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A DYNAMIC ANALYSIS OF RECENT CHANGES IN THE RATE OF PART-TIME EMPLOYMENT

by Donald R. Williams

Donald R. Williams is an associate professor of economics at Kent State University, Kent, Ohio. This paper was written while he was a visitor at the Federal Reserve Bank of Cleveland. The author is grateful to Fran Horvath of the U.S. Department of Labor, Bureau of Labor Statistics, for providing the gross change data and to Thomas Nardone for helpful comments and additional data.

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Abstract

The part-time employment rate has declined since the early 1980s, especially among females. This paper examines the decline over the 1980-1990 period, with a focus on the gender differential, using gross change data from the Bureau of Labor Statistics. Monthly transition rates between full-time employment, part-time employment, unemployment, and nonparticipation are estimated according to sex. Trend and cyclical analysis of the transition rates is conducted to identify the sources of part-time employment-rate trends and to explore gender differentials in them. The results suggest that the decline in the rate of part-time employment among females is not so much because unemployed females are more likely to move into full-time employment, but rather because females have become more likely to move from part-time to full-time employment and, most important, because they have become less likely to leave full-time employment once they get there.

I. Introduction

A well-known change in the U.S. labor force over the past three decades has been the rapid growth in the proportion of workers who are employed part-time. For example, in 1957 the part-time employment rate was 12.1 percent, compared with 19.5 percent in 1990.[1] This growth corresponds with an international trend (Thurman and Trah [1990]). The rate of increase declined significantly in the late 1970s, however, and although the current U.S. rate of part-time employment is higher than pre-1970 rates, it has actually fallen since 1980 (from 18.8 percent of employees in 1980 and a peak of 20.6 percent in 1982 to 18.5 percent in 1990).[2] This is primarily the result of a marked decline in the rate of part-time employment among females set against only moderate increases in the rate among males (see figure 1). Still, however, the rate of part-time work among females is considerably greater than for males.

Although previous analyses of changes in the rate of part-time employment have focused on its growth, the insights provided there may be useful in identifying the sources of its decline. The reasons cited in the literature can be broadly classified

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[1]Recent papers highlighting this growth include Tilly (1991) and Ichniowski and Preston (1986).

[2]Calculated from U.S. Department of Labor (1988) and Employment and Earnings, various issues. I should note the difference between the proportion of the employed who work part-time, which is the focus of this paper, and the proportion of the labor force or of the population who work part-time. It is possible to have the first term fall and the other two rise over time if the overall employment rate increases sufficiently.

into those corresponding to supply and demand. On the supply side has been the rapid growth of segments of the labor force who have historically high propensities for part-time employment: females, teenagers, and older workers. Their greater preference for part-time work is usually attributed to a desire for greater flexibility of scheduling on the one hand and for fewer hours on the other, due to home responsibilities, school, and health (Tilly [1991], Nardone [1986]) and the use of part-time employment as a bridge to retirement (Ruhm [1990]). One supply-side factor found not to have contributed to the growth of part-time work has been the overall growth in unemployment (Tilly [1991], Ichniowski and Preston [1986]).

Demand-side factors can be placed in two groups. First is the argument that firms are increasing their use of part-timers in order to decrease costs of production, given the technologies of the firms. Lower costs arise from the propensity to offer fewer fringe benefits (Ichniowski and Preston [1986], 9to5 [1986]), the desire to avoid overtime pay (Belous [1989]), the ability to fend off unions (Tilly [1991], 9to5 [1986]), and the possibility of greater productivity or efficiency of part-time workers (Hallaire [1968]). The second type of change in demand arises from changes in the technologies of firms toward those that correspond to the kinds of jobs best suited for part-time work. Jobs in the retail sector are well suited for part-timers, for example, with an emphasis on daily or weekly peak hours and on flexible schedules (Hallaire [1968]), as are low-skilled jobs with routine and repetitive discrete job tasks (Nollen et al. [1978]).

Of course, there also are interactions between the factors presented above, such that the growth of the female labor force may have facilitated the growth of retail trade, and the move toward low-skilled jobs may have been in response to a growing low-skilled labor force.

The current view of the sources of growth of part-time employment concludes that supply may have been most important through the 1960s and demand through the 1970s (Tilly [1991]). But what explains the decline since 1980? Although the teenage and older populations have been in relative decline as a proportion of the labor force, the female sector has continued to grow (albeit at a declining rate). It is difficult to argue that firms have become less concerned about decreasing costs over the past decade. Likely explanations include a slowing of the transition toward industries and occupations with technologies which lend themselves to part-time work, coupled with an increased preference for full-time employment among women.

The goal of this paper is to shed some light on the issues through an examination of the differences in the levels and trends in part-time employment in a dynamic context. In particular, I focus on the labor-market flows (transitions) between the states of full-time employment, part-time employment, unemployment, and nonparticipation, recognizing that the part-time employment rate at a point in time is a function of these flows. This approach has been used extensively in analyses of variations in unemployment and labor-force participation rates.[3] Although the analysis is primarily descriptive, it can provide insights not available from simple time series analyses of the part-time employment rate alone, nor even from cross-sectional micro-level data (which would nevertheless be useful in analyzing differences in levels).

The next section presents a brief description of the flow approach and the relationship between transition rates and the part-time employment rate. This is followed by a simple dynamic choice model that is extended to include part-time employment. The model highlights the roles of wages, the value of leisure, and the rate of offer of new jobs in explaining part-time rate differentials. Unpublished gross change data from the Bureau of Labor Statistics are then used to estimate trends in the probabilities of transitions between the four labor-market states noted above, separately by gender. I also examine gender differentials in the levels and cyclical responsiveness of the rates.

II. The Flow Approach

Define the following three mutually exclusive labor-market states: full-time employment, part-time employment, and non-

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[3]For analyses focusing on the unemployment rate, see Marston (1976), Ehrenberg (1980), and DeBoer and Seeborg (1989); for participation rates, see Williams (1985, 1987) and Smith and Vanski (1978). Also see Blanchard and Diamond (1990).

employment, and let the number of individuals from the population in each of those states at time t be F_t, P_t, and Z_t, respectively.[4] Denote the numbers of individuals who make transitions from state to state during the interval [t,t+1] as FP_t, FZ_t, PF_t, PZ_t, ZF_t, and ZP_t. Then the transition rate between states I and J at time period t is defined as $\lambda_{ij}=IJ_t/I_t$. Six transition rates describe the flows between the three states. As is the case for unemployment and labor-force participation rates, the part-time employment rate can be expressed as a function of these rates of flow. Following Marston (1976) and defining the steady state as occuring when flows into a state equal flows out of a state, the steady state part-time employment rate, $\underline{PR}=P/(P+F)$, can be written as

$$(1) \qquad \underline{PR} = 1/[1+((\lambda_{PF}+\lambda_{PZ})\lambda_{ZF} + \lambda_{PF}\lambda_{ZP})/((\lambda_{FP}+\lambda_{FZ})\lambda_{ZP} + \lambda_{FP}\lambda_{ZF})].$$ [5]

It is easily shown that the part-time employment rate is directly related to the rates of transition from full- to part-time (λ_{FP}) and nonemployment to part-time (λ_{ZP}) and inversely related to the rates of transition from part- to full-time (λ_{PF}) and part-time to nonemployment (λ_{PZ}). Consequently, trends in the part-time employment rate can be related to trends in these transition rates. Similarly, gender differences in the levels and trends in

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[4]This three-state case is presented only for expositional purposes. The full four-state case is presented below.

[5]This equation is derived in appendix A.

the part-time employment rate can be attributed to gender differences in the levels and trends in the various transition rates. The purpose of the empirical analysis below is to identify the transition rates representing the sources of the trends in the part-time employment rates and gender differentials noted above. That is, we can determine whether the part-time rate is higher for females than for males because females are more likely, for example, to make transitions into part-time employment from nonemployment (λ_{ZP} is greater for females), or because they are less likely to make transitions from part-time to full-time employment (λ_{PF} is lower for females).

III. A Model of Transition Rate Determination

Before examining the empirical evidence, I present a model of the determination of transition rates, which provides a framework for interpreting the transition rate differentials observed. The model is based on one presented (for full-time employment only) by Mortensen and Neumann (1984).[6] I will now allow there to be four labor-market states: unemployment (U), nonparticipation (N), and F and P as above. There are now 12 possible transitions between labor-market states. Individuals are assumed to choose the labor-market state P, F, U or N that maximizes the expected present value of future utility, V,

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[6]The model is very similar to one presented in Burdett et al. (1981). None of the work in this area is concerned with the distinction between full- and part-time employment. Still, the presentation in this paper draws much from that earlier work.

derived from the wage y and the value of leisure u. They make transitions between states only when the value of future utility changes, which occurs when the individual receives a new wage (job) offer or something causes a change in his or her value of leisure. These changes are assumed to occur in random intervals.

In this framework, any transition rate λ_{ij} can be expressed as the product of the probability that a new wage (job) offer or value of leisure has "arrived" and the probability that the change is sufficient to cause the worker to prefer another labor-market state:

$$(2) \qquad \lambda_{ij} = \eta_i \pi_{ij},$$

where η_i is the rate at which new wage offer/value of leisure pairs arrive in state I and π_{ij} is the probability that state J will be preferred, given the change in the wage offer/value of leisure pair. From equation (2) we see that workers who have high arrival rates will be more likely to make transitions than those with low arrival rates, ceteris paribus. The arrival rates are closest to capturing differences in demand-side factors, to the extent they reflect differences in the probability of receiving a job offer.[7] The choice probabilities π_{ij}, on the other hand, more closely represent supply-side factors. The determinants of the choice probabilities are explored in more

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[7]Note, however, that the value of leisure can also change, which generally is interpreted as a supply variable.

detail below.

Choice among Labor-Market States

Rewrite the current wage and value of leisure as $y = w + \epsilon_1$ and $u = v + \epsilon_2$, where w is the mean expected wage, v is the mean expected value of leisure, and ϵ_1 and ϵ_2 are random disturbances (deviations from the mean). To simplify notation, let the currently realized wage offer/value of non-market time pair, $(y, u)=(w+\epsilon_1, v+\epsilon_2)$, be denoted as $(x+\epsilon)$ and define the utility in state I associated with that pair as $U_i(x + \epsilon)$.

Assume that the set of disturbances ϵ changes from time to time to some value ϵ' at random intervals, at the rate given by $\eta_i(x)$. I assume that the time until arrival of the new disturbance has a negative exponential distribution, such that the expected time before ϵ changes again is $1/\eta_i(x)$. Let $F(\epsilon,\epsilon')$ be the distribution of the new disturbance ϵ' given the current value, ϵ. Note that the distribution of disturbances is independent of the state occupied.[8] The worker is assumed to assess her state occupancy each time she is faced by a new disturbance ϵ', choosing the state that yields the highest level of discounted future utility.

The expected present value of future utility associated with state i can be written as a function $V_i(x,\epsilon)$ of the current disturbance and the worker's stationary wage and value of leisure pair. The value associated with state i today is the expected

[8]A more general specification would allow F(.) to be state dependent.

utility derived while currently in state i, plus the expected value of the state the worker chooses to occupy if and when a new disturbance arrives. Under the standard assumption of intertemporally separable utility, this sum can be written as

$$(3) \qquad V_i(x,\epsilon) = E\{\int U_i(x+\epsilon)e^{-rs}ds + e^{-rt} \max_k V_k(x,\epsilon) | \epsilon\},$$

where t_i is the time of arrival of new information and r is the discount rate. The first term can be interpreted as the expected utility enjoyed in state i prior to the arrival of a new disturbance. The second term represents the expected present value of the optimal state choice after a new wage offer/value of leisure pair has arrived. When the new disturbance ϵ is realized, the worker chooses the state k that yields the greatest expected value. Taking expectations, the equation can be written as

$$(4) \qquad V_i(x,\epsilon) = \frac{U_i(x+\epsilon)}{r+\eta_i(x)} + \frac{\eta_i(x)}{r+\eta_i(x)} \Psi(x,\epsilon),$$

where $\Psi(x,\epsilon) = \int \max V_k(x,\epsilon) dF(\epsilon,\epsilon')$. Now let

$$(5) \qquad A_j(x) = \{\epsilon | V_j(x,\epsilon) = \max V_k(x,\epsilon)\}$$

be the "acceptance set" A_j, the set of disturbances $\epsilon = (\epsilon_1,\epsilon_2)$ such that state j is at least as desirable as the other states.

The choice probability from above is simply the probability that the next disturbance ϵ falls in the acceptance set $A_j(x,z)$,

$$(6) \qquad \pi_{ij}(x,\epsilon) = \int_{A_j(x)} dF(\epsilon,\epsilon').$$

Note that it is an increasing function of the "size" of the acceptance set A_j. We thus can discuss differences in the choice probabilities between, for example, males and females in terms of differences in the sizes of their acceptance sets.

I have noted above that the utilities are state dependent. In particular, I assume that a worker receives utility from the wage only when employed, receives utility from leisure only when not employed full-time, and incurs some cost to searching for employment when unemployed. In addition, I assume that the individuals are risk neutral (wealth maximizers) and write the respective utilities as follows:

$$(7a) \qquad U_P = y = w + \epsilon_1$$

$$(7b) \qquad U_F = ay + (1-a)u = a(w + \epsilon_1) + (1-a)(v + \epsilon_2)$$

$$(7c) \qquad U_U = u - c = (v + \epsilon_2) - c$$

$$(7d) \qquad U_N = u = v + \epsilon_2,$$

where a is the proportion of time that a part-time worker spends employed and c is the cost of search (viewed as lost leisure).

Substitution of these values and the respective arrival rates into equation (4) yields the four value functions V_F, V_P, V_U, and V_N.

The boundaries of the acceptance sets are given by the values of ϵ_1 and ϵ_2 that make the worker indifferent between states (that is, that equate the respective value functions). Hypothetical sets of such boundaries are depicted in figure 2. The relevant (dominant) regions of the boundaries are solid lines, and partition the (ϵ_1, ϵ_2) space into the four acceptance sets A_F, A_P, A_U, and A_N. The sizes of the acceptance sets, and hence the probability that a given state will be chosen at the arrival of a new wage or value of leisure, are determined by the positions of these boundaries. Equations for the boundaries are given in appendix B.

Two key assumptions about the relative magnitudes of the arrival rates have been made in order to construct these boundaries. First, it is assumed that there is no job search when a worker is employed either full- or part-time, so that there should be no reason to expect the arrival rates to differ in the F and P states ($\eta_F=\eta_P$). This causes the boundary between the full- and part-time acceptance sets to have slope equal to one. Second, we must assume that the arrival rate is greater when a worker is unemployed than when not participating ($\eta_U>\eta_N$), or there would never be a reason to prefer U to N.[9]

[9]Both of these rationales refer only to the wage disturbance, ϵ_1, while the arrival rate also applies to the disturbance in the value of leisure. They are valid if the rate

(continued)

Comparative Statics

In the context of this model, changes (or differences) in the choice probabilities can arise from changes (differences) in the values of the four variables in the utility functions (w, v, c, and a) and the four arrival rates. Because the part-time employment rate is most influenced by the rates of transition into and out of full- and part-time employment, the focus is primarily on those rates. For purposes of this discussion I drop the notation regarding the initial state, and refer to the choice probability π_j as the probability that state J is chosen at the next arrival of a new wage/value of leisure pair, regardless of the initial state. In all cases I begin with the situation depicted in panel (a) of figure 2. The effects of changes in proportion a are not examined. The comparative statics results are derived by differentiating the equations for the borders with respect to the variable of interest.

Effects of changes in the mean wage

An increase in w, the mean wage, causes the acceptance sets to change, as depicted in figure 3. The full-time/part-time, part-time/nonparticipation, and full-time/unemployment borders all make parallel shifts downward. As a result, the full-time acceptance set is clearly larger, while the part-time set remains the same size. From equation (5) we see that the choice probability π_F rises, while the choice probability π_P does not change. Consequently, we would expect high-wage

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of change of the value of leisure is not state dependent.

workers to have higher rates of flow into full-time employment and lower rates of flow out of full-time employment than low-wage workers, ceteris paribus, while the rates of flow into and out of part-time employment would not differ. The net effect is that high-wage workers will have lower part-time employment rates than will low-wage workers. Another way to view it is that an increase in the mean wage causes full-time employment to become relatively more attractive than part-time employment, such that the part-time employment rate falls.

Effects of changes in the value of leisure

An increase in the mean value of leisure, v, causes all of the borders to shift to the left, as depicted in figure 4. The unemployment and full-time employment acceptance sets decrease in size, while the part-time set remains the same size. The nonparticipation acceptance set, on the other hand, increases. These changes imply that part-time employment becomes more attractive relative to full-time employment, such that the part-time employment rate should rise. Workers with high values of leisure will have higher rates of flow out of full-time employment and lower rates of flow into full-time employment than will those with low values of leisure.

Effects of changes in costs of search

Under my assumptions of no search while employed, an increase in the costs of search leaves the part-time acceptance set unchanged. The unemployment set decreases, however, with corresponding increases in the nonparticipation and full-time employment sets. The figure basically changes from panel (a) to panel (b) in figure 2. Since the full-time employment set increases, the rate of flow into full-time work will rise, and the rate of flow out of full-time work will fall, such that the part-time employment rate will decrease.

Changes in arrival rates

The effects on choice probabilities of changes in the arrival rates basically come through changes in the slopes of the borders between the four acceptance sets. To summarize the results with respect to A_F and A_P, we have the following: The full-time employment choice probability increases with η_F and decreases with η_U and η_N, while the part-time employment choice probability increases with η_N and decreases with η_P. The effects on transition rates are less clear, however, since the transition rate is the product of the choice probability with the arrival rate itself (equation 2).

Summary

In section III I have presented a model of choice among the four labor-market states of full- and part-time employment, unemployment, and nonparticipation, which allows us to derive relationships between transition rates and variables such as wage levels, the value of leisure, and costs of search. Presumably gender differences and trends in transition rates over time can be related to differences or trends in these variables. In the context of this model, the male/female part-time employment rate differential can result, for example, from well-known gender differentials in wages. The model also predicts that females will have higher part-time rates if they have higher values of leisure (on average). Sources of the recent decrease in the part-time employment rate among females therefore also include rising wages and declining values of leisure.

The model presented here is based on several simplifying assumptions that might be questioned. For example, it is assumed that job search occurs only when workers are unemployed, in the face of a growing literature stressing the importance of "on-the-job" search in our economy. More important, I have ignored the particular role that on-the-job search while workers are employed part-time can play in facilitating their moves into full-time employment, especially among females (Blank [1989]). Another weakness of the model is that there is no distinction between the wages or other characteristics of full- and part-time jobs, including nonpecuniary rewards or fringe benefits. Both of these factors could be incorporated into the model. I could allow some lost utility from search while in the part-time state, adding a term to equation 7b, or I could adjust the definitions of wages in equations 7a-7c. Neither of these variations would be expected to alter the qualitative results presented above, however. But finally, I do not distinguish between the arrival of full- vs. part-time job offers. As a result, it is somewhat difficult in the context of this model to imagine that females might be more likely to be offered part-time employment than males. This is a difficult problem, and an inadequacy of the model.

IV. Data

The data are from table 4 of the unpublished "Gross Change Tables," available from the U.S. Department of Labor, Bureau of Labor Statistics (BLS).[10] The table indicates, in a given month, the employment status of the civilian labor force by employment status in the previous month, for the entire population and by sex. The estimates are calculated by BLS using data from the Current Population Survey. Unlike other gross change tables, table 4 differentiates between full- and part-time employment status.[11] The data used in this paper are from the tables for January 1980 through July 1989, the most recent available month. The figures are not seasonally adjusted. These raw flow data are used to calculate monthly transition rates between the four labor-market states, for the entire sample time period, by sex.

The average monthly transition rates for this sample time

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[10]For a description of the gross change data in general and their problems, see Flaim and Hogue (1985); for a method to adjust the data, see Abowd and Zellner (1985). I use the raw, unadjusted data in this analysis.

[11]The table gives the number employed full-time, part-time for economic reasons, and "voluntary" part-time, the number with jobs but not at work (broken down by reason), the number unemployed, and the number out of the labor force (by reason). Unlike published figures in Employment and Earnings, in these tables those with jobs but not at work have not been allocated to the full- and part-time employment categories. In the empirical analysis that follows, I have allocated them according to the ratio used by the BLS for its published tables, which is based on whether the individual "usually" worked full- or part-time.

period are presented in table 1. The estimates suggest that there is considerable movement between states over time. For example, on average about 42 percent of the males in part-time employment in one month moved to another state in the next month. The highest rates of flow are from part-time (P) to full-time (F) employment for males and from unemployment (U) to nonparticipation (N) for females. Note that these rates are not indicative of the raw magnitudes of the flows, since they are conditioned on the number of people initially in the state.

There are some significant gender differentials in the average transition probabilities in this time period. The most striking is that males are much more likely than females to make transitions from P to F, and less likely to make the F to P transition. Males also are more likely to make the U to F transition. Indeed, the relative odds than an unemployed worker will move to full-time as opposed to part-time employment are about 1 1/2 times as high for males as they are for females. All of these differences cause the part-time employment rate to be lower for males than for females. Another gender difference is that males are significantly less likely to make the transition from U to N, which has been noted in previous work.

One of the insights provided by this analysis is that the gender differential in part-time employment rates is a function of the rates of flow <u>out of</u> states as well as the rates of flow into states. It is true that males are much more likely than females to enter full-time employment from the other states. But in addition, males are less likely to leave full-time employment once they get there. Less than 6 percent of full-time employed males made a transition out of that state in the average month, compared to about 10 percent of full-time employed females. This contributes to males having a higher full-time rate. Similarly, although females are more likely to enter part-time employment from other states (except nonparticipation),[12] they are less likely to leave it once they get there (31 percent exit rate for females vs. 42 percent for males). Note that females are less likely than males to make transitions from part-time employment into unemployment and nonparticipation, as well as into full-time employment. These differences in transition rate levels will be examined again in the discussion in section VI. The following section examines trends and the cyclical variability of the rates.

V. Empirical Analysis

Using the flow data for the January 1980 to July 1989 period, we have a monthly time series of 115 observations for each of the 12 transition rates, for both males and females. The empirical analysis is simply to estimate the parameters of the following equation for each transition, by sex:

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[12] Using the absolute rates in the table, females are "less likely" than males to make the N to P transition. If you consider that rate relative to the rate of flow of N to F, however, then females are more likely to end up part-time.

$$(8) \qquad \log(\lambda_{ij})_t = \alpha + \beta_1 TIME_t + \beta_2 \log(URAT_{t-1}) + \Gamma(\text{Monthly Dummies}),$$

where TIME takes the value 1 in January 1980 and URAT is the unemployment rate for males with spouse present, a commonly used measure for business cycle effects. A vector of monthly dummy variables is used to capture seasonal variations in the transition rates, with December being the excluded month.

The natural log of the transition and unemployment rates is used such that the coefficient β_2 represents the elasticity of the transition rate with respect to the unemployment rate. This makes comparisons of cyclical responsiveness fairly straightforward, both across rates and across gender groups. The trend coefficient (β_1) can be interpreted as the average rate of growth of the transition rate. A lagged (rather than contemporaneous) unemployment rate is used simply to mitigate the effect of the simultaneous nature of the determination of the flow and unemployment rates. A specification also was estimated using the contemporaneous rate, which yielded results qualitatively the same as those presented below.

Five of the transition rate series exhibited evidence of first-order serial correlation for at least one gender group. For those transitions, the parameters were estimated assuming a first-order autoregressive process, using the Prais-Winsten procedure. The parameters were estimated using ordinary least squares (OLS) for the remaining seven transition rates. The estimated coefficients and their standard errors for the trend and cyclical variables are presented in table 2 (the coefficients for the seasonal dummies are available upon request). The Durbin-Watson statistics are from the initial OLS regressions.

Analysis of Trends

Referring first to the trend estimates, for males there are negative and significant trends in the probabilities of transitions from F to U, P to N, U to F, N to F, N to P, and N to U. There is a significant positive trend in the probability of transition from U to P. Some of these trends have contributed to the slight overall increase in the rate of part-time employment exhibited by males in the 1980-90 period (for example, the increase in λ_{UP} and decreases in λ_{UF} and λ_{NF}), while others have worked against it and explain the decreasing rate since 1983 (for example, the decreases in λ_{FU} and λ_{NP}).

The transition rates for females have exhibited significant negative trends for the F to U, F to N, P to U, and P to N transitions. All of these signify a greater degree of attachment to work among females; that is, females are less likely to leave employment, for both full- and part-time. The magnitudes of the coefficients indicate that the trends have been strongest in the flows from full-time employment, which contributes to the decline in the part-time employment rate. Also contributing to this decline are the positive trends in the probabilities of transitions from P to F and N to F. But at the same time, the rates of flow from U to P and N to P also increased (reflecting the increased labor-force participation among females), which would tend to increase the part-time employment rate.

Note that there is no evidence of a significant positive trend in the U to F transition rate (indeed, the trend coefficient is of the opposite sign). The growth of female full-time employment therefore is not the result of an increase in the proportion of unemployed females finding full-time employment. Rather, the growth has been the result of the joint product of increases in the proportion of females moving from part-time to full-time employment and decreases in the proportion leaving full-time employment when they get there.

Finally, as an aside, there are significant gender differences in transition rate trends that should be highlighted. First, there is a significant (.01 level) difference in the trend coefficient for the F to N transition, with females exhibiting a greater decline. Similarly, the trend coefficient is significantly larger (in absolute value) for females for the transition from P to N. The coefficients for all of the transitions from nonparticipation are significantly different, even exhibiting different signs for N to P and N to F.

Cyclical Variability

Although the focus of the paper has not been on the cyclical variability of the part-time employment rate for either gender group, one of the most striking features of table 2 is the strong cyclical responsiveness of nearly all of the transition rates. For both males and females, there are strong decreases in the rates of flow out of unemployment as unemployment rates rise (as would be expected), and increases in the rate of flow into unemployment from all of the other states. For both sexes, there is a difference between the responsiveness of the flows into and out of full- and part-time employment. Flows from U to F are more cyclically sensitive than those from U to P, while flows from P to U are more cyclically sensitive than those from F to U.

Consistent with evidence regarding hours adjustments over the business cycle, the rate of flow from F to P increases in an economic downturn. The rate of flow from P to F decreases as the unemployment rate rises, but only for females. The findings regarding the cyclical responsiveness of the N to U and U to N transitions are consistent with those from earlier time periods (Williams [1985], Deboer and Seeborg [1989]).

There are significant gender differences in the cyclical responsiveness of several of the transition rates. The effect of an increase in the unemployment rate is significantly greater for males for the F to P, P to U, P to N, U to N, and N to F transitions. These findings are consistent with earlier work, which did not differentiate between full- and part-time employment (Williams [1985], DeBoer and Seeborg [1989]). They have implications for that work, however, since the gender differences in exit rates from employment appear to be from part-time rather than full-time employment, at least for the time period studied here.

VI. Discussion of the Results

As is noted above, this paper is primarily descriptive in nature, with the simple identification of trends and gender differences in transition probabilities as its goal. The results suggest that there are several key transition rates contributing to the gender differential in the level of the part-time employment rate and to trends in that rate over the 1980-90 period. First, the female part-time employment rate is higher than the male rate because females have higher probabilities of transitions from F to P and N, and lower probabilities of transitions from P to F or U, and a lower probability of transition from U to F. But at the same time, the female part-time rate has been falling because the F to U and F to N rates are falling while the P to F and N to F rates have been rising.

In the context of the model presented in section III, the sources of these differences and trends are likely the following: first, the gender differentials in the F to P, P to F, and U to F transition rates could result from higher wages among males and higher values of leisure among females. They could also result from higher rates of arrival of full-time (vs. part-time) job offers for males, a factor not explicit in the model. One source of a higher value of leisure among females is the unequal distribution of responsibilities at home, including housekeeping, cooking, and child care.

It is possible that changes in wages are one source of the <u>trends</u> in transition rates as well, since the wages of females have been rising relative to males. According to the model, this trend would increase (relative to males) the female rates of flow into, and decrease the rates of flow out of, full-time employment. But this hypothesis is somewhat weakened by the fact that the female/male earnings ratio was also rising (though at variable rates) during a long period during which the female part-time rate was increasing. A similar statement could be made with regard to the hypothesis that the trends we observe are the result of a decline in the value of leisure among females. Nevertheless, both the rising wage and falling value of leisure hypotheses are consistent with the finding that the female rates of flow out of full-time employment have been falling.

Another hypothesis regarding the decline of part-time employment is that the rate of offer of full-time jobs has been rising. This is not especially convincing, however, since we find no evidence that the U to F transition rate has been rising, although it is consistent with the results for the N to F and P to F transitions. The role for the hypothesis is further diminished, however, to the extent that a major cause of the decrease in the part-time employment rate is the tendency for females to be more likely to stay in full-time jobs rather than more likely to get them.

VII. Summary and Concluding Remarks

This paper has examined recent changes in the rate of part-time employment in the United States from a new perspective, focusing on changes in the probabilities of making transitions between full-time employment, part-time employment, unemployment, and nonparticipation. Using monthly gross change data for the 1980-89 time period, I find that several transition rates have exhibited trends that contribute to the declining propensity to work part-time, especially among females. The results point to one important source of this change: a decreased propensity to leave full-time employment, as well as an increased propensity to enter it.

A model of labor-market dynamics presented here suggests that changes in wages, in the value of leisure, and in the rate of offer of full-time jobs all could have contributed to the trends in transition rates that are the source of the decline of part-time employment among females. Testing these hypotheses is a topic for further research, which could proceed in two main directions. First, more variables could be added to the time-series regressions presented here. A more fruitful direction, however, would be to analyze the transition behavior for a sample of individuals from a longitudinal data set, such as the National Longitudinal Survey or Panel Study of Income Dynamics. In particular, the analysis should estimate the influence of variables such as wages, number of children, and the availability of child care on individual transition probabilities, following the now common techniques proposed by Heckman, Singer, and others.[13] Given the lengths of the panels, it would also be possible to examine changes in the influence of the variables over time.

Regardless of the methodology, major focuses of further research should be the increased duration of full-time employment among females on the one hand, and the increased rate of flow from part-time to full-time employment on the other. Regarding perhaps both of these phenomena is an additional hypothesis, that females are simply more "career oriented" than in the past, which has led them to choose jobs that are more stable and that provide more opportunity for career advancement. Cause and effect are as always difficult to disentangle, and perhaps this is just reflective of the higher wage/lower value of leisure hypotheses. Nonetheless, it is a factor that also should be examined in detail.

[13]Blank (1989) presents estimates of the parameters of hazard functions for a sample of females from the PSID. Although she includes several variables that I would want to include, there is no control for wages.

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Table 1: Means and Standard Deviations of Monthly Transition Rates, by Sex

	Percent Making Transition			
	Males		Females	
Transition	Mean	St Dev	Mean	St Dev
F to P	3.58	0.47	7.47	1.06
F to U	1.42	0.29	1.05	0.21
F to N	1.11	0.46	2.20	0.66
P to F	27.66	4.42	19.44	3.57
P to U	5.56	0.99	2.47	0.49
P to N	9.41	1.95	9.15	1.37
U to F	16.55	3.41	11.08	2.28
U to P	10.41	1.70	11.99	1.70
U to N	14.94	2.07	27.04	2.10
N to F	2.42	1.00	1.41	0.42
N to P	3.24	0.56	2.70	0.41
N to U	3.49	0.72	2.35	0.37

Note: F=full-time employed, P=part-time employed, U=unemployed, N=not in labor force.
Source: Author's calculations from BLS gross change data, Jan. 1980-July 1989.

Table 2: Regression Results (Equation 8)

Coefficients
(Standard Errors)

MALES

Transition	Intercept	TIME	Log(URAT)	R-Square	D.W.
F to P	.9213[c]	.0005	.1803[c]	.5500	2.204
	(.0893)	(.0003)	(.0476)		
F to U*	.0815	-.0022[c]	.2775[c]	.6980	1.314
	(.1173)	(.0004)	(.0649)		
F to N	.0087	-.0005	-.1231[b]	.9091	1.989
	(.0912)	(.0004)	(.0486)		
P to F*	3.159[c]	.0002	-.0118	.8013	2.586
	(.0671)	(.0002)	(.0340)		
P to U*	1.073[c]	-.0004	.4326[c]	.6671	1.467
	(.1115)	(.0004)	(.0610)		
P to N	2.542[c]	-.0007[b]	-.2345[c]	.8563	2.062
	(.0680)	(.0003)	(.0362)		
U to F	3.308[c]	-.0006[a]	-.5473[c]	.8249	2.183
	(.0867)	(.0003)	(.0462)		
U to P*	2.612[c]	.0016[c]	-.2926[c]	.7987	2.266
	(.0648)	(.0003)	(.0357)		
U to N	3.307[c]	-.0000	-.3916[c]	.5355	1.802
	(.1060)	(.0004)	(.0565)		
N to F	.9883[c]	-.0016[c]	-.3509[c]	.9226	2.269
	(.0938)	(.0004)	(.0499)		
N to P	1.199[c]	-.0006[b]	-.1364[c]	.7227	2.258
	(.0858)	(.0003)	(.0457)		
N to U*	.6024[c]	-.0017[c]	.3877[c]	.8548	1.947
	(.0737)	(.0003)	(.0393)		

*Estimates based on assumption of first-order autoregressive process. The Durbin-Watson (D.W.) statistics are from the original OLS regressions.
Note: Coefficients significantly different from zero at (a) .10, (b) .05, or (c) .01 level.
Source: Author's calculations.

Table 2: Regression Results (Equation 8), continued

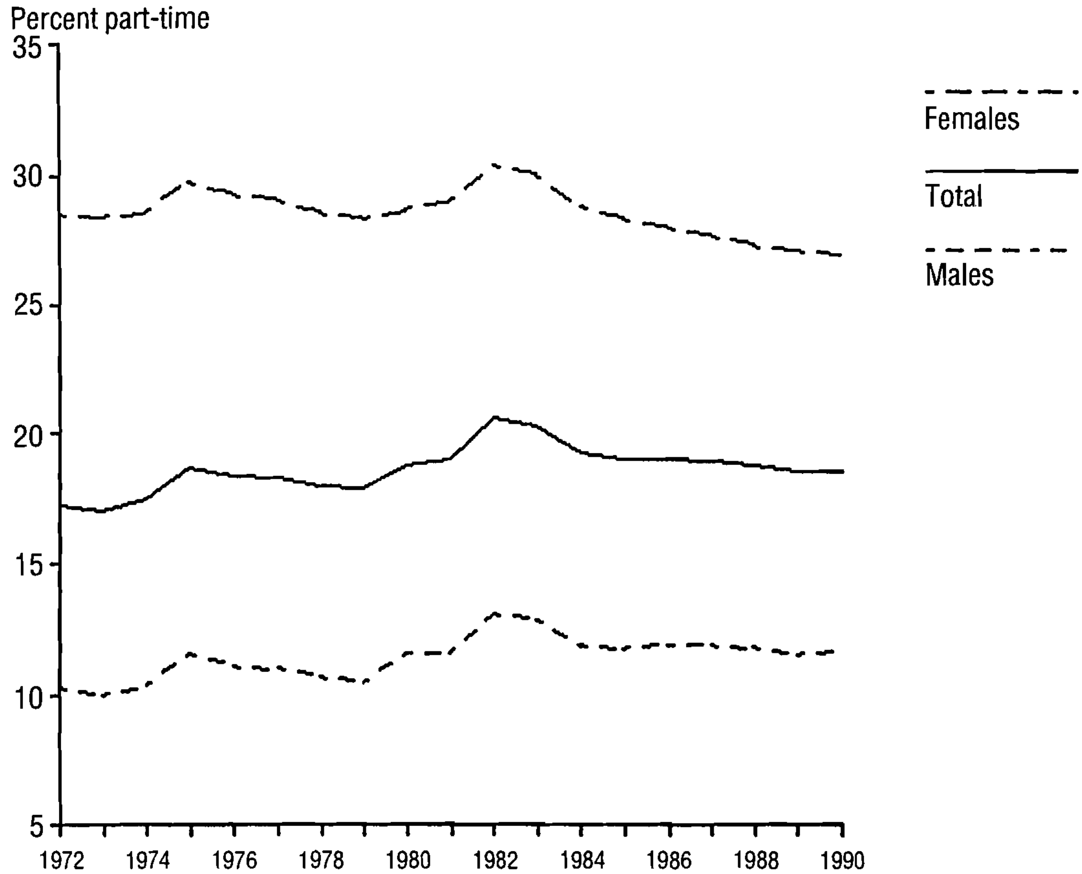
Coefficients
(Standard Errors)

FEMALES

Transition	Intercept	TIME	Log(URAT)	R-Square	D.W.
F to P	1.748[c]	-.0001	.0569[b]	.8520	1.639
	(.0498)	(.0001)	(.0265)		
F to U*	-.2903[b]	-.0026[c]	.2132[c]	.6322	1.710
	(.1251)	(.0005)	(.0676)		
F to N	.8082[c]	-.0023[c]	-.1569[c]	.9078	1.924
	(.0801)	(.0003)	(.0427)		
P to F*	2.862[c]	.0005[b]	-.0701[b]	.9256	2.077
	(.0462)	(.0002)	(.0245)		
P to U*	.3168[c]	-.0009[b]	.3101[c]	.7675	1.633
	(.1026)	(.0004)	(.0558)		
P to N	2.343[c]	-.0014[c]	-.1218[c]	.8482	2.160
	(.0544)	(.0002)	(.0290)		
U to F	2.880[c]	-.0004	-.5020[c]	.7549	2.094
	(.0986)	(.0004)	(.0525)		
U to P*	2.768[c]	.0009[c]	-.2547[c]	.7497	1.450
	(.0774)	(.0003)	(.0425)		
U to N	3.552[c]	-.0001	-.1520[c]	.4748	2.108
	(.0504)	(.0002)	(.0268)		
N to F	.2454[c]	.0005	-.2320[c]	.9058	1.744
	(.0842)	(.0003)	(.0448)		
N to P	1.024[c]	.0005[b]	-.1277[c]	.7982	2.296
	(.0620)	(.0002)	(.0330)		
N to U*	.1307	-.0003	.3184[c]	.8225	1.545
	(.0796)	(.0003)	(.0435)		

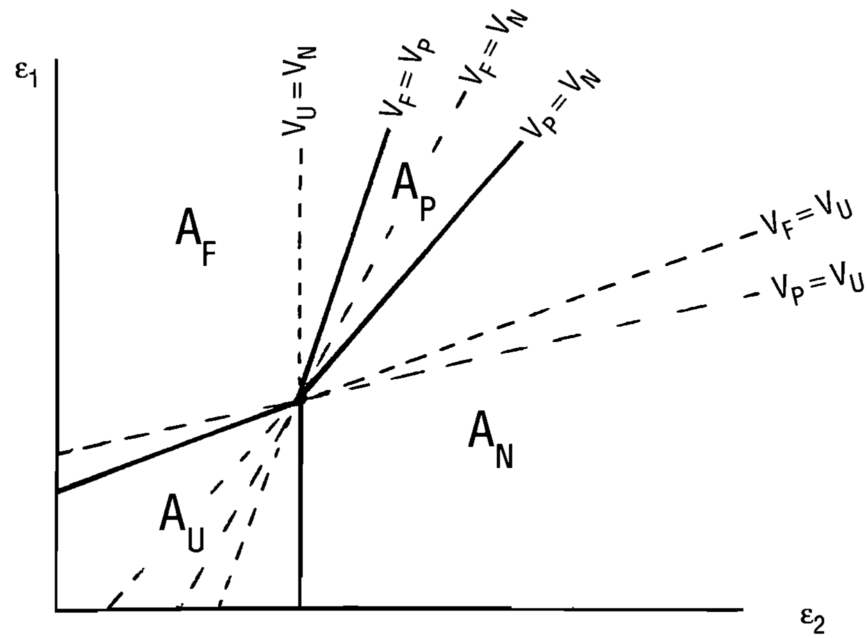
*Estimates based on assumption of first-order autoregressive process. The Durbin-Watson (D.W.) statistics are from the original OLS regressions.
Note: Coefficients significantly different from zero at (a) .10, (b) .05, or (c) .01 level.
Source: Author's calculations.

Figure 1: Part-Time Employment Rate, 1972–1990

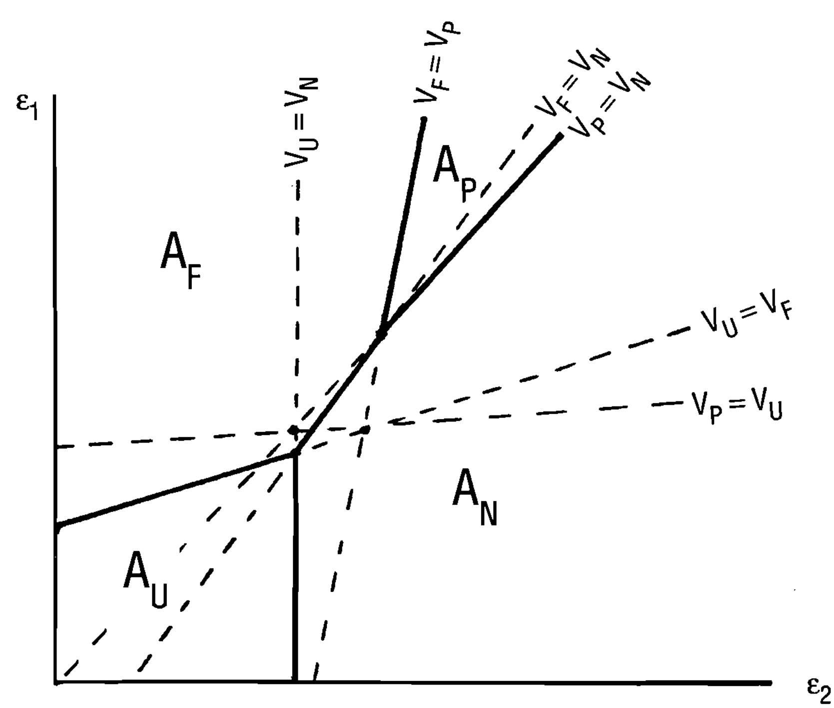


Source: Author's calculations from data in U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings,* various issues.

Figure 2: Hypothetical Acceptance Sets



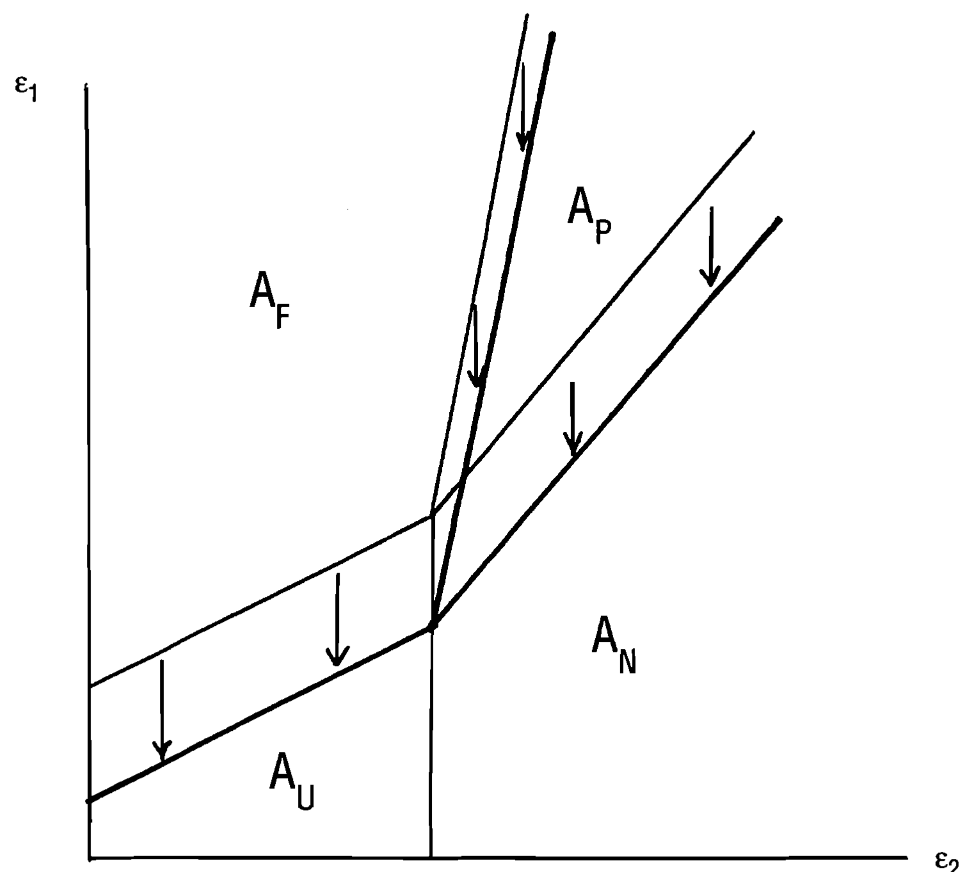
(a)



(b)

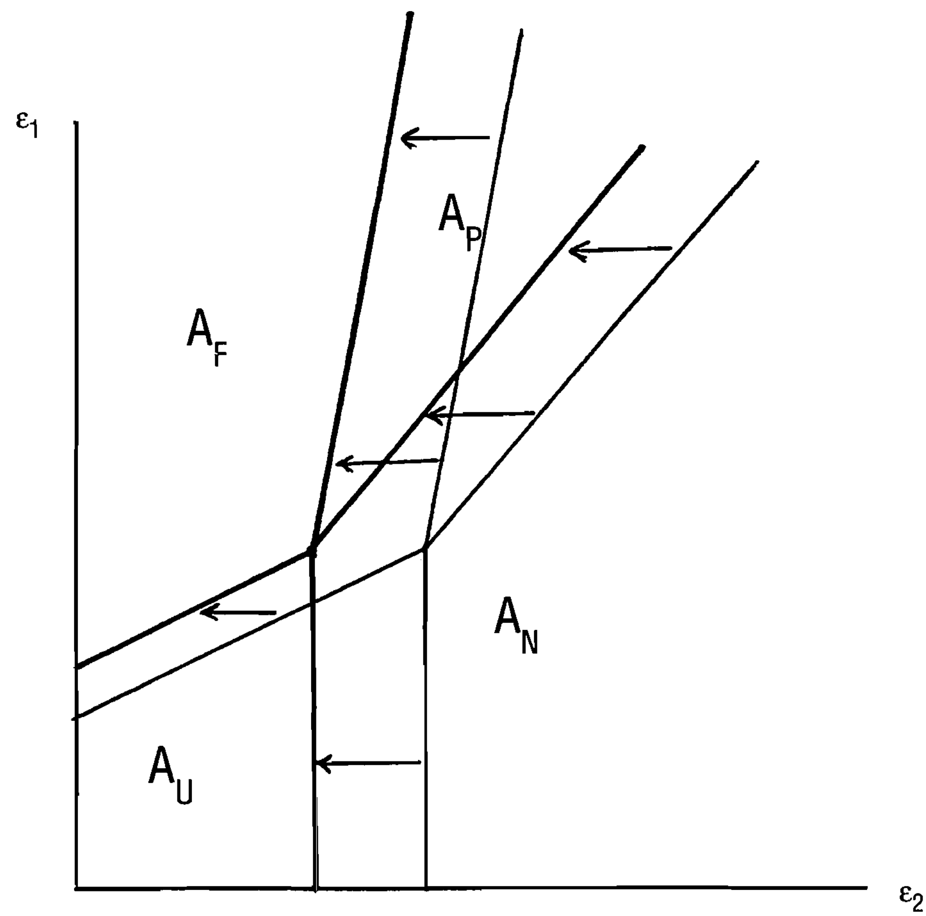
Source: Author.

Figure 3: Effect of an Increase in the Average Wage



Source: Author.

Figure 4: Effect of an Increase in the Value of Leisure



Source: Author.

APPENDIX A

DERIVATION OF THE PART-TIME EMPLOYMENT RATE

In the steady state, the flow into a state is equal to the flow from a state. For part-time, this condition implies

(A1) $$P(\lambda_{PF} + \lambda_{PX}) = F\lambda_{FP} + X\lambda_{XP},$$

and for full-time,

(A2) $$F(\lambda_{FP} + \lambda_{FX}) = P\lambda_{PF} + X\lambda_{XF}.$$

Multiply equation A1 by λ_{XF} and equation A2 by λ_{XP}, and subtract A2 from A1 to get

(A3) $$P[(\lambda_{PF} + \lambda_{PX})\lambda_{XF} + \lambda_{PF}\lambda_{XP}] = F[(\lambda_{FP} + \lambda_{FX})\lambda_{XP} + \lambda_{FP}\lambda_{XF}].$$

Solving this equation for P, substituting for P in <u>PR</u> = P/(P+F), and rearranging terms yields equation (1) in the text.

APPENDIX B

EQUATIONS FOR THE ACCEPTANCE SET BORDERS

$\underline{V_F=V_P}$:

$$e_1 = v - w + e_2$$

$\underline{V_F=V_U}$:

$$e_1 = (r+\eta_F)\left[\frac{v+e_2-c}{r+\eta_U} + \Psi\left(\frac{\eta_U}{r+\eta_U} - \frac{\eta_F}{r+\eta_F}\right)\right] - w$$

$\underline{V_F=V_N}$:

$$e_1 = (r+\eta_F)\left[\frac{v+e_2}{r+\eta_N} + \Psi\left(\frac{\eta_N}{r+\eta_N} - \frac{\eta_F}{r+\eta_F}\right)\right] - w$$

$\underline{V_P=V_U}$:

$$e_1 = \left(\frac{r+\eta_P}{\alpha}\right)\left[\frac{v+e_2-c}{r+\eta_U} - \frac{(1-\alpha)(v+e_2)}{r+\eta_P} + \Psi\left(\frac{\eta_U}{r+\eta_U} - \frac{\eta_P}{r+\eta_P}\right)\right] - w$$

$\underline{V_P=V_N}$:

$$e_1 = \left(\frac{r+\eta_P}{\alpha}\right)\left[\frac{v+e_2}{r+\eta_N} - \frac{(1-\alpha)(v+e_2)}{r+\eta_P} + \Psi\left(\frac{\eta_N}{r+\eta_N} - \frac{\eta_P}{r+\eta_P}\right)\right] - w$$

$\underline{V_U=V_N}$:

$$e_2 = \left(\frac{1}{r+\eta_U} - \frac{1}{r+\eta_N}\right)\left[\frac{v+c}{r+\eta_U} - \frac{v}{r+\eta_N} + \Psi\left(\frac{\eta_N}{r+\eta_N} - \frac{\eta_U}{r+\eta_U}\right)\right]$$