Opportunities and outcomes in the U.S. labor market, 1967-1981
by Charles John Romeo

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Applied Economics
Montana State University

Abstract:
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Tests of hypotheses presented in the literature indicate that the "baby boom" cohort and increasing labor force participation among women are the two most important factors influencing relative wages. Results also suggest that affirmative action and increasing career orientation among women are important factors. Increasing educational attainment among young people, on the other hand, was not found to be very influential.

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Aug 9- 1984
Date

Chairperson, Graduate Committee

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ABSTRACT

Recent demographic and social changes have affected relative opportunities and outcomes of the various labor force groups. Opportunities are given by offered wages, and outcomes by accepted wages. White males still hold the dominant position in the labor force, though some whittling away at this position has occurred. Relative opportunities of white females and non-whites have increased, while relative outcomes show mixed results.

Tests of hypotheses presented in the literature indicate that the "baby boom" cohort and increasing labor force participation among women are the two most important factors influencing relative wages. Results also suggest that affirmative action and increasing career orientation among women are important factors. Increasing educational attainment among young people, on the other hand, was not found to be very influential.

INTRODUCTION

Major changes have occurred in the demographic composition of the labor force over the last quarter century. Researchers have found that these changes, coupled with affirmative action programs, have had a strong impact on opportunities available to various labor force groups. A few major demographic factors stand out as being the most influential. Berger (1983), Easterlin (1978), Freeman (1979), and Welch (1979) have found that the post World War II "baby boom" cohort has both depressed the relative wages of young adults and reduced their career opportunities. Increasing labor force participation among women has depressed their own relative wages, and those of young males as well (Berger, 1983; Grant and Hammermash, 1981). However, greater career orientation of women has at least partially countered the downward pressure on their wages (Shapiro and Shaw, 1983). And finally, Freeman (1977), Stapleton and Young (1984), and Welch (1979) conclude that increasing educational attainment has exerted further downward pressure on the wages of young college educated workers. In each case, increased competition for better jobs, and therefore greater difficulty in realizing career aspirations, is implied with each of these demographic changes.

The economic explanation for changes in relative wages and opportunities due to demographic changes is that different types of workers are imperfect substitutes in production. A relative increase

in the supply of one worker type reduces relative wages paid to that type (Berger, 1983; Grant and Hammermash, 1981). Changes in relative wages and opportunities due to affirmative action legislation, on the other hand, are explained as a response to increases in the cost of discrimination (Becker, 1971; Beller, 1982).

The purpose of this thesis is to examine changes in relative opportunities and observed outcomes of various labor force groups. Opportunities are assumed to be given by offered wages and outcomes by accepted wages. The gap between opportunities and outcomes arises from the fact that not all wage offers are accepted. What constitutes an acceptable wage offer to an individual varies by personal characteristics and constraints, and varies over time as well. Examining offered wages corrects changes in relative wages for behavioral changes and allows opportunities to be focused on. Estimates of real offered wages across years, for individuals with constant characteristics, are directly comparable. Examining accepted wages, on the other hand, gives information on changes in the labor force behavior of each demographic group.

The model developed here is similar to Heckman's (1974, 1979) procedure to correct for selection bias. Fixed costs of working are accounted for by the addition of a third equation. Also, since the March Current Population Survey (CPS) data used in this study do not contain wage data, further complications arise in the estimation process (Stapleton and Young, 1984).

The outline of this thesis is as follows. Theory is presented in Chapter 1, as it provides the framework for what comes after.

Chapter 2 is a review of the literature. This review is organized as a discussion of relevant hypotheses in the literature. The model is presented in Chapter 3. Chapter 4 contains the empirical findings, which are presented as tests of the hypotheses in Chapter 2. Chapter 5 is summary and conclusions.

CHAPTER 1

THEORY

The purpose of this section is to discuss certain topics from neoclassical theory of labor supply and labor demand. Treatment of labor supply theory is limited to topics that are relevant to the present study. Empirical analysis of labor demand is beyond the scope of this study, but a short theoretical treatment is given here to show how changes in the demand for labor affect labor supply decisions.

Labor Supply

Labor supply theory focuses on factors that influence an individual's allocation of time between market and non-market alternatives. If it is assumed that individuals make a tradeoff between the purchase of market goods and services (g) and time spent in non-market activities (l), then time allocation can be viewed as a utility maximization problem;

$$(1) \qquad \underset{g,l}{\text{Max}} \quad U(g,l)$$

subject to:

$$T-h-l = 0,$$

$$y_n + wh = g \geq 0,$$

and

$$l \geq 0, \; g \geq 0.$$

Where it is assumed that $U(g,1)$ is strictly quasi-concave, $T-h-1 = 0$ is a time constraint, which specifies that total time (T) is fully divided between market (h) and non-market activities; and $y_n + wh - g \geq 0$ is the budget constraint, where y_n is non-labor income and w is the real wage rate. Fixed costs of working, f, are assumed to be zero in this initial formulation.

An interior solution to the maximization problem is obtained if

$$U_g = \frac{U_1}{w} \tag{2}$$

at $h>0$, where U_g and U_1 are the marginal utilities of goods and leisure respectively. Rearranging terms yields

$$\frac{U_1}{U_g} = w, \tag{3}$$

which reads, the marginal rate of substitution between goods and leisure equals the wage rate, $MRS_{gl} = w$. Figure 1 illustrates this result. The budget constraint is given by line g,y_n, where the slope equals the negative of the real wage rate. The vertical line starting at T is the time constraint. $MRS_{gl} = w$ implies that there exists a tangency point between $U(g^*,1^*)$ and budget line g,y_n at some interior point.

On the other hand, if $MRS_{gl} > w$ at zero hours of work, no interior solution obtains. The inequality indicates that the shadow price of the person's time is greater than the real offered market wage. A corner solution results, as is displayed in Figure 2. The wage rate at

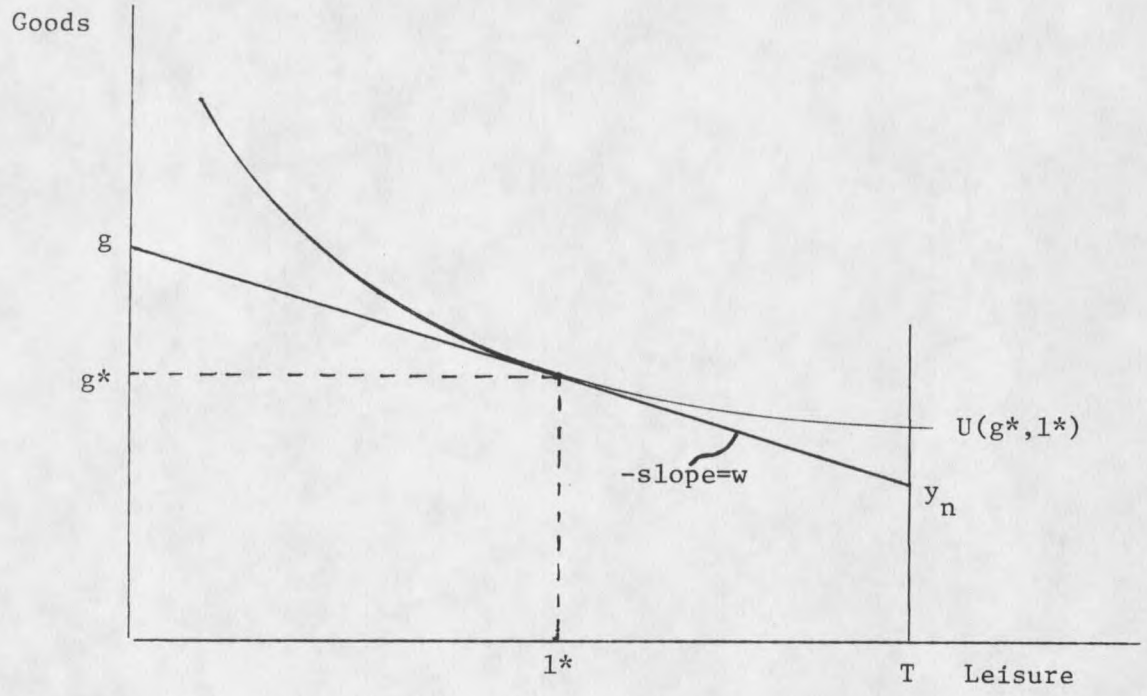

Figure 1. Interior solution.

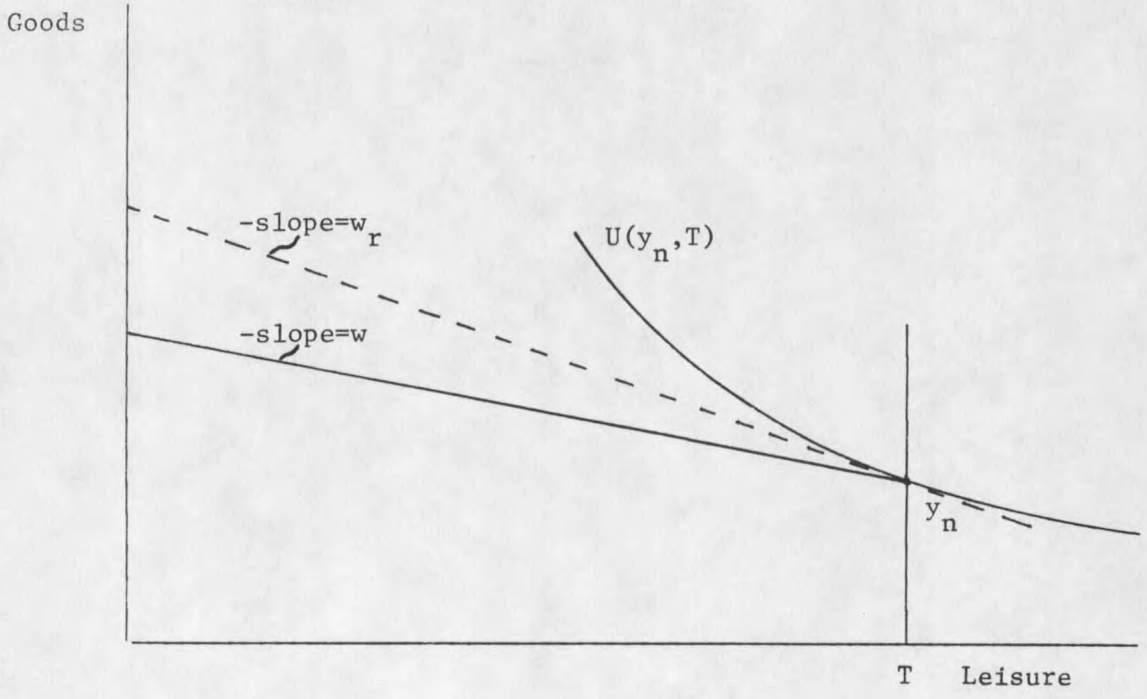

Figure 2. Corner solution.

which an individual is indifferent between spending time in market or non-market activities is called the reservation wage, w_r.

If $w \leqq w_r$, then individuals choose not to work (as shown); if $w > w_r$, then individuals choose to work.

The effect of adding fixed costs to the problem will now be analyzed. Fixed costs are incurred only if the individual chooses to work; if so, the budget constraint in (1) becomes

$$y_n - f + wh - g \geqq 0. \tag{4}$$

Thus an individual is faced with a discontinuous budget constraint. If he or she chooses not to work, he or she consumes his/her non-labor income, y_n, and leisure T; utility is $U(y_n,T)$. If the individual works, he or she chooses among points along (4).

Figure 3 illustrates the effect of adding fixed costs to an interior solution. Subtracting fixed costs is shown to be equivalent to a reduction in non-labor income. Analysis of $\frac{\partial h^*}{\partial y_n}$, therefore, will show the effect of fixed costs on labor supply.

The above assumption of strict quasi-concavity of the utility function insures that indifference curves mapping the tradeoff between goods and leisure are strictly convex. If goods and leisure are both assumed to be normal goods, it can be shown that

$$\left.\frac{\partial h^*}{\partial y_n}\right|_{dw=0} < 0, \tag{5}$$

which implies that the effect of adding fixed costs of working, for those who work, is to increase labor supply. If, on the other hand, leisure is an inferior good, the effect of adding fixed costs will be

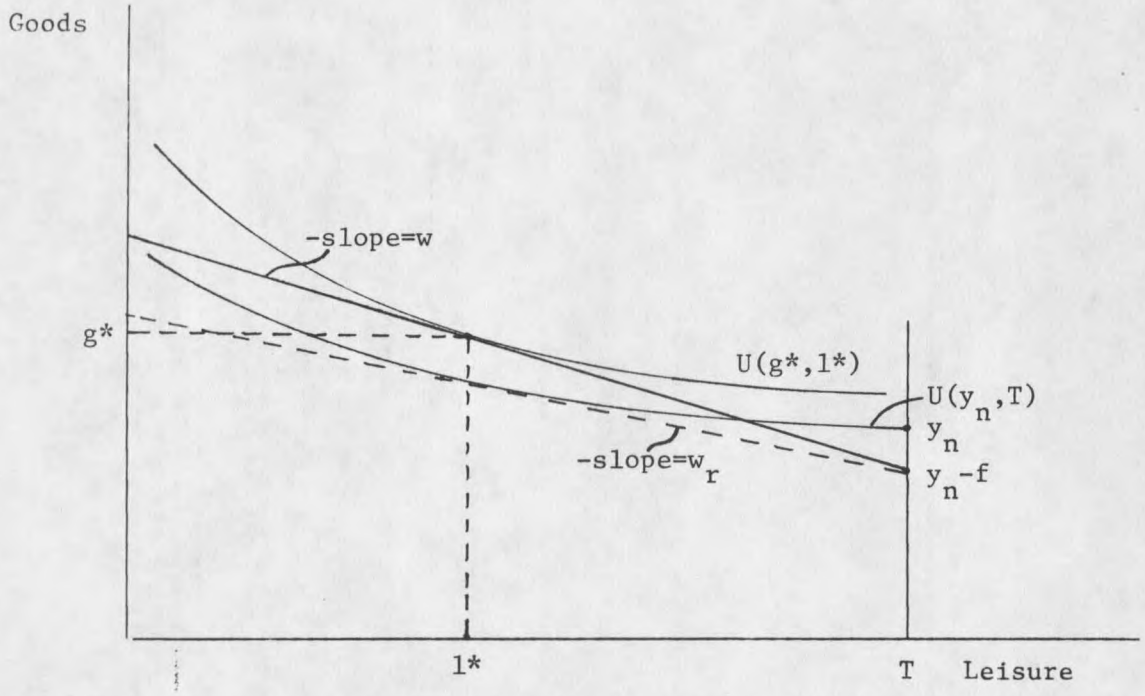

Figure 3. Interior solution with fixed costs included.

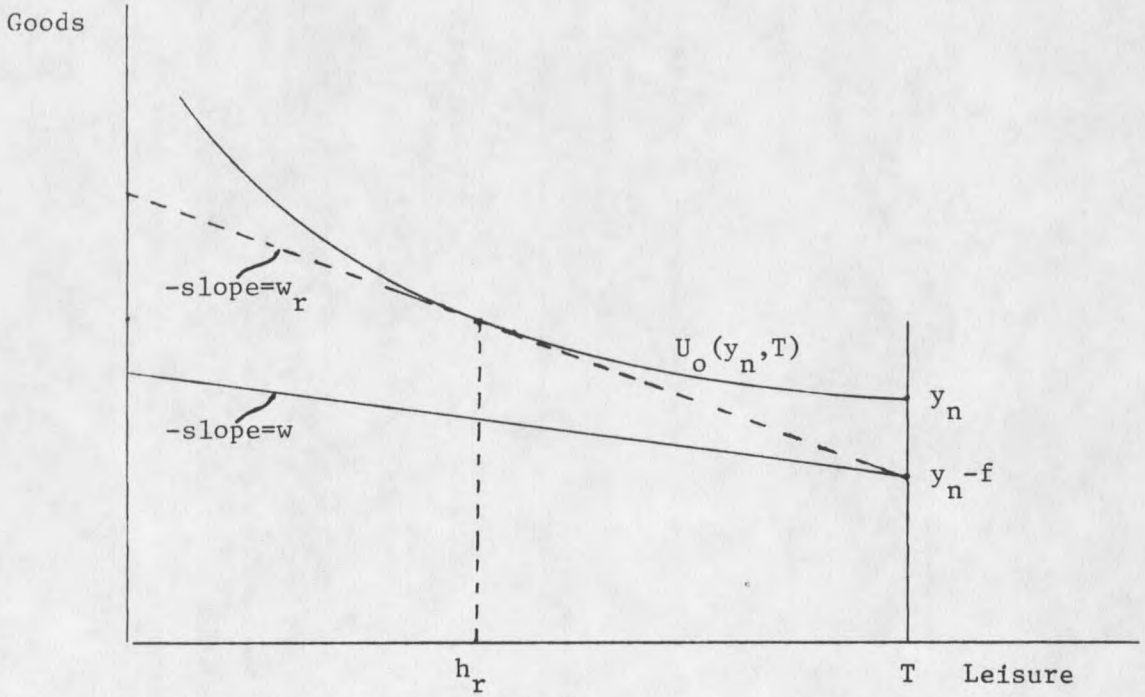

Figure 4. Corner solution with fixed costs included.

to decrease the labor supply of those who work. That is,

$$\left.\frac{\partial h^*}{\partial y_n}\right|_{dw=0} > 0, \tag{6}$$

when leisure is inferior.

For non-workers, bringing fixed costs into the problem implies that an additional condition be met for an individual to enter the labor market. Figure 4 illustrates this point. At $w = w_r$ individuals are indifferent between working zero hours or working h_r hours, where h_r is reservation hours. Entry costs, which reduce the initial endowment by f, imply that indifference curve $U_o(y_n,T)$ which is obtained at h=0 can only be obtained at $h = h_r$, if $w = w_r$. At $w > w_r$ indifference curves higher than U_o can be attained at $h \gtrless h_r$ depending on whether leisure is a normal or inferior good.

A Slutsky equation is used to analyze the effect of a change in the real wage rate on hours worked. We may write,

$$\frac{\partial h^*}{\partial w} = \left.\frac{\partial h}{\partial w}\right|_{du=0} + h\,\frac{\partial h^*}{\partial y_n}, \tag{7}$$

where $\frac{\partial h}{\partial w}$ holding utility constant is the substitution effect, and $h\frac{\partial h^*}{\partial y_n}$ is the income effect. It has been shown above that the sign on the income effect depends on whether leisure is a normal or inferior good. Since $h \geq 0$ depending on whether a corner or interior solution obtains, the whole second term of (7) will be negative for an interior solution when leisure is normal, positive for an interior solution when leisure is inferior, and zero otherwise. The substitution effect on hours

worked, however, is positive whether leisure is normal or inferior, and is positive for both an interior and corner solution. Figure 5 illustrates this discussion. Given convex indifference curves, an increase in the real wage rate from w_0 to w_1 will cause an individual to substitute goods for leisure, moving from point A to point B. The income effect moves the individual from point B to point C, with the total effect being a move from point A to point C. Whether point C is to the right or the left of point B depends on whether leisure is a normal or inferior good. If leisure is normal, as the figure illustrates, the substitution and income effects are in opposite directions, and point C is to the right of point B. Alternatively, if leisure is inferior, the

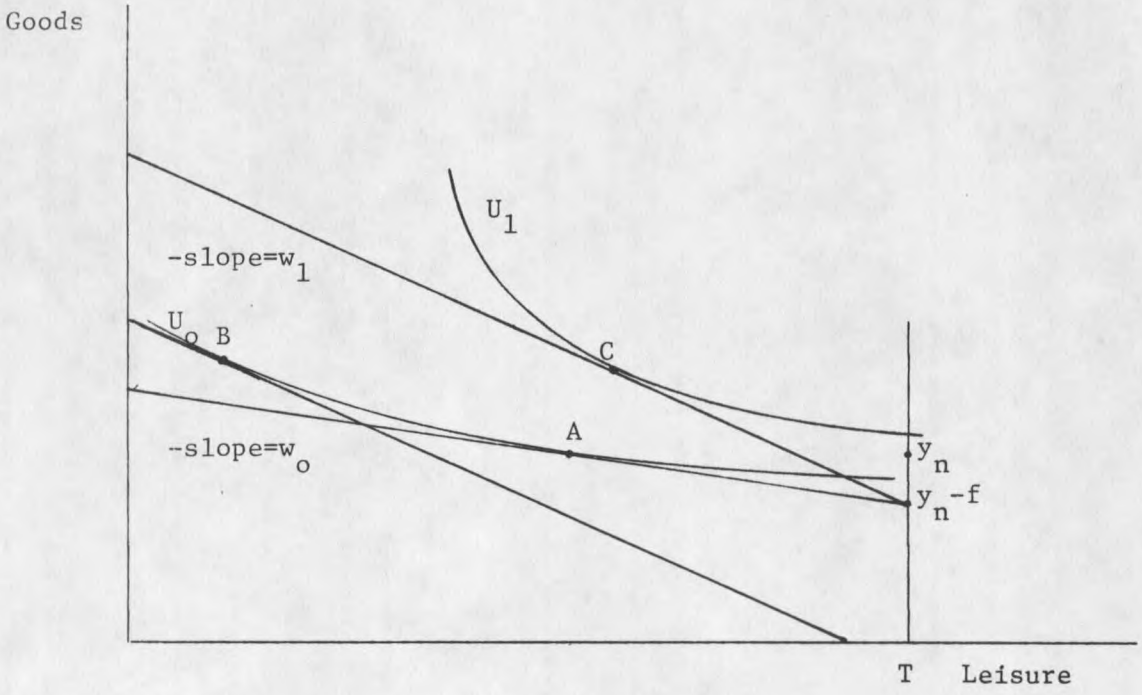

Figure 5. Income and substitution effects.

substitution and income effects move in the same direction, point C will fall to the left of point B, and it can be unequivocally stated that hours worked will increase.

For a corner solution, the effect on hours worked is entirely given by the substitution effect. Since the substitution effect requires that utility remains constant, hours worked will not be positive until $w \geq w_r$, then h_r hours will be worked.

The last topic to be discussed in the area of labor supply is selection bias. A general discussion of this problem will be given in Chapter 2. Development of the concept here is limited to formulating the problem in mathematical terms and explicitly showing the relationship between offered and accepted wages.

Having established w_r as the reservation wage, we observe

$$h > 0_r \text{ if } w > w_r$$

and

$$h = 0 \text{ if } w < w_r.$$

Assume an offered wage equation of the form

$$w = \mu + \varepsilon, \quad E(\varepsilon) = 0 \tag{8}$$

where $\mu = f(x)$, and x is a vector of personal characteristics relevant to the determination of offered wages. We seek to estimate μ, the average offered wage, given characteristics x. But, w is only observed

(9) $$\text{if } w > w_r,$$

that is, $$\text{if } \mu + \varepsilon > w_r,$$

or $$\varepsilon > w_r - \mu.$$

Labor force participation decisions are not completely random; positive hours of work and market wages are only observed for individuals who are offered wages higher than their reservation wages. Accepted market wages then are conditional on $w > w_r$, and their expectation can be written as

(10) $$E(w|w>w_r) = \mu + E(\varepsilon|\varepsilon>w_r-\mu),$$

where $$E(w|w>w_r) > E(w) = \mu,$$

which indicates that selection affects the expectation of ε, the $E(\varepsilon|\varepsilon>w_r-\mu) \neq E(\varepsilon)$. This result implies that average accepted wages are greater than average offered wages. Figure 6 illustrates this result.

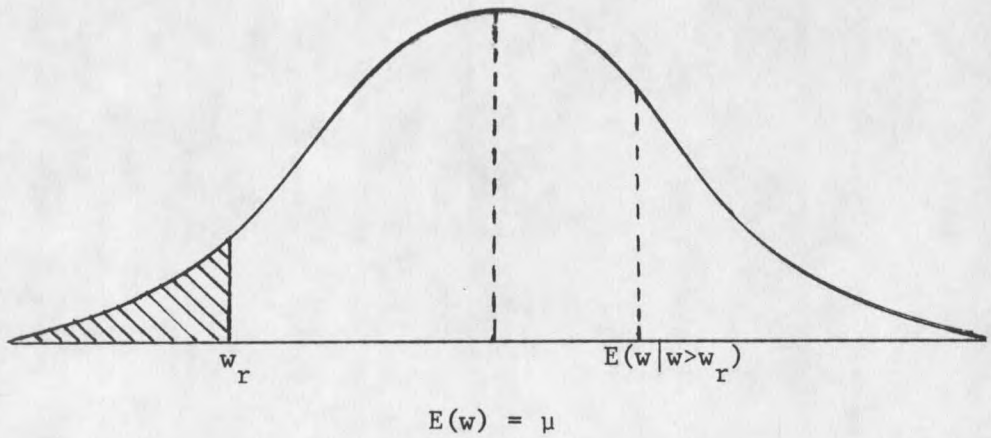

Figure 6. Means of offered and accepted wages.

Assuming that the distribution of offered wages is normal, if LFP decisions were completely random, offered wages would be accepted over the entire range of the distribution. Offered would equal accepted wages and the $E(w) = \mu$ would be the mean of the observed distribution. But, since $w \leqq w_r$ are not accepted, the lower tail of the distribution is not observed. The lower range of offered wages are not accepted, and the observed wage distribution is truncated. The average accepted wage is greater than the average offered wage, $E(w \mid w > w_r) > E(w)$. Intuitively, for a given set of characteristics, the higher the wage offered to an individual, the higher the probability that positive hours of work will be observed.

Labor Demand

The development of labor demand theory here will be limited to a discussion of the effects of changes in relative quantities of various types of labor on labor supply. Assuming a single output economy, where output g is the consumption good, and that the labor market is perfectly competitive, we can write

$$MP_i = w_i \qquad i = 1,\ldots,n. \tag{11}$$

That is, the marginal product of the ith labor type equals the real wage rate. Further, it can be shown

$$MP_i = \frac{\partial F(x_1 \ldots x_n, k),}{\partial x_i} \tag{12}$$

where $F(x_1 \ldots x_n, k)$ is a production function with n labor inputs and capital.

The focus here is on changes in the MP_i resulting from increases in the jth labor type relative to the ith labor type, where j = (1...n), and j can equal i. Relative increases in the jth labor type will either increase, decrease, or not affect MP_i depending on whether i and j are technically complementary, technically competitive, or technically independent respectively (Beattie and Taylor, 1984).

$$(13) \qquad \frac{\partial MP_i}{\partial x_j} = f_{ij} = \frac{\partial f(x_1 \ldots x_n, k)}{\partial x_j \partial x_i} \gtrless 0.$$

Changes in MP_i imply like changes in w_i and, as equation (7) indicates, changes in w_i will affect hours worked as well. If two labor types are either technically complementary or technically competitive in production, an increase in the quantity of labor supplied by one type will affect the labor demand for and, hence, quantity supplied of the other type.

The elasticity of complementarity, c_{ij}, is a particular measure of how a change in the quantity of factor j affects wages paid to factor i (Sato and Koizumi, 1973). It is defined as

$$(14) \qquad c_{ij} = \frac{\partial \ln MP_i}{\partial \ln X_j} \cdot \frac{1}{S_j}$$

$$= \frac{\partial MP_i}{\partial X_j} \cdot \frac{X_j}{MP_i} \cdot \frac{1}{S_j}$$

$$= \frac{f\, f_{ij}}{MP_i\, MP_j},$$

where $S_j \equiv w_j X_j / f$ is the share of factor j in output, f. It is the percentage change in the wage of i when input j is increased by one percent, divided by the share of input j. If $c_{ij} > 0$, then the two inputs i and j are q-complements (technically complementary); if $c_{ij} < 0$, then i and j are q-substitutes (technically competitive).

CHAPTER 2

LITERATURE SURVEY

This survey is organized as a discussion of hypotheses that have emerged to explain recent changes in relative wages between different demographic groups in the labor force. Groups are broken down by race, sex, education, experience and marital status. (In each category white males serve as the benchmark: all differentials and ratios are measured relative to them.)

Eight hypotheses will be discussed and can be stated as follows:

1) Since the 1950's, relative offered wages of females to males have increased more (decreased less) than relative accepted wages. This narrowing of the gap between offered and accepted wages for females relative to males suggests either that relative opportunities for females have increased, or mean reservation wages among women have decreased, or both.

2) The effects of government affirmative action programs are discussed. Three arguments concerning the effects of these programs on minority groups are analyzed.

i) Program effects are negative for low skill minorities and positive for high skill minorities.

ii) Programs have virtually no effect.

iii) The form of job discrimination has merely changed, the extent has not abated.

3) Increasing education levels of young blacks relative to young whites and decreasing labor market discrimination against blacks have narrowed the gap in entry level wages between blacks and whites. Consequently, life cycle age-earnings profiles of young blacks should be closer to that of young whites than the age-earnings profiles of older blacks were to older whites.

4) As the number of women workers increases relative to men, a decrease in the relative offered wages of women should result.

5) The coming of working age of the post World War II baby boom cohort has shifted the age composition of the labor force. The ratio of young to old workers has increased substantially. As a result the relative earnings of young to old workers have decreased.

6) In recent years, the number of workers with college educations have increased relative to those with high school educations. This implies that there will be a decrease in the wages of college educated workers relative to workers with a high school education.

7) Studies suggest that increasing LFPRs of women have had their greatest impact on the wages of young high school graduates, while the wages of young college graduates are most influenced by their absolute increase in numbers. The total effect implied by these changes on the wages of young male high school and college graduates relative to each other, and relative to their older counterparts, is that young high school graduates have fared worse relative to their older counterparts, while young college graduates have fared worse overall.

8) It has been argued that women are becoming more career oriented. If this is so, we should observe two things:

a) The quantity and quality of education, as well as occupational choices of women, are closer to those of men. This implies that entry level wages of women relative to men have increased.

b) The accumulation of on-the-job training (OJT) among women will be closer to men as well. The implication here is that the growth in wages with experience for women should have increased relative to men.

Selection Bias

Labor force participation rates (LFPRs) of women have historically been much lower than those of men. When making labor supply decisions, women are subject to a number of constraints that do not affect LFP decisions of men. Child bearing and rearing, social attitudes, and additional fixed costs incurred when both spouses work all increase the reservation wages of women relative to men.

On the demand side, average wages offered to women relative to men have historically been low. Lack of market oriented education and training, short work horizons, part-time and discontinuous employment, and discrimination have all reduced wage offers to women. In many cases, wage offers are less than the reservation wage, and, as such, we observe zero hours of work for many women. This implies that the mean wage offered to women in the aggregate is less than the mean accepted wage.

Not accepting wages below one's reservation wage causes a statistical problem known as selection bias. A range of positive hours

worked is observed for anyone who works, while exactly zero hours are observed for all non-workers. The distribution of hours is said to be censored at zero. Not correcting for selection bias either by ignoring it or discarding all observations on non-workers introduces a bias into estimated coefficients of the offered wage equation (Keeley, 1981, 23-32).

Changing opportunities for women in the labor market are best characterized by offered as opposed to accepted wages. There are two reasons for this. First, in choosing whether or not to accept an offer, one's reservation wage, the determinants of which are exogenous to the labor market, comes into play. Second, offered wages give information on real wages offered to individuals with certain characteristics, while accepted wages give the variety of individuals that will accept an offer. Over time, who will and will not accept a certain real wage offer will vary with the mean level of selection bias. Therefore, the set of individuals being observed at any two points in time is not the same.

A change in the level of selection bias can occur from either a change in real wages offered to women with constant characteristics or a shift in the labor supply of women given constant real offered wages. Between 1955 and 1978, the percentage of women of working age who work full-year, full-time (FY-FT) has increased from 36.7 percent to 49.4 percent (Mallan, 1983). The increase in the LFPR of women over this period implies that selection among women has decreased: offered and accepted wages are converging. Whether this decrease has resulted from higher real wage offers to women (better opportunities) or lower mean

reservation wages among women is unclear. Results in the literature suggest both reasons. This study will attempt to determine if predicted values of real offered wages have increased for the period 1967-1981.

Government Influence

In the 1960's and 1970's a number of pieces of anti-discrimination legislation were passed by Congress, and anti-discrimination victories were won in the Supreme Court as well. The two most important legislative enactments in this area were the 1964 Civil Rights Act (Title VII) and the Equal Employment Opportunity Act of 1972 (Title IX). Title VII prohibited firms as well as unions and employment agencies from discrimination on the basis of race, color, sex, religion, or national origin. Title IX added the federal and state and local governments, education institutions, and small firms (15 or more employees) to the list of covered employments, and it gave the "right to sue" to individuals who experienced discrimination (Welch, 1981).

The effectiveness of affirmative action legislation has been debated by researchers. On the one hand, it has been suggested that this legislation has increased the expectation of incurring costs from discriminatory practices. Figure 7 illustrates this argument. Assuming an employer's demand for discrimination is not a Giffen good, an increase in the price of discrimination will reduce the equilibrium quantity. The increase in the number of discrimination cases reaching