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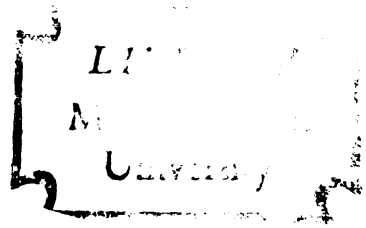

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TRANSITION FROM UNEMPLOYMEMT: CUTCOME AND DURATION OF INDIVIDUAL SPELLS

By

Janet Louise Scholl

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ABSTRACT

TRANSITION FROM UNEMPLOYMENT:
OUTCOME AND DURATION OF INDIVIDUAL SPELLS

By

Janet Louise Scholl

The primary research objective is definition of the relationship between a labor supply decision and socio-economic characteristics by studying changes in labor market status experienced by a cross-sectional sample of unemployed persons. A second objective is to determine how individual characteristics affect the duration of an unemployment spell.

Transition from unemployment is treated as an individual's decision to maximize utility by allocating more time either to market or non-market activities. Based on Becker's model of time allocation, the hypothesized relationships are: (1) greater earnings potential increases the probability of becoming employed; (2) greater productivity in non-market activities increases the probability of labor force withdrawal; (3) greater need or preference for goods-intensive commodities increases the probability of transition to employment; and (4) greater income resources increase the probability of labor force withdrawal.

The data base for the analysis is a file of unemployed respondents to the February 1973 Current Population Survey. The file was matched with March 1973 CPS records in order to determine the respondents' labor

market status four weeks later. The March survey also provides data on family and individual employment and income for the previous calendar year, 1972.

Transition from unemployment is analyzed in three ways. (1) Two equations representing probability of employment and probability of labor force withdrawal in March are estimated independently for the entire study group by ordinary least squares regression. (2) Separate regression equations analyze probability of being employed rather than unemployed in March and probability of being out of the labor force rather than unemployed. (3) A maximum likelihood estimation technique known as the multinomial logit model is used to analyze the joint probabilities of becoming employed, leaving the labor force, and remaining unemployed. For all three methods, the principal variable measures are earnings and weeks of work in 1972, education, race, sex, age, potential childcare responsibility, family size, family income in 1972 less the subject's earnings, eligibility for unemployment benefits, reason for unemployment, and duration of current unemployment spell.

The analysis lends some support to all four hypotheses. Of the factors representing greater earnings potential, recent work experience and being white both increase the probability of employment in March, but education and previous earnings produce no significant effects on transition. Indicators of greater productivity in non-market activities increase the probability of labor force withdrawal as expected. None of the variables representing greater need for goods-intensive commodities significantly increase probability of employment. However, other family income and eligibility for unemployment benefits influence transition as predicted. All models are more successful in explaining

probability of labor force withdrawal than probability of employment.

The second research problem is an analysis of unemployment duration based on McCall's simple job search model. Given individuals with equal wage offer distributions, it is expected that spell length will be shorter for those who (1) have higher costs of search per period, (2) have higher expected returns to non-market activities, or (3) have searched the labor market prior to becoming unemployed. Separate regression equations are estimated for those employed and those not in the labor force in March. The dependent variable is weeks of unemployment reported in February, and the independent variable measures are those described for transition from unemployment.

Eligibility for unemployment benefits is found to increase spell duration by three weeks for the employed and by five weeks for the not-in-the-labor-force group. Search prior to unemployment, represented by job leavers and labor force entrants, decreases spell length as predicted. The model as specified has low explanatory power, and the estimates fail to support the hypotheses.

ACKNOWLEDGMENTS

Special thanks are due the members of my committee, Professors Daniel Kruger, Richard Block, William Faunce, and Daniel Hamermesh, for working with me via mail and telephone over a period of five years. Professor Michael Borus helped me formulate the research problem and served as my principal advisor.

The Bureau of Labor Statistics provided the matched Current Population Survey file for the data base and supported my work with a dissertation internship in the Office of Current Employment Analysis. I am particularly indebted to the staff in that office and in the Office of Research Methods and Standards for their professional assistance and advice.

Ms. Beverly Disbrow assisted with typing of drafts and proof-reading, and Ms. Linda Grubbs typed the final manuscript. I was able to rely on them completely for efficiency and attention to detail. Finally, I thank my parents and my husband, James Lockhart, for their constant encouragement.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Statement of Problem

This research analyzes the duration and outcomes of individual spells of unemployment. The objective is to define the relationship between a labor supply decision and fundamental demographic and economic characteristics. A second objective is to determine how these individual characteristics affect the completed length of a spell of unemployment.

The first research problem can be described more fully as a study of changes in labor market status experienced by a cross-sectional sample of unemployed persons. At a given point in time, each member of the sample had decided to take an available job, to remain unemployed, or to cease looking for work. It is hypothesized that the relationships between choice of status and variables describing the individual's socioeconomic situation are consistent with labor supply and search models based on utility maximization theory.

The second problem is an analysis of completed spell duration for those sample members who left the labor force or became employed. The analysis focuses on individual characteristics which define the costs and benefits of remaining unemployed. The hypothesized relationships are derived from a simple model of job search.

Implications

The analysis of unemployment poses a methodological problem since unemployment does not exist as a naturally identifiable state in reality. It is the product of several survey questions addressed to a small sample of households. In order to study movement from unemployment, it is necessary to build a model with elements that coincide with the approximate boundaries of the unemployment definition. The model describes a process that roughly duplicates the steps leading to an unemployment response in the survey. In the past twenty years, several economists have analyzed the unemployment rate and the flows in and out of unemployment. One discussion that occurs in most of their articles is the value of search theory (or contract theory or segmented labor market models) as an explanation of unemployment. The general conclusion is that only a modest portion of measured unemployment can be accounted for by any given model. Nevertheless, it is important to attempt an explanation of unemployment as a basis for developing policies to address the problems it reveals. For example, the analysis of measured unemployment provides information about dysfunctions in the labor market such as institutional barriers to labor mobility or the maintenance of artificially low wage rates.

The study of unemployment data has also been the basis of judgments about the welfare of the population. The degree to which measured unemployment represents economic hardship was a major research area for the National Commission on Employment and Unemployment Statistics.[1] Using data on individual spells of unemployment, it is

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[1] U.S. Department of Labor, Counting the Labor Force: Preliminary Draft Report of the National Commission on Employment and Unemployment Statistics (Washington, D.C.: January 1979), pp. 41-61.

possible to examine the factors associated with long duration unemployment and labor force withdrawal. Both phenomena have frequently been identified as representing economic hardship. This type of information can then be used to evaluate policies designed to alleviate economic hardship.

Plan of Study

Chapter II discusses labor supply and search theories and describes models of transition from unemployment. Chapter III proposes a model for analysis of transition probabilities. The data base, variable measures, and methods of estimation are also described. Chapter IV presents the equation estimates and tests of hypotheses for transition from unemployment. Chapter V describes a search model of unemployment duration and the methods of estimation. The data analysis is contained in Chapter VI. The Conclusion, Chapter VII, summarizes the model expectations and results of the analysis.

CHAPTER II

THEORY AND MODELS

The analysis of individual changes in labor market status is based on the utility theory of choice in which a rational individual allocates resources so as to maximize expected utility from consumption. Two major derivatives of utility theory applicable to labor markets are labor supply theory and search theory. These are described in the following two sections. The third section is a discussion of models of transition among labor market states.

Labor Supply Theory

In the standard model of labor supply the individual derives utility from consumption of market goods and leisure time.[1] The level of utility that can be achieved is constrained by the individual's total time available for work and leisure, by the rate at which the individual can convert time to earned income, and by the amount of unearned income available. Leisure time is demanded (and labor time supplied) at the level where the individual's marginal rate of substitution between additional income and additional leisure time equals the wage rate.

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[1] Summary of labor supply theory follows explanations by H. Gregg Lewis, "Hours of Work and Hours of Leisure," Proceedings of the Ninth Annual Meeting (Madison, Wis.: Industrial Relations Research Association, 1957), pp. 196-197; and Jacob Mincer, "Labor Force Participation of Married Women: A Study of Labor Supply," in Aspects of Labor Economics, National Bureau of Economic Research, Special Conference Series No. 14 (Princeton: Princeton University Press, 1962), p. 63.

There are three principal results of the simple labor supply model.

1. Assuming the individual is not saturated with leisure time, additional unearned income has a positive income effect on consumption of leisure time. Consequently, additional unearned income reduces time supplied to the labor market.

2. An increase in the real wage rate increases income and tends to increase consumption of leisure. However, the higher wage rate also makes each unit of leisure more costly in terms of foregone income so that the individual tends to substitute some leisure time for income. Either the income or substitution effect may dominate so that the net result is a decrease or increase in labor time supplied.

3. A shift in the individual's utility function in favor of leisure time (flatter indifference curves) would decrease the amount of labor supplied at a given wage rate and level of unearned income. A shift in favor of income would have the opposite effect.

The usefulness of the simple supply model is limited by the income-leisure dichotomy. Time is spent either earning income or enjoying leisure, and time spent on work activities that do not earn income is not considered. Furthermore, leisure is a single consumption good measured in units of time. An increase in leisure consumption is realized only through an increase in leisure time and not through changes in style or quality of leisure. The restrictions are removed in a broader model of the allocation of time developed by Jacob Mincer and Gary Becker.

Mincer's analysis of labor force participation of married women considers demand for hours of unpaid work as well as hours of leisure. Educational activity and production of home goods and services are

cited as the primary examples of non-market work.[1] In the same article, Mincer introduces the family as the unit of analysis by examining individual labor supply decisions in the context of total family income, the relative wage rates of family members, and family demand for home goods and for leisure. The results differ from those of the simple supply model in two ways. Assuming substitutability between market and home goods, an increase in income may increase leisure time at the expense of home production time instead of labor time. Thus, the negative effect of unearned income on hours of work is weakened. Second, an increase in an individual's wage rate is more likely to increase his/her labor supply (substitution effect is dominant) since the negative income effect may appear in the reduction of labor supply by family members whose relative wage rates declined.[2]

Becker generalizes Mincer's analysis by treating the allocation of time as a problem of combining time and market goods in the production of basic commodities. Instead of balancing demand for goods (both home- and market-produced) against demand for leisure time, the consuming unit chooses among a variety of basic commodities including specific leisure activities. The cost of a commodity to an individual equals the cost of the market goods and time units used in production of the good. The foregone earnings cost of a commodity depends on the amount of time required for its production and on the cost of that time. In a cross-sectional comparison of individuals, those with higher earnings would generally experience greater foregone earnings costs in consumption. To

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[1] Mincer, p. 65.

[2] Ibid., pp. 65-68.

counteract the higher cost of time, they might be expected to use more market goods and services and less personal time in the production of basic commodities. Likewise, if total income were constant across individuals, the high earnings individuals would spend more time at work.[1]

As originally applied, labor supply theory explains differences over time or among population groups in continuous measures of supply such as hours or weeks of work. The theory also serves as a basis for models of labor force participation in which the measure of supply is the number or proportion of people in the labor force. A prominent example of this application is William G. Bowen's and T. Aldrich Finegan's analysis of the 1/1000 Sample from the 1960 Census. In that study, labor supply is represented by a binary variable indicating whether an individual was in or out of the labor force during the Census week. The explanatory variables are measures of household tastes or preferences for goods and activities, the individual's expected market and non-market "earnings" rates, and the household's time and income resources.[2]

Search Theory

The application of utility theory to production of information about job vacancies was developed by George Stigler. In his 1962 article, Stigler suggests that dispersion of wage offers exists within

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[1] Gary S. Becker, "A Theory of the Allocation of Time," The Economic Journal 75 (September 1965):495-502.

[2] William G. Bowen and T. Aldrich Finegan, The Economics of Labor Force Participation (Princeton: Princeton University Press, 1969), pp. 29-36.

homogeneous labor markets because of imperfect knowledge about wage rates, random changes in the characteristics of workers and jobs, and fluctuations in supply and demand. The persistence of wage dispersion makes the sampling of wage offers potentially profitable for job seekers. In Stigler's model, the returns to search are a function of the degree of wage dispersion, the stability of the wage structure over time, the individual's expected length of employment, and the individual's discount rate.[1] The costs of search decrease with the ease of identifying potential employers and with the probability that employers have job openings. On the other hand, extensive search over a wide geographic area, the use of purchased information, and earnings foregone because of search increase costs. The basic utility maximization rule applied to job search behavior is that the individual continues searching until the expected marginal return equals the marginal cost of search.[2]

Several economists have developed Stigler's ideas into formal models of the search process. Dale Mortensen's model is summarized here as a representative example. The job seeker is assumed to be unemployed and ignorant of the skills required and wages offered for particular job vacancies. However, the job seeker does know the distribution of wage offers across skill levels. Mortensen assumes that job vacancies requiring the same skill levels offer the same wages and that relative wages increase with skill level. One vacancy can be sampled during each period of time, and the offer must be accepted or

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[1]George J. Stigler, "Information in the Labor Markets," Journal of Political Economy 70, supplement (October 1962):96-97.

[2]Ibid., pp. 101-103.

rejected during the same period. In order to maximize utility, the job seeker chooses an acceptance wage level which equates the marginal cost of search each period with the present value of the expected marginal return to search. The cost of search is determined by the level of unemployment compensation, and the present value of the expected return to search is represented by the individual's skill level and discount rate.[1]

In order for an individual to become employed during a given period, his or her skill level must equal or exceed that required by the vacancy sampled, and the wage offer must equal or exceed the acceptance wage. The probability of becoming employed in a period is equal to the proportion of the wage offer distribution which falls between the minimum acceptance wage and the maximum wage for the job seeker's skill level. The expected duration of unemployment in terms of number of periods searched equals the reciprocal of this probability. Consequently, probability of employment should increase (and expected duration of unemployment, decrease) with a lower acceptance wage or a higher skill level, ceteris paribus. However, a higher skill level will also raise the job seeker's optimum acceptance wage and thus indirectly reduce the proportion of the wage offer distribution that is acceptable and available. The net effect of an increase in relative skill level is ambiguous and depends on the shape of the wage offer distribution and the relative position of the individual's maximum attainable wage.[2]

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[1]Dale T. Mortensen, "Job Search, the Duration of Unemployment, and the Phillips Curve," American Economic Review 60 (December 1970):848-49.

[2]Ibid., pp. 852-54.

Although models of search behavior are commonly applied to the analysis of frictional unemployment, search activity does not require unemployment, and the periods of job search and unemployment are not necessarily coterminous. The distinction is clearly explained by Armen Alchian. He contends that although an individual can readily find an available job, search for information about vacancies, wage rates, and working conditions is undertaken because the individual attempts to maximize utility. Since the production of information becomes more efficient with specialization, an individual may find it cheaper to search for job information while unemployed.[1] According to Reuben Gronau, the probability of choosing unemployment is greater the lower the wage loss (foregone earnings less unemployment compensation), the greater the amount of time already spent in search, and the more rapid the expected flow of job offers. As an alternative to unemployed job search, the individual may search while employed by remaining at his or her original job or, if already unemployed, by taking temporary employment until a more desirable job is located.[2]

In the static models of job search developed by Mortensen and John McCall, the job seeker's search costs and perception of the wage offer distribution remain constant across periods. Thus, once search is determined to be profitable, the individual continues searching until an acceptable wage offer is received. If job search is not expected to be

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[1]Armen A. Alchian, "Information Costs, Pricing, and Resource Unemployment," in Microeconomic Foundations of Employment and Inflation Theory, ed. Edmund S. Phelps (New York: W. W. Norton, 1970), pp. 29-30.

[2]Reuben Gronau, "Information and Frictional Unemployment," American Economic Review 61 (June 1971):296-98.

profitable, the individual never commences search. In Mortensen's model, the decision rule is stated simply. Search will not occur if the individual's level of unemployment compensation equals or exceeds the maximum attainable wage rate.[1] Similarly, McCall suggests that a discouraged worker is one who does not search at all because the marginal cost of job search is sufficiently high compared with prospective wage offers that the appropriate critical value or minimum acceptance wage would be lower than the return the individual could expect from remaining unemployed.[2]

The possibility of dropping out of the labor force after a period of job search is considered by Gronau. His search model is dynamic in that the job seeker adjusts his or her asking wage from period to period in accordance with optimal search strategy. Thus, the model allows for changes in current earnings during search, the shortening of the time horizon as search lengthens, changes in the rate of arrival of job offers, or an increase in the interest rate due to the deterioration of assets. When the value of current earnings exceeds the expected future gains from search, the individual will stop search and drop out of the labor force. This is more likely to occur when current earnings are high, wage dispersion (and thus the expected gain from search) is small, interest rates are high, and job offers arrive slowly.[3]

In the search models described above, the process is one of randomly sampling vacancies or offers from a large population. The amount

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[1]Mortensen, p. 853.

[2]J[ohn] J. McCall, "Economics of Information and Job Search," Quarterly Journal of Economics 84 (February 1970):118-19.

[3]Gronau, pp. 293-96.

of time and expense required to locate an offer is an important determinant of the expected length of unemployment. A 1966 article by Albert Rees suggests a search process in which both job seekers and employers base decisions on intensive information about a few openings or individuals rather than on extensive information about large numbers of openings or individuals.[1] Rees contends that informal sources can provide more intensive information than formal sources of job information. Since obtaining information from informal sources requires little time or money, these factors become less important in determining length of search. However, informal job search still involves the cost (measured by foregone earnings) of waiting for job offers.[2] Individuals who have other income sources and individuals whose earnings are replaced by unemployment compensation should be able to endure longer waiting periods before they feel compelled to accept less desirable jobs that are immediately available. Although the factors emphasized in the search process are different, the expected duration outcomes are similar to those predicted by formal search models.

Transition Models

Models of labor market transition describe the probabilities of movement between labor market states--usually defined as employed, unemployed, and not in labor force. Theoretical expectations regarding flow probabilities are derived from both labor supply and search theory. One of the earliest comprehensive models of transition was developed

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[1]Albert Rees, "Information Networks in Labor Markets," American Economic Review 56 (May 1966):560-62.

[2]Ibid., pp. 562-63.

and refined over a period of several years by economists associated with Charles Holt. As originally formulated by Holt, the model emphasizes the flows between unemployment and employment in response to changes in the stocks of jobs, vacancies, employed workers, and unemployed workers. As a stock increases, movement into it becomes less attractive and the entering flow is consequently reduced so that the market achieves equilibrium. For example, as the stock of unemployed workers increases, expected duration of unemployment lengthens, and the flow of quits and labor force entrants into unemployment decreases. Holt assumes that both workers and jobs have unique and complex characteristics. The matching of workers and jobs is accomplished through a random and somewhat imperfect search process conducted by both workers and employers. It is through this process that employed and potential workers judge the relative utility of alternative labor market states.[1]

Early formulations of Holt's model focus on the response of transition probabilities to changes in demand measured by unemployment and job vacancies. A later version developed by Richard Toikka, examines transition probabilities as a function of the expected utility from non-market activity as well as the expected utilities of employment and job search. Toikka's three-state model is Markovian in that the costs and benefits of movement between non-participation in the labor force, unemployment, and employment are dependent on the state of origin. In order to estimate the model, Toikka assumes that employer decisions

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[1]Charles Holt, "Job Search, Phillips' Wage Relation, and Union Influence: Theory and Evidence," in Microeconomic Foundations of Employment and Inflation Theory, ed. Edmund S. Phelps (New York: W. W. Norton, 1970), pp. 54-59.

regarding layoffs and level of hiring are given so that the individual worker makes labor force participation and job acceptance decisions accordingly. The labor force participation decision (assumed to occur prior to the job acceptance decision) is based on the expected values of market and non-market activities. Job acceptance depends on the probability of receiving an offer and the probability that the offer exceeds the individual's reservation wage. Thus, Toikka's model is an attempt to integrate search theory with labor supply theory.[1]

The above models are estimated with gross change data on month-to-month movements between labor market states.[2] Therefore, individual characteristics can be represented only to the extent that gross change data are disaggregated by variables such as age, sex, and race. Most of the transition models which focus on supply side differences as well as changes in demand for labor are estimated with data on individuals. Models developed by James Hosek and Stephen Nickell are described here as examples of the literature. Hosek is concerned with explaining weekly probabilities of entering and leaving unemployment. His model assumes a steady state distribution of the population among the three labor market states so that all of the weekly transition probabilities are constant over time.[3] The factors affecting probability of transition

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[1]Richard Toikka, "A Markovian Model of Labor Market Decisions by Workers," American Economic Review 66 (December 1976):821-23.

[2]Other examples of this type of analysis are George Perry, "Unemployment Flows in the U.S. Labor Market," Brookings Papers on Economic Activity 2 (1972):247-54; and Stephen T. Marston, "Employment Instability and High Unemployment Rates," Brookings Papers on Economic Activity 1 (1976):171-74.

[3]James R. Hosek, Unemployment Patterns Among Individuals (Santa Monica, Ca.: Rand, 1975), pp. 2-4.

from unemployment out of the labor force are derived from labor supply theory. These include systematic life cycle factors and random factors such as marital status, education, potential wage income, and other family income. The probability of leaving unemployment to become employed is expressed as the sum of the probability of recall to a former job and the probability of locating a new job. The former increases with the level of firm-specific capital possessed by the job seeker, and the latter increases with education, work experience, and number of dependents, and decreases with unemployment compensation and net worth. Hosek's job search model, like Mortensen's, produces an ambiguous relationship between skill level and weekly probability of becoming employed.[1]

In Nickell's model, which is based solely on search theory, the individual is assumed to continue searching until taking employment. Dropping out of the labor force is not considered a transition possibility. The wage offer distribution facing an individual is the distribution of wages received by workers in the same broad category of skill and experience. However, the productivity of workers within the same category will vary for reasons such as health and age. The probability of receiving an offer when a particular firm is sampled is a function of personal characteristics related to productivity, the number of job vacancies and the wages associated with those vacancies, and the number of people competing for positions. Given a wage offer, actual offer acceptance depends on the individual's reservation wage which is set to equalize the net gain from accepting a job at that wage with the

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[1]Ibid., pp. 17-21.

expected gain from continuing search. Nickell suggests that probability of leaving unemployment will generally vary directly with the probability of receiving an offer but cautions that the model does not provide an unambiguous prediction. The model is duration dependent in that probability of leaving unemployment is allowed to vary with the length of time already unemployed. However, Nickell does not specify whether the expected relationship between current duration and probability of escape from unemployment is positive or negative.[1]

Summary

The theory of labor supply suggests that higher expected earnings from non-market activity increase the probability of labor force exit. The probability of continued labor force participation--either job search or employment--is increased by higher expected earnings from market activities. Differentiation between probability of remaining unemployed and probability of becoming employed is based on search theory. The job seeker establishes a minimum acceptance wage that equates the expected marginal return from a period of search with the marginal cost. Search continues another period unless a job offer equalling or exceeding the acceptance wage is received. In general, a higher minimum acceptance wage relative to the distribution of wage offers decreases the probability of becoming employed in a given period.

Models derived from labor supply and search theory describe the expected returns to alternative labor market moves. These models are used to estimate probabilities of transition between labor market

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[1]Stephen Nickell, "Estimating the Probability of Leaving Unemployment," Econometrica 47 (September 1979):1250-53.

states. Most are state dependent in that the expected utility of movement to a state depends on the state of origin.

CHAPTER III

TRANSITION FROM UNEMPLOYMENT: BACKGROUND FOR ANALYSIS

Transition from unemployment is treated as a decision made by the individual to supply labor at an available wage, to continue searching or waiting for a better wage offer, or to withdraw the supply of labor from the market. The proposed model describes how individual characteristics of unemployed persons affect probabilities of becoming employed and leaving the labor force by a future point in time. The hypothesized relationships are drawn from both labor supply and search theory.

Model

It is assumed that an individual's move from one labor market state to another is the result of a decision to reallocate time to maximize utility. Of course, occupation of a labor market state (for example, employment) does not imply the devotion of all available time to one activity (that is, market work). Movement from unemployment to employment is simply assumed to indicate the allocation of more time to market activities. Similarly, movement from unemployment out of the labor force indicates the allocation of more time to non-market activities.

As suggested by Becker's model (described on pages 6-7), utility is derived from the consumption of basic commodities produced from inputs of time and market goods. The consuming unit is the family, and the individual makes labor market decisions that maximize

utility in accordance with family needs and preferences. Although the family is also the producing unit, the labor market input of other family members is treated as exogenous in order to simplify the model. Therefore, the individual's resource constraint depends on total time available, the ability to convert time into market goods, and the time and goods available from other family sources.

The unemployed individual is assumed to have optimally allocated time between market and non-market activities in the current period. Probabilities of reallocation of time and subsequent transition into employment or out of the labor force in a future period can be differentiated in two ways. First, there are long-run persistent differences among individuals in likelihood of being employed or out of the labor force. That is, most people are either employed most of the time or out of the labor force most of the time. The two groups exhibit different patterns of characteristics indicating greater productivity in market activities or in non-market activities. When unemployed individuals are differentiated by these same characteristics, it is expected that greater productivity in market activities is associated with greater probability of employment in a future period. Relatively greater productivity in non-market activities is similarly associated with greater probability of labor force exit. Probabilities of transition from unemployment also differ because of transitory factors which bear on relative productivity in market and non-market activities and on preferences for time-intensive and goods-intensive commodities. Transitory factors would include changing labor market conditions, exhaustion of unemployment insurance benefits, depletion of savings and other assets, a decreasing time horizon for expected length of

employment, and changes in demand for leisure time.

Given these assumptions, a comparison of individuals is expected to show the following relationships.

1. A factor representing greater productivity in market activities (when all other factors are equal to average values for the group) increases the probability of movement to employment for those individuals possessing the factor.

2. A factor representing greater productivity in non-market activities (when all other factors are equal to average values for the group) increases the probability of movement out of the labor force for those individuals possessing the factor.

3. A factor representing greater need or preference for goods-intensive commodities (when all other factors are equal to average values for the group) increases the probability of movement to employment for those individuals possessing the factor.

4. A factor representing greater need or preference for time-intensive commodities (when all other factors are equal to average values for the group) increases the probability of movement out of the labor force for those individuals possessing the factor.

The model developed here includes concepts representing productivity in market and non-market activities, family needs and preferences, and family income resources. An individual's productivity in market activities is a function of intangible benefits derived from working and of purchasing power derived from earned income. Intangible benefits may be social prestige, fellowship, enjoyment of work activities, or a sense of accomplishment. Their value to the individual depends on the degree of self-investment in the work

situation as well as on characteristics of the job itself.

The purchasing power derived from market activity is determined by inputs of ability, training, and experience, by a particular labor market's rate of pay for these inputs, and by discrimination patterns. The influence of other factors on an individual's earning power is assumed to be random. A primary source of variation in earnings rates is the human capital input. Greater ability, training, and experience increase an individual's expected wage rate, other factors being equal. However, the same qualifications do not earn the same rate of pay in all labor markets. The premiums paid for education and experience vary by occupation and type of employer, and average wages vary among geographic regions and between metropolitan and rural areas. Another important determinant of expected earnings rates from market activity is discrimination by sex, race, or age. Women and nonwhites may earn lower wages than men and whites because of employers' discriminatory practices in hiring and making job assignments. A contributing factor to the measured wage gap may be a difference in quality of education and work experience between men and women and between whites and nonwhites who appear to have equivalent backgrounds. Discrimination against young or old workers is evident in the accepted practices of many labor markets: for example, the payment of lower wages to youths doing the same tasks as adults or the setting of arbitrary age limits for hiring new workers.

Productivity in non-market activities is a function of efficiency in combining personal time and purchased goods to produce basic commodities. The variety of non-market activities and resultant commodities defies comprehensive specification. Consideration is limited to those

activities that exert an important influence on labor force participation. Although greater productivity in any non-market activity tends to reduce hours of labor market work, there are only a few major activities that are viewed as "full-time" alternatives to working. The most common of these are attending school, caring for young children, and retirement. Since these activities are not available or equally productive for everyone, it is expected that young persons, women with pre-school children, and persons eligible for retirement benefits expect relatively greater utility from non-market activities.

An unemployed individual's relative preferences for additional goods-intensive and time-intensive commodities in the next period depends on family needs and resources. A general indicator of need for market goods is the individual's family size or number of dependents. Additional dependents should increase the expected utility of employment in the next period. Since continued employment exhausts some sources of income, the utility of becoming employed in the next period is expected to increase with spell duration as well.

Greater income resources during unemployment increase the utility of additional leisure time and decrease the utility of additional income from earnings. The source of income as well as the amount influences the choice of employment status. Income saved from past earnings increases the length of time an individual can remain unemployed, but a higher earnings level in the past also increases the expected return to employment. Therefore, higher past earnings have a clearly negative effect on probability of dropping out of the labor force but an ambiguous effect on probability of taking employment relative to remaining unemployed. The earnings of other family members

and unearned income have pure income effects and should be positively associated with probability of leaving the labor force. Since the receipt of unemployment benefits is contingent on remaining unemployed, this type of income increases the probability of staying unemployed relative to both the probabilities of leaving the labor force and of becoming employed.

Data Base

In order to analyze transition from unemployment, a longitudinal data base was constructed from the Current Population Survey (CPS). Each month the Bureau of the Census interviews a rotating sample of households in order to estimate the civilian population's labor force activity during the week of the 12th. Since each sample household is interviewed eight times, it is possible to link survey records on individuals for different months.[1] The data base used here is a linked file for February and March 1973 CPS. It includes only those persons reported as unemployed during the February reference week. Their labor force status four weeks later was ascertained in the March survey.

Besides measuring labor force activity during the reference week, the March survey collects information on weeks of employment and unemployment during the previous calendar year. Respondents are also asked about the sources and amounts of income earned or received by each family member during the previous calendar year. A summary of employment and income information for all family members is included with each individual's record. Thus for individuals unemployed in February

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[1] Each sample household is interviewed for four consecutive months, skipped for eight months, and then interviewed for an additional four months. Consequently, year-to-year as well as month-to-month matches are possible.

1973, the data base provides information on personal and family economic status during 1972 as well as follow-up information on the current unemployment spell.

The CPS uses a rotating sample so that 75 percent of the households interviewed one month are reinterviewed the following month. The desired data file would include all members of households surveyed in both February and March 1973 who were 16 years or older and who were unemployed during the February reference week. Since nearly 3,100 persons were reported unemployed in the February survey, the potential number in the matched February-March file is about 2,300. The Bureau of Labor Statistics was able to match survey records for 1,522 individuals, about two-thirds of the potential match. The failure to obtain a complete match was largely due to entire households moving out of the sample areas and to individual members moving out of sample households. There were also problems in uniquely identifying members of the same household. Although household records for the two months could be matched by identification codes, the records of individual members were matched by comparing age, sex, family status, and education data.

A data base drawn from the CPS has the advantage of including a broad cross-section of the population. The results of the analysis are not unique to one area, occupation, or demographic group. However, the data base is not a representative sample of unemployed persons since the Bureau of Census oversamples some population groups in order to obtain numbers large enough to support labor force estimates for specific groups. In terms of representing the total spells of unemployment that occur during a period, the monthly cross-sectional sample misses many short spells that fall outside the reference week and selects

a disproportionate number of persons experiencing long spells of unemployment. To be free of length bias, a sample of unemployment spells should be based on all persons commencing unemployment at the same time or on all persons ending unemployment at a given point in time.[1] Summary descriptors of the data used here present a distorted picture of unemployment, but the analysis of individual movements from unemployment is not affected.

Since the sample is drawn from one time period, the results are subject to cyclical and seasonal factors. In cyclical terms, 1973 was a period of continued recovery from the 1970-71 economic recession. This recovery peaked in November 1973, but annual average labor force participation and employment figures for 1973 were high, and the unemployment rate was 4.9 percent. The estimated number unemployed in February 1973 was lower than in February of the two previous years.[2] Because tight labor markets narrow the gaps in unemployment rates between some groups (particularly whites and minorities), the differences in probability of transition to employment among these groups should be less in this sample than in samples drawn from high unemployment periods.

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[1]The limitations of the CPS as a sample of unemployment spells are discussed by Hyman Kaitz in "Analyzing the Length of Spells of Unemployment," Monthly Labor Review 93 (November 1970):11-13; and in "The Duration of Unemployment," Proceedings of the Social Statistics Section 1972 (Washington, D.C.: American Statistical Association, 1972), pp. 313-4. Also see Stephen Salant, "Search Theory and Duration Data: A Theory of Sorts," Quarterly Journal of Economics 91 (February 1977):39-44.

[2]The recession dates are those determined by the National Bureau of Economic Research. Labor force and employment data are reported in U.S. Department of Labor, Manpower Administration, Manpower Report of the President (April 1974), p. 253; and in U.S. Department of Labor, Bureau of Labor Statistics, Employment and Earnings 20 (February 1974): 156.

February itself is historically a month of high unemployment. Data unadjusted for seasonality consistently show a decline in estimated unemployment from February to March.[1] This seasonal drop varies across occupations and geographic areas, and should produce higher probabilities of transition to employment for groups concentrated in seasonal work.

The most serious problem with the data base is that the discrete labor market states defined by the Current Population Survey do not fit the concepts of market activity--search and employment--and non-market activity described by the model. In search theory, the individual makes a time allocation decision each period. The length of time between decision points may be quite brief (a day is not unreasonably short), and it is possible that an individual who has been looking for work will engage in job search, non-market activities and employment activities within the space of a week. The Current Population Survey definitions, on the other hand, place an individual in one of three mutually exclusive states for the survey week. Since transition studies are based on month-to-month movements between labor market states, we have very crude measures of changes in labor market activity.[2]

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[1] Data unadjusted for seasonality were obtained from unpublished tables provided by U.S. Department of Labor, Bureau of Labor Statistics.

[2] The blurring of lines between labor market states has been described frequently. Martin Feldstein argues that a large proportion of unemployment spells involve very little job search and should be treated as periods of leisure financed by unemployment insurance benefits. See "The Importance of Temporary Layoffs: An Empirical Analysis," Brookings Papers on Economic Activity 3 (1975):731-3. Examining data on labor force withdrawals, Kim Clark and Lawrence Summers conclude that a large number of persons not in the labor force (relative to the number unemployed) desire work and are available for work when job opportunities occur. However, these persons are reported in the CPS as being out of the labor force due to the structure of the survey questions and interviewer errors. See "Labor Market Dynamics

Variable Measures

The analysis of movement from unemployment requires measures representing an individual's productivity in market and non-market activities and his or her relative preferences for time-intensive and goods-intensive commodities. It was suggested above that an individual's expected earnings rate from market activity is determined by inputs of ability, training, and experience, by a particular labor market's rate of pay for these inputs, and by discrimination patterns. Ability, training, and experience are measured very crudely by survey data. The most general representation is the individual's past earnings level. In the March survey, respondents are asked to report earned income from wage and salary employment and from self-employment in a business or farm for the previous calendar year. The desired measure would be average weekly or monthly earnings, but the weeks of employment during 1972 are divided into seven classes: 0, 1-13, 14-26, 27-39, 40-47, 48-49, and 50-52 weeks. Average weekly earnings can be approximated by dividing total earnings by an estimated value for weeks worked in 1972 or by including both total earnings and weeks of work in the analysis as separate variables.[1]

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and Unemployment: A Reconsideration," Brookings Papers on Economic Activity 1 (1979):27-30. A final piece of evidence is the extent of job search by employed persons. In May 1976, special CPS questions asked of persons who had been employed at least four weeks revealed that 4.2% had looked for work during the past four weeks. Thus, the total number searching for work during the period was about one and one-half times the number unemployed. See Carl Rosenfeld, "The Extent of Job Search by Employed Workers," Monthly Labor Review 100 (March 1977):58.

[1]The seven classes of weeks of work were assigned midpoint values of 0, 7, 20, 33, 43, 48, and 51 weeks, respectively. If a person was not in the civilian labor force for part or all of 1972 because of service in the Armed Forces, his weeks of employment were estimated to include both civilian and military employment.

Ideally, work experience would be measured by years of work related to the occupation being sought. The available measures are weeks of work in 1972 and whether or not the individual ever worked full-time in the past five years. Therefore, the work experience variable can only distinguish between those with some recent work experience and those with none.

Training is represented in the analysis by formal educational attainment. The alternative variable measures are completed years of schooling (including post-secondary schooling) and a binary indication of graduation from high school. Although formal educational attainment does not bear directly on earnings in many occupations, it does indicate an individual's general marketability.

The particular labor market being searched can be designated by geographic area, occupation, and type of employment sought (whether full-time or part-time). The Bureau of the Census suppresses geographic area information that would identify state and city of residence. However, respondents can be identified as residents of one of the nine Census divisions in the United States and by whether they live within an SMSA. Although respondents are not asked to state the type of employer or occupation they are looking for, occupational market can be inferred from either the occupation of the last full-time job or the occupation of the job held longest in 1972. Over five hundred different occupational categories are reported, but it is not feasible to use more than ten general categories in the analysis. Another way of defining the individual's labor market is by whether he or she is seeking part-time work, that is, a job where regular hours of work are less than 35 per week. The distinction between part-time and full-time work is

important because part-time employment generally offers a lower rate of pay and fewer benefits than full-time work in the same occupation.

Members of groups that are discriminated against in hiring have lower expected earnings rates from market activity. Racial minorities and women are the two largest demographic groups adversely affected by discriminatory hiring practices. Older workers and members of certain religious-ethnic groups also face limited job opportunities, but discrimination against them is not common to all labor markets. Racial minorities are identified by the CPS as persons other than whites. Since Puerto Ricans and Mexican Americans are usually classified as white, the non-white category excludes some people subject to racial discrimination. Because of traditional role differences, the male-female variable represents several factors besides discrimination that affect labor market behavior. Some of these factors are related to work experience and training, and others are related to non-market activities.

It was suggested above that a limited number of non-market activities are viewed as full-time alternatives to working. Since the CPS does not obtain information on the activities of persons not in the labor force[1], it is assumed that certain types of people are more likely to have non-market opportunities that are relatively more productive. In particular, youth under 22 years of age are more likely to enroll in school full-time; women in families with children under age 6 are more likely to assume full-time childcare responsibilities, and persons aged 50 and over are more likely to retire with social security and pension

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[1]This statement should be qualified by noting that respondents in sample households being surveyed the fourth and eighth times are asked to report reasons for non-participation in the labor force.

benefits. Binary variables are used in the analysis to represent each of these groups.

Relative preference for additional income or a greater need for goods-intensive commodities is represented by the size of the individual's family. A more specific measure of need would be the number of persons dependent on the individual job-seeker. Respondents are not asked to report the number of dependents; consequently, it is assumed that each family member under 18 counts as a dependent of each adult family member. A weakness of the family size variable is that more family members might indicate more potential earners as well as more financial burdens. Similarly, the number of family members under 18 is a measure of unpaid labor available for household work as well as a measure of the need for additional income.

A relatively greater preference for time-intensive commodities is assumed for persons seeking part-time employment and for persons with greater income resources. The former are indicated by a binary variable equal to 1 if a person is looking for less than 35 hours of work per week. Income resources are represented by the dollar amount of the individual's earnings in 1972 and by the total amount of unearned income and income of other family members in 1972. The two types of income are separated because the individual's earned income is expected to reduce likelihood of withdrawal from the labor force; whereas income from other sources is expected to increase the likelihood of withdrawal.

The sources of unearned income available during unemployment are approximated by sources of unearned income received during 1972. The March 1973 CPS grouped sources of unearned income into five categories: (A) social security and railroad retirement benefits, (B) income from

assets such as estates, trusts, stocks, bonds, savings and rental property, (C) welfare payments and other public assistance, (D) unemployment compensation, workmen's compensation, government employee pensions, and veteran's payments, and (E) private pensions and annuities, alimony, regular contributions from persons not in the household, and other miscellaneous income. These categories do not completely separate income that is earnings-conditioned from other types of unearned income. Most income reported under (C) and (D) is earnings-conditioned to some extent so that becoming employed would reduce income from these sources. Thus eligibility for income from Source C or D is expected to reduce the likelihood of becoming employed. Since unemployment benefits are contingent on remaining unemployed, eligibility for income from Source D is expected to reduce the likelihood of labor force withdrawal as well.[1]

In a Markov model of transition from unemployment, the probability of exiting from a state (unemployment) is independent of the length of time already unemployed. The model developed here is duration dependent since probability of leaving unemployment is expected to increase with weeks of unemployment already experienced. Continued unemployment increases the expected utility of employment because it depletes income resources through savings withdrawals, loans, asset liquidation, and exhaustion of unemployment insurance benefits. This effect pertains more to those unemployed because of losing or quitting a job than to those unemployed because of entrance into the labor force. A second reason for expecting duration dependence is that continued job search

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[1]This expectation is based on the assumption that most persons receiving income from Source D were receiving unemployment compensation.

in limited occupational and geographic labor markets reduces the number and desirability of potential vacancies to be sampled and thus reduces the expected utility of additional unemployment.

Despite these theoretical expectations, gross change data from the CPS consistently exhibit a negative relationship between current weeks of unemployment and probability of being employed or out of the labor force in the next survey reference week. As explained by Salant, the declining aggregate escape rate is due to differences among people in propensity to remain unemployed. Persons entering unemployment at the same time have different escape rates, but after several weeks those with high escape rates tend to leave unemployment and those with low escape rates comprise the long-duration unemployed. Consequently, a cross-sectional sample of unemployed persons will show a smaller proportion of long-term than short-term unemployed escaping unemployment by the next survey reference week.[1]

If the other variables in the model successfully represent the differences in propensity to remain unemployed, current duration should have a positive effect on probability of employment or labor force withdrawal. The primary measure of current duration is the reported number of weeks spent looking for work or on layoff as of the survey reference week.

Methods of Estimation

Analysis of transition from unemployment is based on estimation of each variable's effect on probabilities of becoming employed, leaving the labor force, and remaining unemployed. These three events

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[1]Salant, pp. 44-48.

are defined to be mutually exclusive and to include all possible states. Essentially they are unordered since an individual may move from any state directly into either of the other states. However, movement from unemployment to employment is assumed to entail allocation of more time to market activities. Similarly, movement from unemployment to not-in-labor-force status is assumed to represent the allocation of more time to non-market activities. Given these assumptions, it is sufficient to estimate the effect of a variable on the likelihood of becoming employed relative to the likelihood of remaining unemployed or of leaving the labor force. If a variable functions to increase the allocation of time to market activities, it will increase the probability of becoming employed relative to remaining unemployed, and it will also increase the probability of becoming employed relative to leaving the labor force. The analysis is completed by estimating the effect of a variable on the likelihood of leaving the labor force relative to the likelihood of remaining unemployed or of becoming employed.

One method of estimating variable effects on relative probabilities is to construct an equation regressing a binary dependent variable representing status in March 1973 on a group of independent variables. In one equation, the dependent variable represents becoming employed, and in the other equation, it represents leaving the labor force (NILF).

$$P(\text{Employed}) = a + b_1x_1 + b_2x_2 + \ldots b_nx_n + e$$

$$P(\text{NILF}) = a + b_1x_1 + b_2x_2 + \ldots b_nx_n + e$$

The two equations include the same independent variables and are estimated independently by ordinary least squares (OLS) regression.

The use of OLS regression techniques to estimate the effects of variables on a binary dependent variable poses several problems. To be meaningful, the estimated effect of an independent variable should be a probability between zero and one. However, OLS regression does not constrain the regression estimates to fall between zero and one for extreme values of the independent variables. A second problem is that a binary dependent variable violates the OLS assumption of constant variance in the error team. Since each observation's Y-value is either 1 or 0, the estimated value errs by either $1 - \hat{Y}$ or $0 - \hat{Y}$. The OLS estimators are not efficient since the variances of the coefficients are larger than the variances of coefficients estimated by a method which considers information about uneven variance in the error term. Although the OLS estimators are unbiased and consistent, James Murphy suggests that the estimated standard error of the OLS estimated coefficient is "lower than it should be on average" under conditions of heteroscedasticity. When standard error estimates are biased downward, t- and F-values are overestimated and the null hypothesis of no significance is rejected too frequently.[1]

Because of problems with the OLS estimates, a maximum likelihood estimation technique known as the multinomial logit model is used to estimate effects on the joint probabilities of becoming employed, leaving the labor force, and remaining unemployed. The model is formulated as a series of equations representing the probability of occurrence for each event.[2] The same set of independent variables is

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[1]James Murphy, Introductory Econometrics (Homewood, Ill.: Richard D. Irwin, 1973), pp. 298-300.

[2]The computer program used to estimate the model is "LOGIT" written by Joseph R. Antos.

included in each equation.

$$P(\text{Employed}) = (e^{B_E'X_i}/(e^{B_E'X_i} + e^{B_U'X_i} + e^{B_N'X_i}))$$

$$P(\text{NILF}) = (e^{B_N'X_i}/(e^{B_E'X_i} + e^{B_U'X_i} + e^{B_N'X_i}))$$

$$P(\text{Unemployed}) = (e^{B_U'X}/(e^{B_E'X_i} + e^{B_U'X_i} + e^{B_N'X_i}))$$

The coefficients $B_U'X$ are set to 0 so that only the first two equations are estimated. The effect of an independent variable on the probability of occurrence of one of the three events is given by:

$$\frac{\delta P_E}{\delta X_i} = P_E(B_{Ei} - P_N B_{Ni})$$

$$\frac{\delta P_N}{\delta X_i} = P_N(B_{Ni} - P_E B_{Ei})$$

$$\frac{\delta P_U}{\delta X_i} = P_U(- P_E B_{Ei} - P_N B_{Ni})$$

The multinomial logit model has the advantage of constraining a variable's marginal effect on all three probabilities to sum to zero. The logistic transformation of the independent variables also approximates the normal probability density function more closely than a linear form.

Tests of Hypotheses

A variable's estimated effects on probability of becoming employed and probability of leaving the labor force are tested for significant difference from zero in the hypothesized direction (see Table 1). Coefficients estimated by the OLS regressions indicate the absolute change in probability of becoming employed (or of leaving the labor force) that is associated with a one-unit change in an independent

TABLE 1

MODEL OF TRANSITION FROM UNEMPLOYMENT

Independent Variables	Hypothesized Effects on Labor Market Status in March 1973	
	P(Employed)	P(NILF)
Earned income in 1972/est. weeks of work	+	-
Worked 1 week or more in 1972	+	-
Worked at least 2 weeks in past 5 years	+	-
Years of schooling or high school graduate	+	-
Nonwhite	-	+
Female	-	+
Age 21 or younger	-	+
Age 50 or older	-	+
Female in family with children under age six	-	+
Size of family or number in family under age 18	+	-
Other earners in family in 1972	-	+
Total family income in 1972 less subject's earnings	-	+
Eligibility for unemployment benefits	-	-
Unemployed because of job loss	+	-
Unemployed--on layoff	+	-
Weeks unemployed as of February 1973 CPS	+	+

variable. As noted above, the t-values of these coefficients are biased toward rejection of the null hypotheses. Each logit analysis coefficient estimates the percentage change in the probability of becoming employed (or of leaving the labor force) relative to the probability of remaining unemployed for a one-unit change in an independent variable. The t-values generated by the logit analysis asymptotically approach the t-distribution. An asymptotic Chi-square value is also computed for each independent variable as a test of the null hypothesis that both coefficients estimated for a variable are equal to zero.

Using the OLS regression results, it is possible to test the joint significance of a subgroup of coefficients estimated for related variables. In this case, the variables representing productivity in non-market activities (demographic characteristics) are hypothesized to explain a significant amount of variation in addition to the variation already explained by variables representing productivity in market activities. A second test examines the hypothesis that variables measuring income needs and resources contribute significant additional explanatory power when all other variables have been included in the model. These joint significance tests are based on a series of regressions in which groups of variables enter the equations in a specified order.

CHAPTER IV

TRANSITION FROM UNEMPLOYMENT: ANALYSIS

Description of Data

Slightly over half (52.7%) of the study group left unemployment between the February and March surveys. Of this group, 51.7% became employed and 48.3% left the labor force. Demographic and economic data describing the total number unemployed in February are shown in the first column in Table 2. The other three columns compare the characteristics of those entering employment, remaining unemployed, and withdrawing from the labor force.

The simple relationships between transition from unemployment and the factors hypothesized to influence transition are summarized in Table 2 and in cross-tabulations included in the Appendix. In general, the study group appears to be dominated by persons who were tangential to the regular work force. About 64% of the sample had worked half a year or less in 1972; 27% had not worked at all the previous year. A large proportion (27%) were seeking part-time jobs, and 45% had been out of the labor force prior to becoming unemployed. Compared with persons employed at that time, the study group includes proportionately more females, nonwhites, and persons under age 22.

A second general observation is that the characteristics of persons who dropped out of the labor force are quite different from those of persons who remained unemployed or found jobs. In terms of work experience, 46% of the labor force dropouts had not worked in 1972,

TABLE 2

CHARACTERISTICS OF SAMPLE BY LABOR MARKET STATUS IN MARCH 1973

Characteristics	Total Sample	Labor Market Status in March 1973		
		Employed	Unemployed	NILF
Weeks worked in 1972:				
48 to 52	15.0%	25.3%	13.6%	6.5%
1 to 26	37.0%	34.7%	37.5%	38.5%
None	27.4%	16.6%	23.3%	46.5%
No full-time work in past five years	19.4%	12.8%	15.6%	33.6%
Earned income in 1972	$2553	$3449	$2863	$1015
Estimated weekly earnings in 1972	$101	$113	$118	$56
Highest grade completed:				
12th	36.3%	38.8%	39.0%	28.4%
Beyond 12th	14.8%	14.7%	14.9%	14.7%
Age in years	30.8	30.5	31.8	29.4
Age group:				
21 or younger	36.4%	38.0%	30.1%	46.4%
50 or older	13.9%	12.1%	14.4%	15.0%
Race: nonwhite	17.7%	11.3%	18.5%	23.3%
Sex: female	46.1%	38.1%	43.6%	59.2%
Female with children under age six	10.5%	8.2%	8.3%	17.1%
Number in family	3.9	3.8	3.9	4.1
Marital status:				
Married, spouse present	44.9%	44.8%	47.4%	40.6%
Never married	41.7%	41.7%	38.5%	47.8%
Other earner(s) in family in 1972	75.7%	76.5%	73.6%	78.8%
Total family income less subject's earnings in 1972	$8401	$7446	$7967	$10201

TABLE 2--Continued

Characteristics	Total Sample	Labor Market Status in March 1973		
		Employed	Unemployed	NILF
Reason for unemployment:				
On layoff	13.9%	20.0%	14.2%	7.0%
Lost job	27.0%	26.7%	33.3%	15.5%
Quit job	13.5%	14.7%	14.2%	11.1%
Labor force entrant	45.5%	38.6%	38.3%	66.4%
Number of weeks unemployed as of February	11.0	8.2	13.0	10.2
Seeking part-time work	27.4%	21.7%	19.1%	48.7%
Number of observations	1522	415	720	387

and 34% had not worked full-time in the past five years. Almost half (49%) were seeking part-time jobs. For 66% of those withdrawing from the labor force, the spell of unemployment followed a period outside the labor force. The demographic characteristics are consistent with those usually ascribed to the secondary labor force--predominately female and under age 25. Average earnings in 1972 were less than half the earnings of the group remaining in the labor force, but average unearned income exceeded the unearned income of both employed and unemployed groups by more than $2,000.

Supporting the discussion on escape rates in Chapter II, Table 17 in the Appendix reveals an inverse relationship between current weeks of unemployment and probability of escape from unemployment. When the probability of transition from unemployment is separated into probability of employment and probability of labor force exit, two different patterns emerge. The proportion entering employment is highest for those unemployed only a week and lowest for persons unemployed more than a year. The decline in probability of employment with increased duration appears nearly continuous. The proportion leaving the labor force is also highest for persons with one week of unemployment, but it is lowest for persons with thirteen to twenty weeks of unemployment. Duration cohorts over twenty weeks have probabilities of leaving the labor force that are comparable to those of cohorts with two to six weeks of unemployment. This pattern of change in escape rates would appear as a U-shaped curve instead of a negatively sloped line.

Regression Analysis

Two different regression models are used in testing the hypotheses. The first is a regression of the probability of becoming unemployed (or

the probability of leaving the labor force) estimated for the entire study group. The second model is a regression of the probability of becoming employed rather than remaining unemployed (or the probability of leaving the labor force rather than remaining unemployed). Since the individual can consider three labor market states simultaneously, the first model more accurately reflects the transition process. However, the first model requires an assumption that labor market states are ordered in terms of allocation of time to market (or nonmarket) activities. The second model is more sensitive to variable effects when this assumption does not hold.

The regression estimates for probability of employment are summarized in Tables 3 (Model I) and 4 (Model II). Tables 5 and 6 present summaries of the estimated equations for probability of labor force withdrawal. Of the several versions of the two models, none explained more than six percent of the variance in probability of becoming employed or more than fifteen percent of the variance in probability of labor force withdrawal. Although the explanatory power is low, all of the estimated equations produced F-values significant at the .01 level. Individual coefficients of the exogenous variables are discussed below.

An individual's human capital stock is represented by variables measuring education, work experience, and past earnings. It was hypothesized that persons with greater human capital assets would be more likely to leave unemployment to take jobs and less likely to drop out of the labor force. Education measured as years of schooling completed did not produce significant coefficients (Equation 1 in Tables 3 and 5). In Equations 2, 3, and 4, two dummy variables indicate completion of less than 12 years, 12 years, or 13 or more years of school. In the

TABLE 3

REGRESSION EQUATIONS SUMMARY - MODEL I

(Probability of being employed rather than unemployed or not in labor force)

Independent Variables	Regression Estimates (standard errors)		
	1	2	3
Constant	.27670	.27493	.28765
Education (in years)	-.00037 (.00472)		
Education (dummy)			
Completed 12 yrs. school		.02280 (.02616)	.02147 (.02630)
Completed > 12 yrs. school		.00484 (.03502)	.00055 (.03511)
Worked 1 wk. or more in 1972	.11981** (.03237)	.12173** (.02876)	
Worked full-time at least 2 wks. in last 5 years			.08472** (.03217)
Earnings in 1972/est. wks. of work/100	-.00753 (.009)	-.00778 (.009)	.00201 (.009)
Nonwhite	-.10505** (.03091)	-.10412** (.03089)	-.11492** (.03078)
Female	-.06279* (.02531)	-.06619** (.02554)	-.06433* (.02580)
Age (in years)	.00465 (.00471)	.00395 (.00475)	.00247 (.00488)
Age (squared)	-.00009 (.00006)	-.00008 (.00006)	-.00006 (.00006)
Female in family with children under age 6	-.00951 (.04164)	-.01147 (.04164)	-.03047 (.04070)
Number of earners in family in 1972	.00349 (.01412)		

TABLE 3--Continued

Independent Variables	Regression Estimates (standard errors)		
	1	2	3
Number of earners in family besides subject in 1972		.00312 (.01414)	
Other earners in family besides subject in 1972			.06067 (.03118)
Number of family members under age 18	-.00547 (.00772)	-.00409 (.00778)	-.00426 (.00766)
Family income in 1972 less subject's earnings/1000	-.00541** (.00)	-.00540** (.00)	-.00693** (.00)
Weeks unemployed	-.00285** (.00074)	-.00285** (.00074)	-.00310** (.00074)
$\bar{R}^2$	.0473	.0472	.0426
F-value	7.198** (12,1486)	6.705** (13,1485)	6.126** (13,1485)
Number of observations	1499	1499	1499

*Significant at .05 level.

**Significant at .01 level.

TABLE 4

REGRESSION EQUATIONS SUMMARY - MODEL II

(Probability of being employed rather than unemployed)

Independent Variables	Regression Estimates (standard errors)			
	4	5	6	7
Constant	.57889	.56370	.37225	.37306
Education (dummy)				
Completed 12 yrs. school	-.00286 (.03245)			
Completed > 12 yrs. school	.00636 (.04440)			
High school graduate (dummy)		-.00780 (.02971)	-.00464 (.02942)	-.00475 (.02936)
Worked 1 wk. or more in 1972	.09003* (.03999)			
Worked full-time at least 2 wks in last five years		.02794 (.04577)	.03563 (.04534)	.03563 (.04531)
Estimated weeks of work in 1972		.00306** (.00103)	.00313** (.00103)	.00312** (.00103)
Earnings in 1972/est. wks. of work/100	-.01838 (.011)			
Earnings in 1972/1000		-.00139 (.01)	-.00061 (.01)	-.00060 (.01)
Nonwhite	-.12349** (.04054)	-.11728** (.04013)	-.11474** (.04005)	-.11457** (.04002)
Female	-.05214 (.03209)	-.04530 (.03282)	-.04481 (.03206)	-.04520 (.03213)
Age (in years)	-.00727 (.00649)	-.00835 (.00676)		
Age (squared)	.00007 (.00009)	.00009 (.00009)		
Age (dummy)				
21 or younger			.09616** (.03665)	.09572** (.03661)
50 or older			-.00619 (.04472)	-.00626 (.04449)
Female in family with children under age 6	.05541 (.05660)	.05972 (.05577)	.07355 (.05545)	.07502 (.05587)
Number of family members under 18	-.00343 (.00941)			
Number in family		-.00032 (.00779)	-.00193 (.00777)	
Number of nonearners in family in 1972				-.00255 (.00865)
Family income in 1972 less subject's earnings/1000	-.00410 (.00)	-.00323 (.00)	-.00388 (.00)	-.00405 (.00)
Eligibility for unemployment benefits		-.15932** (.03572)	-.15295 (.03531)	-.15307** (.03531)
Reason unemployed				
Lost job		-.02877 (.03430)	-.02607 (.03423)	-.02614 (.03419)
On layoff		.07845 (.04355)	.08073 (.04345)	.08053 (.04341)

TABLE 4--Continued

Independent Variables	Regression Estimates (standard errors)			
	4	5	6	7
Weeks unemployed	-.00447** (.00096)	-.00351** (.00097)	-.00330** (.00097)	-.00329** (.00097)
$\bar{R}^2$	.0349	.0598	.0639	.0639
F-value	4.351** (12,1100)	5.808** (15,1119)	6.158** (15,1119)	6.160** (15,1119)
Number of observations	1113	1135	1135	1135

*Significant at .05 level.

**Significant at .01 level.

TABLE 5

REGRESSION EQUATIONS SUMMARY - MODEL I

(Probability of being out of labor force rather than employed or unemployed)

Independent Variables	Regression Estimates (standard errors)		
	1	2	3
Constant	.74652	.67497	.63046
Education (in years)	-.00790 (.00446)		
Education (dummy)			
Completed 12 yrs. school		-.06843** (.02469)	-.06628** (.02495)
Completed > 12 yrs. school		-.00432 (.03306)	.00492 (.03331)
Worked 1 wk. or more in 1972	-.17056** (.03061)	-.17630** (.02715)	
Worked full-time at least 2 wks. in last 5 years			-.13422** (.03052)
Earnings in 1972/est. wks. of work/100	-.01999* (.009)	-.02111* (.009)	-.03547** (.008)
Nonwhite	.05309 (.02923)	.05351 (.02917)	.07067* (.02919)
Female	.06913** (.02394)	.07685** (.02412)	.06959** (.02448)
Age (in years)	-.02338** (.00445)	-.02295** (.00449)	-.02033** (.00463)
Age (squared)	.00033** (.00006)	.00033** (.00006)	.00030** (.00006)
Female in family with children under age 6	.12047** (.03937)	.12032** (.03931)	.15369** (.03861)
Number of earners in family in 1972	-.01079 (.01336)		

TABLE 5--Continued

Independent Variables	Regression Estimates (standard errors)		
	1	2	3
Number of earners in family besides subject in 1972		-.00837 (.01335)	
Other earners in family besides subject in 1972			-.03993 (.02957)
Number of family members under age 18	.00082 (.00730)	.00017 (.00734)	-.00155 (.00726)
Family income in 1972 less subject's earnings/1000	.00719** (.00)	.00652** (.00)	.00708** (.00)
Weeks unemployed	-.00111 (.00070)	-.00110 (.00070)	-.00070 (.00070)
$\bar{R}^2$	.1215	.1241	.1116
F-value	18.259** (12,1486)	17.322** (13,1485)	15.471** (13,1485)
Number of observations	1499	1499	1499

*Significant at .05 level.

**Significant at .01 level.

TABLE 6

REGRESSION EQUATION SUMMARY - MODEL II

(Probability of being out of labor force rather than unemployed)

Independent Variables	Regression Estimates (standard errors)			
	4	5	6	7
Constant	.88129	.75547	.53983	.53132
Education (dummy)				
Completed 12 yrs. school	-.09048** (.03150)			
Completed > 12 yrs. school	-.00274 (.04179)			
High school graduate		-.04805 (.02845)	-.06189* (.02842)	-.06102* (.02843)
Worked 1 wk. or more in 1972	-.16488** (.03297)			
Worked full-time at least 2 wks. in last five years		-.05932 (.03772)	-.06510 (.03770)	-.06434 (.03770)
Estimated weeks of work in 1972		-.00384** (.00111)	-.00387** (.00112)	-.00384** (.00112)
Earnings in 1972/est. wks. of work/100	-.03191** (.011)			
Earnings in 1972/1000		-.01167 (.01)	-.01191 (.01)	-.01203 (.01)
Nonwhite	.02759 (.03555)	.02380 (.03513)	.01912 (.03525)	.01714 (.03517)
Female	.07995** (.03038)	.03200 (.03101)	.02729 (.03047)	.02589 (.03057)
Age (in years)	-.02896** (.00551)	-.01664** (.00573)		
Age (squared)	.00040** (.00007)	.00026** (.00007)		
Age (dummy)				
21 or younger			.01738 (.03513)	.01328 (.03496)
50 or older			.14759** (.04182)	.15120** (.04158)
Female in family with children under age 6	.16768** (.04685)	.15252** (.04640)	.14397** (.04671)	.14857** (.04705)
Number of family members under 18	-.00530 (.00893)			
Number in family		-.00848 (.00736)	-.01046 (.00742)	
Number of nonearners in family in 1972				-.00976 (.00837)
Family income in 1972 less subject's earnings/1000	.00570** (.00)	.00515** (.00)	.00552** (.00)	.00479** (.00)
Eligibility for unemployment benefits		-.10666** (.03594)	-.10639** (.03606)	-.10591** (.03608)
Reason unemployed (dummy)				
Lost job		-.08930** (.03443)	-.09055** (.03459)	-.09297** (.03449)
On layoff		-.03027 (.04713)	-.03330 (.04732)	-.03555 (.04727)

TABLE 6--Continued

Independent Variables	Regression Estimates (standard errors)			
	4	5	6	7
Weeks unemployed	-.00202* (.00083)	-.00219** (.00083)	-.00223** (.00084)	-.00219** (.00084)
R^2	.1338	.1559	.1484	.1479
F-value	15.075** (12,1081)	14.617** (15,1091)	13.844** (12,1094)	13.795** (15,1091)
Number of observations	1094	1107	1107	1107

*Significant at .05 level.

**Significant at .01 level.

remaining equations, one binary variable represents completion of 12 or more years of school. The estimated coefficients in the employment equations are neither significant or consistently positive. In the labor force withdrawal equations, high school graduates are less likely to drop out of the labor force than non-graduates, but post-high school education shows no effect.

The coefficients for three different measures of work experience confirm that persons who had worked more in the past were more likely to take employment in the next month and less likely to leave the labor force. The dummy variable indicating at least one week of work in 1972 increased the estimated probability of employment by nine to twelve percentage points and decreased the probability of labor force withdrawal by about seventeen percentage points (Equations 1, 2, and 4). When work experience was represented by estimated weeks of work during 1972, the results were similar (Equations 5, 6, and 7).

The individual's earnings in 1972, whether total annual or estimated weekly, had a significant negative effect on the likelihood of labor force withdrawal. An additional $100 in estimated weekly earnings decreased the probability of labor force withdrawal by two to four percentage points (Equations 1 to 4). Neither earnings variable, however, produced a coefficient with the expected positive sign in the employment equations. Since the work experience variable carried the positive substitution effect of greater human capital assets on labor supply, it is possible that the negative income effect of past earned income overwhelmed the remaining substitution effect.

None of the variables defining the individual's labor market were included in the regression equations. A cross-tabulation of labor

market status in March by the Census division shows that the proportions entering employment and leaving the labor force vary only slightly by geographic area (Appendix, Table 18). Furthermore, no consistent geographic patterns emerge. Residents of areas with severe winters were generally more likely than other persons to remain unemployed except that the Pacific states had a higher proportion remaining unemployed than the Mountain states. Since the inclusion of geographic area in the equations held very slight promise of differentiating among outcomes and also used up eight degrees of freedom, the variable was omitted.

Appendix Table 19 compares the transition probabilities of seven occupational groups where occupation was defined as the longest job held in 1972. The differences among groups are clearly sex-linked. Occupations in which women are more frequently employed (sales, clerical, service, and operative) had smaller proportions entering employment and greater proportions leaving the labor force. Occupational group was not included in the equations so that the variable representing females could measure these effects.

Two variables representing discriminatory factors, race and sex, were entered in all equations. Members of minority groups were significantly less likely than whites (by ten to twelve percentage points) to take employment in the next period. They were also more likely to leave the labor force, but the coefficient was significant only in Equation 3. Being female decreased the probability of transition to employment and increased the probability of exit from the labor force. Both sets of coefficients are significant. In Equations 1, 2, and 3, the estimated difference between men and women in probability of employment or

probability of labor force withdrawal is between six and seven percentage points.

Variables representing potential productivity in non-market activities are significant in most of the labor withdrawal equations but not in the employment equations. Coefficients for age and age squared indicate that probability of labor force withdrawal decreased up to age 35 and then began to increase if all other factors were held equal (Equations 1 to 5 in Tables 5 and 6). The two equations using dummy variables to represent age reveal that being age 50 or older increased the likelihood of labor force withdrawal by fifteen percentage points (Equations 6 and 7). Persons aged 21 or younger were significantly more likely than those aged 22 to 49 to take employment in the next month; the difference was nearly ten percentage points (Table 4). A comparison of age effects in Tables 3 and 4 reveals that being younger has the expected negative effect on probability of becoming employed when the entire study group is considered (Equations 1, 2, and 3). In Model II which includes only those persons remaining in the labor force, the youth effect on probability of employment is positive. If the labor force participation decision is assumed to occur prior to the employment decision[1], these results suggest that young people have stronger incentive than adults to pursue non-market activities full-time and smaller expected gains from employment. However, among persons remaining in the labor force, being young increases the rate of escape from unemployment. In search theory terms, youth take jobs more quickly

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[1]This assumption is the basis of Toikka's model of transition from unemployment. See Toikka, p. 822.

than adults because the expected gains from continued unemployment are relatively small.

The other measure of potential productivity in non-market activities is a binary variable representing women in families with children under age six. This characteristic increases the probability of labor force withdrawal by an estimated twelve to fifteen percentage points (Equations 1, 2, and 3). The coefficients in the employment equations are not significant, but they are consistently negative in Model I and consistently positive in Model II. This is the same pattern exhibited by the variables representing youth. Expected gains from continued unemployment may be relatively small for women in families with young children because they are predominately labor force entrants who are eligible for unemployment compensation.

Several representatiions of relative needs or preferences for goods-intensive and time-intensive commodities were tried, but few produced significant coefficients. The most useful variable is total family income in 1972 less the subject's earnings. An additional $1,000 of other income was estimated to decrease probability of employment .5 to .7 percentage point and to increase probability of labor force withdrawal by .7 percentage point (Equations 1, 2, and 3). In Equations 5, 6, and 7, an indicator of eligibility for unemployment benefits (receipt of income from Source D in 1972) was associated with significant decreases in both probability of employment and probability of labor force withdrawal. 'This variable lowered probability of employment by more than fifteen percentage points and probability of labor force withdrawal by more than ten percentage points. Being unemployed because of job loss and being on layoff are also indicators of

eligibility for receipt of unemployment benefits in the current spell. Both variables lower the probability of labor force withdrawal relative to persons unemployed because they quit jobs or entered the labor force (Equations 5, 6, and 7). However, only the estimated coefficient for unemployment because of job loss is significant.

Other measures of income resources--number of earners in family in 1972, number of earners other than the subject in 1972, and a binary variable indicating the presence of other earners in the family--produced no significant effects on transition probabilities. Likewise, the variables indicating relatively greater need for income--family size, number of persons under age 18, and number of family members without earnings--have estimated coefficients that are not significant.

The hypothesized effect of current duration on both probability of employment and probability of labor force withdrawal is positive. This expectation is based on the assumption that other variables in the model adequately represent individual differences in propensity to remain unemployed. The regression estimates belie this assumption. The number of weeks unemployed has a negative effect on probability of escape from unemployment. Increasing average spell length by ten weeks reduces probability of employment in March by three to four percentage points and probability of labor force withdrawal by one to two percentage points.

Multinomial Logit Analysis

The logit analysis estimates a variable's effect on probability of becoming employed (or leaving the labor force) relative to probability of remaining unemployed (Table 7). Coefficients estimated by the

TABLE 7

LOGIT ANALYSIS

(Log of probability of being employed or probability of being out of labor force relative to probability of remaining unemployed)

	$\ln\frac{P(\text{Employed})}{P(\text{Unemployed})}$	$\ln\frac{P(\text{NILF})}{P(\text{Unemployed})}$	Chi-Square (df)
Constant	-.4928 (.3029)	.1323 (.2906)	3.798
High school graduate	-.0457 (.1369)	-.3229* (.1455)	5.069 (2)
Worked at least 2 wks. in last 5 yrs.	.1759 (.2087)	-.1984 (.1798)	3.080 (2)
Earnings in 1972/1000	-.0011 (.0240)	-.0954* (.0427)	5.178 (2)
Estimated weeks of work in 1972	.0141** (.0047)	-.0187** (.0061)	26.563** (2)
Age (dummy) 21 or younger	.4491** (.1666)	.0690 (.1739)	22.861** (4)
50 or older	-.0187 (.2111)	.8243** (.2214)	
Female	-.2072 (.1488)	.1597 (.1539)	4.406 (2)
Nonwhite	-.5708** (.1958)	.1146 (.1758)	11.166** (2)
Female in family with children under 6	.3225 (.2546)	.6217** (.2257)	7.635* (2)
Number in family	-.0102 (.0362)	-.0444 (.0382)	1.359 (2)
Family income less subject's earnings/ 1000	-.0191 (.0105)	.0282** (.0101)	16.392** (2)

TABLE 7--Continued

	$\ln\frac{P(\text{Employed})}{P(\text{Unemployed})}$	$\ln\frac{P(\text{NILF})}{P(\text{Unemployed})}$	Chi-Square (df)
Eligibility for unemployment benefits	-.7105** (.1713)	-.5760** (.2100)	20.751** (2)
Reason unemployed (dummy)			
Lost job	-.1536 (.1593)	-.5403** (.1854)	13.872** (4)
On layoff	.3481 (.1958)	-.2208 (.2558)	
Weeks unemployed	-.0198** (.0059)	-.0106* (.0043)	14.482** (2)

Log Likelihood, Unconstrained -1439.38

Log Likelihood, Constrained to Zero -1608.18

χ^2 = 2 (Unconstrained Log Likelihood - Constrained Log Likelihood) = 337.592 (30 df)**

Likelihood Ratio Index = $1 - \frac{\text{Unconstrained Log Likelihood}}{\text{Constrained Log Likelihood}}$ = .105

Number Correctly Predicted 821 or 53.9% of 1522 observations

*Significant at .05 level.

**Significant at .01 level.

multinomial logit model have the same signs as those estimated by OLS regressions of Model II (Tables 4 and 6). Of fifteen independent variables, five produced asympototic t-values significant at the .05 level or better in the employment equation--work experience in 1972, age 21 or younger, nonwhite, eligibility for unemployment benefits, and weeks unemployed. "Age 21 or younger" was the only variable with a coefficient significantly different from zero and sign opposite that hypothesized. In the labor force withdrawal equation, nine variables had coefficients significant at the .05 level or better and all had the expected signs--high school graduate, weeks of work in 1972, earnings in 1972, age 50 or older, female in family with children under age six, other income, eligibility for unemployment benefits, unemployed because of job loss, and weeks unemployed. An asymptotic Chi-square test for each variable posed the null hypothesis that both estimated parameters were equal to zero. If a variable is represented by two dummy variables, the Chi-square tests the null hypothesis that all four estimated parameters are equal to zero. The null hypothesis was rejected for all but five of the independent variables.

Summary statistics for the logit estimates are shown at the bottom of Table 7. The Chi-square statistic tests the null hypothesis that all estimated parameters except for the constants are equal to zero. The likelihood ratio index is similar to the multiple correlation coefficient in regression analysis; it indicates that about 10% of the variation in the dependent variable was explained by the independent variables. The model correctly predicts labor market status in March for 821 persons or 53.9% of the study group.

The individual parameter estimates are interpreted as the percentage change in probability of becoming employed (or of leaving the labor force) relative to remaining unemployed produced by a one unit change in the independent variable. Partial derivatives comparable to the coefficients produced by regression analysis were also computed (Table 8). They are interpreted as the estimated change in probability of becoming employed, remaining unemployed, or leaving the labor force for a one-unit change in the independent variable evaluated at the mean probability. Since derivatives for all three probabilities sum to zero, it is possible to examine a variable's effect on probability of occupying a particular state in terms of the complementary effects on probabilities of occupying the other two states.

The discussion first considers factors with significant effects on probability of employment and then the additional factors that produce significant effects on probability of labor force withdrawal. Weeks of employment in 1972 have a positive effect on probability of employment; an additional week increases likelihood of employment in March by .4 percentage point. The positive effect appears to be entirely due to the negative effect on probability of labor force withdrawal since the unemployment effect is negligible. Probability of employment for youths age 21 or younger is an estimated eight percentage points higher than for adults age 22 to 49. Most of the difference is attributable to youths' more rapid exit from unemployment. Adults age 50 and older also leave unemployment more quickly than those age 22 to 49, but they drop out of the labor force rather than take employment. Being nonwhite decreases probability of employment by an estimated

TABLE 8

DERIVATIVES EVALUATED AT THE MEAN

(Estimated change in probability of becoming employed, remaining unemployed, or leaving the labor force)

	P (Employed)	P (Unemployed)	P (NILF)
Constant	-.10465	.05396	.05069
High school graduate	.00962	.04206	-.05168
Worked full-time at least 2 wks. in last 5 years	.04607	-.00255	-.04352
Estimated weeks of work in 1972	.00386	.00010	-.00397
Earnings in 1972/1000	.00528	.01070	-.01598
Age: 21 or younger	.08443	-.07014	-.01429
50 or older	-.05122	-.08853	.13975
Female	-.05000	.01118	.03882
Nonwhite	-.11898	.06678	.05220
Female in family with children under 6	.02762	-.11361	.08599
Number in family	.00055	.00633	-.00688
Family income less subject's earnings/1000	-.00538	-.00046	.00585
Eligibility for unemployment benefits	-.10664	.16257	-.05593
Reason unemployed: Lost job	.00092	.08111	-.08203
On layoff	.08126	-.02403	-.05723
Weeks unemployed	-.00328	.00392	-.00064

twelve percentage points; nonwhites are more likley both to remain unemployed and to leave the labor force.

The subject's earned income in 1972 has a negative effect on probability of labor force withdrawal. An additional $1,000 of earnings is associated with a decrease of two percentage points in probability of dropping out. Higher earnings apparently increase unemployment duration, but their estimated effect on probability of employment is very slight. The positive effect of other family income on probability of labor force withdrawal is an estimated .6 percentage point for each additional $1,000. This effect is complemented by a comparable decrease in probability of becoming employed. Contrary to expectations, the estimated effect of other income on continuing unemployment is negligible. Women in families with young children are more likely than others to leave the labor force. Their relatively low continuation rate in unemployment suggests brief spells of job search in order to assess employment opportunities.

Tests on Joint Significance of Subgroups of Coefficients

Joint significance tests were constructed to determine whether particular subgroups of variables added significant explanatory power to the model. The model proposed that three types of factors influence likelihood of transition to employment or out of the labor force--productivity in market activities, productivity in non-market activities, and relative needs for time-intensive and goods-intensive commodities. If a group of variables measuring one type of influence failed to add significant explanatory power to the model, two problems should be considered. The chosen variables may be weak or invalid measures of a

factor or, more importantly, the basic arguments developed in Chapter III may be invalid. Summaries of the joint significance tests for Equations 2, 4, and 6 are shown in Tables 9, 10, and 11, respectively.

In Equation 2 (Table 9), the variables representing greater opportunity for productive non-market activities were included in the initial regression estimate. A second regression added variables representing potential productivity in market activities. The additional variation explained by the second set of variables produced an F-value significant at the .01 level. Groups of variables were entered in the same order in Equation 4 (Table 10), which was estimated separately for persons who remained in the labor force and for persons who did not take jobs. The market productivity variables contributed significant additional explanatory power in both estimates. In Equation 6 (Table 11), the measures of market productivity were included first followed by measures of potential for productive non-market activities. The latter variables explained significant additional variation in both probability of becoming employed and probability of labor force withdrawal.

Measures of family income resources and needs were included as the third set of variables in all of the regression estimates. The subgroup's contribution to explanatory power was significant in all of the estimates but one, Equation 4 estimated for persons who remained in the labor force. In this estimate, the variable indicating eligibility for unemployment benefits was not included. Its inclusion in Equation 6, which was estimated for the same group, made the addition to explanatory power significant for income resources and needs.

TABLE 9

JOINT SIGNIFICANCE TESTS ON SUBGROUPS OF COEFFICIENTS
MODEL I, EQUATION 2

Independent Variable Groups	Probability of Employment			Probability of Labor Force Withdrawal		
	Sum of Squares	d.f.	Mean Square	Sum of Squares	d.f.	Mean Square
Demographic Characteristics						
Regression	6.330	5		20.517	5	
Market Earnings Potential						
Regression	11.769	9		34.848	9	
Extra variation explained	5.439	4	1.360	14.332	4	3.583
Residual	283.808	1489	.191	251.755	1489	.169
F-value, extra variation explained		(4,1489)	7.134**		(4,1489)	21.191**
Family Needs and Resources						
Regression	13.583	12		37.319	12	
Extra variation explained	1.814	3	.605	2.470	3	.823
Residual	281.994	1486	.190	249.284	1486	.168
F-value, extra variation explained		(3,1486)	3.187*		(3,1486)	4.909**

*Significant at .05 level.

**Significant at .01 level.

TABLE 10

JOINT SIGNIFICANCE TESTS ON SUBGROUPS OF COEFFICIENTS
MODEL II, EQUATION 4

Independent Variable Groups	Probability of Employment			Probability of Labor Force Withdrawal		
	Sum of Squares	d.f.	Mean Square	Sum of Squares	d.f.	Mean Square
Demographic Characteristics						
Regression	3.536	5		20.288	5	
Market Earnings Potential						
Regression	6.071	9		32.840	9	
Extra variation explained	2.534	4	.634	12.052	4	3.013
Residual	251.557	1103	.228	216.966	1084	.200
F-value, extra variation explained		(4,1103)	2.778*		(4,1084)	15.054**
Family Needs and Resources						
Regression	6.853	11		34.629	11	
Extra variation explained	.782	2	.391	1.789	2	.895
Residual	250.775	1101	.228	215.177	1082	.199
F-value, extra variation explained		(2,1101)	1.718		(2,1082)	4.499*

*Significant at .05 level.

**Significant at .01 level.

TABLE 11

JOINT SIGNIFICANCE TESTS ON SUBGROUPS OF COEFFICIENTS
MODEL II, EQUATION 6

Independent Variable Groups	Probability of Employment			Probability of Labor Force Withdrawal		
	Sum of Squares	d.f.	Mean Square	Sum of Squares	d.f.	Mean Square
Market Earnings Potential						
Regression	5.070	4		27.138	4	
Demographic Characteristics						
Regression	11.131	9		32.663	9	
Extra variation explained	6.061	5	1.212	5.524	5	1.105
Residual	252.129	1125	.224	219.045	1097	.200
F-value, extra variation explained		(5,1125)	5.409**		(5,1097)	5.533**
Family Needs and Resources						
Regression	15.930	12		37.143	12	
Extra variation explained	4.799	3	1.600	4.481	3	1.494
Residual	247.330	1122	.220	214.564	1094	.196
F-value, extra variation explained		(3,1122)	7.256**		(3,1094)	7.615**

*Significant at .05 level.

**Significant at .01 level.

Summary

The analysis lent some support to all four hypotheses, but several individual variables failed to produce the expected effects on transition from unemployment. Of the factors representing greater market productivity, recent work experience and being white both increased the probability of employment in March. However, two important measures of market potential, education and previous earnings, produced no significant effects on transition. All three measures of greater productivity in nonmarket activities increased the probability of labor force withdrawal in the first model. In the second model, persons age 21 and younger were not significantly more likely to leave the labor force, but they were more likely to take employment. None of the variables representing relatively greater need for goods-intensive commodities, such as family size or number of dependents, significantly increased probability of employment. However, two direct measures of income resources, family income other than the subject's earnings and eligibility for unemployment benefits, did influence probabilities of employment and labor force withdrawal as hypothesized.

Both the regression and multinomial logit models were more successful in explaining variation in labor force withdrawal than in employment. This difference was not expected since the line between "unemployed" and "not in labor force" is less definitive than the line between "unemployed" and "employed." Part of the distinction between persons becoming employed and persons remaining unemployed is the level of demand for their labor, and specific demand factors were not included in the model. Descriptive data on the study group indicate that the independent variables clearly distinguish persons leaving the labor

force from those remaining unemployed and those taking employment. The labor supply characteristics of the latter two groups are very similar, but there are sufficient differences revealed by the analysis to warrant application of labor supply theory to movement from unemployment to employment.

CHAPTER V

DURATION OF UNEMPLOYMENT: BACKGROUND FOR ANALYSIS

The second problem is an examination of individual characteristics associated with the length of completed unemployment spells. The model of unemployment duration includes variables representing job search costs, returns to non-market activities, and search prior to unemployment. In addition to estimating individual variable coefficients, the analysis will assess the relative importance of the three types of variables as determinants of spell length.

Model of Unemployment Duration

The analysis of duration is based on John McCall's simple model of job search. He describes the following assumptions:

1. An unemployed individual has a fixed perception of the distribution of wage offers for a particular labor market.

2. The individual receives one wage offer per period of search, and each offer is accepted or rejected before beginning a new period of search.

3. The average time required to complete a period of search is uniform across individuals. Therefore, a greater number of search periods indicates longer duration of unemployment.

4. The individual knows the cost of search per period, and the cost remains constant over time.

5. An offer is accepted only if it equals or exceeds a critical value which equates the expected marginal return to searching another period with the marginal cost.[1]

The expected marginal return to a period of search is the difference between the value of the average wage offer and the minimum acceptance wage, multiplied by the probability of receiving an acceptable offer. The marginal cost is determined by out-of-pocket job hunting expenses and by the value of opportunities foregone while remaining unemployed another period. Since in McCall's model the minimum acceptance wage or critical value equates expected marginal return with marginal cost, the expected number of periods an individual will search is a complex function of the distribution of wage offers and of costs. If two individuals face the same wage offer distribution, the person with lower marginal costs per period of search is expected to set a higher critical value, to search a greater number of periods before finding an acceptable offer, and to experience a longer spell of unemployment.[2]

The distribution of wage offers to an individual affects expected duration of unemployment in two ways. As described above, the job seeker adjusts his or her minimum acceptance wage to equate the expected gain from a period of search with the marginal cost. The expected gain is a function of the perceived distribution of wage offers in relation to costs of search. In general, a higher expected wage offer relative to the cost of obtaining each offer raises the critical value which increases the expected number of periods searched. However, the wage offer

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[1]McCall, pp. 114-116.

[2]Ibid., pp. 117-119.

distribution also affects the job seeker's foregone opportunity cost for an additional period of search. The opportunity cost is the value of the individual's best available alternative to continuing search in the next period. An individual with a higher wage offer distribution is expected to have a higher current wage offer and thus a higher foregone opportunity cost to continuing search. A higher marginal cost of search, other things being equal, would tend to reduce the expected duration of unemployment.

Without knowing the shape and mean value of each individual's wage offer distribution, it is impossible to determine the duration effects of a shift in the distribution. A wage offer distribution is a function of the particular labor market (geographic area and occupation), education and training, experience, skill level, and discriminatory factors. If all of these wage variables are assumed to have constant values, it is possible to hypothesize how search costs affect relative unemployment duration for individuals facing the same wage offer distribution.

McCall's model assumes that search costs are constant for all periods of search. Thus the opportunity cost of rejecting an existing wage offer is equivalent to the amount of earnings that could be derived during a period from the average wage offer. Opportunity costs can be defined more broadly to include the value of non-market activities that are also foregone while continuing job search. The out-of-pocket expenses described by McCall are transportation and information costs associated with job hunting. However, other direct costs such as interest paid on borrowed funds may also be incurred by remaining unemployed another period. These costs are reduced by unemployment benefits and by the value of additional nonmarket activities pursued while unemployed.

One limitation of McCall's simple search model is its failure to explain unemployment duration for those who drop out of the labor force. McCall suggests that a discouraged worker is one who does not search at all because the marginal cost of job search is sufficiently high compared with prospective wage offers that the appropriate critical value or minimum acceptance wage would be lower than the return the individual could expect from remaining unemployed.[1] Since an individual who decides to search is assumed to have constant marginal costs and a fixed perception of the wage distribution, he or she will continue searching until an offer meets or exceeds the critical value. Exits from the labor force after a period of search can be explained only by an increase in the marginal cost of search and/or by a change in perception of the wage distribution so that the individual's critical value is lowered to a point where job search is no longer profitable. For example, unemployment insurance benefits are expected to prolong unemployment because they lower search costs. Once benefits are exhausted, search costs may be so high that the individual leaves the labor force. Alternatively, the expected return from full-time pursuit of a nonmarket activity may increase so that it exceeds the critical value. In either case, the expected length of the unemployment spell would be shortened for those whose job search is less profitable.

The search model assumes that the spell of job search is coterminous with the spell of unemployment. However, employed persons seeking to change jobs and students looking for permanent employment typically

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[1] Ibid. McCall distinguishes between job seekers and discouraged workers, but both groups are described as "unemployed." Here it is assumed that an unemployed person is searching for work; a person who has determined search is unprofitable is not in the labor force.

investigate some job offers prior to becoming unemployed. Although search prior to unemployment is not part of the search process according to the models, it familiarizes the job seeker with the market and allows him or her to accept or reject some job offers. Thus, prior search should reduce the expected number of searches required while unemployed to find an acceptable wage offer. It may also reduce the average time required to locate and respond to a job offer.

The hypothesized associations with unemployment duration are summarized below. All expectations are based on equal wage offer distributions.

1. Higher costs of search per period decrease the expected number of periods searched and shorten the expected duration of unemployment.

2. A higher expected return to full-time pursuit of non-market activities reduces the expected duration of unemployment.

3. Search prior to unemployment decreases the expected number of periods searched and reduces the expected duration of unemployment.

Variable Measures

Analysis of completed spell duration requires variables that define an individual's wage offer distribution, costs of search, and returns to non-market activities. The differentiation of wage offer distributions is accomplished by including measures of education, experience, past earnings, occupation, geographic area, race, and sex. These variables were described in Chapter III as measures of an individual's market productivity.

The marginal costs of search include the direct costs incurred in job search and the indirect costs of opportunities foregone while unemployed. Defined broadly, direct costs are all extra expenses

incurred by remaining unemployed another period. These include the cost of borrowing money as well as the costs of obtaining information and contacting employers. In this analysis, higher costs are represented by larger family size or by greater number of dependents. Lower costs are represented by greater amounts of family income (excluding the individual's earnings) during the previous year. The receipt of unemployment insurance benefits directly reduces the cost of remaining unemployed each period. Since the survey does not provide information on unemployment benefits during the current spell, a binary variable representing receipt of unemployment benefits during 1972 is substituted. Variables representing persons on layoff and persons who lost jobs are also included to identify those individuals most likely to have received benefits during the current spell. Entrants to the labor force and persons unemployed because they quit jobs generally are ineligible to receive compensation or are disqualified for the first few weeks of unemployment.

The indirect or foregone opportunity costs of unemployment are a function of the individual's best available alternative to continuing job search. These costs are represented by variables defining an individual's wage offer distribution and by variables indicating the value of nonmarket activities foregone because of unemployment. The latter are described below.

According to the job search model, persons whose expected returns from non-market activities are high relative to their expected returns from employment would have shorter spells of unemployment. Since some non-market activities such as housework are more easily pursued while unemployed than employed, the benefits derived from them may actually

prolong unemployment. However, activities commonly pursued as long-term alternatives to employment--enrollment in school, care of children, and retirement should reduce the expected gain from job search and hasten a decision to drop out of the labor force. The likelihood of having such alternatives is indicated by variables measuring age and age squared and by a variable representing women in families with children under age six.

A final factor described as influencing duration of unemployment is the extent of job search prior to becoming unemployed. Prior job search is assumed most likely for persons unemployed because they voluntarily left a previous job. Persons who were full-time students during 1972 and who were looking for full-time employment in February 1973 would also be likely to have searched the market before becoming unemployed. A binary variable indicates if a person is unemployed because of quitting a job or entrance to the labor force.

Methods of Estimation

The analysis of spell duration is limited to those individuals unemployed in February 1973 who were either employed or not in the labor force during the March reference week. Since an individual could have exited unemployment any time during the four weeks between the two survey reference weeks, the exact length of the completed spell is unknown. If the distribution of spell completions over the four-week period is assumed to be random (with respect to the explanatory variables), it is possible to substitute the duration of unemployment reported in February as the dependent variable. A second problem with the dependent variable is the imprecise reporting of weeks of unemployment. The distribution of current weeks of unemployment has consistently

exhibited a pattern of "lumps" at four-week intervals--4, 8, 12, 16, and 20 weeks--instead of a smooth curve. Respondents tend to state length of unemployment in terms of months rather than weeks, and interviewers who are unable to obtain more specific information simply multiply the number of months by four. The effect of both measurement errors is to increase the size of the error term in a least squares analysis. The estimated coefficients are not biased by the measurement error, but they are less likely to be judged significant.

The model for completed spell duration can be estimated by one equation for all individuals no longer unemployed in March 1973 or by separate equations for those who became employed and those who left the labor force. Separate equations are used for two reasons. Because of the way unemployment is operationally defined, persons leaving the labor force are likely to have shorter completed spells of unemployment than persons becoming employed even though their reported current duration is the same.[1] Although the signs of the estimated coefficients would be unchanged by this difference, the absolute magnitudes of the coefficients would differ for the employed and the labor force dropouts. Estimating the equations separately would reduce the variance in the error term.

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[1]To be unemployed, a person must have sought work during the past four weeks and must have been available to work during the reference week. A person reported unemployed during the second week of February and out of the labor force during the second week of March may have ceased active job search as early as the third week of January or (if not available to work during the March reference week) as late as the first week in March. A person reported as employed during the second week of March is more likely to have ceased job search between the February and March reference weeks. (A small number who were counted as unemployed in February because they were waiting to start jobs within thirty days may have ceased job search before the February reference week.)

The other consideration is that coefficients for some variables are likely to have opposite signs when estimated for employed persons and labor force dropouts because of differences between the two groups that are not represented in the model. Theoretically, all unemployed persons seek work until it is no longer economically rational to remain unemployed, but it is likely that the expected utility of remaining unemployed varies for reasons not represented in the model of unemployment duration. These unmeasured sources of variation are not distributed randomly between the employed and labor force dropouts. For example, the psychological commitment to finding a job is probably stronger on the average among those who become employed than among those who leave the labor force. During unemployment, psychological commitment functions to shorten the spell length of those who take employment and to lengthen the spells of those who leave the labor force. The effects of this unmeasured variable would confound the effects of measured variables such as other family income if a single equation was estimated for both the employed and not-in-labor force groups.

Tests of Hypotheses

Table 12 lists the independent variables and their hypothesized effects on spell duration. The coefficients estimated by OLS regression are tested for significant difference from zero in the hypothesized direction by computing t-statistics. In addition, the extra variation explained by two groups of variables--demographic characteristics and indicators of family needs and resources--is tested for significance.

TABLE 12

MODEL OF DURATION OF UNEMPLOYMENT

Independent Variables	Hypothesized Effect on Weeks of Unemployment
Years of schooling or high school graduate	control variable
Work experience (1972 or last five years)	control variable
Earned income in 1972/est. weeks of work	control variable
Looking for part-time work	control variable
Nonwhite	control variable
Female	control variable
Age in years	+
Age squared	-
Female in family with children under age six	-
Number of other earners in family in 1972	+
Family income in 1972 less subject's earnings/1000	+
Number in family or number under age eighteen	-
Eligibility for unemployment benefits	+
Unemployed - on layoff	+
Unemployed because of job loss	+

CHAPTER VI

DURATION OF UNEMPLOYMENT: ANALYSIS

Description of Data

Completed spell duration is analyzed separately for those who became employed by the March 1973 survey and for those who left the labor force. Table 13 compares the mean weeks of unemployment reported in the February survey for the two groups. Unemployment duration was two weeks longer on the average for persons who left the labor force than for persons who took employment. However, as discussed in Chapter V, measured unemployment duration overstates average length of job search for the "not in labor force" group. Distributions of the employed and "not in the labor force" groups by weeks employed also differ slightly in shape. Persons who became employed were more likely to have spells lasting two to six months (5 to 26 weeks). Those who left the labor force were more likely to have very brief or very long spells of unemployment.

Table 20 in the Appendix summarizes a series of cross-tabulations of unemployment duration by demographic and economic characteristics. For each characteristic group, the summary table presents the proportion unemployed thirteen or more weeks (at least three months). Since cross-tabulations were constructed separately for the three labor force status groups in March, it is possible to compare extent of long-term unemployment for those employed and those not in the labor force.

TABLE 13

DURATION OF UNEMPLOYMENT REPORTED
IN FEBRUARY 1973

Weeks Unemployed (Week of 2/12/73)	Persons No Longer Unemployed in March 1973		
	Employed	NILF	Total
Mean Weeks	8.1 weeks	10.2 weeks	9.1 weeks
Distribution:			
4 or less weeks	54.5%	57.1%	55.7%
5 to 13 weeks	30.4%	24.3%	27.4%
14 to 26 weeks	10.8%	9.6%	10.2%
27 or more weeks	4.3%	9.0%	6.6%
N	415	387	802

It was expected that a person's skill level or earning potential would bear an ambiguous relationship to spell duration. The probability of long-term unemployment decreased with greater education. However, males, whites, and full-time job seekers were more likely than females, nonwhites, and part-time job seekers, respectively, to remain unemployed at least thirteen weeks. Contrary to expectations, a high proportion of persons age 55 or older had long spell durations. Likewise, the probability of long-term unemployment was unexpectedly high for persons with no other earners in the family. The clearest pattern of difference was produced by eligibility for unemployment benefits. Over a third of the persons who received unemployment compensation in 1972 remained unemployed at least thirteen weeks compared with fifteen percent of the persons who received no benefits. Also consistent with this difference is the high proportion of job losers (about one-fourth) who experienced long-term unemployment.

The proportion with completed spell lengths of 13 weeks or more was 18% for those who became employed and 19% for those who withdrew from the labor force (see Table 20). The difference in extent of long-term unemployment was much larger for specific characteristic groups. For example, 19% of the full-time job seekers who found employment had been unemployed thirteen weeks or more; 24% of those who left the labor force had been unemployed that long.

Regression Analysis

Separate regression equations were estimated for persons who were employed during the March reference week and for persons who had left the labor force. Regression estimates for two different sets of independent variables are shown in Tables 14 and 15. The explanatory

TABLE 14

REGRESSION EQUATIONS SUMMARY - SPELL LENGTH
OF EMPLOYED GROUP

(Weeks of unemployment as of 2-12-73)

Independent Variables	Regression Estimates	
	1	2
Constant	17.3805	16.8356
Education (dummy)		
Completed 12 yrs. school	1.9170 (1.2949)	
Completed > 12 yrs. school	2.0322 (1.7956)	
High school graduate		1.9230 (1.1742)
Worked 1 wk. or more in 1972	-3.2842* (1.7239)	
Worked full-time at least 2 wks. in last 5 years		-1.4229 (1.8145)
Earnings in 1972/est. wks. of work/100	0.4841 (0.566)	
Earnings in 1972/1000		-0.1762 (0.17)
Looking for part-time work		-1.5301 (1.4709)
Age in years	-0.5505* (0.2781)	-0.6349* (0.2914)
Age - squared	0.0085* (0.0038)	0.0096* (0.0039)
Nonwhite	-2.0385 (1.8019)	-2.2782 (1.7977)
Female	0.2280 (1.3158)	0.0912 (1.3129)

TABLE 14--Continued

Independent Variables	Regression Estimates	
	1	2
Female in family with children under age 6	.8973 (2.3573)	2.7858 (2.2074)
Number of other earners in family in 1972	-0.7484 (0.8051)	
Family income in 1972 less subject's earnings/1000	0.0198 (0.12)	0.0727 (0.09)
Number in family		0.2256 (0.3199)
Number of family members under age 18	0.3486 (0.3998)	
Eligibility for unemployment benefits		3.1320* (1.5244)
Reason unemployed (dummy) On layoff	-1.7574 (1.4477)	-1.6143 (1.5297)
Job loss		2.1397 (1.3565)
$\bar{R}^2$	.0102	.0219
F-value	1.322 (13,391)	1.662 (14,400)
Number of observations	405	415

*Significant at .05 level.

TABLE 15

REGRESSION EQUATIONS SUMMARY - SPELL LENGTH
OF NOT IN LABOR FORCE GROUP

(Weeks of unemployment as of 2-12-73)

Independent Variables	Regression Estimates	
	1	2
Constant	7.2397	6.9940
Education (dummy)		
Completed 12 yrs. school	-0.2185 (2.1166)	
Completed > 12 yrs. school	-1.0240 (2.6136)	
High school graduate		0.5731 (1.8447)
Worked 1 wk. or more in 1972	-1.5297 (1.9456)	
Worked full-time at least 2 wks. in last 5 years		-0.6012 (1.9988)
Earnings in 1972/est. wks. of work/100	-0.5546 (0.923)	
Earnings in 1972/1000		-1.5840** (0.51)
Looking for part-time work		-0.4959 (1.9848)
Age in years	0.3813 (0.3289)	0.3731 (0.3369)
Age - squared	-0.0022 (0.0042)	-0.0022 (0.0042)
Nonwhite	1.8858 (2.1195)	1.6206 (2.1478)
Female	-4.0376* (1.9827)	-3.7144 (1.9594)

TABLE 15--Continued

Independent Variables	Regression Estimates	
	1	2
Female in family with children under age 6	-0.5513 (2.6473)	-1.5981 (2.4837)
Number of other earners in family in 1972	-0.0123 (1.0317)	
Family income in 1972 less subject's earnings/1000	-0.0610 (0.13)	-0.0524 (0.12)
Number in family		-0.5519 (0.4838)
Number of family members under age 18	-0.9976 (0.6200)	
Eligibility for unemployment benefits		4.9419 (2.9307)
Reason unemployed (dummy) On layoff	0.0264 (3.2571)	2.0710 (3.4034)
Job loss		5.6294* (2.5519)
$\bar{R}^2$	.0442	.0690
F-value	2.369** (13,372)	3.044** (14,372)
Number of observations	386	387

*Significant at .05 level.

**Significant at .01 level.

power of all four equations was low; the highest adjusted coefficient of multiple determination was just seven percent. The independent variables were more successful in explaining unemployment duration for labor force dropouts than for persons who took employment. Both of the "dropout" equations had F-values significant at the .01 level, but neither of the "employed" equations produced a significant F-value.

The expectations of the search model are based on uniform wage offer distributions of all job seekers. The regression analysis simulates a constant wage offer distribution by including variables representing human capital assets and discrimination factors. A variable distinguishing persons seeking part-time and full-time employment is also included. Three of the estimated coefficients for these variables were significant. Among persons becoming employed in March, those who worked one or more weeks during 1972 averaged 3.3 fewer weeks of unemployment than those without work experience in 1972 (see Table 14). For persons who left the labor force, the second equation (Table 15) estimates that an additional $1,000 of earnings in 1972 decreased unemployment length by 1.6 weeks. Also, women who left the labor force averaged 3.7 to 4.0 fewer weeks of unemployment in both equations. More important than the individual coefficient estimates is the proportion of variation explained by the variables as a group. In the second set of equations, education, work experience, past earnings, and search for part-time work explained less than .1 percent of the variation in spell duration of the employed and .4 percent of the variation in spell duration of the not-in-the-labor-force group.

The variables of primary interest are those representing opportunities for non-market activities, costs of job search, and job search

prior to the spell of unemployment. A higher expected return to full-time pursuit of non-market activities is hypothesized to reduce duration of unemployment. Greater potential for schooling and retirement were represented by age and age squared. Both variables showed a significant influence on unemployment duration for those who became employed but not for those who left the labor force. For the employed, estimated spell duration declined with age up to 33 years and then began to increase. This pattern is not consistent with the hypothesis that young persons of school age and older persons approaching retirement would have shorter spells of unemployment. The age variable coefficients in the not-in-the-labor-force equation did have the predicted signs although they were not significant. A possible explanation for the reversed signs is that young and old persons who eventually became unemployed had longer spell lengths than the middle age group because they derived greater utility from non-market activities during unemployment. This explanation would also apply to the positive (but not significant) coefficient estimated for the variable representing potential for childcare responsibilities in the employed equation.

There is an interesting contradiction with the age coefficients estimated for probability of becoming employed rather than remaining unemployed (Table 4 in Chapter IV). Since probability of becoming employed in March declined with age and increased with the square of age, the estimate implies that probability of remaining unemployed rather than taking employment increased with age and decreased with the sqaure of age. However, for the employed group, the duration analysis indicates the opposite pattern; spell duration declined with age and increased with the square of age. The difference can be

attributed to the characteristics of persons who remained unemployed in March.

Higher search costs are also expected to reduce unemployment duration. Since greater income resources would reduce costs, variables representing eligibility for unemployment benefits and unearned income would have positive coefficients. As expected, receipt of Source D income in the previous year (the indicator of eligibility) was associated with longer spells of unemployment both for those who became employed and those who left the labor force. Eligibility for unemployment insurance benefits added about three weeks to unemployment duration for the employed and almost five weeks for the labor force dropouts. Neither of the estimated coefficients for other family income were significant, and only the coefficient estimates for the employed in the first equation (Table 14) had the expected positive sign. One problem with other family income as an indicator of relative search costs is that it may also indicate less commitment to finding employment. That is, persons with greater family income may be less reluctant to cease job search, and thus they drop out of the labor force more quickly.

Two variables representing higher search costs due to greater financial responsibilities were tried in the equations--number of family members under age eighteen and family size. Both variables were associated (although not significantly) with an increase in duration for those who became employed and with a decrease in duration for those who left the labor force. There is probably some contamination of both variables with the age variables since younger persons are more likely than adults to be members of large families and to have family members

under age eighteen. In fact, there are negative correlations of -.42 between age and family size, and -.21 between age and number of dependents under age eighteen.

Persons on layoff or who had lost their jobs permanently were expected to have longer unemployment spells because they were less likely to have searched for work prior to becoming unemployed. The estimated coefficients for layoff and job loss were positive except for the group on layoff that returned to employment. The only significant coefficient was produced by the group who had lost jobs permanently and left the labor force.

It was assumed for this research that if differences in wage offer distributions were adequately defined, one could measure the effects of search costs, non-market alternatives and prior job search on unemployment duration. In order to test whether each set of factors adds significant explanatory power to the model, joint significance tests on sub-groups of coefficients were computed for Equation 2 (see Table 16). In the equation estimated for persons who became employed, the factors other than those defining the wage offer distribution were jointly significant in providing additional explanatory power. However, no one set of factors explained a significant amount of additional variation in duration. In the equation estimated for persons who left the labor force, the variables representing demographic characteristics added significant explanatory power to that of the wage distribution variables. The extra variation explained when demographic characteristics and family needs and resources variables entered the model as one group was also significant.

TABLE 16

JOINT SIGNIFICANCE TESTS ON SUBGROUPS OF COEFFICENTS
EQUATION 2

Independent Variable Groups	Duration of Employed Group			Duration of Not in Labor Force Group		
	Sum of Squares	d.f.	Mean Square	Sum of Squares	d.f.	Mean Square
Market Earnings Potential						
Regression	494.175	4		1,496.438	4	
Demographic Characteristics						
Regression	1,565.466	9		8,276.747	9	
Extra variation explained	1,071.291	5	214.258	6,780.309	5	1,356.062
Residual	48,501.267	405	119.756	98,994.322	377	262.584
F-value, extra variation explained		(5,405)	1.789		(5,377)	5.164**
Family Needs and Resources						
Regression	2,080.522	12		9,765.503	12	
Extra variation explained	515.056	3	171.685	1,488.756	3	496.252
Residual	47,986.211	402	119.369	97,505.566	374	260.710
F-value, extra variation explained		(3,402)	1.438		(3,374)	1.903

TABLE 16--Continued

Independent Variable Groups	Duration of Employed Group			Duration of Not in Labor Force Group		
	Sum of Squares	d.f.	Mean Square	Sum of Squares	d.f.	Mean Square
Demographic Characteristics and Family Needs and Resouces						
Regression	2,080.522	12		9,765.503	12	
Extra variation explained	1,586.347	8	198.293	8,269.065	8	1,033.633
Residual	47,986.211	402	119.369	97,505.566	374	260.710
F-value, extra variation explained		(8,402)	1.661		(8,374)	3.965**

*Significant at .05 level.

**Significant at .01 level.

Summary

The formulation of the search model estimated here performs poorly in terms of explaining variation in unemployment duration. Other estimations based on survey data have produced R^2 figures ranging from .11 to .37. These studies were limited to adult males, and division of this study group by age and sex would undoubtedly increase the proportion of variation explained.[1]

One problem with this formulation of the search model may be failure to adequately differentiate wage offer distributions. In particular, differences among labor markets in wage levels and demand conditions are not accounted for. Variables indicating geographic area and occupation probably should be included in the equation. They could be represented by a series of dummy variables or by average wage rates and unemployment rates. If the regression equations do not simulate a constant wage offer distribution, the effects of other variables in the search model are largely unpredictable.

The data base did not permit accurate specification of the dependent variable. Current duration in February underestimates completed spell length by one to four weeks for persons entering employment. Spell length for those leaving the labor force is difficult to determine

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[1] Examples are Robert Feinberg's study of male heads of households from the Panel Study of Income Dynamics, Suresh Malhotra's study of male prime earners from the Survey of Economic Opportunity, and Ronald Schmidt's study of men who changed jobs after unemployment from the National Longitudinal Survey. See Robert M. Feinberg, "Theoretical Implications and Empirical Tests of the Job Search Theory" (Ph.D. dissertation, University of Virginia, 1976), pp. 131-36; Suresh Malhotra, "Job Search Behavior--An Empirical Analysis of Unemployment Duration" (Ph.D. dissertation, University of Washington, 1976), p. 83; and Ronald M. Schmidt, The Theory of Search and The Duration of Unemployment, Graduate School of Management Working Paper Series, no. 7317 (Rochester, N.Y.: University of Rochester, 1973), p. 46.

since a person is officially unemployed until he or she is either unavailable to work or has stopped looking for work for four weeks. However, current duration in February probably overestimates actual weeks of job search for the not-in-the-labor-force group.

A fuller explanation of spell duration requires a more specific representation of time use during unemployment. The search model developed for this analysis is based on assumptions that job seekers receive one wage offer per period of search and that the average time required to complete a period of search is uniform for all individuals. Since unemployed persons can pursue both job search and non-market activities during periods of measured unemployment, the allocation of time within each period can vary according to the relative expected utility from each type of activity. Consideration of activities other than job search during unemployment presents two problems in trying to explain duration. One is the measurement of job search activity in uniform units of time and income. A supplement to the May 1976 CPS contained several questions about the job search methods of persons reported to be unemployed. The survey produced a measure of total number of hours spent looking for work during the previous four weeks. In a preliminary analysis by John Barron and Wesley Mellow, this measure, converted to weekly hours of job search, had a significant effect on probability of leaving unemployment by the June CPS.[1]

The other problem incurred in explaining duration is the incorporation of non-market activities during unemployment into the search model. If there is no theoretical distinction between non-market activities

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[1]John M. Barron and Wesley Mellow, "Changes in Labor Force Status Among the Unemployed," Journal of Human Resources, forthcoming.

pursued while unemployed and activities pursued while out of the labor force, the model cannot predict whether greater expected utility from non-market activities lengthens or shortens unemployment duration. In this analysis, non-market activities are treated as full-time alternatives to employment and their greater utility is expected to hasten exit from the labor force. Activities other than job search during unemployment are not specified (except through income resources), and this omission may explain why variables representing younger age and potential childcare responsibilities have positive coefficients in the employed equations.

CHAPTER VII

CONCLUSION

The purpose of this research was to define the relationship between an unemployed individual's labor supply decision and basic demographic and economic characteristics. The supply decision was analyzed as three problems: (1) the probability of becoming employed or of leaving the labor force by a future point in time; (2) the probability of becoming employed or of leaving the labor force by a future point in time relative to probability of remaining unemployed; and (3) the expected duration of the completed unemployment spell. Since transition from unemployment was modeled as a labor supply decision, the research focused on factors that motivate behavior during unemployment rather than on the behavior itself.

Summary of Expectations and Results

The expectations for probability of transition from unemployment can be summarized as: (1) a factor representing relatively greater earnings potential increases the probability of being employed in a future period; (2) a factor representing relatively greater productivity in non-market activities increases the probability of labor force withdrawal in a future period; (3) a factor representing relatively greater need or preference for goods-intensive commodities increases the probability of transition to employment; and (4) a factor representing greater income resources or preferences for time-intensive

commodities increases the probability of labor force withdrawal, except that eligibility for unemployment benefits increases the probability of remaining unemployed.

The first regression model estimated variable effects on probability of transition to employment or out of the labor force in March for all persons unemployed in February. Measures of greater earnings potential generally had a positive effect on probability of becoming employed and a negative effect on probability of labor force withdrawal. Significant coefficients were produced by variables indicating persons with recent work experience, whites, and males. Persons most likely to have productive non-market alternatives to employment were significantly more likely than other persons to leave the labor force in March. Most of the variables measuring family needs and resources did not produce coefficients with the expected signs. The effects of family size and presence of other earners in the family were apparently confounded by unmeasured factors. However, greater amounts of income from sources other than the subject's earnings decreased probability of employment and increased probability of labor force withdrawal as expected.

In the second regression model, probability of transition to employment relative to probability of remaining unemployed was estimated for just those sample members who were employed or unemployed in March. Similarly, the probability of labor force withdrawal was estimated for those who were out of the labor force or unemployed in March. For the not in labor force equations, the results were generally consistent with estimates from the first model. An additional variable indicating eligibility for unemployment benefits had the

expected negative effect on probability of labor force exit. Also as predicted, persons unemployed because of job loss or layoff were less likely than job leavers and labor force entrants to drop out of the labor force.

In the equations estimated for employed persons using the second model, several variables produced coefficients with signs opposite those predicted. High school graduates and persons with higher past earnings were less likely (although not significantly) to become employed in March than groups with lower potential earnings. Likewise, two indicators of non-market alternatives (youth and females in families with young children) increased the probability of becoming employed in March. None of the measures of greater family needs had the expected positive signs, but greater amounts of unearned income did lower probability of employment as predicted.

The multinomial logit model jointly estimated the probabilities of employment and labor force withdrawal relative to the probability of unemployment. The results were very similar to the estimates produced by the second regression model. All of the estimated coefficients for relative probability of labor force withdrawal had the predicted signs, and most were significant. Several coefficients for relative probability of employment had the wrong signs, and most coefficients were not significant. Of the variables representing greater earnings potential, only weeks of work in 1972 and being white increased the probability of employment significantly. Having non-market alternatives to employment did not lower the probability of employment; in fact, youth were significantly more likely than other persons to become employed. The only measure of family needs and resources to produce a significant

coefficient of the expected sign was eligibility for unemployment benefits.

The results of the two regression models and the logit model support the hypothesized relationships regarding allocation of time between market and non-market activities. However, when just those persons who remained in the labor force are considered, the model fails to explain probability of employment. Factors important to transition from unemployment to employment are evidently inadequately represented in the model. In particular, measures of labor market demand would probably improve explanatory power.

Current duration of unemployment was included as the final variable in all estimates of the regression and logit models. The theoretical expectations were that probability of employment and probability of labor force withdrawal would both increase with weeks of unemployment as the expected gains from continued job search declined. However, empirical studies have consistently shown that the probability of leaving unemployment is negatively associated with current duration. These results occur because of basic differences among individuals in propensity to take employment or leave the labor force. The sorting process of continued unemployment creates a long-term unemployed group with very low escape rates from unemployment.

In this analysis, it was expected that the inclusion of several variables representing differences in propensity to take employment or leave the labor force would enable current duration to reflect the positive effects of transitory differences (e.g., declining assets, exhaustion of unemployment compensation, narrowing of job prospects) on probability of escape from unemployment. Nevertheless, the

estimated coefficients for weeks of unemployment were negative in all equations and significant in all but the labor force withdrawal equation estimated for the entire sample. These results indicate that basic differences in propensity to remain unemployed were not adequately specified in the model.

The analysis of completed spell duration was based on a simple model of job search. It was assumed that the wage offer distributions faced by unemployed individuals could be made equivalent by including measures of earnings potential in the model. Given individuals with equal wage offer distributions, it was expected that completed spell length would be shorter for those who (1) had higher costs of search per period, (2) had higher expected returns to non-market activities, or (3) had searched the labor market prior to becoming unemployed. The model was estimated separately for those who entered employment and those who left the labor force in order to reduce the variance in the error terms.

The model as specified had very low explanatory power. No more than two percent of variation in completed spell duration was explained in the equations estimated for employed persons. Of the measures of search costs, only the indicator of eligibility for unemployment benefits significantly affected spell duration. The variables representing greater returns to non-market activities tended to increase spell length rather than shorten it as predicted. The indicator of search prior to unemployment produced no significant effect.

The model's explanatory power in the equations estimated for labor force dropouts was slightly stronger (seven percent of variation explained). However, none of the measures of search costs or non-market

opportunities showed significant effects on spell duration. Persons most likely to have searched prior to unemployment (labor force entrants and job leavers) did have shorter spell lengths as expected.

The analysis of spell duration was weakened by several problems including an inaccurate measure of total weeks unemployed, inadequate specification of the wage offer distribution, and lack of information about use of time during unemployment. Although the model proved to be a poor test of search theory, it did provide a valuable comparison of duration effects for employed persons and labor force dropouts. Variables representing persons with more education, youth, older persons, women in families with young children, and whites tended to increase spell length for persons who became employed. Among labor force dropouts, persons who were middle-aged, male, or members of large families experienced longer spell duration than other persons. These differences support the theory that a high degree of commitment to finding employment shortens unemployment for those who become employed and prolongs unemployment for those who eventually leave the labor force.

APPENDIX

TABLE 17

LABOR MARKET STATUS IN MARCH 1973 BY
UNEMPLOYMENT DURATION

Weeks of Unemployment Reported in February 1973 CPS	Labor Market Status in March 1973			Total Number
	Proportion Employed	Proportion Unemployed	Proportion NILF	
0-1	36.6%	26.7%	36.6%	131
2	33.5%	39.0%	27.5%	200
3	31.4%	39.6%	28.9%	159
4	29.2%	36.4%	34.4%	209
5-6	28.8%	46.2%	25.0%	132
7-8	21.4%	56.0%	22.6%	159
9-12	26.7%	58.2%	15.2%	165
13-16	26.9%	62.4%	10.8%	93
17-20	21.2%	68.8%	10.0%	80
21-26	18.6%	54.3%	27.1%	70
27-52	16.9%	54.2%	28.9%	83
53 or more	9.8%	63.4%	26.8%	41
Number of Observations	415	720	387	1522

TABLE 18

LABOR MARKET STATUS IN MARCH 1973 BY GEOGRAPHIC AREA

Census Division of State of Residence	Labor Market Status in March 1973			Total Number
	Proportion Employed	Porportion Unemployed	Proportion NILF	
New England	27.0%	52.7%	20.3%	74
Middle Atlantic	28.9%	50.7%	20.4%	152
E. North Central	24.4%	49.4%	26.2%	332
W. North Central	30.0%	51.3%	18.7%	150
South Atlantic	26.5%	44.9%	28.6%	185
E. South Central	34.3%	40.7%	25.0%	108
W. South Central	27.2%	37.5%	35.3%	136
Mountain	30.2%	40.7%	29.1%	86
Pacific	25.4%	50.2%	24.4%	299
Number of Observations	415	720	387	1522

TABLE 19

LABOR MARKET STATUS IN MARCH 1973 BY OCCUPATION in 1972

Occupational Group of Longest Job Held in 1972	Labor Market Status in March 1973			Total Number
	Proportion Employed	Proportion Unemployed	Proportion NILF	
No occupation	16.5%	40.2%	43.3%	418
Professional and managerial	32.0%	54.0%	14.0%	100
Sales and clerical workers	26.9%	52.4%	20.7%	208
Craftsmen	36.9%	54.8%	8.3%	157
Operatives	28.6%	54.7%	16.7%	210
Drivers and laborers	36.8%	49.5%	13.7%	190
Service workers	28.3%	40.9%	30.8%	198
Farm owners and workers	34.1%	31.7%	34.1%	41
Number of observations	415	720	387	1522

TABLE 20

LONG-TERM UNEMPLOYMENT BY CHARACTERISTICS AND LABOR MARKET STATUS IN MARCH 1973

Characteristics	Proportion of Group Unemployed 13 Weeks or More		
	Total No Longer Unemployed in March	Employed in March	NILF in March
Weeks worked in 1972:			
One or more	18.1%	17.0%	19.8%
None	18.1%	20.6%	17.2%
Highest grade completed:			
Less than 12th	19.4%	19.2%	19.5%
12th	18.1%	18.0%	18.2%
Beyond 12th	13.6%	11.5%	15.8%
Type of work sought:			
Full-time	21.2%	19.3%	24.2%
Part-time	12.2%	11.2%	12.7%
Race:			
White	18.6%	18.5%	18.9%
Nonwhite	15.3%	10.6%	17.8%
Sex:			
Male	19.8%	17.9%	22.8%
Female	16.3%	17.1%	15.7%
Age group:			
21 or younger	14.2%	17.1%	11.7%
22 to 34	17.0%	18.7%	14.9%
35 to 54	18.1%	13.6%	25.0%
55 or older	40.0%	29.0%	48.7%
Marital status:			
Married	17.8%	17.2%	18.5%
Never married	17.6%	20.2%	15.1%
Childcare responsibility:			
Female with children under 6	14.0%	17.6%	12.1%
Other female	17.1%	16.9%	17.2%
Male	19.8%	17.9%	22.8%

TABLE 20--Continued

Characteristics	Proportion of Group Unemployed 13 Weeks or More		
	Total No Longer Unemployed in March	Employed in March	NILF in March
Other earners in family in 1972:			
None	22.5%	17.7%	28.0%
One or more	16.8%	17.6%	16.1%
Unemployment benefits in 1972:			
Did not receive benefits	15.0%	14.2%	15.7%
Probably received benefits	35.8%	32.9%	40.9%
Reason for unemployment:			
On layoff	18.2%	16.9%	22.2%
Lost job	25.1%	21.6%	31.7%
Quit job	16.3%	13.1%	20.9%
Labor force entrant	15.6%	16.9%	14.8%
Total sample	18.1%	17.6%	18.6%
Number--13+ wks.	145	73	72
Number of observations	802	415	387

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