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THE IMPACT OF UNEMPLOYMENT INSURANCE GENEROSITY ON MATCH QUALITY DISTRIBUTION

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The impact of unemployment insurance generosity on match quality distribution

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Abstract

This paper investigates the impact of unemployment insurance (UI) generosity on the distribution of match tenure. We show that more generous UI increases expected tenure, reducing the mass of the lower tail of match duration and increasing the duration of matches available. This impact is differentiated across education levels, with the larger benefits accruing to the less educated.

Keywords: Unemployment insurance; Quantile regression; Duration analysis

JEL Classification: J65; J64; J23

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1 Introduction

The impact of the unemployment insurance (UI) system generosity on different labor market outcomes, such as the duration of unemployment spells, has drawn the attention of a large number of researchers in labor economics. More recently, it has been recognized that UI might also be associated with an overall increase in match quality (Acemoglu and Shimer, 2000). The UI system might encourage risk averse workers to take on more risk, since without UI they would avoid the risk of unemployment by taking low productivity jobs that are easier to obtain, forgoing better job/matches.

Match quality is difficult to quantify empirically. In this paper, we rely heavily on theory to identify job tenure with match quality. The idea of representing a good match by a lengthy duration comes from Jovanovic (1979), where a match is a pure experience good: the quality of a match is not known *ex ante*, but must be experienced. Under the assumption that "good matches endure," we argue that looking at match duration, while conditioning on the wage, implies that the focus of the paper is on the other aspects of match quality that combine to impact on mobility.

We test the impact of UI generosity on match quality and argue that UI has a positive impact on the expected quality of job matches (proxied by job tenure), exerting a change in the location and scale parameters of the match quality distribution. This implies that more generous UI increases the expected tenure, and that the UI impact is greater at higher tenure quantiles, thus increasing the variance of the tenure distribution.

Previous empirical research on the UI impact on subsequent job duration includes Belzil (2001) and Centeno (2004). Belzil, exploring the change in the initial entitlement period rule implemented in Canada in 1977, focuses on UI duration and finds a weak positive impact of the maximum benefit duration on subsequent job duration. Centeno focuses on the impact of the UI amount, the other dimension of generosity, in a proportional hazard model of job duration, finding a positive impact of UI on expected match duration and a dampening effect on its cyclical behavior.

2 Data

The data is taken from the male subsample of the NLSY79 dataset, covering the 1979-1998 period. The NLSY79 panel was transformed so that each observation corresponds to an employment spell. For each individual several observations were created. In the NLSY79 this is feasible using the variable in the Workhistory database that links jobs over years.[1] For each observation, we collected worker and match-specific information and merged it with a measure of UI generosity.

We use differences in UI benefit systems across the U.S. states and over time within states as a proxy for changes in the opportunity cost of being unemployed, computing a state-level simulated UI benefit. We follow previous work by Levine (1993). For each pair (worker i, state j), we computed the benefit that worker i would receive if she were to be unemployed in state j. The simulated benefit for each state/year pair is the average benefit that the individuals in the sample would receive in each state and year. This simulated benefit allows us to use individual variation in how each state's UI system structure applies and at the same time avoids the simultaneity problems associated with using the actual benefits received.

We included observations with tenure greater than two weeks and for individuals 16 years or older and not enrolled in school. Given that the variable of interest is job tenure in matches preceding unemployment spells, we included only employment spells that follow an unemployment experience in which the individual was eligible to receive some kind of UI, leaving 2,994 observations for 2,066 individuals. In the final sample, we included only one observation per individual (randomly selected) to avoid the problems associated with non-observed individual heterogeneity (see Centeno, 2004, for a more complete description of the data).

[1] In the empirical analysis we did not include the military subsample. Self-employment and government job spells were also excluded from the final sample. The latter exclusions are justified by the specificity of the process that governs match duration for these workers (e.g., these jobs have quite different employment protection rules, indeed, they represent the least and the most protected jobs). Thus, by restricting our attention to private salaried jobs, we obtain a more homogeneous and less idiosyncratic sample.

3 Econometric Methodology

We use quantile regression to analyze employment duration data. Recent applications of quantile regression to duration models can be found in Fitzenberger (1996), Koenker and Bilias (2001), and Machado and Portugal (2002). While most applications of duration analysis use models specified with hazard functions, the specific questions we would like to address in this paper are very well suited to the quantile regression setting. In fact, quantile regression overcomes the two main limitations of mean regression-type models to the study of duration data, namely the need to assume a parametric form for the duration distribution, and that only the conditional mean depends on the covariates.

The linear-in-parameters quantile regression model to be estimated is as follows:

$$Q_{h(T)}(\tau|x) = x'\beta(\tau), \tag{1}$$

where $h(T)$ is the transformed survival time and x is a p-dimensional vector of the covariates. There are as many β vectors as the number of specified quantiles τ. This dependency of the slope coefficients of $\beta(\tau)$ upon the quantile τ, allows for a larger variety of heterogeneity in the conditional distribution of $h(T)$ over the space of the covariates. In particular, it allows us to test the location and scale shift hypotheses of the tenure distribution as a response to changes in UI generosity. In (1), all the coordinates of $\beta(\tau)$ depend upon τ in the same way up to a location and scale shift. It is assumed that the effect is linear at each quantile, but in contrast to the mean classical regression model, it does not assume that this effect is necessarily the same across all quantiles.

The statistical inference necessary to test the location and scale shift hypotheses was developed in Koenker and Xiao (2002). The location shift hypothesis is a pure location change model, which corresponds to the classical homoscedastic linear regression model. This hypothesis implies that the quantile regression slopes are constant and independent of τ, implying only a change in the mean of the tenure distribution.

A more general case corresponds to the location-scale hypothesis in which the slopes of the quantile regression depend upon τ. The general model may be seen as arising from the following linear model,

$$y_i = x_i'\beta + (x_i'\gamma)u_i. \tag{2}$$

In this model, the covariates affect both the location and scale of the conditional distribution of y_i given x_i. As a consequence, there will be not only a mean change but also a change in the variance of match tenure distribution.

4 Estimation Results

The quantile regression estimates for the log duration model are reported in Figure 1.[2] Each plot illustrates one coordinate of the parameter vector $\beta(\tau)$, as a function of τ. We allow τ to take on values in [0.2, 0.8], neglecting the very short and very long employment spells. The shaded area in each plot represents a 90 percent confidence band. The heuristic interpretation of the results from Figure 1 in terms of testing the hypotheses is as follows: in the case of a pure location change, the slope coefficients $\beta(\tau)$ should fluctuate around a constant value, whereas in the case of a change in location and scale, they should mimic the "intercept" coefficient up to a change in location and scale.

Insert Figure 1 here

The effect of log unemployment rate on tenure is clearly increasing with the quantile and does not conform to the more restrictive location change hypothesis. The same is true for the log simulated UI and its interaction with the unemployment rate. The starting unemployment rate has no significant effect at shorter durations and gradually increases its impact for larger match durations; the elasticity goes from close to zero to -0.4 at the 80th percentile.

More relevant for the purpose of this study are the results for the log simulated UI benefit, which are interacted with the education level to control for a potential selectivity

[2]The results were obtained using the `R`'s quantile regression package. The included covariates were the log of the state monthly unemployment rate at the start of the match, the log of the simulated UI, an interaction between these two variables, log wage at the beginning of the match and indicators for marital status, union coverage, race, high-school and college degrees as the highest completed degree. Additionally, the interactions of UI and schooling indicators were included to test for differences in the impact of UI along the "quality of workers." We use completed employment spells. The inclusion of censored observations does not change the results from our basic quantile regression model, but the statistical inference theory used to perform the formal tests is not valid under the type of censoring observed in our sampling process.

effect that "better" workers take on jobs that last longer not because of the UI effect, but simply because they are better matches. In the log simulated UI plot, we see that it has no effect in the shorter durations for high school dropouts (the excluded educational level), but it has a sizeable effect for longer tenure, peaking at the 60th percentile, with an elasticity of 0.9. At the higher percentiles the elasticity decreases, reaching 0.55. Recall that a location shift would imply that the UI benefit exerts a constant *percentage* change at all durations. That does not seem to be the case. Actually, under the assumption that the marginal effects do not change as the conditional variables change, our results suggest that a 10 percent increase in the UI value for the median tenured high school dropout would increase tenure duration by approximately 3 weeks (from 42 to 45 weeks). For the 60th and 80th tenure quantiles, the gains would be of 5 and 6 weeks, respectively. This result shows that a more generous UI system increases match duration and that this impact is larger at longer matches. Figure 2 reports the total effect of UI for the other two classes of workers, reproducing first the graph in Figure 1 pertaining to HS dropouts. Workers who completed high school seem to benefit uniformly over the entire log tenure distribution, but at more modest rates than the HS dropouts. On the other hand, for college graduates the UI system generosity has in general a null impact on match duration (or even negative at the lower quantiles). A possible explanation for this pattern across workers qualifications is that education and job search, proxied by UI as in Acemoglu and Shimer (2000), are substitutes. Better matches come about by providing either better education or a more generous UI system, which enables workers to look for jobs harder to get, but also potentially better matches. In general, workers with lower levels of education are more exposed to match termination (Bernhardt et al., 1999, present evidence using also a NLSY male sample) and the UI system allows them to take on better matches that end up lasting longer.

Insert Figure 2 here

Other covariates in Figure 1 have mixed results. The union coverage dummy has an increasing coefficient that is statistically significant only at the highest quantiles, while the white dummy coefficient looks constant over the entire tenure distribution and is always statistically non-significant. The wage at the beginning of the job, which arguably controls

for "all" other aspects of match quality, is considerably more interesting. It has a clear increasing coefficient, with an elasticity of about 0.25 at the bottom quantiles, reaching 0.5 at the top quantiles.

The results presented in Figure 1 seem to lend some support to the location-scale change hypothesis of the conventional regression model. However, the location change hypothesis seems to receive much less support from the analysis of individual graphs. We next present a formal evaluation of these impressions.

Insert Table 1 here

Table 1 presents the results for the two test statistics proposed by Koenker and Xiao (2002) to evaluate the location change and location-scale change hypotheses. The joint test of the location-scale change hypothesis is clearly accepted, while the more restrictive hypothesis of constant β coefficients for τ in the [0.25, 0.75] range - the location change hypothesis - is rejected at the 0.05 level. The analysis of the results for each of the coordinates separately gives us an indication of which of them contributes the most to these joint effects. From Table 1 we can conclude that, regarding the location-scale change hypothesis, none of the individual effects are statistically significant at the 0.01 level. For the location change hypothesis, the reported effect for the log simulated UI is significant at the 0.01 level, and at the 0.05 level its interaction with the high-school graduate dummy. The rest of the effects are non-significant.

5 Conclusions

The purpose of this paper is to analyze the relationship between the quality of job matches (measured by job tenure) and the UI system generosity. We find evidence that for less educated workers, particularly high school dropouts, the UI generosity increases the duration of job tenure upon unemployment at all quantiles. This impact is greater the longer the match duration, which translates into a scale effect of UI generosity in the tenure distribution, increasing therefore the variance of tenure distribution.

These results can be interpreted to mean that the UI system is more than a search subsidy, and has the effect of increasing both the workers pickiness at the moment of

taking a job and the quality of matches made available by firms. Along the lines of the work by Acemoglu and Shimer (2000), we can interpret this result as the effect of more generous UI benefits in efficiency gains operating through the scale effect on the upper tail of the match tenure distribution.

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Table 1: Location Scale Shift and Location Shift Hypotheses Testing

	Null Hypothesis	
Variable	Location-Scale Shift	Location Shift
Log Starting Unemployment Rate	1.091	0.894
Log Simulated UI	1.981	3.042
Log UR × Log Simulated UI	1.138	0.915
Union dummy	0.897	0.964
Race dummy	1.212	0.984
High-School Graduate	1.076	1.005
College Graduate	1.268	1.353
Marital Status Dummy	0.569	0.943
Log Starting Wage	1.178	1.529
Log Sim. UI × College Grad.	1.310	1.594
Log Sim. UI × H. School Grad.	1.772	1.956
Joint Effect	10.104	12.399

The statistics reported are computed in the quartile range $[0.25, 0.75]$ for robustness reasons.

The critical values for the coordinatewise tests are 1.923 and 2.420 at the 0.05 and 0.01 levels, respectively; for the joint effect test, they are, respectively, 10.99 and 12.48. See Koenker and Xiao (2001) for further details on the critical values.

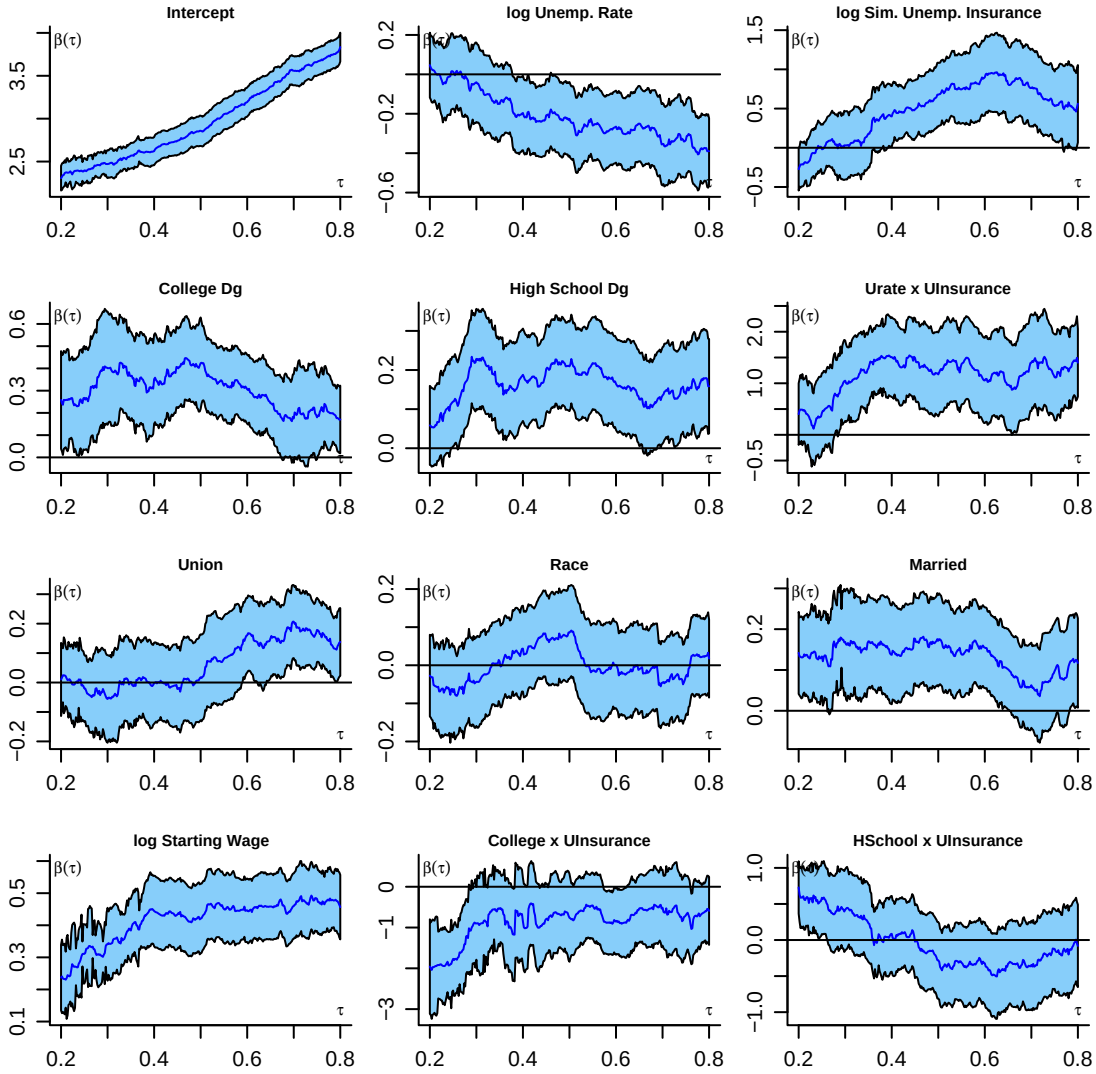

Figure 1: Quantile regression process for log employment duration model.

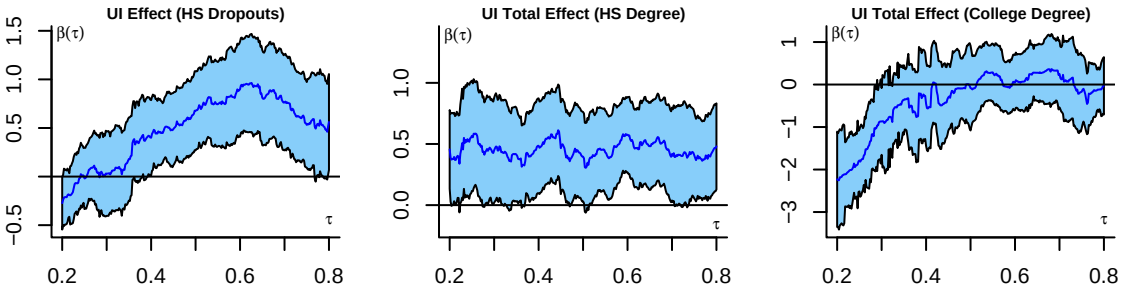

Figure 2: Log simulated UI effect by education level

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