TWO ESSAYS ON WOMEN IN THE LABOR MARKET:

THE EFFECTS OF TIME SPENT NOT EMPLOYED
and
THE DETERMINANTS OF PART-TIME AND FULL-TIME WORK

by

LESLIE ANN SUNDT

B.A. Math-Econ. & Govt., Wesleyan University
(1981)

SUBMITTED TO THE DEPARTMENT OF ECONOMICS
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
May, 1989

Signature of Author.....
Department of Economics
May, 1989

Certified by.....
Henry S. Farber
Professor of Economics
Thesis Supervisor

Accepted by.....
Peter Temin, Chairman
Departmental Graduate Committee
Department of Economics

TWO ESSAYS ON WOMEN IN THE LABOR MARKET:

The Effects of Time Spent Not Employed

and

The Determinants of Part-Time and Full-Time Work

TWO ESSAYS ON WOMEN IN THE LABOR MARKET:

The Effects of Time Spent Not Employed
and
The Determinants of Part-Time and Full-Time Work

by
LESLIE A. SUNDT

Submitted to the Department of Economics
on May 17, 1989 in partial fulfillment of the
requirements for the Doctoral Degree in Economics

ABSTRACT

Ch. 2: Previous empirical findings suggest that earnings 1) depreciate during periods of non-employment and 2) following reentry rebound and make up in large part for their initial decline. An alternative interpretation of these results is that they are driven by a sample selection bias. Analysis of the NLS of Young Women indicates that individuals who remain employed for substantial periods after reentry do not experience wage depreciation whereas those who re-exit the labor force rapidly do. Earnings depreciate for only part of the population. The so-called rebound effect is a statistical artifact resulting from a labor supply bias.

Ch. 3: An analysis of part-time and full-time employment opportunities is combined with an analysis of employment preferences in order to measure the extent to which individuals are constrained in their labor market choices and to determine what factors make this constraint binding. A model is developed for the simple case in which only three employment options are possible: full-time work, part-time work, and no work at all. Individuals weigh the costs and benefits of each option and rank their preferences among them. Their actual employment outcome is a function of both these preferences and the ease with which they can obtain part-time and full-time positions. A sample of women from the May 1975 CPS is employed to estimate the parameters of this model.

These estimates are then used to generate predictions regarding preferences and opportunities for employment as well as employment outcomes. The results suggest that constraints upon full-time employment are far more severe than those upon part-time employment. These constraints are significantly more likely to be binding for minority women, women with less than a high school education, and young women. These women are both more likely to be unemployed and more likely to be underemployed. While women with children are more likely to be constrained by a lack of part-time employment opportunities than the average woman, even they are more likely to be constrained by limited full-time employment probabilities.

Thesis Supervisor: Dr. Henry S. Farber
Professor of Economics

CONTENTS

ACKNOWLEDGEMENTS

I would like first to thank my advisors on this project for their guidance and support. Dan McFadden listened to my ideas and provided constructive criticism of both the technique and the content. Hank Farber worked hard to make me a better economist and a better writer. His comments were more valuable than I can fully express. I was honored to work with them both.

Though I alone am responsible for any flaws, many others also contributed to this dissertation. Katherine Abraham and Lisa Lynch encouraged me and offered helpful advice along the way. Shulamit Kahn and Kevin Lang contributed the same, as did Paul Joskow, Ernie Berndt, and Tom Stoker. Joyce Shackett saved me much needed time by providing some of the computer programs needed to construct the NLS data set. For both her excellent work in this field and her constructive comments, Becky Blank, deserves special mention.

Thanks also are due to the faculty of Wesleyan University. Stanley Lebergott, who first introduced me to labor economics, offered comments on several drafts, for which I am grateful. Former advisors Thomas Whitin and Michael Lovell have also shown a constant interest in my career.

Funding from an Ida M. Green Fellowship, the Alfred P. Sloan Foundation, and the Henry A. Murray Research Center, Radcliffe College helped me through in a more material way. The data used in the first portion of this work were made available by the Inter-University Consortium for Political and Social Research. These data (the NLS of Young Women) were originally collected by the Center for Human Resources Re-

search at the Ohio State University. None of these organizations, of course, bear any responsibility for the analyses or interpretations presented here.

Others, more numerous than I can name, listened to my tales of computer malaise, technical quandaries, and successful estimation, enduring such technical (and often boring) conversation for long stretches of time. Perhaps most noteworthy are Liz Bussiere and Sharon Graw, who lived through some of this dissertation as roommates, and Karen Zallen, a longtime friend. Others include Stephen Ryan, Alessandra Casella, and Anne Gron, who could empathize as fellow economics students. Diane Goldstein and Heidi and Chris Logan should also be mentioned.

Most of all I would like to thank my family for their continued support throughout this seemingly endless process. My brother Mark often called on just those crucial days when I needed a shoulder to lean on. My brother Mitchell was so impressed he has now embarked on a similar road. Throughout it all, my parents, Neil and Pauline Sundt, have been there. To them I dedicate this manuscript.

Chapter 1

Introduction

The worker traditionally portrayed in the popular press and often in the economics literature is one who begins employment immediately after completing school and continues working full-time, without interruptions, until retirement. As is often the case, this 'typical' worker is in fact an unusual one. In a normal year, less than forty percent of the working age population is employed full-time, full-year. When the focus is upon a worker's lifetime rather than just a year, this pattern of employment is even more uncommon. Economists have recently begun to explore the incentives for and the implications of nontraditional employment patterns such as part-time work and time spent not employed. The following chapters provide additional contributions to this relatively new field.

The popularity of the forty hour work week and the prevalence of jobs lasting on and on over time explain the fixation of the popular press. Census data show that approximately forty percent of all employed men report working exactly forty hours per week, and over eighty percent report working at least thirty-five hours (full-time by U.S. standards)[1]. Jobs themselves (positions with a particular employer) frequently outlast the tenure of any particular individual. There are always car salesmen, journalists, secretaries, and at least until the late 1970's blue collar workers, but these jobs are not always held for a long time by the same individual. While Hall (1982) finds that men

---

[1] Reported in Pencavel (1986), Table 1.8.

stand a good chance of, at some point in their lives, being continuously employed by a single employer for twenty years or more, he also finds that the average worker switches jobs nine times over the course of his lifetime (more often for women) and further acknowledges that the typical job lasts less than a year.

Employment is taken for granted in much of the economics literature as well. Although hypothetical production functions may call for X units of labor, how those X units are to be allocated amongst potential employees is rarely discussed. Labor is treated as just another input to the production process. Even within labor economics the "popular notion that, each and every year, virtually all men work 2000 hours per year (40 hours per week and 50 weeks per year)" (Pencavel 1986, p. 25) has played a significant role. The assumptions underlying the empirical analysis of wages are exactly those of the so-called 'traditional' worker. Mincer (1974) explicitly assumes that "work experience is continuous and starts immediately after completion of schooling" (p. 84) and that "changes in earnings over the life cycle represent changes in earning capacity rather than changes in hours of work supplied to the labor market" (p. 20)[2], in deriving and applying the much used wage equation:

$$(1) \quad \text{Ln Wage} = \beta_0 + \beta_1 \text{ EDUC} + \beta_2 \text{ EXP} + \beta_3 \text{ EXP}^2 + \xi$$

where EDUC represents years of schooling, EXP years of experience (= Age - EDUC - 6), ξ a random error term, and β a parameter vector.

---

[2] He relaxed this assumption somewhat in his empirical work, but left a detailed theoretical discussion to 'future study'.

These assumptions were, in fact, not very restrictive when applied to the cross-section of white men from the 1960 Census that Mincer used for his empirical work. The civilian labor force participation rate for white men between the ages of 20 and 54 who were not enrolled in school was above ninety-six percent in 1960, and the unemployment rate below four percent according to data from the Current Population Survey (CPS).

Over time, these figures have slipped measurably and they have never been representative of minorities or women. The participation rate for white men has fallen to ninety-two percent for those aged 45 to 54 and the unemployment rate has risen up above four percent. Black men have a participation rate fifteen percent below that of white men and an unemployment rate twice as high. Women, even today, have a participation rate only two-thirds that of men. Obviously the 'typical' assumptions are not universally applicable.

Yet even these figures are somewhat misleading. They represent employment at only one point in time or for only one week. Other CPS information reveals that of those men who worked at all during the year 1960, only about sixty-four percent worked full-time for fifty or more weeks during the year (ie. 2000 hours per year). Figures in Table 1-1 demonstrate that less than forty percent of the working age population works the 'traditional' 2000 hours per year even for one year. A comparison of 2209 married men from the Michigan Panel Study of Income Dynamics (PSID) who worked at least 250 hours in 1967 and 1974 shows similar variation across time. Of those who worked between 1850 and 2149 hours in 1967, 49.5% worked similar hours in 1974 but 20.6% worked

Table 1-1

Labor Force Participation Rate
at 2000 Hours/Year

Total Number of	1950	1960	1970	1980
(1) Civilian Non-Institutional Population 16+ Years of Age	104,995	117,245	137,085	167,745
(2) Who Worked at Some Point During the Year	68,876	80,618	93,850	115,752
(3) Who Worked Full-Time, 50+ Weeks During the Year	38,375	43,265	52,143	64,936
(3) as a Percentage of (1) or % Working 2000 Hrs/Yr	36.5%	36.9	38.0	38.7

Source: U.S. Department of Labor, Bureau of Labor Statistics, Handbook of Labor Statistics, June 1985. (1) is from Table 3, p. 10. (2) & (3) are from Table 46, p. 100.

fewer hours and 29.9% worked more[3]. Blank (1989), using the PSID, obtained comparable results for women. Over a nine year period, 19.0% of the women were working full-time at each interview date, 2.0% were working part-time each period, and 14.6% were never observed working. The remaining 64.4% were observed in multiple states. The average probability of being observed working full-time for two consecutive years was only 38.1%.

In conclusion, there is a considerable dispersion of employment patterns within the population. While use of the 'traditional' assump-

[3] Results obtained by Hill and Hoffman (1977), repeated in Pencavel (1986), p. 25.

tions has contributed significantly to our understanding of wages and of the labor market as a whole, it is obvious that we must also examine the interest in and impact of nontraditional employment outcomes. Such research is particularly relevant given the increasingly important role women are playing within the labor market and their continued tendency to accept nontraditional employment.

Mincer (1974), himself, began this work by incorporating information on weeks worked per year in his initial studies of earnings. He also mentions the possibility that skills could depreciate over time and discusses how this depreciation would affect earnings' profiles. Mincer and Polachek (1974) expanded upon this work both theoretically, by postulating what optimal investment patterns might look like for women planning discontinuous employment, and empirically, by estimating wage equations for women including more accurate measures of experience as well as measures of time spent not employed.

The analysis presented in the next chapter focuses upon the earnings dynamics of women who interrupt their employment. Of particular interest are the supposed depreciation and rebound effects. Researchers in the field have found that individuals who leave employment receive wages upon reentry that are on average below those they were receiving prior to withdrawal. This phenomenon is known as the depreciation effect. Furthermore, it has been suggested that these reentry wages rise rapidly and make up for much of their initial decline. This is known as the rebound effect.

It is conjectured here that the empirical evidence presented in support of these wage effects may be the result of a sample selection

bias. There, in fact, appears to be a relationship between reentry wages and reentry spell length that was not taken into account in the earlier studies. Individuals who reenter employment and remain employed for some time following reentry, tend not to experience wage depreciation, ie. tend to reenter at wages not significantly below those they had previously reported. Individuals who reenter employment for only a short period, however, tend to reenter at significantly lower wages. The so-called 'rebound' effect appears to be a statistical artifact caused by these differential depreciation rates. The labor supply decisions following reentry are more important than previously reported.

Other research on nontraditional employment has focused upon the distinction between part-time and full-time employment. Technically these are distinguished only by the number of hours worked per week. However, legal requirements concerning benefits as well as the stereotypical image of the forty hour work week have created a more formal distinction between them. A model is presented in chapter three which combines elements from both labor supply and labor demand theory in order to explain who works part-time and who full-time. Individuals are assumed to weigh the costs and benefits of each employment option (full-time work, part-time work, and no work) and rank them in order of preference. Actual employment outcomes are then a function of both these preferences and the ease with which individuals are able to obtain employment. The primary question addressed here is whether full-time or part-time employment constraints are the more binding. This issue is especially important for those seeking to direct public policy regarding job creation. The results suggest that full-time employment op-

portunities are significantly more difficult to obtain than part-time employment opportunities.

Thus, certain aspects of both discontinuous employment and part-time employment are examined in this text. The first chapter examines the effect interruptions in employment have upon subsequent earnings and the second how interest in and opportunities for part-time and full-time employment differ. Both chapters contribute to the growing literature on nontraditional employment patterns.

BIBILIOGRAPHY

Blank, Rebecca M. "The Role of Part-Time Work in Women's Labor Market Choices over Time." American Economic Review 79, no. 2 (May 1989): 295-299.

Hall, Robert E. "The Importance of Lifetime Jobs in the U.S. Economy." American Economic Review 72, no. 4 (September 1982): 716-724.

Mincer, Jacob. Schooling, Experience, and Earnings. New York: National Bureau of Economic Research, 1974.

Mincer, Jacob and Solomon Polachek. "Family Investments in Human Capital: Earnings of Women." Journal of Political Economy 82, no. 2, pt. II (March-April 1974): S76-S110.

Pencavel, John. "Labor Supply of Men: A Survey." Chapter 1 in Handbook of Labor Economics, edited by Orley C. Ashenfelter and Richard Layard, vol. 1. New York: North-Holland, 1986.

U.S. Department of Labor. Bureau of Labor Statistics. Handbook of Labor Statistics. Washington, D.C.: Government Printing Office, 1985.

Chapter 2

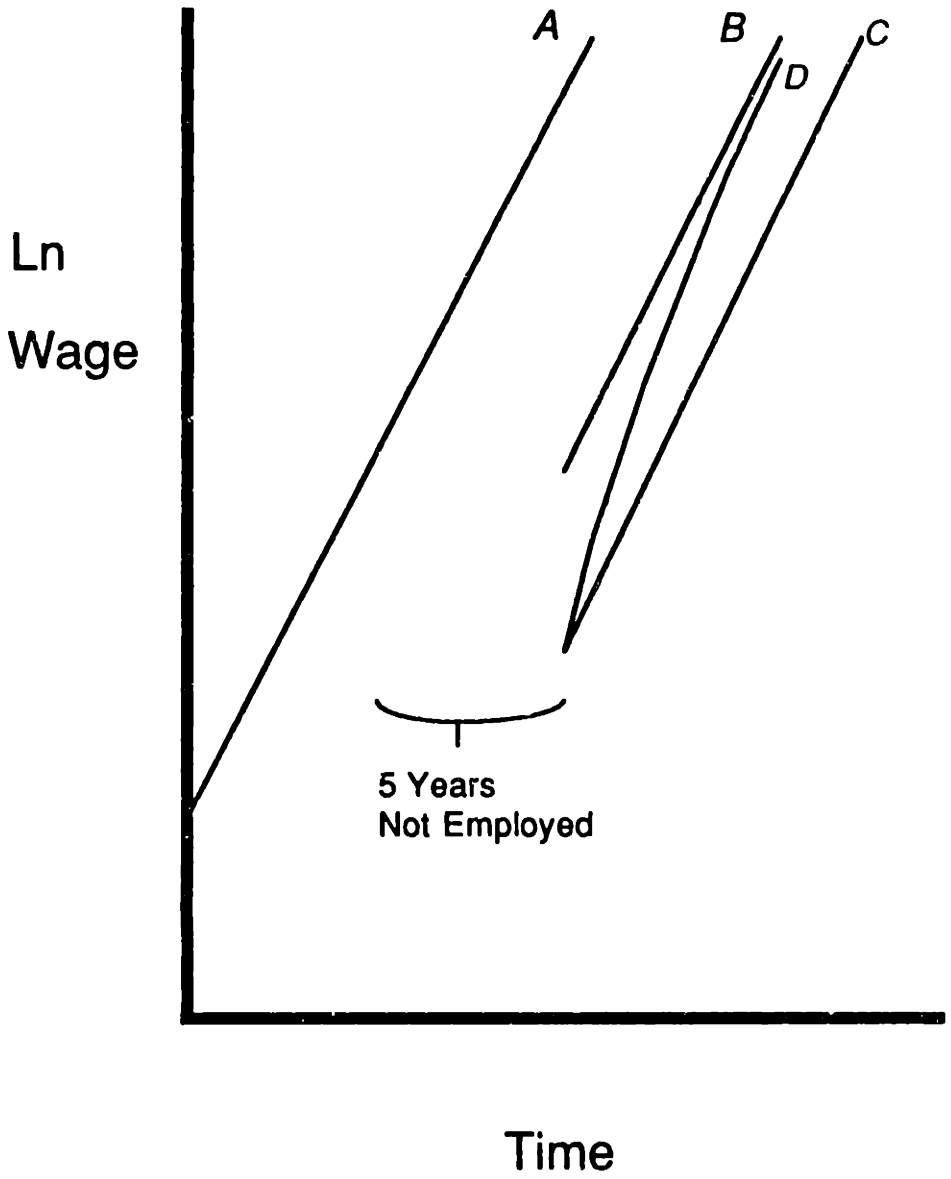
The Effect of Work Interruptions on Subsequent Earnings

Individuals who choose to interrupt their careers are generally expected to "pay a price in the workplace." A recent New York Times article (Basler 1986) stated that wages will be thirteen to nineteen percent below what they might have been, for women resuming work after a five year interruption. One interpretation of this penalty is that, during time out of the labor force, workers are not accumulating human capital. This puts them at a skill disadvantage relative to those who remain in the labor force accumulating human capital. For example, if wages rise between two and three percent for each year of labor market experience, individuals who spend five years away will earn from ten to fifteen percent less than their counterparts who did not leave work. This cost can be seen in Figure 2-1 as the vertical distance between line A and line B.

Others argue that the cost is even greater than this. They suggest that potential wages actually fall during time spent out of the labor force (Mincer and Polachek 1974). According to this hypothesis, skills atrophy during periods of non-employment. Jobs are forgotten; knowledge becomes obsolete. Past experience is less valuable than it was. Thus, when reentering the labor market, an individual will be forced to accept a wage below that at which he/she had been employed previously. This case is illustrated by line C in Figure 2-1.

Finally, several economists have suggested that wages/skills may first depreciate, then rebound and asymptotically approach B or some

Figure 2-1



line between B and C (see line D) (Corcoran 1977; Mincer and Ofek 1982; Corcoran, Duncan, and Ponza 1983). This, in fact, appears to be the current empirical consensus. Estimates of the impact a withdrawal has upon wages vary considerably depending upon the proportion of recent reentrants in the sample. The depreciation rate computed from a sample containing primarily recent reentrants can be two to four times as large as that computed when a more diverse sample is used.

The results reported below, however, suggest that this interpretation of the data is very misleading. A closer look reveals that individuals who re-exited the labor force soon after reentry did encounter a sharp decline in earnings as a result of their initial interruption. Whether their future withdrawal is brought about by lower than expected earnings or their lower earnings reflect a lack of commitment to the labor force is uncertain. In contrast, individuals who remain employed after reentry do not experience significant wage depreciation. Depreciation seems to be an important factor for only part of the population. Forcing a single empirical model upon the whole population yields divergent long run and short run estimates of depreciation because in the longer run, labor supply decisions eliminate those who experienced the greatest decline in earnings. The so-called rebound effect is simply a statistical artifact.

These arguments are organized as follows. Section I reviews the empirical literature on wage behavior following periods of nonmarket activity. Section II reviews and critiques the theoretical arguments that have been proposed to explain these earlier findings. In section III a new approach to the empirical analysis is suggested, that makes better

use of the available data. This approach is employed to test two specific criticisms of the previous work. These results are presented in sections IV and V. Section VI concludes.

I. LITERATURE REVIEW

One of the first attempts to estimate the effect periods of non-employment have on wages was by Mincer and Polachek (1974). They present wage equations for a cross-section of married women age 30 to 44[1], entering both years of work experience and years spent out of the labor force as explanatory variables. Their results indicate that a period of non-employment not only carries a penalty of forgone experience but also a significant negative return of about 1.5% per year[2].

Mary Corcoran (1977) attempted to replicate these results using the PSID and found only a 0.6% net depreciation rate when studying women of all ages who had ever married and raised a child. Yet when restricting her sample to 30 to 44 year old women in order to more closely match the Mincer and Polachek sample, Corcoran finds a similar, significant 1.2% net depreciation rate. She attributes these different findings to the fact that those in the 30 to 44 age group are more likely to be observed immediately after reentry. The younger women included in the broader sample are less likely to have withdrawn, and the older women are more likely to have been working for some time following reentry. She portrays the 1.2% net depreciation rate as the short term effect on

---

[1] These data are from the 1966 cross-section of the National Longitudinal Survey (NLS) of Mature Women.

[2] Whether this depreciation occurs only during periods of non-employment or more generally can not be ascertained. The two possibilities are not identifiably distinct.

wages and the 0.6% rate as the long term effect. Mincer and Ofek (1982) later replicated these results using the Mature Women's cohort of the NLS. They find a very short run 3.0 to 7.6 percent annual depreciation rate which declines to between 0.6 and 1.0 percent in the longer run. Such results imply that wages may initially drop, then rebound as was illustrated by line D in Figure 2-1.

These cross-sectional estimates receive further support when the panel nature of the NLS and PSID surveys is exploited. Mincer and Ofek and then Corcoran, Duncan, and Ponza (1983) (CD&P) employ log wage difference equations to study the effect work interruptions have on subsequent earnings. This approach eliminates individual specific characteristics from the analysis, thus, hopefully, eliminating any bias caused by unobservables such as ability or overall motivation. By assuming that wages reflect a constant rate of return to experience[3], the need to know each subject's entire work history is also circumvented by using difference equations. Only knowledge of the intervening work history is necessary.

While Mincer and Ofek have data for only five years, CD&P are able to employ a thirteen year sample of the PSID. They use the first and last available wage observations for all white women and divide the intervening work history into three segments: 1) the most recent employment spell, 2) the most recent interruption, and 3) all the time spent

- - - - - - - - - - -

[3] The usual assumption in the literature on human capital based wage determination is that the log of potential earnings is a linear function of experience but that the log of actual earnings (ie. post-investment) is a quadratic function of experience. Only if the percentage of time devoted to on-the-job training is constant over time will actual earnings/wages reflect a constant rate of return to experience.

prior to the most recent interruption and after the initial wage observation. Each of these periods is modeled separately in the analysis. A significant, negative 3.5% return to time spent not employed is interpreted as evidence of short run wage depreciation. In order to permit the short run annual depreciation rate to diverge from the long run rate, a quadratic, post-reentry experience term is entered. A significant and large return to post-reentry to experience (5-6%) combined with a significantly negative quadratic term (-.0038) thus appears to confirm the finding of a rebound effect. On the basis of these results, CD&P conclude that in the case of a one year withdrawal, the short run depreciation is more than entirely recouped within one year.

II. CRITIQUE

This observed wage behavior can be explained in several ways. Corcoran suggests that it may be the result of poor reentry job matching. According to this theory, an individual's job skills may atrophy at some rate, but her knowledge of the opportunities available in the job market becomes obsolete even faster during a period of nonmarket activity. Upon reentry, individuals may make poor job matches. As their knowledge of the job market increases or returns, they switch into more appropriate and more rewarding jobs. Thus, their wages rebound[4].

While Mincer and Ofek concur with Corcoran's empirical findings, their interpretation of the result is quite different. They explain the

---

[4] This conjecture may be testable by examining job turnover rates for reentrants. A job match could be improved either by transferring within a firm or by transferring between firms. Unfortunately, reliable information is only available on interfirm job movement.

rebound in wages by relying on human capital rather than job matching arguments. Human capital, they write, does depreciate when not used in the marketplace, but it can also be restored more rapidly than new human capital can be created. Thus wages of reentrants rebound or rise faster than those of first time entrants and make up some of that which they originally lost.

These are both plausible explanations for why a period of nonmarket employment might result in a fall in wages followed by a rebound. Other equally reasonable theories might rely on signaling theory, fixed training costs, or differential quit rates. There are, however, reasons to believe that these results (particularly the rebound effect) are purely spurious findings brought about by misspecification.

First, none of the studies yet done has permitted wages set on a part-time job to differ from those set on a full-time job. CD&P do allow part-time and full-time experience to influence wages differently, but they do not accommodate differences due to current work status. To the extent that wages received by part-time employees are below those of full-time employees, and those reentering the labor force are more likely to ease back into employment by first accepting part-time work then moving on to full-time work, both a depreciation effect and a rebound effect would <u>appear</u> to exist even where they did not. Where there were some depreciation and/or rebound of wages, failure to fully control for part-time work would foster overestimates of the true effects.

Alternatively, the observed rebound may simply be a reflection of labor supply decisions. Individuals whose wages upon reentry are particularly low (as compared with their pre-exit wages) may be more likely

to re-exit. By doing so, they reduce the mean depreciation observed amongst those remaining and thus 'create' a rebound effect.

This hypothesis would explain why the choice of sample has been an important determinant of the estimated depreciation rate. In the cross-section analyses, if women between the ages of 30 and 44 are more likely to be recent reentrants, as Corcoran suggests, then they are also less likely to have been observed long enough to ascertain their long run labor supply behavior. More diverse cross-sections include younger women who have not yet withdrawn and older women who have chosen to continue working and so are less likely to have drawn a low wage upon reentry. In their analysis of panel data, CD&P choose to difference each individual's first and last available log wage, thus producing a similar bias. All those who re-exit are represented by their relatively low pre-exit wage and report few years of post-reentry experience. Those who maintain a more continuous work history will report having on average more post-reentry experience. The procedures employed may then yield an estimated depreciation rate consistent with the compensation history of those who have the shortest post-reentry work experience, counterbalanced by an upward biased estimate of the return to post-reentry experience, the so-called rebound effect, to more closely match the wages of those with a longer post reentry work spell.

Each of these criticisms has testable implications. These are pursued in sections IV and V. It is now necessary to present the data, the empirical specification, and the sampling technique that are used in this analysis.

III. DATA & EMPIRICAL SPECIFICATION & SAMPLING TECHNIQUE

A. Data

The data used in this study are drawn from the National Longitudinal Survey (NLS) of Young Women. The sample is restricted to women since they are still far more likely to interrupt their employment to devote full-time to household activities. In recognition of the racial differences in labor supply patterns observed by Mary Corcoran, the sample is restricted to include only white women[5]. Previous work by Mincer relied on the Mature Women's cohort; this is the first time the Young Women's cohort has been used to analyze these issues.

The 5159 women interviewed for this survey in 1968 were between the ages of fourteen and twenty-four. They are followed until they are lost through attrition[6] or until 1982, the last year of data employed here. The individuals in this sample are on average much younger than those previously studied. The oldest individual reporting a wage is thirty-eight years old. The young age of the sample may result in larger than usual returns to experience.

For the purposes of this study, the relevant starting date for each individual's employment history is her final date of full-time school enrollment. Since numerous measures of academic enrollment are provided, and are rarely in agreement with one another, a great deal of effort has been invested to assign each individual a single last enrollment date. The result is usually that date which the respondent most frequently reports as the date at which she was last enrolled in school.

---

[5] Initial examination confirms that the pattern for the NLS nonwhite sample is quite different from that for the sample employed in the text.

[6] Fewer than thirty percent of the sample is lost prior to 1982.

Where conflicts arise, the data are scrutinized, sometimes on a case by case basis. Individuals who remain in school for the duration of the sample, who reenter school full-time after several years away[7], who report an education level of zero, or for whom no clear last enrollment date is available are dropped from the sample (529 in all, or ten percent of the sample - most having never left school).

For the 3290 white individuals remaining, a complete work history is constructed beginning with this last enrollment date[8]. The survey includes information on the first and last dates spent on most jobs, thus allowing quite precise work histories to be created. Usual hours worked, industry, occupation, and wage information are also regularly recorded. Of course, gaps in the record still exist. These gaps occur most commonly during the early job history of older women who left school many years before 1968, for the 1973-1975 period when only scant employment information is available, and for frequent job changers for whom the available information is just not sufficient. As indicated below, the sample selection criteria permit no gaps in the data actually used in the analysis.

CD&P work with a far less complete work history. Knowing how many hours an individual works per year, they classify individuals as not employed if they work for fewer than 150 hours per year and as employed full-time if they work over 1500 hours per year. Thus, if an individu-

- - - - - - - - - -

[7] Those who interrupt their education for fewer than three years then return for twice as many years of full-time education are, however, treated as if they never left.

[8] Joyce Shackett supplied several of the programs used to create this history vector. They have been improved and updated to incorporate post-1977 data.

al's full-time job were to end half way through the year, that individual would appear to have been employed part-time for the entire year and the actual spell of non-employment would not be recorded. This coding scheme is likely to result in a gross overestimate of part-time employment and an underestimate of time spent not employed. These data problems may in turn bias the empirical results.

The sample used here makes use of actual hours worked on the job and actual job length. Thus, non-employment means no paid employment. Periods of non-market activity lasting less than three months are ignored. Such short periods between jobs are less likely to reflect time spent focusing on home activities and more likely to reflect job search. Job skills are not likely to become obsolete this quickly[9]. Part-time employment is defined as work involving thirty or fewer hours per week. Given these differences in data definition, some variation is expected in the estimated returns to experience.

Finally, in order to perform wage differencing, at least two valid wage observations bounding a period of known work activity must exist. Wages are converted to constant 1982 dollars and excluded if they fall below $1.50 per hour, approximately the minimum wage for employees who receive tips, or above $27.50 per hour. Very few such extreme wages are reported (fewer than 1.5% of all reported wages), however over 550 individuals must be dropped from the sample due to gaps in their work history or insufficient wage information. In all, 2631 individuals meet the criteria necessary to be included in the final sample.

- - - - - - - - - -

[9] Neither Mincer and Ofek (1982) nor CD&P (1983) consider withdrawals less than a year in length.

B. Empirical Specification

The empirical specification employed in this analysis is similar to that used by CD&P. As discussed earlier, they divide the intervening work history into three periods: 1) the time preceding the most recent interruption but following the initial wage observation (PRE), 2) the most recent interruption (NT), and 3) the time following the most recent interruption (POST). PRE is the most complicated interval as it may encompass earlier interruptions (denoted PRENT), part-time work, and full-time work. POST can at most involve full- and part-time employment. Believing that full-time (FT) and part-time (PT) work offer different returns to experience, CD&P tested three different specifications:

$$(1)\quad \ln W_{t+i} - \ln W_t = \gamma_0 PRENT + \gamma_1 PRE + \delta_0 NT + \beta_0 POST + \beta_1 POST^2 + \xi_1$$

$$(2)\quad \ln W_{t+i} - \ln W_t = \gamma_0 PRENT + \gamma_2 PREFT + \gamma_3 PREPT + \delta_0 NT + \beta_2 PT + \beta_4 FT + \xi_2$$

$$(3)\quad \ln W_{t+i} - \ln W_t = \gamma_0 PRENT + \gamma_2 PREFT + \gamma_3 PREPT + \delta_0 NT + \beta_2 PT + \beta_3 PT^2 + \beta_4 FT + \beta_5 FT^2 + \xi_3$$

(see Table 2-1 for complete variable definitions and summary statistics)

None of these equations is wholly consistent with the theory being tested. Each enters pre-interruption experience linearly when in fact that experience may be dotted with interruptions and thus supposed rebounds. The initial wage itself may be observed following a period away from market work and thus be understated in some sense if wages do

Table 2-1

Variable Definitions and Summary Statistics[1]

		Mean
DLWAGE	- Dependent variable. Difference between two log real wages (1982$).	0.125 (0.353)
PRENT	- Years of non-market work prior to most recent interruption (must exceed 3 months) and after initial wage observation.	0.006 (0.108)
PRE	- Years employed prior to most recent interruption and after initial wage observation.	0.007 (0.078)
PREFT	- PRE employed full-time (>30 hours/week).	0.002 (0.041)
PREPT	- PRE employed part-time (≤30 hours/week).	0.004 (0.066)
NT	- Length of most recent interruption (must exceed 3 months).	0.421 (1.032)
POST	- Years employed since most recent interruption.	2.822 (2.776)
FT	- POST employed full-time (>30 hours/week).	2.461 (2.734)
PT	- POST employed part-time (≤30 hours/week).	0.362 (1.027)
PTDUM	- 0 if working PT at both jobs or if working FT at both jobs. 1 if working PT at second job and FT at first. -1 if working PT at first job and FT at second.	-0.015 (0.429)

1 Standard deviations in parentheses.
Number of observations: 12743.

rebound. Finally, the experience of individuals who never leave employment is coded as post-interruption and so may dilute or bias all the returns estimated to POST experience, particularly the so-called rebound effect.

C. Sampling Technique

Some of these problems can be mitigated by choosing an appropriate sampling technique. Unlike past studies which rely on a single log wage difference equation per individual, thus ignoring a great deal of potential information and aggravating possible labor supply induced biases, this study employs a series of log wage differences per individual, making fuller use of the time-series, cross-section nature of the data[10]. When a period of nonmarket activity occurs, the log of the last wage recorded prior to exit is fixed and subtracted from the log of each successive wage until/unless another period of non-employment is encountered. Example 2-1 illustrates this sampling scheme.

- - - - - - - - - -

[10] The results obtained by replicating the exact equations and sampling technique CD&P employ are quite similar to those reported by CD&P. The main difference is a significantly lower estimate of the depreciation rate: 1.5 to 2.0% versus 3.5 to 4.0%. This may be due to the shorter interruptions acknowledged here. CD&P work with increments of a year; these data permit increments of as little as three months. Mincer and Ofek suggest that short interruptions (periods of less than one year) have no effect on wages. The difference may also be due to the younger age of this sample.

A less important distinction in the results is the significantly positive contribution part-time work makes in this sample. CD&P found that part-time work had no influence on wages. This difference is probably due to the different (more accurate) definition of part-time employment used here.

EXAMPLE 2-1

	Activity	New Wage Delta	Error Term
t_1	Working		
t_2	Working	$t_2 - t_1$	$\varepsilon_2 - \varepsilon_1$
t_3	Not Working	$t_4 - t_2$	$\varepsilon_4 - \varepsilon_2$
t_4	Working	$t_5 - t_2$	$\varepsilon_5 - \varepsilon_2$
t_5	Working	$t_6 - t_2$	$\varepsilon_6 - \varepsilon_2$
t_6	Working		

This hypothetical individual is observed for six spells, the third of which is a withdrawal from the labor force. The CD&P sampling technique would simply involve differencing the log wages from the first and sixth periods ($t_6 - t_1$). Periods 1 and 2 correspond to PRE; period 3 to NT; and periods 4 through 6, to POST. The effect of the withdrawal on wage movement would be obscured somewhat by uncertainty surrounding what the wage was immediately before and immediately after the withdrawal. Information regarding how the wage changed between the first and second periods is lost, as is information relevant to post-reentry wage movement. The scheme employed here (as shown above) yields four observations, three of which have positive values for NT. By focusing attention on wage movement about the withdrawal, some of the uncertainty is eliminated.

This sampling method also increases the sample size from 2631 to 12743 observations of which 4151 include a period of non-employment. The chief problems with this approach are 1) the unusual error structure resulting from the differencing pattern and 2) the possibly dis-

proportionate effect part-year workers may have upon the results. In the example above, the error terms are shown and illustrate the correlation problem. While errors will be uncorrelated across individuals, even if the error terms generated by distinct observations on a single individual are independent, they will yield a correlation matrix (Σ) with off-diagonal ± 0.5 terms. This will not bias the OLS results, but OLS will produce inefficient estimates and inconsistent standard errors. Since the Σ matrix is of known form, weighted least squares can be performed to yield efficient estimates. (See Appendix 2A for details concerning the necessary GLS transformations.)

With respect to the problem of part-year workers, observations on individuals who are employed part-year will indicate only short periods of post reentry employment. Each withdrawal will reinitiate wage differencing; no long term wage movement will ever be observed. Since each log wage difference observation is given equal weight[11], the influence of part-year work on wage behavior immediately following reentry will be great.

The severity of this problem is mitigated by the probable bias against including part-year workers in the data set. Part-year workers are likely to change jobs relatively frequently. Due to the limited information available from certain interviews, the work histories of these individuals are more likely to have gaps. Since no wage differencing is performed when the intervening period is incompletely reported, these individuals will be underrepresented in the sample. Thus, while part-

---

[11] This is not strictly true since GLS is weighted least squares in this case.

year workers may have disproportionately more observations spanning a period of non-market activity, they will also have disproportionately fewer observations in the sample. It is hoped that these effects counterbalance one another.

The GLS results derived employing this expanded data set are presented in Table 2-2. The OLS findings were very similar and so are not presented. The estimated coefficient on NT suggests a depreciation rate of between 1.8 and 2.6 percent per year. This is smaller than previous estimates and may reflect the younger age of the sample or the shorter duration of the withdrawals. Point estimates of the effect prior work experience has upon wages, the coefficients on PRE, PREFT, and PREPT, range from zero to five percent per year but are in each case insignificant. The positive and significant effect of earlier withdrawals (PRENT) on wages is the result of only twenty-five observations. Recent full-time work has a large (3.0 to 5.2%) and significant effect on earnings that does decline over time with a strong nonlinear or 'rebound' element. Part-time work, on the other hand, has a smaller, solely linear effect. This result differs from the CD&P findings of no return to part-time work and may reflect the clear identification of part-time work in this data rather than the confusion of part-time and part-year employment that occurred earlier. There is some evidence that part-time workers more closely resemble full-time workers than do part-year workers (Blank, 1988).

In order to select the specification which best describes the data, F-tests are performed to compare the fit of equations (1) and (2) with the fit of the most general equation, (3). Specification (2) is clearly

Table 2-2

Log Wage Change Equations[1]
GLS Estimates

Indep. Vars.	Unweighted Means	(1)	(2)	(3)
PRENT	.006	.093 **	.095 **	.095 **
	(.108)	(.028)	(.028)	(.028)
NT	.421	-.026 **	-.018 **	-.023 **
	(1.032)	(.003)	(.002)	(.003)
PRE	.007	.002		
	(.078)	(.040)		
POST	2.822	.050 **		
	(2.776)	(.002)		
$POST^2$	15.671	-.0023 **		
	(29.276)	(.0002)		
PREFT	.002		.046	.027
	(.041)		(.065)	(.065)
PREPT	.004		.007	-.004
	(.066)		(.050)	(.050)
FT	2.461		.030 **	.052 **
	(2.734)		(.001)	(.002)
FT^2	13.529			-.0024 **
	(27.370)			(.0002)
PT	.362		.022 **	.026 **
	(1.027)		(.003)	(.005)
PT^2	1.186			-.0011
	(5.970)			(.0009)
R^2@		.172	.159	.172
Nobs	12743			

* Significant at 5% level.
** Significant at 1% level.
Standard Errors in Parentheses.
1 NLS Young Women's data on white women who have completed their full-time education (2631 individuals).
@ This R^2 measure compares the predicted values to the actual (unweighted and unstandardized) values of the dependent variable.

rejected, but the restrictions implied by specification (1) are not[12]. The third specification will, however, be used in the analysis which follows in order to permit part-time and full-time experience to have distinct effects. This choice seems necessary if the hypothesis concerning part-time employment is to be tested.

IV. PART-TIME EMPLOYMENT

It was suggested earlier that part-time employment, if used to ease reentry to the labor force and if subject to lower wage rates, might explain the observed wage behavior following interruptions. This hypothesis can be tested by rerunning the analysis allowing wages set on part-time jobs to have a different equilibrium level than wages set on full-time jobs. In a simple log wage regression, assuming that the difference due to hours worked is a constant percentage change, a dummy for part-time work would suffice. Following wage differencing, this 'dummy', PTDUM, will take on values of -1, 0, and 1. A zero will indicate that either both positions were full-time or both were part-time. A one would indicate that the first job was full-time but the second part-time; a negative one, the reverse.

The results of this analysis are presented in equation (4) of Table 2-3. They indicate that part-time workers do receive a significantly lower wage than full-time workers (almost two percent), but allowing for this differential does not change any of the other parameters. Overall, it appears to make sense to distinguish between part-time and full-time

---

[12] Equation (2) versus (3) yielded an $F(2,\infty)$ of 71.90.
Equation (1) versus (3) yielded an $F(3,\infty)$ of 1.58.

Table 2-3

Log Wage Change Equations[1]
GLS Estimates

Indep. Vars.	(4)	(5) Sample A[2]	(6) Sample B[2]	(7) Sample B
PRENT	.096 **	.013	.109 *	.110 *
	(.028)	(.087)	(.054)	(.054)
NT	-.023 **	-.011	-.020 **	-.018 **
	(.003)	(.007)	(.007)	(.007)
PREFT	.030	.484 **	.361 *	.365 *
	(.065)	(.163)	(.154)	(.154)
PREPT	-.004	.227 *	-.100	-.096
	(.050)	(.114)	(.104)	(.104)
FT	.051 **	.058 **	.050	.036 **
	(.002)	(.006)	(.034)	(.013)
FT^2	-.0023 **	-.0030 **	-.0067	
	(.0002)	(.0006)	(.0148)	
PT	.029 **	.040 **	.086	.037
	(.006)	(.012)	(.063)	(.024)
PT^2	-.0014	-.0022	-.0270	
	(.0009)	(.0017)	(.0322)	
PTDUM	-.017 **	.003	-.022	-.019
	(.007)	(.020)	(.023)	(.022)
R^2@	.173	.220	.016	.015
Nobs	12743	1821	1304	1304

* Significant at 5% level.
** Significant at 1% level.
Standard Errors in Parentheses.

1 NLS Young Women's data on white women who have completed their full-time education.

2 These subsamples select for observations containing an interruption followed by at least 3 years of known activity. Those in Sample A remain employed for these 3 years; those in Sample B do not.

@ This R^2 measure compares the predicted values to the actual (unweighted and unstandardized) values of the dependent variable.

employment, but this distinction does not decrease the apparent depreciation or rebound effects.

V. LABOR SUPPLY

As noted above, if individuals whose wages fall most during an interruption are more likely to re-exit employment, the depreciation and rebound effects may only be a reflection of that labor supply decision. One way to test this hypothesis is to examine the mean decline in wages for those who remain employed for some number of years after reentry and compare it to the mean for those who re-exit within this period. For the purpose of this analysis only observations on individuals who left employment then reentered and were observed (either employed or not employed) for three years following reentry are used. Of the 4151 observations which span a period of non-employment, 3125 meet these conditions. Most of these observations (1821 or 58%) involve withdrawals followed by more steady employment. These are designated Sample A. The remainder, those comprising a withdrawal followed by a shorter period of employment, are designated Sample B.

Looking at the average difference in log wages for each sample will give a gross indication of the percentage change in wage associated with withdrawals of each type. In the first year back, wages rise on average 8.1% for observations in Sample A and fall on average 0.1% for observations in Sample B. Looking at figures for the second year (not necessarily for the same set of individuals - some from Sample B, for instance, will already have re-exited), wages rise by 11.6% for those in Sample A and by 3.4% for those in Sample B.

These means are unadjusted for duration of interruption. If withdrawing for longer periods results in a higher probability of re-exiting, general means may only reflect the length of withdrawal. Indeed, a larger percentage of observations in Sample A involved an interruption of less than one year. Figures in Table 2-4 reflect average wage differentials after making some adjustment for the duration of the withdrawal. Even holding duration relatively constant, it is evident that wages fall more, relatively, for the group that re-exits, Sample B.

Another way to approach this issue is to run separate regressions for each of the two samples. These GLS estimates are presented in Table 2-3. The coefficient estimate for NT indicates that employment interruptions in Sample A are associated with little, if any, wage loss. For individuals who do not remain employed (Sample B), however, withdrawal does impose an additional, statistically significant cost of approximately two percent per year[13]. Only those who reenter for a relatively short period of time appear to reenter at a significantly lower wage.

Moreover, it is the wages in Sample A that respond in a strongly nonlinear fashion to post-reentry experience. The post-reentry experience of Sample B is too short to necessitate a nonlinear fit. The so-called rebound effect then, appears to reflect the nonlinear relationship between experience and log wages, not a rebounding wage.

Overall, the differenced log wage model is far less precise and explains far less for the sample that re-exits (Sample B) than for the

---

[13] This result appears to be robust to changes in the required number of years of post reentry information. When four years of post reentry information is required, the coefficient to NT for Group A is -0.005 (0.009) and for Group B, -0.021 (0.007).

Table 2-4

Average Wage Changes Received
During the First Year Following a Withdrawal[1]

	Length of Interruption	Number of Observations	Average Change in Log Wage
Sample A[2]:	< 1 Year Mean of 0.62	227	0.0492 (0.0226)
	1-3 Years Mean of 1.57	111	0.1460 (0.0405)
	3+ Years Mean of 4.84	21	0.0845 (0.0637)
Sample B[3]:	< 1 Year Mean of 0.62	560	0.0038 (0.0163)
	1-3 Years Mean of 1.62	362	0.0009 (0.0218)
	3+ Years Mean of 5.24	65	-0.0486 (0.0543)

1 NLS Young Women's data on white women who have completed their full-time education and experienced an interruption in their careers after which their activities are traced for at least 3 years.
2 Sample A: Observations encompassing interruptions followed by at least 3 years of employment.
3 Sample B: Observations encompassing interruptions followed by fewer than 3 years of employment.

sample that maintains a closer attachment to the labor force (Sample A). The R-squared measure for Sample A is 0.22 and for Sample B, 0.02. This suggests that some more fundamental distinctions could be drawn between these two data sets.

Such differences must involve both individual specific and withdrawal or time specific factors. Since the sample selection criterion is based not on characteristics specific to individuals but on characteristics specific to periods of non-market activity, some individuals contribute observations to both samples. The two samples contain data on 942 women (1245 withdrawals) of whom 310 (319 withdrawals) contribute observations exclusively to Sample A, 537 (716 withdrawals) exclusively to Sample B, and 95 (114+96 withdrawals) to both. These mutually exclusive groups will henceforth be called Group A, Group B, and Group C. Group C observations can then be further differentiated by type of withdrawal, A or B.

In general, it is useful to compare these individuals with others exhibiting more extreme labor supply patterns. Thus, table 2-5 presents some basic statistics for individuals who are never employed and for individuals who are always employed, as well. On most of these scales there is significant variation across the samples. Individuals who show greater attachment to the labor force tend to be younger, more educated, healthier, more likely to plan to be working at age thirty-five, and less likely to be married or living in the South. They also have more highly educated parents and fewer family members. Individuals in Groups A and B appear to have characteristics falling roughly between those of

Table 2-5

Characteristics of Individuals
Exhibiting Different Degrees of Attachment to the Labor Force[1,2]

	Always Works	Group A	Group C	Group B	Never Works
Date of Birth	1949.6	1948.2	1947.9	1948.5	1947.4
	(3.0)	(3.0)	(2.7)	(2.9)	(3.0)
Final School Enrollment Date	1969.8	1967.4	1966.3	1966.9	1965.1
	(3.8)	(3.6)	(3.0)	(3.2)	(4.2)
Highest Reported Education Level	14.0	13.1	12.4	12.0	10.8
	(2.2)	(2.2)	(2.1)	(2.2)	(2.8)
Mother's Education	11.5	11.1	10.2	10.4	9.5
	(2.5)	(2.9)	(2.3)	(3.1)	(3.4)
	(171)	(291)	(86)	(480)	(53)
Father's Education	11.1	10.9	10.0	10.1	9.2
	(3.5)	(3.5)	(3.4)	(3.5)	(3.9)
	(158)	(250)	(68)	(412)	(41)
% Self-reported Healthy					
- upon leaving school	97%	93	93	95	84
	(185)	(310)	(95)	(536)	(61)
- 5 yrs later or upon return to work after 1st reported interruption	96%	93	95	90	86
	(133)	(225)	(95)	(440)	(56)
% Living in the South (full sample)					
- " "	25%	31	27	33	34
- " "	26%	35	33	34	34
% Living in an SMSA (full sample)					
- " "	71%	72	65	67	64
- " "	70%	71	61	68	67
% Married Spouse Present (full sample)					
- " "	28%	43	56	53	85
- " "	57%	70	80	82	89
Number of Family Members (full sample)					
- " "	3.4	3.4	3.7	3.6	3.7
	(2.2)	(1.8)	(2.3)	(2.0)	(1.5)
- " "	2.7	3.3	3.5	3.4	4.1
	(1.5)	(1.5)	(1.5)	(1.4)	(1.1)
% Planning to Work at Age 35					
- " "	71%	72	58	62	46
	(164)	(269)	(89)	(504)	(54)
- " "	76%	73	38	39	32
	(168)	(230)	(61)	(397)	(44)
Total Number of Persons	185	310	95	537	61

Distribution of Schooling:

	Grade						
	<8	8	9-11	12	13-15	16	17+
Always Work	0.0%	0.5	2.2	40.0	21.1	21.6	14.6
Group A	1.6	0.6	7.1	49.0	21.6	10.7	9.4
Group C	1.0	3.2	16.8	44.2	24.2	6.3	4.2
Group B	2.2	4.5	20.8	50.1	12.5	6.0	3.9
Never Work	9.8	8.2	37.7	24.6	11.5	6.6	1.6

1 Mutually exclusive samples from National Longitudinal Survey of Young Women. Group A individuals report 1+ withdrawals, each followed by 3+ years of continuous work experience. Group B individuals report 1+ withdrawals, each followed by another withdrawal within 3 years. Group C individuals report 2+ withdrawals, one of each type. The samples of those reported to be always working and of those reported to have never worked are restricted to individuals observed for at least 5 years after completing school.

2 Standard errors are presented in parentheses (), the number of valid responses in curly brackets {}.

the two extreme populations. Thus, labor force attachment does appear to have an important individual specific component.

However, the existence of a significant hybrid population, Group C, and the varied employment histories of those individuals who contribute exclusively to one or the other sample group suggest that other factors, too, play a role. The periods of non-employment upon which this analysis focus are not the only such periods in the typical respondent's work history. Years not employed prior to the first sample observation average 1.1 for those in Group A and 1.3 for those in Group B. It seems reasonable to assume that individuals vary their commitment to the labor force over time as their nonmarket responsibilities (to spouse and children) change[14]. As the children in a family grow up, for example, their mother may be more likely to make a firm commitment to the labor market.

There is, in fact, some evidence that individuals increase their commitment over time. The employment pattern for those in Group C demonstrates this evolution. Ninety-one of the ninety-five individuals contributing to Group C report short reentry periods earlier in life, followed by a more permanent reentry. These individual records also support the regression results presented earlier. Wages fall slightly during withdrawals followed by short periods of employment and rise during withdrawals followed by more permanent reentry[15].

- - - - - - - - - -

[14] Heckman & MaCurdy (1980) find that the value of nonmarket time does change over time as suggested by this description, although they do not propose any particular pattern to this change.

[15] Of course, this pattern is also consistent with a job matching story in which poorly placed individuals exit employment rather than switch jobs.

Information more clearly linked to a particular withdrawal spell is presented in Table 2-6[16]. Strikingly, the length of the most recent interruption does not appear to be related to the degree of labor force commitment reflected in ex post employment duration. The distribution of time spent not employed is similar for each group, if not longer for the 'more committed' in Group A.

Occupation, however, appears quite correlated with the degree of labor force attachment observed. More continuously employed labor force participants are more likely to be classified as professional/technical or clerical workers and less continuously employed participants are more likely to be classified as service workers or operatives. This is true even of the hybrid group and even of the jobs held prior to the interruption[17]. Although individuals who withdraw from the job market are more likely to change broad occupation than those who work continuously, individuals in Group A are somewhat less likely to change than individuals in Group B. Those who are more committed upon reentry may recognize their commitment to the labor force in advance and so be more likely to choose a more time consuming and presumably monetarily rewarding occupation early in their lives; those who expect to be more occupied with nonmarket activities may delay such investment until they are ready to remain employed (Polachek 1979, 1981). In general, some time or

- - - - - - - - - -

[16] Some data listed in the previous table, such as family size and marital status, also changes over time, but these data are very difficult to match to the employment history.

[17] These results are strikingly similar to those predicted by Polachek (1981). He looks at occupational self-selection as a function of occupational atrophy rates and predicts the occupational distribution for women who never exit from the work force. Professional, managerial, and clerical employment increases, while service and other employment declines.

Table 2-6

Characteristics of Withdrawals & Post-Reentry Employment
For Those Exhibiting Different Degrees of Attachment to the Labor Force[1,2]

	Always Working	Group A	Group C Type A	Group C Type B	Group B
	(185)	(319)	(96)	(114)	(716)
Mean Length of Most Recent Withdrawal (Yrs)	- - -	1.46 (1.72)	1.59 (1.76)	1.09 (0.73)	1.43 (1.55)
% of Withdrawals Lasting					
<1 Year	- - -	57.1%	60.4	56.1	54.7
1-3 Years	- - -	32.6	26.0	43.0	35.5
3+ Years	- - -	10.3	13.5	0.9	9.8
Mean Wage Level Upon Reentry (1982$)	8.48 (3.31) {173}	6.57 (2.93) {319}	6.10 (2.40) {96}	5.33 (2.16) {114}	5.06 (2.30) {716}
% Employed by Broad Occupation Upon Reentry	(185)	(318)	(96)	(114)	(715)
Prof/Tech/Mgrl	42.7	26.4	13.5	9.6	10.5
Clerical	42.7	45.3	45.8	35.1	29.9
Service	5.9	10.1	15.6	22.8	23.1
Oper/Craft	5.9	10.1	17.7	19.3	20.0
Sales	2.7	6.3	9.4	10.5	10.5
Other	0.0	1.8	2.1	2.7	5.4
% Changing Broad Occupation	22.7 (180)	35.0 (311)	45.8 (96)	37.1 (113)	45.8 (692)

1 Data from the National Longitudinal Survey of Young Women based on withdrawals not on individuals. The groups are based on distinct sets of individuals but the number of observations in a group is the number of observed withdrawals by those in the group. Group A individuals report 1+ withdrawals each followed by 3+ years of continuous work experience (310 individuals). Group B individuals report 1+ withdrawals, each followed by another withdrawal within 3 years (537 individuals). Group C individuals (of which there are 95) report 2+ withdrawals, at least one of each type, A and B.
The sample of those reported to be always working is restricted to include only individuals observed for at least 5 years after completing school. Wages and occupations shown are those reported in the fifth year. Occupations are compared with those reported in the first year.

2 Standard errors are presented in parentheses (), the number of valid responses in curly brackets {}.

employment specific characteristics do appear to be correlated with the duration of reentry employment.

This analysis emphasizes the fact that not only the wage paths need to be examined and explained, but the different patterns of labor supply themselves must be. Two simple search models can be used to demonstrate the range of possible explanations. These models are polar cases in that in one causality runs from wages to spell length and in the other from spell length to wages. The true explanation undoubtedly combines elements of both.

The first story is one in which luck plays a dominant role. Individuals decide to return to work regardless of the reentry wage they obtain. Having decided to reenter, they accept the first employment offer they receive. Some are lucky and some are not. Individuals who draw a wage below some level (approximated by their pre-withdrawal wage) become discouraged and re-exit employment. In this extreme case, wages are independent of the decision to accept employment but critical in determining whether or not to leave employment. Thus, the wage received causes the employment spell length observed.

Causality is reversed in the second case. Here, reentry is predicated upon the wage offer received whereas the decision to exit is fixed and independent. Individuals know in advance when they have time for a job and when they do not. Upon entering the labor force, they know for how long they will be participating. The sample selection criterion used here might be interpreted as an assumption that individuals can forecast up to three years in advance. A simple search model for employment predicts that the shorter the expected work horizon, the

lower the reservation wage until, in the last possible work period, the reservation wage falls to equal the value of the next best alternative activity. Thus, the length of the planned employment spell in some sense affects the wage. Provided the pre-withdrawal wage is based upon an employment spell of average length, the empirical results presented earlier can be explained within this framework. In contrast to the model based upon the luck of the wage draw, this is a model of a perfectly planned employment spell.

A more realistic theory would incorporate elements of both random chance and planning. The labor supply decision is clearly an endogenous one. While a low draw on wages is more likely to be accepted by someone planning to re-exit relatively soon, it is also more likely to itself induce exit. Table 2-6 shows that not only is the wage depreciation greater for those who appear relatively less committed to the work force, but the wage level is lower as well.

Past work has focused almost entirely on wage behavior alone. CD&P and Corcoran make adjustments for those individuals who never work or who work too little for a log wage difference to be calculated, but make no effort to discuss why individual X exits for ten years and individual Y for one. Market wages play an important role in this decision in the traditional labor supply literature (Heckman 1974, 1977; Heckman & MaCurdy 1980). Mincer and Ofek attempt an adjustment using the percentage of time employed as the dependent variable. While intuitively this makes more sense for a panel data set, it does not clearly fit the usual labor supply framework, either.

Unfortunately there is no straightforward way to incorporate labor supply decisions into this type of study. Future research taking a

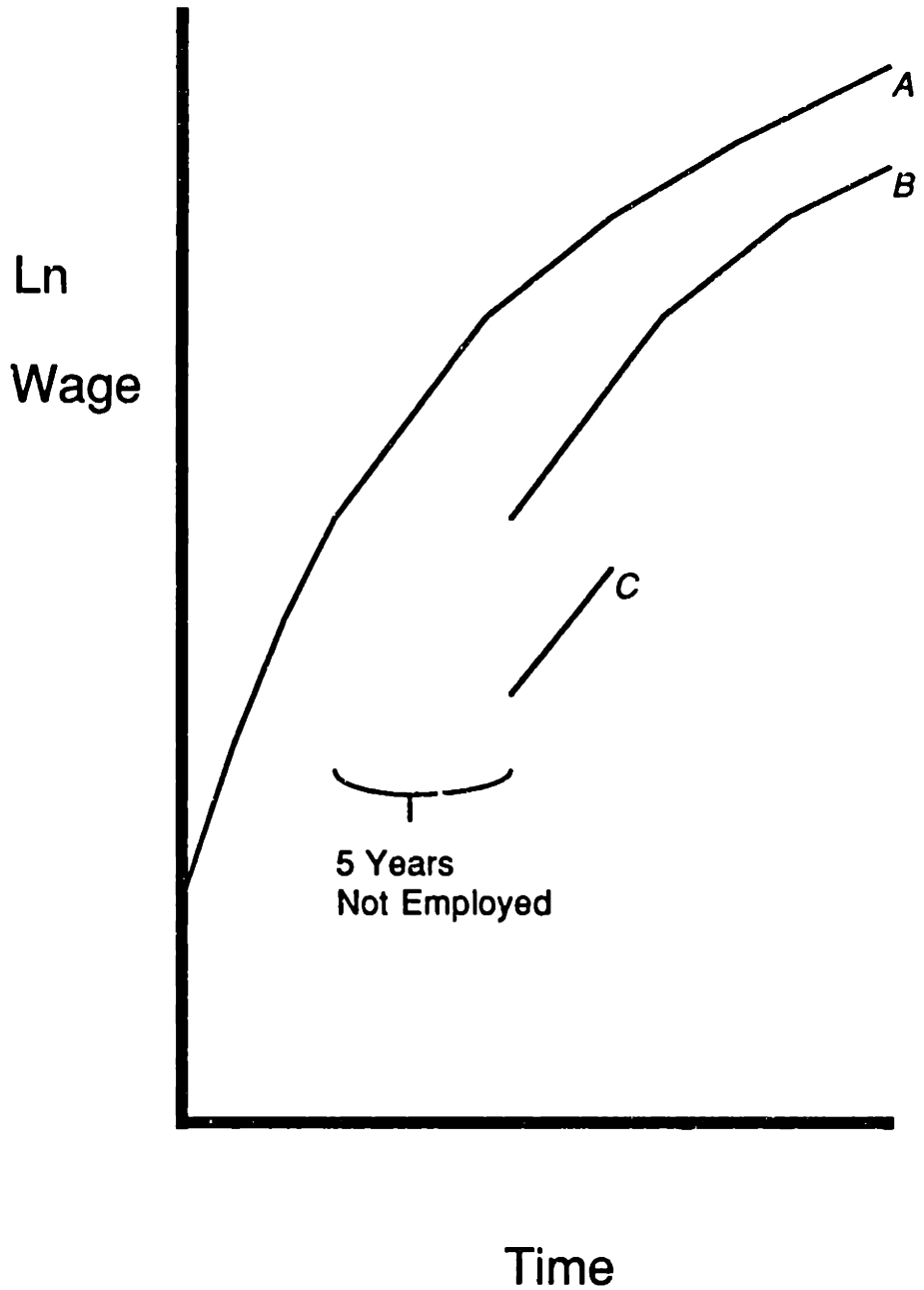
closer look at who these women are and what factors are important in their labor supply decisions would help clarify some of these issues. Until this work is done, it is difficult to specify exactly what is driving the differential 'depreciation' experienced by women leaving employment. What can be said is that not all those who withdraw from employment experience a decline in wages and that any decline appears to be inversely related to the reentry spell length.

VI. CONCLUSION

In conclusion, it appears as if the past literature on wage behavior following reentry to the labor force has paid too little attention to the labor supply decisions naturally embedded in the analysis to provide reliable information regarding what to expect in terms of future wages to families considering how to allocate their time. The results presented above indicate that individuals who will remain committed to the labor market after reentering seem to forego only the returns to experience they fail to accumulate during their period of non-employment. Their wages follow a path similar to that of line B in Figure 2-2. Individuals who will soon re-exit both forego returns to experience and suffer an additional penalty for their withdrawal. Their wages follow a path like that of line C in Figure 2-2. How individuals are categorized or self-select into these two groups remains poorly understood and should be a topic for future research. Both individual and time/work specific characteristics appear to play a role.

What is clear from this analysis is that there is no evidence of a rebound effect as defined in the earlier literature. Wages do not fall

Figure 2-2



then rise faster than expected to 'make up' in some sense for their decline. Indeed, the wages of individuals who will remain attached to the labor force upon reentry do not decline in response to a withdrawal at all.

BIBLIOGRAPHY

Basler, Barbara. "Putting a Career on Hold." New York Times Magazine, 7 December 1986.

Blank, Rebecca M. "Simultaneously Modelling the Supply of Weeks and Hours of Work Among Female Household Heads." Journal of Labor Economics 6, no. 2 (April 1988): 177-204.

Corcoran, Mary E. "Work Experience, Labor Force Withdrawals, and Women Wages: Empiricial Results Using the 1976 Panel of Income Dynamics." In Women in the Labor Market, edited by Cynthia B. Lloyd, Emily S. Andrews, and Curtis L. Gilroy. Conference on Women in the Labor Market, 1977, Barnard College. New York: Columbia University Press, 1979: 216-245.

Corcoran, Mary and Greg J. Duncan. "Work History, Labor Force Attachment, and Earnings Differences Between Races and Sexes." The Journal of Human Resources 14, no. 1 (Winter 1979): 3-20.

Corcoran, Mary, Greg J. Duncan, and Michael Ponza. "A Longitudinal Analysis of White Women's Wages." The Journal of Human Resources 18, no. 4 (Fall 1983): 497-520.

Heckman, James J. "New Evidence on the Dynamics of Female Labor Supply." In Women in the Labor Market, edited by Cynthia B. Lloyd, Emily S. Andrews, and Curtis L. Gilroy. Conference on Women in the Labor Market, 1977, Barnard College. New York: Columbia University Press, 1979: 66-97.

———. "Shadow Prices, Market Wages, and Labor Supply." Econometrica 42, no. 4 (July 1974): 679-694.

Heckman, James J. and Thomas E. MaCurdy. "A Life Cycle Model of Female Labour Supply." Review of Economic Studies 47 (1980): 47-74.

Mincer, Jacob. Schooling, Experience, and Earnings. New York: National Bureau of Economic Research, 1974.

Mincer, Jacob and Haim Ofek. "Interrupted Work Careers: Depreciation and Restoration of Human Capital." The Journal of Human Resources 17, no. 1 (Winter 1982): 3-24.

Mincer, Jacob and Solomon Polachek. "Family Investments in Human Capital: Earnings of Women." Journal of Political Economy 82, no. 2, pt. II (March-April 1974): S76-S110.

———. "Women's Earnings Reexamined." The Journal of Human Resources 13, no. 1 (Winter 1978): 118-134.

BIBLIOGRAPHY (Cont.)

Polachek, Solomon William. "Occupational Segregation Among Women: Theory, Evidence, and A Prognosis." In Women in the Labor Market, edited by Cynthia Lloyd, Emily S. Andrews, and Curtis L. Gilroy. Conference on Women in the Labor Market, 1977, Barnard College. New York: Columbia University Press, 1979: 119-136.

Polachek, Solomon William. "Occupation Self-Selection: A Human Capital Approach to Sex Differences in Occupational Structure." Review of Economics and Statistics 63, no. 1 (February 1981): 60-69.

Sandell, Steven H. and David Shapiro. "An Exchange: The Theory of Human Capital and the Earnings of Women - A Reexamination of the Evidence. The Journal of Human Resources 13, no. 1 (Winter 1978): 103-117.

-----. "Work Expectations, Human Capital Accumulation, and the Wages of Young Women." The Journal of Human Resources 15, no. 3 (Summer 1980): 335-353.

Shackett, Joyce Reynolds. "Experience and Earnings of Young Women." Ph.D. diss., Harvard University, October 1981.

GLS Data Transformations

This analysis assumes that wages are best modeled using an equation similar to (A1):

(A1) $\quad \text{Ln Wage}_{it} = \alpha_0 + X_i\alpha_1 + Z_{it}\alpha_2 + \phi_{it}$

Log wages in this example are a linear function of a constant term α_0; a vector, X, of individual specific characteristics (like education); a vector, Z, of cumulative labor market experience; their coefficient vectors, α_1 and α_2; and a random error term, ϕ_{it} . The error term can be split into two independent parts, an individual specific component, μ_i, and a random component, ξ_{it}. Each of these is distributed with mean zero and variance σ_i^2 and σ^2 respectively. Both error terms are assumed to be independently distributed across individuals and ξ_{it} is assumed to be independently distributed across time as well. Perhaps the chief weakness of this specification is its failure to allow for serial correlation of the error terms for a given individual. The independence assumptions are summarized in (A2).

(A2)
$$\begin{aligned} &E(\mu_i\mu_j) = 0 && i \neq j \\ &E(\xi_{it}\xi_{js}) = 0 && i \neq j \text{ or } t \neq s \\ &E(\mu_i\xi_{jt}) = 0 && \text{for all } i,j,t \end{aligned}$$

When two such log wage observations are differenced, the intercept, α_0, the individual specific characteristics, X_i, and the labor market experience accumulated prior to the first wage observation, $Z_{i,t-1}$, fall out of the equation. The individual specific component of the error term, μ_i, is also eliminated. Thus the model becomes:

$$(A3) \quad \text{Ln Wage}_{i,t} - \text{Ln Wage}_{i,t-1} = (Z_{i,t} - Z_{i,t-1})\alpha_2 + \xi_{i,t} - \xi_{i,t-1}$$

This error term has a variance of $2\sigma^2$. The assumption that wages for a given individual are not serially correlated eliminates the correlation term that would otherwise enter these calculations.

A single observation of this type per individual would not require GLS estimation. It is the unusual sampling technique employed here that results in heteroskedasticity. Employing the simple example from the text of an individual who is observed working for two periods, withdrawing once, then reentering for three periods, the heteroskedasticity problem and the solution can be examined in detail.

Example

	Activity	New Wage Delta	Error Term
t_1	Working		
t_2	Working	$t_2 - t_1$	$\xi_2 - \xi_1$
t_3	Not Working	$t_4 - t_2$	$\xi_4 - \xi_2$
t_4	Working	$t_5 - t_2$	$\xi_5 - \xi_2$
t_5	Working	$t_6 - t_2$	$\xi_6 - \xi_2$
t_6	Working		

(individual subscripts removed)

The correlation matrix generated by this individual's employment history is:

$$(A4) \quad \Sigma = \begin{bmatrix} 1.0 & -0.5 & -0.5 & -0.5 \\ -0.5 & 1.0 & 0.5 & 0.5 \\ -0.5 & 0.5 & 1.0 & 0.5 \\ -0.5 & 0.5 & 0.5 & 1.0 \end{bmatrix}$$

The goal is to discover a linear transformation of the data that will yield a post-transformation correlation matrix equal to the identity matrix. Since Σ is symmetric and positive definite, so is its inverse and thus there exists a nonsingular square matrix P, further restricted to be a lower triangular matrix, such that $P'P = \Sigma^{-1}$. P will be an appropriate transformation matrix.

The chief difficulty encountered in applying this technique to this particular problem is the diversity of the data. First, each individual has a unique pattern of work experience and hence a unique P. Likewise, if the sample is restricted in any way (ie. to Sample A or Sample B specifications - see text of paper under 'Labor Supply' heading), a completely different transformation matrix is usually required for each individual. Thus, to employ this approach one must be able to a) determine each individual's labor market pattern and b) transform the data by applying the appropriate pattern specific weights. The general form of P, and therefore the formula for the weights is:

$$A(5) \quad P = \sqrt{2} \begin{bmatrix} \sqrt{\frac{1}{2*1}} & 0 & \cdots & 0 & 0 & 0 \\ -\sqrt{\frac{1}{3*2}} & \cdot & 0 & \cdots & 0 & 0 & 0 \\ \cdot & \cdot & \cdots & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdots & 0 & \cdot & \cdot \\ -\sqrt{\frac{1}{(N-1)(N-2)}} & \cdot & \cdots & \sqrt{\frac{(N-2)}{(N-1)}} & 0 & 0 \\ -\sqrt{\frac{1}{N(N-1)}} & \cdot & \cdots & -\sqrt{\frac{1}{N(N-1)}} & \sqrt{\frac{N-1}{N}} & 0 \\ -\sqrt{\frac{1}{(N+1)N}} & \cdot & \cdots & -\sqrt{\frac{1}{(N+1)N}} & \sqrt{\frac{-1}{(N+1)N}} & \sqrt{\frac{N}{N+1}} \end{bmatrix}$$

where N refers to the number of wage differenced observations.

This general formula must be altered each time a withdrawal from the labor force is encountered, ie. each time a new wage is employed as the reference wage, the wage to be differenced. Recall that the first period wage is fixed and its log subtracted from each subsequent log wage until a withdrawal (or experience gap) is encountered. Thus, W_1 is the initial reference wage. Upon encountering a withdrawal, a new reference wage is identified and its log is subtracted from each subsequent log wage. The reference wage chosen is the last wage observed prior to exit. In the example above, the base wage is changed as a result of labor market withdrawal in period 3. This change occurs between differenced observations 1 and 2.

The formula change involves multiplying a particular column of the above P matrix by a constant. The column whose number (D) corresponds to the last observation which makes use of the 'old' reference wage is multiplied by (-D). In the example above, observation 1 is the last to employ wage W_1 as the reference wage, therefore column 1 of the general transformation matrix presented above is multiplied by (-1), N is set equal to 4, and the transformation is performed. All the data observations are handled in a similar manner.

Chapter 3

Employment
Preferences Versus Opportunities

Part-time jobs have been the object of much praise and much criticism in the popular press. Proponents contend that part-time employment is a valuable option for women, students, and others who face substantial constraints on their time. They support legislation to expand part-time job opportunities and make them more readily available. Opponents argue that employers create part-time jobs in order to further exploit their work force and that, in fact, many part-time employees would prefer to work full-time. Opponents support legislation to limit or reduce the exploitation of workers by guaranteeing minimum pay and benefit levels and by supporting programs which make full-time employment both more feasible and more readily available. One side lauds the postwar expansion of part-time job opportunities; the other decries the recent surge in involuntary part-time employment. Both suggest that individuals are sometimes constrained in their job choice.

Economists have typically avoided this controversy. Part-time employment in general has received relatively little attention in the economics literature. Studies of job rationing or labor market constraints are somewhat more common. Designating the unemployed as labor force participants implicitly recognizes that such constraints exist. Studies of the labor supply decision, however, often assume that workers are free to choose their hours. This assumption skirts the basic question posed above: whether and how part-time and full-time jobs are rationed.

The goal of this study is to combine an analysis of the availability of part-time and full-time employment with an analysis of part-time and full-time employment preferences, in order to measure the extent to which individuals are constrained in the labor market and to determine what factors make this constraint binding. A model is developed for the simple case in which only three employment options exist: working full-time, working part-time, and not working at all. Individuals weigh the costs and benefits of each option and rank their preferences among them. The actual employment outcome is a function of both these preferences and the ease with which part-time and full-time positions can be found.

Data from the Current Population Survey (CPS) are used to estimate the parameters of this model. The CPS contains detailed information on employment outcomes. Given certain assumptions relating outcomes to preferences and opportunities, these data are sufficient for identification of the model.

The resulting parameter estimates are used to generate predictions regarding preferences and opportunities for employment. These probabilities are then combined to predict employment outcomes. Of particular interest is the relative probability with which an individual will be constrained in the search for part-time as opposed to full-time employment. It is over the answer to this question that proponents and opponents of public policy to expand part-time employment opportunities clash. The relative roles of 'involuntary' employment and unemployment in contributing to these constraints can also be assessed within this framework.

The results obtained using a sample of women, suggest that constraints upon full-time employment are much more severe than those upon part-time employment. While the majority of individuals achieve their most preferred employment outcome, minorities, youths, and those with little formal education are significantly more likely to have difficulty obtaining full-time employment. They are both more likely to be 'involuntarily' employed and more likely to be unemployed. By comparison, relatively few individuals want but are unable to obtain part-time employment. These findings are quite robust and suggest that providing more part-time job opportunities of the sort currently observed may only increase the number of involuntary part-time employees.

In part I of this paper, the popular arguments for and against expanding part-time employment opportunities are outlined; in part II, some of the relevant economic literature is presented. The theoretical model is developed in part III assuming that complete information is available regarding individuals' preferences and opportunities for employment. What information is available is, in fact, quite limited. Both preferences and opportunities must be inferred from labor force status. The assumptions underlying these inferences are discussed in section IV, where the model is also modified to fit the limited information case. Section V concludes the presentation of the data, introducing the explanatory variables and the sample selection rules. Initial results are reported in section VI, and expanded upon in sections VII and VIII. Section IX contains some concluding remarks.

I. Issue/Problem

Those who advocate expanding the options available to part-time job seekers argue that part-time jobs provide some income to and help maintain labor force contacts for individuals who might otherwise stop working altogether. Studies of women (Mincer and Polachek 1974, 1978; Corcoran 1977; Mincer and Ofek 1982; and Corcoran, Duncan, and Ponza 1983) suggest that withdrawal from employment reduces future wages[1]. This reduction may be due to lost or depreciated skills, or to lack of information regarding job market opportunities. In either case, part-time employment can reduce the loss by keeping skills and information networks more up-to-date[2].

Support for expanding part-time employment opportunities also stems from the expectation that more choices are preferred to less. Ceteris paribus, each individual's welfare would increase if constraints upon employment were relaxed and the choice of hours were free[3]. The group thought to benefit most from such free choice is women[4]. Clearly women over the age of twenty have been historically more likely to work part-time than men of the same age, presumably because of greater household responsibilities. In 1957, 20.7% of all employed women held part-time jobs as compared to 6.1% of all employed men. As women have entered the

- - - - - - - - - -

[1] Results presented in the preceding chapter indicate that this conclusion may be premature.

[2] Other studies referring to the use of part-time work to maintain skills include the Royal (Canadian) Commission on the Status of Women (cited in White, 1983, p.1), Kahne (1985, pp. 51-53), and Leon and Bednarzik (1978).

[3] The actual welfare effect will depend upon the production cost incurred by permitting unrestricted hours choice by employees.

[4] Kahne (1985) and Hallaire (1968) argue that older workers will be an increasingly important resource and that they will be the part-time work force of the future.

labor force in ever greater numbers, they have maintained this differential (see Table 3-1). Meanwhile, part-time employment has become increasingly common for all labor force participants. Whereas 11.0% of the labor force reported working fewer than thirty-five hours per week in 1957, 23.8% of the jobs created since have been part-time in nature (see Table 3-1). Thirty-four percent of the increase in female employment has been in part-time positions.

In spite of this rapid growth in part-time employment, the unemployment rate for part-time positions has remained consistently greater than the comparable measure for full-time positions. This rate is defined by the Bureau of Labor Statistics as the number of unemployed individuals searching for part-time work divided by this number plus the number of individuals currently employed part-time. Furthermore, this number will understate the true, unmet interest in a shorter work week if some individuals accept full-time positions in lieu of difficult to find part-time positions. No information is collected on such 'involuntary' full-time employment. Clearly there are still individuals out there who would like to work part-time but have not been able to obtain a part-time job.

Critics of part-time employment, on the other hand, contend that involuntary part-time work is the more serious problem[5]. Ideally, involuntary part-time employment would be defined in much the same way as Ashenfelter (1978) defined involuntary unemployment. It exists when an

- - - - - - - - - -

[5] Among those expressing concern over involuntary part-time employment are Applebaum (1985) and Tilly (1987).

Table 3-1

Nonagricultural Employment
by Usual Full-Time/Usual Part-Time Status

Total Population

Year	Total	Usual Full-Time	Usual Part-Time	% Part-Time
1957	55,967	49,800	6,167	11.0
1962	59,552	51,668	7,884	13.2
1967	66,826	57,925	8,901	13.3
1972	74,080	62,756	11,324	15.3
1977	83,362	69,687	13,675	16.4
1982	90,552	74,414	16,138	17.8
1987	103,448	85,992	17,456	16.9
Change	47,481		11,289	23.8

Women Alone

Year	Total	Usual Full-Time	Usual Part-Time	% Part-Time
1957	18,739	14,853	3,886	20.7
1962	20,764	15,758	5,005	24.1
1967	24,637	18,737	5,900	23.9
1972	28,524	20,986	7,538	26.4
1977	34,182	24,956	9,226	27.0
1982	39,795	28,764	11,032	27.7
Change	21,056		7,146	33.9

Source: All data are from the U.S. Department of Labor, Bureau of Labor Statistics. 1957-1967 data are from the 1975 Handbook of Labor Statistics; 1972-1982 data from the 1985 Handbook of Labor Statistics; and 1987 data from Employment and Earnings, January 1988. 1987 data is not available broken down by gender. Column 1 is the sum of columns 2 and 3. Column 2 is the sum of Nonagricultural Workers on Full-Time Schedules (Table 22, pp. 76-77; Table 20, pp. 56-57; Table 32, p. 196) and Nonagricultural Workers on Part-Time Schedules for Economic Reasons Who Usually Work Full-Time (Table 25, pp. 80-81; Table 22, pp. 59-60; Table 31, p. 196). Column 3 is the sum of Nonagricultural Workers on Voluntary Part-Time Schedules (Table 22; Table 20; Table 32) and Non-agricultural Workers on Part-Time Schedules for Economic Reasons Who Usually Work Part-Time (Table 25; Table 22; Table 31). Column 4 is equal to column 3 divided by column 1.

individual "is unable to find the number of hours of work that others (with identical skills and preferences) have both chosen and managed to find" (p. 136, parentheses added). Individuals are then employed part-time involuntarily when they are unable to obtain the full-time work they desire, yet identical workers have been able to do so. In practice, however, involuntary part-time workers are identified based upon their expressed reason for working part-time. Most respond that they are so employed because they have been unable to obtain full-time employment[6]. Thus, it is assumed that individuals know what jobs it is feasible for them to obtain.

Between 1957 and 1987 the number of nonagricultural workers classified as involuntary part-time employees by the U.S. Department of Labor rose on average 4.3% per year. The average annual growth rate of voluntary part-time employment over this period was a similar 3.4%. The growth rates observed over the last fifteen years differ somewhat more. During this period, full-time employment rose 2.1% per year, voluntary part-time employment 2.2% per year, and involuntary part-time employment 6.7% per year (see Figure 2-1). The pattern is similar for women. In addition, although women constitute only forty-one percent of the work force, sixty-one percent of those employed part-time involuntarily are women. Such figures demonstrate that involuntary part-time employment is a growing phenomenon and one which affects women disproportionately.

Other critics of part-time employment are opposed to what they perceive as exploitation. White (1983) and Applebaum (1985) claim that

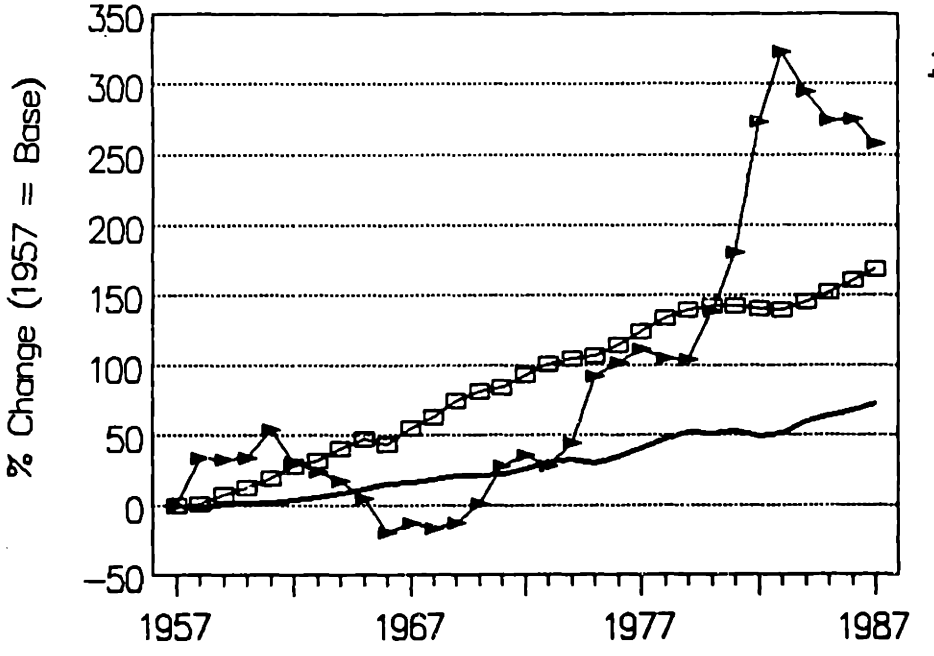
---

[6] Details concerning the coding procedure used by the Labor Department are presented in Section VII of this chapter.

Figure 3-1

Employment Growth By Labor Force Status

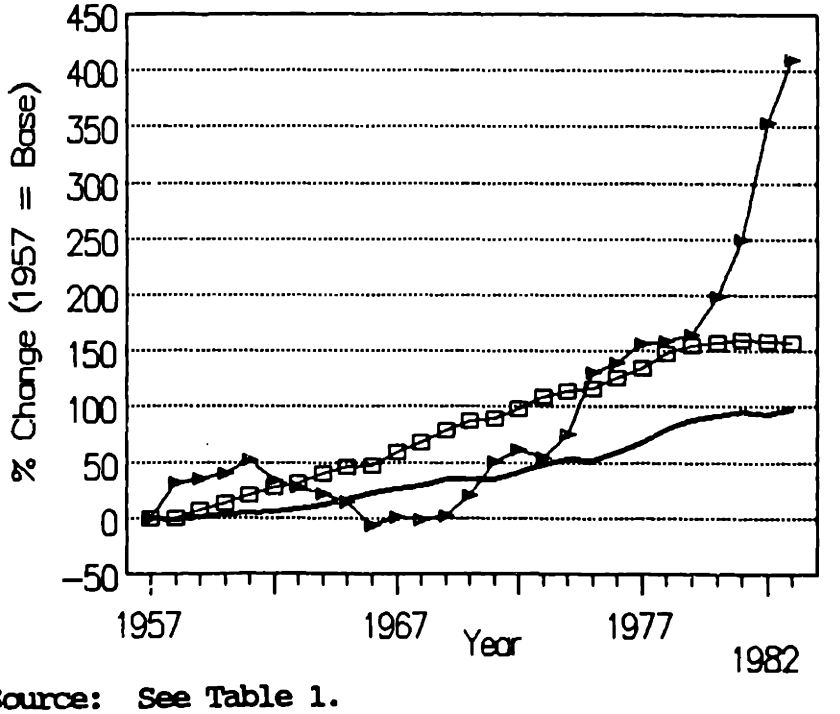
Total Population



	CAGR	
	1957-87	1972-87
	4.3%	6.7%
	3.4	2.2
	1.8	2.1

Usual FT
Vol PT
Inv PT

Women Alone



	CAGR	
	1957-83	1972-83
	6.5%	11.0%
	3.7	2.4
	2.7	3.1

Source: See Table 1.
CAGR: Compound Annual Growth Rate

many women accept part-time employment because they are unable to get competent, affordable day care and yet need to work to make ends meet. Employers then take advantage of these workers by offering lower pay as well as health care, pension, and vacation benefits reduced more than proportionally to hours. Work by Blank (1987) suggests that 17% of all part-time, female employees are covered by pension plans compared to 54% of all full-time, female employees. The figures are similar for health coverage. Nollen (1982, p. 104) presents results of a 1977 survey of 387 firms, showing that sick leave, life insurance, health insurance, and pensions are offered to only 51-59% of those employed part-time as opposed to 85-97% of those employed full-time. When offered, these benefits are usually prorated by hours worked. Only in the case of health insurance were part-time employees offered the same coverage as full-time employees even 25% of the time.

In terms of hourly wages, on the other hand, Blank (1987) has shown that while on average part-time employees earn less than full-time employees[7], this may not be the case for all part-time workers. An examination of the wages received by those employed in specific occupations revealed that in certain cases, part-time employees earned higher per hour compensation. In particular, professional/technical workers often seem to have a positive return to part-time employment.

These occupational differentials may be explained in part by the distinction Kahne (1985) argues is now arising between 'Old Concept' part-time work which has low status and low pay and 'New Concept' part-

- - - - - - - - - -

[7] Indeed, surveys of part-time employers indicate that the strongest incentive for employing a part-time work force is to reduce labor costs. (Nollen and Martin 1978; Applebaum 1985; Blank 1987)

time work which has better wages, prorated benefits, and higher status. Kahne suggests that this new sort of part-time employment is relatively more common amongst white collar workers, like professional/technical workers. She is, however, the first to admit that there is, as yet, too little data to clearly distinguish between New Concept and Old Concept employment. Should 'New' part-time jobs become more commonplace, it may become necessary to analyze them separately, but for now the generalization that part-time workers receive less compensation than full-time workers is quite accurate.

While the development of such 'New Concept' part-time jobs would undoubtedly be heralded by all sides, critics of part-time employment also advocate the establishment of good quality, low cost child care, which would free more women to work full-time, and minimum benefits' standards, which would help those working in the 'Old' part-time sectors.

Before attempting to address these grievances, it is important to know which interest group is 'right'. What problem most needs to be addressed - limited part-time employment or limited full-time employment? It would also be useful to know more about the populations involved. Who is it that wants to work part-time? Who is employed part-time involuntarily? What factors constrain individuals' labor market preferences and why? Would policies that increase part-time job opportunities also increase involuntary part-time employment? This study takes a first step toward answering such questions.

II. Literature Review

In general, economists have paid relatively little attention to part-time employment, involuntary or otherwise. There is, however, a considerable literature on the related issues of hours choice and job rationing. With respect to hours choice, the literature on labor supply clearly relies upon some measure of time spent at a job. The theoretical literature usually leaves the time unit itself unspecified. The units may refer to hours per day, hours per week, or hours per year (see Killingsworth 1983, pp. 43-45)[8].

Empiricists, on the other hand, must choose a time unit. Perhaps as a result of the theoretical ambiguity, much empirical work has focused upon the relatively simple decision to work itself, ignoring the choice of hours. This approach equates the choice of part-time and full-time employment. Any distinctions between them, such as differential compensation packages, are ignored.

Another common specification uses hours worked per week as the dependent variable. This specification is usually accompanied by an assumption that the labor supply schedule is continuous. Not only is this model more detailed than seems necessary for the analysis planned here, but the assumption of continuity is a questionable one. The observed distribution of hours worked per week is quite lumpy, with spikes arising at forty, thirty-five, and twenty hours of employment per week.

- - - - - - - - - -

[8] Blank (1988) points out that part-year employment is also an issue. Individuals choose not only how many hours to work per week but also how many weeks to work per year. This is particularly pertinent for temporary workers.

This unusual pattern is itself evidence that discontinuities may be important.

Restricting the choice set to include only three employment options - full-time, part-time, and no work - is a third possibility. This specification permits more flexibility than the literature which addresses only the decision to work and promises a more focused approach than that which distinguishes more finely amongst hours choices. Both Jones and Long (1981) and Blank (1987) have applied this simplification in order to study female labor supply decisions. Jones and Long model the employment preferences of married women using an ordered probit across full-time work, part-time work, and no work options. This specification, much like that which analyzes hours worked, relies upon the assumption that the hours decision is a continuous one, that the same factors which determine participation also determine hours worked.

Work by Blank (1987) relaxes this assumption but imposes a sequential decision framework wherein individuals first choose whether or not to work at all then, if they choose to work, they choose between a part-time and full-time schedule. The assumption underlying this model is that the decision to accept employment is separable from the decision to work part-time or full-time. If there are large fixed costs incurred by working in the market and if jobs are not rationed, then this will be a good approximation of reality. If the fixed cost of part-time employment differs greatly from the fixed cost of full-time employment, this is not an appropriate model to employ. For instance, an individual may have low fixed costs to part-time work if another family member can fill in at home, but high fixed costs to full-time work when this informal

help is no longer sufficient. In this paper, a less restrictive approach will be employed to model choice amongst the three labor market alternatives. This approach will permit fixed costs and preferences to be still more flexible.

In order to discuss 'involuntary' employment, some restriction upon realizing preferences must be introduced. Job rationing provides one such explanation. Early research in this field proposed a "take-it-or-leave-it" choice between the standard forty hour work week and no work at all. Later work has introduced lower and upper bounds on hours (Moffitt 1982; Maloney 1987) or multiple, tied wage/hours offers among which individuals must choose (Lundberg 1985; Dickens and Lundberg 1985). In each case, job rationing is justified as a means of explaining the observed distribution of hours worked. The prevalence of the forty hour work week may, after all, be caused by factors on the demand as well as the supply side of the market. Fixed start-up costs and/or the need for a common work schedule are frequently cited as examples of demand side constraints.

The theoretical arguments presented in this literature suggest that the under-, over- and un-employed could all be considered constrained labor market participants. This is the interpretation adopted here. An individual who is unable to find a job with the number of hours of work he/she desires when others with identical characteristics have been able to do so will be deemed 'involuntarily constrained[9]. Numerous studies

- - - - - - - - - -

[9] If wages are a function of the hours one works, then it is the inability to locate the optimal pair that constitutes the constraint. Note that the empirical definition of employment constraints relies upon the individual's own perception of his/her opportunities.

have focused upon the ramifications such constraints would have upon the economy through household decisions regarding consumption and labor supply (Ashenfelter 1980; Ham 1982; Moffitt 1982). Few of these studies have explored the sources of these demand based constraints or explained why such disequilibria might persist over time (Pencavel 1986).

One explanation for their persistence may be offered by efficiency wage models (Carmichael 1986; Katz 1986; Lang and Kahn 1987; Stiglitz 1987; Yellen 1984). These models suggest that wages in excess of the market clearing level may be optimal if they reduce shirking by increasing its expected cost or if they more directly improve productivity by evoking more effort from employees. 'High' wages may also be an efficient means of thwarting unionization efforts provided the threat and nonwage cost of unionization are sufficiently large. Finally, high wages may be induced by rent sharing in product markets that are less than fully competitive. This sharing could give rise to wages that are consistently above the market clearing level (Krueger and Summers 1987; Dickens and Katz 1986).

These 'high' wages will induce an excess supply of labor. This gives firms some added discretion in hiring; job rationing becomes a feasible strategy[10]. If workers are not all identical, but vary as to their productivity, employers will select workers in a manner consistent with profit maximization. If certain worker characteristics are associated with greater productivity, reduced training costs, or lower turnover, then workers with these characteristics will be more likely to be

---

[10] This argument is similar to that which appears in the literature on queuing for union jobs (Farber 1983).

hired by employers. Yet most studies assume that job rationing is a random process, that every applicant stands an equal chance of obtaining a job offer.

One exception is Blundell, Ham, and Meghir (1987). They develop a model similar to that presented below which combines both a labor supply function and an 'employment probability' function. In this case, an individual is only observed working if 1) he/she wishes to work and 2) he/she finds and holds onto a job. Each of these probabilities is modeled as a linear function of personal and family characteristics. As no information on who might desire but be unable to find employment is available, cross equation parameter restrictions are used to identify the model. Despite this, the approach is found to be an improvement over one which fails to incorporate job rationing. Indeed, interpreting the coefficients of a simple labor supply model as indicative of individual preferences for employment would be quite misleading if firms do not make job offers randomly. When an individual is observed working, it would have to be the case <u>both</u> that the individual actually received a job offer <u>and</u> that he/she decided to accept it.

The ability to find or keep a job may be influenced not only by the profit motive and employer preferences but also by individual behavior towards search and work. Hence the term 'employment probability' is used rather than the term 'job rationing'. If certain individual characteristics affect search intensity or style, then these effects too will be reflected in the employment probabilities. For example, if personal contacts are important for receiving job offers, particularly for

full-time work, and if blacks have fewer such contacts (see Osterman 1979) then being black may have a negative effect upon the probability of receiving a full-time job offer. This would not be a result of discrimination per se on the part of employers, but could rather be explained as a result of a poor information network on the part of certain job seekers. Likewise, women with children may have more difficulty paying for or obtaining limited child care while they are searching for employment than they would when on a more regular employment schedule.

In concluding, Blundell et al. suggest that further work using information on reported search or on unemployment status would aid identification. Ham (1982), in fact, uses such information to estimate unemployment and underemployment probabilities for married men. He finds that several variables, notably union membership, tenure, education, number of children, and various unemployment measures, have significant effects upon employment probabilities. At issue here is whether these variables have different effects upon part- and full-time employment probabilities.

The literature on demand for part-time labor does, in fact, suggest that the characteristics desired in part-time workers may be different from those desired in full-time workers. Studies by Applebaum (1985), Nollen and Martin (1978), and Tilly (1987) have suggested that jobs involving simple, repetitive, or stressful tasks are more likely to be suitable for part-time employment. These jobs frequently require little skill and as such may not require as much education or training as full-time positions. It has also been pointed out that the positions most

often held by part-ti ers are prone to high turnover[11]. This may be due to the repetitive nature of the jobs, but if employers design part-time jobs assuming turnover will be high, they may be less concerned about certain personal/family characteristics that could indicate a lesser attachment to the labor force. For example, married women may be more likely to leave employment in order to start a family or to take advantage of the other household income upon which they could rely. Employers filling full-time positions may be more concerned about long-term commitment and hence more sensitive to such family characteristics. In general, there is some evidence that part-time and full-time employment opportunities should be modeled separately.

---

[11] Many studies simply report that part-time workers have a higher turnover rate than full-time workers. It is not, however, clear what the turnover rate of full-time workers would be in positions comparable to those held by part-timers. Hallaire (1968) reports that at least one study found that part-time employees had a lower turnover rate in the long run.

III. The Model under Perfect Information

The model to be estimated below combines an analysis of such part-time and full-time employment opportunities with an analysis of part-time and full-time employment preferences. The theoretical model developed here assumes complete information. This means that all preferences and offers are assumed to be known. The data to be used, the data's limitations, and the actual estimation procedure will be discussed in the next section (IV).

The labor supply decision which distinguishes preferences can be represented as a problem in utility maximization. Suppose each individual knows that he/she faces three possible choices. He/she may work full-time (F), part-time (P), or not at all (N). Each option has associated with it a certain amount of leisure time and a certain wage or income level, about which it is assumed individuals are perfectly informed. Given this information an indirect utility function can be constructed whose arguments are observable characteristics, tastes, monetary factors (such as non-labor income and the price level), and the price of labor or the wage. To proceed with this functional form, the wage would have to be known for each member of the population - those not employed as well as those employed.

This problem can be addressed by using a reduced form specification. In this case, variables affecting both wages and preferences are entered as explanatory variables. Only the net effect any variable has upon preferences will be identified. If more education increases productivity in the market place hence increasing wages and also increases

productivity at home hence increasing the value of time spent in the home, these two effects will be indistinguishable.

This reduced form, indirect utility function will be approximated by a linear function of observable characteristics (X) and unobservables (ξ) (tastes). A maintained assumption is that the observables (X) are uncorrelated with all components of the error term (ξ), including tastes. In order to permit as flexible a specification as possible, coefficient estimates will be allowed to differ across each of the three recognized labor force states: F, P, and N. Thus, individual i's utility level when not employed is:

(1) $U_{Ni} = X_i B_N + \xi_{Ni}$

when working part-time is:

(2) $U_{Pi} = X_i B_P + \xi_{Pi}$

and when working full-time is:

(3) $U_{Fi} = X_i B_F + \xi_{Fi}$

where X_i is a vector of individual i's observable characteristics, B_j is a vector of parameters specific to labor force state j, and ξ_{ji} denotes the unobserved characteristics which affect the utility individual i would derive from employment state j.

Of course, the utility levels (U_{Fi}, U_{Pi}, and U_{Ni}) are themselves never observed. All that can be known is the relative ranking of the employment alternatives. If an individual prefers full-time employment to no employment at all and no employment to part-time employment, then for that individual: $U_F > U_N$ and $U_N > U_P$[12]. Assuming preferences

---

[12] The subscript i for individual is suppressed for the remainder of this section.

are transitive, these two rankings fully describe this individual's employment preferences.

Substituting equations (1) and (3) into the inequality $U_F > U_N$ and simplifying the notation yields:

(4) $X\gamma_1 > n_1$

where $\gamma_1 = B_F - B_N$ and $n_1 = \xi_N - \xi_F$. Likewise the inequality $U_N > U_P$ can be rewritten, using equations (1) and (2), as:

(5) $-X\gamma_2 > -n_2$

where $\gamma_2 = B_P - B_N$ and $n_2 = \xi_N - \xi_P$. The third pair wise comparison, that between full-time and part-time employment, could be expressed as:

(6) $X\gamma_3 > n_3$

where $\gamma_3 = B_F - B_P$ and $n_3 = \xi_P - \xi_F$, however γ_3 is equivalent to $\gamma_1 - \gamma_2$ and n_3 to $n_1 - n_2$. Introduction of a third parameter would be redundant.

The unobserved components (ξ_N, ξ_P, ξ_F) are assumed to be random variables with mean zero that are distributed independently across individuals but may be correlated for a particular individual. The variance-covariance matrix for the ξ then takes the form:

$$(7) \quad \Theta = \begin{bmatrix} \theta_N^2 & \cdot & \cdot \\ \theta_{NP} & \theta_P^2 & \cdot \\ \theta_{NF} & \theta_{PF} & \theta_F^2 \end{bmatrix}$$

The comparable matrix for the random variables n_1, n_2, and n_3, also distributed with mean zero, is:

$$(8)\quad \Omega = \begin{bmatrix} \sigma_1^2 & \cdot & \cdot \\ \sigma_{12} & \sigma_2^2 & \cdot \\ \sigma_1^2 - \sigma_{12} & \sigma_{12} - \sigma_2^2 & \sigma_1^2 + \sigma_2^2 - 2\sigma_{12} \end{bmatrix}$$

where $\sigma_1^2 = \theta_N^2 + \theta_F^2 - 2\theta_{NF}$,

$\sigma_2^2 = \theta_N^2 + \theta_P^2 - 2\theta_{NP}$, and

$\sigma_{12} = \theta_N^2 - \theta_{NP} - \theta_{NF} + \theta_{PF}$

Provided full knowledge of relative preferences, one could estimate γ_1, γ_2, and σ_{12}. The values of σ_1^2 and σ_2^2 are normalized to one since the model is estimable only up to the ratio of the parameter vectors to their standard errors. Without imposing cross-equation restrictions, the parameters B_N, B_F, and B_P can not be recovered. Only the relative importance or net impact of the observable characteristics is estimable. Nevertheless, the parameters γ_1, γ_2, and σ_{12} are theoretically identified and could be used to predict the probability with which individuals having particular characteristics would prefer specific employment outcomes.

A key advantage to this specification is that, unlike previous specifications, it permits maximum flexibility in terms of preference rankings. An individual may prefer full-time work to no work ($U_F > U_N$) and no work at all to part-time work ($U_N > U_P$). This ranking might occur if there were relatively large fixed costs associated with part-time employment and relatively low compensation rates. Conversely, an individual may prefer part-time work to no work ($U_P > U_N$) but no work to

full-time work ($U_N > U_F$) if his/her fixed costs of full-time employment were significantly greater than those for part-time employment, and if the wage differential between part-time and full-time employment were relatively small. Parents with school aged children might find this to be the case. Neither of these preference rankings was possible using the sequential choice specification of Blank (1987).

Of course, an individual is not actually observed working unless an employment offer has been made. Employment constraints may prevent an individual from obtaining a job with his/her most preferred hours. The specification chosen to represent these possibly limited part-time and full-time employment opportunities is that of a bivariate probit. Its form closely resembles that used by Ham (1982) to model under- and un-employment probabilities. These probabilities combine consideration of both employer hiring decisions and individual search decisions. As discussed earlier, characteristics which are important in leading to an offer of full-time employment may differ from those which will lead to an offer of part-time employment. This specification offers a framework in which such a hypothesis can be tested.

Suppose then that employment opportunities can be represented by indicator functions, G_{Fi} and G_{Pi}. If G_{Fi} (G_{Pi}) were greater than zero, then individual i would be able to find a full-time (part-time) job. Let

$$(9) \quad G_{Fi} = Z_i A_F + \mu_{Fi}$$

and

$$(10) \quad G_{Pi} = Z_i A_P + \mu_{Pi}$$

where Z_i is a vector of observable individual specific characteristics, A_F and A_P are parameter vectors specific to full-time and part-time

employment opportunities respectively, and μ_{Fi} and μ_{Pi} capture all the unobserved components (including luck) that are important to obtaining a job.

These unobserved components are assumed to have mean zero, to be distributed independently across individuals, and to have a within observation variance-covariance matrix:

$$(11) \quad \Sigma = \begin{bmatrix} \sigma_P^2 & \cdot \\ \sigma_{PF} & \sigma_F^2 \end{bmatrix}$$

Once again, because this is a model of discrete choice, the variance terms (σ_P^2 and σ_F^2) must be normalized to one. Given complete information on each individual's ability to find part-time and full-time employment, A_F, A_P, and σ_{PF} are all theoretically identified.

In combining these two components - one dealing with job choice, the other with employment opportunity - to complete the theoretical model, it is assumed that the n and the μ terms are independent. This assumption implies that the unobservables which contribute to the labor supply decision (like tastes) are independent of the unobservables which influence employment probabilities (like luck). It is imposed in order to keep the problem more tractable[13]. Given this assumption plus complete information on preferences and employment opportunities, not only

---

[13] Without this assumption, it would be necessary to evaluate a trivariate normal density function. While this is possible, the difficulties involved in evaluating the two bivariate normal density functions discussed above were sufficient to discourage analysis of the less restrictive case. See Section V and footnote 27 for some empirical justification for this assumption.

would the parameters be fully identified but the likelihood function would be completely separable between employment preferences and employment opportunities. Unfortunately, no data set provides complete information.

IV. Data Limitations - The Model under Imperfect Information

The data chosen to estimate this model come from the Current Population Survey (CPS). These data provide as complete a record of employment preferences and employment opportunities as can be found. Much of this must, however, be inferred from labor force status. Since a primary purpose of this survey is to gather information on labor force status, the CPS includes numerous questions designed to identify ongoing employment and job search activities. The U.S. Department of Labor uses responses to specific questions to classify each respondent as either out of the labor force (OLF), unemployed, or employed[14]. This same classification system is adopted here and expanded upon where possible to distinguish between part-time and full-time work.

In accordance with the Labor Department rules, anyone working as little as one hour with pay or fifteen hours without pay during the reference week is considered employed. Since the compensation received by those working without pay is quite different from that received by regular employees and this could affect the form of the indirect utility function, such individuals are excluded from the sample[15]. Those who are not deemed employed are classified as unemployed if they have actively looked for work during the past four weeks and are prepared to begin work immediately. The remainder are designated as OLF.

- - - - - - - - - -

[14] A study by Summers and Poterba (1986) suggests that these classifications are subject to substantial error. Information gathered in reinterviews not infrequently results in classification changes. This observation makes analysis of the dynamics of labor market status very difficult but should have a smaller impact upon the static analysis presented here.

[15] This restriction eliminated fewer than two percent of the original sample.

This classification system naturally suggests certain employment preferences. For example, employed individuals must derive greater utility from employment than they would from no employment. No one is forced to work. In terms of the model presented earlier, this translates into $U_F > U_N$ for a full-time employee and $U_P > U_N$ for a part-time employee. How the remaining employment option is valued can not be determined from information on employment status alone.

Although additional information is not available for full-time workers, it is for part-time workers[16]. These individuals are asked why they are working less than full-time. Based upon the response offered, individuals are classified as 'voluntary' or 'involuntary' part-time employees by the Labor Department. Individuals who respond that they prefer part-time work or that they are too busy at home to work additional hours are classified as voluntary part-time workers; individuals who claim that they could 'only find part-time work' are classified as involuntary part-time workers. This practice assumes that individuals are aware of the alternatives available to someone with their characteristics in the marketplace and that other like individuals have successfully obtained full-time employment. This assumption is necessary in order to link the theoretical definition of involuntary employment with the definition that can actually be applied to the data.

Almost seventy percent of those employed part-time offer one of these explanations. A few report having changed jobs during the

- - - - - - - - - -

[16] Part-time work is defined as work usually involving less than thirty-five hours per week. This means that work that is usually full-time but temporarily part-time (perhaps due to slack work, . . .) is classified as full-time. This is in accordance with recent Labor Department reporting procedures (Nardone 1986).

reference week or blame persistent plant shortages, slack work, or machine repair. The Labor Department classifies them as involuntary part-time workers. All other respondents are presumed to be voluntary workers[17]. Many of these claim that their full-time work week is less than thirty-five hours, offer a nonstandard response (coded 'Other'), or never answer the question. It is more difficult to explain why they are necessarily working part-time voluntarily. Nevertheless, this classification method is adopted without modification for the initial analysis. Allowance will be made later, in Section VII, to permit the model to identify the preferences of individuals' whose responses are relatively ambiguous.

The designation of voluntary or involuntary identifies at least one more preference ranking for part-time workers. Recall that all part-time workers must prefer part-time work to no work. 'Voluntary' part-time workers are assumed to also prefer part-time work to full-time work ($U_P > U_F$). Their preference between no work and full-time work remains uncertain. Involuntary part-time employees are assumed to prefer full-time work to part-time work. Given transitivity, their preference ranking is completely identified: $U_F > U_P > U_N$.

The preferences of the unemployed can likewise be inferred. Assuming that they are aware of all the costs and benefits of employment[18] and that they are responding honestly to the questionnaire, the unemployed must prefer some sort of market work to none at all. In this

- - - - - - - - - -

[17] See section VII, Table 3-14, for details.

[18] This implies knowledge of the true market wage available to them as part-time or full-time participants in the labor market. They must not be misinformed.

survey, they are also asked what sort of employment they are searching for - part-time or full-time. If their response is a true reflection of their preferences[19], then the unemployed who respond that they are looking for part-time employment will rank U_P above both U_N and U_F, while those looking for full-time employment will rank U_F above both U_N and U_P. For these individuals, two of three preference orderings are known.

Finally, those classified as OLF are, at least initially, assumed to prefer no employment. This is perhaps the most restrictive assumption made, as all that is actually known about these individuals is that they are neither employed nor looking for employment. If someone were so discouraged by a low probability of finding employment that he/she were to give up looking for a job, this assumption would result in parameter estimates which confuse preferences and opportunities. This issue is discussed in greater detail in section VIII of this chapter. In the interim, those who are OLF are assumed to rank $U_N > U_P$ and $U_N > U_F$.

A summary of these pair wise preferences by employment status is presented in Table 3-2. A question mark indicates uncertainty. Obviously these data provide less than complete information regarding preferences. Incomplete information does not necessarily impede identification; however, in this case the correlation term, σ_{12}, is unidentified. Recall that σ_{12} measures the correlation between the unobservables which yield preferences favoring full-time employment over no employment and those which yield preferences favoring part-time

---

[19] It is possible that the response to this question already incorporates the individual's perception of his/her employment probabilities. This possibility is not reflected in the estimation which follows.

Table 3-2

Pair Wise Employment Preferences
as Revealed by Employment Status

	Pair Wise Employment Preferences		
	FT vs. NT	PT vs. NT	FT vs. PT
Employment Status:			
- Employed FT	FT	?	?
- Employed PT			
- Voluntary PT	?	PT	PT
- Involuntary PT	FT	PT	FT
- Unemployed			
- Looking for FT	FT	?	FT
- Looking for PT	?	PT	PT
- OLF	NT	NT	?

employment over no employment. The only individuals for whom both these rankings are known with certainty are those who are OLF and those who are employed part-time involuntarily. In the first case, individuals rank $U_N > U_F$ and $U_N > U_P$, while in the latter, they rank $U_F > U_N$ and $U_P > U_N$. No individual for whom no employment (U_N) ranks second is observed with certainty. Without some such observation, σ_{12} can not be identified.

If complete information on employment opportunities were available, then a procedure which combined estimation of the preference relation with estimation of the employment opportunities would be completely

identified. Complete information on offers, however, presupposes that the job opportunities available to the unemployed are known. If these were known, then it might be possible to identify some individuals who ranked no employment (U_N) as their second best. Any individual who reported being unemployed, was looking for a full-time position, and had a guaranteed part-time employment opportunity, for example, must prefer FT to NT and NT to PT, else he/she would accept the part-time job.

Yet this is just the information which is not available! Information on job offers is also incomplete. What offers have been made must be deduced from employment status in much the same manner as were preferences. For those who are out of the labor force, no information at all is available (again, see Section VIII for a more complete discussion of discouraged workers). They have not applied for employment, hence no employment offers can be observed.

On the other hand, the unemployed are, by assumption, having difficulty receiving an acceptable job offer. As discussed earlier, this may be because no employer will offer them such a job or it may be because their means of search is inappropriate. Whichever the case, they are effectively constrained in their employment choice. Whether the unemployed are constrained in their choice of both part-time and full-time employment is not known. Those expressing a preference for part-time employment must rank PT above both NT and FT, but whether they would accept an offer of full-time work rather than go unemployed is uncertain.

One important assumption underlying this model is that there is no difference between the jobs available to people currently working and those available to the unemployed. Given fixed training costs and dif-

ferent expected tenures, this may not be realistic. For example, it may both not make sense to hire a 55 year old and not make sense to fire one. A model could be developed in which employers are only permitted to make an employment decision at the time an individual is first hired. Termination of employment would then only occur at the employees' initiative. In the model estimated below, it is assumed that both the employer and the employee reassess their situation every period. Reality undoubtedly lies somewhere between these two extremes[20].

Finally, those who are currently employed have obviously been able to obtain an acceptable offer. Full-time workers received an offer of full-time employment and part-time workers one of part-time employment. It is assumed that voluntary part-time workers never sought full-time work and involuntary part-time workers sought it and were unsuccessful in their search. The preferences with respect to PT employment of those employed FT are unknown, so it is uncertain whether a) $U_P > U_F$ and they could not obtain part-time work or b) $U_F > U_P$ so they never looked for it. No information regarding involuntary full-time employment is available else much of the debate between proponents and opponents of expanded part-time job opportunities would be resolved. Since part-time and full-time work are treated as discrete employment options, it is

- - - - - - - - - -

[20] Were information on job tenure available, it could be used to investigate this issue in a manner similar to Farber's (1983) analysis of union preferences. In that case, it was assumed that an individual would not be observed working in a union establishment unless he had both wanted a union job and been offered one when he applied. Both preferences and opportunities were then modeled as a function of individual characteristics, including age. Knowing each individual's job tenure, age at the time of hire could be calculated and, assuming other characteristics to be time invariant, Farber estimated the time of hire parameters. Unfortunately, information on tenure is not available in this data set.

also true that no one is observed with offers of both types of employment.

In sum, information on the offers received by or denied respondents is summarized in Table 3-3. A dash indicates no information and a question mark uncertainty. This information is sufficient to identify the coefficients in each employment probability equation but not the correlation term, σ_{PF}. For this parameter to be identified, some individuals must be observed receiving an offer of one sort of employment but not the other and some receiving offers of either both or neither type of employment. Involuntary part-time workers satisfy the first criterion but none satisfy the second with certainty. Whereas to identify σ_{12} it would be sufficient to locate some unemployed individuals who prefer no employment over some employment option (ie. rank U_N second), to identify σ_{PF} it is necessary to locate some unemployed individuals who would accept any employment offer (ie. rank U_N third).

Neither component of the model, neither the representation of employment preferences nor that of employment opportunities, is fully identified on its own. Estimated together, however, all the parameters are theoretically identified. The equations representing individual job choice provide information which helps to pinpoint those who receive no offer of employment and hence identify σ_{PF}, while the equations representing employment opportunities provide information which helps to pinpoint those who regard no employment as their second best alternative and hence identify σ_{12}. Together they provide the information which individually they lack.

Table 3-3

Employment Opportunities
as Revealed by Employment Status

	Employment Opportunities	
	FT	PT
Employment Status:		
- Employed FT	Yes	?
- Employed PT		
- Voluntary PT	-	Yes
- Involuntary PT	No	Yes
- Unemployed		
- Looking for FT	No	?
- Looking for PT	?	No
- OLF	-	-

V. The Data

The specific sample used to estimate this model is a subset of the May 1975 CPS. In order to focus upon those for whom the issue of part-time employment is most relevant, only women, age sixteen and above, who did not report being in school are included in the sample. Women make a particularly interesting sample due to their apparent preference for part-time employment and to the frequency with which they report involuntary part-time employment. The age restriction is imposed because job opportunities are often limited by law for those under age sixteen. Finally, while the decision to continue with one's education should ideally be endogenously determined given the effect of schooling on earnings, such a study is beyond the scope of this paper. As school attendance frequently limits work opportunities yet is quite different from the decision not to work, those women reported to be in school are removed from the sample. Women who state that they are 'unable to work' because of poor health or because they are enrolled in a training program (less than 0.1% of the sample) are removed for similar reasons.

In order to include as much information as possible about those classified as OLF, the sample is also constrained to include only women in certain 'rotation' groups. Once selected for the survey, residences are visited by interviewers each month for four consecutive months. After an eight month break, they are visited again for four consecutive months. Each month there are households in each stage of this rotation. Hence there are eight rotation groups. The fourth and

eighth are called the outgoing rotation groups as they will not be interviewed in the following month. Only in these interviews are those OLF asked more detailed questions about their current work interests. This information is vital to the identification of potentially discouraged workers who are treated separately in Section VIII of this chapter.

Other information is available for nearly every observation. Race, age, education, marital status, and state or region of residence is recorded for every respondent. Information on the number of family members less than eighteen years of age is available for all but twenty-four individuals. Finally, information on the state's or region's unemployment rate[21] is incorporated.

One variable, which has been found to be important in labor supply studies and is not available in this survey is non-wage income. Only family income is reported, and this is encoded in a multiple choice format (ie. 0=less than $1000, . . . etc.). Non-wage income is likely to constitute but a small fraction of this figure, as it includes both own and spousal wage income. For this reason, family income is not included in the analysis. The explanatory variables entered in the model will have to capture the effect of both own wage and non-wage income.

Husband's earnings are another important income source for many in the sample. Reported hourly wage or weekly pay for the spouse could be used to control for such income, but if the labor supply de-

---

[21] These data were taken from the Employment and Training Report of the President, 1979, p. 339. When several states are coded together by the CPS, a labor force weighted average is used.

cision is a household one, these variables would be endogenous. Information on husband's education will be used instead to reflect potential earnings. This variable is matched using CPS household numbers and information on the respondent's relationship to the head of the household. In only 163 cases was this procedure not successful in matching women reported to be currently married. In over seventy-five percent of these cases (124) the husband was reported to be away in the military.

Many of the explanatory variables are entered as 0-1 dummies in order to permit them to have more flexible, nonlinear effects. This is true of own education, husband's education, number of children, and the unemployment rate[22]. Two age dummies are also incorporated: one to capture the effects of extreme youth and inexperience (age less than twenty-one) and the other to capture the effect of possible retirement plans (age greater than fifty-five). Continuous measures of potential experience and its square are also used, in part to reflect the influence experience or training is known to have upon wages. A series of age dummies could serve this purpose, but it seems inappropriate to lump twenty-two and twenty-nine year olds together in one category, given the rapid changes that occur early in one's labor market experience, and extreme to create separate dummies. The names and definitions of the variables used are shown in Table 3-4.

The final data set contains 11,075 observations. Sample means are presented in Table 3-5. These figures show that over half the

---

[22] Of these four variables, husband's education appears to have the most nearly continuous effect. Early tests, however, rejected the hypothesis that a continuous variable was sufficient.

Table 3-4

Variable Definitions

NW	=	1 if Respondent is nonwhite
NW*MAR	=	1 if she is both nonwhite and married
EDUC < 9	=	1 if Respondent completed less than 9 years of formal education
EDUC 9-11	=	1 if she received some high school education
EDUC 12	=	1 if she completed high school (Default)
EDUC 13-15	=	1 if she completed some college
EDUC 16+	=	1 if she has a college diploma
MAR	=	1 if Respondent is married and living with spouse
HEDUC < 9	=	1 if her husband completed less than 9 years of formal education
HEDUC 9-11	=	1 if her husband received some high school education
HEDUC 12	=	1 if her husband completed high school (Default)
HEDUC 13-15	=	1 if her husband completed some college
HEDUC 16+	=	1 if her husband has a college diploma
AGE 20-	=	1 if Respondent is less than or equal to 20 years old
AGE 56+	=	1 if Respondent is over 55 years old
POTEXP	=	Age - Education - 6
POTEXP2	=	(Age - Education - 6) squared
0 CH	=	1 if Respondent has no children less than age 18 in the household (Default)
1 CH	=	1 if she has 1 child
2-3 CH	=	1 if she has 2 or 3 children
4+ CH	=	1 if she has 4 or more children
CH*MAR	=	1 if she has any children and is married
UR < 7%	=	1 if the state/regional unemployment rate is less than 7%
UR 7-7.9%	=	1 if the state/regional unemployment rate is between 7 and 7.9%
UR 8-8.9%	=	1 if the state/regional unemployment rate is between 8 and 8.9% (Default)
UR 9-9.9%	=	1 if the state/regional unemployment rate is between 7 and 7.9%
UR 10+%	=	1 if the state/regional unemployment rate is greater than or equal to 10%

Table 3-5

Sample Statistics
(May 1975 CPS - Women)

Characteristic	Percent of Sample
NW	11.8 %
NW*MAR	5.4
EDUC < 9	19.8
EDUC 9-11	17.1
EDUC 12	41.3
EDUC 13-15	12.1
EDUC 16+	9.7
MAR	63.7
HEDUC < 9	13.4
HEDUC 9-11	9.1
HEDUC 12	22.0
HEDUC 13-15	8.4
HEDUC 16+	10.8
AGE 20-	6.4
AGE 56+	30.7
POTEXP	28.1 Yrs
POTEXP2	1164.4
0 CH	53.0 %
1 CH	17.7
2-3 CH	22.9
4+ CH	6.4
CH*MAR	34.4
UR < 7%	17.0
UR 7-7.9%	9.3
UR 8-8.9%	29.2
UR 9-9.9%	28.1
UR 10+%	16.4

Employment Status:

OLF		53.5%
Unemployed		4.4
Looking for FT Work	82.8%	
Looking for PT Work	17.2	
Working PT		10.7
Voluntarily	85.1%	
Involuntarily	14.9	
Working FT		31.3

Total Number of Observations	11,075

women are OLF. This is explained in part by the large number of older women. Almost a third of the sample is over age fifty-five[23][24]. At the same time, almost a third of the sample are employed full-time. Only 4.4% are unemployed and of these, over eighty percent are looking for full-time work. Just over ten percent are employed part-time, with over eighty-five percent reportedly preferring these shorter hours. There is substantial variation amongst employment preferences and outcomes within this sample.

These figures can be used to estimate the extent to which labor market constraints are binding. They suggest that 5.2% of the sample or 11.3% of those in the labor force desire but are unable to obtain full-time employment. Approximately thirty percent of this group is employed part-time involuntarily; the remainder report being unemployed and seeking full-time work. Only 0.8% of the sample or 1.6% of those in the labor force clearly desire but have been unable to obtain part-time work. No information on involuntary full-time employment is available. If involuntary full-time employment were as common as involuntary part-time employment, then 14.9% of all full-time employees would prefer part-time work. In that case, 5.4% of the sample and 11.7% of those in the labor force would be constrained by limited part-time job opportunities. Proponents of part-time job expansion would, in this case, be correct in claiming that constraints upon part-time employment affect a larger population than constraints upon

---

[23] In 1975, 32.0% of all civilian noninstitutionalized women twenty years and older were over age fifty-four, hence this large proportion is not unrepresentative of the general population.

[24] Only about a third of these women are over seventy years old. Results vary little when women above this age are excluded.

full-time employment. Whether or not this is the case is a question the model outlined above has been designed to answer.

First, however, let us examine the data in greater detail. The distribution of characteristics by labor force status is illustrated in Table 3-6. These figures suggest that women with little education and older women are more likely to be classified as OLF. The older women may be retirees whereas those with less education may have signalled their disinterest in work when they chose to invest in less education. Whether as a result of discrimination or inefficient job search, blacks appear more likely to be unemployed. Young women, too, appear to have difficulty finding employment. When employed, they tend to work part-time. This may be their choice or it may be evidence of labor market constraints. Finally, while the unemployment rate does not appear to be systematically related to the percentage of women employed, it does appear to be related to the distribution of employment between part-time and full-time work. As the unemployment rate rises, more women work part-time. Again, this may or may not be their choice. Involuntary part-time employment is known to be positively correlated with the unemployment rate (Deutermann and Brown 1978).

Drawing conclusions from such general statistics can be very misleading. First, no control is imposed upon other variables. Thus, for example, these summary statistics suggest that women with no children under age 18 are more likely to be OLF than those with one or two. It seems likely that this is a function of the large population of older women whose children have grown up and that, once age is held

Table 3-6

Distribution of Characteristics
By Gross Employment Status
(May 1975 CPS - Women)

	OLF	Unemployed	Employed Part-Time	Employed Full-Time
NOBS	53.5 %	4.4 %	10.7 %	31.3 %
NW	49.0	7.2	10.5	33.3
NW*MAR	48.4	5.5	11.6	34.5
EDUC < 9	77.2	3.0	6.3	13.5
EDUC 9-11	59.5	6.1	9.8	24.6
EDUC 12	47.0	4.4	12.3	36.4
EDUC 13-15	42.6	5.1	14.0	38.3
EDUC 16+	36.3	3.3	10.7	49.8
MAR	56.8	3.7	11.2	28.3
HEDUC < 9	67.2	3.8	8.3	20.7
HEDUC 9-11	59.5	4.1	10.3	26.0
HEDUC 12	54.0	4.0	12.5	29.5
HEDUC 13-15	47.2	3.2	11.5	38.1
HEDUC 16+	54.7	3.0	12.6	29.7
AGE 20-	27.9	13.4	19.9	38.8
AGE 56+	79.4	1.5	6.3	12.8
0 CH	55.4	3.2	8.3	33.0
1 CH	46.6	6.6	12.2	34.6
2-3 CH	53.4	4.8	14.3	27.5
4+ CH	57.4	6.0	14.3	22.3
MAR*CH	56.5	4.2	13.5	25.7
UR < 7%	53.7	3.9	10.2	32.3
UR 7-7.9%	54.4	3.3	10.3	32.0
UR 8-8.9%	52.7	4.4	9.9	33.0
UR 9-9.9%	54.4	4.4	10.9	30.3
UR 10+%	53.0	5.4	12.9	28.8
NOBS	5930	483	1190	3472

constant, this 'result' will disappear. Likewise, it is difficult to know whether the patterns observed are due to individual preferences or employment constraints. Labor force status combines elements of both.

In order to take some of these factors into account, several simple probits were performed. The results obtained from these exploratory runs provide additional information on preferences and opportunities either conditional upon labor force status or for a somewhat simplified choice set. This analysis does control for other observable characteristics.

In the first such analysis, the choice between part-time and full-time employment is observed conditional upon labor force status for two subsamples. Probit results are presented in column 1 of Table 3-7 for those who are unemployed and in column 2 for those who are employed part-time. A value of one for the dependent variable indicates a preference for full-time employment. While few coefficients are individually significant, particularly in the sample of unemployed, certain patterns do arise. It would appear, for example, that nonwhite women are more likely to prefer full-time work, as are women who have few or no children. Married women appear to prefer part-time work, more so the greater their husband's education. This result is quite consistent with household income considerations. Finally, more educated women seem to prefer full-time work if unemployed and part-time work if already employed part-time. This distinction may be a function of the different employment opportunities available to the two subsamples. Controlling for gross labor market status is not

Table 3-7

Conditional Analysis
of Employment Preferences
(1975 CPS - Women)

	Conditional on Being Unemployed	Employed PT
	Prefer FT to PT	Prefer FT to PT
Constant	1.828 **	-0.067
	(0.467)	(0.209)
NW	0.610	0.499 **
	(0.403)	(0.187)
NW*MAR	-0.107	0.215
	(0.532)	(0.283)
EDUC < 9	0.054	0.434 *
	(0.309)	(0.192)
EDUC 9-11	-0.220	-0.069
	(0.207)	(0.150)
EDUC 13-15	0.103	-0.302
	(0.242)	(0.162)
EDUC 16+	0.848	-0.152
	(0.555)	(0.253)
MAR	-0.469	-0.541 **
	(0.395)	(0.180)
HEDUC < 9	0.467	0.336
	(0.304)	(0.203)
HEDUC 9-11	0.542	0.059
	(0.352)	(0.223)
HEDUC 13-15	0.122	-0.269
	(0.351)	(0.271)
HEDUC 16+	-0.789 *	-0.305
	(0.317)	(0.304)
AGE 20-	0.018	-0.136
	(0.381)	(0.189)
AGE 56+	0.265	0.043
	(0.458)	(0.246)
POTEXP	0.0591	-0.0117
	(0.0322)	(0.0140)
POTEXP2	-0.0019 *	-0.0002 **
	(0.0008)	(0.0003)
1 CH	-0.287	-0.077
	(0.415)	(0.176)
2-3 CH	-0.931 *	-0.276
	(0.416)	(0.170)
4+ CH	-0.733	-0.208
	(0.457)	(0.219)
CH*MAR	-0.220	-0.048
	(0.418)	(0.215)
UR < 7%	-0.328	-0.302
	(0.287)	(0.174)
UR 7-7.9%	-0.536	-0.541 *
	(0.343)	(0.214)
UR 9-9.9%	-0.416	-0.244
	(0.219)	(0.135)
UR 10+%	-0.244	-0.172
	(0.255)	(0.143)
NOBS	483	1190
LF	-182.4	-437.6

* Significant at the 5% level
** Significant at the 1% level
Asymptotic Standard Errors in Parentheses

sufficient when trying to estimate full sample preferences. That which we would like to control for is labor market opportunity. It is perhaps for this reason that one can reject the hypothesis that these two sets of parameter estimates are identical[25].

By choosing a simplified choice set in which only two options exist, employment and no employment, it is possible to use simple probits to analyze both employment preferences and employment opportunities. To do this, the entire sample is split into those desiring employment of any sort (those in the labor force) and those desiring no employment (those OLF). Those in the labor force are then further divided into those who are employed and those who are not. The first split distinguishes crude employment preferences and the latter employment opportunities.

The probit which identifies preferences (reported in column 1 of Table 3-8) reveals little unexpected. The dependent variable has a value of one when employment is desired. The results suggest that older, nonwhite and married women, women with less education, and women with children in the household (especially married women) are significantly more likely to prefer no work. Women whose husbands are well educated are also less likely to desire employment. These explanatory variables appear to be capturing the effect of the individual's own potential earnings, of the value of non-market time, and of the household's potential income, as was hoped.

---

[25] The LR test statistic is distributed chi-squared with 24 degrees of freedom. It has a value of over 600 which clearly indicates a rejection of the hypothesis that the equations are identical at any reasonable significance level.

Table 3-8

Simple Model of Employment/No Employment
Choice and Opportunity
(1975 CPS of Women)

	Choice:	Opportunity:	
	Prefer Work to NT	Able to Find Work	Able to Find Work
Constant	1.049 **	1.385 **	1.342 **
	(0.065)	(0.1[illegible])	(0.098)
NW	-0.197 **	-0.348 **	-0.213 **
	(0.059)	(0.097)	(0.072)
NW*MAR	0.493 **	0.305 *	
	(0.081)	(0.145)	
EDUC < 9	-0.257 **	-0.428 **	-0.467 **
	(0.044)	(0.093)	(0.089)
EDUC 9-11	-0.272 **	-0.352 **	-0.370 **
	(0.038)	(0.071)	(0.069)
EDUC 13-15	0.078	-0.005	0.014
	(0.045)	(0.080)	(0.078)
EDUC 16+	0.254 **	0.236 *	0.248 **
	(0.055)	(0.099)	(0.093)
MAR	-0.596 **	-0.096	
	(0.049)	(0.094)	
HEDUC < 9	0.195 **	-0.096	
	(0.049)	(0.102)	
HEDUC 9-11	0.048	0.004	
	(0.050)	(0.106)	
HEDUC 13-15	0.093	0.149	
	(0.052)	(0.110)	
HEDUC 16+	-0.216 **	0.003	
	(0.052)	(0.108)	
AGE 20-	0.118	-0.176	-0.183
	(0.069)	(0.097)	(0.095)
AGE 56+	-0.209 **	-0.252	-0.241
	(0.055)	(0.131)	(0.131)
POTEXP	0.0292 **	0.0193 *	0.0187 *
	(0.0032)	(0.0076)	(0.0075)
POTEXP2	-0.0011 **	-0.0001	-0.0001
	(0.0001)	(0.0002)	(0.0002)
1 CH	-0.250 **	-0.284 **	-0.234 **
	(0.059)	(0.089)	(0.068)
2-3 CH	-0.479 **	-0.167	-0.118
	(0.058)	(0.092)	(0.068)
4+ CH	-0.631 **	-0.266 *	-0.224
	(0.070)	(0.119)	(0.104)
CH*MAR	-0.223 **	0.081	
	(0.061)	(0.107)	
UR < 7%	-0.044	0.043	0.042
	(0.040)	(0.080)	(0.079)
UR 7-7.9%	-0.024	0.112	0.108
	(0.051)	(0.101)	(0.101)
UR 9-9.9%	-0.124 **	-0.116	-0.108
	(0.035)	(0.068)	(0.068)
UR 10+%	-0.011	-0.186 *	-0.178 *
	(0.041)	(0.076)	(0.076)
NOBS	11075	5145	5145
LF	-6096.5	-1514.0	-1518.7

* Significant at the 5% level
** Significant at the 1% level
Asymptotic Standard Errors in Parentheses

Columns 2 and 3 of Table 3-8 contain estimates from probits on employment opportunities. The dependent variable here has a value of one when the individual is employed. The subsample itself is restricted to include only those who are in the labor force (ie. desire a job). These results suggest that single, white women with a college education, with no children, and with a residence in a state with a low unemployment rate stand a better chance of finding employment. No information relative to marital status appears to significantly affect this probability[26]. This is to be expected if marital status primarily plays a role in identifying potential household income and need. The presence of children appears to be at least marginally significant and may reflect different search intensity or employer fear of reduced work commitment. The results of this simplified model indicate that there are significant differences between employment preferences and employment opportunities[27], but because no distinction is drawn between part-time and full-time employment, no light can be shed on the issue of voluntary versus involuntary employment. For this, we must turn to the full model.

- - - - - - - - - -

[26] Distributed chi-squared with 7 degrees of freedom, the test statistic for this hypothesis is 9.38. The appropriate critical value for a 10% significance level is 12.01. Thus, one can not reject the hypothesis that MAR, NW*MAR, MAR*CH, and the HEDUC variables have no effect upon employment opportunities.

[27] A sequential probit was also performed to test whether the correlation between the unobservable components of preferences and of employment probabilities from this simplified model was equal to zero. The estimates were positive and ranged from -0.03 to 0.41 depending upon the specification, but in each case the t-statistic was less than 1.0. The hypothesis that the correlation is zero can not be rejected even at high significance levels. These results lend some support to the maintained assumption in the full model that this correlation is zero.

VI. Results

The parameters to the complete model are estimated by maximizing a multi-part likelihood function. Details concerning this likelihood function are presented in Appendix 3A. While the function is theoretically identified, the results obtained from the unconstrained model yield correlation terms, σ_{PF} and σ_{12}, which approach boundary levels, specifically 1.0. The function appears to be numerically unbounded.

In light of this problem, the model is estimated assuming a variety of restricted variance-covariance structures. While alternative assumptions do affect the mix of predicted preferences, they do not appear to affect the general conclusions. These seem relatively insensitive to the values assigned the correlation terms. Results generated assuming σ_{PF} equals 0.0 and σ_{12} equals 0.5 (equivalent to the assumption that the unobserved utility components, ξ_F, ξ_P, and ξ_N, are uncorrelated) are presented first and in detail. These are followed by a brief comparison with results obtained when σ_{PF} is fixed at a value of 0.70 and σ_{12} is unrestricted. The likelihood function failed to converge for higher values of σ_{PF}; σ_{12} is then unbounded. Specifications in which σ_{12} was set equal to 1.0 were attempted but proved intractable. Such a variance-covariance matrix implies that the unobserved utility components ξ_P and ξ_F are perfectly correlated. When they are permitted to have a correlation of one but distinct variances (ie. $\xi_P = \delta\xi_F$), δ tends towards one. This implies that the choice between part-time and full-time employment is deterministic, a characterization rejected by the data. The parameter estimates fail to acknowledge the existence of

voluntary part-time workers. Furthermore, σ_{PF} approaches its boundary value in this specification. Taking this into consideration is not of any help. The data are apparently not rich enough to estimate all the parameters.

The parameter estimates obtained using the government definitions of labor force status and assuming σ_{PF} to be zero and σ_{12} to be 0.5, are presented in Table 3-9. The first three columns contain coefficient estimates pertaining to employment preferences. The last two contain coefficient estimates pertaining to employment opportunities. A likelihood ratio test of the hypothesis that the probability of being in any labor force category is explained just as well by a constant term can be rejected at a one percent significance level[28].

The estimates from column 1 reflect the net effect each characteristic has upon the decision to work full-time rather than not at all. Since most employment is on a full-time basis, it is not surprising that the estimates from column 1 closely resemble those from the earlier probit upon the decision to seek employment of any sort (Table 3-8, column 1). The results indicate that married women, nonwhite women, less educated women, older women, and women with children (again especially married women) are significantly more likely to remain OLF than to work, in this case, full-time. Married minority women are more likely to choose full-time employment than married white women and, in fact,

- - - - - - - - - -

[28] The test statistic is 3773.8 and is distributed chi-squared with 77 degrees of freedom. The appropriate critical value is approximately 112. This hypothesis is somewhat less restrictive than one in which constant terms alone enter the parameterization. The test statistic for this hypothesis is 3795.3 and is distributed chi-squared with 78 degrees of freedom. Its critical value is also approximately 112.

Table 3-9

Combined Model of Employment Preferences and Opportunities
(1975 CPS - Women)
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

Explanatory Variables	Prefer FT to NT	Prefer PT to NT	Prefer FT to PT	Able to Find FT	Able to Find PT
Constant	1.024 **	-0.460 **	1.483 **	1.076 **	1.212 **
	(0.065)	(0.083)	(0.083)	(0.096)	(0.298)
NW	-0.163 **	-0.198 **	0.036	-0.311 **	-0.046
	(0.060)	(0.076)	(0.082)	(0.072)	(0.218)
NW*MAR	0.535 **	0.326 **	0.208		
	(0.082)	(0.105)	(0.113)		
EDUC < 9	-0.221 **	-0.230 **	0.009	-0.551 **	-0.316
	(0.046)	(0.060)	(0.067)	(0.092)	(0.229)
EDUC 9-11	-0.266 **	-0.215 **	-0.051	-0.375 **	-0.294
	(0.039)	(0.051)	(0.054)	(0.074)	(0.179)
EDUC 13-15	0.040	0.120 *	-0.080	0.007	0.064
	(0.046)	(0.054)	(0.055)	(0.082)	(0.185)
EDUC 16+	0.282 **	0.105	0.177 **	0.253 **	0.474
	(0.055)	(0.068)	(0.068)	(0.092)	(0.311)
MAR	-0.650 **	-0.324 **	-0.326 **		
	(0.050)	(0.064)	(0.066)		
HEDUC < 9	0.238 **	0.065	0.172 *		
	(0.050)	(0.064)	(0.068)		
HEDUC 9-11	0.081	-0.033	0.114		
	(0.052)	(0.064)	(0.068)		
HEDUC 13-15	0.118 *	0.007	0.110		
	(0.054)	(0.064)	(0.067)		
HEDUC 16+	-0.263 **	-0.079	-0.184 **		
	(0.054)	(0.063)	(0.066)		
AGE 20-	0.004	0.408 **	-0.404 **	-0.338 **	0.112
	(0.068)	(0.086)	(0.084)	(0.097)	(0.276)
AGE 56+	-0.159 **	-0.137	-0.022	-0.113	-0.225
	(0.058)	(0.073)	(0.078)	(0.138)	(0.311)
POTEXP	0.0340 **	0.0251 **	0.0090	0.0312 **	0.0122
	(0.0035)	(0.0042)	(0.0046)	(0.0082)	(0.0168)
POTEXP2	-0.0013 **	-0.0007 **	-0.0006 **	-0.0004 *	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0003)
1 CH	-0.285 **	-0.104	-0.181 *	-0.254 **	-0.161
	(0.058)	(0.072)	(0.073)	(0.067)	(0.211)
2-3 CH	-0.586 **	-0.112	-0.474 **	-0.167 *	-0.149
	(0.057)	(0.073)	(0.073)	(0.071)	(0.183)
4+ CH	-0.741 **	-0.215 *	-0.526 **	-0.428 **	0.033
	(0.071)	(0.086)	(0.089)	(0.107)	(0.263)
CH*MAR	-0.277 **	-0.020	-0.257 **		
	(0.061)	(0.076)	(0.078)		
UR < 7%	-0.071	0.002	-0.073	0.120	-0.064
	(0.042)	(0.052)	(0.055)	(0.080)	(0.222)
UR 7-7.9%	-0.068	0.058	-0.126	0.190	-0.088
	(0.052)	(0.064)	(0.067)	(0.104)	(0.246)
UR 9-9.9%	-0.183 **	0.016	-0.199 **	-0.084	-0.220
	(0.036)	(0.045)	(0.048)	(0.069)	(0.176)
UR 10+%	-0.090 *	0.133 **	-0.224 **	-0.191 *	-0.212
	(0.042)	(0.051)	(0.054)	(0.077)	(0.135)

NOBS = 11075
LF = -10734.30

- - - - - - - - - - -
* Significant at the 5% level
** Significant at the 1% level
Asymptotic Standard Errors in Parentheses

are no less likely than single minority women to desire such a job[29]. Potential experience has a positive but declining effect upon full-time employment preferences, much as it does upon wages. Finally, women whose husbands have a college degree and who live in areas with high unemployment rates also appear to prefer no employment. At least part of the variance in full-time employment rates that is observed across areas with different unemployment rates appears to be due to hours preferences rather than opportunities.

The decision to seek part-time work rather than none at all is reflected in the coefficient estimates reported in column 2. Three main differences can be observed between these estimates and those in column 1. First, household factors do not appear to be as significantly related to the decision to search for part-time employment as they do to the decision to search for full-time employment. For example, married women are less likely to seek part-time work but their spouses' education (a proxy for potential other household income) is not a significant factor. The presence of children still has a negative effect but one that is only just significant for a large family. This latter result suggests that the cost of alternative care for children on a part-time basis is significantly lower than the cost incurred on a full-time basis. Perhaps the children are in school during the hours their mothers work, for example. Information on the age of the children, were it available, could be used to test this proposition.

- - - - - - - - - -

[29] A Wald test of this hypothesis yields a test statistic of 2.21 which is distributed chi-squared with two degrees of freedom. The critical value for the ten percent significance level is 4.6.

Second, young women appear to have quite distinct preferences. They are not significantly more likely to seek full-time employment rather than remain OLF, but they are significantly more likely to seek part-time employment. This suggests that the greater relative part-time employment of young women is due at least in part to a greater preference for part-time employment. This is confirmed in the coefficient to AGE 20- in column three which indicates a significant preference for part-time work over full-time work.

Finally, residence in areas with a high unemployment rate appears to be significantly correlated with a preference for PT employment over none and none over FT. The results in column three confirm that women living in areas with high unemployment rates are more likely to choose part-time work than full-time work. Why this might occur is not clear. Full-time employment opportunities may be reduced more rapidly than part-time employment opportunities and cause some women seeking full-time work to become discouraged and drop out. An added worker effect may simultaneously encourage more women to seek part-time employment. This hypothesis will be partially testable in Section VIII when allowance is made for discouraged workers. Alternatively, wages in full-time jobs may fluctuate more with the unemployment rate than wages in part-time jobs - perhaps due to the fixed minimum wage. If women only marginally prefer full-time work to part-time work or no work, then small relative wage changes may be sufficient to alter preference rankings. The reduced form nature of this model makes any definitive conclusions impossible.

The nonlinear nature of this model makes any more detailed analysis of the coefficient estimates difficult. Predicted employment prefer-

ences, reported in Table 3-10, provide a clearer picture of the relative importance various characteristics have upon preferences. These predictions are obtained by using the coefficient estimates from Table 3-9 to generate expected preferences for individuals with predetermined characteristics. For purposes of comparison, a woman who is single and white, who lives in a region with an unemployment rate of 8.5 percent, who is thirty-five years old, and who has a high school diploma and no children is chosen to represent the base case. Such an individual is predicted by this model to prefer no employment with a 9.6 percent probability, to prefer part-time employment with a 5.6 percent probability, and to prefer full-time employment with an almost eighty-five percent probability.

By altering the characteristics of this hypothetical individual, one can calculate the marginal impact various factors are predicted to have upon preferences. The predictions which follow indicate that the probability with which any specific outcome is preferred can be made to vary by at least a factor of two without altering more than a few characteristics. The probability with which an individual will prefer not to work ranges from six percent for a woman with a college degree to over fifty percent for a married woman with one child and a college educated husband. The probability with which such an individual will prefer part-time employment ranges from four percent to almost thirteen percent. Finally, the probability she will prefer full-time employment ranges from ninety percent to thirty-five percent.

Several characteristic values have effects worth noting separately. First, residence in an area with an unemployment rate of over ten percent results in a fifty percent increase in the probability one prefers

Table 3-10

Predicted Hours Preferences
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

	Most Preferred Outcome:		
	OLF	Part-Time	Full-Time
Base Case	9.56%	5.60%	84.84%
	(0.94)	(1.53)	(1.53)
Nonwhite	12.87	4.81	82.33
	(1.53)	(1.52)	(2.00)
Educ < 9	14.11	4.95	80.94
	(1.43)	(1.52)	(1.92)
Educ 16+	5.72	4.21	90.08
	(0.78)	(1.39)	(1.46)
Age 20	11.23	11.13	77.65
	(1.44)	(2.31)	(2.28)
Age 60	41.99	9.58	48.43
	(2.17)	(1.61)	(2.10)
Married, 1 Child, Heduc = 12	43.13	11.62	45.25
	(2.02)	(1.61)	(1.84)
Married, 1 Child, Heduc = 16	52.18	12.61	35.21
	(2.56)	(1.79)	(2.27)
Married, NW, 1 Child, Heduc = 12	30.47	9.96	59.56
	(2.52)	(2.12)	(2.75)
UR < 7%	10.69	6.35	82.96
	(1.10)	(1.66)	(1.70)
UR > 10%	10.62	8.54	80.85
	(1.14)	(1.93)	(1.86)
'Worst Case'	30.40	15.42	54.18
	(3.16)	(2.99)	(3.52)

- -

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

part-time employment - entirely at the expense of interest in full-time employment. Second, minority women, women with less than nine years of education, and young women are significantly less likely to desire full-time employment. This probability declines by 1.5% points for minorities, 4% points for those with little education, and 7% points for twenty year olds. Nonwhite women and women with little education have a correspondingly greater probability of preferring no employment, but young women are twice as likely to prefer part-time employment and only slightly more likely to prefer none. Older women have an over forty percent probability of preferring no employment and, like younger women, are almost twice as likely to prefer part-time employment. Over fifteen percent of older women desiring employment would prefer to work part-time rather than full-time. This contrasts with six percent for a similarly situated thirty-five year old.

The low probability with which women having base case characteristics are predicted to prefer no employment belies the large fraction of the sample known to be OLF (see Table 3-5). Some individuals must have a high probability of desiring no work. Older women and married women, who comprise 30.7% and 63.7% of the sample respectively, are indeed quite likely to choose not to work (40-50% probability). This lends some credence to the estimated probabilities. These same populations are also more likely to prefer part-time employment, again in support of the sample averages.

Probabilities are also calculated for a twenty year old, high school dropout, who lives in a state with a high unemployment rate and is single, nonwhite, and the mother of one child. This case is referred

to as the 'worst case' scenario. Clearly, more disadvantaged individuals could be conjured up. This set of characteristics, however, seemed to be a fairly reasonable one. Notable in this case is the relatively strong preference for part-time employment. The probability such an individual would prefer part-time work exceeds fifteen percent. This is almost three times the base case probability and exceeds even the probability for a married white women with a child.

An analysis of employment opportunities completes the other 'half' of the model. The impact various characteristics have upon the probability of obtaining employment offers is reflected in the parameter estimates in columns 4 and 5 of Table 3-9 for full-time and part-time employment respectively. The probability that these opportunities are fixed and independent of any characteristics can be rejected at any reasonable significance level[30]. The assumption that job offers are random is not realistic.

Full-time employment opportunities in particular appear to be significantly influenced by individual characteristics. Young women, nonwhite women, women with little education, and women with children all appear to have more difficulty obtaining such offers. While one could argue that marital status would affect offer rates through an effect upon search effort, it appears to have little influence[31] and was ex-

---

[30] The likelihood ratio test statistic is 266.36 and is distributed chi-squared with 32 degrees of freedom. The critical value for a 1% significance level is 53.5.

[31] The value of the likelihood function when HEDUC, CH*MAR, NW*MAR, and MAR are included in all equations is -10725.32. The likelihood ratio test statistic is 17.96 and is distributed chi-squared with 14 degrees of freedom. The critical value assuming a 10% significance level is 21.06, hence the null hypothesis that these variables have no significant effect upon employment opportunities can not be rejected.

cluded from the results reported here. Finally, full-time employment opportunities also appear reduced in areas with high unemployment rates. This finding suggests that not all the difference in employment outcomes observed across areas with different unemployment rates is necessarily due to preferences.

Part-time employment opportunities appear to be less significantly related to individual characteristics. No variable is individually significant. The four variables which capture own education, however, are jointly significant at the 10% significance level[32]. The more education one has, the greater one's probability of receiving any type of job offer. Though the sign and size of the coefficients are suggestive of a reduction, the unemployment rate has no significant effect upon the availability of part-time employment. Some of the increase in part-time employment in areas with high unemployment rates may, therefore, be due to the greater relative ease with which it can be obtained.

Once again, the impact different characteristics have is most easily observed by examining predicted values. Table 3-11 presents predicted employment opportunities for much the same groups portrayed in Table 3-10. As would be expected, the probability of receiving an offer of part-time employment varies relatively little and has a rather high standard error. The probability of receiving an offer of full-time employment shows much more variation. All the predicted probabilities are relatively high, ranging from 78% to 97% when only one or two characteristics are altered. Given that the overall unemployment rate

---

[32] The Wald test statistic is 8.20. The critical value for the 10% significance level is 7.78.

Table 3-11

Predicted Employment Opportunities
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

	Probability of Obtaining a ...	
	Part-Time Job	Full-Time Job
Base Case	92.32%	93.01%
	(2.97)	(0.96)
Nonwhite	91.64	87.82
	(4.54)	(1.92)
Educ < 9	86.67	82.28
	(6.83)	(2.91)
Educ 16+	97.13	95.82
	(2.41)	(0.93)
Age 20	91.13	78.78
	(4.35)	(2.51)
Age 60	93.86	93.13
	(2.71)	(1.27)
Married, 1 Child	89.72	88.93
	(3.61)	(1.51)
Married, NW, 1 Child	88.89	81.93
	(5.08)	(2.60)
UR < 7%	91.35	94.49
	(3.67)	(0.93)
UR 10+%	88.77	90.08
	(3.95)	(1.26)
'Worst Case'	74.56	39.19
	(10.64)	(4.52)

- -

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

within the sample is 9.5%, this is not unexpected. Still, there is an almost ten percentage point difference in the probability with which a less educated woman or a nonwhite woman is predicted to receive an offer of full-time employment as compared to the base case. Even more striking is the mere 39% probability with which a woman having so-called 'worst case' characteristics is predicted to obtain an offer of full-time employment. Her chances of finding part-time employment are almost twice as great.

Actual labor market outcomes are a function of both preferences and opportunities. It is the observation that some individuals are constrained by limited employment opportunities that drives this analysis. One of the questions to be answered is which sort of employment is more difficult to obtain: part-time or full-time. The predicted probabilities with which individuals will encounter constraints are presented in Table 3-12 and provide some insight into this problem.

The most striking feature of this table is the high probability with which an individual will achieve her first best employment outcome. The probability of being unconstrained ranges from eighty to nine-five percent for individuals with these selected characteristics. It exceeds sixty percent even for the so-called 'worst case'. This high probability of success is driven by two factors. First, a preference for no employment is by its nature never constrained. Married women with children and older women prefer no employment with a thirty to fifty percent probability and so must have at least that great a probability of achieving their first best outcome. Second, as was already observed, the probability of receiving an employment offer is also high. Perhaps

Table 3-12

Predicted Labor Market Outcomes
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

	Unconstrained	Constrained			
		By Limited PT Opportunities		By Limited FT Opportunities	
	First Best	Unemp. Lkg PT	Inv FT	Unemp. Lkg FT	Inv PT
Base Case	93.64%	0.11%	0.32%	3.65%	2.27%
	(0.83)	(0.06)	(0.15)	(0.52)	(0.38)
Nonwhite	89.57	0.14	0.27	6.84	3.19
	(1.60)	(0.09)	(0.17)	(1.13)	(0.62)
Educ < 9	85.00	0.26	0.40	10.15	4.19
	(2.40)	(0.17)	(0.25)	(1.74)	(0.87)
Educ 16+	96.11	0.02	0.10	2.11	1.66
	(0.84)	(0.02)	(0.09)	(0.48)	(0.41)
Age 20	82.53	0.39	0.60	8.99	7.49
	(2.05)	(0.22)	(0.34)	(1.16)	(1.17)
Age 60	96.08	0.30	0.29	2.49	0.84
	(0.67)	(0.15)	(0.14)	(0.46)	(0.20)
Married, 1 Child, Heduc 12	93.80	0.66	0.54	3.69	1.32
	(0.81)	(0.27)	(0.21)	(0.51)	(0.27)
Married, 1 Child, Heduc 16	94.81	0.79	0.50	2.92	0.97
	(0.73)	(0.32)	(0.20)	(0.43)	(0.21)
Married, NW, 1 Child Heduc 12	88.13	0.56	0.55	7.69	3.07
	(1.69)	(0.30)	(0.28)	(1.20)	(0.62)
UR < 7%	94.88	0.15	0.40	2.83	1.74
	(0.81)	(0.08)	(0.21)	(0.49)	(0.33)
UR 10+%	91.02	0.29	0.67	4.71	3.31
	(1.05)	(0.13)	(0.29)	(0.63)	(0.53)
'Worst Case'	63.13	3.01	0.91	23.42	9.53
	(3.40)	(1.53)	(0.46)	(2.66)	(1.85)

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite, Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

most impressive on this account are college graduates who prefer no employment with a mere six percent probability yet still attain their most preferred choice with a ninety-six percent probability. Least impressive is the record of those resembling the 'worst case'. They prefer no employment with a predicted thirty percent probability yet achieve their first best only sixty percent of the time.

The second most striking characteristic of these predictions is the low probability with which an individual is predicted to be constrained in her ability to obtain part-time employment. This probability is composed of two parts: 1) the probability with which an individual is unemployed and looking for part-time employment (column 2) and 2) the probability with which an individual is employed full-time involuntarily (column 3). Sample statistics (Table 3-5) indicate that approximately 0.8% of the population is unemployed and looking for part-time employment. The results in Table 3-12 imply that this probability is greater for young, married women with children and for young, minority, high school dropouts[33].

Sample statistics provide no information on the number of women who are employed full-time involuntarily, ie. who work full-time but would prefer part-time employment. Proponents of part-time employment have suggested that this is a large, hidden problem. One advantage of this model lies in its ability to provide an estimate. The figures in column 3 do this for specific cases. While in many instances, this figure exceeds the probability of being unemployed and looking for part-time work

- - - - - - - - - -

[33] Since no probability can be less than zero, these predicted probabilities are forced to err on the high side and are accompanied by high standard errors.

(column 2), it is also small. For women with these selected characteristics, the predicted probability never exceeds even one percent. This low value is supported by some of the recent literature on hours constraints (Kahn and Lang 1986, 1987; Shank 1986), in which it is the rare individual who reports desiring fewer hours of employment even at the same wage rate. Furthermore, this probability appears relatively independent of individual characteristics; it varies little.

The final two columns in Table 3-12 contain the predicted probability with which an individual will be constrained in her search for full-time employment. The figures in the next to the last column represent the probability with which an individual will be unemployed and looking for full-time work; those in the final column represent the probability of being employed part-time involuntarily. Sample means indicate that approximately 3.6% are unemployed and looking for full-time work and 1.6% are employed part-time involuntarily.

The predicted values in Table 3-12 reflect these sample proportions while at the same time showing significant variation across population groups. A sixty year old woman, for example, has a 2.5% probability of being unemployed and looking for full-time work and a 0.8% probability of being employed part-time involuntarily; yet a twenty year old has a 9.0% probability of being unemployed (looking for full-time work) and a 7.5% probability of being employed part-time involuntarily. Women with little formal schooling and black women are also disproportionately affected by constraints upon full-time employment. White, married women with children, who are predicted to be amongst the most constrained when it comes to part-time employment, are amongst the least constrained (relatively) when it comes to full-time employment.

The magnitude of this constraint is also of a different order than the constraint upon part-time employment. Where constraints upon part-time employment are predicted to affect no more than two percent of most population subgroups, full-time employment constraints are predicted to affect approximately four percent of these same populations and over sixteen percent of others. In the 'worst case' scenario, the probability of encountering part-time constraints approaches four percent, but the probability of encountering full-time constraints exceeds thirty percent.

Alternative assumptions regarding the variance-covariance structure do not significantly alter these basic findings. Fixing σ_{PF} at 0.70 and leaving σ_{12} unrestricted increases the value of the likelihood function from -10734.30 to -10719.57, indicating a significant improvement in fit[34]. The parameter estimates suggest that the decision to choose full-time work over no work and the decision to choose part-time work over no work are more alike than previously estimated. The estimate of σ_{12} (0.958) suggests that even the error terms are highly correlated. The probability that the estimated value of σ_{12} could be this low when the true value is 0.999 is 12.1%. The preferences individuals are predicted to have are, however, fairly similar to those indicated by the earlier specification. Interest in no employment is somewhat greater (7% or 0.7 percentage points greater in the base case) and interest in part-time employment somewhat reduced (16.8% or 0.9 percentage points smaller).

- - - - - - - - - -

[34] Results corresponding to Tables 3-9 through 3-11 are presented in Appendix 3B for this specification.

At the same time, opportunities for part-time employment are predicted to be significantly smaller and more responsive to individual characteristics - especially education - than they were in the previous specification. Opportunities for full-time employment are essentially unchanged. The net result, in terms of predicted labor market outcomes, is presented in Table 3-13. The primary difference between these results and those presented in Table 3-12 is an increase in the predicted probability of being constrained by limited part-time employment opportunities. For individuals with base case characteristics, this probability increases by almost fifty percent. However, in absolute terms this is still small. There is only a 0.64% probability that someone is so constrained. The likelihood of being constrained by a lack of part-time offers still never exceeds the likelihood of being constrained by a lack of full-time offers for anyone with these selected characteristics.

Using the parameters obtained from this less restrictive specification to predict the number of full-time employees in the actual data set who are employed involuntarily yields an estimate of less than two percent[35]. For proponents of part-time employment to claim more individuals are constrained by a lack of part-time employment than by lack of full-time employment, this figure would have to approach fourteen percent. Even allowing significant room for error, it is unlikely to do so. The finding that full-time employment opportunities are more constrained than part-time employment opportunities appears to be relatively robust to changes in the specification of the error structure.

- - - - - - - - - -

[35] This estimate is derived as the average of the predicted probabilities, conditional upon full-time employment.

Table 3-13

Predicted Labor Market Outcomes
Assuming: $\sigma_{PF} = 0.70$

	Unconstrained	Constrained			
		By Limited PT Opportunities		By Limited FT Opportunities	
	First Best	Unemp. Lkg PT	Inv FT	Unemp. Lkg FT	Inv PT
Base Case	93.47%	0.22%	0.42%	3.97%	1.92%
	(0.84)	(0.05)	(0.16)	(0.59)	(0.46)
Nonwhite	89.43	0.26	0.30	6.56	3.45
	(1.59)	(0.09)	(0.16)	(1.13)	(0.97)
Educ < 9	85.25	0.40	0.38	9.83	4.14
	(2.37)	(0.14)	(0.21)	(1.73)	(1.49)
Educ 16+	96.12	0.09	0.27	2.31	1.20
	(0.81)	(0.03)	(0.15)	(0.54)	(0.50)
Age 20	82.73	1.15	0.78	8.91	6.43
	(1.98)	(0.32)	(0.35)	(1.33)	(1.47)
Age 60	95.75	0.40	0.49	2.13	1.22
	(0.72)	(0.12)	(0.26)	(0.41)	(0.34)
Married, 1 Child, Heduc 12	93.12	0.96	1.11	3.48	1.34
	(0.95)	(0.22)	(0.46)	(0.50)	(0.35)
Married, 1 Child, Heduc 16	93.97	1.11	1.19	2.71	1.02
	(0.91)	(0.26)	(0.51)	(0.41)	(0.27)
Married, NW, 1 Child Heduc 12	87.68	0.95	0.75	7.29	3.33
	(1.72)	(0.29)	(0.39)	(1.18)	(0.95)
UR < 7%	94.60	0.25	0.67	3.34	1.14
	(0.83)	(0.07)	(0.27)	(0.58)	(0.36)
UR 10+%	90.81	0.54	0.86	5.36	2.43
	(1.21)	(0.13)	(0.31)	(0.82)	(0.62)
'Worst Case'	62.14	5.68	1.01	22.22	8.95
	(3.61)	(1.69)	(0.57)	(2.97)	(2.80)

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite, Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

These conclusions rest heavily upon the assumptions made regarding employment preferences. Two of the most restrictive of these assumptions are relaxed in the following sections. The first to be questioned is the means by which the government distinguishes between voluntary and involuntary part-time employment. The second is the assumption that all those who are neither working nor looking for work have no interest in employment.

VII. Relaxing the Voluntary/Involuntary PT Classification

The analysis presented above assumes that the government's classification of part-time employees into voluntary and involuntary subgroups is correct. As was suggested earlier, this is not entirely clear. The governmental classification is based upon the individuals' professed reasons for working less than 35 hours last week. Some of these explanations have clearer interpretations than others.

For example, many women respond that they "did not want full-time work" or that they were "too busy with housework, ... " (See Table 3-14). These responses suggest that part-time employment was engaged in voluntarily, and these respondents are classified as voluntary part-time workers by the government. Likewise, the ninety-six individuals who respond that they could only find part-time work imply by their response that they would prefer to work full-time. They are classified as involuntary part-time workers. These reasonable assumptions are used to classify almost seventy percent of the women who usually work part-time.

The true preferences of the remaining thirty percent are more difficult to ascertain. All of them report that they usually work less than thirty-five hours per week. Seventy-four women blame slack work or material shortages for their short work week. The government classifies these workers as involuntarily constrained. Seven women who report having changed jobs during the week are similarly classified. It is not clear, however, why these women <u>usually</u> work part-time.

All those remaining are classified by the government as voluntary part-time workers. These include 169 who claim to have a short full-

Table 3-14

Reason Worked Less Than 35 Hours Last Week

Number	Percentage	Reason
347	29.1%	Did Not Want FT Job
386	32.4	Too Busy
96	8.1	Could Only Find PT Job
74	6.2	Slack Work / Material Shortage
7	0.6	New Job Started or Old Job Terminated
169	14.2	FT Work Week < 35 Hours
19	1.6	Illness / Vacation
26	2.2	Other
66	5.5	No Answer
1190	100.0	TOTAL

time work week, 19 who blame illness or vacation, 26 who give another reason, and 66 who were for some reason not asked the question. Of those claiming a short full-time work week, almost half say that they usually work fewer than thirty hours per week. This schedule is hardly comparable to the thirty-five or more hours worked by those classified as full-time employees, hence it seems reasonable to consider these individuals part-time workers. Respondent's preferences, however, are not clearly revealed by this response. Classifying all non-respondents as voluntary part-time workers is, of course, the least defensible motion. There is no additional information on preferences for these individuals, at all.

Should any of these workers be misclassified, the analysis reported upon in Section VI will not reflect actual preferences or employment opportunities; the results will be biased. To test the sensitivity of the

results to this type of classification error, the model is re-estimated under less restrictive assumptions. Only those women who say they work part-time because they are unable to find full-time work are classified as involuntary part-time workers, and only those who respond that they do not want full-time employment or are too busy to consider it are classified as voluntary part-time workers. The remaining part-time workers are included in the estimation in such a way as to permit the model itself to determine their status[36].

As before, the model is numerically unbounded when the variance-covariance structure is unconstrained. In this case, however, it is σ_{PF} alone which is unbounded and the likelihood function does converge when σ_{PF} is set equal to one, the value the data imply is correct[37]. As σ_{PF} is allowed to increase, predicted preferences for part-time work decline and are offset by an increase in the probability with which part-time employment is predicted to be obtainable. Furthermore, the impact of variables such as education, children, and the unemployment rate become statistically significant in determining part-time employment opportunities and the coefficients, A_F and A_P, generally become more alike.

The estimated coefficients reported in Table 3-15 are based upon a specification in which σ_{PF} is set equal to one and the determinants of individuals' opportunities for obtaining part-time employment are identical to those for obtaining full-time employment, up to a constant

---

[36] See Appendix 3A for a description of their contribution to the likelihood function.

[37] The results obtained when estimating the model under the alternative assumption that $\sigma_{PF} = 0.0$ and $\sigma_{12} = 0.5$ are presented in Appendix 3C for comparison with those results reported in Section VI.

Table 3-15

Combined Model of Employment Preferences and Opportunities
(1975 CPS - Women)
Relaxed Definition of Vol/Inv Part-Time Employment
Assuming: $\sigma_{pf} = 1.00$

Explanatory Variables	Prefer FT to NT	Prefer PT to NT	Prefer FT to PT	Able to Find Work
Constant	1.046 **	0.249	1.548 **	1.104 **
	(0.066)	(0.200)	(0.092)	(0.098)
NW	-0.184 **	-0.226 **	0.083	-0.324 **
	(0.060)	(0.067)	(0.097)	(0.074)
NW*MAR	0.522 **	0.417 **	0.204	
	(0.082)	(0.094)	(0.129)	
EDUC < 9	-0.235 **	-0.275 **	0.078	-0.577 **
	(0.045)	(0.051)	(0.077)	(0.094)
EDUC 9-11	-0.271 **	-0.262 **	-0.017	-0.394 **
	(0.039)	(0.044)	(0.059)	(0.074)
EDUC 13-15	0.059	0.112 *	-0.104	0.019
	(0.046)	(0.049)	(0.059)	(0.081)
EDUC 16+	0.275 **	0.187 **	0.171 *	0.223 *
	(0.055)	(0.063)	(0.076)	(0.093)
MAR	-0.635 **	-0.459 **	-0.342 **	
	(0.050)	(0.066)	(0.073)	
HEDUC < 9	0.214 **	0.136 *	0.151 *	
	(0.050)	(0.057)	(0.075)	
HEDUC 9-11	0.061	0.007	0.106	
	(0.051)	(0.057)	(0.074)	
HEDUC 13-15	0.113 *	0.042	0.137	
	(0.053)	(0.058)	(0.074)	
HEDUC 16+	-0.245 **	-0.143 *	-0.198 **	
	(0.053)	(0.059)	(0.073)	
AGE 20-	0.084	0.285 **	-0.390 **	-0.318 **
	(0.070)	(0.083)	(0.090)	(0.096)
AGE 56+	-0.168 **	-0.199 **	0.059	-0.192
	(0.057)	(0.063)	(0.088)	(0.140)
POTEXP	0.0339 **	0.0262 **	0.0150 **	0.0274 **
	(0.0034)	(0.0038)	(0.0052)	(0.0082)
POTEXP2	-0.0012 **	-0.0008 **	-0.0008 **	-0.0003
	(0.0001)	(0.0001)	(0.0001)	(0.0002)
1 CH	-0.282 **	-0.175 **	-0.208 **	-0.202 **
	(0.059)	(0.067)	(0.080)	(0.071)
2-3 CH	-0.552 **	-0.283 **	-0.521 **	-0.126
	(0.060)	(0.079)	(0.080)	(0.072)
4+ CH	-0.712 **	-0.405 **	-0.595 **	-0.327 **
	(0.073)	(0.093)	(0.098)	(0.108)
CH*MAR	-0.248 **	-0.119	-0.249 **	
	(0.062)	(0.072)	(0.086)	
UR < 7%	-0.055	-0.019	-0.069	0.117
	(0.041)	(0.045)	(0.060)	(0.083)
UR 7-7.9%	-0.038	0.021	-0.115	0.113
	(0.051)	(0.057)	(0.073)	(0.103)
UR 9-9.9%	-0.151 **	-0.052	-0.191 **	-0.119
	(0.036)	(0.042)	(0.052)	(0.069)
UR 10+%	-0.053	0.073	-0.244 **	-0.188 *
	(0.042)	(0.048)	(0.058)	(0.078)
PTDIFF				0.966 **
				(0.269)
PTVAR				1.453 **
				(0.160)
Rho = σ_{12}		0.867 **		
		(0.064)		

NOBS = 11075
LF = -10522.36

- - - - - - - - - - - -

* Significant at the 5% level
** Significant at the 1% level
Asymptotic Standard Errors in Parentheses

term and a distinct variance term[38]. A more general specification in which all the variables are allowed to have distinct effects upon part-time and full-time employment opportunities was estimated[39]. One can not, however, reject the null hypothesis that only the constant term and the variance are significantly different[40].

The finding of a distinct variance term when the correlation is one suggests that the unobserved components (μ) are related in the following manner: $\mu_P = \delta\mu_F$. This restriction implies that if σ_F^2 is normalized to one, then σ_P^2 equals δ^2 or PTVAR. If one believes that all potential employers observe the same individual characteristics, including some that are unobserved by the econometrician, and respond to them in similar ways, then such a restriction makes sense. It also makes sense if employment opportunities are in part influenced by an individual's search technique, and this technique is similar regardless of the sort of employment being sought. This specification suggests that all potential employers respond similarly to the search method employed.

The parameter estimates indicate that both the differential constant term and the differential variance term are statistically sig-

---

[38] Although less restrictive specifications did not converge when the CPS definitions of labor force status were used, this particular specification did. The high estimated value for σ_{12} (0.994), however, still suggests that a boundary value for σ_{12} would be more appropriate.

[39] Setting σ_{PF} equal to one is equivalent to a generalized ordered probit specification. See Chapter 36 of Johnson and Kotz (1972) for details on the bivariate normal distribution and its form when the correlation term equals one. While this form converged, it did so only with a less stringent tolerance level of 0.02 as opposed to the usual level employed in this paper of 0.001. The likelihood function is simply extremely flat under these assumptions.

[40] The likelihood ratio test statistic is 16.93 and is distributed chi-squared with 15 degrees of freedom. The appropriate critical value is 22.31 for the 10% significance level. Hence the hypothesis that the more restrictive model is appropriate can not be rejected.

nificant. The constant term, labeled PTDIFF, reflects the difference between the constant term for full-time employment opportunities and the constant term for part-time employment opportunities. It's coefficient is relatively large and significantly greater than zero at the one percent level. This statistical significance implies that part-time employment is generally easier to obtain than full-time employment. The variable PTVAR is also statistically significant. In this case, significance is measured against the null hypothesis that δ^2 equals one, that the variances are equal. This hypothesis can be rejected at a one percent significance level. It would appear that the variance of the unobserved component leading to part-time employment is greater than that leading to full-time employment.

The remaining coefficients are not very different from those reported in the previous section, despite the revised definition of voluntary and involuntary part-time employment. The predicted hours preferences (reported in Appendix 3D) indicate that there is some reduction in the probability with which an individual is predicted to prefer part-time employment, as well as a correspondingly larger probability of preferring full-time employment. Predicted employment opportunities (also reported in Appendix 3D) are virtually unchanged for full-time jobs. Those for part-time jobs indicate a much higher probability of success (by almost five percentage points for most cases) and a much lower standard error.

The labor market outcomes predicted using this specification are reported in Table 3-16. There are two primary distinctions between these results and those obtained using the government's classification

Table 3-16

Predicted Labor Market Outcomes
Relaxed Definition of Vol/Inv Part-Time Employment
Assuming: $\sigma_{pF} = 1.00$

	Unconstrained	Constrained			
		By Limited PT Opportunities		By Limited FT Opportunities	
	First Best	Unemp. Lkg PT	Inv FT	Unemp. Lkg FT	Inv PT
Base Case	93.98%	0.22%	0.00%	4.39%	1.41%
	(0.85)	(0.04)	(0.00)	(0.23)	(0.35)
Nonwhite	89.68	0.27	0.00	7.27	2.79
	(1.67)	(0.07)	(0.00)	(0.29)	(0.62)
Educ < 9	84.92	0.36	0.00	10.32	4.40
	(2.50)	(0.10)	(0.00)	(0.45)	(0.95)
Educ 16+	95.97	0.12	0.00	3.16	0.75
	(0.88)	(0.03)	(0.00)	(0.29)	(0.38)
Age 20	83.06	1.08	0.00	10.08	5.79
	(2.07)	(0.23)	(0.00)	(0.55)	(0.95)
Age 60	96.90	0.38	0.00	2.25	0.47
	(0.59)	(0.08)	(0.00)	(0.15)	(0.18)
Married, 1 Child, Heduc 12	94.84	0.68	0.00	3.45	1.03
	(0.75)	(0.12)	(0.00)	(0.19)	(0.24)
Married, 1 Child, Heduc 16	95.76	0.75	0.00	2.71	0.78
	(0.64)	(0.14)	(0.00)	(0.21)	(0.19)
Married, NW, 1 Child, Heduc 12	89.20	0.81	0.00	7.23	2.77
	(1.68)	(0.18)	(0.00)	(0.44)	(0.59)
UR < 7%	95.28	0.21	0.00	3.55	0.96
	(0.84)	(0.05)	(0.00)	(0.23)	(0.36)
UR 10+%	91.68	0.45	0.00	5.56	2.31
	(1.25)	(0.09)	(0.00)	(0.28)	(0.52)
'Worst Case'	62.84	4.10	0.00	22.37	10.69
	(3.82)	(1.08)	(0.00)	(1.89)	(1.78)

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite, Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

system. One is the finding that no one having these selected characteristics is ever predicted to be employed full-time involuntarily. Furthermore, amongst all those actually employed full-time in the sample not one is predicted to prefer part-time employment. The large size of the differential constant term associated with part-time job opportunities seems to always outweigh the leveling effect of the greater variance to preclude this possibility. Second, the probability with which an individual is predicted to be unemployed and seeking full-time employment is somewhat higher for most individuals. Overall, these results suggest that constraints upon full-time employment opportunities are even greater relative to those upon part-time employment than was suggested in the previous section. This result appears to be robust to changes in the classification of voluntary/involuntary part-time employees. Given the small population for whom preferences are redefined, it would be both surprising and devastating if this were not the case.

VIII. Discouraged Workers

Another potential classification problem involves those designated OLF. An individual is classified as OLF if she is neither employed nor searching for employment. Till now it has been assumed that these women prefer not to work. In fact, it may be the case that some of these women would like to work but are so discouraged by the low probability with which they would find employment that they have stopped searching. This seems particularly likely for those who resemble the 'worst case' and have a less than fifty percent chance of obtaining an offer of full-time employment. Assuming that such individuals do not want work when they actually do could seriously bias the parameter estimates. Depending upon the preferences such individuals have for part-time and full-time employment, the conclusions drawn regarding relative employment constraints may also need to be revised.

In order to adjust for what is essentially a miscoding of the dependent variable, additional information is necessary. In fact, the data were selected so that such information would be available. All those in the sample classified OLF are asked if they would like to have a regular job. Approximately eighty-eight percent respond that they would not, somewhat fewer than five percent respond that they would, and the remaining seven percent respond 'maybe/it depends' or that they 'do not know'. Those who respond yes or maybe are also asked why they are not actively looking for a job[41]. Approximately thirty-five percent

---

[41] Three hundred thirty women answered this question. Almost twenty-three percent of these answers contain no useful information (ie. the only responses were "Other" or "Don't Know"). Another ten percent blame poor health alone. Multiple explanations were permitted.

reply that family responsibilities or child care prevent them from doing so. It is not clear whether these women are actually prepared to accept a job. On the other hand, between twenty and twenty-five percent claim that 'no work is available' or that they 'couldn't find work'. Other responses include 'lack of training or experience', age concerns (too young or too old for employers), and 'other personal handicaps'. These rationalizations lend some credence to the discouraged worker hypothesis[42].

Sample statistics for those OLF who claim they do not, might, and do want employment are presented in Table 3-17. Also presented, for purposes of comparison, are similar statistics for the unemployed. Those who are OLF but say they would like to have a job are somewhat younger, more likely to be black, and more likely to have children than the average woman who is OLF. They are also a bit more likely to have some high school education. In each case, this difference makes them more like the average unemployed person than the average OLF person. These statistics further demonstrate the need to explore the impact potentially discouraged workers would have upon this analysis.

The possibility such individuals exist is accommodated in the following manner. All those OLF who respond that they do not want a regular job are assumed to be responding honestly and to prefer no employment above all other options. Those who respond that they might want employment or do not know are permitted complete flexibility of

---

[42] Flaim (1984) finds that the labor force attachment of discouraged workers is quite weak. This finding does not, however, necessarily suggest that they would not truly like to work. In fact, one could argue that the unemployed, too, often exhibit weak labor force attachments (Clark and Summers 1979).

Table 3-17

Sample Statistics for those OLF
By Expressed Willingness to Accept a Job
(1975 CPS - Women)

	Response to the question: 'Does ___ want a regular job now, either full- or part-time?'			
	No	Maybe/DK	Yes	Unemployed
NW	9.7	15.2	25.9	19.7
NW*MAR	4.3	7.2	12.2	6.8
EDUC < 9	29.8	21.0	15.5	13.5
EDUC 9-11	18.2	23.1	28.4	23.8
EDUC 12	36.0	38.1	38.8	41.4
EDUC 13-15	9.4	11.3	11.5	14.1
EDUC 16+	6.6	6.5	5.8	7.2
MAR	67.7	70.6	61.5	54.0
HEDUC < 9	17.1	16.6	13.3	11.6
HEDUC 9-11	10.2	9.4	9.4	8.5
HEDUC 12	21.6	27.0	24.0	20.2
HEDUC 13-15	7.4	9.2	6.5	6.2
HEDUC 16+	11.4	8.4	8.3	7.5
AGE 20-	2.4	8.4	12.6	19.7
AGE 56+	48.6	30.4	12.2	10.8
0 CH	56.6	47.0	34.5	39.3
1 CH	14.8	18.1	23.0	26.7
2-3 CH	21.9	27.7	33.5	25.3
4+ CH	6.7	7.2	9.0	8.7
MAR*CH	35.6	41.0	43.5	33.3
UR < 7%	17.1	18.8	14.7	15.1
UR 7-7.9%	9.3	12.3	8.6	7.0
UR 8-8.9%	29.0	27.5	24.9	29.2
UR 9-9.9%	28.4	24.8	36.7	28.4
UR 10+%	16.2	16.6	15.1	20.3
NOBS	5237	415	278	483

preferences, subject to the restriction that if they desire employment they are unable to obtain it. Finally, all those OLF who express an interest in employment are assumed to actually be discouraged workers. They are assumed to prefer some sort of employment but be unable to obtain it[43]. Tables 3-18 through 3-21 present the results generated given these assumptions. The relaxed definitions of voluntary/involuntary part-time employment, discussed in the previous section, are maintained here. All comparisons are made to those results. The specification which these data support is also the same as that employed in the previous section - σ_{12} is unrestricted, σ_{PF} equals one, and the determinants of individuals' opportunities for obtaining part-time employment are identical to those for obtaining full-time employment, up to a constant term and a distinct variance term[44].

Several differences are immediately obvious. The most striking involves the predicted preferences of nonwhite women. The results in Table 3-18 demonstrate that, given this redefinition of the dependent variable, there is no longer any significant difference between the employment preferences of single nonwhite and single white women. Single minority women are apparently more likely to report no active search, but no less willing to express an interested in employment. There is, in fact, also no significant difference between the

- - - - - - - - - -

[43] See Appendix 3A for further details. As not all those expressing an interest in employment are probably willing to invest in the effort to obtain it, these assumptions are likely to overstate the discouraged worker phenomenon. The 'correct' estimates probably fall somewhere between these and those presented in previous sections.

[44] Results obtained assuming $\sigma_{PF} = 0$ and $\sigma_{12} = 0.5$ are presented in Appendix 3E in the interest of comparability.

Table 3-18

Combined Model of Employment Preferences and Opportunities
(1975 CPS - Women)
Relaxed Definition of Vol/Inv Part-Time Work
&
Discouraged Workers
Assuming: $\sigma_{pf} = 1.00$

Explanatory Variables	Prefer FT to NT	Prefer PT to NT	Prefer FT to PT	Able to Find Work
Constant	1.180 **	0.214	1.540 **	1.999 **
	(0.069)	(0.249)	(0.090)	(0.088)
NW	-0.067	-0.134	0.108	-0.399 **
	(0.063)	(0.072)	(0.097)	(0.063)
NW*MAR	0.545 **	0.421 **	0.198	
	(0.086)	(0.102)	(0.129)	
EDUC < 9	-0.191 **	-0.240 **	0.077	-0.569 **
	(0.046)	(0.054)	(0.075)	(0.081)
EDUC 9-11	-0.210 **	-0.209 **	-0.000	-0.452 **
	(0.040)	(0.046)	(0.058)	(0.064)
EDUC 13-15	0.064	0.127 *	-0.099	0.020
	(0.048)	(0.051)	(0.058)	(0.070)
EDUC 16+	0.254 **	0.152 *	0.163 *	0.273 **
	(0.056)	(0.067)	(0.075)	(0.082)
MAR	-0.680 **	-0.469 **	-0.337 **	
	(0.052)	(0.075)	(0.072)	
HEDUC < 9	0.231 **	0.135 *	0.152 *	
	(0.051)	(0.061)	(0.074)	
HEDUC 9-11	0.049	-0.013	0.099	
	(0.051)	(0.059)	(0.073)	
HEDUC 13-15	0.095	0.013	0.131	
	(0.054)	(0.061)	(0.073)	
HEDUC 16+	-0.266 **	-0.142 *	-0.197 **	
	(0.054)	(0.063)	(0.072)	
AGE 20-	0.156 *	0.407 **	-0.399 **	-0.262 **
	(0.076)	(0.090)	(0.090)	(0.087)
AGE 56+	-0.174 **	-0.199 **	0.040	-0.107
	(0.059)	(0.067)	(0.087)	(0.121)
POTEXP	0.0323 **	0.0239 **	0.0135 **	0.0263 **
	(0.0035)	(0.0040)	(0.0052)	(0.0066)
POTEXP2	-0.0013 **	-0.0008 **	-0.0007 **	-0.0003 *
	(0.0001)	(0.0001)	(0.0001)	(0.0002)
1 CH	-0.285 **	-0.159 *	-0.201 *	-0.238 **
	(0.062)	(0.072)	(0.079)	(0.062)
2-3 CH	-0.564 **	-0.246 **	-0.506 **	-0.229 **
	(0.064)	(0.088)	(0.080)	(0.062)
4+ CH	-0.755 **	-0.389 **	-0.583 **	-0.322 **
	(0.076)	(0.104)	(0.098)	(0.096)
CH*MAR	-0.251 **	-0.094	-0.251 **	
	(0.064)	(0.078)	(0.085)	
UR < 7%	-0.045	-0.006	-0.061	0.056
	(0.042)	(0.047)	(0.059)	(0.072)
UR 7-7.9%	-0.025	0.038	-0.100	0.036
	(0.053)	(0.060)	(0.072)	(0.090)
UR 8-9.9%	-0.109 **	-0.000	-0.172 **	-0.219 **
	(0.037)	(0.044)	(0.051)	(0.060)
UR 10+%	-0.042	0.107 *	-0.238 **	-0.187 **
	(0.044)	(0.051)	(0.058)	(0.069)
PTDIFF				0.557 **
				(0.148)
PTVAR				1.275 **
				(0.099)
Rho = σ_{ij}		0.803 **		
		(0.099)		

NOBS = 11275
LF = -11931.29

- - - - - - - - - - -

* Significant at the 5% level
** Significant at the 1% level

preferences of married and single minority women. Only married, white women are less interested in employment[45].

The coefficients to the dummy variables representing youth, AGE 20-, also show some variation. Whereas before young women were not significantly more likely to prefer full-time employment over none, in this case they are. In two of the three cases in which ability to obtain employment is relatively constrained (minorities, teenagers, and those with little education), allowing for the possibility of discouraged workers yields estimates which suggest that these individuals are even more likely to desire employment. The effect upon those in the third group, those with little education, also tends in this direction, though not significantly so.

Making allowances for discouraged workers has not, however, altered the effect the unemployment rate has upon preferences. It is still true that women living in areas with a high rate of unemployment are more likely to desire part-time rather than full-time employment. The reduced interest in full-time employment observed earlier does not appear to be driven solely or even primarily by an exodus of workers discouraged by their low probability of obtaining full-time employment. Increased interest in part-time employment may still be driven by an 'added worker' effect but this can not explain why fewer individuals want full-time work. This finding remains unexplained.

Predicted employment preferences based upon these estimates are reported in Table 3-19. The average probability with which any

---

[45] The Wald test statistic for the hypothesis that the sum of the coefficients to MAR and NW*MAR in both preference equations is zero, equals 2.45. The 10% critical value for this test is 4.60. The hypothesis can not be rejected at this level of significance.

Table 3-19

Predicted Hours Preferences
Relaxed Definition of Vol/Inv Part-Time Employment
&
Discouraged Worker Model
Assuming: $\sigma_{pF} = 1.00$

	Most Preferred Outcome:		
	OLF	Part-Time	Full-Time
Base Case	8.12% (0.82)	5.07% (0.80)	86.82% (1.15)
Nonwhite	9.27 (1.25)	3.95 (0.97)	86.78 (1.65)
Educ < 9	11.51 (1.26)	4.04 (0.91)	84.45 (1.56)
Educ 16+	4.99 (0.70)	3.80 (0.77)	91.21 (1.07)
Age 20	7.25 (1.02)	10.88 (1.66)	81.88 (1.93)
Age 60	41.00 (2.03)	9.96 (1.22)	49.04 (2.14)
Married, 1 Child, Heduc = 12	40.72 (1.77)	11.83 (1.18)	47.45 (1.86)
Married, 1 Child, Heduc = 16	50.24 (2.38)	12.98 (1.57)	36.79 (2.34)
Married, NW, 1 Child, Heduc = 12	24.66 (2.24)	9.60 (1.68)	65.75 (2.69)
UR < 7%	8.76 (0.92)	5.68 (0.93)	85.56 (1.32)
UR > 10%	8.51 (0.90)	8.04 (1.16)	83.45 (1.48)
'Worst Case'	17.60 (2.30)	15.43 (2.95)	66.97 (3.55)

- -

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

individual is predicted to prefer no employment is lower. This is reasonable given the smaller population believed to prefer no employment. In accordance with the findings reported above, the decrease is greatest for nonwhite women (both married and single) but is also noticeable for young women and women with little education. These are just those who the model has predicted will have the most difficulty finding employment and hence may logically be the most easily discouraged. The reduction is offset primarily by an increase in the probability of preferring full-time employment. As before, interest in part-time work is relatively stable and never greater than interest in full-time employment.

The effects individual characteristics have upon employment opportunities have also changed (Table 3-18, column 4). Higher education appears to have a somewhat stronger positive effect upon the availability of employment while minority status and the presence of children have a somewhat stronger negative effect. As would be expected, given the well known correlation between the unemployment rate and the discouraged worker effect, a high unemployment rate appears to reduce employment opportunities much more than was implied earlier. Finally, the estimated value of PTDIFF is much smaller. This indicates that part-time employment is a bit more difficult to obtain than was predicted earlier.

The predicted employment opportunities shown in Table 3-20 are based upon these findings. Both part-time and full-time employment opportunities are reduced, particularly for minorities, those with little education, and those with children. The predicted probability that an individual with 'worst case' characteristics will obtain an offer of

Table 3-20

Predicted Employment Opportunities
Relaxed Definition of Vol/Inv Part-Time Employment
&
Discouraged Worker Model
Assuming: $\sigma_{pF} = 1.00$

	Probability of Obtaining a ...	
	Part-Time Job	Full-Time Job
Base Case	93.28%	91.19%
	(0.87)	(1.02)
Nonwhite	88.19	82.99
	(1.60)	(2.13)
Educ < 9	85.34	78.34
	(2.10)	(2.83)
Educ 16+	95.65	94.80
	(0.79)	(0.97)
Age 20	85.42	78.48
	(1.79)	(2.31)
Age 60	94.00	92.31
	(0.90)	(1.20)
Married, 1 Child	90.49	86.74
	(1.15)	(1.49)
Married, NW, 1 Child	84.07	76.28
	(2.05)	(2.68)
UR < 7%	93.83	92.05
	(0.86)	(1.12)
UR 10+%	91.16	87.81
	(1.14)	(1.50)
'Worst Case'	53.67	33.02
	(5.19)	(4.23)

- - - - - - - - - - - - - - - - - - - -

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

full-time employment falls from 41.4% to 33.0%. The predicted probability that such an individual will find a part-time job is only just greater than fifty percent.

Predicted outcomes are reported in Table 3-21. As might be expected when some who were judged content are now counted amongst the constrained, the predicted probability of achieving a first best outcome has fallen for all groups, particularly for members of minority groups. The predicted probability of being employed part-time involuntarily is almost unchanged and the likelihood of involuntary full-time employment is still nil. The decline in first best outcomes is primarily offset by an increase in the probability of being unemployed. Again, given the nature of the changes introduced (of discouraged workers), this is quite reasonable. The probability which changes most is the probability of being unemployed, looking for full-time employment. This increases by about one percentage point for those with a college education (this represents over a thirty percent increase given the small base) and by more than five percentage points (almost seventy-five percent) for married, minority women with children. As was suggested by the raw data, minority women, women with little education, young women, and women with children experience the greatest increase in predicted unemployment. In the 'worst case', the predicted probability of being unemployed increases by almost sixteen percentage points with over four-fifths of the increase registering as a lack of full-time opportunities.

Nevertheless, all of the basic conclusions drawn earlier still hold true. Most women stand an excellent chance of obtaining the type of employment they most desire. Very few women are predicted to be

Table 3-21

Predicted Labor Market Outcomes
Relaxed Definition of Vol/Inv Part-Time Employment
&
Discouraged Worker Model
Assuming: $\sigma_{PF} = 1.00$

	Unconstrained	Constrained			
		By Limited PT Opportunities		By Limited FT Opportunities	
	First Best	Unemp. Lkg PT	Inv FT	Unemp. Lkg FT	Inv PT
Base Case	92.01%	0.34%	0.00%	6.39%	1.26%
	(0.93)	(0.07)	(0.00)	(0.28)	(0.33)
Nonwhite	84.77	0.47	0.00	11.84	2.92
	(1.92)	(0.12)	(0.00)	(0.35)	(0.53)
Educ < 9	81.11	0.59	0.00	14.66	3.63
	(2.50)	(0.15)	(0.00)	(0.44)	(0.67)
Educ 16+	95.09	0.17	0.00	4.18	0.57
	(0.91)	(0.04)	(0.00)	(0.34)	(0.34)
Age 20	80.79	1.59	0.00	13.19	4.43
	(2.07)	(0.32)	(0.00)	(0.69)	(0.70)
Age 60	95.63	0.60	0.00	3.35	0.42
	(0.68)	(0.12)	(0.00)	(0.21)	(0.15)
Married, 1 Child, Heduc 12	92.58	1.12	0.00	5.35	0.94
	(0.86)	(0.17)	(0.00)	(0.26)	(0.20)
Married, 1 Child, Heduc 16	93.89	1.23	0.00	4.17	0.70
	(0.75)	(0.21)	(0.00)	(0.30)	(0.15)
Married, NW, 1 Child, Heduc 12	82.88	1.53	0.00	12.59	3.01
	(2.04)	(0.32)	(0.00)	(0.60)	(0.52)
UR < 7%	92.85	0.35	0.00	5.75	1.06
	(1.01)	(0.07)	(0.00)	(0.30)	(0.36)
UR 10+%	89.12	0.71	0.00	8.13	2.04
	(1.34)	(0.13)	(0.00)	(0.37)	(0.44)
'Worst Case'	48.00	7.15	0.00	35.22	9.64
	(3.79)	(1.66)	(0.00)	(2.46)	(1.61)

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite, Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

constrained by a lack of part-time job opportunities. Full-time employment offers are more difficult to obtain by a factor of five to thirty times. Involuntary part-time employment appears to occur with the same likelihood when the model allows for discouraged workers, and it is still a particular problem for young women, minority women, and women with less education - increasing the problem of under-employment by as much as four percentage points or (for these populations) up to thirty percent above the figure for unemployment alone. The major finding here is that when allowance is made for discouraged workers minority women are no less likely to express an interest in employment than are white women, they are just less likely to respond that they are actively looking for it.

IX. Conclusions

In conclusion, basic employment statistics suggest that 0.8% of the population is unemployed and seeking part-time employment and 3.6% is unemployed and seeking full-time employment. These figures in isolation suggest that constraints upon full-time employment are more prevalent than those upon part-time employment. The debate surrounding part-time employment focuses attention upon those employed 'involuntarily' as well as those unemployed. Those advocating the expansion of part-time employment opportunities claim that substantial numbers of full-time employees would prefer to work part-time, if they could only find such a job. Opponents of this policy point out that many part-time employees would prefer to work full-time. No simple settlement is possible, as no data set provides information on involuntary full-time employment[46].

Using a model which simultaneously combines an employment preference relation with an employment opportunity function for a simplified case in which only three employment choices are recognized - no work, part-time work, and full-time work - an estimate of involuntary full-time employment can be constructed. In fact, the prevalence of each sort of involuntary employment as well as of unemployment itself can be assessed for different population groups. These results clearly suggest that constraints upon full-time employment are the more severe. Evidence of involuntary full-time employment is rather difficult to obtain.

---

[46] Several surveys ask whether the respondents would like to increase or decrease their hours of work given their current rate of pay but this question is not the appropriate one if the compensation received for part-time and full-time employment is not identical.

Though some individuals, like married women with children, appear significantly more likely to be constrained by an inability to locate a part-time position than others (some by a factor of ten or more), even they are more likely to be constrained by a lack of full-time employment opportunities.

These constraints appear to be correlated with certain individual characteristics. Education is significantly positively correlated with increased employment opportunities while minority status and young age are significantly negatively correlated with such opportunities. Women facing these constraints are more likely both to be unemployed looking for full-time employment and to be employed part-time involuntarily - ie. unemployed and underemployed. This finding receives further support, especially in the case of minority women, when the existence of potentially discouraged workers is recognized. Whether these constraints are due to discrimination on the part of employers or inefficient individual job search methods is not known, but the probability that these individuals will be constrained ranges from ten to twenty percent. For a young, single, minority mother it exceeds thirty percent. The probability that anyone will be constrained by an inability to obtain part-time employment, on the other hand, rarely exceeds 1.5%. This probability is not insensitive to individual characteristics, it is just small. The role of involuntary full-time employment is particularly small as part-time jobs appear to be easier to obtain than full-time jobs for all individuals.

In light of this, the concern expressed by opponents of increased part-time employment opportunities appears more justified than that of

proponents. Unless the nature of part-time employment were to change, an expansion of part-time job opportunities would most likely simply increase involuntary part-time employment. If the alternative were no job growth, such expansion might be beneficial; if the result were reduced full-time employment opportunities, then it may be particularly onerous. Unless the conditions associated with part-time employment change/ improve, as Kahne (1985) claims they are, the unmet demand for part-time employment is too small relative to that for full-time employment to justify expanding part-time opportunities if it is at the expense of regular, full-time opportunities.

BIBLIOGRAPHY

Abraham, Katharine G. "Flexible Staffing Arrangements: Models and Some New Evidence." Brookings Institute. Mimeo. September 1986.

Abraham, Katharine G. "Restructuring the Employment Relationship: The Growth of Market-Mediated Work Arrangements." Paper presented at the Conference on New Developments in Labor Markets and Human Resource Policies, Massachusetts Institute of Technology, June 1987.

Applebaum, Eileen. "Restructuring Work: Temporary, Part-time, and At-home Employment." In Computer Chips and Paper Clips: Technology and Women's Employment, edited by Heidi Hartmann, Robert Kraut, and Louise Tilly, vol. II. Washington, D.C.: National Academy of Sciences, 1987: 269-310.

Ashenfelter, Orley. "Unemployment as Disequilibrium in a Model of Aggregate Labor Supply." Econometrica 48, no. 3 (April 1980): 547-564.

Ashenfelter, Orley. "What is Involuntary Unemployment?" Proceedings of the American Philosophical Society 122, no. 3 (June 1978): 135-138.

Blank, Rebecca M. "The Effect of Part-Time Work on the Compensation of Adult Women." Princeton University. Mimeo. November 1987.

Blank, Rebecca M. "Simultaneously Modelling the Supply of Weeks and Hours of Work Among Female Household Heads." Journal of Labor Economics 6, no. 2 (April 1988): 177-204.

Blundell, Richard, John Ham, and Costas Meghir. "Unemployment and Female Labour Supply." The Economic Journal 97 (Conference Papers 1987): 44-64.

Carmichael, H. Lorne. "Efficiency Wage Models of Unemployment: A Survey." Mimeo. December 1986.

Corcoran, Mary E. "Work Experience, Labor Force Withdrawals, and Women's Wages: Empirical Results Using the 1976 Panel of Income Dynamics." In Women in the Labor Market, edited by Cynthia B. Lloyd, Emily S. Andrews, and Curtis L. Gilroy. Conference on Women in the Labor Market, 1977, Barnard College. New York: Columbia University Press, 1979: 216-245.

Corcoran, Mary, Greg J. Duncan, and Michael Ponza. "Work Experience and Wage Growth of Women Workers." In Five Thousand American Families - Patterns of Economic Progress, edited by Greg J. Duncan and James N. Morgan. Ann Arbor, MI: Survey Research Center, Institute for Social Research, University of Michigan, 1983: 249-301.

BIBLIOGRAPHY (Cont.)

Deutermann, William V. Jr. and Scott Campbell Brown. "Voluntary Part-Time Workers: A Growing Part of the Labor Force." Monthly Labor Review 101, no. 6 (June 1978): 3-10.

Dickens, William T. and Lawrence F. Katz. "Interindustry Wage Differences and Industry Characteristics." Working Paper No. 2014, National Bureau of Economic Research (September 1986).

Dickens, William T. and Shelley J. Lundberg. "Hours Restrictions and Labor Supply." Working Paper No. 1638, National Bureau of Economic Research (June 1985).

Farber, Henry S. "The Determination of the Union Status of Workers." Econometrica 51, no. 5 (September 1983): 1417-1437.

Flaim, Paul O. "Discouraged Workers: How Strong are Their Links to the Job Market?" Monthly Labor Review 107, no. 8 (August 1984): 8-11.

Hallaire, Jean. Part-Time Employment: Its Extent and Its Problems. Paris: Organization for Economic Cooperation and Development, 1968.

Ham, John C. "Estimation of a Labour Supply Model with Censoring Due to Unemployment and Underemployment." Review of Economic Studies 49 (1982): 335-354.

Heckman, James. "Shadow Prices, Market Wages, and Labor Supply." Econometrica 42, no. 4 (July 1974): 679-694.

Heckman, James J. and Thomas E. MaCurdy. "A Life Cycle Model of Female Labour Supply." Review of Economic Studies 47 (1980): 47-74.

Holzer, Harry J., Lawrence F. Katz, and Alan B. Krueger. "Job Queues and Wages: New Evidence on the Minimum Wage and Inter-Industry Wage Structure." Mimeo. January 1988.

Johnson, Norman L. and Samuel Kotz. Distributions in Statistics: Continuous Multivariate Distributions. New York: John Wiley & Sons, Inc., 1972.

Kahn, Shulamit and Kevin Lang. "Constraints on the Choice of Work Hours: Agency vs. Specific-Capital." Mimeo. Revised October 1987.

Kahn, Shulamit and Kevin Lang. "The Effects of Hours Constraints on Labor Supply Estimates." Working Paper No. 2647, National Bureau of Economic Research (July 1988).

Kahne, Hilda. Reconceiving Part-time Work. Totowa, NJ: Rowman & Allanheld Publishers, 1985.

BIBLIOGRAPHY (Cont.)

Katz, Lawrence F. "Efficiency Wage Theories: A Partial Evaluation." Paper presented at National Bureau of Economic Research Conference on Macroeconomics, March 1986.

Killingsworth, Mark R. Labor Supply. New York: Cambridge University Press, 1983.

Krueger, Alan B. and Lawrence H. Summers. "Reflections on the Inter-Industry Wage Structure." NBER Reprint No. 850 (1987).

Lang, Kevin and Shulamit B. Kahn. "Efficiency Wage Models of Unemployment: A Second View." Mimeo. February 1987.

Leon, Carl and Robert W. Bednarzik. "A Profile of Women on Part-Time Schedules." Monthly Labor Review 101, no. 10 (October 1978): 3-12.

Long, James E. and Ethel B. Jones. "Married Women in Part-Time Employment." Industrial and Labor Relations Review 34, no. 3 (April 1981): 413-425.

Lundberg, Shelly. "Tied Wage-Hours Offers and the Endogeneity of Wages." Review of Economics and Statistics 67, no. 3 (August 1985): 405-410.

Maloney, Tim. "Employment Constraints and the Labor Supply of Married Women." The Journal of Human Resources 22, no. 1 (Winter 1987): 51-61.

Mincer, Jacob and Haim Ofek. "Interrupted Work Careers: Depreciation and Restoration of Human Capital." The Journal of Human Resources 17, no. 1 (Winter 1982): 3-24.

Mincer, Jacob and Solomon Polachek. "Family Investments in Human Capital: Earnings of Women." Journal of Political Economy 82, no. 2, pt. II (March-April 1974): S76-S110.

Mincer, Jacob and Solomon Polachek. "Women's Earnings Reexamined." The Journal of Human Resources 13, no. 1 (Winter 1978): 118-134.

Moffitt, Robert. "The Tobit Model, Hours of Work, and Institutional Constraints." Review of Economics and Statistics 64, no. 3 (August 1982): 510-515.

Nardone, Thomas J. "Part-time Workers: Who Are They?" Monthly Labor Review 109, no. 2 (February 1986): 13-19.

Neubourg, Chris de. "Part-Time Work: An International Quantitative Comparison." International Labour Review 124, no. 5 (September-October 1985): 559-576.

BIBLIOGRAPHY (Cont.)

Nollen, Stanley D. New Work Schedules in Practice. New York: Van Nostrand Reinhold Company, 1982

Nollen, Stanley D. and Virginia H. Martin. "Permanent Part-time Employment - An AMA Survey." Alternative Work Schedules. Part 2. New York: AMA-COM (a division of American Management Associations), 1978.

Osberg, Lars, Richard Apostle, and Don Clairmont. "The Incidence and Duration of Individual Unemployment: Supply Side or Demand Side?" Cambridge Journal of Economics 10, no. 1 (March 1986): 13-33.

Osterman, Paul. "The Structure of the Labor Market for Young Men." In Unemployment and Inflation: Institutionalist and Structuralist Views, edited by Michael J. Piore. White Plains, N.Y.: M.E. Sharpe, Inc., 1979.

Pencavel, John. "Labor Supply of Men: A Survey." Chapter 1 in Handbook of Labor Economics edited by Orley C. Ashenfelter and Richard Layard, vol. 1. New York: North-Holland, 1986.

Pfeffer, Jeffrey and James N. Baron. "Taking the Workers Back Out?: Recent Trends in Labor Contracting." Stanford University Graduate School of Business. Mimeo. July 1985.

Poterba, James M. and Lawrence H. Summers. "Reporting Errors and Labor Market Dynamics." Econometrica 54, no. 6 (November 1986): 1319-1338.

Sandell, Steven H. and David Shapiro. "An Exchange: The Theory of Human Capital and the Earnings of Women - A Reexamination of the Evidence." The Journal of Human Resources 13, no. 1 (Winter 1978): 103-117.

Stiglitz, Joseph E. "The Causes and Consequences of the Dependence of Quality on Price." Journal of Economic Literature 25, no. 1 (March 1987): 1-48.

Tilly, Chris. "More Part-Time Jobs: Workers Don't Want Them so Why are Firms Creating Them?" Paper presented at the Union of Radical Political Economists, December 1987.

U.S. Department of Labor. Bureau of Labor Statistics. Handbook of Labor Statistics. Washington, D.C.: Government Printing Office, 1975.

U.S. Department of Labor. Bureau of Labor Statistics. Handbook of Labor Statistics. Washington, D.C.: Government Printing Office, 1985.

U.S. Department of Labor. Bureau of Labor Statistics. Employment and Earnings. Washington, D.C.: Government Printing Office, January 1985-1988.

BIBLIOGRAPHY (Cont.)

U.S. Department of Labor. Employment and Training Administration. Employment and Training Report of the President. Washington, D.C.: Government Printing Office, 1979.

White, Julie. Women and Part-Time Work. Ottawa, Ontario: The Canadian Advisory Council on the Status of Women, 1983.

Yellen, Janet L. "Efficiency Wage Models of Unemployment." American Economic Review, 74, no. 2 (Papers and Proceedings, May 1984): 200-205.

Yohalem, Alice M. "United States." In Women Returning to Work: Policies and Progress in Five Countries, edited by Alice M. Yohalem. Monclair, New Jersey: Allanheld, Osmun & Co. Publishers, Inc., 1980.

Appendix 3A

The Likelihood Function

The likelihood function is comprised of numerous parts. Each part represents the contribution made by a specific 'type' of respondent, where 'type' refers to detailed labor force status. Following below is a list of these groups and a description of the contribution each makes to the likelihood function.

OLF - Basic Model

In the basic model, individuals who are neither currently employed nor currently looking for a job are designated OLF (Out of the Labor Force). They are assumed to prefer not to be employed and so to have never sought employment. Thus, their contribution to the likelihood function reflects only their preferences. This contribution is[1]:

$$\Pr(U_N > U_F \;\&\; U_N > U_P)$$

or $$\Pr(-n_1 < -X\gamma_1,\ -n_2 < -X\gamma_2)^2$$

In the case of all other respondents both the likelihood of exhibiting certain preferences and the likelihood of receiving certain offers must be considered. Since it is assumed that the disturbances which affect preferences are uncorrelated with those which affect offers, these contributions to the likelihood function are actually a product of two

---

[1] Individual subscripts, i, have been left off all appendix notation in the interest of clarity.

[2] See section III of the paper for details on notation.

distinct probabilities: the probability of having a certain set of preferences and the probability of obtaining a certain set of job offers. Furthermore, information on employment opportunities is incomplete for many respondents and requires that their contribution to the likelihood function be a sum of probabilities. It is these additive contributions which prevent the separation of the likelihood function between preferences and opportunities. For example:

Unemployed - Looking for PT Employment

Individuals in this group are assumed to prefer part-time work to any other activity. Thus $U_P > U_N$ & $U_P > U_F$. However, no part-time job has been offered to them: $G_P < 0$. This information is valuable, but incomplete. Information regarding preferences and opportunities for full-time employment is missing. It may be that the individual prefers part-time employment to no employment and no employment to full-time employment and is unable to find a part-time job - or - that while the individual prefers part-time work, he/she would accept any sort of employment rather than remain unemployed, but is unable to obtain any offer. These two possibilities can be written as:

$$\Pr(U_P > U_N \;\&\; U_N > U_F)*\Pr(G_P < 0) +$$
$$\Pr(U_P > U_F \;\&\; U_F > U_N)*\Pr(G_P < 0 \;\&\; G_F < 0)$$

or
$$\Pr(n_2 < X\gamma_2,\ -n_1 < -X\gamma_1)*\Pr(\mu_P < -ZA_P) +$$
$$\Pr(-n_3 < -X\gamma_3,\ n_1 < X\gamma_1)*\Pr(\mu_P < -ZA_P,\ \mu_F < -ZA_F)$$

Other respondent 'types' can be treated similarly.

Unemployed - Looking for FT Employment

Individuals with this labor force status are treated in a manner quite similar to that just discussed. These individuals are assumed to prefer FT work to any other employment option but to have been unable to obtain it. Their preferences for and ability to obtain PT work are unknown. Thus, their contribution to the likelihood function is also the sum of two probabilities:

$$\Pr(U_F > U_N \;\&\; U_N > U_P)*\Pr(G_F < 0) +$$
$$\Pr(U_F > U_P \;\&\; U_P > U_N)*\Pr(G_F < 0 \;\&\; G_P < 0)$$

or $$\Pr(n_1 < X\gamma_1,\ -n_2 < -X\gamma_2)*\Pr(\mu_F < -ZA_F) +$$
$$\Pr(n_3 < X\gamma_3,\ n_2 < X\gamma_2)*\Pr(\mu_F < -ZA_F,\ \mu_P < -ZA_P)$$

where the first represents the probability of preferring no work to part-time work and the second the probability of preferring part-time work to no work but being unable to obtain either a part-time or a full-time job offer.

Voluntary PT

These individuals are believed to prefer part-time employment to both no employment and full-time employment. Furthermore, they have been successful in obtaining a part-time job offer. This information implies:

$$\Pr(U_P > U_N \;\&\; U_P > U_F)*\Pr(G_P > 0)$$

or $$\Pr(n_2 < X\gamma_2,\ -n_3 < -X\gamma_3)*\Pr(-\mu_P < ZA_P)$$

Involuntary PT

These workers, too, received an offer of part-time work, but it is assumed that they only accepted it because they were unable to find a full-time job. They prefer full-time work to part-time work and part-time work to none at all. This translates to the single term contribution:

$$\Pr(U_F > U_P \;\&\; U_P > U_N)*\Pr(G_P > 0,\; G_F < 0)$$

or $$\Pr(n_3 < X\gamma_3,\; n_2 < X\gamma_2)*\Pr(-\mu_P < ZA_P,\; \mu_F < -ZA_F)$$

FT

Individuals who are employed FT may by assumption a) prefer full-time employment over any other option and have been lucky enough to have received such an offer or b) prefer part-time employment but settle for second best because they are unable to find a part-time job. The contribution made by those working full-time is again a sum of probabilities:

$$\Pr(U_F > U_N \;\&\; U_F > U_P)*\Pr(G_F > 0) +$$
$$\Pr(U_P > U_F \;\&\; U_F > U_N)*\Pr(G_F > 0,\; G_P < 0)$$

or $$\Pr(n_1 < X\gamma_1,\; n_3 < X\gamma_3)*\Pr(-\mu_F < ZA_F) +$$
$$\Pr(-n_3 < -X\gamma_3,\; n_1 < X\gamma_1)*\Pr(-\mu_F < ZA_F,\; \mu_P < -ZA_P)$$

Maximization Procedure

The natural logs of these contributions are summed over the entire sample assuming the disturbances are distributed normally with variance-

covariance matrices as defined in Section III of the paper. The resulting log likelihood function is maximized using the Berndt-Hall-Hall-Hausman optimization routine.

Expanded Labor Force 'Types'

- Other PT (see Section VII)

These part-time employees explained their part-time status in ways not strictly interpretable as voluntary or involuntary. Most were not asked to explain their part-time status at all or failed to respond. A few replied that they usually worked part-time because of illness or vacation, responses that are difficult to interpret. The government classifies these workers as voluntary part-time workers. Others respond that they usually work part-time because of slack work. These workers are classified by the government as involuntary part-time workers. In both cases, it is possible to let the model itself predict the workers' preferences. In this case the contribution to the likelihood function would consist of the sum of the contributions detailed above for voluntary and involuntary part-time workers.

- Discouraged Workers (see Section VIII)

Individuals who are technically OLF are also asked whether or not they would like to work. Most answer no but a few do say yes or maybe/don't know. It is not known how these individuals feel about part-time versus full-time employment. If those who answer that they would like a job actually do, then their contribution to the likelihood

function would consist of three parts: the probability that only a full-time job is acceptable but is not obtainable, the probability that only a part-time job is acceptable but is not obtainable, and the probability that either type of job would be acceptable but neither is obtainable.

$$\Pr(U_F > U_N \;\&\; U_N > U_P)*\Pr(G_F < 0) +$$
$$\Pr(U_P > U_N \;\&\; U_N > U_F)*\Pr(G_P < 0) +$$
$$\Pr(U_F > U_N \;\&\; U_P > U_N)*\Pr(G_P < 0 \;\&\; G_F < 0)$$

or

$$\Pr(n_1 < X\gamma_1,\ -n_2 < -X\gamma_2)*\Pr(\mu_F < -ZA_F) +$$
$$\Pr(n_2 < X\gamma_2,\ -n_1 < -X\gamma_1)*\Pr(\mu_P < -ZA_P) +$$
$$\Pr(n_1 < X\gamma_1,\ n_2 < X\gamma_2)*\Pr(\mu_F < -ZA_F,\ \mu_P < -ZA_P)$$

If those who answer that they are uncertain are uncertain, then their contribution to the likelihood function would consist of all of the above plus the probability that they actually do prefer no employment:

$$\Pr(U_N > U_F \;\&\; U_N > U_P)$$

or

$$\Pr(-n_1 < -X\gamma_1,\ -n_2 < -X\gamma_2)$$

Such individuals would contribute no information to the identification of preferences.

Table B1

Combined Model of Employment Preferences and Opportunities
(1975 CPS - Women)
Assuming: $\sigma_{PF} = 0.70$

Explanatory Variables	Prefer FT to NT	Prefer PT to NT	Prefer FT to PT	Able to Find FT	Able to Find PT
Constant	1.050 **	0.601 **	1.545 **	1.062 **	0.972 **
	(0.065)	(0.195)	(0.098)	(0.093)	(0.181)
NW	-0.190 **	-0.221 **	0.106	-0.314 **	-0.104
	(0.059)	(0.063)	(0.097)	(0.072)	(0.132)
NW*MAR	0.518 **	0.447 **	0.242		
	(0.082)	(0.088)	(0.131)		
EDUC < 9	-0.242 **	-0.273 **	0.106	-0.535 **	-0.341 *
	(0.045)	(0.047)	(0.083)	(0.093)	(0.162)
EDUC 9-11	-0.274 **	-0.259 **	-0.049	-0.356 **	-0.354 **
	(0.038)	(0.041)	(0.067)	(0.072)	(0.127)
EDUC 13-15	0.066	0.104 *	-0.130	0.031	-0.011
	(0.046)	(0.048)	(0.067)	(0.079)	(0.138)
EDUC 16+	0.264 **	0.221 **	0.147	0.281 **	0.185
	(0.055)	(0.059)	(0.082)	(0.091)	(0.188)
MAR	-0.621 **	-0.519 **	-0.347 **		
	(0.050)	(0.062)	(0.077)		
HEDUC < 9	0.208 **	0.156 **	0.179 *		
	(0.049)	(0.054)	(0.080)		
HEDUC 9-11	0.059	0.022	0.128		
	(0.050)	(0.054)	(0.081)		
HEDUC 13-15	0.102	0.068	0.118		
	(0.052)	(0.055)	(0.079)		
HEDUC 16+	-0.235 **	-0.174 **	-0.207 **		
	(0.053)	(0.056)	(0.079)		
AGE 20-	0.092	0.214 **	-0.418 **	-0.271 **	-0.061
	(0.070)	(0.082)	(0.099)	(0.096)	(0.162)
AGE 56+	-0.190 **	-0.199 **	0.031	-0.087	-0.375
	(0.057)	(0.060)	(0.097)	(0.134)	(0.230)
POTEXP	0.0318 **	0.0270 **	0.0164 **	0.0333 **	0.0007
	(0.0034)	(0.0037)	(0.0057)	(0.0079)	(0.0116)
POTEXP2	-0.0012 **	-0.0009 **	-0.0007 **	-0.0005 **	0.0004
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)
1 CH	-0.265 **	-0.210 **	-0.188 *	-0.239 **	-0.168
	(0.059)	(0.064)	(0.085)	(0.066)	(0.125)
2-3 CH	-0.518 **	-0.378 **	-0.481 **	-0.181 **	0.043
	(0.060)	(0.075)	(0.085)	(0.069)	(0.118)
4+ CH	-0.675 **	-0.520 **	-0.532 **	-0.406 **	0.102
	(0.072)	(0.087)	(0.107)	(0.105)	(0.181)
CH*MAR	-0.240 **	-0.156 *	-0.289 **		
	(0.062)	(0.068)	(0.090)		
UR < 7%	-0.052	-0.019	-0.113	0.126	-0.095
	(0.041)	(0.043)	(0.068)	(0.078)	(0.150)
UR 7-7.9%	-0.039	0.012	-0.177 *	0.181	0.005
	(0.051)	(0.055)	(0.081)	(0.101)	(0.184)
UR 9-9.9%	-0.144 **	-0.073	-0.243 **	-0.078	-0.138
	(0.036)	(0.042)	(0.058)	(0.067)	(0.124)
UR 10+%	-0.038	0.046	-0.286 **	-0.177 *	-0.152
	(0.042)	(0.048)	(0.065)	(0.075)	(0.134)
Rho = σ_{12}		0.958 **			
		(0.035)			

NOBS = 11075
LF = -10719.57

- - - - - - - - - - -
* Significant at the 5% level
** Significant at the 1% level

Table B2

Predicted Hours Preferences
Assuming: $\sigma_{PF} = 0.70$

Most Preferred Outcome:

	OLF	Part-Time	Full-Time
Base Case	10.27%	4.66%	85.07%
	(0.92)	(0.78)	(1.19)
Nonwhite	14.15	3.52	82.33
	(1.62)	(0.85)	(1.82)
Educ < 9	15.35	3.46	81.19
	(1.49)	(0.84)	(1.69)
Educ 16+	6.32	3.61	90.07
	(0.81)	(0.77)	(1.13)
Age 20	11.05	10.73	78.21
	(1.29)	(1.78)	(2.10)
Age 60	42.55	9.35	48.10
	(1.99)	(1.24)	(2.10)
Married, 1 Child, Heduc = 12	43.31	11.72	44.97
	(1.76)	(1.30)	(1.91)
Married, 1 Child, Heduc = 16	52.09	13.03	34.88
	(2.34)	(1.67)	(2.33)
Married, NW, 1 Child, Heduc = 12	31.58	8.33	60.10
	(2.44)	(1.59)	(2.72)
UR < 7%	11.19	5.79	83.02
	(1.05)	(1.01)	(1.43)
UR > 10%	10.83	8.07	81.10
	(1.03)	(1.24)	(1.58)
'Worst Case'	29.98	15.09	54.93
	(2.94)	(2.96)	(3.68)

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

Table B3

Predicted Employment Opportunities
Assuming: $\sigma_{PF} = 0.70$

	Probability of Obtaining a ...	
	Part-Time Job	Full-Time Job
Base Case	86.36%	93.07
	(3.47)	(0.93)
Nonwhite	83.96	87.84
	(4.93)	(1.88)
Educ < 9	77.51	82.79
	(6.71)	(2.87)
Educ 16+	89.99	96.10
	(4.03)	(0.87)
Age 20	81.99	80.39
	(4.33)	(2.37)
Age 60	90.47	93.02
	(3.40)	(1.23)
Married, 1 Child	82.33	89.30
	(4.43)	(1.43)
Married, NW, 1 Child	79.52	82.34
	(5.88)	(2.51)
UR < 7%	84.17	94.60
	(4.21)	(0.89)
UR 10+%	82.75	90.39
	(3.97)	(1.34)
'Worst Case'	55.66	43.25
	(8.76)	(5.05)

- -

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

Table C1

Combined Model of Employment Preferences and Opportunities
(1975 CPS - Women)
Relaxed Definition of Vol/Inv Part-Time Employment
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

Explanatory Variables	Prefer FT to NT	Prefer PT to NT	Prefer FT to PT	Able to Find FT	Able to Find PT
Constant	1.021 **	-0.458 **	1.479 **	1.113 **	1.220 **
	(0.066)	(0.082)	(0.084)	(0.104)	(0.300)
NW	-0.168 **	-0.197 **	0.029	-0.310 **	-0.050
	(0.062)	(0.076)	(0.084)	(0.075)	(0.219)
NW*MAR	0.528 **	0.333 **	0.195		
	(0.084)	(0.104)	(0.113)		
EDUC < 9	-0.225 **	-0.227 **	0.002	-0.571 **	-0.323
	(0.047)	(0.060)	(0.067)	(0.097)	(0.230)
EDUC 9-11	-0.263 **	-0.215 **	-0.048	-0.399 **	-0.301
	(0.040)	(0.051)	(0.054)	(0.077)	(0.180)
EDUC 13-15	0.043	0.118 *	-0.075	-0.010	0.064
	(0.047)	(0.054)	(0.055)	(0.086)	(0.185)
EDUC 16+	0.297 **	0.093	0.203 **	0.188 *	0.490
	(0.056)	(0.069)	(0.071)	(0.095)	(0.311)
MAR	-0.652 **	-0.323 **	-0.329 **		
	(0.051)	(0.064)	(0.066)		
HEDUC < 9	0.229 **	0.071	0.158 *		
	(0.051)	(0.064)	(0.067)		
HEDUC 9-11	0.076	-0.029	0.106		
	(0.052)	(0.064)	(0.068)		
HEDUC 13-15	0.127 *	0.002	0.125		
	(0.054)	(0.064)	(0.068)		
HEDUC 16+	-0.266 **	-0.077	-0.189 **		
	(0.055)	(0.063)	(0.067)		
AGE 20-	0.021	0.398 **	-0.377 **	-0.390 **	0.125
	(0.069)	(0.086)	(0.086)	(0.101)	(0.277)
AGE 56+	-0.151 *	-0.138	-0.014	-0.181	-0.228
	(0.059)	(0.072)	(0.078)	(0.153)	(0.312)
POTEXP	0.0345 **	0.0253 **	0.0092 *	0.0270 **	0.0115
	(0.0035)	(0.0042)	(0.0046)	(0.0096)	(0.0168)
POTEXP2	-0.0013 **	-0.0007 **	-0.0006 **	-0.0003	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0003)
1 CH	-0.300 **	-0.095	-0.205 **	-0.222 **	-0.173
	(0.059)	(0.073)	(0.074)	(0.072)	(0.211)
2-3 CH	-0.606 **	-0.101	-0.505 **	-0.107	-0.163
	(0.059)	(0.073)	(0.074)	(0.076)	(0.184)
4+ CH	-0.760 **	-0.205 *	-0.555 **	-0.374 **	0.019
	(0.072)	(0.086)	(0.090)	(0.113)	(0.264)
CH*MAR	-0.270 **	-0.025	-0.245 **		
	(0.062)	(0.076)	(0.078)		
UR < 7%	-0.063	-0.003	-0.060	0.100	-0.058
	(0.042)	(0.052)	(0.055)	(0.084)	(0.223)
UR 7-7.9%	-0.052	0.048	-0.100	0.134	-0.076
	(0.052)	(0.065)	(0.067)	(0.110)	(0.246)
UR 9-9.9%	-0.173 **	0.009	-0.182 **	-0.122	-0.214
	(0.036)	(0.045)	(0.048)	(0.073)	(0.176)
UR 10+%	-0.088 *	0.130 *	-0.217 **	-0.202 *	-0.211
	(0.043)	(0.051)	(0.054)	(0.082)	(0.195)

NOBS = 11075
LF = -10521.65

- - - - - - - - - - -

* Significant at the 5% level
** Significant at the 1% level

Table C2

Predicted Hours Preferences
Relaxed Definition of Vol/Inv Part-Time Employment
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

	Most Preferred Outcome:		
	OLF	Part-Time	Full-Time
Base Case	9.57% (0.96)	5.68% (1.61)	84.76% (1.58)
Nonwhite	12.98 (1.58)	4.93 (1.61)	82.09 (2.11)
Educ < 9	14.19 (1.45)	5.09 (1.61)	80.73 (1.97)
Educ 16+	5.58 (0.77)	4.04 (1.43)	90.38 (1.49)
Age 20	11.01 (1.44)	10.73 (2.38)	78.25 (2.32)
Age 60	42.35 (2.22)	9.91 (1.68)	47.74 (2.12)
Married, 1 Child, Heduc = 12	43.40 (2.06)	11.95 (1.67)	44.65 (1.85)
Married, 1 Child, Heduc = 16	52.48 (2.59)	13.01 (1.84)	34.51 (2.28)
Married, NW, 1 Child, Heduc = 12	31.06 (2.59)	10.58 (2.23)	58.36 (2.82)
UR < 7%	10.58 (1.11)	6.28 (1.72)	83.14 (1.73)
UR > 10%	10.59 (1.18)	8.55 (2.00)	80.86 (1.90)
'Worst Case'	30.40 (3.22)	15.38 (3.04)	54.22 (3.60)

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

Table C3

Predicted Employment Opportunities
Relaxed Definition of Vol/Inv Part-Time Employment
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

	Probability of Obtaining a ...	
	Part-Time Job	Full-Time Job
Base Case	92.31%	93.31%
	(2.99)	(1.01)
Nonwhite	91.57	88.28
	(4.59)	(1.99)
Educ < 9	86.51	82.35
	(6.92)	(3.06)
Educ 16+	97.23	95.42
	(2.35)	(1.04)
Age 20	91.44	78.26
	(4.24)	(2.62)
Age 60	93.79	94.43
	(2.74)	(1.15)
Married, 1 Child	89.50	89.92
	(3.68)	(1.53)
Married, NW, 1 Child	88.57	83.32
	(5.21)	(2.63)
UR < 7%	91.43	94.52
	(3.64)	(1.00)
UR 10+%	88.78	90.27
	(3.96)	(1.34)
'Worst Case'	74.45	38.14
	(10.70)	(4.68)

- -

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

Table C4

Predicted Labor Market Outcomes
Relaxed Definition of Vol/Inv Part-Time Employment
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

	Unconstrained	Constrained			
		By Limited PT Opportunities		By Limited FT Opportunities	
	First Best	Unemp. Lkg PT	Inv FT	Unemp. Lkg FT	Inv PT
Base Case	93.89%	0.11%	0.32%	3.48%	2.19%
	(0.86)	(0.06)	(0.16)	(0.54)	(0.40)
Nonwhite	89.97	0.14	0.28	6.54	3.08
	(1.66)	(0.10)	(0.18)	(1.17)	(0.64)
Educ < 9	85.06	0.27	0.42	10.06	4.20
	(2.51)	(0.18)	(0.26)	(1.81)	(0.91)
Educ 16+	95.75	0.02	0.09	2.33	1.81
	(0.95)	(0.02)	(0.09)	(0.54)	(0.45)
Age 20	82.07	0.36	0.56	9.30	7.71
	(2.15)	(0.21)	(0.32)	(1.23)	(1.23)
Age 60	96.73	0.31	0.30	1.98	0.68
	(0.61)	(0.16)	(0.14)	(0.41)	(0.18)
Married, 1 Child, Heduc 12	94.24	0.69	0.57	3.31	1.19
	(0.81)	(0.29)	(0.22)	(0.50)	(0.26)
Married, 1 Child, Heduc 16	95.15	0.83	0.53	2.60	0.88
	(0.73)	(0.34)	(0.21)	(0.42)	(0.21)
Married, NW, 1 Child, Heduc 12	89.06	0.61	0.60	6.92	2.82
	(1.68)	(0.33)	(0.31)	(1.17)	(0.62)
UR < 7%	94.90	0.14	0.40	2.82	1.74
	(0.87)	(0.08)	(0.20)	(0.53)	(0.35)
UR 10+%	91.18	0.28	0.67	4.62	3.25
	(1.12)	(0.14)	(0.29)	(0.67)	(0.56)
'Worst Case'	62.53	3.04	0.89	23.87	9.68
	(3.51)	(1.55)	(0.46)	(2.77)	(1.92)

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite, Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

Table D1

Predicted Hours Preferences
Relaxed Definition of Vol/Inv Part-Time Employment
Assuming: $\sigma_{PF} = 1.00$

	Most Preferred Outcome:		
	OLF	Part-Time	Full-Time
Base Case	9.89% (0.90)	4.76% (0.76)	85.35% (1.17)
Nonwhite	13.57 (1.57)	3.75 (0.92)	82.69 (1.86)
Educ < 9	14.72 (1.44)	3.71 (0.85)	81.57 (1.66)
Educ 16+	5.95 (0.78)	3.53 (0.73)	90.51 (1.09)
Age 20	10.83 (1.27)	10.06 (1.57)	79.11 (1.97)
Age 60	42.41 (1.99)	9.57 (1.18)	48.03 (2.09)
Married, 1 Child, Heduc = 12	43.34 (1.76)	11.23 (1.13)	45.43 (1.83)
Married, 1 Child, Heduc = 16	52.20 (2.34)	12.41 (1.52)	35.39 (2.28)
Married, NW, 1 Child, Heduc = 12	31.44 (2.43)	8.80 (1.56)	59.75 (2.71)
UR < 7%	10.83 (1.03)	5.41 (0.89)	83.76 (1.36)
UR > 10%	10.62 (1.01)	7.63 (1.12)	81.75 (1.51)
'Worst Case'	30.04 (2.94)	13.51 (2.59)	56.45 (3.56)

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

Table D2

Predicted Employment Opportunities
Relaxed Definition of Vol/Inv Part-Time Employment
Assuming: $\sigma_{PF} = 1.00$

	Probability of Obtaining a ...	
	Part-Time Job	Full-Time Job
Base Case	95.45%	93.21%
	(0.67)	(0.96)
Nonwhite	92.89	87.84
	(1.15)	(1.96)
Educ < 9	90.20	81.96
	(1.70)	(2.98)
Educ 16+	96.74	95.68
	(0.65)	(0.95)
Age 20	89.29	79.95
	(1.56)	(2.45)
Age 60	96.03	94.34
	(0.67)	(1.09)
Married, 1 Child	93.96	90.14
	(0.86)	(1.42)
Married, NW, 1 Child	90.80	83.27
	(1.47)	(2.52)
UR < 7%	96.17	94.62
	(0.62)	(0.97)
UR 10+%	94.08	90.38
	(0.87)	(1.45)
'Worst Case'	69.68	41.42
	(5.23)	(5.19)

- -

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

Table E1

Combined Model of Employment Preferences and Opportunities
(1975 CPS - Women)
Relaxed Definition of Vol/Inv Part-Time Employment
&
Discouraged Worker Model
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

Explanatory Variables	Prefer FT to NT	Prefer PT to NT	Prefer FT to PT	Able to Find FT	Able to Find PT
Constant	1.145 **	-0.369 **	1.513 **	0.980 **	0.846 **
	(0.070)	(0.093)	(0.097)	(0.096)	(0.273)
NW	-0.049	-0.091	0.042	-0.397 **	-0.445 *
	(0.066)	(0.089)	(0.103)	(0.068)	(0.187)
NW*MAR	0.531 **	0.355 **	0.175		
	(0.085)	(0.110)	(0.123)		
EDUC < 9	-0.176 **	-0.221 **	0.044	-0.585 **	-0.282
	(0.048)	(0.064)	(0.074)	(0.089)	(0.201)
EDUC 9-11	-0.200 **	-0.181 **	-0.019	-0.466 **	-0.303
	(0.042)	(0.056)	(0.063)	(0.071)	(0.158)
EDUC 13-15	0.045	0.127 *	-0.082	0.001	0.060
	(0.049)	(0.059)	(0.064)	(0.080)	(0.170)
EDUC 16+	0.279 **	0.057	0.222 **	0.236 **	0.479
	(0.058)	(0.075)	(0.079)	(0.088)	(0.276)
MAR	-0.684 **	-0.346 **	-0.338 **		
	(0.052)	(0.065)	(0.069)		
HEDUC < 9	0.238 **	0.078	0.160 *		
	(0.052)	(0.065)	(0.070)		
HEDUC 9-11	0.063	-0.035	0.097		
	(0.053)	(0.065)	(0.070)		
HEDUC 13-15	0.109 *	-0.010	0.118		
	(0.055)	(0.066)	(0.070)		
HEDUC 16+	-0.284 **	-0.085	-0.199 **		
	(0.056)	(0.064)	(0.069)		
AGE 20-	0.080	0.463 **	-0.382 **	-0.346 **	0.057
	(0.074)	(0.101)	(0.103)	(0.094)	(0.248)
AGE 56+	-0.163 **	-0.144	-0.018	-0.077	-0.126
	(0.061)	(0.078)	(0.086)	(0.140)	(0.286)
POTEXP	0.0321 **	0.0237 **	0.0084	0.0284 **	0.0091
	(0.0037)	(0.0046)	(0.0052)	(0.0082)	(0.0150)
POTEXP2	-0.0013 **	-0.0007 **	-0.0006 **	-0.0004 *	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0003)
1 CH	-0.297 **	-0.093	-0.204 *	-0.248 **	-0.132
	(0.063)	(0.082)	(0.086)	(0.067)	(0.191)
2-3 CH	-0.610 **	-0.088	-0.522 **	-0.197 **	-0.126
	(0.062)	(0.081)	(0.084)	(0.070)	(0.169)
4+ CH	-0.775 **	-0.261 **	-0.514 **	-0.393 **	0.242
	(0.075)	(0.095)	(0.101)	(0.105)	(0.246)
CH*MAR	-0.274 **	-0.014	-0.260 **		
	(0.065)	(0.079)	(0.082)		
UR < 7%	-0.057	0.035	-0.092	0.065	-0.210
	(0.044)	(0.058)	(0.064)	(0.078)	(0.207)
UR 7-7.9%	-0.040	0.072	-0.112	0.055	-0.138
	(0.055)	(0.071)	(0.078)	(0.100)	(0.225)
UR 9-9.9%	-0.138 **	0.072	-0.210 **	-0.203 **	-0.371 *
	(0.038)	(0.049)	(0.055)	(0.066)	(0.160)
UR 10+%	-0.078	0.166 **	-0.244 **	-0.189 *	-0.242
	(0.044)	(0.055)	(0.061)	(0.077)	(0.175)

NOBS = 11075
LF = -10941.89

- - - - - - - - - - -

* Significant at the 5% level
** Significant at the 1% level

Table E2

Predicted Hours Preferences
Relaxed Definition of Vol/Inv Part-Time Employment
&
Discouraged Worker Model
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

	Most Preferred Outcome:		
	OLF	Part-Time	Full-Time
Base Case	8.18% (0.88)	5.57% (1.59)	86.26% (1.60)
Nonwhite	9.07 (1.28)	4.99 (1.75)	85.94 (2.11)
Educ < 9	11.43 (1.28)	4.69 (1.58)	83.88 (1.93)
Educ 16+	4.87 (0.71)	3.74 (1.37)	91.39 (1.47)
Age 20	7.93 (1.21)	10.83 (2.59)	81.24 (2.53)
Age 60	41.38 (2.22)	9.84 (1.71)	48.79 (2.23)
Married, 1 Child, Heduc = 12	41.13 (2.04)	12.51 (1.81)	46.36 (1.99)
Married, 1 Child, Heduc = 16	50.80 (2.61)	13.71 (2.01)	35.50 (2.41)
Married, NW, 1 Child, Heduc = 12	24.71 (2.41)	12.06 (2.72)	63.23 (3.13)
UR < 7%	8.90 (1.02)	6.62 (1.79)	84.48 (1.81)
UR > 10%	8.84 (1.07)	8.89 (2.00)	82.27 (1.94)
'Worst Case'	18.42 (2.61)	17.68 (3.89)	63.90 (4.10)

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

Table E3

Predicted Employment Opportunities
Relaxed Definition of Vol/Inv Part-Time Employment
&
Discouraged Worker Model
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

	Probability of Obtaining a ...	
	Part-Time Job	Full-Time Job
Base Case	85.03%	91.17%
	(4.62)	(1.14)
Nonwhite	72.34	83.02
	(8.69)	(2.33)
Educ < 9	77.52	77.82
	(8.54)	(3.15)
Educ 16+	93.53	94.38
	(4.15)	(1.11)
Age 20	82.18	75.49
	(6.47)	(2.64)
Age 60	90.74	92.11
	(3.45)	(1.38)
Married, 1 Child	81.74	86.51
	(5.00)	(1.69)
Married, NW, 1 Child	67.75	76.02
	(8.65)	(2.96)
UR < 7%	79.61	92.17
	(6.23)	(1.22)
UR 10+%	78.69	87.74
	(5.61)	(1.44)
'Worst Case'	42.86	28.87
	(11.19)	(3.88)

- - - - - - - - - - - - - - - - - - - -

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

Table E4

Predicted Labor Market Outcomes
Relaxed Definition of Vol/Inv Part-Time Employment
&
Discouraged Worker Model
Assuming: $\sigma_{PF} = 0.00$ & $\sigma_{12} = 0.50$

	Unconstrained	Constrained			
		By Limited PT Opportunities		By Limited FT Opportunities	
	First Best	Unemp. Lkg PT	Inv FT	Unemp. Lkg FT	Inv PT
Base Case	91.55%	0.22%	0.61%	4.77%	2.85%
	(0.96)	(0.11)	(0.28)	(0.64)	(0.47)
Nonwhite	84.03	0.47	0.91	10.30	4.29
	(1.97)	(0.26)	(0.50)	(1.50)	(0.85)
Educ < 9	80.34	0.43	0.63	13.39	5.21
	(2.65)	(0.25)	(0.36)	(1.99)	(1.05)
Educ 16+	94.52	0.05	0.19	2.93	2.21
	(1.01)	(0.04)	(0.16)	(0.60)	(0.49)
Age 20	78.16	0.74	1.18	10.91	9.00
	(2.21)	(0.38)	(0.61)	(1.32)	(1.41)
Age 60	95.24	0.47	0.44	2.88	0.96
	(0.72)	(0.22)	(0.19)	(0.52)	(0.23)
Married, 1 Child, Heduc 12	91.46	1.26	1.03	4.67	1.58
	(0.95)	(0.48)	(0.35)	(0.61)	(0.32)
Married, 1 Child, Heduc 16	92.71	1.54	0.96	3.64	1.15
	(0.93)	(0.57)	(0.33)	(0.52)	(0.25)
Married, NW, 1 Child, Heduc 12	80.95	1.99	1.90	11.23	3.93
	(2.11)	(0.85)	(0.78)	(1.56)	(0.85)
UR < 7%	92.03	0.36	0.99	4.23	2.39
	(1.09)	(0.18)	(0.45)	(0.67)	(0.46)
UR 10+%	88.02	0.56	1.33	6.11	3.97
	(1.22)	(0.23)	(0.50)	(0.77)	(0.64)
'Worst Case'	44.44	8.09	2.02	35.85	9.61
	(3.49)	(2.88)	(0.78)	(3.33)	(2.62)

Base Case = Single, White, 35 Year Old, High School Graduate with No Children and living in an area with an unemployment rate of 8.5%.
'Worst Case' = Single, Nonwhite, Woman, 20 Years Old, a High School Dropout with 1 Child, living in an area with an unemployment rate above 10%.
Approximate asymptotic standard errors in parentheses were derived using Delta method first-order expansion of the likelihood function around the estimated parameter values.

Chapter 4

Conclusions

The analysis presented in chapters two and three makes some significant contributions to the study of nontraditional employment alternatives. The specific patterns examined include discontinuous and part-time employment. As these employment outcomes are far more commonly observed amongst women, the empirical work presented in this manuscript relies exclusively upon this subset of the population.

The focus of chapter two is upon the effect a discontinuous employment record has upon an individual's earnings profile. In particular, previous studies conclude that potential wages depreciate during spells of non-employment so that upon reentry to the labor market wages are below those received prior to withdrawal. Furthermore, the estimated depreciation rate appears to be greater the more recent the withdrawal. This has been interpreted as evidence that wages 'rebound' following reentry in at least partial compensation for their initial depreciation.

These conclusions are challenged in chapter two as the observed pattern of wages is shown to be still more closely linked to the labor supply decision than was previously suspected. A sample of women from the National Longitudinal Survey of Young Women (a panel data set) is used first to replicate the earlier findings, then to test for a specific sort of sample selection bias. If those who suffer the greatest wage depreciation upon reentry are also the most likely to reexit the labor force, then the observed depreciation/'rebound' effect could be induced by using ordinary least squares to fit a wage equation

for a sample which includes both women who rapidly re-exit and women who remain committed to employment. When the sample includes many individuals who have recently reentered, it also includes a larger proportion of individuals who may shortly re-exit and so naturally yields a greater estimated depreciation rate. These individuals are selected out of studies with few recent reentrants.

A simple test for such a labor supply bias is performed by dividing the sample of reentrants according to the length of their observed reentry spell. Individuals who remain employed for less than three years following reentry are separated from those who establish a more continuous post-reentry employment record. An analysis of wages for these two groups reveals that those who reenter for shorter spells are significantly more likely to reenter at a lower real wage level, whereas those who reenter for at least three years do not appear to experience any significant wage depreciation. The so-called 'rebound' effect does appear to be a statistical artifact, the result of a subtle sample selection bias.

This finding underscores the need to develop a more comprehensive model to explain both dynamic labor supply decisions and wage determinants over time. Such a model is necessary in order to determine whether it is the low reentry wages which induce withdrawal or a planned future withdrawal which makes the low reentry wages acceptable. Only the correlation between reentry wages and reentry spell length is identified here, not the direction of causality. Sample statistics suggest that both individual specific characteristics such as education and time specific characteristics such as occupation play a role in the labor

supply decision. Much work, however, remains to be done before a precise theoretical model with an empirically tractable form can be tested. This text advances one step in that direction by introducing an efficient methodology for handling multiple wage difference observations per individual. Earlier studies employ only one difference observation per individual, hence wasting much of the information available in panel data sets. Use of multiple observations introduces heteroscedasticity, but it is of a known form and standard generalized least squares methods can be applied to yield efficient estimates.

In chapter three of the text, dynamic labor supply issues are put aside in order to consider how labor market outcomes at one point in time are influenced by individuals' preferences for employment, and constrained by real and perceived employment opportunities. Simplifying the set of potential employment outcomes to one containing only three options - full-time work, part-time work, and no work - a model is constructed which combines analysis of the labor supply decision with analysis of an employment opportunity function. The form of the model implies that individuals first rank their preferences amongst the three possible outcomes, then seek to obtain the best personal outcome available to them. While opportunities for no work are not constrained, opportunities for both part-time and full-time employment must be if unemployment is taken seriously. Opportunities may be limited because efficiency wages or some other labor market condition gives employers discretion in hiring or because some individuals utilize search methods that are more or less efficient than those others use.

Of particular concern here is whether part-time employment is more difficult to obtain than full-time employment. Unemployment figures

alone imply that far more women are searching for full-time work than are searching for part-time work. Fewer than twenty percent of those unemployed express an interest in part-time employment. This information, however, is not sufficient to resolve the issue of relative constraints. Some employed individuals may also have been constrained in their labor market choice. An individual who is employed part-time (full-time), but would have preferred a full-time (part-time) job if she could obtain it, is also effectively constrained. While some information is available on those employed part-time involuntarily, similar information on those employed full-time involuntarily is not. Using the model outlined above, it is possible to predict this likelihood and so more accurately address the issue of constraints.

The model is estimated using a sample of women from the May 1975 Current Population Survey (CPS). Information on labor force status is used to infer preferences for employment as well as employment opportunities. Personal, family, and labor market characteristics are then employed as explanatory variables to describe labor market outcomes. The results strongly support the finding that part-time employment is easier to obtain than full-time employment. This suggests that policy makers should be careful when seeking to expand part-time employment opportunities, that they are not doing so only at the expense of full-time employment opportunities.

This analysis also suggests that involuntary part-time employment poses a particular burden on just those populations that also bear a greater risk of unemployment. Minority women, women with less than a high school education, young women, and especially women having all

these characteristics are two to seven times more likely to be employed part-time involuntarily than a single, white, high school graduate of about age thirty. Those with the greater constraints have a ten to thirty percent predicted probability of being constrained by limited full-time employment opportunities. What causes these constraints and how they might be relaxed are important questions left for future study. As stated earlier, these findings may reflect employer discrimination, differential search effort, or use of different search techniques.

The model is modified in a later section to incorporate information on discouraged workers. The strongest assumption made regarding preferences is that all those women who are neither working nor looking for work actually prefer not to work. In fact, however, approximately twelve percent of those classified as out-of-the-labor force do express some interest in employment. When the model is adjusted to take this information into account (under the additional assumption that these individuals face constrained employment opportunities similar to those experienced by the unemployed), one strikingly different result arises. Whereas before the coefficient estimates indicated that minority women were significantly more likely to choose not to work, when discouraged workers are accommodated within the model this preference for no work vanishes. It would appear that minority women are no less likely to express an interest in employment, just less likely to respond that they are actively pursuing this interest. This may be because they perceive their chances of success to be very small, but the chances faced by high school dropouts and teenagers are also low, and they do not seem as 'discouraged'. Perhaps future research will shed some light on this matter.

Several other avenues of study are suggested by this work. The data employed here are from May 1975; it would be interesting to see if and/or how the results might have changed over time, particularly as involuntary part-time employment has become more prevalent. Some data problems will have to be resolved for such an analysis to be carried out as information on family size is not as readily available in the CPS surveys after 1981. Additional information on household income and job tenure could also be used. Further income data would eliminate the need to instrument for this important labor supply determinant. Information on job tenure could be used to observe how the results change when jobs are assumed, once offered, to last as long as the individual desires rather than to be renegotiated each period as is implicitly assumed in this study.

While the focus here has been upon women, both models could be applied to a sample of men as well. Such an extension, while intriguing, may not be feasible. Given the problems already extant within the samples of women utilized here (ie. the limited number of withdrawals and the limited number believed to prefer part-time work), the data for men may not be sufficiently rich to permit estimation at all.

Each of these suggestions for further study promises to contribute more to the expanding literature on nontraditional employment. The analysis of dynamic lifetime employment decisions will perhaps be one of the most challenging of these fields. The challenges offered by the model incorporating involuntary employment are not insignificant either and raise questions, like why minorities are less likely to find employment, whose answers are of great interest to policy makers. While this

work has provided some insights into the operation of the nontraditional labor market, much work still remains to be done.