967-1979 period, as more women decided to work outside home, they became more concerned to prepare themselves for the job market. As a result of this great incentive, many women went back to school to take up their education from where they had left off. Many of them completed high school while some others entered college either for the first time in their lives or to start graduate work. Table 4-2 shows the number of years of schooling received by these women in 1967 and 1977.

The information in Table 4-2 reveals the fact that the overall educational attainments of the sample in NLS is not substantial. However, the decades of the 70's witnessed a very important feature of the educational pattern amongst women. That is many women who were over 30 years old were attending graduate school. The following information obtained from the 1977 interview reveals this significant fact. When asked about the "type of school currently enrolled in" the respondent's answers were:

266 Doctoral Granting Institutions

TABLE 4-2

EDUCATIONAL ATTAINMENT IN 1967 AND 1977

Years of Education	1967		1977	
	Frequency	Percent	Frequency	Percent
1	1	0.025	1	0.250
2	13	0.321	13	0.321
3	25	0.617	25	0.617
4	33	0.814	31	0.765
5	50	1.233	50	1.234
6	96	2.367	95	2.345
7	145	3.576	141	3.480
8	307	7.571	308	7.601
9	281	6.930	271	6.688
10	365	9.001	353	8.712
11	258	6.363	258	6.367
12	1805	44.513	1793	44.250
13	166	4.094	172	4.245
14	155	3.822	174	4.294
15	46	1.134	40	0.987
16	248	6.116	235	5.800
17	31	0.764	41	1.012
18	30	0.740	51	1.259

266	Comprehensive Universities & Colleges
128	Liberal Arts Colleges
206	Two year Colleges and Other Specialized Institutions
4,192	NA

As women gained more access to the job market, they also spent time and made efforts acquiring training and skills on their jobs.

As far as the earnings are concerned, the data suggest that the average level of wages earned by these women increased from 1967 to 1979. But the rate of increase differed on the basis of how continuous they worked. Table 4-3 compares the wages (in constant dollars) earned by the women in NLS in 1967 and 1977. A rise in the wage rate could be an important stimulus to participation in the labor force by raising the relative price of the time spent on her leisure and home production in return for market work. It shows that on the average the women who were employed in 1977 earned slightly higher wages than the first year of the study.

Number of children as well as their ages, ordinarily is a constraint to women's work. Table 4-4 shows the number of children less than 18 years of age in 1967 and in 1977. As it can be seen in 1967, large majority of the women, about 85 percent, have had children whom required care and thus took up the mother's time. By 1977 only half of the women had children less than 18 years old. In addition to the number of children, the presence of small children strongly affects

TABLE 4-3

WAGES IN 1967 AND 1977
(In Constant Dollars)

$ Wages Per Hour	Percent 1967	Percent 1977
.00 - 1.00	67.291	64.703
1.01 - 2.00	17.205	17.994
2.01 - 3.00	12.103	10.994
3.01 - 4.00	2.613	4.585
4.01 - 12.00	.311	1.674

women's decisions to enter the labor force. Traditionally, a woman's most important role is to stay home to raise children while the father is supposed to work continuously. Table 4-5 shows the number of smaller children in years 1967 and 1977 respectively. According to these tables, in 1967, about 34 percent of women had children less than 12 years of age while in 1977 only 5 percent did. This indicates that initially the majority of the women in the sample possessed a high value of home productivity. But gradually as they went through that stage of life cycle where the value of home productivity decreases due to the decrease in family responsibility, mature women became more involved in the labor market.

A considerable number of women work because of economic necessity. Consequently a woman's labor force participation

TABLE 4-4

NUMBER OF CHILDREN LESS THAN 18 YEARS OF AGE IN 1967 AND 1977

Number of Children	1967		1977	
	Frequency	Percent	Frequency	Percent
0	597	14.715	1954	48.164
1	631	15.553	848	20.902
3	779	19.201	330	8.134
4	499	12.300	165	4.067
5	237	5.842	85	2.095
6	133	3.278	27	0.666
7	102	2.514	14	0.345
8	39	0.961	5	0.123
9	29	0.715	2	0.025
10	11	0.271	1	0.025
11	6	0.148		
12	2	0.049		
13	1	0.025		
15	1	0.025		

can be very well affected by her husband's income. Also the husband's income indicates the extent to which the wife can enjoy leisure typed activities and obtain valued goods and services without the necessities for additional income. Table 4-6 displays the incomes of the husbands of the women

TABLE 4-5

NUMBER OF CHILDREN LESS THAN 12 YEARS OF AGE
IN 1967 AND 1977

Number of Children	1967		1977	
	Frequency	Percent	Frequency	Percent
0	2,487	61.301	3,856	95.046
1	986	24.304	183	4.511
2	418	10.303	16	0.394
3	126	3.106	2	0.049
4	33	0.813		
5	6	0.148		
6	1	0.025		

in the sample for periods 1967 and 1977 respectively.

Another economic factor which normally influences women's decision to work is family income. This consists of the sum of all earnings plus any unearned income which can be termed as the permanent family income. An increase in the family's other sources of income (excluding wife's earnings) would increase the demand for wife's leisure and home goods, so that eventually the wife could drop out of the labor force altogether and devote her time exclusively between home production and leisure. Table 4-7 compares the total family income for 1967 and 1977.

TABLE 4-6

HUSBAND'S INCOME IN 1967 AND 1977

	Percent	
$ Income Per Year	1967	1977
0- 2,500	20.832	28.619
2,500- 5,000	14.218	11.580
7,500-10,000	18.808	19.810
10,001-12,500	11.755	11.125
12,501-15,000	3.023	6.079
15,501-17,500	1.987	1.985
17,501-20,000	0.756	2.357
20,001-22,500	0.448	0.786
22,501-25,000	0.168	0.579
25,001-27,500	0.168	0.331
27,501-30,000	0.056	0.827
30,001-32,500	0.084	
32,501-35,000	0.140	

In order to estimate the effect of interruptions on wages and labor force participation, some other variables in addition to age, education, wages, number of children, husband's income, family income, etc. were needed. However since the information regarding them were not readily available in our data, they had to be constructed. Thus the values

TABLE 4-7

FAMILY INCOME IN 1967 AND 1977
(In Constant Dollars)

	Percent	
$ Family Income Per Year	1967	1977
0- 5,000	20.445	5.979
5,001-10,000	44.355	14.499
10,001-15,000	26.724	14.873
15,001-20,000	5.970	16.891
20,001-25,000	1.516	16.069
25,001-30,000	.433	12.631
30,001-35,000	.557	19.058

for the variables length of interruption, experience, total experience and tenure were constructed by using the information in the data. The variable "length of interruption" is the time period out of work since the last job. Table 4-8 shows the information about the length of interruption experienced by the women in the sample for 1967 and 1977.

The variable "experience" was also constructed. It measures the number of years the woman has worked since her last interruption. The values for this variable obtained for 1967 and 1977 are shown in Table 4-9.

Finally, the mean values for the variables which were

TABLE 4-8

LENGTH OF INTERRUPTION IN 1967 AND 1977

Number of Years	Percent	
	1967	1977
0 - 6	21.315	36.268
7 - 9	9.514	6.018
10	20.927	9.091
15	23.194	11.688
20	25.043	36.934

TABLE 4-9

NUMBER OF YEARS WORKED SINCE LAST INTERRUPTION

Number of Years	Percent	
	1967	1977
0	70.249	57.396
1	8.233	1.299
2	3.352	9.123
3	3.475	8.806
5	4.535	13.494
10	10.155	2.249

used in the model are presented. First, the mean values for those women who have worked are presented in Table 4-10. Of these women, some have worked continuously and some have worked intermittently. The mean values for these two groups of women are shown in Tables 4-11 and 4-12 respectively.

The significance of the NLS lies in the fact that it is the only kind of data which will generate accurate estimates in examining the effects of certain factors which go through change in different stages of an individual life cycle. Particularly in estimating the effects of interruption on the labor force participation and wages of married women, which is the focus of this research, only a data of this nature will provide acceptable estimates. Furthermore, with panel data one can control heterogeneity by having multiple observations on individuals. Inferences can also be made concerning unobservable traits such as motivation and ability.

TABLE 4-10

MEAN VALUES OF VARIABLES ESTIMATED FOR ALL WORKING WOMEN

Variable	Label	N	Mean
AGE	Age in 1967	2008	37.2166335
RACE		2008	1.2719124
INTRPT	Indicator of interruption	2008	0.2066733
FYEAR	Year of first observed wage	2008	68.3999004
FEDUC	Education level, F	2008	11.3316733
FWAGE	Wage rate, first observation	2008	194.1447111
FTEXP	Cumulative exp., F	2008	10.5657371
LYEAR	Year of last observed wage	2008	74.9412351
LWAGE	Wage rate, last observation	2008	217.2734354
LLINT	Length of last interruption	2008	10.9203187
IHUBY	Husband income during interruption	342	6.6333764
IHLTH	Health status during interruption	411	0.1678832
ILKIDS	Number of children <6, interruption	415	0.1012048
IBKIDS	Number of children 6-18, interruption	415	1.7180723
IAGE	Age at beginning of interruption	415	43.0746988
BYEAR	Year interruption began	415	73.2698795
IHUBAGE	Age of husband when interruption began	415	46.4265060
PIEXP	Preinterruption experience	415	3.1132530
PIHOME	Preinterruption home time	415	1.7469880
DLNW	Difference in log wages	2008	0.1145359
DEDUC	Indicator of change in education	2008	0.0373506
ADEDUC	Amount of additional education	2008	0.9751992
YSDEDUC	Number of years ago education changed	2008	0.1010956
ATENURE	Average job tenure, to BI	2002	3.1091830
PT	Proportion part time, to BI	2008	0.2745061
DEXP	Exp since last interruption of F	2008	4.8771730
DHLTH	Change in health status, F-BI	2008	0.2071713
BKID	Birth of child, F-BI	2008	0.0258964
PSV	Participation selectivity variable	2008	-0.3720203
EV1	E (Epsilon 1 given S and I)	2008	0.3135077
EV2	E (Epsilon 2 given S and I)	2008	0.4960038

TABLE 4-11

MEAN VALUES OF VARIABLES ESTIMATED FOR THE CONTINUOUS WORKER

Variable	Label	N	Mean
AGE	Age in 1967	1593	37.3239171
RACE		1593	1.2768362
FYEAR	Year of first observed wage	1593	68.3973635
FEDUC	Education level, F	1593	11.3873195
FWAGE	Wage rate, first observation	1593	197.4989464
FTEXP	Cumulative exp., F	1593	10.8832392
LYEAR	Year of last observed wage	1593	74.5706215
LWAGE	Wage rate, last observation	1593	219.9549536
LLINT	Length of last interruption	1593	13.2492153
IHUBY	Husband income during interruption	0	
IHLTH	Health status during interruption	0	
ILKIDS	Number of children <6, interruption	0	
IBKIDS	Number of children 6-18, interruption	0	
IAGE	Age at beginning of interruption	0	
BYEAR	Year interruption began	0	
IHUBAGE	Age of husband when interruption began	0	
PIEXP	Preinterruption experience	0	
PIHOME	Preinterruption home time	0	
DLNW	Difference in log wages	1593	0.1079788
DEDUC	Indicator of change in education	1593	0.0338983
ADEDUC	Amount of additional education	1593	0.0684244
YSDEDUC	Number of years ago education changed	1593	0.0860013
ATENURE	Average job tenure, to BI	1589	3.3646393
PT	Proportion part time, to BI	1593	0.2713381
DEXP	Exp since last interruption of F	1593	5.5555556
DHLTH	Change in health status, F-BI	1593	0.1971124
BKID	Birth of child, F-BI	1593	0.0269931
PSV	Participation selectivity variable	1593	-0.3664500
EV1	E (Epsilon 1 given S and I)	1593	0.3388254
EV2	E (Epsilon 2 given S and I)	1593	0.5966979

TABLE 4-12

MEAN VALUES OF VARIABLES ESTIMATED FOR THE WOMEN WITH INTERRUPTED CAREERS

Variable	Label	N	Mean
AGE	Age in 1967	415	36.8048193
RACE		415	1.2530120
FYEAR	Year of first observed wage	415	68.4096386
FEDUC	Education level, F	415	11.1180723
FWAGE	Wage rate, first observation	415	181.2696386
FTEXP	Cumulative exp., F	415	9.3469880
LYEAR	Year of last observed wage	415	76.3638554
LWAGE	Wage rate, last observation	415	206.9802825
LLINT	Length of last interruption	415	1.9807229
IHUBY	Husband income during interruption	342	6.6333764
IHLTH	Health status during interruption	411	0.1678832
ILKIDS	Number of children <6, interruption	415	0.1012048
IBKIDS	Number of children 6-18, interruption	415	1.7180723
IAGE	Age at beginning of interruption	415	43.0746988
BYEAR	Year interruption began	415	73.2698795
IHUBAGE	Age of husband when interruption began	415	46.4265060
PIEXP	Preinterruption experience	415	3.1132530
PIHOME	Preinterruption home time	415	1.7469880
DLNW	Difference in log wages	415	0.1397057
DEDUC	Indicator of change in education	415	0.0506024
ADEDUC	Amount of additional education	415	0.1012048
YSDEDUC	Number of years ago education changed	415	0.1590361
ATENURE	Average job tenure, to BI	415	2.1263261
PT	Proportion part time, to BI	415	0.2866667
DEXP	Exp since last interruption of F	415	2.2731646
DHLTH	Change in health status, F-BI	415	0.2457831
BKID	Birth of child, F-BI	415	0.0216867
PSV	Participation selectivity variable	415	-0.3934022
EV1	E (Epsilon 1 given S and I)	415	0.2163240
EV2	E (Epsilon 2 given S and I)	415	0.1094841

CHAPTER V

EMPIRICAL RESULTS

The empirical analysis, as mentioned in Chapter Three, is based on a sequential decision making model of a woman's work career. In order to investigate the effects of interruption on wages and future labor force participation, the woman must first decide whether or not to work. If she chooses to work, she is included in the sample. Estimated coefficients from the sample inclusion equation are reported in Table 5-1. Those women who work, may interrupt their work careers with time out of labor market. The estimate of the interruption equation coefficients are presented in Table 5-2. Next, a wage growth equation for those women who work continuously was estimated and the coefficient estimates are reported in Table 5-3. Finally, wage growth and length of interruption equations were estimated simultaneously for the working women with interrupted career. These estimates are presented in Tables 5-4 and 5-5.

Self Selection

The individual effects of various variables on the labor force participation of the married women in the sample are analyzed first. Estimated coefficients from the sample inclusion equation are reported in Table 5-1. A negative value for a coefficient means that an increase in the associated variable decreases the probability that a woman will be observed to have worked outside the home. Inspection of the coefficients in this table reveals that SHOME, SLKIDS, RACE, SBKIDS, and SHUBY are all the significant determinants of sample inclusion. The negative sign of SHOME indicates that wives who have spent more time at home in the past are more likely to remain in the home. The estimate for this coefficient shows that as a result of every one year of staying home, the probability of going to work decreases by .003. This finding supports the contention that more time at home increases the odds of being unskilled and thus reduces the probability of future labor force participation. An alternative explanation may be because women with a longer history of work find such intangible rewards as self-expression, independence, self-fulfillment, and escape from boredom by working so that they will seek to work later. On the other hand, women who had not worked long enough in the past would be less likely to realize that such intangible benefits were available through work and will have a larger tendency to stay out of labor force.

The negative sign of SBKIDS shows, as expected, that having young children is the most powerful factor dissuading a married woman from joining the labor force. The presence

TABLE 5-1

ESTIMATES OF SAMPLE INCLUSION COEFFICIENTS

Variable	Coefficient	Standard Error
INTERCEPT	0.6884***	0.0791
SEDUC	0.0031	0.0038
SEXP	0.0001	0.0020
SHOME	-0.0017***	0.0020
SHUBY	-0.0003+	0.0018
SBKIDS	0.0133**	0.0050
SLKIDS	-0.0916***	0.0094
RACE	0.0735***	0.0159
R^2	0.1227	

Sample Size = 2008

+Significant at 10 percent level

**Significant at 1 percent level

***Significant at 0.1 percent level

of one more preschool child decreases the probability of a woman's participation by .0308. This variable has the largest magnitude amongst the significant parameters affecting a woman's participation decision. Furthermore, the positive sign of the variable SBKIDS confirms the existence of a strong relationship between the age of children and a mother's decision to work outside the home. It is more difficult for a woman to work if she has a preschool child than with one who is in school. The presence of one older child increases the probability of a woman working by .0058. A possible interpretation of the estimated results is that a woman who has an older child in the household is more likely to be employed than if she has none for two reasons. One reason is that the older children are left with responsibilities of caring for the younger ones as well as helping with the housework. The second reason may be that older children increase the costs to the family which may increase the necessity of earning additional income.

The estimated coefficient for SHUBY confirms the traditional theory of household behavior suggesting that the labor force participation of wives should vary immensely with the amount of other family income, the primary component of which is the husband's income. It was found that the husband's income in 1967 was almost significantly associated with the labor force participation decision of his wife and the overall effect was that for every $1,000 increase in the husband's income, the probability of the wife's working decreased by .003.

Finally, in this table the variable RACE was found to have had a positive association with the employment decision. This implied that race was an important determinant of female labor force participation. It was found that the probability of black married women working outside the home was .0205 greater than the probability of labor force participation of white married women. It was not difficult to think of possible explanations for this finding. The negative association between a husband's income and the probability of the wife working confirmed the importance of race as a determining factor in working decision. The earnings of black women were needed to supplement the comparatively lower earnings of their husband and to support larger families.

Table 5-2 contains the estimates of the interruption equation coefficient estimates and several features of these results were worthy of notice. First was the education variable, FEDUC, although of the correct sign, was not significant at commonly accepted levels. This may be explained by the belief held by some people that education may not ensure employment while, increasingly, certain levels of formal schooling have become entrance requirements for most jobs. Second, the variables which were the indicators of "commitment" to the labor force (as mentioned in Chapter Three) were all highly significant. Job tenure was an important dimension of job experience because it measured the length of specific job experience with an individual employer. Lack of work experience increased the probability of withdrawal from the labor force and thus reduced a woman's work attachment. It was found that one more year of job tenure prior to the interruption would decrease the probability of withdrawal by 0.0039.

The demands of housework and child rearing often

TABLE 5-2

INTERRUPTION EQUATION COEFFICIENT ESTIMATES

Variable	Coefficient	Standard Error
INTERCEPT	0.2520***	0.05590
FEDUC	-0.0041	0.00270
PT	-0.1424+	0.07860
PTSQR	0.1639**	0.07020
ATENURE	-0.0063**	0.00130
PTTEN	-0.0134**	0.00450
BKID	-0.0905**	0.03060
DHLTH	-0.0282+	0.01690
PCHUBY	-0.0062*	0.00250
NCHUBY	-0.0872***	0.00160
RACE	0.0477***	0.01310
PSV	0.1306*	0.0552
R^2	0.0711	

+Significant at 10 percent level

*Significant at 5 percent level

**Significant at 1 percent level

***Significant at 0.1 percent level

causes women to seek part-time employment as a compromise solution to the conflicts between the two values of home productivity and market work. Many married women with young children may choose to work part-time hoping that it would facilitate their entry to full time employment in the future. Working part-time may also be a source of paying a wife's education when she decides to go back to school. Regardless of the reason a woman chooses to work part-time instead of full time, generally part-time work carried with it fewer opportunities for advancement than full-time jobs. A possible explanation could very well be the fact that a part-time worker acquires less training and accumulates lower amounts of investment in human capital than a full-time worker. The findings show that a 10% increase in part-time employment decreases the probability of a woman dropping out of the labor force by 0.004. Evidently working part-time, eventhough it results in lower accumulation of skills, it is beneficial for future steady participation. An alternative explanation would be that part-time work is a substitute for full withdrawal from the labor force.

Among the variables measuring a change in the value of non-market time, the negative change in husband's income, a change in health status, birth of a child, as well as the positive change in the husband's income were significant. A negative change in the husband's income by $1,000, decreased the probability of a wife's withdrawal from the labor force by .0057. This is because a reduction in the husband's income resulted in a reduction of the family's economic well being. This economic pressure will increase the value of the wife's market work, thus reducing the chances of interruption. The findings show that as the husband's income increases by $1,000, decreases the probability of wife's withdrawal by 0.0039. A possible interpretation of this finding is that a woman with a long history of work is more attached to the labor market for non-pecuniary reasons as well as economic independence. Thus an increase in the husband's income would enable the wife to enjoy the services of domestic helpers and reliable child care services which in turn reduce the possibility of her dropping out of the labor market.

The coefficient estimate on the birth of a child variable, BKID, is statistically different from zero but has a sign contrary to expectation. However, it may not be of great concern simply because relatively few women in the sample continued to bear children.

However, the coefficient on DHLTH, shows that a change in the health status of a married woman decreases the probability of interruption by .0119, contrary to the expected positive sign. This is an uncomfortable result. Theoretically, a woman's health is a significant condition of her labor force attachment. However, the finding here may suggest that since these women were healthy at the time of labor force entrance, the change in their health status later on would not be as significant as it would have been at the work entry period. Furthermore, it may be assumed that changes in health status of a working woman will result in higher costs which increases the necessity of earning higher income.

It is interesting to note that non-white wives have a higher tendency to have irregular employment patterns. It was found that the probability of a black married woman dropping out of work is greater in comparison to that of a white married wife by 0.0157. The intermittent work pattern of non-white wives could very well be the result of one or a combination of such factors as lower education, fewer skills and work experience, poorer health, and more extensive family responsibilities.

Continuous Workers

Next, the wage change equations were estimated. First the wage change coefficient estimates for those women who did not interrupt their careers are reported in Table 5-3. In this analysis, the following variables were first used: DEDUC (indicator of change in education), DEXP (experience since last interruption), RACE, and PX (the interaction between part-time and experience). The estimates of these coefficients appear in column 1. To these sets of variables DXSQR was added (squared past interruption experience) in order to investigate the concavity of the earning profile. In addition, we add the following set of variables: RAEXP (RACE - DEXP interaction), RAED (RACE - DEDUC interaction), RAPX (RACE - PX interaction) in order to explore the possibility that RACE influences the labor market returns to experience,

TABLE 5-3

NON-INTERRUPTED CAREER WAGE CHANGE EQUATION COEFFICIENT ESTIMATES

Variable	1	2	3	4	5	6	7	8
INTERCEPT	0.2314 (.2393)	0.2232 (.2389)	0.2505 (.2396)	0.2474 (.2390)	0.0088 (.2351)	0.0170 (.2354)	-0.0374 (.2358)	-0.0229 (.2358)
DEDUC	0.0231 (.0428)	0.0189 (.0421)	0.0276 (.0431)	0.0235 (.0425)	0.0118 (.2351)	0.0050 (.2354)	0.0352 (.2358)	0.0263 (.2358)
DEXP	0.0206*** (.0026)	0.0350*** (.0105)	0.0187*** (.0029)	0.0329*** (.0104)	0.0207*** (.0028)	0.0320*** (.0104)	0.0204*** (.0028)	0.0295** (.0104)
RACE	0.0769** (.0230)	0.0749** (.0227)	0.0233 (.0430)	0.0180 (.0418)	0.0726** (.0235)	0.0698** (.0232)	0.0432+ (.0265)	0.0415 (.0261)
PX	-0.0085 (.0054)	-0.0099+ (.0055)	-0.0079+ 0.0054	-0.0093+ (.0055)				
DXSQR		-0.0013 (.0009)		-0.0013 (.0009)		-0.0010 (.0009)		-0.0008 (.0009)
RAEXP			0.0091 (.0059)	0.0097+ (.0057)				
RAED					0.1688 (.1139)	0.1502 (.1111)		
RAPX							0.0295* (.0118)	0.0293** (.0118)
EV_1	-0.3591* (.1417)	-0.3193** (.1409)	-0.2749** (.1415)	-0.3339* (.1406)	-0.3716** (.1441)	-0.3171* (.1426)	-0.3453* (.1439)	-0.2934 (.1424)
EV_2	-0.2112 (.3766)	-0.2576 (.3732)	-0.2182 (.3770)	-0.2722 (.3734)	0.1506 (.3742)	0.0769 (.3697)	-0.2144 (.3750)	0.1371 (.3703)
R^2	0.0597	0.0609	0.0628	0.0641	0.0595	0.0603	0.0624	0.0628

+Significant at 10 percent level

*Significant at 5 percent level

**Significant at 1 percent level

***Significant at 0.1 percent level

TABLE 5-3--Continued

Variable	9	10	11	12	13	14	15	16
INTERCEPT	0.2338 (.2383)	0.2519 (.2375)	0.2448 (.2397)	0.2423 (.2391)	0.2712 (.2387)	0.2706 (.2379)	0.2671 (.2387)	0.2676 (.2378)
DEDUC	0.0030 (.0460)	0.0001 (.0454)	0.0084 (.6462)	0.0056 (.0457)	0.2712 (.0424)	0.2706 (.0418)	0.2671 (.0462)	0.2676 (.0457)
DEXP	0.0206*** (.0026)	0.0346*** (.0104)	0.0189*** (.0028)	0.0332** (.0104)	0.0192*** (.0029)	0.0330** (.0104)	0.0194*** (.0029)	0.0333*** (.0103)
RACE	0.0338 (.0262)	0.0322 (.0260)	0.0218 (.0430)	0.0168 (.0418)	-0.0010 (.0436)	-0.0059 (.0425)	-0.0025 (.0436)	-0.0069 (.0042)
PX	-0.0158 (.0059)	-0.0173**	-0.0078	-0.0091+	-0.0153** (.0060)	-0.0168** (.0060)	-0.0153** (.0059)	-0.0168** (.0060)
DXSQR		-0.0013 (.0009)		-0.0013 (.0009)		-0.0013 (.0009)		-0.0013 (.0009)
RAEXP			0.0087 (.0059)	0.0092+ (.0057)	0.0071 (.0060)	0.0076 (.0057)	0.0065 (.0060)	0.0070 (.0058)
RAED	0.1567 (.1077)	0.1440 (.1055)	0.1304 (.1156)	0.1178 (.1127)			0.1396 (.1089)	0.1258 (.1062)
RAPX	0.0439** (.0129)	0.0446*** (.0128)			0.0410** (.0131)	0.0415** (.0130)	0.0419** (.0130)	0.0424*** (.0129)
EV_1	-0.3593** (.1409)	-0.3171* (.1401)	-0.3777** (.1415)	-0.3361* (.1406)	-0.3687** (.1408)	-0.3265* (.1399)	-0.3704** (.1409)	-0.3279* (.1399)
EV_2	-0.2363 (.3750)	-0.2930 (.3711)	-0.2078 (.3771)	-0.2630 (.3737)	-0.2494 (.3757)	-0.3070 (.3717)	-0.2418 (.3756)	-0.3017 (.3717)
R^2	0.0692	0.0703	0.0640	0.0653	0.0693	0.0704	0.0706	0.0717

+Significant at 10 percent level

*Significant at 5 percent level

**Significant at 1 percent level

***Significant at 0.1 percent level

education and part-time experience. These results are presented in columns 2-16.

The coefficients generally have the anticipated patterns. As expected, the coefficient for DEDUC, although not significant, is positive (except for the specification 10). This means that one additional year of schooling increases the earnings of a continuous female worker by .3% to 3.5%. When the variable RAED is added, the estimated coefficient for RAED is positive but not significant. However, as the result of inclusion of RAED (the interaction of RACE and DEDUC), the magnitude of the coefficient for DEDUC decreases compared to the estimates obtained from specifications without the variable RAED. This suggests that the effect of additional educational attainment is relatively larger on wage growth of non-white women than that of white women. That is to say increases in years of schooling have a higher return for nonwhite women than for white women. Nevertheless, since the estimates of coefficients for both EDUC and RAED are not statistically significant at commonly accepted levels, the above implication may only be a speculation.

The coefficient for DEXP is always positive and significant. The findings reveal that the amount of experience is one of the most significant determinants of wage increase. Furthermore, it is found that for the continuous female worker, each year of labor market experience results in a wage increase in the neighborhood of 2.0%. When DXSQR is included in the basic model, the estimate on DEXP increases slightly while the estimated coefficients on DXSQR are negative but not significant. These results are consistent with an earning function concave with respect to experience. However, the lack of significance on the quadratic term indicates that the concavity, if it exists, is not overly pronounced.

The variable RAEXP is added in order to understand the difference in the effect of years of experience on the wage growth of white worker and that of the non-white worker. The estimated coefficient for this variable is always positive and significant. It implies that non-white continuous female workers are rewarded more than the white ones for every additional year of experience.

Women may work part-time for different reasons as mentioned earlier. Generally speaking, women are more likely to work part-time than men. Interestingly, it was found working part-time instead of full-time decreases the wage growth of continuous female workers by .78% to 1.73%. This suggests that whatever the reason for working part-time instead of full-time may be, the part-time work leads to the acquiring of less skill and on-the-job training and thus will have a depreciating effect on wage growth. When the variable RAPX is added, the coefficient for this variable is always positive and significant ranging between .03 to .04. It shows that non-white women are penalized less for working part-time than are white women. In other words, each year of working part-time instead of full-time, decreases the wage of a white female worker by 1.58% while it increases that of the non-white worker by 3.0%.

The variable RACE is also found to be one of the most significant determinants of wage increase for the continuous female workers. When RACE only is specified as an indicator and the RACE interaction variables (RAEXP, RAED and RAPX) are excluded, the coefficient estimate for RACE is always positive and significant. Initially, one might think this variable would have negative sign, that is, to expect that racial differences would have a negative effect on wage growth. However, that argument confuses the wage level with wage growth. Nonwhite continuous workers according to our findings are experiencing a .07% to .08% faster wage growth than the white continuous workers. Once the variable RAEXP is added, the estimated coefficient for variable RACE drops by .05 and loses its significance. Alternatively, RAED is added to the basic model. The inclusion of this variable hardly causes any difference in the magnitude of RACE coefficients and is absolutely insignificant. On the other hand, when the variable RAPX is added, the magnitude of coefficient for RACE drops by .03 and is significant. Finally when all three Race-interaction variables are included in the specification, we do not get a significant estimate. Altogether the estimates reveal the fact that effects of RACE are in terms of (1) greater return to each year of experience, and (2) a lower penalty to part-time work. That is to say, the rate of wage growth is higher for non-white women than white women mainly because the non-white women are rewarded more than white women for each year of experience and also black women are penalized less for each year of part-time than the white women.

Interrupted Work Careers

Finally, for female workers with interrupted career the simultaneous equation model is estimated. The estimated coefficients are shown in Table 5-4 and 5-5. Table 5-4 contains the wage change equation estimates. Table 5-5 presents the corresponding length of interruption equation estimates. Similar to the previous procedures, in order to assess the effects of various variables on wage growth, the first step is to estimate a basic model with the following variables: DEDUC (indicator of change in education), PIHOME (pre-interruption home time), PIEXP (pre-interruption experience), LLINT (length of last interruption), DEXP (experience since last interruption), DXSQR (squared past interruption experience), and RACE. The estimates for these basic coefficients appear in column 1 in Table 5-4. To this set of variables, we add a number of other variables, PX (part-time - DEXP), RAEXP (RACE - DEXP interaction), RAED (RACE - DEDUC interaction), and RAPX (RACE - PX interaction). In order to see their effects on wages and length of interruption independent

TABLE 5-4

INTERRUPTED CAREER WAGE ESTIMATES

Variable	1	2	3	4	5	6	7	8	9
INTERCEPT	0.1705 (.1435)	0.1685 (.1493)	0.2345 (.1468)	0.2358 (.1468)	0.2379 (.1469)	0.2365 (.1472)	0.2380 (.1474)	0.2351 (.1473)	0.2370 (.1478)
DEDUC	0.1443* (.0745)	0.1823* (.0775)	0.1395* (.0771)	0.1358 (.0924)	0.1405† (.0771)	0.1420† (.0773)	0.1403 (.0929)	0.1366 (.0925)	0.1398 (.0930)
PIHOME	0.0013 (.0115)	0.0009 (.0128)	0.0005 (.0113)	0.0006 (.0112)	0.0005 (.0113)	0.0005 (.0113)	0.0005 (.0113)	0.0005 (.0113)	0.0005 (.0114)
PIEXP	-0.0018 (.0082)	0.0008 (.0092)	0.0005 (.0082)	0.0006 (.0081)	0.0007 (.0082)	0.0060 (.0083)	0.0007 (.0082)	0.0005 (.0082)	0.0006 (.0083)
LLINT	-0.1682*** (.0123)	-0.1641*** (.0092)	-0.1662*** (.0082)	-0.1655*** (.0120)	-0.1660*** (.0121)	-0.1663*** (.0122)	-0.1660*** (.0121)	-0.1662*** (.0122)	-0.1663*** (.0122)
DEXP	0.0445 (.0295)	0.0469 (.0315)	0.0357 (.0290)	0.0349 (.0290)	0.0351 (.0290)	0.0356 (.0292)	0.0350 (.0292)	0.0356 (.0292)	0.0355 (.0293)
DXSQR	-0.0063 (.0048)	-0.0076 (.0052)	-0.0053 (-----)	-0.0057 (.0048)	-0.0057 (.0049)	-0.0054 (.0049)	-0.0057 (.0049)	-0.0053 (.0049)	-0.0054 (.0050)
RACE	0.1164* (.0478)	0.1428** (.0489)	0.2135** (.0694)	0.1928*** (.0564)	0.2025*** (.0586)	0.2157** (.0698)	0.2025** (.0592)	0.2133** (.0696)	0.2155** (.0700)
PX		0.0297* (.0149)	0.0224† (.0142)	0.0223† (.0143)	0.0263† (.0161)	0.0255† (.0163)	0.0263† (.0161)	0.0224† (.0143)	0.0255† (.0163)
RAEXP			-0.0086 (.0171)			-0.0063 (.0181)		-0.0087 (.0172)	-0.0064 (.0183)
RAED				0.0008 (.1271)			0.0007 (.1286)	0.0074 (.1287)	0.0055 (.1299)
RAPX					-0.0148 (.0270)	-0.0116 (.0286)	-0.0148 (.0271)		-0.0116 (.0287)
EV_1	-0.1882 (.2278)	-0.2204 (.2269)	-0.3024 (.2299)	-0.3031 (.2300)	-0.3099 (.2302)	-0.3079 (.2306)	-0.3099 (.2306)	-0.3025 (.2302)	-0.3080 (.2309)
EV_2	2.3802* (1.0543)	2.1286* (1.0709)	1.7548† (1.0694)	1.7693† (1.0698)	1.7426† (1.0705)	1.737† (1.072)	1.7423 (1.0732)	1.7514 (1.0723)	1.7351 (1.075)
R^2	0.1111	0.1271	0.1278	0.1271	0.1282	0.1284	0.1282	0.1278	01.284

†Significant at 10 percent level

*Significant at 5 percent level

**Significant at 1 percent level

***Significant at 0.1 percent level

TABLE 5-5

INTERRUPTED EQUATION COEFFICIENT ESTIMATES

Variable	1	2	3	4	5	6	7	8	9
INTERCEPT	1.4556** (.5683)	1.6202** (.5002)	1.8792** (.5752)	1.8789** (.5796)	1.8812** (.5730)	1.8807** (.5713)	1.8812** (.5730)	1.8787** (.5752)	1.8803** (.5713)
DLNW	-3.0676*** (.8203)	-2.4929*** (.6604)	-3.3442*** (.9206)	-3.4010*** (.9339)	-3.3239*** (.9145)	-3.3005*** (.9090)	-3.3240*** (.9142)	-3.3446*** (.9206)	-3.3010*** (.9089)
IHUBY	-0.0052 (.0127)	-0.0042 (.0128)	-0.0004 (.0129)	-.0003 (.0129)	-0.0002 (.0129)	-0.0004 (.0128)	-0.0003 (.0129)	-0.0004 (.0129)	-0.0004 (.0129)
ILKIDS	0.0554 (.1875)	0.0514 (.1884)	0.0155 (.1906)	0.0088 (.1903)	0.0122 (.1902)	0.0163 (.1906)	0.0121 (.1905)	0.0150 (.1907)	0.0160 (.1908)
IBKIDS	0.0448 (.0409)	0.0553 (.0408)	0.0413 (.0410)	0.0388 (.0409)	0.0405 (.0409)	0.0420 (.0410)	0.0405 (.0408)	0.0414 (.0410)	0.0420 (.0410)
IHLTH	0.1222 (.1644)	0.1350 (.1654)	0.0798 (.1654)	0.0777 (.1657)	0.0832 (.1656)	0.0837 (.1656)	0.0833 (.1659)	0.0804 (.1657)	0.0841 (.1658)
RACE			0.5332+ (.3202)	0.5489+ (.3228)	0.5301+ (.3186)	0.5230+ (.3176)	0.5301+ (.3185)	0.5333+ (.3202)	0.5231+ (.3176)
EV_1	-0.5045 (.9817)	-0.6106 (.8821)	-1.3247 (1.0643)	-1.3502 (1.0708)	-1.3305 (1.0602)	-1.3162 (1.0578)	-1.3304 (1.0600)	01.3245 (1.0643)	-1.3161 (1.0578)
EV_2	8.9923 (5.0259)	6.7417 (4.3630)	5.8607 (4.9337)	5.9944 (4.9736)	5.8376+ (4.9118)	5.7770 (4.8269)	5.8381 (4.9112)	5.8633 (4.9338)	5.7794 (4.8962)
R^2	0.0482	0.0506	0.0447	0.0445	0.0448	0.0449	0.0448	0.0447	0.0449

+Significant at 10 percent level

**Significant at 1 percent level

***Significant at .1 percent level

of their correlation with the basic variables. The results are shown in columns 2-9 of Table 5-4.

As Table 5-4 indicates, the most significant determinant which has a reducing effect on wages, is LLINT, the length of the last interruption. Consistently in all of the different variations of the wage change equation, the estimates show that for each year of interruption, these women's earnings drop by 16%. This negative association between the length of interruption and women's earning is similar to that found by Mincer and Ofek (1982) as well as by Corcoran, Duncan, and Ponza (1983).

The variable DEDUC is found to have a significant and positive impact on the wage growth of women with interrupted careers. As a result of one additional year of schooling, the wages of the intermittent female workers increase by 13% to 18%. Notice that the impact of education on the wages of continuous workers (Table 5-3) was not significant. These two findings obtained in Table 5-3 and 5-4 suggest that for those women with non-interrupted careers, changes in educational level does not have a large impact on wages while for intermittent female workers each additional year of schooling increases the wage growth.

In Table 5-4, when the Race-Education interaction variable is added to the basic model, the variable DEDUC loses its significance while no change occurs in its magnitude. In every case the Race-Education coefficient is very small and not statistically different from zero. This suggests that the estimated effect of education is approximately correct while the addition of the interaction term introduces sufficient colinearity to adversly affect the precision of our initial estimates.

The estimates of coefficient PX is always positive and significant. It implies that for those women who reenter the labor force a 10% increase in the amount of experience obtained in part-time work will increase their wages by 0.2% to 0.3%. Again, it may be seen how one variable has different impacts on the wages of women based on the regularity of their work pattern. For women with a regular work pattern, part-time work is found to have a reducing effect on wages. On the contrary, for women with an interrupted labor force participation pattern, part-time work results in increases in wage growth. When the variable RAPX is included, the coefficient estimate for RAPX is negative and insignificant. However, the inclusion of this variable does not cause changes in the magnitude and the significance level of PX. Again, colinearity appears to be the source of these results.

Moreover, the variable RACE is found to have a positive and significant effect on wages of intermittent workers similar to its impact on wages of continuous workers. The estimates for this coefficient reveal that the wages of nonwhite women with interrupted work career grow faster (by 12% to 21%) than that of the white intermittent worker. Comparing this result with the magnitudes of coefficient for race obtained in Table 5-3, indicates that RACE has a larger impact on the wage growth of intermittent workers than for continuous workers. The inclusion of RAED, RAEXP, and RAPX do not cause any major change in the magnitude and significance level of coefficient for variable RACE. Furthermore, none of the coefficient estimates for the interaction terms are significant. This implies that the effect of RACE on wage growth of this group of women is independent of differential returns to education, experience, or part-time work.

The variable DEXP in Table 5-4 has a positive coefficient ranging from 0.035 to 0.047 but is insignificant at commonly accepted levels. However, it reveals that as a woman returns to the labor force, initially her wage grows by 3.5% to 4.7%. Putting all the findings together, it has been seen that as a result of one year dropping out of the labor force, the earnings depreciate by 16%. After returning to the labor force, during the first months, wages grow by 3.5% to 4.7%. By comparing the wage growth of intermittent workers with that of continuous workers, it is found that in the short-run the wage growth of intermittent workers is faster than the continuous workers. Using these differential wage growth paths coupled with the 16% interruption wage penalty, a long-run wage cost of interruption can be inferred. These calculations indicate a long-run interruption cost on the order of 9% to 10%. One should recall however, that these calculations are based on imprecisely estimated coefficients on DEXP and DXSQR.

In Table 5-5, it is consistently found that the most significant determinant on the length of interruption is DLNW, the rate of change of wages, with a negative association. This result indicates that those women facing larger penalties for their interruption will tend to shorten the length of their time out of labor force. Nevertheless, a most interesting feature emerges from this estimate when put together with the finding in Table 5-4 concerning a negative association between wages and interruption. These two estimates provide a confirmation of the basic assumption concerning the existence of a crucial interaction between the labor force participation and earnings. As the findings reveal, the withdrawal from work will result in lower accumulation of skills or even deteriation of human capital which causes a reduction on earnings. The reduced earnings in turn will affect the length of interruption.

Another significant determinant of length of interruption is found to be variable RACE. As it can be seen in Table 5-5, the non-white women who re-enter the labor force tend to have interruptions of approximately .5 years longer than the whites.

CHAPTER VI

SUMMARY AND CONCLUSION

The objective of this research was to examine an important issue associated with married women's increased participation in the world of work: to estimate the effect of interruption on earning and labor force participation of married women.

One of the most important social changes in the American economy has been the entry of women into the labor market. At any one time, more than half of the total of American women aged between sixteen and sixty have jobs outside the home. Married women have flooded back to work since the Second World War. In 1930 only one married woman in ten was employed. Now about five in ten have jobs (Table 2-6).

There are several reasons underlying the tremendous rate of growth of female labor force participation. One major reason is the expansion of employment in the service sector. A large percentage of women are employed in occupations which provide service work. In general, the factors which contribute to the growth of married female labor force participation rate during the last decades are: greater educational attainment, higher wages, smaller families, reductions in the proportion of households with preschool children, advances in technology which facilitate household duties, changes in social norms regarding working women, and finally improved opportunities for advancement in professional and managerial jobs.

Despite the increasing involvement of women in the American occupational structure, women's total earnings are still about two-thirds of that of men (Table 2-8). The existence of this seemingly substantial sex related earning differential generated certain amounts of concern amongst women, causing some of them to perceive it as evidence of discrimination in the labor market. In addition, the wage differences between men and women has also puzzled some economists leading them towards finding proper explanations. However, the existence of a wage gap by itself should not be attributed to discrimination. There are certain events in some women's lives which may cause the work history pattern of a woman to become different from that of a man. This difference in the work pattern will lead to differences in acquisition of work experience which consequently will affect the earning ability of women workers. Most married women stop work in their twenties and return in their thirties. So while some women have jobs throughout their lives, and some leaving on marriage and do not return, the normal working life of a married woman is often characterized by at least one interruption. In other words, certain events such as child bearing, following a husband to a different region, and divorce, may cause a working woman to interrupt her career. These interruptions will affect a woman's productivity which in turn will influence her earnings.

Human capital theory provides a prominent interpretation of how the discontinuous work pattern results in the apparent sex related wage gap by linking labor supply patterns and earnings. According to this interpretation, individual's investment in themselves is a productive process through which productivity is enhanced and subsequent earnings are increased. Investment is defined as acquiring skills and qualifications, such as education or training. Since women are likely to spend many years out of the labor market attending to home responsibilities, they will accumulate fewer years of market work experience and gain fewer skills than will men. This difference in work experience and amount of skill due to discontinuous work pattern translates into the existing gap between the earnings of men and women.

Interruption in the work career of a person has a depressing effect on the individual's earning power. Several authors have estimated the effects of sex related differences in patterns of labor force participation on the earnings of individuals. These models introduce depreciation of human capital during periods of withdrawal from the labor force. As a result of this depreciation, wages upon re-entry to the labor market will be lower than the pre-interruption wage. Mincer and Polacheck (1974), analyzing the human capital investment over the life histories of women, reported that after leaving school, never-married women spent 90 percent of their lives in the labor force, while married women with children spent less than 50 percent of their lives in the labor force. They concluded that the 1967 wages dropped by 1.2 percent per year out of work for white married women aged 30 to 44 with children. In another empirical study which was to some extent a response to Mincer and Polacheck's work, Sandel and Shapiro (1978) examined the effect of discontinuous work on women's earnings. Their findings of the effect of "depreciation" of human capital on the earnings is of smaller magnitude than the one found by Mincer and Polacheck. In addition, quite differently from Mincer and Polacheck, they concluded that difference in work experience explains only one fourth of the difference between male-female earning, while major percentage of the wage gap can be explained as a result of labor market discrimination. Corcoran and Duncan (1979) analyze the same issue by extending the previous works and using new data. They suggest that time out may lead to a temporary reduction in wages because of temporary mismatches between worker skills and jobs. Women workers lack complete information about job opportunities when they do return to their labor force, and it takes time for them to discover jobs that are best matched to their skills. These works are largely cross-sectional. Mincer and Ofek (1982), using a longitudinal panel data, revised the original Mincer and Polacheck (1974) model to account for "restoration" or "repair" of depreciated human capital. They found that there is a large short-run loss in wages immediately following an interruption. This short-run loss ranging from 3.3 to 7.6 percent per year is followed by a period of rapid wage growth and results in a long-run wage loss equal to 0.4 to 1.1 percent per year out of work. They further report that post-interruption wages grow at roughly 2.5 percent per year of experience, on average, and that growth rates in the first year following an interruption range from 5.8 to 6.4 percent per year. Corcoran, Duncan and Ponza (1983) present a model based on Mincer and Ofek (1982) to study the human capital predictions about the effect of withdrawal, part-time work experience, and working in "male" and "female" jobs on wage growth for women. Using a sample of white women, who in 1967, were 25 to 47 years old provided by 13 years of data from Income Dynamics, they find a slightly lower estimates of the short-run depreciation effect (3.5 percent) and slightly larger long-run depreciation effect (1.5 percent) per year. They also find that full-time work is rewarded more than the part-time work.

Previous research findings although valuable and have contributed considerably to an understanding of the effect that an interruption in labor force participation has on earnings of married females, do not provide a definitive answer to the problem because of several existing shortcomings such as selectivity bias, heterogeneity and not treating wages and participation simultaneoulsy.

In the absence of an existing model that treats wages and participation jointly with special attention paid to heterogeneity and selectivity bias, the dynamic model specified in Chapter III was developed based on human capital models of female labor force participation and interrupted careers by Mincer and Ofek. The model was then estimated utilizing 12 years of longitudinal data from the mature women cohort of the National Longitudinal Survey and only married women were included. This is a sample of 5,083 women who, in 1967 were 30 to 44 years old. The longitudinal nature of the data set makes it possible to observe these women through various life cycle stages and to separate variations in an individual's labor force participation.

Following Corcoran, Duncan and Ponza (1983) the attention is focused on wage growth rather than on wage rates. This research is unique in that two points are made. First, it is argued that a woman's career interruption should be considered as a sequential decision. In order to "interrupt," the woman must first decide to work, and once a decision to work is made she may choose to interrupt. As a consequence, women with interrupted work careers should be considered as a doubly censured sample. The second point is that for those who choose to interrupt their careers, the length of interruption is also subject to choice. Consequently wage changes and interruption lengths are jointly dependent variables. Furthermore, the model is designed such that it takes account of the sequential self-selection process underlying the interruption of a career. Utilizing a pair of selectivity variables, the model switches between a system of simultaneous equations, one for changes in wages and the other for the length of interruption, and a single wage equation.

The following results were obtained relating to a woman's decision to participate in the labor force:

- A single year of dropping out of work to stay home, decreases the probability of going to work by .003. This confirms the contention that more time at home reduces the probability of future labor force participation.
- The presence of one preschool child decreases the probability of a woman's participation by 0.0308 while the presence of one older child increases the probability of a woman working by 0.0058. This reveals the existence of a strong relation between the age of children and a mother's decision to work outside the home.
- Every $1,000 increase in husband's income decreases the probability of the wife's working by 0.003.
- Race is an important determinant of female labor

force participation. The probability of a black married woman being in the labor force is 0.0205 greater than the probability of a comparable white married woman.

The following results were obtained relating to a woman's decision to interrupt her labor force participation:

- One more year of job tenure prior to interruption will decrease the probability of future withdrawal by 0.0039.
- Part-time work carries with it fewer opportunities for advancement than full-time jobs. A 10 percent increase in part-time employment decreases the probability of a woman dropping out of the labor force by 0.004. However, it suggests that working part-time, although it results in a lower accumulation of skills, it is beneficial for future steady participation. Thus, it can be concluded that part-time work is a substitute for full withdrawal from the labor force.
- A $1,000 reduction in the husband's income decreases the probability of a wife's withdrawal from the labor force by .0057. It is also found that a $1,000 increase in the husband's income decreases the probability of a wife's withdrawal by 0.0039.
- Nonwhite wives have a higher tendency to have irregular employment patterns than the white wives.

The following results were obtained for wage growth of continuous workers:

- Additional years of schooling have a higher return for nonwhite continuous female workers than for the white continuous workers.
- The amount of experience is the most significant determinant of growth of wages of continuous workers. For the continuous female worker, each year of labor market experience brings a wage increase in the neighborhood of 2.0 percent. However, nonwhite continuous workers are rewarded more than the white ones for every additional year of experience.
- Working part-time instead of full time has a depreciating effect on the wage growth of continuous workers. Nevertheless, it was found that for continuous workers, nonwhite women are penalized less for working part time than are white women.
- The nonwhite continuous workers experience a .07 to .08 percent faster wage growth than do white continuous workers. This is found to be so mainly because nonwhite women are rewarded more than are white women for each year of experience and also black women are penalized less for each year of part-time than the white women.

The following results were found for wage growth of women who interrupted their labor force participation:

- The most significant determinant of wage growth of intermittent workers is the length of the last interruption. For every one year of interruption, a woman's earning drops by 16 percent.
- Each year of additional schooling results in a 13 to 18 percent growth in wages of women with an interrupted career, while changes in educational level does not have a large impact on the growth of wages of continuous workers.
- For women who re-enter the labor force, a 10 percent increase in the amount of experience obtained in part-time work will increase the growth of wages by 0.2 to 0.3 percent. This is opposite to the effect that part-time work has on the wage growth of continuous workers.
- The wages of nonwhite women with an interrupted work career grow faster (by 12 to 21 percent) than do those of the white intermittent workers. Altogether, the nonwhite intermittent workers experience a higher wage growth than do the nonwhite continuous workers.
- Women facing larger penalties for their interruption will tend to shorten the length of their time out of labor force.
- The withdrawal from work will result in lower earnings. The reduced earnings in turn will affect the

length of interruption.

- The nonwhite women who re-enter the labor force tend to have interruptions of approximately .5 years longer than do whites.

The results of this study differ in magnitude from previous studies, in that it was found that for each year of interrupted career carries a wage penalty of 16 percent. This short-run loss in earnings followed by an initial wage growth of 3.5 to 4.7 percent and the result is moderate long-run wage loss. By comparing the wage growth of intermittent workers with that of the continuous workers, it was found that in the short-run the wages of intermittent workers grew faster than those of continuous workers. Using these different wage growths, coupled with a 16 percent interruption wage penalty, it was estimated that the long-run wage loss is in the neighborhood of 9 to 10 percent for each year out of work. Taken together, these results suggest that women who drop out of the labor force to raise families cannot expect to earn as much when they return as persons with uninterrupted careers are earning. If women work only intermittently, they cannot expect much upward mobility over their life cycle.

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