Unemployment Insurance, Unemployment Durations and

Re-employment Wages

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Abstract

We develop an empirical model to estimate the impact of UI on unemployment duration and reemployment wages. The model estimates the UI receipt, unemployment duration and re-employment wage equations simultaneously and incorporates unobserved heterogeneity variables in each equation and allows them to be correlated. The NLSY79 data is used to estimate the model. Some results are found support of the positive effect of UI on re-employment wages.

1. Introduction

The disincentive effect of unemployment insurance (UI) benefits has been discussed extensively in the unemployment and UI literature. A substantial amount of empirical evidence has been found in support of the hypotheses that extending benefit durations or increasing benefit levels decrease the reemployment hazards and increase the joblessness durations of the unemployed.[1] However, UI receipt may have a positive effect on post-displacement wages.

The difficulty in measuring the effect of UI is because the receipt of UI, the benefit level and duration are potentially endogenous. Individuals who expect a long unemployment spell and large earning drop may be more likely to claim benefits, UI recipients may be found to have relatively lower post-displacement wages than non-recipients. Little research has been done that estimates UI receipt, unemployment duration, and post-displacement earnings simultaneously while accounting for selectivity due to UI receipt and unobserved heterogeneity in UI receipt, unemployment duration, and subsequent wage.[2]

2. Empirical Model

We develop a multi-episode, random-effects model of the duration of unemployment and re-employment wage following a job loss that allows the unobservable determinants of UI receipt to be correlated with the unobservable determinants of the unemployment duration and re-employment wage

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[1] These studies include the U.S. studies by Meyer (1990), Fallick (1991), and Card and Levine (2000) the Canadian study by Ham and Rea (1987).

[2] Devine and Kiefer (1991) summarize earlier findings on the effect of UI on post-displacement wages. Recent studies of UI and post-displacement wages include Addison and Blackburn (2000).

The model uses a discrete-time hazard model for unemployment durations (see Meyer, 1990). Let D_s be the time until the person becomes reemployed after the sth job loss and let C_s be a censoring variable which equals one if the spell is incomplete. Define $K_s = \min\{D_s, C_s\}$.

The discrete hazard of re-employment at k weeks of unemployment is

$$(1) \qquad P(D_s = k \mid K > k - 1, \mathbf{x}_{sk}, \mathbf{y}_{sk}, \xi^d) = 1 - \exp(-\xi^d \exp(\mathbf{x}'_{sk}\boldsymbol{\beta}^d + \mathbf{y}'_{sk}\boldsymbol{\delta}^d)\lambda_k)$$

where $\mathbf{x_{sk}}$ is a vector of exogenous (possibly-time varying) variables, $\mathbf{y}_s$ is a vector of possibly endogenous variables and λ_k are the baseline hazard parameters.

Here the endogenous variables in the duration equation are all functions of one endogenous variable, UI receipt, which we denote by u_s and model by

$$(2) \qquad P(u_s = 1 \mid \mathbf{z}, \xi^u) = 1 - \exp[-\xi^u \exp(\mathbf{z}'_s\boldsymbol{\beta}^u)]$$

where $\mathbf{z}$ is a vector of exogenous variables (which may include some variables from $\mathbf{x}$) and ξ^u is an unmeasured variable that is assumed to be independent of $\mathbf{z}$ and $\mathbf{x}$. If ξ^d and ξ^u are correlated then not explicitly modeling u_s may result in biased estimates of the parameters in (1).

Finally, we assume that the re-employment wage after the sth job loss, w_s, is log-normally distributed:

$$(3) \qquad f(w_s \mid \mathbf{x}_s, \mathbf{y}_s, \xi^w) = \frac{1}{w_s}\phi\left(\frac{\ln w_s - \mathbf{x}_s\beta^w - \mathbf{y}_s\delta^w - \xi^w}{\sigma^w}\right)$$

where, ϕ is the p.d.f. of a standard normal random variable, σ^w is its standard deviation, $\mathbf{x}_s$ is a vector of exogenous variables and $\mathbf{y}_s$ is a vector of endogenous variables both measured at the start of the job measured at the start. Here the endogenous variables in the wage equation are various functions of UI receipt and the duration of unemployment. While the conditional distribution (on ξ^w) of w is

potential restrictive, the unconditional distribution being a mixture of log normally

distributed random variables is more flexible.

Under (1) – (3), the likelihood function for the ith individual is then

$$L_i = \int \prod_{s=1}^{S_i} \left\{1 - \exp[-\xi^u \exp(\mathbf{z}'_{si}\boldsymbol{\beta}^u)]\right\}^{u_i} \left\{\exp[-\xi^u \exp(\mathbf{z}'_{si}\boldsymbol{\beta}^u)]\right\}^{1-u_i} \left[\exp(-\xi^d \sum_{m=1}^{K_{si}-1} \exp(\mathbf{x}'_{ski}\boldsymbol{\beta}^d + \mathbf{y}'_{ski}\boldsymbol{\delta}^d)\lambda_m\right]$$

$$\left\{[1-\exp(-\xi^d \exp(\mathbf{x}'_{si}\boldsymbol{\beta}^d + \mathbf{y}'_{ski}\boldsymbol{\delta}^d))\lambda_{K_{si}}]\frac{1}{w_{is}}\phi\left(\frac{\ln w_{is} - \mathbf{x}'_{ski}\boldsymbol{\beta}^w - \mathbf{y}'_{si}\boldsymbol{\delta}^w - \xi^w}{\sigma^w}\right)dG(\xi^u,\xi^d,\xi^w)\right\}^{c_{si}}$$

where $G(\xi^u,\xi^d,\xi^w)$ is the distribution of the unobserved heterogeneity parameters

and c_{si} is a censoring variable that equals 1 if the ith individual's unemployment spell

is complete. We assume that the unobserved heterogeneity distribution has a

mass-point specification in which there are R types of individuals in the population

with type m having the unique pair $(\xi^u_m,\xi^d_m,\xi^w_m)$ of "location" points and composing

the fraction p_r of the population, r=1,…,R, where

$\sum_{r=1}^{R} p_r = 1$. In this case the likelihood for the ith individual becomes:

$$L_i = \sum_{r=1}^{R} p_r \prod_{s=1}^{S_i} \left\{1 - \exp[-\xi^u_r \exp(\mathbf{z}'_{si}\boldsymbol{\beta}^u)]\right\}^{u_i} \left\{\exp[-\xi^u_r \exp(\mathbf{z}'_{si}\boldsymbol{\beta}^u)]\right\}^{1-u_i} \left[\exp(-\xi^d_r \sum_{m=1}^{k_{si}-1} \exp(\mathbf{x}'_{si}\boldsymbol{\beta}^d + \mathbf{y}'_{si}\boldsymbol{\delta}^d)\lambda_m\right]$$

$$\left\{[1-\exp(-\xi^d_r \exp(\mathbf{x}'_{si}\boldsymbol{\beta}^d + \mathbf{y}'_{si}\boldsymbol{\delta}^d))\lambda_{k_{si}}]\frac{1}{w_{is}}\phi\left(\frac{\ln w_{is} - \mathbf{x}'_{is}\boldsymbol{\beta}^w - \mathbf{y}'_{si}\boldsymbol{\delta}^w - \xi^w_r}{\sigma^w}\right)\right\}^{c_{si}}$$

3. Data

The sample of unemployment spells and re-employment wages is derived

from the National Longitudinal Survey of Youth 1979 (NLSY79).   Here, we

constructed panel data containing individual weekly job histories up until the time of the 2002 survey.

All demographic variables are updated on a yearly basis and the value at the beginning of the year in which a job loss occurred is assigned to that particular job loss episode.

Using data on state UI rules contained in the Department of Labor's semiannual publication *Significant Provisions of State Unemployment Insurance Laws* we compiled state UI policy rules on such parameters as the maximum benefit amount. Based on these policy rules and weekly earnings history, we determined eligibility and calculated the weekly benefit amount (WBA) that individual's qualified for. We also determined whether a state required a waiting period, the maximum duration of regular benefits, and whether the state had extended benefits in a year. Moreover, state level variables based on administrative data were constructed for UI initial claim denial rates, on-going-claim denial rates, state average real WBA. Only unemployment spells where an individual did not return to the previous employer are included in the analysis. Selected summary statistics are reported in Table 1. A sample consists of a total of 13,387 spells of unemployment associated with 5732 individuals.

4. Results

The impact of UI receipt and unemployment durations on the re-employment wage are identified by the state's average denial rates and by spouse's past use of UI and by the time-varying nature of the state's monthly unemployment rate over an unemployment spell. Table 2 shows the coefficient estimates of for a model with a three mass-point distribution. Here we discuss only coefficient estimates associated

with variables pertaining to UI system, in particular, WBA and duration of benefits, on re-employment wages. These are reported in column (3) of Table 2.

Here we see that the impact of WBA for UI recipients on the re-employment wage as measured by the coefficient of WBA x UI is positive and statistically significant. This positive impact, however, is for unemployment spells equal to 1 week. Thus, initially, a $100 increase in weekly benefits increases the re-employment wage by nearly 7 percent. The negative and statistically significant coefficient on the interaction variable ui x spell x wba implies, however, that the impact dissipates with the length of the unemployment spell. Specifically, the effect of a $100 increase is zero after approximately 34 weeks of unemployment which is consistent with search models that predict that the reservation wage decreases smoothly to that of a non-recipient at the time of benefit exhaustion.

The coefficient associated with the duration of regular UI benefits is positive and statistically significant and suggests that increasing the duration of UI benefits by 1 week increases re-employment wages by approximately one percent.

5. Conclusion

In this paper we develop a random-effects panel data model, which jointly models probability of UI receipt, the unemployment duration and re-employment wage in each job loss episode of an individual, to estimate the impact of UI policy characteristics such as the weekly benefit level and regular benefit durations on an individual's reemployment wage following a spell of unemployment. The model estimates show some evidence of the positive effect of WBA on re-employment wages but only for those with short unemployment durations. Empirical support was

also found for the notion that an increase in the regular duration of benefits increases

re-employment wages which is also predicted by theoretical models of job search.

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Table 1

Summary Statistics

(n=13,387)

Variables	Mean	Standard Deviation
WBA	$142.83	$87.97
UI receipt (UI)	0.22	
Claim Denial Rate	0.10	
Maximum Duration of Regular Benefits	20.22	8.77
State has Waiting Week	0.82	
State had Extended Benefits in Year of Job Loss (EB)	0.67	
Denial Rate - On going claims	0.14	
State Average Real WBA in Year of Job Loss	$215.47	$35.41
State Unemployment rate	7.17	2.29
High Quarter Earnings	$4,449	$2,291
Base Period Earnings	$12,576	$4,617

Source: NLSY79. See text for details

Table 2: Model Estimates with Three Mass Point Unobserved Heterogeneity
(n=13,387)

Time-Constant Regressors	UI Receipt (1)	Re-employment Hazard (2)	Re-employment Wage (3)
WBA ($100)	0.4386	-	-
	(0.0542)		
UI receipt (UI)	-	-1.3297	-0.0864
		(0.2856)	(0.0756)
WBA x UI	-	0.0909	0.0696
		(0.0858)	(0.0320)
Spell / 100	-	-	-0.0518
			(0.0384)
Spell x UI/ 100	-	-	0.1716
			(0.1846)
WBA x Spell x UI / 100	-	-	-0.2074
			(0.0879)
Claim Denial Rate	1.4664	-0.0301	0.5687
	(1.0129)	(0.0086)	(0.2763)
Maximum Duration of Regular Benefits	0.0213	-	.01090
	(0.0055)		(0.0011)
State has Waiting Week	0.1503	-	0.0180
	(0.1582)		(0.0431)
State had Extended Benefits in Year of Job Loss (EB)	0.1342	0.0096	-0.0188
	(0.1305)	(0.0702)	(0.0357)
UI x EB	-	0.1320	0.0783
		(0.0595)	(0.0385)
Denial Rate - On going claims	0.2579	0.0786	-0.1718
	(0.5453)	(0.1469)	(0.1584)
State Average Real WBA in Year of Job Loss	0.0018	0.3064	0.0008
	(0.0015)	(0.2433)	(0.0005)
State unemployment rate / 10	0.6339	-0.0016	-0.0890
	(0.1953)	(0.0007)	(0.0606)
Spouse Received UI in Past	0.5095	-0.1603	-
	(0.1390)	(0.0637)	
Male x Spouse Received UI in Past	0.2089	-0.0024	0.0000
	(0.2327)	(0.0594)	(0.0000)
Time-Varying Regressors			
State Unemployment Rate	-	-3.4951	-
		(1.1606)	
Remaining Weeks of Regular Benefits (WRB)	-	-2.6286	-
		(1.6674)	
UI x EB x Spell Week/ 100	-	0.5677	-
		(0.4933)	

UI x EB x Spell Week Squared/ 10000	-	-0.0030	-
		(0.0039)	
UI x EB x Spell Week Cubed/100000	-	119.0140	-
		(28.9396)	
UI x WRB x Spell Week/100	-	-90.7105	-
		(35.4943)	
UI x WRB x Spell Week Squared/10000	-	1.7171	-
		1.2082	
UI x WRB x Spell Week Cubed/100000	-	11.6694	-
		(2.7730)	
UI x Spell Week/100	-	-2.6774	-
		(0.7582)	
UI x Spell Week Squared/10000	-	0.1707	-
		(0.0571)	
UI x Spell Week Cubed/100000	-	-1.0538	-
		(0.9531)	
UI x WBA x Spell Week/100	-	0.3204	-
		(0.2779)	
UI x WBA x Spell Week Squared/10000	-	-0.0022	-
		(0.0022)	
UI x WBA x Spell Week Cubed/100000	-	-0.0022	-
		(0.0021)	

Log Likelihood= -119,225.64

Notes: Standard errors are in parentheses. Data from the NLSY79, see text for details. Estimations also include controls for gender, race , marital status, age, age squared, number of children, children 0-2, live with parents, family size, years of schooling, AFQT percentile, health limitations, interactions of gender with race, age, marital status, and living with parents, tenure, tenure squared, union status, lost job due to plant closing, industry, occupation, state of residence, resides in SMSA, month of job loss, year of job loss, dummies for high quarter earnings indicating whether high quarter earnings were between 0-1, 1-2, 2-3, 3-4, 4-5, 5-6, 6-7, 7-8, 8-9, and 9-10 thousand dollars and dummies for base period earnings indicating whether base period earnings were between 0-2, 2-4, 4-6, 6-8, 8-10, 10-12, 12-14, 14-16, 16-18, 18-20, 20-25 and 25-30 thousand dollars.