

On the empirical relationship between unemployment duration, unemployment insurance and voluntary unemployment

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This paper is concerned with the detection of the empirical consequences of nonstationarity in the search behavior of the unemployed. Initially, workers are laid off and forced to search while unemployed. Upon re-employment, individuals may choose an employment search strategy (continue search for better offers) or initiate unemployment (voluntarily) by quitting their job if it is optimal to do so. We refer to this strategy as 'voluntary' unemployment. We analyze how this decision is related to benefit exhaustion or, more generally, to the completed duration of unemployment and we are therefore able to find a relationship between unemployment duration and the incidence of voluntary unemployment. The model is estimated from a panel of young Canadian labor force participants.

1. Introduction and theoretical framework

Job search theory has, through the last 10 or 15 years, generated an impressive number of econometric studies. In a recent survey, Devine and Kiefer (1991) review more than 500 studies. Nonstationarity in job search theory, however, has only recently raised some interest. One of the most important sources of nonstationarity, unemployment benefit exhaustion, has been analyzed theoretically by Burdett (1977) and empirically, through reduced form econometric models, by Ham and Rea (1987), Solon (1987) and Meyer (1990). Van den Berg (1990) has developed and estimated a nonstationary and structural model with UI benefits. Generally speaking, these studies (generally based on single spell unemployment duration analysis) find that the probability of escaping unemployment rises when unemployment benefits lapse. Because most studies make inference from unemployment duration data and, in some cases, also from accepted wage data, very few papers have investigated how nonstationarity in job search may affect subsequent search strategies for the unemployed. Belzil (1990, 1991) has analyzed the effects of nonstationarity on subsequent employed search behavior but did not consider the possibility that individuals may initiate

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unemployment voluntarily. Blau and Robins (1990) and Belzil (1992) have analyzed the relative efficiency of employed vs unemployed search but they assume stationarity. This paper is concerned with the empirical relationships between the search behavior of the re-employed workers and the preceding unemployment duration outcome. The underlying framework may be presented as follows. Initially, workers are laid off (we exclude temporary layoffs) and are forced to use unemployment search which has payoff $V_u(e(t_u))$ where $V(\cdot)$ is increasing in e (the benefit duration period) which, itself, decreases in t_u (elapsed duration of unemployment) because unemployment benefits are received for only a limited period. See Burdett (1977) for a theoretical treatment. However, we assume that the benefit entitlement period increases with job tenure and that workers have unrestricted strategies (they can always quit). The value of employed search, $V_e(w, t_j)$, understood here as the value of remaining employed and waiting for new offers, is increasing in the accepted wage (w) and non-decreasing in t_j (elapsed job tenure) since, as benefit entitlement increases with tenure, the individual may reach a point at which it is optimal to leave employment (voluntarily) and search while unemployed. It is understood that $V_e(\cdot)$ represents the value of remaining employed at a given wage rate for a particular period plus the discounted value of following the optimal strategy (perhaps choosing voluntary unemployment) in the future. The relative values of $V_u(\cdot)$ and $V_e(\cdot)$ are unrestricted, for instance the functions may or may not cross. Given that the individual faces a stationary wage offer distribution $F(\cdot)$ and an offer probability λ_u , the transition out of unemployment is given by

$$\theta_u(t_u) = \lambda_u \{1 - F(w^*(t_u))\}, \quad (1.1)$$

where $w^*(\cdot)$ denotes the reservation wage for the unemployed¹ and implies that the density of unemployment durations, denoted $g(t_u)$, is

$$g(t_u) = -d/dt_u \left\{ \exp \left(- \int_0^{t_u} \theta_u(s) ds \right) \right\}. \quad (1.2)$$

This implies that the accepted (re-employment) wage depends on the completed duration of unemployment, that is

$$E(w_j) = \int_0^\infty E(w | w \geq w^*(t_u)) g(t_u) dt_u. \quad (1.3)$$

Note that two cases are interesting to consider upon re-employment since newly re-employed workers now face two strategies (employment and voluntary unemployment) with respective payoffs $V_e(w_j, t_j)$ and $V_u(e(t_j))$ that are both increasing with tenure since the worker accumulates entitlement period with job tenure. First, if at a given t and given an accepted wage w $V_e(\cdot) > V_u(\cdot)$, then it is optimal to remain employed and wait for new offers. Some of these individuals are those who eventually change jobs without intervening unemployment. Belzil (1990, 1991) derived the job hazard rate [such as in eq. (1.1)] for this case and looked at potential stigma effects. However, if at some time t the inequality is reversed (perhaps because the worker has now accumulated UI benefit entitlement for a long period), it is optimal to quit to become unemployed. We refer to that as 'voluntary unemployment'. In this simple model, we see that the incidence of unemployment

¹ Burdett and Sharma (1988) have pointed out that in a nonstationary environment, individuals may sometimes be willing to accept any job offer for a limited period in order to re-qualify for unemployment benefits. It may therefore be possible that the reservation wage may actually be 0 (acceptance probability = 1).

(voluntary) is related to the unemployment duration outcome. It is this relationship that we analyze now through a simple discrete choice model (nonstationary) between an employment and an unemployment strategy. An employment search strategy will therefore be simply defined as the complement state of unemployment and contains all individuals who either held on to their accepted job over all the sample period or those who changed jobs without unemployment (using employed job search). Those who will have been laid off will be treated as censored spells.

2. Econometric specification

In order to make inference from actual data, we assume the following parametrization for the values of the two mutually exclusive strategies: quitting for unemployment $V_u(\cdot)$ and remaining employed $V_e(\cdot)$. More precisely, if we set calendar time at 0 (when the accepted job started), we have that the value of initiating unemployment voluntarily (quit for unemployment) for individual i with job tenure t is given by

$$V_i^u(t) = X_{it}\beta^u + \epsilon_{it}^u, \quad \epsilon_{it}^u \sim \text{i.i.d. } N(0, \sigma_u^2), \quad (2.1)$$

where X_{it} represents a vector of individual or labor market characteristics which may in general depend on tenure (time) such as in the case of the potential benefit period. Similarly, the value of continuing employment (not quitting for unemployment), is given by

$$V_i^e(t) = X_{it}\beta^e + \epsilon_{it}^e, \quad \epsilon_{it}^e \sim \text{i.i.d. } N(0, \sigma_e^2). \quad (2.2)$$

Clearly, V_u and V_e are latent variables, and we can define $V_i(t)$ as

$$V_i(t) = X_{it}\beta + \epsilon_{it}, \quad \epsilon_{it} \sim \text{i.i.d. } N(0, \sigma^2), \quad (2.3)$$

where $\beta = \beta^u - \beta^e$ and $\epsilon_{it} = \epsilon_{it}^u - \epsilon_{it}^e$ and σ^2 is normalized to 1. Clearly, an employed worker will quit for unemployment (at time t) only if $V_i(t)$ exceeds 0. Note that (2.3) defines the hazard rate from employment to voluntary unemployment. Since the potential benefit period reaches a maximum (always below 50 weeks) depending on prior experience and current tenure, it enables to identify both the effect job tenure and benefit qualification on the hazard rate. We observed each individual for 52 weeks after the end of his initial spell of unemployment and we therefore defined, for each individual, a waiting time until voluntary unemployment is chosen that we denote D_i . Letting $\nu_i = 1$ if the accepted job has been terminated by a quit to unemployment and 0 if not, we can write the contribution to the likelihood for an individual characterized by a re-employment history given by $\{D_i, \nu_i\}$ as follows:

$$L_i(\beta) = \prod_{s=1}^{D_i-1} \left\{ (1 - \theta_{\text{qui}}(s)) \theta_{\text{qui}}(D_i) \right\}^{\nu_i} (1 - \theta_{\text{qui}}(s))^{1-\nu_i}, \quad (2.4)$$

where θ_{qui} , the instantaneous probability of quitting to become unemployed, is

$$\theta_{\text{qui}}(s) = P(V_i(s) > 0) = \{1 - \phi(-X_{is}\beta)\}, \quad (2.5)$$

where $\phi(\cdot)$ denotes the standard normal cumulative distribution function. The likelihood for a

sample of size N is simply the product of (2.4) over all individual contributions. Maximization of the likelihood function is therefore quite straightforward.

3. The data

The model has been estimated from a panel of Canadian labor force participants extracted from the Longitudinal Labor Force File of Employment and Immigration of Canada. The data set covers a period going from January 1972 until December 1984 and contains several pieces of information about employment and unemployment spells of a random sample of Canadian labor force participants and is a merge of three administrative files; Records of Employment, Income Tax Records and UI Administrative Files ². Only a restricted sample has been used: only young males (less than 24 years old) who experienced a permanent layoff (who did not come back with the same employer) immediately followed by an insured spell of unemployment. The data set is particularly convenient since it also enables to capture exogenous variation in the entitlement period (because of change in the UI legislation) and therefore helps solving the collinearity problem that could have existed between the duration of unemployment and the potential (remaining) benefit period at a given point in time. Note that when the accepted job was terminated for a reason other than voluntary unemployment, the waiting time until voluntary unemployment is treated as censored, a common procedure in competing risk analysis [see Lancaster (1990)]. Note that out of our complete sample of laid off workers, 55 had chosen voluntary unemployment once re-employed. Apart from the waiting time until the worker quits for unemployment (our dependent variable of interest), we observe the following regressors: the completed duration of unemployment, the total entitlement period to UI benefits and the number of weeks left when leaving unemployment, experience (when layoff took place), industrial classification, the accepted weekly earnings and the current potential benefit period and level (in dollars) corresponding to each week of tenure once re-employed ³. This information enables us to distinguish between the tenure effect on the probability of choosing voluntary unemployment and the effect due to the increase in UI entitlement if unemployment was chosen. Note that in order to investigate whether the duration of unemployment outcome, through UI benefit exhaustion, affects the probability of re-entering unemployment (voluntarily), we can either use a measure of the exhaustion of benefits such as the number of weeks left or, alternatively, since the reservation wage is expected to be decreasing over time, use the level of the accepted earnings. Finally, we can restrict the homogeneity of the sample by comparing only those who quit their accepted job for a new one without an intervening spell of unemployment (using employed search) to those who quit for unemployment and therefore excluding those who were subsequently laid off. Summary statistics for this sample are given in table 1.

4. Results

The results may be found in table 2. Generally speaking, they are in accord with the hypothesis that longer spells of unemployment should be associated with a higher likelihood of re-entering

² Ham and Rea (1987) use Canadian administrative data quite similar to those used in this paper. Note that this sample has been used in Belzil (1991).

³ Note that, unlike in the U.S. system, job quitters are entitled to claim UI benefits if they quit their job. Remember that the potential benefit period changes with job tenure; that is, it increases to a certain maximum and remains constant thereafter.

Table 1
Summary statistics.

| Variable | Mean | Standard error |
|------------------------------------|------|----------------|
| Experience (weeks) | 127 | 61 |
| Earnings before layoff | 240 | 120 |
| Duration of unemployment | 12 | 18 |
| Potential benefit duration (unemp) | 23 | 14 |
| Accepted earnings (dollars) | 223 | 102 |
| Duration of accepted job (weeks) | 35 | 65 |

unemployment voluntarily since the waiting time until the unemployment strategy is chosen is positively related to benefit exhaustion (negatively related to the number of weeks left) and negatively related with the accepted earnings. It has also been found that the likelihood of quitting for unemployment is increasing with the potential duration of benefit but decreasing with tenure when entitlement (and all other factors) are held constant. Note, however, that the level of the potential benefits does not seem to affect the choice of unemployment significantly. Overall, the data reveals that the incidence of voluntary unemployment (not to be confused with the layoff incidence) is closely related to the unemployment duration outcome. In a certain sense, this result may be viewed as a more general extension of the well-known result about the effects of benefit duration exhaustion on the escape rate out of unemployment.

Table 2
Maximum likelihood estimates. ^{a,b,c}

| Variable/parameter | Full sample | Full sample | Job quitters | Job quitters |
|--|-------------------|-------------------|-------------------|-------------------|
| Intercept | -2.4657 (6.12) | -2.4378 (6.54) | -3.2675 (7.13) | -3.3456 (6.97) |
| Experience | -0.0994 (3.12) | -0.0976 (3.49) | -0.0539 (2.34) | -0.0546 (2.48) |
| Weeks of benefit left when leaving unemp. | -0.4624 (5.12) | - | -0.3967 (4.38) | -0.4503 (4.28) |
| Accepted earnings (in log) | - | 0.3965 (4.27) | - | -0.4287 (3.56) |
| Potential level of benefits (log) | -0.2411 (1.34) | -0.2673 (1.09) | -0.1976 (1.37) | -0.2034 (1.05) |
| Potential duration of benefits | 0.0452 (2.03) | 0.0436 (1.97) | 0.0622 (2.45) | 0.0865 (2.68) |
| Job tenure | -0.0556 (3.29) | -0.0654 (3.68) | -0.0437 (4.69) | -0.0567 (4.91) |
| Log likelihood | -1987.6 | -1985.4 | -587.6 | -585.2 |
| Sample size | 823 | 823 | 225 | 225 |

^a Dependent variable: Waiting time until voluntary unemployment.

^b Parameter estimates for industrial classification are not reported in order to ease the presentation.

^c Numbers in parentheses are asymptotic *t*-statistics.

5. Conclusion

In this paper, we have investigated how nonstationarity in job search (restricted to the limited UI benefit duration) affects the choice of a subsequent search strategy for the currently unemployed. In its generality, job search theory admits that, when the opportunity cost of unemployment is lowered by UI benefit and when the accepted wage is low enough, it may be optimal to quit a job to become unemployed. In such case, voluntary unemployment may help laid off workers to absorb earnings loss due to a random shock (a permanent layoff followed by a long spell of unemployment). We have seen that this hypothesis is consistent with Canadian data in the sense that the incidence of voluntary unemployment (transition probability to unemployment by job quitting) is positively correlated (through reservation and re-employment arguments) to the duration of the preceding spell of unemployment.

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