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Darling, David Lane, Jr.

THE PERSONAL INCOME CONSEQUENCES OF CHANGING JOB STATUS: A STATISTICAL ANALYSIS OF THE LABOR MARKET BEHAVIOR OF YOUNG MALE WORKERS

The Ohio State University

Ph.D. 1983

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OF CHANGING JOB STATUS
A Statistical Analysis of the Labor Market
Behavior of Young Male Workers

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
David L. Darling, Jr., B.S., M.S.

** ** **

The Ohio State University
1983

Reading Committee:
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Dr. Leroy J. Hushak
Dr. Bernard Erven

Approved By:

Co-Advisors
Department of Agricultural Economics
and Rural Sociology
DEDICATION

To my wife, Carol Darling, and to others who have supported and assisted me: Dr. George Morse and my fellow graduate student friends.
ACKNOWLEDGMENTS

I would like to thank my reading committee for their helpful guidance. Dr. Leroy Hushak helped to better conceptualize, formulate, and specify the model. Dr. George Morse helped to organize and focus the dissertation and draw out the results. Dr. Bernard Erven helped to polish the final drafts and prepare for my final defense of the dissertation.

Any remaining omissions and errors are solely the responsibility of the author.
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CHAPTER I
INTRODUCTION

Problem Statement

As a county's economy expands, new job opportunities and better income earnings possibilities are available to the labor force. It is often thought that all segments of society benefit equally during a period of prosperity. However, some subsets of the population are better able to take advantage of new economic opportunities than other subsets (Summers, et al.). Young people are more mobile across occupations and industries than older people (Ragan). When a new plant locates in an area and needs to train its new employees in a unique production process it will likely choose a set of young, high school educated workers. The new employer will prefer younger employees since an investment in their on-the-job training will yield a longer stream of income to the employer (Becker). Also, other personal characteristics such as health, job skills, and personality traits make some workers more desirable than others. Unfortunately, the questions of who benefits the most from the opportunities that arise from economic growth and which variables most affect the annual income gains that people realize from one time period to another are not well understood. However, the value of this information to policy makers, employers, and workers appears great.
At the state and national level, policy makers need better information about the size and distribution of benefits people experience when the economy expands. Will new jobs help the unemployed and allow current welfare recipients a chance to find productive employment? Policy makers at these two levels need information about the type of economic activities which will best serve to decrease government transfer payments. Also these two sets of policy makers need information about the tax revenues that can be expected to flow into public accounts as workers' incomes increase.

Local policy makers often must confront the problem of how best to expand or revive the private sector of their community's economy. Elected officials usually are worried about the short fall in public revenues as a result of a decline in local private sector business activity. Together, both elected and nonelected leaders must consider what types of economic activity should be encouraged to locate or to expand locally. How will a specific new industry increase local personal incomes and affect the flows of local government revenues and expenditures? Should local government offer an industrial prospect any local tax relief or public service subsidies? Public policy makers are willing to commit public funds when they think that their community's public and private sector will benefit substantially. However, their expectations of a high positive return on the local public sector's investment are often overly optimistic (Summers, et al.).

Ideally, policy makers would have information on the likely changes in local personal income in the short and the long run. While distinct sets of variables may govern the economic impact of new industry in the
long and short run, common variables in each set are the average wage rates paid, the average length of the employees' work week in hours worked, the new firm's stability, its fringe benefit package, its training and promotion policies, and its growth.

Employers are interested in how much they will have to pay employees in one area compared to another. Often the labor costs of a firm are the largest production expense. Given a type of needed labor input, a firm considering location of a new plant will want to be able to forecast the total cost of their labor bill at each location under consideration. The variation in their labor cost across communities is expected to be a function of unemployment rates, labor force participation rates, and the existing skill levels of the different local laborers. The weaker the competition is for desirable workers, the cheaper will be the cost of hiring these workers.

People are interested in maximizing their personal and family welfare. They are concerned about how they can best compete for the scarce good jobs. Should they invest in post high school general education or should they try to find an employer who will train and promote them within the firm? What are the potential payoffs resulting from a geographic move to a better job market? Is it worth quitting one's present job in order to devote full time to searching for a better one? Again, many different variables may determine the income differentials workers realize over a short time period. These can be classified into three groups: (1) the personal characteristics of the workers themselves, (2) the relative characteristics of their employer compared to other potential employers, and (3) the characteristics of the local
labor market. Some of these same variables also will determine the income differentials gained over a longer time period.

This research addresses the questions "who is likely to change jobs" and "how much do workers benefit if they do change jobs?" The time period chosen is one when the U.S. economy was growing. The data base for this research is comprised of a national sample of young men who have been interviewed periodically from 1966 to 1978.1/ Once the variables are identified that influence these differentials, they then will be separated into ones that can be manipulated by public policy and ones that can not be manipulated. The policy implication of the results of this analysis can then be explored.

An initial exploration of the data set used in this study reveals that job changers do indeed benefit more from the decision to change jobs relative to job stayers. Table 1 presents a test of the variance of means. A t-test is used to consider the significant differences in the distribution of 1976 hourly wage rates, 1978 hourly wage rates, and the percentage change in hourly wage rates between 1976 and 1978. The starting and ending wage rates for job changers are less than their counterparts who do not change jobs. However, the average percentage change realized by job changers is higher than the average percentage change realized by job stayers. These simple statistical results indicate that job stayers benefit from their decision. It is impossible to statistically prove but one can guess that a decision to change jobs improved their income status more than a decision not to change jobs. To further explore the relative welfare gains of job changers and job

1/ More information on the data is given on page 8 and in Chapter Four.
### Table 1

**HOURLY WAGE RATE CHANGES: JOB STAYERS VS. JOB CHANGERS: 1976-1978**

<table>
<thead>
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<th></th>
<th>Average Hourly Wage Rates 1976</th>
<th>Average Hourly Wage Rates 1978</th>
<th>Percentage Changes</th>
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<tr>
<td></td>
<td>$</td>
<td>$</td>
<td>%</td>
</tr>
<tr>
<td>All Workers</td>
<td>5.82</td>
<td>7.23</td>
<td>24</td>
</tr>
<tr>
<td>Job Stayers</td>
<td>6.13</td>
<td>7.45</td>
<td>22</td>
</tr>
<tr>
<td>Job Changers</td>
<td>5.19</td>
<td>6.90</td>
<td>33</td>
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For Ho: Variances are equal (t-Test)
- 1976 Hourly Wage: Prob > $F' = 0.9177$
- 1978 Hourly Wage: Prob > $F' = 0.0001$
- Change in Hourly Wage: Prob > $F' = 0.0001$
stayers a statistical model is conceptualized, formulated, and tested. The model allows the researcher to control for other factors that correlate with a job status variable. These factors can bias the results shown in Table 1.

**A Brief Overview of Previous Research**

Many case studies have been done on the impact of rural industrialization on specific communities (Summers, et al.). However, few studies have been done that concentrate on the impacts on individual rural workers under a wide variety of employment and rural labor market conditions. Deaton and Landes looked at what happened to family incomes in Tennessee before and after a family member secures a job in a new industry. They considered the gain and loss of income from all family sources as independent variables. However, they did not look specifically at the change in wages for the worker changing jobs. Further, they did not have a control group of families who had no members changing jobs. Bawden looked at the rural, nonfarm, working poor. He regressed husbands' wage income, per quarter of a year, against a set of explanatory variables. He did not, however, consider job status changes. Thus, neither of these studies considered which variables affect earned income for rural workers changing their job status.

Other studies have looked at job status changers in both the rural and urban labor markets combined. Borjas and Rosen test the hypothesis that labor turnover is a device through which workers seek their best match with employers. They regress the log of the ratio of wages earned in 1975 over wages earned in 1971, for a sample of young men age 19 to
21 in 1971, against a set of independent variables. Their results are empirically weak; their model had no variables with t-statistics greater than 2.15. Part of the weakness in their study is a result of the researchers choice of a period of time when the U.S. business cycle was in several different stages.

Bartel and Borjas look at middle-aged men who change job status. They regress the percentage change in wage against a set of variables indicating a worker's reason for changing jobs and a set of variables measuring personal characteristics of the workers. However, they do not control for the residence of the worker. They found that the workers reasons for quitting had a significant impact on the wage differential obtained as a result of going from one job to the next. Finally, Parnes and Nestel also look at job changing behavior of middle-aged men. They found that men who change jobs during the expansionary part of the business cycle obtained a higher wage differential than those who change jobs at other times. However, they do not develop and test a model to explain what affects the variation in the wage differential. Instead they look at factors explaining job mobility.

These studies add interesting insights into how to research the problems. However, they do not provide all the answers to the questions raised. This dissertation is distinctly different from the reviewed research. These differences include the model formulated, the variables chosen, and the time period chosen.

**Objectives**

The overall objectives of this proposed research are to explore the factors that determine who is likely to change jobs and to estimate the
size of the percentage change in wages earned by job changers relative to those who do not change jobs. To do this the following specific objectives are pursued:

1. To formulate a conceptual model which explains the factors that influence changes in hourly wages, changes in average hours worked, and the decision to change employers.

2. To empirically test the above model using a sample of longitudinal data on workers who are employed by the same employer and by different employers over the time period.

3. To draw conclusions from the empirical results and to consider the implications for growth and development policy.

Data Source and Profile

The source of data for this research comes from the young men's cohort in the National Longitudinal Survey of Labor Market Experience (NLS). These NLS data have been compiled by the Center for Human Resource Research at The Ohio State University and the U.S. Bureau of Census under separate contracts with the Manpower Administration of the U.S. Department of Labor. The young men's cohort ranged in age from 24 to 34 in 1976. Three other age cohorts are also available: older men, young women, and older women.

A sample was drawn from the 1966 national data base of the U.S. Bureau of Census. Interviews have been conducted periodically by Census enumerators from 1966 to the present. As of January, 1982 the latest data on the young men's cohort come from the 1978 survey. Other survey data used include data from the 1976 survey, the 1975 survey, and a small amount of data drawn from even earlier surveys.
The sample consists of 2,725 men from age 26 to 36 in 1978 that meet the minimum criteria necessary for inclusion in this analysis. These criteria are the following:

1. Respondents either had to be working the week of the survey in 1978, have a job but be temporarily absent from it, or be recently unemployed. Wage rates and hours worked information on a 1978 job had to be available.

2. Respondents had to report a wage rate earned and an average hours per week worked for their current job or for a recent job in 1978. This excludes self-employed people who did not provide their wage rate or average hours per week worked.

3. Respondents had to have a job in 1976 about which they could report a wage rate earned and an average hours per week worked.

In 1976 the respondents ranged in age from 24 to 34. This age group is very mobile and most likely to take advantage of new job opportunities. Between 1976 and 1978, 755 respondents or about one in four changed jobs. Also, of those working in 1976, 766 (26%) had secured their job the same year. And, 53 percent of those working in 1976 had job tenure of three years or less. This group also shows a high amount of residential mobility. Over 57 percent reported changing their county of residence between 1976 and 1978 at least once.

In 1978, 38.4 percent of the respondents lived in the south. Over one quarter (28.1%) lived in a nonmetropolitan county, while 30 percent lived in a central city, and 41.9 percent lived outside a central city. About three quarters of the respondents are white and 23.7 percent are nonwhite young men. In 1978, 51 percent of the respondents worked an
average of 40 hours per week. Forty percent worked more and 8 percent worked less than 40 hours per week. Finally, in 1978, 25 percent of the sample made $3.00 per hour or less in wages while 40 percent made $10.00 per hour or more in wages.
CHAPTER II

LITERATURE REVIEW

Economic Theory

This section is divided into a review of the pertinent economic theory and a survey of related empirical studies. Three distinct areas of economic theory are relevant to labor behavior: (1) neoclassical labor economics, (2) human capital theory, and (3) signaling theory. Each body of theory identifies different variables that are likely to influence a worker's hourly wage and his annual income.

Neoclassical Labor Theory

Neoclassical labor theory focuses on the market supply and demand for labor. On the demand side labor is conceptualized as an input into the firm's production function. Labor is viewed as a commodity that can be classified by skill types but still can be treated as a homogeneous input within a skill type (Ginzberg). This implies that all workers with the same skills are perfect substitutes for one another.

The demand for labor by a firm is a derived demand. This means that the amount of labor hired is a result of the demand for the firm's output. If the pure competition conditions hold, the firm will equate the wage they pay their last worker hired to his value marginal product (VMP). Firms will view the supply of labor as perfectly elastic, so they can hire all the workers they need without offering to pay higher
wages for each additional worker hired. Under conditions of perfect competition, fixed input and output prices, and where the firm can adjust production only through the purchase of labor services, the firm's labor demand curve is the value of the marginal product of labor at each quantity of labor. The demand curve is downward sloping since the firm experiences a diminishing marginal product when adding additional units of labor. Again, given the neoclassical assumption of labor as a homogeneous input, a unique demand schedule is assumed to exist for each type of labor.

Labor demand can be considered in the short run or the long run. The short run demand for labor by a firm is defined as that time period when the firm can only buy more or less variable inputs such as labor, fuel, and water. Inputs like equipment and buildings are fixed. In the long run all inputs become variable ones. If the price of labor per unit of output increases relative to the price of capital, firms will substitute capital for labor. Since labor services are not perfectly mobile across states and between communities, unique local labor markets are found both in the short run and the long run (Hansen).

The supply of labor services also can be considered in the short run and the long run. In the short run a worker can choose to work from zero to over 100 hours per week. Within one skill, the supply of labor services will vary according to both the number of workers and the hours offered to firms in the local labor market. The maximum supply offered will be constrained by the total hours available in a week. Adding this fact with the theoretical postulate that people will offer more labor
Figure 1

Short Run Labor Supply Curve for an Average Week

Point A = The maximum hours the average worker can work per week multiplied by the number of workers in the category.
services at higher wages results in an upward sloping short run supply curve with a finite limit (see Figure 1).

In the long run the local supply curve for any skill can shift to the right or left. If there is in-migration or if unskilled laborers acquire the necessary skills the supply curve shifts to the right. Deaths, retirements, and out-migration can shift the supply curve to the left. Neoclassical economics predicts that if local wages are above average for a region, long run adjustments will shift the local supply curve to the right, bringing down wage rates. Conversely, if local wages are below average long run adjustments will shift the supply curve to the left bringing up wages rates.

Unemployment occurs because wages are not perfectly flexible downwards. Theory suggests this is only a short run market situation if the nation is at full employment over all, and if the unemployed labor is willing to migrate to other areas. Empirical evidence suggests, however, that pockets of unemployment frequently persist (Acquah, Caudill, 1963 and 1976).

Let us examine unemployment. First we must assume away skill differences. In Figure 2 all persons that are willing and able to work in a local labor market are on the labor supply curve. Potential workers include anyone who might join the labor force if wages are high enough to attract them away from home, school, or retirement. In Figure 2, there are C potential workers at a wage of $10.00 per hour. Fleisher and Knieser define the official unemployment rate as C-A, but the equilibrium wage is $8.00 per hour. Consequently, the official
Figure 2

Short Run Local Labor Market

The Number of Workers all Working the Same Hours Per Week

Point

A = The number of workers employed.

B = The equilibrium number of workers that would be employed at $8.00 per hour.

C = The number of workers who would like to work at $10.00 per hour.

D = The maximum number of workers available in the area.
unemployment rate overstates the number of workers that would work at the equilibrium wage.

Labor force participation rate is defined as that percentage of the total population that make up the labor force (Fleisher and Kniesner). The labor force is defined as those employed or actively seeking employment. The labor force participation rate is often broken down into categories by age, sex, color, or marital status. Thus, the labor force participation rate (LFPR) for a category is the number of persons in the category who are in the labor force divided by the total number in that category. Historically, men have had higher LFPR than women, but the LFPR for women has increased dramatically in the last 50 years. In Figure 2 the LFPR for the local labor market at a wage rate of $10.00 per hour is the ratio of C divided by the total population in the area.

In this study labor supply decisions are conceptualized as those made by the household or family as a unit. A family is defined as one or more individuals living in the same dwelling, sharing incomes and possessions, and making joint decisions. The classic decisions that a family must make are who works and how many hours do they devote to their job as opposed to leisure. As wages rise time becomes more expensive and the expected reaction is a substitution effect; households take more time to work and have less time remaining for leisure.\(^1\) This is one explanation for the rising labor force participation rate of women; no longer can women afford to pass up the opportunity to work outside the home because the opportunity costs are too high. Therefore, they

\(^{1}\)Leisure is defined as all time not spent working or commuting to and from work.
join the work force and spend less time at home on child rearing and home production.

Another reaction to raising wages is the income effect. If it is assumed that leisure time is a normal good, then as incomes rise people can afford to purchase more nonwork time. The purchase price is the opportunity cost of that time in wages forgone.

Since the two effects work in opposite directions on the supply of hours worked there is a real problem in predicting the results of an increase in salary. The trend for men of working age over this past century is to work a shorter number of hours a week. This suggests that the income effect is dominating the substitution effect. Many economists think that at high wages the income effect actually forces the labor supply curve to become backward bending (Fleisher).

In mathematical terms the following can be shown for an individual making work time allocation decisions in the face of rising wages. Maximize utility:

(1) \[ U = u(Y, S) \]

Subject to the following constraint:

(2) \[ Y = W(T - S) \]

And to the following identity:

(3) \[ S = T - L \]

Where:

\[ U = \text{Utility} \]
\[ Y = \text{Labor income} \]
\[ W = \text{Wage rate} \]
\[ T = L + S = \text{Total time available} \]
This problem posits that the worker will maximize his utility \( U \). Utility is conceptualized as a function of income \( Y \) and leisure \( S \) subject to an income and a time constraint. It further hypothesizes that utility is a positive function of both income and leisure \( U_1 \text{ and } U_2 > 0 \) but that individuals have a diminishing marginal utility for both \( U_{11} \text{ and } U_{22} < 0 \). To explore the impact of changing wage rates on labor time the first order conditions are derived:

\[
\begin{align*}
(4) & \quad \epsilon = U(Y,S) + \lambda (Y-W(T-S)) \\
(5) & \quad \frac{\partial \epsilon}{\partial Y} = U_1 + \lambda = 0 \\
(6) & \quad \frac{\partial \epsilon}{\partial S} = U_2 + \lambda W = 0 \\
(7) & \quad \frac{\partial \epsilon}{\partial \lambda} = Y-W(T-S) = 0
\end{align*}
\]

First order conditions are the following:

\[
\begin{align*}
(8) & \quad W = \frac{U_2}{U_1}
\end{align*}
\]

This can be expanded to:

\[
\begin{align*}
(9) & \quad WU_1 (W(T-S), S) = U_2 (W(T-S), S)
\end{align*}
\]

And then \( L = T-S \text{ and } S = T-L \) then

\[
\begin{align*}
(10) & \quad WU_1 (WL, T-L) = U_2 (WL, T-L)
\end{align*}
\]

Now differentiating with respect to the exogenous variables \( W \) and \( L \) we obtain the following:

\[
\begin{align*}
(11) & \quad (U_1 + WU_{11}) \ dW + W(WU_{11} - U_{12}) \ dL = LU_{21} \ dW + (WU_{21} - U_{22}) \ dL
\end{align*}
\]

Now, combining terms yields equation 12.
(12) \( (U_t + WU_{11} - LU_{21}) \, dW = -(W^2 U_{11} - 2WU_{12} + U_{22}) \, dL \)

or

(13) \( \frac{dL}{dW} = \frac{U_t + WU_{11} - LU_{12}}{-[W^2 U_{11} - 2WU_{12} + U_{22}]} \)

The denominator is unambiguously positive but the numerator cannot be unambiguously signed. Therefore, we cannot tell whether the income or the substitution effect will dominate given a wage change.

In summary, neoclassical labor economic theory identifies a number of variables that vary systematically with changes in hourly wage and annual wage earnings. Typically workers will want to work more hours as wages go up. This should lead to higher annual incomes of workers both due to higher wages and more hours worked. Also, as wages go up more people will be drawn into the work force; thus, the LFPR increases. Unemployment is due to inflexible wages of those already employed; however, a high unemployment rate will dampen wage increases. At high wages and high levels of labor force participation, however, workers may choose to work less rather than more hours as their wage rates go up. This will hold down the wage effect on annual income. Finally, additional unearned income can only have an income effect on hours worked. This will also have a negative effect on hours worked and lead to a lower than expected annual income earned.

Human Capital Theory

Human capital theory separates what a worker has to offer an employer into two commodities. Workers offer employers unskilled labor services that can be thought of as workers' time. This commodity is an undifferentiated output of the worker and a homogeneous input for the
employer. Next, the theory identifies human capital as the second facet. Human capital is acquired by workers through some formal or informal learning process. It is ability absorbed in one time period that increases a worker's productivity on the job during later time periods. Money or time expenditures on formal education, on-the-job training, health, and migration are all forms of human capital investment.1/

Human capital can be divided into two categories, general and specific human capital. General forms of human capital (GHC) are identified as learned abilities that increase the worker's VMP for his current employer and equally for other potential employers. For example, if an employee learned key punching skills and then changed jobs within the same firm from a clerk to a key punch operator, the skills acquired would be just as valuable to another employer. Therefore, key punching skills are classified as general, GHC. If the employee, in this example, learned these new skills at the firm's expense, that firm is risking the loss of their investment in training. The worker may quit this job and go to work for another employer.

The following equation expresses this mathematically:

\[
G = \sum_{t=1}^{n-1} \frac{VMP_t - W_t}{(1+i)^t}
\]

Where:

- **G** = The excess of future receipts to the firm over future outlays
- **VMP** = The value marginal product of the worker receiving training
- **W** = Wages paid to worker

1/ The following discussion is based on a theory developed by Gary Becker and published in *Human Capital*. 
i = Market discount rate

t = Time period

A rational, profit maximizing, firm would only provide training when it expects G to be positive. But if the market for a skill is competitive, then the wage paid by the firm for trained personnel with GHC skills will be about equal to its value marginal product.

\[(15) \ VMP_t - W_t \sim 0\]

In this example G will equal zero and the firm will gain nothing by investing in training for a GHC skill. If firm X tries to pay their current employees with GHC less than the competitive wage, they can quit and go work for firm Y. In conclusion, one can expect, based on this theory, that general forms of human capital will be acquired at the expense of the individual, not the firm.

Specific human capital is defined as learned abilities which increase the marginal product of a worker for the firm employing the worker but not for any other firm. An example of specific human capital is a maintenance skill of a unique piece of equipment. If all training were completely specific, the wage that employees received and the wage these same employees could get elsewhere would be independent of their specific training and the marginal value product of their labor in the job for which they were trained. In this situation a rational employee would not pay for his training since he would not directly benefit from it. Instead the employing firm would collect a return on the HC investment that would be positive, \( G > 0 \), since the worker's marginal value product would be greater than his wage. In the special case of a purely competitive labor market, long run equilibrium would force the net
present value of the capital investment in specific HC to zero since the present value of costs of the investment would equal the present value of benefits.

The above argument in mathematical terms is the following:

\[
(16) \quad V_{MP_0} + G = \sum_{t=1}^{n-1} \frac{V_{MP_t} - W_t}{(1+i)^t} = W_0 + C
\]

where:

- \( V_{MP_0} \) = The value of the employee's time to the firm during training if used in the best alternative way
- \( G \) = The excess of discounted future receipts over discounted future firm outlays
- \( V_{MP_t} \) = Value marginal product in period \( t \)
- \( W_t \) = Wages paid in period \( t \)
- \( i \) = Market discount rate
- \( W_0 \) = Wages paid to a trainee during training
- \( C \) = Cost of training the employee including the sum of the opportunity cost and outlays on training

Equation 16 shows the long run competitive equilibrium. A firm will invest in specific HC training if it expects that \( G \) will be positive and greater than \( C \). And a profit maximizing firm will want to train workers who will most likely generate a maximum net return on the firm's investment, \( G-C \), where \( C \) is an investment occurring in the initial period.

Age of workers, health of workers, and sex of workers all could affect the value of \( G-C \). Consider the following case illustrated in Figure 3. If an untrained worker could get a job that paid \( U \) dollars per hour at the beginning of his work life but never more than this, his earnings curve over his life can be shown by \( UU' \). However, another worker who joined a firm and received on-the-job training but only
Figure 3

Age-Earnings Curve

Wages Per Hour

T' T

U U'

16 25 65 Age

(Source: Becker, Human Capital, 1975, p. 23)
earned T dollars to start with, would be able to command a higher wage leveling off at T' dollars at the end of his work life: curve TT'. In this case the type of training acquired is not completely specific HC. This is indicated by the employer's willingness to pay for the increasing productivity of the trained worker and also the worker's willingness to pay part of the training cost in the form of foregone earnings between the ages of 16 and 25 years old.

Workers considering general training must weigh the benefits during the pay-back period compared to the costs during the investment period. If all the investment was made in period one and this investment equaled the cost of going to school and the lost opportunity to earn wages during this period, then this total cost (E) must be less than the discounted present value of the future earnings realized as a return on the educational investment.

\[ E_1 < \sum_{t=2}^{n} \frac{NW_t}{(1+i)^t} \]

where:

\[ t = \text{Time period 2 through n} \]

\[ E = \text{The total cost of education} \]

\[ NW = \text{The net wage gain secured due to a worker's education attainment} \]

\[ i = \text{The subjective discount rate decided on by the worker (how much he values a dollar in t time period)} \]

The type of people who would invest most in education would be the young, able, healthy individuals who do not expect to experience job discrimination (Becker, pages 73, 75 and 85). This type of individual will maximize the difference between E and the present value of the returns on human capital. Women and nonwhites will invest less in
their general education if they expect to be discriminated against in the labor market based solely on race and sex.

The employer will invest in the same type of worker described above. He will want a relatively young person so that he can receive a return on his investment over a longer period. He will want quick learners to minimize training time. The employer will also want a healthy worker who will take off only a minimum number of sick days. Thus, from the above arguments it can be concluded that the strongest competitors for specific on-the-job training are bright, young, healthy workers who have not invested in substantial amounts of post high school general human capital.

Signaling Theory

Signaling theory considers the imperfect process of matches between employees and employers similar to any other two party pairing such as a man and a woman in the marriage bond. This theory views workers as multifaceted individuals and jobs as needing a particular set of worker characteristics. The one dimensional and two dimensional worker in neoclassical economics and human capital theory respectively are replaced with a multidimensional worker.

The process by which employees find employers, and vice versa, occurs in a world of uncertainty. Both employers and employees look for signals to aid their decision making (Blaug). Some authors suggest that employers use educational attainment as a short cut screening technique to choose among the better job prospects (Arrow). This "theory of credentialism" or "screening hypothesis" is but one part of the
signaling theory. An employee-employer match results from each sorting through all potential matches in their respective opportunity sets, like each party in a marriage, and choosing the best match. Both parties in the labor market try to maximize their respective objective functions. The employer looks for the employee who can generate the most output per unit of input. The employee looks for the employer who can pay the best wages for a given set of working conditions.

Signaling theory suggests that, with the arrival of a new employer in a local labor market, existing employer-employee matches become less stable. Workers would have a new opportunity set. If the new employer has jobs where workers can produce a higher valued output per unit of labor input than with the old employer the new employer can afford to bid away workers. The resulting new equilibrium set of matches, after all resorting occurs, will be economically efficient and maximize the value of the local gross product.

Signaling theory also suggests relationships between job tenure, job separation and worker productivity. Bartel and Borjas have hypothesized that both the employer and the employee learn about each other during the first several years the worker is on the job. If either determines that the match is a poor one there is a high likelihood the employer-employee relationship will be terminated. Thus, this suggests a negative correlation between job turnover and job tenure. The employees who remain on the job are likely to become more productive the longer they continue. If all employers reward higher productivity with higher wages then there should be a positive correlation between job tenure and wages earned. Finally, a job switcher who changes jobs after
only a short period with his first employer will probably realize only a small increase in hourly wages paid by the new employer, since both employers are likely to pay a relatively low starting wage.

This review of pertinent economic theory has covered neoclassical economic theory, human capital theory, and signaling theory. Each contributes important variables that need to be considered in this study of labor market behavior. The section on model development will draw heavily from the discussion concluded here.

Empirical Research

This section of the literature review is divided into two parts. Studies that examined the factors that influence wage changes will be examined first. Studies that provide useful insights into which variables are important and their expected signs will also be reviewed.

Wage Determinant Studies

Deaton and Landes conducted a study on the income distributional effects of rural industrialization on Tennessee families. They hypothesized that the income distributional consequences are a function of three sets of variables: community characteristics of the plant location, industrial characteristics of the new plant, and personal characteristics of the new plant employees. Using ordinary least squares regression analysis the researchers tested a model that has dollar changes in family income from all sources (FINCH) as the dependent variable. Twenty-five independent variables were tested to explain variance in FINCH. Three time periods were considered: \( t_1 \) was the year before the worker secured a job with his new employer, a newly located
industry in Tennessee. Next, $t_2$ was the first year people worked for their new employer. Finally, $t_3$ (1977) was the most recent year data was available for these employees. The dependent variable FINCH was defined to be the difference in family income between $t_3$ and $t_1$. The results of the analysis show that 55 percent of the variance of the change in family income was explained by the variables. Most of the explained variance was associated with changes in family income unrelated to the employee's earnings including variables for the spouse entering or exiting from the work force, gains or losses in public assistance and changes in income from nonwage, nonpublic assistance courses. A large percentage of the remaining explained variance was accounted for by demographic variables, principally previous employment experience. Plant characteristics explained only six percent of the variance and community characteristics explained even less, three percent.

Briefly, the following continuous variables proved significant at the ten percent significance level. The sign of the regression coefficient is given in parenthesis following each variable:

1. Months worked (+)
2. Age (-)
3. Education (+)
4. The ratio of the plant's average weekly wage to the average weekly manufacturing wage in the county (+)
5. The size of the plant's labor force (+)
6. The ratio of the change in the unemployment rate between $t_2$ and $t_3$ over $t_2$ (+)
7. The level of manufacturing development in the area (+)

The following discrete variables of interest proved significant at the ten percent significance level: sex and return migration. The discrete variable for commuters was not statistically significant.

This research by Deaton and Landes, though similar to this dissertation, has several important differences. The first is the specification and measurement of the dependent variable FINCH. This variable includes income from all sources rather than just income from the new employer. For this dissertation it is necessary to isolate the change in income earned by switching employers and use other family income as an independent variable. An allied difference is the use of $t_1$ and $t_3$ income levels instead of $t_1$ and $t_2$. The authors wanted to consider the long term changes in family income. But, by using $t_1$ and $t_3$ the authors blend two effects on earned income, (1) the immediate wage differential realized by switching jobs and (2) the wage gains received while on the new job. Goode suggests that these two should be analyzed separately since factors associated with these two are likely to be different.

Promotion on the job and the factors that bring this about occur in the long run. Goode also suggests that the next logical question to consider is who benefits from new job opportunities. Finally, no control group exists to compare to those obtaining employment in new industries with those not changing jobs in the area. Therefore, the reader does not have any way to gauge the relative family income benefits for those who secured new manufacturing jobs.

The second relevant study was done by Borjas and Rosen. They used the National Longitudinal Survey data on the young men age cohort to look
at the gains from job changing. The authors hypothesized that job turnover is a market device that improves the economic efficiency of labor input in the production process. This results in a match between workers and employers that leads to a high marginal value product. Among other things, they specify and test two statistical models that have the log of the ratio of the wage rate a worker earned in 1975 to his wage rate in 1971 as a function of 21 independent variables. The first model is specified for employees that do not change jobs while the second is specified for those who do. The relevant independent variables include eleven discrete variables representing eleven different industries, education, job tenure, knowledge of the world of work, experience, resident of the south in 1971, resident of a standard metropolitan statistical area (SMSA) in 1971, and months of army experience in 1971.

Their predictive equations are weak. Only a few independent variables have t-values above 2.00. For job changers the most significant variables are tenure, tenure squared, experience squared, south, employed in agriculture in 1971, and employed in business and repair services in 1971. For workers who did not change jobs the most significant variables are tenure squared, knowledge of the world of work in 1971, experience, SMSA, and employed in agriculture in 1971.

Borjas and Rosen choose a dependent variable which measures change in wage rates earned between 1971 and 1975. In contrast to the changes in jobs that occurred between 1971 and 1973, the authors include this longer time period for measuring wage changes. This incorporates the effects of any subsequent job changes on the decision to change jobs in
the shorter period. In an extension of this work the authors also exa-
mined the wage impacts of changing jobs and they found young men to be
more responsive to immediate wage growth as compared to longer term wage
growth. The dependent variable in this dissertation, the percentage
change in the wage rate earned over a shorter period, avoids this
problem. In most cases the authors did not explain the rationale for
their choice of independent variables. Also, only two variables, both
in the job changer's equation, had a t value above 2.00. These are job
tenure, having a minus sign; and the agricultural industry variable
having a plus sign. However, beyond these shortcomings the study provi-
des some valuable insights. They are the following:

1. Job changers had a lower wage prior to changing than job
   stayers. Job changers also had poorer family backgrounds and
   lower values on other characteristics usually associated with
   higher earnings.

2. Job changers realized a larger wage gain in percentage terms
   than job stayers. Thus, mobility improved the worker's job
   opportunities.

3. Job stayers gained more by remaining on their job than job
   changers would have if they had stayed. Thus, both groups
   acted rationally.

4. Job separation occurs if a worker's productivity in another
   position exceeds his productivity at his present job.

The third relevant study was done by Bartel and Borjas. They also
used the National Longitudinal Survey data on the middle-aged men's
cohort. They looked at job changers: what are the determinants and
consequences of middle-age job separation. Among other things, they specify and test four different models, two for job changers and two for job stayers. The dependent variable in the first two equations measures the percentage wage growth between 1966 and 1967. The independent variables include a set of four dummy variables indicating the reason the worker changed jobs. These variables are layoff, personal, and pull, and push. The other nine variables are years of schooling, remaining years a worker is expected to work, two marriage variables, years of job tenure, number of weeks unemployed during 1965-1966, number of spells of unemployment during 1965-1966, a variable to account for occupational change, and any change in the worker's Duncan Occupational Index. The significant variables are \( t > 1.5 \), layoff (+), Push (-), education (-), remaining years of work (+), married in the first period (-), and married in the second period (+).

Next, two equations are specified for changers and nonchangers where the dependent variable is defined as the wage change between 1966 and 1969. The same independent variables are used to explain variance. The results show that for job changers the significant variables are pull (+), remaining years of work (+), spells of unemployment (-), and change in Duncan Occupational Index (+).

Bartel and Borjas estimate a model different from the one this author proposes to estimate. Their dependent variable, short term wage gains realized by workers between 1966 and 1967, is the same as the dependent variable in this dissertation. However, they do not recognize

\[2/\] See the next page for the definitions.
the simultaneity between wage changes, hours worked, and job changing status.

This study provides some valuable insights. These are the following:

(a) They split job quits into three groups;
   (1) those who were pulled from one job to another by knowledge of a better job,
   (2) those who were pushed by job dissatisfaction into another job, and
   (3) those who quit for personal reasons unrelated to their job.

These give rise to the variables previously mentioned: personal, and push and pull. The quitters who were pulled into their new job realized a higher immediate wage gain than those who changed for any other reason.

(b) The authors found a correlation between job separations and job tenure. Most separations occur in the first few years of job tenure. This finding supports the hypothesis that job matching is an imperfect process. As both parties learn about each other one or both may decide to dissolve the match.

(c) The availability of pension plans decreases job quits but does not stop quits for personal reasons. Also, factors such as time remaining in the labor force and one's wife's job situation affect job pull quits but not job push quits.

(d) The empirical results show a positive relationship between jobs that have a high degree of stability and the wages paid these
Higher wages were paid to workers with less stable jobs.

Another relevant study was done by Parnes and Nestel. They use the National Longitudinal Survey data on the middle-aged men's cohort. Like Bartel and Borjas, they also looked at job changers. They focus on interfirm movement. They measure the propensity of men to change jobs, the opportunity, and the economic and psychological effect of the job change on middle-aged men. They hypothesized that the likelihood of a voluntary job change is a function of a worker's propensity to move and his opportunity.

The likelihood of a voluntary job change (M) was tested using multiple classification analysis (MCA). This is a more general formulation than the multiple regression approach. It avoids assuming a linear relationship between the dependent and the independent variables. The MCA results showed that job tenure, age, coverage by a pension, and job satisfaction all were significant and also monotonically and negatively correlated with a voluntary job change (M). Neither the health variable nor the local area unemployment rate were significant determinants of job changing. Also, racial differences did not determine a significant amount of the variation in M. However, occupational differences and industrial differences did affect job mobility. Professional workers changed more often than operatives and service workers. Also, men in the construction industry changed more often than all other occupations, while men in mining changed least often.

These results refer to variables that affect the propensity to change jobs. Among the variables exclusively affecting the opportunity to switch jobs two were significant, hourly wages earned and educational
Men with below average earnings in their occupational category by at least $1.00 per hour were more likely to change jobs. Also men with above average educational attainment for their occupation were twice as likely to change jobs as those with two or more years below average educational attainment.

Next, the authors considered the consequences of job changing. It is most pertinent to consider how much new job recipients benefit. The previous portion gave us insight into who benefits. First, the authors considered how to explore worker's gain from voluntary job switching. The ideal way conceptually is to answer the question "whether the job changers are better off than they would have been had they not changed." However, no data set provides this information. One could test to see if job changers had experienced gains, but in a period of rising wages this would be a weak approach. One could compare absolute wage gains by job changers to job stayers. Since the authors found job changers were more often those with below average pay in an occupation this would be a biased test. The authors chose the percentage change in hourly wages over two periods for both job changers and job stayers as their best alternative.

Finally, the authors pulled out hourly earnings in $t_1$ and $t_2$ for all men and then split white men into three categories and black men into the same three. These are (1) nonchangers, (2) voluntary job changers, and (3) involuntary job changers from layoffs or discharges. The results were then computed into percent changes. They concluded that middle-aged men making voluntary switches did at least as well as those not switching. Men did better switching jobs during the expansion
part of the business cycle. Those who changed jobs due to involuntary circumstances did almost as well, when one considers hourly wages only, as those who changed jobs voluntarily.

Parnes and Nestel explored a similar set of questions to that researched in this dissertation. However, they chose a different methodology. They looked at hourly wages only between 1966 and 1971, 1967 and 1969, and 1969 and 1971. They used MCA to analyze job mobility (M) against personal, industry, occupational, and local job market characteristics. Finally, they looked only at middle-aged job changers. Therefore, differences exist in the age groups, time periods, and model formulation when Parnes' and Nestel's research is compared to this dissertation.

One other relevant research document is worth noting. A publication entitled Career Thresholds (Kohen) analyzes the young men's age cohort in the National Longitudinal Survey. It concentrates on data gathered in 1966 through 1969. By using extensive cross tabulations his findings are the following:

1. Young white working men in 1966 had hourly wages increase an average of 53 percent by 1969 while their black counterparts experienced an average increase of 68 percent.

2. The likelihood of men changing employers was strongly correlated with age and race. Blacks and the youngest moved more often.

3. Occupational differences were correlated with job movement. Men in lower status jobs and lower paying jobs showed less
attachment to them. For example, blacks in farm employment tended to be job changers.

4. Job changers were found to improve their economic position relative to nonchangers. This was true for both blacks and whites and for all levels of educational attainment. However, job changers started with lower average hourly wages than nonchangers but by 1969 they caught up.

5. White men experienced a diminishing return to them for each change they made.

6. Between 1967 and 1969 fifty percent of the out-of-school young men changed jobs at least once. About 80 percent of these changes were voluntary for whites and 60 percent were voluntary for blacks.

7. Voluntary job quits were highest during the first few months of job service. Beyond this period the likelihood of quitting diminished as workers built equity in their jobs, such as seniority rights, and developed strong social and psychological ties to their place of work.

8. Men with less than a high school education and who changed jobs were more likely to receive training in the job than their counterparts who did not change jobs.

Labor Market Studies

A number of case studies that consider the dynamic changes in rural and urban markets are reviewed next.

Parnes lists the reasons given by workers for voluntary job separations. Twenty-seven percent gave wage reasons for switching jobs in one
study, while in another study workers gave wage reasons only four percent of the time. These figures are the high and low ends of the range. Other major reasons for switching jobs include steadiness of employment, a chance for advancement, job safety, working conditions on the job, working hours, degree of independence on the job, and a set of personal reasons such as health.

Wilcock and Sobel classified voluntary job separations into four categories. In their study, 34 percent of the primary workers and 22 percent of the secondary workers changed jobs for economic reasons. These include higher wages and steadier work. Seventeen percent of both primary and secondary workers switched jobs because of the physical characteristics of the job and the mental stimulation of the job. Nineteen and 39 percent of the primary and secondary workers respectively switched because of moving or leaving the labor market. Finally, nine percent of the primary workers and eight percent of the secondary workers switched jobs for other reasons such as relationship with other workers.3/

Helgeson and Zink found in their study of new employees in a North Dakota manufacturing plant that most had economic reasons for choosing their current job. Advancement opportunities, job training possibilities, and higher wages were all given as reasons. Interestingly, no women gave job training possibilities as a reason for taking their job. The authors reported that 63.3 percent of the females improved their income by securing their new jobs. Another 30.3 percent of the men and

3/ See Wilcock and Sobel, page 133, Table 6, for a complete breakdown of both the Kankakee data reported and the Shoe Towns data not reported.
27.3 percent of the women kept their income constant. The remainder reported accepting a lower income level.

Wadsworth and Conrad discovered the net benefits to employees, to the local economy, and to the public sector of Linton, Indiana were surprisingly small as a result of the arrival of a chair manufacturer. Out of the 100 new jobs 25 employees were previously unemployed, 38 were employed but commuted to another town, 9 were employed locally, 10 were new entrants into the local labor market, 8 were self-employed farmers, and 10 were previously employed part time locally. Of those previously employed out commuters, the authors found that their old job paid more per week than their new job. Therefore, these people traded higher paying jobs for lower paying ones closer to home.

Shaffer and Tweeten studied five communities in four rural eastern Oklahoma counties to quantify the economic changes brought about by industrial development. Thirty percent of 554 workers employed in new industry returned their questionnaire. The authors found that the average worker increased his income by $568 a year. Most, 69 percent, of the employees already lived in the same community where they worked. However, 11 percent commuted to work, and 12 percent moved into the communities to take their new job. Eight percent of the new employees were previously unemployed. Of the jobs vacated, one in every five was not filled. Finally, about 17 percent of the respondents said they would have commuted or moved to other places to seek work if their present job had not been available.

This section on case studies is concluded with a brief review of pertinent findings in the survey book by Summer's, et al. The following
pertinent empirical generalizations are given by the authors on the subject of nonmetropolitan industrial development:

1. New jobs often do not go to the local unemployed, minorities and marginally employed persons likely to be near or below the poverty level.

2. Low-skill, low-wage industries are more likely to employ the disadvantaged while high-skill, high-wage industries are least likely to do so.

3. Males predominate as the employees of heavy industry while females predominate in light industries that are low-skill and low-wage industries.

4. Nonwhites are under represented in the work forces of nonmetropolitan industries. Where present, they are found in unskilled and semiskilled jobs.

5. Nonmetropolitan workers often commute long distances to work.

6. Employers prefer young workers although they hire older skilled workers.
CHAPTER III
THEORETICAL MODEL DEVELOPMENT

The literature just reviewed provides helpful insights into how to conceptualize and specify an explanatory model. The stated objective are to determine the characteristics of job changers and to estimate the relative size of the percentage gains in wages earned by job changers as compared to job stayers. The following three equation simultaneous model is one method to research these objectives.\(^1\)

\[
\begin{align*}
(18) & \quad \text{CHGWR} = f(\text{CHGHW}, \text{JSC}, P, E, M) \\
(19) & \quad \text{CHGWR} = g(\text{CHGWR}, \text{JSC}, P, E, M) \\
(20) & \quad \text{JSC} = h(\text{CHGWR}, \text{CHGHW}, P, E, M)
\end{align*}
\]

where:

\[
\begin{align*}
\text{CHGWR} & \quad \text{The percentage change in hourly wage rates earned between two time periods.} \\
\text{CHGHW} & \quad \text{The percentage change in the average hours worked per week between two time periods.} \\
\text{JSC} & \quad \text{A discrete variable that indicates the worker's status, a job switcher or a job stayer.} \\
P & \quad \text{A set of personal characteristics of the workers.} \\
E & \quad \text{A set of employer characteristics.} \\
M & \quad \text{A set of local labor market characteristics.}
\end{align*}
\]

\(^1\) This model is unique. It is based on the logic that income is a function of wage rates and hours worked. It assumes that the decision to change employers is made simultaneously with the decision to secure a new job that pays more and offers different working hours.
This model hypothesizes that the three variables CHGWR, CHGHW, and JSC are determined simultaneously. This model also hypothesizes that each of the dependent variables are a function of sets of personal, employer, and local labor market characteristics. This formulation allows the researcher to estimate the relative value of the coefficient of JSC. It allow the researcher to test the explanatory power of P, E, and M in equations 18 and 19. Finally, this model allows the researcher to investigate the explanatory power of variables that are hypothesized to influence the decision to change employers.

It is hypothesized that the variable CHGWR will be positively associated with JSC in equation 18. No such hypothesis can be put forward between the variables CHGWR and CHGHW in equation 18 since workers can choose to buy more leisure time with additional income. In equation 19 the hypothesized sign of the coefficient of CHGWR is uncertain for the same reason; however, the hypothesized sign of the coefficient for JSC is positive. Workers can improve their welfare by changing jobs to work longer hours or work for higher wages or both. The following equation shows this relationship.

\[(21) \ CHGY = CHGWR + CHGHW + (CHGWR * CHGHW)\]

where:

CHGY = The percentage change in annual earned income between two
time periods.

Economic theory postulates that individuals make decisions to improve their welfare position. In this study it is assumed that income is a dominant factor in the individuals welfare function. It is now obvious that the expected signs in equation 20 for the coefficients of
CHGWR and CHGHW are positive. That is, the higher the wages and hours available the more the individual switches jobs.

The remainder of this section identifies specific independent variables included in each of the three equations in the model. The theoretical logic for choosing each variable is discussed. Any empirical evidence on the relevance of the variable is given. Finally, the expected sign of the partial derivative of the regression coefficient for each variable is indicated.

The Wage Rate Differential Function

To begin with, specific variables in sets P, E, and H are considered that are hypothesized to explain the variance in CHGWR.

Personal Characteristics (P)

1. **Specific and General Human Capital (SHC and GHC)**

   Human capital theory suggests education has a positive effect on people's earnings potential (Becker, Caroy and Marenbach). Specific human capital, however, is not tied as closely as general human capital to income earned. Economic theory suggests that after on-the-job training is complete the value marginal product for people with mainly specific human capital (SHC) will be greater than their wage received (Becker). For people with mainly general human capital (GHC) their VMP will approximately equal their wage received in a competitive labor market environment. From these two simple relationships it can be shown that people with SHC, who voluntarily change jobs, will probably realize a larger wage gain than job changers who have only GHC.2/

2/ The following idea is an extension of an argument made by Borjas and Rosen, p. 161.
Figure 4 shows a worker with only SHC. The employer has invested in hiring and training this employee and is receiving a return on that investment equal to $G$:

$$ G = VMP - W $$

$G = $ Firm's return on investment in SHC (Axis)

$VMP = $ Value marginal product

$W = $ Wage paid employee

$S = $ The surplus over the worker's reservation wage the employee receives (Axis)

This relationship is shown by line AA' in Figure 4. If the employee is at point 1 in Figure 4 both he and his employer have a satisfactory bargain. At point 1 both $G$ and $S$ are positive. Now, if for some reason one of the parties to the bargain tried to impose a wage at either points 4 or 6 the relationship between this employer and employee will break down. However, a renegotiated wage at points 2 or 7 could be acceptable to both parties, although the employee prefers 2 to 1 and 1 to 7, and vice versa for the employer. Finally, a renegotiated wage at either points 5 or 3 puts the relationship in jeopardy since either the employer is receiving zero return, i.e. $G$ is zero at point 3, or the employee is getting his reservation wage and $S$ is zero at point 5.

If another employer finds the skills of the worker attractive because of some unique set of nonspecific HC attributes, he will try to bid away the worker's labor services from the current employer. Based purely on wage earnings criteria, the new employer would have to offer a

---

3/ The reservation wage is defined here as the minimum wage the worker will accept from his employer before quitting to find another job.
Figure 4

Employee With Specific Human Capital

1 is the initial starting point

G = A Firm's Return on its Investment

S = The Surplus Over a Worker's Reservation Wage
wage equal to $S_3$ or higher. If the new employer offers less than $S_3$, the existing employer will be able to match the offer and the likely outcome would be a decision by the worker to remain at his present job.

Figure 5 adds a worker with only GHC. Line $AA'$ shows the same curve as in Figure 4 for a worker with SHC. Line $BB'$ shows a worker with GHC. The employer has invested nothing in training the employee but has invested a small amount in finding, screening, and hiring the employee. Assuming that the employee has searched the job market and chosen the employer because he pays the highest wage, then $S_1'$ is positive since the employee's reservation wage is his wage at the next best job. However, since the worker has GHC he can find a like job elsewhere at a wage close to his current one so $S_1'$ is positive but smaller than $S_3'$ for the worker with SHC. Likewise, $G_1'$ is positive but smaller than $G_2'$ since little or no employer financed on-the-job training investment was made.

In Figure 5 the distance between point $S_1'$ and $S_3'$ is less than the distance between $S_2'$ and $S_4'$ on $AA'$. Another employer, therefore, can bid away an employee with only GHC with a smaller wage gain offer than an employee with considerable SHC, ceteris paribus.

Thus, it is hypothesized that a worker with SHC is likely to receive a higher hourly wage differential when he quits one job to take another than the worker with GHC. However, a worker with SHC who does not change jobs is likely to receive a smaller wage increase than a worker with just GHC. Finally, a worker with SHC who is forced to leave will probably experience a negative change in wages while a worker with
Figure 5

Employee With General As Compared To Specific Human Capital

1 and 1' are initial starting points

G = A Firm's Return on its Investment

S = The Surplus over a Worker's Reservation Wage
GHC who is forced to leave will not necessarily lose earnings power in his next job.

2. **Age (AGE)**

Human capital theory suggests that age affects job mobility. Each job change can be viewed as an investment to gain future benefits. The worker will consider the expected length of the benefit stream and his rate of return on his investment (Becker). Workers will be more likely to change jobs the higher the expected net present value of the stream of benefits over costs.

\[
(23) \quad \text{NPV} = (B_1 - C_1) + \sum_{t=2}^{n} \frac{B_t}{(1+i)^t}
\]

where:

- **NPV** = The net present value expected by the worker
- **B** = The net wage gains due to job changing
- **C** = The cost of job changing (i.e. weeks out of work and other search costs)
- **t** = Time periods 2 to \( n \)
- **i** = Discount rate

Obviously the longer a worker's expected work life is, the larger will be the NPV realized from job changing. Thus, it is hypothesized that younger workers will require a smaller hourly wage gain to induce them to switch jobs than older workers. However, a worker who is older and chooses not to change jobs will not necessarily gain more in wage increases than his younger counterpart. Also, a worker who is older and is forced out of his job in \( t_1 \) may have a difficult time finding a job by \( t_2 \) that pays as well.
3. **Health (HEALTH)**

Poor health can affect the productivity of a worker and thus his value to employers. A worker who is well in one time period and sick in the next may have to leave his job and end up taking another at a lower wage rate. If the health problem is temporary the income loss may be a short term one. If the health problem is more lasting the worker may have to change occupations and accept a lower wage.

4. **Job Tenure (JT)**

Many worker fringe benefits are linked to the duration of continuous employment. Some of these are seniority, vacation days, and retirement benefits. Since the annual value of these fringe benefits are part of all workers' real wages those with longer job tenure will receive a higher valued set of fringe benefits than workers with less job tenure. The cost of changing jobs for those with more years of continuous work is greater than for those with less years of job tenure. Therefore, it is hypothesized that the hourly wage differential will have to be greater to induce workers with long job tenure to quit than for those with only a short period of continuous employment with their current employer. If the worker is forced to leave his job, the change in wage rates realized upon securing a new job could be inversely related to job tenure. Finally, for the job stayer the expected sign is ambiguous.

5. **Commuting Time to One's Place of Work (CA76)**

Wadsworth and Conrad found in their study of Linton, Indiana, that out of 100 new employees hired, 38 were previously employed at jobs they
commuted to out of town. The old job paid more per week to 35 workers out of the 38 than they earned in the new job. These workers put a high value on convenience and travel savings of a job near home compared to further away. Thus, it is hypothesized that workers will trade jobs for a smaller hourly wage differential if they can save time and commuting costs. For the job stayer commuting time is a constant variable, unless a new highway is built, and it has no effect on the percentage change in wages.

6. **Other Family Income (OFI)**

Economic theory postulates that workers have a labor leisure trade-off. It is also assumed that leisure is a normal good. But, the effect of a raise in hourly wage will also encourage workers to substitute work for leisure. The substitution effect is expected to dominate the income effect for workers earning a modest wage. At a high wage, however, the income effect can dominate the substitution effect. Taken together the resulting labor supply curve slope is positive over much of its range but may become backward bending at the highest end of the pay scale (Fleisher and Kneiser).

What happens when people have income from non-labor sources? Since the income is earned outside the workplace, no substitution effect occurs, only the income effect occurs.

Figure 6 shows the likely effect of unearned income on weekly hours of participation in the labor force when there is only one wage earner in the family. In the initial situation the worker is working 40 hours per week. The family budget is tangent to $U_1$ at point 1 where the wage
Figure 6

The Impact Of Unearned Income
One A One Wage Earner Family
income of the worker is $125. This income is the only family income. Next, the family received an inheritance that when invested yields an interest income of $81.25 per week. The worker now decides that he can afford to buy ten hours more of leisure. This is the income effect. He cuts his work week to 30 hours and still earns $93.75 plus interest income. His income now equals $175 per week. The marginal utility for wage income earned in the 10 hours no longer worked is less than the marginal utility of ten hours of free time in this case. This person is work averse. Economic theory, as shown in the theory section, usually assumes people get utility from spending income and free time, not from working (see Equation 1).

If all workers get disutility from work and utility from leisure then the worker with unearned income would choose to work less. To be induced to change jobs and work the same number of hours as his counterpart who has no unearned income it would take a larger wage differential offer. Thus, it is hypothesized that a job changer will require a larger net wage gain the greater is his unearned income. For workers who do not change jobs unearned income will not affect the percentage change in wage rates over time.

7. Race (RACE)

In the review of literature several authors found differences between the labor behavior of black and white men. Black men changed jobs more often (Kohen). Nonwhites have higher unemployment rates and longer periods of unemployment than whites (Ragan). Finally, Becker theorizes that if blacks experience job discrimination they will have less of an incentive to invest in formal higher education since the
payoff will be lower. All these pieces add up to a picture of blacks being forced to accept an inferior competitive position in the work force. However, the theory does not predict how black wage differentials will compare with whites. One might expect that black job changers will do better than the average worker due to the recent federal and state programs aimed at encouraging equal opportunity hiring practices. For those who do not change jobs their race should not affect their wage raises if no discrimination exists. The results for this variable will provide insight on the relative progress nonwhites make compared to white workers.

8. **Unemployment Experience (WKSUN)**

A worker who is unemployed during a period of weeks between jobs will probably reduce his wage expectations the longer he is unemployed. This hypothesis is supported by some empirical evidence (Barron and McCafferty). Thus, it is hypothesized that the longer the period of unemployment prior to the job change the smaller will be the wage rate differential finally realized.

9. **Hourly Wage Rate in t, (HWR)**

Empirical evidence from other studies in Chapter Two shows that job changers are often the least well paid workers in the labor force (Parnes and Nestel, and Kohen). Also, empirical evidence shows that below average wage earners in the labor force gain more by changing jobs than workers who did not change jobs (Borjas and Rosen). It is thus hypothesized that the sign of the coefficient on the variable HWR will be negatively correlated with hourly wage rate gains.
Employer Characteristics

Although several employer characteristics may influence the wage differential acceptable to an employee they may be jointly determined with wages, hours, and the decision to change jobs. If labor market conditions, production technology, and the employees skills allow him wide flexibility in selecting the type of industry and firm in which he will work then the variables are endogenous. If the worker has little choice in the type of industry then these are exogenous variables.

1. Relative Stability of the New Employer (JOBJS)

If workers want to maximize expected earnings, they consider the immediate wage differentials as well as the expected future wage differentials. Thus, workers are interested in the stability of the firm compared to their current employer when considering a job switch. If the new industry is a "foot loose" one such as a clothing manufacturer which may change locations in a few years, it may fire all its employees in one place and hire all new employees in its new location. If the industry is tied to the residential construction industry, like a storm window manufacturer, then it will have to vary its labor force as the residential construction industry varies. Thus, workers will compare the relative stability of their current employer to a prospective one. One would expect, and research results have shown, that the wage differential will have to be greater to attract workers to a firm perceived to be unstable than to a firm perceived to be stable (Bartel and Borjas). Thus, it is hypothesized that workers will accept a smaller wage differential if the new employer offers more stability than the old
one. For those who do not choose to change jobs any new job opportunities, even with highly stable employers, did not seem attractive enough to influence these workers.

2. The Relative Difference in Working Conditions (JOBWC)

   Since workers spend a large proportion of their waking hours at their work place, it is logical to expect that the working conditions will affect the employees' level of utility (Becker). Working conditions include the noise level, tension level, danger level, and other physical and psychological characteristics of the plant environment. It is therefore hypothesized that a worker will trade a smaller wage gain for a substantially better work environment in his new place of work compared to his old one.

3. The Relative Difference in the Fringe Benefit Package (FBP)

   Fringe benefits are part of the total value of the income offered to new employees by employers. While wages are fully taxable fringe benefits are not. In 1976 the average value of fringe benefits equalled about 14 percent of the wages paid by employers (Reiss, p. 192). Therefore one would expect a utility maximizing wage earner to compare his present fringe benefit package to one being offered by a perspective employer. It is thus hypothesized that a worker will be willing to settle for a smaller hourly wage differential if the new employer offers a substantially higher valued fringe benefit package than the old employer.
4. The Relative Difference Between Job Training and Promotion Opportunities (JOBPO)

Future earnings are partly a function of future changes in job productivity and responsibility. The obvious way to improve one's wage is to acquire more training and a more responsible position. A new firm coming into an area that offers better job training and promotion opportunities will be able to attract strong applicants. The utility maximizing wage earner will try to raise his expected long run earnings by taking advantage of the new firm's programs. It is thus hypothesized that a worker will settle for a smaller initial hourly wage gain if he expects that his long run earnings will be greater as a result of the new firm's policies.

5. The Relative Strength of the New Firm's Growth Prospects Compared to Established Firms (JOBFG)

A firm experiencing expanding markets for their products may also realize a rise in their product prices if conditions are right. In the case where the firm and others in the industry cannot expand supply as fast as the demand schedule is shifting outwards, the market will ration the product by raising prices. In this situation the firm will realize above average profits as long as their long run average cost curve is flat or declining. The workers in this firm will contribute an above average value amount of added. At least for established workers this high marginal value product might be passed on to the workers in the form of above average wages and benefits. However, the firm has no incentive to pay a starting wage above the local market. In fact they might be able to hire workers below the norm since the prospects of above average earnings are high for the future.
It is therefore hypothesized that in order to acquire a higher future income workers will be willing to settle for a smaller initial hourly wage differential to secure a job in a strong firm in a rapidly growing industry.

6. **Unions (UNION)**

The worker who switches from a job that is not unionized to one that is unionized may experience a different wage change than if he switches from a nonunionized job to another nonunionized one. Based on a national sample of workers, Shapiro found that unionized workers earn significantly higher wages than nonunionized workers. This may be because many unionized industries in the United States historically have been oligopolistic industries. The unions gained a monopoly over the sale of labor to these industries and the resulting negotiated wage rates reflected some of the producer surplus being shared with company workers (Weiss).

It is hypothesized that for workers changing jobs from a non-unionized to unionized firms they should realize an above average wage rate change. For unionized workers in unionized firms who do not change jobs it is hypothesized that these workers also should realize an above average wage gain.

7. **Company Employment Size (COMPSZ)**

Another employer characteristic is the total number of employees a company has on its payroll. This variable is a proxy for the intra-company promotion opportunities. It may also be a proxy for the size of the fringe benefit package provided employees. The value of this
package added to the size of the wages earned is a truer measure of the actual income earned by workers. However, overtime added fringe benefits may be given in lieu of added wage raises. Thus, for workers not changing employers company size should affect raises. The direction, however, is uncertain.

Local Labor Market Characteristics (M)

1. The Local Unemployment Rate (UR76)

Generally, the labor market is a competitive market where workers are competing against each other for a better return on their labor resources (time and human capital). A high unemployment rate indicates that demand is inadequate relative to labor supply at a fixed wage rate. As a result of the unemployment more applicants will be competing for the new job openings at existing wage levels. Thus, it is hypothesized that job changing workers will have to settle for a smaller initial hourly wage differential when the local unemployment rate is higher.

2. Commuting Patterns (CP)

A labor force that exhibits a pattern of out commuting to jobs usually has this pattern because local jobs are inadequate or nonexistent. Although some counties and communities have developed as bedroom communities, this is not always the reason for a weak local labor market. The arrival of a new firm can change that market. Wadsworth and Conrad, as already noted, found workers willing to quit old jobs they commuted to, to take new ones close to home. Based on their results it also appears workers were willing to accept a lower wage for the opportunity to work at home. The percentage of the work
force that is commuting out of the community is hypothesized to be negatively correlated with the size of the hourly wage differential offered by the new firm.

3. Residential Location (LFSZ76 and SOUTH)

The chosen sample includes workers living in all regions of the country and in urban as well as rural communities. In order to control for these residential location differences and in order to focus on non-metropolitan workers these variables are included. Borjas and Rosen found a positive sign for their South coefficient, in the log of the ratio of wages equation, and a negative sign on their SMSA coefficient. This empirical evidence suggests that location variables are important. It is hypothesized both LFSZ76 and SOUTH will have positive coefficients.

The Average Hours Per Week Worked Differential Function

Equation 19 hypothesizes that the percent change in hours worked per week is a function of the percent change in wages earned per hour, a set of personal, employer, and market characteristics, and a discrete variable that indicates a job status change. As already discussed, an increase in wages may induce a worker to devote more or less time to his job. Other activities and responsibilities will claim time that may compete with a worker's job. These are considered below.

A worker's time, 168 hours a week, must be allocated to a number of uses. So far we have considered only two, on-the-job time and off-the-job time. For equation 19 a more elaborate breakdown is needed. Workers can use their time for a second job, another business, commuting
to work, sleeping, eating, child care, health care, off-the-job training, home maintenance, recreation, and many other things. Any or all of these uses of time can affect the amount of time a worker wishes to devote to work at his primary place of employment. For example, for a non-farm family, children take more adult time than they give back in labor. An economist might classify children as a consumption item that requires parents' time and money to rear. Thus, the more children a family has the more time and money is required. Therefore, a working parent with a large family will want to earn the maximum return on his work time yet have enough nonwork time to devote to parenting his children.

Personal Characteristics (P)

1. **Dual Job Holder (DUALJOB)**

   If a worker holds two jobs in time period one he most likely does so because he needs or wants more income. His marginal utility for an additional dollar of income as compared to an additional unit of leisure time is higher than average. His likely motivation for switching jobs from his primary employer in $t_1$ to another primary employer in $t_2$ is to earn more income per hour or to work more hours at his primary job. Thus, for equation 19 it is hypothesized that a job changer will switch to another job if it offers a chance to work additional hours per week. This could give the worker a chance to quit his second job. For those who do not switch jobs if it hypothesized that they will try to gain more work time on their first job and give up work time on their second job.
2. Health of Worker (HEALTH)

The more healthy workers need to spend less time on health care which leaves more time for other things. A person with deteriorating health will spend more time sick, visiting doctors, and taking medicine. It is hypothesized that workers who report deteriorating health will work shorter hours at their job (Watts, et al.; and Andrisani).

3. The Number of Dependents (CHGND)

Parenting is a time intensive activity. It is hypothesized that a worker who changes jobs will choose a job which reduces hours worked the more children he has, other things being equal.

4. Off-The-Job Training (EDUC)

If a worker chooses to acquire more formal training or education it will require a rescheduling of his use of time. Education and training are time intensive activities. It is hypothesized that a worker will work fewer hours while pursuing more education. After his education is completed, it is hypothesized that a worker will work more hours per week.

5. Other Family Income Besides a Worker's Wages (OFI)

Income from other sources such as interest, rent, prize money, and other unearned sources allows the worker to buy more leisure time. It is hypothesized, therefore, that a worker will choose to work fewer hours per week if other family income goes up over the period being analyzed (Watts, et al.).
6. Race (RACE)

Blacks and other minorities, historically, have had to accept the more menial jobs in society. Thus, in order to increase their utility level they must work longer hours. It is hypothesized that nonwhites will expand their average work week from \( t_1 \) to \( t_2 \) at a percentage rate higher than average.

7. Weeks Unemployed (WKSUN)

A worker who experiences a long unemployment period immediately prior to \( t_1 \) will have lost a large amount of income. He will be anxious to catch up. Thus, it is hypothesized that he will expand his average work week at a percentage rate higher than average.

Employer Characteristics (E)

1. Government Job Held (GOVTJOB)

It has usually been accepted as common knowledge that government jobs are more secure and pay lower wages than private sector jobs. Government jobs usually provide a steady work week in terms of number of hours per week. Also, government jobs do not offer much overtime work. Thus, the sign of the coefficient is hypothesized to be positive for people changing to government jobs in \( t_2 \) and negative for government workers who do not change jobs.

2. Firm Size (FIRMSZ)

The hours worked in an average week in \( t_1 \) may change for a worker who changes jobs by \( t_2 \). This variable hypothesizes a correlation between CHGHW and the number of employees in the firm the worker is
employed in during $t_1$. Small firms may offer longer or shorter work weeks than larger firms. The sign on the coefficient for FIRMSZ is uncertain.

Local Labor Market Characteristics ($M$)

1. **Residential Location of Worker (SOUTH, LFSZ76)**

   In the data set information is provided about the region of the country, south or nonsouth, in which a worker lives and the size of the local labor force. These are included as dependent variables. The researcher wants to see what sign each coefficient will have and whether any of these variables are significant. It is hypothesized that bigger labor forces in an area indicate more opportunities for jobs and that a growing industrial base offers more opportunities in the South. Thus the signs for both variables should be positive.

2. **Unemployment Rate (UR76)**

   Neoclassical economics considers the effect of the unemployment rate on wages offered in the market place. A logical extension is the interaction of unemployment rate on hours worked a week. In an area where unemployment is high, the demand for locally produced goods is weak. This will often affect the average work week negatively. The areas with the highest unemployment in $t_1$ will have the smallest expansion in the average work week by $t_2$ since the slack in capacity utilization of workers' time must be absorbed before the work week is expanded.

   **The Job Status Change Function**

   Job status change has been hypothesized to be endogenous and is a function of changing wages, hours, as well as personal characteristics,
employment characteristics, and labor market characteristics. This is shown again in general form in equation 20.

\[ JSC = n(CHGWR, CHGHW, P, E, M) \]

The predetermined variables and the hypothesis about their relationship to JSC are described below.

Personal Characteristics (P)

1. **Specific and General Human Capital (SHC and GHC)**

   The analysis on general and specific human capital, presented earlier for the wage rate differential function, also has implications for JSC function. Figures 4 and 5 can be used to demonstrate that employees with SHC are less likely to change jobs since fewer employers can afford to bid them away from their current employers. In contrast, those employers with larger amounts of GHC are likely to be more mobile.

2. **Age (AGE)**

   As shown in equation 23, the longer the period of payback from a job change the greater will be the net present value of this change. Thus, it follows that older workers are less likely to voluntarily switch jobs since they would have to be enticed by a larger wage. Empirical evidence supports this hypothesis (Parnes and Nestel, and Kohen).

3. **Health (HEALTH)**

   Equation 23 implies that workers expecting shortened work lives may be reluctant to change jobs. The net present value of the change depends on the length of the future earning stream as well as the
increase in wages. Thus, few workers with health problems will voluntarily change jobs but many more may change jobs on an involuntary basis. It is hypothesized that HEALTH is positively correlated with JSC.

4. **Job Tenure (JT)**

Job tenure reflects the degree of perfection of the match between workers and their employers. This suggests that wage increases will need to be higher to induce a job change. Or conversely, it is hypothesized that job tenure is likely to be negatively related to JSC, holding constant wage changes and other variables.

5. **Other Family Income (OFI)**

The availability of other family income from nonwage earnings sources gives a worker and his family more freedom of choice. This freedom of choice increases with the size of the unearned income. One choice is to work in a job he enjoys with less concern for its relative earnings potential. Another choice is to change employers whenever the worker is unhappy with his employer. Thus, the expected sign of the coefficient is ambiguous.

6. **Race (RACE)**

There is some empirical evidence that blacks change jobs more often than whites (Kohen). The theoretical reason for this is uncertain, therefore, no hypothesized sign is suggested here.
7. **Hourly Wage Rate (HWR)**

Since there is more incentive to change jobs for low wage earners than for higher wage, it is hypothesized that the hourly wage in 1976 will be negatively related to JSC.

8. **Commuting Time to One's Place of Work (GA76)**

The time it takes to commute is time not spent at work or in leisure. If this time could be shortened due to the decision to change jobs or the construction of a new highway then the worker would have more leisure time or work time. It is hypothesized that a worker will be tempted to change jobs if the job change will shorten the time used to commute to work holding all other factors constant.

9. **Wife's Earned Income (WIFEY)**

About fifty percent of all married couples both work. The income of the female spouse is an important part of the buying power of the families. The decision to move, change jobs, buy a house, are all decisions made with the wife's earning power as a variable. It is hypothesized that the larger the wife's earnings are in \( t_1 \) the less likely it is that the husband will change jobs.

10. **The number of Jobs Held (EXP)**

Job changing activity usually occurs infrequently for an individual. Yet some workers are continually changing employers. Between \( t_1 \) and \( t_2 \), a short period of time in this study, a majority of the workers in the U.S. labor market remain with their \( t_1 \) employer. However, it is hypothesized that the more often a worker has previously
changed jobs the more likely he will again change jobs between $t_1$ and $t_2$.

Employer Characteristics (E)

1. **Union Membership (UNION)**

Unions occur in some industries more often than in others. In the real estate industry no unions exist. In the automobile manufacturing industry most hourly wage earners belong to a union. Union members gain valuable seniority over time and their union protects their jobs as a part of that seniority. Thus, it is hypothesized that union members in $t_1$ will be less likely to switch jobs by $t_2$.

2. **Firm Size (FIRMSZ)**

Large firms differ from small firms in this study according to the number of employees. Large firms are large because they are successful and they offer attractive employment opportunities. It is hypothesized that larger firms will have less employees leaving them than will smaller ones.

3. **Government Job Held (GOVTJOB)**

Workers who choose government jobs usually do so for at least three different reasons. One, their job skills are weak and government jobs offer the best overall benefits. Two, they want to avoid the higher risks of job instability in the private sector. Three, they have received training that best suits them for public sector employment. All these reasons lead to the hypothesis that government workers in $t_1$ are most likely to be employed in $t_2$ by the same government employer.
Local Labor Market Characteristics (M)

1. **The Unemployment Rate Change (CHGUR)**

   Between one period and another a change in the unemployment rate indicates a change in the opportunity set of jobs for a worker in that labor market. It is hypothesized that the larger the decrease in the unemployment rate the higher will be the likelihood that a worker will change jobs.

2. **The Size of the Local Labor Force (LFSZ76)**

   In order to research the importance of differences across localities this variable is added. Larger labor pools usually indicate more job opportunities. It is hypothesized that LFSZ76 will have a positive coefficient.
This chapter describes the data set, specifies the empirical model, explains why it differs from the theoretical model, discusses the estimation procedures, and presents the analysis.

The Longitudinal Data Base

In order to test the model developed in Chapter Three a large data base with longitudinal information on the same subjects was needed. The National Longitudinal Surveys of Labor Market Experience (NLS) provides this wealth of data on thousands of people across the United States and over a considerable period of time. The surveys were initiated in 1965 by the Center for Human Resource Research of The Ohio State University under contract with the Office of Employment and Training in the United States Department of Labor. Since 1965 four age cohorts of working people have been interviewed nine or more times up through 1980. These cohorts are called the Young Men's Cohort, the Young Women's Cohort, the Men's Cohort, and the Women's Cohort. In 1966 the people in the Young Men's Cohort ranges in age from 14 to 24. The Young Women's Cohort ranged in age from 14 to 24 as of January 1, 1968. The Men's Cohort ranged in age from 45 to 59 in 1966. Finally, the Women's Cohort ranged in age from 30 to 44 as of January 1, 1968. These cases are drawn from a national population base. The only factor which biases the original
Young Men's Cohort is the decision to include twice the percentage of young black men in the sample than actually occurred in the U.S. population as of 1966. The Young Men's Cohort was chosen as the data base because this group is very likely to benefit from new job opportunities and it is very active in terms of job changing activity.\(^1\) Out of the total group 28 percentage changed jobs between 1976 and 1978.

The original sample in 1966 included 5,225 young men. Between 1966 and 1980 the sample population dropped by 1,466. These young men were lost to the sample because of deaths, changes in residence, enlistments into the armed forces, institutionalizations, hospitalizations, and refusals by the respondents to be interviewed.

Out of the original total of 5,225 observations, 1,864 did not meet the requirement that they reported being in the labor force in 1978. Another 336 men were eliminated because they were not working for pay for either the private sector or for the public sector. Another 171 were dropped because they did not report their earned income for the job held in 1978. Another 106 observations were dropped because they reported working an average of less than 35 hours per week in 1978. Finally, 23 cases were lost because they did not report whether their 1978 earned income was an hourly, weekly, monthly, or yearly figure. A final set of 2,725 cases remain for analysis.

As of 1976 the young men ranged in age from 24 to 34. The sample was largely white (76.3%) and most lived in the nonsouthern part of the United States (61.6%). Only 28.1 percent lived in rural counties while 30.2 percent lived in the central city of an SMSA. The rest lived in an SMSA but outside the central city. In 1976, 70.6 percent of the young
men were married. Many had no children but the mean number of dependents excluding the wife was 1.24. In 1976 the average number of completed grades of school was 13.28. Between 1973 and 1975, 783 men reported participating in some type of occupational training. Another 714 men reported participating in occupational training between 1976 and 1978.

In 1976, 29 percent had their wages set by collective bargaining. This percentage rose to 36.4 percent by 1978. Most (81.3%) men worked for private firms. They drove an average of 30 minutes to get to work in 1978. This was up from 20 minutes in 1976. The average hours a week worked by this group was 44.55 hours in 1978. The average wage rate was $7.23 per hour. In 1976 the average work week was 43.23 hours and the average hourly pay rate was $5.82. In 1976, 743 workers stated they preferred to work more hours a week. The average unemployment rate in 1975 was 66.4 percent and 5.71 percent in 1978. The average change in unemployment was .97 percent.

An Explanation of the Differences Between the Theoretical Model and the Estimated Model

The estimated model is slightly different than the conceptual model described in Chapter Three.

There are three main reasons for this. One, the data set does not provide a good measurement for every variable. Two, some variables are highly correlated and, thus, several had to be dropped in order to better estimate the equations. Three, in order to identify the three simultaneous equations it was necessary to make sure each equation had at least one unique independent variable.
Even though the NLS data set is rich in information about each worker interviewed, some variables are not found in the data set. No information was available in the data set for the following:

1. The job security in the job held in 1976
2. The working conditions in the job held in 1976
3. The value of the fringe benefits given by the employers in 1976 and 1978
4. The promotion opportunity available with the 1976 employer
5. The relative growth potential of the 1976 and 1978 employers
6. The local labor force commuting patterns in 1976 and 1978

Next, the dependent variables CHGWR and CHGHW are percentage change variables over the period from 1976 to 1978. The percentage change way of measuring differences in wages earned and hours worked is but one alternative. The other alternatives are the absolute changes or the log of the wages earned and hours worked in each time period. Following the lead of Parnes and Nestel, the percentage change was chosen. They argued that the best way to measure the change in wage rates over time for workers is to use the percentage change. The absolute change would be biased since job changers tend to be paid below average wage rates and the absolute change would thus be relatively small. The log of a change or a ratio would produce a log-linear function rather than a linear one. No theoretical reason was uncovered during the theory and literature review to choose this functional form.

All other information about the way variables are defined can be found on page 75 in the next section.
The Three Equation Model

The following model is formulated on the premise that decisions on wage rates, hours worked, and job changes are simultaneous. Thus, the model shown below hypothesizes a three equation simultaneous system where the three endogenous variables CHGWR, CHGHW, and JSC are determined simultaneously. A set of exogenous variables reflecting personal characteristics (P), employee characteristics (E), and labor market characteristics (M) are also part of the model. This is shown below. Underlined variables are simultaneously determined. Other variables are predetermined.

(21) \[ C_{\text{CHGWR}} = a_0 + b_1 C_{\text{CHGW}} + b_2 JSC + b_3 \text{LOGHC} + b_4 C76 + b_5 \text{LOGAGE} + b_6 \text{LOGGA} + b_7 \text{HEALTH} + b_8 \text{OP176} + b_9 \text{UNION76} + b_{10} \text{RACE} + b_{11} \text{SOUTH} + b_{12} \text{LFS76} + b_{13} \text{WKSUN} + b_{14} \text{UR76} + b_{15} \text{HWR76} + e_0 \]

(22) \[ C_{\text{CHGHW}} = a_1 + b_1 C_{\text{CHGWR}} + b_2 JSC + b_3 \text{DUALJOB} + b_4 \text{HEALTH} + b_5 \text{CHGN}} + b_6 \text{EDUC} + b_7 \text{OP176} + b_8 \text{RACE} + b_9 \text{SOUTH} + b_{10} \text{LFS76} + b_{11} \text{WKSUN} + b_{12} \text{UR76} + b_{13} \text{GOVTJOB} + b_{14} \text{FIRMS} + e_1 \]

(23) \[ JSC = a_2 + b_1 C_{\text{CHGWR}} + b_2 C_{\text{CHGHW}} + b_3 \text{LOGHC} + b_4 \text{C76} + b_5 \text{LOGAGE} + b_6 \text{LOGJT} + b_7 \text{LOGGA} + b_8 \text{OP176} + b_9 \text{UNION} + b_{10} \text{RACE} + b_{11} \text{FIRMS} + b_{12} \text{GOVTJOB} + b_{13} \text{HEALTH} + b_{14} \text{LOGEXP} + b_{15} \text{WIFE76} + b_{16} \text{CHGUR} + e_2 \]

The signs of the beta coefficients, as hypothesized in earlier parts of Chapter Three, are given below for equations 21, 22, and 23.

In summary, the regression coefficients are hypothesized to have the following signs:

**Equation 21**

1. Positive: \( b_2, b_4, b_9, b_{11}, b_{12} \)
2. Negative: \( b_3, b_7, b_{13}, b_{14}, b_{15} \)
3. Unknown: $b_1, b_5, b_6, b_8, b_{10}$

Equation 22
1. Positive: $b_2, b_3, b_6, b_8, b_9, b_{10}, b_{11}$
2. Negative: $b_4, b_5, b_7, b_{12}, b_{13}$
3. Unknown: $b_1, b_{14}$

Equation 23
1. Positive: $b_1, b_2, b_4, b_7, b_{13}, b_{14}, b_{16}$
2. Negative: $b_3, b_5, b_6, b_9, b_{11}, b_{12}, b_{15}$
3. Unknown: $b_8, b_{10}$

JSC = Job status change, an employer change from 1976 to 1978 equals one or else it is zero

LOGSHC = Specific human capital measured in weeks of company training in log form

GHC = General human capital measured in years of formal education

LOGAGE = Age in log form

HEALTH = Health status, a discrete variable with one being good health in 1975 and poor health in 1976; otherwise it is zero

LOGJT = Job tenure, the length of time a worker has worked for the employer in 1976, measured in months and put in log form

LOGGA = Geographic access to work, the minutes of time it takes a worker to get to his 1976 job measured in log form

OFI76 = Other family income from nonwage sources in 1976

RACE = Race, one stands for nonwhite and zero is for white males

WKSUN = Weeks unemployed in 1976

HWR76 = Hourly wage rate earned in 1976
UNION76 = Being represented by a union in 1976, one means represented and zero means not represented

UR76 = The local labor market unemployment rate in 1976

LFSZ76 = The size of the local labor force in 1976

SOUTH = Living in the southern states in 1976 and 1978

DUALJOB = The number of hours a week a worker committed to a second job in 1976

CHGND = The change in number of dependents between t₁ and t₂

EDUC = The worker is enrolled in an education program in 1976 but not enrolled in 1978, this status equals one, else EDUC is zero

UNIONM = Being a member of a union in 1976, this membership status equals one, else UNIONM is zero

GOVTJOB = The worker is employed by a governmental unit in 1975

FIRMSZ = The number of employees in a firm in 1976

WIFEY76 = The income earned by the wife in 1976

LOGEXP = The number of jobs held up to 1976, put in log form

CHGUR = The change in the local unemployment rate from 1976 to 1978

Estimation Procedures

Estimating a single equation from a simultaneous system by ordinary least squares (OLS) yields biased and inconsistent estimates of the regression coefficients.¹ This simultaneity bias does not decrease with sample size. This bias is a result of the correlation between the error term in the omitted equation and the independent variables. Two stage least squares (TSLS) is frequently used to purge the endogenous

¹/ This discussion was drawn from Kmenta and from Wonnocott and Wonnocott.
variables of the error components. In the first stage reduced form equations which contain all the exogenous variables of the system but none of the endogenous variables are estimated. These estimated reduced form equations are used to estimate "purified" or predicted endogenous variables.

The second stage of the TSLS estimation procedure involves using OLS with the predicted endogenous variables.

In order to use two stage estimation the model must meet certain identification conditions. If a parameter is exactly identified, the TSLS estimates are biased and consistent. If the parameter is under identified the TSLS fails because the predicted values are a linear combination of all the other independent variables. If the parameter is overidentified the TSLS provides a consistent estimate. The Bias in TSLS and indirect least squares is of the same sign when the estimate is overidentified. However, the bias in the TSLS is usually smaller than in the direct least squares method.

The identification of a structural equation must meet both order and rank conditions. The order condition requires that the number of predetermined variables excluded from a given structural equation be at least as large as the number of endogenous variables included in the equation less one.\(^2\)

The order condition is a necessary but not a sufficient condition for identification. A necessary and sufficient condition for identification, called the rank condition, is that the number of independent

\(^2\) Predetermined variables include both exogenous and logged endogenous variables.
equations less one is equal to or less than the number of exogenous variables.

All three equations are overidentified on a priori grounds in the actual model estimated.

Empirical Results

Tables 2, 3, and 4 present the estimated results. The empirical results are discussed by first considering the simultaneity issue of the model, next discussing the change in wage rate equation, then discussing the change in hours worked equation, and finally discussing the job status change equation.

Results on the Simultaneity Issue

Prior to examining each equation independently the simultaneity between equations 21, 22, and 23 will be investigated. The empirical results for these equations are reported in Tables 2, 3, and 4 respectively.

In Table 2 we are concerned with the endogenous variables CHGHW and JSC. JSC is significant at the .001 level and the coefficient is estimated to equal 25.7638. This means that job changers improve their wage rate by 25 percent more than job stayers. Thus, this result coupled with the results in Table 1 from Chapter One provide evidence that job changers improved their relative welfare position more by changing jobs during this time period than job stayers, ceteribus paribus. In fact the percentage change in wages due to changing jobs is different than that reported in Table 1, Chapter One. This suggests that the exogenous variables in equation 21 control for some of the total change realized
by job changers. These exogenous variables have some policy implications and their results will be discussed in detail after exploring the simultaneity issue.

It is clear that job changers improve their welfare position more by changing jobs than by staying with the same employer. That is even after holding constant a large set of personal, employer, and community characteristics. There is a 26 percentage point gain in wages for job changers over job stayers.

The results for CHGHW indicate that it is not a determining variable in equation 21. The negative coefficient reported has a Type I error probability of 87.8 percent. The expected sign of the coefficient on this variable was ambiguous. While neoclassical theory suggests wages and hours are simultaneously determined in labor markets, there is no theoretical implication suggesting that an individual worker's wages will depend upon his hours. Thus, this result is consistent with neoclassical theory. However, as seen in equation 20, there is strong logic that indicates that workers reach a certain welfare level by simultaneously changing their hours worked and their wage rates earned by changing jobs.

In Table 3 the results for equation 22 are presented. Both endogenous variables, CHGWR and JSC, are highly statistically significant. As hypothesized, JSC leads to an increase in hours worked. On the average, workers that changed jobs increased their hours worked by 12.69 percent. This evidence supports the claim made above that workers try to change their hours worked on the job.
The hypothesized sign for CHGWR was ambiguous because of the income and substitution effects. At first it appears that the income effect is dominant resulting in the negative coefficient. But recall that these variables are the percentage changes in hours and wages. This merely suggests that each percentage increase in wages results in a minor decline in hours worked.

The results in equation 23 confirm the simultaneity of the model. The estimated results of equation 23, the JSC equation in the model, are presented in Table 4. The estimated coefficient for CHGWR is a positive 0.0048. The variable is highly significant. This result indicates that the decision to change jobs is positively associated with a wage rate gain. This outcome supports the hypothesis that workers change jobs to improve their hourly wage rates.

Next, the estimated coefficient for CHGHW is a positive 0.0053. This coefficient is larger than the one for CHGWR. The CHGWR variable is significant at the .10 level. This result indicates that the decision to change jobs is positively associated with a change in a worker's hours per week. This outcome supports the hypothesis that workers change jobs to secure a new job that offers longer work weeks. Both working for more pay and working longer hours allows a person to earn more income. The evidence shown in Tables 2, 3, and 4 indicate that workers simultaneously consider a job change, the new pay rate and the new length of the work week.

**Change in Hourly Wage Rates-Equation 21**

In the CHGWR equation four predetermined variables are hypothesized to have positive coefficients; GHC76, UNION76, SOUTH, and LFSZ76. The
### Table 2

**The Percentage Change in Wages Equation:**

The Results of a Statistical Estimation

of Equation 21 in a Three Equation

Simultaneous Model, 1976 to 1978

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Probability of t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>100.4525</td>
<td>0.0049</td>
</tr>
<tr>
<td>CHGHW</td>
<td>-0.0415</td>
<td>0.8784</td>
</tr>
<tr>
<td>JSC</td>
<td>25.7638</td>
<td>0.0003</td>
</tr>
<tr>
<td>LOGSHC</td>
<td>1.4284</td>
<td>0.1249</td>
</tr>
<tr>
<td>GHC76</td>
<td>1.6839</td>
<td>0.0001</td>
</tr>
<tr>
<td>LOGAGE</td>
<td>6.9438</td>
<td>0.3309</td>
</tr>
<tr>
<td>LOGGA</td>
<td>0.8935</td>
<td>0.2879</td>
</tr>
<tr>
<td>HEALTH</td>
<td>-7.1244</td>
<td>0.0582</td>
</tr>
<tr>
<td>OFI76</td>
<td>0.0001</td>
<td>0.4888</td>
</tr>
<tr>
<td>UNION76</td>
<td>-1.2216</td>
<td>0.4703</td>
</tr>
<tr>
<td>RACE</td>
<td>-6.4416</td>
<td>0.0011</td>
</tr>
<tr>
<td>SOUTH</td>
<td>-0.7683</td>
<td>0.6639</td>
</tr>
<tr>
<td>LFSZ76</td>
<td>1.7473</td>
<td>0.0001</td>
</tr>
<tr>
<td>WKSUN</td>
<td>0.1102</td>
<td>0.5391</td>
</tr>
<tr>
<td>UR76</td>
<td>0.0019</td>
<td>0.9271</td>
</tr>
<tr>
<td>HWR76</td>
<td>-4.6538</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

\[ R^2 = 0.1330 \]

\[ F \text{ Ratio} = 22.41 \]

\[ DFE = 2191 \]

\[ \text{PROB.} = 0.0001 \]
Table 3

THE PERCENTAGE CHANGE IN AVERAGE HOURS WORKED PER WEEK EQUATION: The Results of a Statistical Estimation of Equation 22 in a Three Equation Simultaneous Model, 1976 to 1978

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Probability of t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>124.6753</td>
<td>0.0001</td>
</tr>
<tr>
<td>CHGWR</td>
<td>-0.1995</td>
<td>0.0001</td>
</tr>
<tr>
<td>JSC</td>
<td>12.6933</td>
<td>0.0019</td>
</tr>
<tr>
<td>DUALJOB</td>
<td>0.0004</td>
<td>0.9972</td>
</tr>
<tr>
<td>HEALTH</td>
<td>4.2795</td>
<td>0.0318</td>
</tr>
<tr>
<td>CHGND</td>
<td>-0.1228</td>
<td>0.7839</td>
</tr>
<tr>
<td>EDUC</td>
<td>11.0936</td>
<td>0.0001</td>
</tr>
<tr>
<td>OFI76</td>
<td>0.0001</td>
<td>0.6248</td>
</tr>
<tr>
<td>RACE</td>
<td>-0.6114</td>
<td>0.5505</td>
</tr>
<tr>
<td>SOUTH</td>
<td>0.8371</td>
<td>0.3728</td>
</tr>
<tr>
<td>LFSZ76</td>
<td>0.6639</td>
<td>0.0014</td>
</tr>
<tr>
<td>WKSUN</td>
<td>0.1993</td>
<td>0.0394</td>
</tr>
<tr>
<td>UR76</td>
<td>-0.0182</td>
<td>0.1074</td>
</tr>
<tr>
<td>GOVTJOB</td>
<td>-2.9074</td>
<td>0.0071</td>
</tr>
<tr>
<td>FIRMSZ</td>
<td>-0.2076</td>
<td>0.5852</td>
</tr>
</tbody>
</table>

$R^2 = 0.0435$  \hspace{1cm} F Ratio = 7.12 \hspace{1cm} DFE = 2,192

PROB. = 0.0001
### Table 4

**A JOB STATUS CHANGE EQUATION: The Results of the Statistical Estimation of Equation 23 in a Three Equation Simultaneous Model, 1976 to 1978**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Probability of t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.2829</td>
<td>0.5702</td>
</tr>
<tr>
<td>CHGWR</td>
<td>0.0048</td>
<td>0.0001</td>
</tr>
<tr>
<td>CHGHW</td>
<td>0.0053</td>
<td>0.0640</td>
</tr>
<tr>
<td>LOGSHC</td>
<td>-0.0255</td>
<td>0.0313</td>
</tr>
<tr>
<td>GHC76</td>
<td>-0.0097</td>
<td>0.0167</td>
</tr>
<tr>
<td>LOGAGE</td>
<td>-0.1124</td>
<td>0.2062</td>
</tr>
<tr>
<td>LOGJT</td>
<td>-0.0365</td>
<td>0.0001</td>
</tr>
<tr>
<td>LOGGA</td>
<td>0.0027</td>
<td>0.7936</td>
</tr>
<tr>
<td>OFI76</td>
<td>0.0001</td>
<td>0.5402</td>
</tr>
<tr>
<td>UNIONM</td>
<td>-0.0528</td>
<td>0.0153</td>
</tr>
<tr>
<td>RACE</td>
<td>-0.0005</td>
<td>0.9814</td>
</tr>
<tr>
<td>FIRMSZ</td>
<td>-0.0333</td>
<td>0.0001</td>
</tr>
<tr>
<td>GOVTJOB</td>
<td>-0.0081</td>
<td>0.7592</td>
</tr>
<tr>
<td>HEALTH</td>
<td>0.0830</td>
<td>0.0778</td>
</tr>
<tr>
<td>LOGEXP</td>
<td>0.0692</td>
<td>0.0001</td>
</tr>
<tr>
<td>WIFEY76</td>
<td>-0.0001</td>
<td>0.2328</td>
</tr>
<tr>
<td>CHGUR</td>
<td>0.0002</td>
<td>0.3482</td>
</tr>
</tbody>
</table>

$R^2 = 0.1254$

**F Ratio = 19.62**

DFE = 2,190

**Prob. = 0.0001**
variables GHC76 and LFSZ76 have positive and significant coefficients. However, UNION76 and SOUTH have negative and insignificant coefficients.

Workers with only General Human Capital are paid close to the value of the marginal product of their labor according to Human Capital Theory. Employers must pay their employees substantially more between 1976 and 1978 if these employees raise their VMP by a significant amount. Since the CHGWR is positively associated with GHC76 it seems that increases in VMP are a function of increasing levels of GHC. For example, workers with 16 years of formal education experience a wage increase that is 6.74 percent above those with only 12 years of formal education. Thus, the GHC76 is a highly significant and important determinant of CHGWR.

The variable LFSZ76 measures the number of workers in an area's labor force in 1976. It is hypothesized that the bigger the labor force is the greater are the number of job opportunities from which to choose. The competition for labor among employers will raise wage rates. The evidence in Table 2 supports the hypothesis that wage rates increase more rapidly in larger employment centers. The coefficient for LFSZ76 is highly significant and relatively large. Obviously this characteristic of the local labor market is a factor in determining changes in wage rates.

The regional characteristic SOUTH also is hypothesized to be positive. Since the area has experienced above average growth in jobs the opportunities for workers have been expanding. This should have a positive impact on wage rate increases over time. The evidence shows that
it did not. Thus the variable SOUTH is not a significant determinant of CHGWR.

The characteristic UNION76 indicates whether or not in 1976 an employee was represented by a union in collective bargaining. Unions historically have been able to bargain successfully for large wage gains (Shapiro). The evidence shows that union representation does not significantly affect the wage-rate gains secured by young male workers between 1976 and 1978. This result is surprising and raises questions about the viability of union bargaining power.

Nonwhites are expected to catch up to white workers during this period of 1976 to 1978. In order to do this they had to receive larger than average wage gains. The results show that they received substantially less. If discrimination on the job still occurs then this result can be explained. If nonwhites have lower status and skilled jobs where they compete in a buyers market this would also explain this outcome. Either way, nonwhites are not improving their relative income position but are slipping further behind their white counterparts in the workforce.

Next, the following variables are hypothesized to have a negative coefficient; HEALTH, LOGSHC, UR76, WKSUN, and WHR76. The HEALTH variable is a discrete one. Workers who reported a change in their health from good (1975) to bad (1976) are given a one value. Thus, it is hypothesized that their health problems will lessen their earnings power. The evidence supports this hypothesis. A health status change has a seven percent negative effect on the change in wages between 1976
and 1978. Health problems significantly determine a worker’s relative welfare position compared to his counterparts.

Specific human capital in log form is measured in weeks of company financed job training. Human Capital Theory suggests that workers with SHC do not have their wage tied directly to the VMP of their labor. However, employers of these workers have substantial investments in their employees. In order to guard against the loss of their employees, employers will pay sufficient pay raises to hold their productive workers. However, SHC is hypothesized to have a negative influence on CHGWR but it does not. The significance level is slightly above .10. This indicates that employers pay above average wage raises to employees with SHC.

The local labor market characteristic UR76 measures the unemployment rate in 1976 where a worker works. It is hypothesized that the higher the unemployment rate is the lower will be the CHGWR in the area. The evidence shows that the variable is not at all significant. This evidence does not support the neoclassical theory of labor market behavior. One possible explanation for this result is that unemployment rates have remained stable relative to each other during this time period. Thus, an improvement in job opportunities in one area was matched by a similar one in another area and the effect of the variable never influenced CHGWR directly.

The hourly wage rate earned in 1976 is hypothesized to be negatively related to the change in wage rates. It has been shown by other researchers (Parnes and Nestel, Borjas and Rosen, and Kohen) that job changers start at below average wage rates and improve their wages by a
larger percentage amount than job stayers. The evidence shows that workers with lower starting wage rates gain more in percentage terms. This indicates that during an expansionary part of the business cycle the relative income position of lower paid workers improve compared to all wage earners. The variable WKSUN is not significant. Being unemployed before 1976 has no influence on wage rate changes between 1976 and 1978.

All other variables have been left unsigned. The expected outcomes are considered ambiguous. The log of age has a large positive coefficient; however, it is not significant. Age is correlated with other variables and this may account for it not being significant. The variable that is the measure of the log of the minutes it takes to drive to work, LOGGA, is not significant and the coefficient is small. The possible reason for this is that the time it takes to get to work only changes if an employee changes jobs or is able to change his route to work. For most cases this variable is a constant over the time period. The variable OFI76 is positive and significant. However, the size of the coefficient is extremely small. For every additional dollar of unearned income received in 1976 a change in wage rates earned increases only 0.0001 percent. One explanation for this association is that those who are able to earn wage raises also have the means and the competence to find ways to generate unearned income.

A possible reason for the model's low explanatory power is that it omits several important conceptual variables. In Chapter III it was suggested that job promotion, working conditions, and other employer characteristics should be in this equation. They were omitted because
the available data was only for the end period, 1978, rather than for 1976. If it is assumed that these variables are characteristic of the original and new jobs over which the employee has some choice, then they become endogenous variables. An alternative view is that the job set is too limited to allow employees to select the optional characteristics of jobs. If this is the case they may use a lexicographic ordering selection process. With lexicographic ordering they would maximize their gain in wages, then maximize their gains in another characteristic, continuing until all job options are explored. Unless the set of jobs for which the individual is qualified is very large, this implies that only a limited number of job characteristics are endogenous. The other job characteristics are accepted with adjustments in wages reflecting the employees satisfaction or dissatisfaction with these characteristics.

Change in the Average Hours Worked Per Week—Equation 22

In the average hours worked equation the following independent variables are hypothesized to have positive coefficients: DUALJOB, EDUC, RACE, SOUTH, LFSZ76, and WKSUN. In Table 3 the estimated results test these hypotheses.

Out of these six variables the EDUC, LFSZ76 and WKSUN variables are significant. Their coefficients are also positive as hypothesized. This leaves the variables DUALJOB, RACE, and SOUTH as ones that are not significant. The interesting implications that can be drawn from these results are given below. Educational activity competes with work activity. This shows that individuals or companies pay a real cost for education in time, foregone earnings, or on-the-job productivity. For
society this should be considered an investment in human capital as theorized by Gary Becker.

Labor force size is significantly associated with the change in hours worked per week between 1976 and 1978. The bigger the labor force is the more opportunities seem to exist for worker to expand their work week. This result parallels the results in the CHGWR for the variable LFSZ76. It seems that workers ability or willingness to increase their income through wages or hours worked is correlated with the local labor market force size for the above same reason. It is not, however, correlated with the SOUTH variable. This is surprising since the southern U.S. has grown faster than the northern and midwestern regions of the U.S. Apparently, the southern states maintained an equilibrium in growth of supply and demand for labor during this period in relation to the rest of the U.S.

The variable WKSUN is significant and positive as hypothesized. The logic previously put forward is that workers who have lost income while unemployed will be anxious to try to regain it by working in jobs that allow them to work longer hours. The results support the hypothesis. However, the coefficient is small. For every week of unemployment experienced in 1975 a worker expanded his work week between 1976 and 1978 by about 0.2 percent.

Finally, it is interesting to note that the variables DUALJOB and RACE are not significant. Workers working at a second job are not able or willing to trade their second job work time for more first job work time. Nonwhites, though receiving a significantly smaller amount of
additional pay are not able or willing to work longer hours to improve their incomes.

In the CHGHW equation (22) the following independent variables are hypothesized to have negative signs; HEALTH, CHGND, OFI76, UR76, and GOVTJOB. In Table 3 the estimated results show that HEALTH, UR76, and GOVTJOB variables are significant at or near the .10 level.

HEALTH is shown to have a positive sign. This reversal of signs can be attributed to how the variable is measured. A change in health status occurs from 1975 to 1976. If most health problems improve then these workers should be able to devote more time to work by 1978. The results show this happening. HEALTH, as a discrete variable, also is significant in the CHGWR equation. This evidence indicates that a health status change can cause a large loss in a workers relative income status. This suggests that workers will be willing to pay high levels for health care and health insurance.

The unemployment rate variable is significant and negative. In high unemployment areas the market for labor is soft. The hypothesis put forward is that will have a negative affect on CHGHW. It does; however, the size of the coefficient is small. Nevertheless, this outcome again shows the significance of local labor market characteristics on determining workers' income changes.

The status variable, GOVTJOB, for being employed by a governmental unit is significant and negative. It is hypothesized that workers, who hold government jobs continuously through the period, will not be able to increase their hours worked. This hypothesis is supported by the
results. It indicates that government job holders can only improve their earnings through wage raises or second jobs.

The insignificant variables that are hypothesized to have a negative coefficient are CHGND and OFI76. Workers whose families expand during this period do not significantly change the number of hours per week they work. The male heads of households may not take on any of the additional parenting responsibilities that a new baby requires. The other possible explanation is that the male head of the household feels that he must continue to work the same or longer hours to earn money needed to pay for the additional expense of providing for a new baby. The results indicate that men do not alter their work week in response to more parenting responsibility.

Neoclassical economics clearly shows that people who receive unearned income can use these dollars to buy leisure time. The results do not support this behavior. Other family income received in 1976 from nonwage sources do not affect the change in average hours worked per week. This indicates that the marginal utility for an extra dollar of income, for this group of cases, is higher than the marginal utility for an extra hour of leisure time.

The number of employees on the payroll where a worker is employed is measured by the variable FIRMSZ. The size is considered ambiguous. The results show that FIRMSZ does not significantly affect CHGHW. It does not seem to matter how large an employer is.

The explanatory power of the CHGHW equation (22) is only 0.0435 ($R^2$). Obviously many other factors influence the CHGHW. The biggest factor that is omitted, that probably controls a large part of the
variation, is the amount of hours worked in 1976. Workers, in 1976, who already work forty or more hours per week are probably less likely to work significantly more hours by 1978. Another interesting variable to include is one that reflects the demand for an employer's output in relationship to his short term ability to produce. Overtime opportunities probably exist in some firms more frequently than in others. Much more research needs to be undertaken to better specify this equation.

**Change in Job Status-Equation 23**

The expected signs for the beta coefficients for independent variables in equation 23 are summarized below. It is hypothesized that GHC76, LOGGA, LOGEXP, HEALTH, and CHGUR all should have positive coefficients. It is hypothesized that LOGSHC, LOGAGE, LOGJT, HWR, WIFEY76, UNIONM, FIRMSZ, and GOVTJOB should all have negative coefficients. The rest of the variable coefficients are not given an expected sign.

The results support many of the hypothesized signs. The variables LOGGA and CHGUR have positive but insignificant coefficients. However, the LOGEXP is positive and highly significant. Thus, people with a long history of changing jobs are likely to continue with this behavior practice. This is exactly the result that was hypothesized to occur. A log of EXP was used because the author felt that once a history of job changing was documented it would not make much difference if the worker had ten or fifteen past jobs.

The surprise sign is a negative one for GHC76. It appears, from the results in Table 4, that for every additional year of education the
likelihood that a worker will change jobs declines by one percent. Thus, more education slows down the tendency to change jobs.

The next group of variable coefficients to be discussed had negative signs hypothesized for the coefficients of the variables. The measure of specific human capital, LOGSHC, was measured by taking the log of the number of weeks of SHC a worker had acquired. The coefficient of LOGSHC is negative and significant. This results conform to the expected one predicted by Human Capital Theory. Unfortunately, the result cannot easily be compared to the estimated coefficient for the GHC76 variable. It was hypothesized that workers with only GHC will be more likely to switch jobs than workers with only SHC.

Age in log form is expected to have a negative coefficient; the older a worker is the less likely he is to change jobs. The results show a negative but not highly significant relationship. Yet this outcome certainly indicates that the hypothesis is correct. The log form of age may not be the best form for this variable, though the difference between a 30 year old man and a 33 year old would not seem to matter when it comes to the propensity to change jobs. Another statistical test supports the possibility that age in its numerical form is significant and gives further evidence that age varies inversely with the propensity for changing jobs (see Appendix, Table 5).

HEALTH is expected to be positive and is positive and significant. The relative size of the coefficient is also large. The way HEALTH is measured is the reason for this result. HEALTH is a discrete variable that is given a value of one if a worker claims to be healthy in 1975 but by 1976 to have a health problem that affects his ability to perform
his job competently. This change in health status probably led some workers to change jobs.

Job tenure is hypothesized to be negative. The variable has a negative coefficient and is highly significant. The variable is measured in log form as are four other variables. Thus, the evidence supports the hypothesis that the longer a man has held a job the less likely he is to change employers between 1976 and 1978. More evidence can be seen in Appendix, Table 2. This variable is suggested by Signaling Theory.

Union membership is a significant determinant of JSC. Union members, during this period, are less likely to change jobs. It seems that unions give workers something that discourages job mobility. The obvious benefit they give their members is a negotiated wage rate higher than average. The correlation coefficient between union membership and the 1976 hourly wage rate is 0.1552. Other benefits include a better package of fringe benefits and a valuable retirement program.

The coefficient of the variable for wife's income in 1976 is expected to be negative and is. However, it is not highly significant.

The next two variables, FIRM SZ and GOVTJOB, are hypothesized to have negative signs and be significant. Firm size is significant and the coefficient is negative. The coefficient is relatively important. For each larger class of employer the probability that a worker will change jobs goes down by three percent.

Government employment is not a significant variable even though the sign of the coefficient is negative. This outcome is surprising. The reduced form equation results for JSC as a function of all independent
variables shows that the GOVTJOB coefficient is negative and significant.

The RACE variable is hypothesized to have an ambiguous sign. The results indicate that it has no affect on the decision to change jobs. This is interesting since others (Borjas and Rosen, and Kohen) have found that nonwhites usually hold inferior jobs at lower than average pay. These authors found that people in low status, low paying jobs are the most mobile across employers.

The expected sign for the variable for other family income is left ambiguous. Other family income can give the worker the freedom to change jobs or to hold a job that pays less than his next best alternative. These conflicting motivations may explain why the coefficient of OFI76 is small and insignificant.

In summary, seven predetermined variables explain about 12.5 percent of the variance in JSC. Both the Human Capital variables of LOGSHC and GHC76 negatively affect the decision to change jobs. The logical explanation for the sign of the coefficient for LOGSHC is given in Chapter III. A similar argument can be used for people with mainly GHC. If we assume that fewer employers are available to hire people with advanced degrees (GHC) then more time and effort must be spent by both an employer and a worker in searching and finding a good match. This process increases the value of G and S (Figures 4 and 5). This logic then explains why more GHC is associated with less job mobility.

Another significant variable is LOGJT. Job tenure is negatively associated with a decision to change jobs. This can be explained two
ways. Job tenure is a proxy for Specific Human Capital. Thus, LOGJT is just another measure of LOGSHC. However, the correlation coefficient is only 0.0675. The next explanation is put forward by Signaling Theory. It hypothesizes that the longer an employee stays with an employer the better is the match between them. Thus, the likelihood that a separation will occur is inversely related to the tenure of a worker with his employer. This explanation probably is more accurate.

Union membership is hypothesized to affect the decision to change jobs. It does negatively affect JSC. Unionized workers are less likely to change jobs. Workers working for employers with large work forces are also less likely to leave their employer to change jobs. However, people who were employed in 1975 by a governmental unit are not significantly less likely to change jobs. This result does not support the hypothesis that government employees are less mobile across employers. Finally, health problems cause people to switch jobs and a history of job changing is associated with a job change between 1976 and 1978.

The relative gains of job changing workers compared to job staying workers is reflected in the value of JSC in both the CHGWR and the CHGHW equations (21 and 22). All other researchers only quantified the benefits of a change in wage rates realized by job changers. This approach underestimates the relative change in income dramatically. The value of the coefficient of JSC in Table 3 is 12.69. The value of the coefficient for JSC in Table 2 is .2576. The combined effect, using equation 20, is a relative income gain of job changers over job stayers of 41.72 percent. If only the CHGWR equation was estimated the relative
income gain would have been only 25.76 percent. The difference, 15.96 percent, is due to the choice of workers to find jobs that offer 12.69 percent longer work weeks.
CHAPTER FIVE
SUMMARY, CONCLUSIONS, AND POLICY IMPLICATIONS

This dissertation addresses two fundamental questions in the field of economic development: during a period of expanding job opportunities "who benefits" and "by how much do they benefit." In order to research these questions three different bodies of labor economics have been reviewed, a large number of empirical research publications have been surveyed, and a three equation simultaneous model has been developed and estimated using a national longitudinal data set. In this chapter the summary of results is presented, conclusions are drawn from these results, and policy implications are discussed.

Summary of Results

The three equation model hypothesized that the percentage change in hours (CHGHW), a change in employers (JSC), a set of personal characteristics (P), a set of employer characteristics (E), and a set of local labor market characteristics (M). In summary form the model is presented below:

(18) CHGWR = f(CHGHW, JSC, P, E, M)
(19) CHGHW = g(CHGWR, JSC, P, E, M)
(20) JSC = h(CHGWR, CHGHW, P, E, M)

This model is estimated using two stage least squares and longitudinal data for 2,745 young men aged 24 to 34 in 1976.
The simultaneity of this model is confirmed by the empirical results but their overall explanatory power is very weak, ranging from 4 percent to 13 percent of the variation in the dependent variables.

Job status change (JSC) is highly statistically significant and important in both the wage and the hours equation. The percentage wage gain is 25.76 percent higher for employees changing jobs than for those not changing jobs, holding constant other factors. The hours worked increase is 12.69 percent higher for employees changing jobs than for those not changing jobs, centeri peribus.

The significant determinants of the CHGWR variable are GHC 76, HEALTH, OFI76, RACE, LFSZ76, and HWR76. The endogenous variable JSC also is highly significant but the endogenous variable CHGHW is not significant. The explained part of the variance ($R^2$) is only 13.30 percent. Most likely some important variables have been omitted.

Briefly, the most important determinants, based on the size of the coefficients, are changing employers (JSC), suffering a health problem (HEALTH), RACE, the 1976 hourly wage rate earned (HWR76), the size of the local labor force (LFSZ76), and the years of formal education a worker has acquired (GHC). The variables JSC, LFSZ76, and GHC are positively associated with CHGWR. The variables HEALTH, RACE, AND HWR76 are negatively associated with CHGWR.

The significant determinants of the CHGHW variable are EDUC, HEALTH, GOVTJOB, LFSZ76, and WKSUN. The endogenous variable JSC and CHGWR are highly significant. The explained part of the variance in CHGHW is only 4.35 percent. The average week does not vary for most
workers so the omitted variable hours worked in 1976 may explain much of the variance not accounted for in Table 3.

Briefly, the variable that accounts for a change in education status (EDUC) has a positive and important affect on CHGWR. The endogenous variable that accounts for a change in employers (JSC) also is an important and positive determinant of CHGHW. A return from poor to good health extended the length of time a worker spent on the job. However, being a government employee is negatively associated with CHGHW. Both LFSZ76 and WKSUN are positively associated with the CHGHW but their affect is very small.

The causal variables that significantly affect the decision to change jobs are SHC, GHC, LOGJT, UNIONM, FIRMSZ, HEALTH, and LOGEXP. These and other variables, however, only explain only 12.54 percent of the variance in the JSC variable. Nevertheless, all but one hypothesized relationship between the dependent variable JSC and the independent variables are supported by the evidence. Workers tend to change jobs more often if they have little SHC or GHC, if they are young, if they have been on the job a short time, if they are not members of unions, if they work for a small firm, if they had a health problem in 1976, and if they have a history of previously changing jobs.

Finally, the evidence, though not perfect, supports the decision to formulate the model as a three equation simultaneous system where the variables CHGWR, CHGHW, and JSC are all determined simultaneously.

Conclusion

The following are the major conclusions of this dissertation.

1. A three equation simultaneous approach is warranted. This
unique approach isolates factors previously never measured in an econometric model.

2. The relative income gains of job changers compared to job stayers not only is derived from wage rate gains but also is derived from gains in hours worked. No other model found in the literature captures both factors; wage rate changes and hours worker per week changes.

3. Workers who choose to change jobs do so for a variety of reasons including to work for higher wage rates and to work more hours per week. More SHC and more GHC are negatively associated with JSC. Also, the longer a worker has worked for an employer the less likely he is to change jobs. Unions discourage job changing. So does firm size; bigger firms are better able to hold their employees. Health status changes and a history of changing jobs are associated with the job changing.

4. A high school graduate will receive better wage raises if he acquires more GHC or more SHC.

5. Of all the independent factors that determine the change in wage rates received personal characteristics are the most important ones tested, particularly health status, race, and wage rates earned in 1976.

6. Low wage rate earners receive relatively larger wage gains than high wage rate earners.

7. In the CHGW equation workers who are students while still workers and later finish their formal education commit 11.1 percent more time to their jobs.

8. Those who suffer health problems lose income due to not keeping up with changes in wage rates and losing work time while sick.
9. All three bodies of theory suggest variables that prove significant. Thus, all theories add valuable insights about which labor and development economists should be aware.

10. The opportunity for future researchers to improve on the explanatory power of this model is obviously considerable. Economists are just beginning to test theories that explain the variance in the variables CHGW, CHGW, and JSC.

Policy Implications

The results of this dissertation are useful to decision makers in the private sector and in the public sector.

Decisions to change jobs for young male workers occur regularly across the U.S. Each worker faces a choice of opportunities. In a rural area employment choices may be fewer for some skills than they are in a large metropolitan area. In either setting a decision to change jobs will influence future earnings and future opportunities. The results of this dissertation show that job changers gain a higher percentage wage increase than job stayers, over the period analyzed, and they gain a bigger percentage increase in hours worked. The decision to change jobs is linked to wage gains and work week gains among other possible considerations.

Those factors that help individuals gain wage raises besides the decision to change jobs are specific human capital, general human capital, and working in a large labor market. All of these variables are, in part, under the control of the individual. A worker can choose to seek employment with a firm that provides on-the-job training. A worker
can acquire more formal training either in his nonworking hours or
during working hours by being a full time student. A worker can choose
to move to or commute to an area where more jobs are available that
match his skills.

Those factors negatively associated with wage gains are not under
the control of a worker. A change in health from good to bad and being
nonwhite both are represented by discrete variables and the coefficients
of both are significant, large, and negative. This suggests that a
worker can realize smaller than average or even negative wage changes
through no fault of his own.

Employers often have a policy to encourage their workers not to
change jobs. Companies also have a policy of training workers while in
their employ. An investment in on-the-job training is lost if an
employee quits to take a job with another employer. Thus, an employer
has to decide who to train and how to encourage his trained worker to
stay on the job. According to the findings of this research the
employer should choose to train healthy men with some formal education
who are in their late twenties or older and who do not have a prior
history of changing jobs frequently.

Public policy makers should expect to witness an active job market.
Since job changers can improve their relative income a strong incentive
exists to change employers. Not all job changers will have a new job
lined up before quitting their old one. During the period between jobs,
while searching for a new employer, workers will be unemployed. This
"frictional unemployment" holds the unemployment rate above zero. It is
possible that this frictional unemployment rate will rise as job opportunities increase. Thus, this may lead to the unexpected phenomenon of a rising unemployment rate during a period when job opportunities are expanding.

Policy makers interested in forecasting the private and public sector impacts of economic growth also can benefit from the results of this dissertation. Policy makers need to know how much individuals will benefit when they are hired by a new employer. Economists assume that if the worker has never held a job before then his new earnings will have been gained at zero opportunity cost. However, for a job changer, his earning in his old job is his opportunity cost. The findings of this dissertation show that the average job changer improves his income both by working for a higher wage and by working longer hours per week. Thus, the opportunity cost is less than the income realized by changing jobs. This information, when added to the original wage levels and rates of increase, can be used to predict an increase in an economy's total personal income, retail spending, bank deposit, sales tax revenues, income tax revenues, and other private and public sector impacts.

Finally, the results of this dissertation show that job changers realize a higher percentage income gain than do job stayers. Also, there is some evidence that job changers start at a lower base wage rate (Table 1). If job changers are earning at a lesser rate initially than job stayers the decision to change jobs helps job changers catch up to their higher paid counterparts who do not choose to change jobs. Thus, the economic goals of income growth and equity in income distribution among this cohort of young men may be mutually attainable.
Future Research

The dependent variable specification needs to be examined further. In the current research the percentage change in wages and percentage change in hours are examined. The theoretical model is largely consistent with a specification of the endogenous variables at their absolute levels. An advantage of the absolute level specification is that the regression coefficients would yield the first derivative rather than the second derivative. This change may require the respecification of some independent variables.

Non-income characteristics of a job may be important determinants of job changes, wage levels, and hours worked. The characteristics of the 1978 jobs may be endogenous variables in the same fashion as are wages and hours. Inclusion in the model would have introduced simultaneity equation bias. It may be possible however to run the reduced form equations in order to remove this bias and include these variables. A second approach that could be explored is whether these variables may indeed be exogenous under certain theoretical scenarios.

The characteristics of industries may influence the decreased demand for labor. The characteristics could be added to the data set used by matching the industry code for individuals to the relevant data. The time frame needs to be examined further. The two year period may be too short to capture the influence of some variables.
### Table 5

Differences across ages when job stayers are compared to job changers, 1976-1978

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<thead>
<tr>
<th>Age</th>
<th>Job Stayers</th>
<th>Job Changers</th>
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<tbody>
<tr>
<td>24</td>
<td>10.83</td>
<td>16.07</td>
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<tr>
<td>25</td>
<td>11.49</td>
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</tr>
<tr>
<td>26</td>
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<td>28</td>
<td>11.07</td>
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Chi-square = 38.475  
DF = 10  
Prob. = 0.0001
Table 6

JOB TENURE DIFFERENCES BETWEEN
JOB STAYERS AND JOB CHANGERS, 1966-1978

<table>
<thead>
<tr>
<th>Job Tenure</th>
<th>Job Stayers</th>
<th>Job Changers</th>
</tr>
</thead>
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<td>Zero</td>
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<td>1-12 months</td>
<td>13.76</td>
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<td>13-24 months</td>
<td>14.06</td>
<td>10.97</td>
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<td>25-36 months</td>
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<td>61-190 months</td>
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<td>9.89</td>
</tr>
</tbody>
</table>


Shaffer, Ron E. and Luther G. Tweeten, "Economic Changes from Industrial Development in Eastern Oklahoma," Bulletin B-715, Stillwater: Agricultural Experiment Station, Oklahoma State University, 1974.


