DETERMINANTS OF VOLUNTARY AND INVOLUNTARY PART-TIME EMPLOYMENT

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INTRODUCTION

In recent decades, there has been a striking increase in the incidence of part-time employment, rising from 14.7 percent of the civilian labor force in 1967 to 17.7 percent in 1987. Part-time employment among workers who prefer full-time work has risen particularly dramatically, from 2.8 percent of the civilian labor force in 1967 to 4.5 percent in 1987.[1,2] These involuntary part-time employees constitute a valuable, underutilized resource; such underutilization diminishes the nation's output just as unemployment does.

What determines whether an individual is employed part-time? How do voluntary and involuntary part-time employees differ? A number of economists have addressed part-time employment issues. Their studies generally do not distinguish between voluntary and involuntary part-time. In so doing, they neglect the issue of inefficient labor utilization.

In one such study, Leeds [1990] found that full-time work carries a far lower wage premium over part-time work for black men than for white men. The study also found a much smaller difference between the levels of on-the-job training of full- and part-time workers among blacks than among whites. Leeds concluded that part-time status represents an optimal allocation of time for many blacks. Consideration of racial differences in the incidence of voluntary and involuntary part-time employment, however, may have led to a very different conclusion.[3]

In another study, Sundström [1991] concluded that rather than marginalizing Swedish women, part-time work "increased the continuity of their labor force attachment, strengthened their position in the labor market, and reduced their economic dependency." She too, however, overlooked the distinction between voluntary and involuntary part-time employment. As a consequence, both Leeds and Sundström probably paint too rosy a picture of part-time employment.

A small body of research has recognized the role of demand-side constraints in determining part-time employment. Sundt [1988], for example, found that married white women with children are most likely to be constrained by a lack of part-time employment opportunities, while young, nonwhite, and less educated women are far more likely to be constrained by limited full-time employment opportunities.

Ham [1982] did not focus on part-time employment *per se*, but he did look at underemployed men, those working fewer hours than desired. In his analysis, he found that schooling reduces the probabilities of unemployment and underemployment while union membership increases those probabilities.

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The current study applies multinomial logit analysis to cross-sectional data of both men and women to examine the determinants of labor force status. The distinction between voluntary and involuntary part-time employment is a primary focus. Striking differences and similarities among eighteen separate age-gender categories are found.

The next section of the paper develops the theoretical model. The data are discussed on pages 60-62, and the empirical results are presented on pages 62-65. Conclusions appear in the final section.

THE MODEL

The non-institutionalized population over age 16 can be divided into five categories: employed full-time, employed part-time voluntarily, employed part-time involuntarily, unemployed, and not in the labor force. Personal preferences and the availability of different types of employment characterize labor supply and demand. These factors therefore determine labor force status, which is an outcome of the interaction of supply and demand.

Multinomial logit analysis can be used to estimate the probabilities of being in one of five discrete categories.[4] According to multinomial logit analysis, if $\mathbf{X}$ is a $1xk$ vector of determinants, and $\mathbf{B}_j$ is a kx1 vector of parameters (j=1,...,5), then the probability of status m ($1 \leq m \leq 5$) is

$$P_m = exp(\mathbf{XB}_m) \; / \; \sum_{j=1}^{5} exp(\mathbf{XB}_j)$$

The set of $\mathbf{B}$'s is estimated by a set of b's such that

$$\sum_{j=1}^{5} b_j = 0.$$

If there are eight characteristics, the estimated log of odds of status 1 relative to status 5 is

$$(1) \qquad \widehat{ln[(P_1)/(P_5)]} = (b_{10} - b_{50}) + (b_{11} - b_{51})X_1 + (b_{12} - b_{52})X_2 + (b_{13} - b_{53})X_3 + \cdots + (b_{18} - b_{58})X_8$$

So, a unit increase in X_1 causes the estimated log of the odds of status 1 relative to status 5 to increase by b_{11} - b_{51}. Differences in b's are estimated using a maximum likelihood technique.[5] Full-time employment is chosen for status 5, the reference category in this analysis, because it is the modal category for the population.[6]

In a reduced form equation, the characteristics expected to influence the labor force status of an individual included education, education of spouse, number of young children, marital status, and race. Also examined are whether the level of unemployment in one's home state was high, what percentage of employees in the state were unionized, and whether one lived in an urban area.[7]

Consider first the effect of education on the labor force status of an individual. Those who have a high level of education have invested considerable time and resources in their schooling. Thus, the educated are more likely to be people who have planned to spend more time working and earning a return on their investment. More educated people, therefore, are more likely to prefer full-time to part-time employment. In addition, education increases the opportunities available to the individual and consequently increases the probability that the desired type of job is located. Thus, for most age groups, education is expected to decrease the log of the odds of being anything other than employed full-time.

The effect of education on younger individuals could be different. For young people, the higher the education, the more likely that they are still enrolled. While they have less time to devote to working, the need for funds for school could increase their desire for some employment. If they have any interest in working, they are more likely to seek part-time than full-time employment, compared to less-educated young people. Their education makes them more attractive employees and increases their employment opportunities. Thus, they are less likely to be employed part-time involuntarily.

The education of one's spouse may also affect one's labor force status. Spouse's education serves as an indicator of potential spousal earnings. In the United States, husband's income traditionally exerts a negative income effect on hours worked by a wife [Schultz, 1980]. Thus, wives whose husbands have high earning potential are more likely to choose to work part-time voluntarily than to be employed full-time, compared to other women. In the U.S., wife's income traditionally exerts a much weaker effect on a husband's labor force status.

The effect of spouse's education may be different for younger people. The greater the spouse's education, the more likely that the spouse is still a student and not at work. Then earnings are low, and the income effect of spouse's education would cause the individual to work more. If the more-educated spouse has completed schooling, earnings are higher and the effect is just the opposite. So, for younger individuals, the effect of spouse's education on the odds of being employed part-time voluntarily is indeterminate.

The presence of young children is expected to have a major impact on the labor force status of women. Young children require much attention, and in the U.S., women traditionally bear most of the responsibility for child care. Formal child care is available, but often expensive. Thus, it is expected that women with young children are more likely to work part-time voluntarily than to be employed full-time, compared to other women. Since small children limit mobility and job search, a woman with small children may also be more likely to be employed part-time involuntarily than to be employed full-time. Furthermore, the more young children there are, the less likely the woman is to work full-time. Men with young children may feel more pressure to earn income and be unable to search long periods for better jobs. Thus, the presence of small children may increase the probability that a man works full-time or part-time involuntarily.

The primary effect of marriage on a woman's labor force status is expected to result from the impact of young children. Holding the number of young children constant and spouse's potential earnings constant at zero, the influence of marriage on women is likely to be small. It may, however, differ by age group. Among the older cohorts of women, it was common to drop out of the labor force upon marrying. Thus, marriage may be negatively related to the probability of being employed (full-time or part-time) for older women. Younger women have been more likely to continue labor force participation after marriage. This pattern of behavior would be especially likely at a time when there are substantial costs of setting up a new household, but little or no accumulated household wealth. In addition, there may be characteristics that make a

woman more attractive as both an employee and marriage partner. For younger women, then, marriage may not reduce the probability of full-time employment.

For men, the effect of marriage may be different. Feeling the need to contribute to the support of others, the married man may be more likely to want to work full-time, at all ages.

The race of an individual may affect labor force status by influencing both preferences and opportunities. Preferences may differ with differences in cultures and financial resources. Opportunities may differ due to employment discrimination and differences in experience and training. A black woman is less likely than a white woman to have substantial nonlabor income. Thus, she is less likely to choose to work part-time rather than full-time.

Market opportunities are likely to be much more limited for black men than for white men. Poor prospects may moreover discourage search for full-time employment. Consequently, black men may be more likely to be employed only part-time, voluntarily and involuntarily.

Another factor expected to influence labor force status is the unemployment rate in the area. The opportunities for employment in depressed areas are limited. Consequently, the probability of involuntary part-time employment would be greater there. This effect is expected for both men and women.

The extent of unionization in an area may also affect labor force status. On the one hand, since women tend not to be union members, they may be adversely affected by unions. They may suffer greater demand-side constraints in highly unionized regions, because of crowding in the nonunion sector due to the spillover effect. On the other hand, the higher the unionization rate among employees, the greater the percent of women who are married to well-paid employed union members. These women, having more nonlabor income, may be more likely to work part-time voluntarily than to be employed full-time.

Men may also suffer from greater demand-side constraints as a result of unions. Young workers especially may be affected, since implicit contracts may require that more senior workers are laid off last.

A final factor influencing labor force status is urbanization. In more-populated areas, employment opportunities are greater; involuntary part-time employment is less probable. The type of person that chooses to live in an urban rather than rural area may also be one who prefers a faster-paced lifestyle with full-time employment. Thus, one may expect that the likelihood of being employed full-time is greater in urban areas.

THE DATA

The data set used for the estimation is the March 1988 Current Population Survey (CPS). The survey collected information from over 43,000 households. Only households which were not group quarters are used for this study. Within such households, attention is focused on those individuals who were either a householder or spouse of a householder. Moreover, individuals who were self-employed, working without pay, or in the armed forces are excluded from this study.[8]

The data include information on the labor force status and other personal characteristics of each individual. The data do not indicate whether a full-time employee would

TABLE 1
Variable Definitions

RACE	a dummy variable which takes on the value 0 if the individual is white; 1 if the individual is black or other.
MARSTAT	a dummy variable which takes on the value 0 if the individual is married with spouse absent, widowed, divorced, separated, or never married; 1 if the individual is married with spouse present.
URATE	a dummy variable which takes on the value 0 if the unemployment rate in the state in March 1988 was less than 6 percent; 1 if the unemployment rate in the state in March 1988 was greater than or equal to 6 percent.[a]
YRSEDUC	a variable measuring years of education completed, taking on the value: 0 if measuring education of spouse and MARSTAT equals 0; 1 if the person did not even complete the first grade; 2 if the person completed first grade only; . . . 19 if the person completed six or more years of college.
KUNDR5	a variable measuring the number of the individual's own children, under the age of 5, taking on integer values from 0 to 6, where 6 represents 6 or more children.
UNIONRT	a variable measuring the percent of unionized employment in the individual's state of residence, in 1982.
URBAN	a dummy variable which takes on the value 0 if the household is not in a metropolitan statistical area (MSA) or is in an area with a population of less than 100,000; 1 if there is a population of 100,000 or more in the household's MSA.

[a] The results are not sensitive to the definition of the unemployment rate variable. When the unemployment rate was entered as a continuous variable for males and for females aged 31 to 35, the signs of all coefficients were unchanged. The significance of the unemployment rate coefficient was somewhat increased. The significance of the other coefficients was largely unaffected.

prefer a part-time job. Consequently, voluntary and involuntary full-time workers are not differentiated in this study.[9] While there is information on whether an unemployed person prefers full- or part-time work, dividing the unemployed category would lead to miniscule groups. Thus, the unemployed were treated as a single category.

The March 1988 unemployment rate in an individual's home state is obtained from the June 1988 issue of *Employment and Earnings*, a publication of the U.S. Department of Labor, Bureau of Labor Statistics. The percentage of unionized employment in the state in 1982, reported in Table No. 666 of the *Statistical Abstract of the United States*, 108th edition, approximates the relative strength of unions locally.

To capture systematic differences based on age and gender, the sample of individuals is divided into 18 age-gender categories, starting with males and females aged 16 to 20 and continuing in five-year intervals to those aged 56 to 60. Due to computational demands, it is not possible to estimate the model on the complete data set. In addition, some age-gender groups are too large for the facilities available. For these groups, a random probability sample of 50 percent or 75 percent is used.

ESTIMATION RESULTS

Table 1 contains definitions of the exogenous variables. Tables 2 through 5 summarize the signs and significance of estimates of differences in b's for log-odds equations like equation (1), in all age-gender categories, by comparative labor force status.[10] For the sake of brevity, only the odds of voluntary and involuntary part-time employment are examined.[11] For all age-gender groups, likelihood ratio tests indicate that the impact of the set of explanatory variables on the odds is significant at the one percent level.

The results indicate that the impacts of the determinants of part-time employment status differ according to whether that status is voluntary or involuntary. Of the 72 slope coefficients described in each table, 32 are significant in Table 2, and 24 are significant in Table 3. For Tables 4 and 5, the counts are 11 and 18, respectively. There are only 10 instances where an explanatory variable has a significant impact of the same sign on both the voluntary and involuntary part-time employment of women in any one age bracket. For men, the number of such instances is only three.[12]

There are more variables that significantly affect part-time employment status for women than for men. The reasons for these patterns are in large part cultural. Once men have completed school, they traditionally seek full-time employment until they reach retirement age. There is greater variability to be explained in the case of women, however.

For women, the variables have a greater impact on voluntary (Table 2) than on involuntary (Table 3) part-time employment. For men, the variables have a greater impact on involuntary (Table 5) than on voluntary (Table 4) part-time employment. When men work part-time, it is largely the result of demand-side constraints. The results show that these constraints are most likely to affect non-white men, men with less education, and men living outside of urban areas or within areas of high unemployment.

Part-time employment is more common among women than among men. Many of these women work part-time voluntarily. The results show that the odds of a woman working part-time voluntarily are higher for women who are white, have small children, have more educated spouses, live outside urban areas, or live in more heavily unionized

TABLE 2
Signs and Significances of Coefficients, Multinomial Logit Results
Log of the Odds, Part-time Voluntarily vs. Full-time Females

	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
constant	- ***	- ***	- ***	- ***	- ***	-	- ***	- ***	- ***
race	-	+	-	- ***	- **	- ***	+	- **	-
marstat	+	+	-	+ *	-	+	-	+	+
urate	+	+	-	- *	+	-	+	+	-
yrseducf	+ ***	+ ***	- ***	-	- **	- ***	- ***	- ***	- *
kundr5	+	+ ***	+ ***	+ ***	+ ***	+	-	-	+
yrseducm	-	-	+ **	+	+ ***	+ ***	+ ***	+ **	+ ***
unionrt	-	+ ***	+ ***	+ **	+	+	+ **	+ **	+
urban	-	- **	- ***	+	-	-	-	+	- ***
sample size	669	2540	2739	2927	2722	2231	2712	3151	3265
%vpt[a]	11.4	9.4	10.5	13.9	12.4	11.7	11.3	11.1	10.4

* significant at the 10 percent level.
** significant at the 5 percent level.
*** significant at the 1 percent level.
[a] percent of sample that is employed part-time voluntarily.

states. Women over 25 years of age are also relatively more likely to work part-time voluntarily if they are less educated.

While women often choose to work part-time voluntarily, some women work part-time as a result of demand-side constraints. These constraints are most likely to affect women who are less educated, live outside of urban areas, or live in states with high unemployment rates.

Finally, the effects of variables on part-time employment status depend on age. This dependence is strikingly apparent in the impact of education on the odds of voluntary part-time employment. For individuals under 25, education increases the odds of voluntary part-time employment. For individuals over 25, education either has no effect or actually reduces the odds of voluntary part-time employment, depending upon gender.

TABLE 3
Signs and Significances of Coefficients, Multinomial Logit Results
Log of the Odds, Part-time Involuntarily vs. Full-time Females

	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
constant	-	- **	-	+	-	-	-	-	+
race	-	+ **	+	+	-	-	+	-	+
marstat	-	+ ***	+	-	+	-	+	+	-
urate	+	+	+ **	+ *	+	-	+ ***	+	+
yrseducf	-	-	- ***	- ***	- **	- ***	- ***	- **	- ***
kundr5	+ **	+	+	+	-	-	+	-	+
yrseducm	+	- **	-	-	-	+	-	-	+
unionrt	-	+	+ **	+	-	+	+	+	- **
urban	- *	- ***	- ***	- ***	- ***	-	- ***	- ***	- *
sample size	669	2540	2739	2927	2722	2231	2712	3151	3265
%vpt[a]	5.7	3.7	3.1	3.3	3.1	3.3	3.7	2.5	2.5

* significant at the 10 percent level.
** significant at the 5 percent level.
*** significant at the 1 percent level.
[a] percent of sample that is employed part-time involuntarily.

Moreover, certain variables affect younger individuals more, while other variables affect older individuals more. For example, the number of children under the age of five is more frequently significant in its effect upon the part-time employment of individuals under 40. The same is true for the unemployment rate. In the former case, the lack of significance among older individuals may be due to the rarity of children still under the age of five. In the latter case, the lack of experience among younger individuals may make them more sensitive to downturns than older, more experienced workers.

Spouse's education is more frequently significant in its effect upon part-time employment of people over 35. This result is largely due to the strong effect of accumulated wealth on older women's tastes for reduced hours of work.[13]

In general, the results of the estimation support the hypotheses outlined on pages 58-60. Moreover, they confirm and extend what has been reported in the few recent studies of involuntary part-time employment.

TABLE 4
Signs and Significances of Coefficients, Multinomial Logit Results
Log of the Odds, Part-time Voluntarily vs. Full-time Males

	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
constant	- ***	- ***	- ***	- **	-	- **	- ***	-	- *
race	+	+	+ **	+	+	+ ***	+	+	+
marstat	-	- *	-	-	-	-	+	-	- *
urate	+	+ ***	+	-	+	+	+	+	+
yrseducm	+ ***	+ ***	+	-	-	+	+	-	-
kundr5	-	+	-	+	+ **	-	-	-	+
yrseducf	+	+	+	+	-	-	-	+	+
unionrt	+	-	+	+	+	-	+	-	- *
urban	-	+	-	+	- **	-	-	- ***	-
sample size	275	2193	3294	2366	2304	2909	3064	2755	2848
%vpt[a]	13.5	5.7	2.3	1.0	1.1	1.2	0.8	1.5	2.3

* significant at the 10 percent level
** significant at the 5 percent level
*** significant at the 1 percent level
[a] percent of sample that is employed part-time voluntarily

CONCLUSIONS

In conclusion, when analyzing labor force behavior, it is important to differentiate between voluntary and involuntary part-time employment. These statuses are qualitatively different states, which people experience for different reasons. The evidence reported here supports this conclusion, by showing that the determinants of these states greatly differ. In addition, the determinants often vary with gender and age.

The findings of this study have some interesting implications for public policy aimed at labor market outcomes. For example, subsidizing child care would in general reduce the odds of part-time employment. This policy would more strongly affect voluntary part-time employment and would affect it more strongly for women than for men.

TABLE 5
Signs and Significances of Coefficients, Multinomial Logit Results
Log of the Odds, Part-time Involuntarily vs. Full-time Males

	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60
constant	+	-	-	-	-	-	-	-	-
race	-	+	+ ***	+ **	-	+	+	+	-
marstat	-	-	-	-	-	+	-	+	- *
urate	+	+ **	+ ***	+	+	+	-	+	+ *
yrseducm	- ***	- ***	- **	- *	-	-	- ***	-	- *
kundr5	+	+ ***	+	-	+	+	-	+ *	+
yrseducf	+	-	-	-	+	-	+	-	+
unionrt	+ **	-	-	+	-	-	+	-	-
urban	-	-	-	- ***	-	- **	- **	+	-
sample size	275	2193	3294	2366	2304	2909	3064	2755	2848
%vpt[a]	4.4	3.8	2.6	2.2	1.6	1.8	1.5	2.1	1.6

* significant at the 10 percent level.
** significant at the 5 percent level.
*** significant at the 1 percent level.
[a] percent of sample that is employed part-time involuntarily.

Encouraging the relocation of individuals to urban areas would also reduce the odds of part-time employment. As with child care programs, relocation programs would affect part-time employment more strongly for women than for men. This policy would more strongly affect involuntary part-time employment, however.

Increasing access to educational opportunities would have mixed effects on the odds of part-time employment. Young individuals would face higher odds of voluntary part-time employment. The odds of voluntary part-time employment for women over 25 would decrease, unless the effect of one's own education were offset by the effect of spouse's education. The odds of involuntary part-time employment would be decreased for both men and women.

Finally, macroeconomic policies to stimulate the economy and reduce the unemployment rate would in general also reduce the odds of part-time employment. In this case,

the effect on men and women would be roughly comparable. Involuntary part-time employment would be more strongly affected than voluntary part-time employment.

In summary, the findings of this study suggest that the effects of policies directed at altering part-time employment status will vary with the characteristics of individuals. Moreover, the design of such policies must depend on whether the target is voluntary or involuntary part-time employment. If inefficiency in labor utilization is the greater concern, then policies must be carefully drafted with that target in mind.

NOTES

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1. *Employment and Earnings*, Table A5 in the January 1968 issue and Table 7 in the January 1988 issue.
2. To be classified as employed full-time, an individual must work at least 35 hours per week.
3. Suppose relatively more of the black part-timers are normally full-timers, but involuntarily became part-timers because of slack conditions. Then characteristics of part-timers would naturally be more similar to full-timers among blacks than among whites.
4. See Amemiya [1981]. A possible alternative to the logit model is the probit model. One of the disadvantages of using probit is that achieving convergence of the likelihood function can be problematic. Both Ham [1982] and Sundt [1988] had such difficulties.
5. In estimating a multinomial logit model, one assumes independence of irrelevant alternatives (IIA). With IIA, the odds between any two statuses are assumed to be unaffected by the existence of other statuses. The assumption can be problematic, especially in applications where some categories are very similar and some very dissimilar. In McFadden's famous transportation example (cited in Amemiya [1981]), there are three options: (1) a car, (2) a blue bus, and (3) a red bus. The probability of choosing a particular option is modeled as the probability that the utility of the option exceeds the utility of both of the other options. So, the probability of choosing a car is P(U1>U2 and U1>U3), or P(U1>U2 | U1>U3)P(U1>U3). With IIA, this probability is calculated as P(U1>U2)P(U1>U3). However, P(U1>U2) probably underestimates P(U1>U2 | U1>U3); those who prefer a car to a red bus are more likely than other people to prefer a car to a blue bus. While the probabilities of included categories may be underestimated because of the IIA assumption, the probability of the reference or omitted category may be overestimated as a result.
   Does violation of the IIA assumption greatly affect the accuracy of the model estimated here? It is difficult to say. Taken pairwise, the options have varying patterns of similarities and dissimilarities. For example, full-time employees and those employed part-time involuntarily have similar tastes affecting labor supply but dissimilar opportunities for employment. Full-time employees and those employed part-time voluntarily have dissimilar tastes but no apparent constraints on their opportunities for employment. People who are employed part-time, whether voluntarily or involuntarily, have similar opportunities for part-time employment but dissimilar tastes. Thus, the extent to which IIA is violated here is not as clear-cut as in the classic McFadden transportation example.
6. An interest in the effects of the **X** variables on the underutilization of labor is well-served by this choice. Note that the set of b's is unaffected by the choice of reference category. Numerical values for b_i-b_6, b_2-b_6, b_3-b_6, and b_4-b_6, along with the constraint that $b_1+b_2+b_3+b_4+b_5=0$, imply a unique set of values for the b's. To measure the effects of the **X** variables on the odds of a status i relative to some status j other than full-time employment, one would have to calculate b_i-b_j by taking the difference of b_i-b_6 and b_j-b_6. Note that this value need not have the same sign as b_i-b_6. For the sake of brevity, these calculations are not discussed here.
7. These variables represent exogenous characteristics that shape a person's current preferences and employment opportunities. Wage and income variables are endogenous and consequently excluded.
8. If the assumption of IIA is valid, this exclusion does not bias the results.
9. This assumption is not expected to cause any serious problems. According to Sundt's [1988] work, very few full-time employed women do so involuntarily.
10. The estimation was performed using the package *Statistical Software Tools*, by Dubin and Rivers. An iterative Newton-Raphson procedure was employed.
11. Information on the odds of other statuses are available from the authors upon request. Detailed results of estimation are presented for each sex for three representative age categories (16-20, 31-35, and 56-60) in Clain and Leppel [1990].

12. The individual's own education accounts for six of these 13 instances, while urban residence accounts for another three.
13. This strong effect could either be due to a greater accumulation of wealth or a greater sensitivity to the income effect of wealth among older women.

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