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ABSTRACT

Is Longer Unemployment Rewarded with Longer Job Tenure?*

This paper examines whether or not a prolonged unemployment period can raise the quality of job matching after unemployment. We focus on job tenure as an indicator of a good quality job match after unemployment. We match two sets of Japanese administrative data compiled by the public employment security offices: one includes information about the circumstances of job seekers receiving unemployment insurance, and the other includes information about job seekers applying for jobs. We first show a negative relationship between unemployment duration and the subsequent job duration. Restricting the sample to job seekers who changed search behaviors in the final 59 days before expiration of unemployment insurance, we secondly show an even greater negative effect of unemployment duration on the following job duration. The importance lies not only in the duration of unemployment. If job seekers keep a high reservation wage and a low search intensity because of the benefits of unemployment insurance, and change them in response to the expiration of insurance, prolonged unemployment will result in short job duration after unemployment.

JEL Classification: J64, J65, J68

Keywords: unemployment duration, unemployment insurance, job search, job stability, administrative data, Japan

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I. Introduction

Unemployment insurance is often analyzed in terms of its effect on job search behavior during unemployment. Search theory suggests that unemployment insurance can raise the reservation wage of job seekers, lower search efforts, lower the rates of exit out of unemployment, and thus lengthen the unemployment period. Many empirical studies support this discouraging effect of unemployment insurance on job searches. The jump up in employment around the expiration of unemployment insurance and thus prolonged unemployment duration until the expiration date is reported by many researchers, for example, Moffitt (1985), Katz and Meyer (1990), Poterba and Summers (1995), Green and Riddell (1997), Card and Levine (2000) for the U.S. results, and Carling, Holmlund and Vejsiu (2001), Bover, Arellano and Bentolila (2002), Lalive and Zweimüller (2004), Lalive, Van Ours and Zweimüller (2006), Lalive (2007), and Card, Chetty and Weber (2007) for the European results.

A prolonged period of unemployment, however, does not always produce an undesirable result. Longer periods of unemployment may lead to a better job match. A limited number of studies have been conducted on this topic, as opposed to the abundant literature on the effect that benefits of unemployment insurance lengthen unemployment duration. Among the limited amount of research on job match quality, several papers examine the relationship between unemployment duration and wage after unemployment. A positive effect of longer unemployment on higher wage is found in Ohkusa (2004) for Japan; Gaure, Røed and Westlie (2008) for Norway; and Addison, McKinley and Blackburn (2000) for the U.S., although the observed effects are rather small. Lalive (2007) finds no effect of extended unemployment insurance benefits on wage at post-unemployment job using Austrian social security data. Classen (1977), Van Ours and Vodopivec (2006), and Card, Chetty and Weber (2007) suggest that there is even a lower wage after

longer unemployment.

Thus, the empirical results on the effect that longer unemployment has on job match quality in terms of wage are inconsistent. Indeed, there are some difficulties in measuring job match quality by wage. A low starting wage, which is used as a measure of job quality in most empirical investigations, may not always indicate a bad match. Rather than the starting wage, subsequent wage increase after that may be an important indicator of job match quality, although wage history is seldom traced over time. In addition, workers may not place a high value on their wage. They consider many factors in addition to their wage when assessing job quality, including work environment, work satisfaction, convenience in daily life and so on.

Job stability, by contrast, measures how good the match is between workers and employers, and reflects all of these factors. Centeno (2004) shows that a generosity in benefits of unemployment insurance (hereafter, called UI) leads to longer subsequent job tenure, using data from US job seekers mainly in the 1980s and 1990s. Van Ours and Vodopivec (2006) find that longer unemployment duration has no effect on the probability of finding a permanent job in Slovenia. Card, Chetty and Weber (2007) find no relationship between unemployment duration and subsequent job duration in Austria. In contrast, Belzil (2001) shows that in Canada longer unemployment duration reduces post-unemployment job duration because of a lower reservation wage during the search period. Della Vigna and Paserman (2005) and Paserman (2007) also show that impatient job seekers decrease their reservation wage a lot once the UI benefits came to expire, which raises the exit rates around the expiration date, and suggest that the subsequent job match quality would be lowered. Tatsiramos (2009) finds that recipients of UI benefits, compared to non-recipients, have longer unemployment and longer employment in a post-unemployment job in several European countries. Caliendo, Tatsiramos and Uhlendorff (2009) report that the

German unemployed who found jobs close to or after the time when their benefits are exhausted stop subsequent jobs earlier than those who found jobs while they are receiving benefits. Schmieder, Wachter and Bender (2012) show that those who had longer potential lengths of UI benefits would have a lower subsequent probability of unemployment after reemployment.[1]

The present paper examines the effect of long unemployment duration on job match quality, especially job stability after the unemployment period, using Japanese microdata that contains information from before, during and after the unemployment period. We will use two sets of administrative data compiled separately by Japanese public employment security offices. One set is used for the administration of unemployment insurance, that is, to record the circumstances of job seekers receiving unemployment insurance. The other set is used for the administration of finding employment, in other words, to store information about job seekers applying for jobs. We need information from both data sets to examine the relationship between job searching and job matching, so we combine the two data sets using an identification number related to unemployment insurance.

The use of these data has several advantages. First of all, our data follow up job losers' behaviors before, during, and after unemployment. This makes it possible to examine the effect of unemployment duration on subsequent job duration, and control for many individual characteristics before and after unemployment. Second, our data contain information related to the intensity of job searching based on job application. We can predict changes in job searching behaviors, observing the timing of job application and the timing of the expiration of UI benefits. This is important since changes in search behaviors are not sufficiently examined in most existing

[1] Job tenure may not be a good measure of job quality in a sense that job satisfaction might decline along with job tenure. Staying at the same job, however, indicates that at least the net gain from the present job is higher than that from job quittance.

empirical literature in spite of its importance in a theoretical sense.

Third, these data are compiled by public employment security offices for administrative purposes. All the unemployed are registered in the data, the respondents are not self-selected, and all the information is registered by employment security officers, unlike in the general survey data. In addition, the respondents are all recipients of unemployment insurance. This is good for the empirical analysis since the past literature suggests that there is unobserved heterogeneity between recipients and non-recipients, which may give biased estimates if we pooled the both samples for the estimation. Fourth, the data represent all the unemployed who lost their jobs during the same month in the same year. This makes it possible to control for conditions in the macro economy when they became unemployed. Fifth, there has been little research examining the relationship between job search and the quality of job match in Japan, especially using administrative data on the unemployed, while the prolonged recession and a dramatic increase in unemployment in Japan have garnered attention in many countries.

Our empirical investigations show that longer unemployment duration decreases job duration after unemployment. We further show that this negative effect becomes greater if we examine the cases where job seekers lowered their reservation wages and changed their intensity of job searching in the final 59 days before expiration of unemployment insurance. That is, longer unemployment duration does lower job stability more seriously, if a job seeker once set a high reservation wage and/or a low search effort, and changed them later when benefits of unemployment insurance came to lapse. If we consider that job duration is one of the indicators of a high quality job match, longer unemployment duration owing to a high reservation wage and a low search intensity does not lead to a better job match.

This paper is composed of four main sections. The empirical model is given in the next section.

Two administrative data are introduced in Section III. The empirical results and their implications are reported in Section IV. Concluding remarks are given in the final section.

II. The Estimation Model

A standard sequential search model incorporating tenure of a job after unemployment shows that longer unemployment duration leads to a higher separation rate and a lower retention rate in a job after unemployment. This is because those who experienced longer unemployment lowered reservation wages, receive lower wages at subsequent jobs, and they thus have an incentive to resign from the current job to look for a new job.[2]

We examine the relationship between lengths of unemployment and subsequent job employment, and the impact of the change in search behaviors on this relationship. We conduct a reduced form estimation of the effect of unemployment duration on separation rates in subsequent jobs, taking right censoring of job duration into account by a standard parametric hazard model on job separation. We assume a non-constant hazard over time to allow duration dependence created by heterogeneity. We maximize the likelihood of $\ln L(\beta) = \sum_{i=1}^{n} d_i \ln f(t_i|x_i;\beta) + (1-d_i)\ln[(1-F(t_i|x_i;\beta)$, using BHHH algorithm, where F is a cumulative density of job duration: $F(t_i \mid x_i) = 1 - \exp\left(-\int_0^{t_i} \lambda(s)ds\right)$, and f is its density: $f(t_i \mid x_i) = \lambda(t_i \mid x_i)\exp\left(-\int_0^{t_i} \lambda(s)ds\right)$. By the empirical test shown in the Results section, we

[2] Burdett (1979) explains that UI benefits are subsidies for job seekers, which raise reservation wage and job match quality at a subsequent job. In other words, job match quality would be decreased if the reservation wage was lowered around the expiration of UI benefits. Simple theoretical framework is also shown in Kohara, Sasaki and Machikita (2011).

assume a log-normal distribution for the hazard rates of subsequent employment: $\lambda(t_i|x_i) = \frac{f(t_i|x_i)}{1-F(t_i|x_i)} = \frac{\frac{1}{t\sigma\sqrt{2\pi}}\exp(-\frac{1}{2}(\frac{\ln(t)-x_i\beta}{\sigma})^2)}{1-\Phi(\frac{\ln(t)-x_i\beta}{\sigma})}$, where Φ denotes a normal distribution and σ is positive. The explanatory variables, x_i, include unemployment duration, individual characteristics and the variables related to job search. We examine the existence of a negative effect of unemployment duration on post-unemployment job duration.

We further examine how this negative effect, if any, could be affected by the change in search behaviors during unemployment. Our data do not directly trace the change in reservation wages or search intensities over unemployment periods. Instead, we can observe the dates of job applications and dates of UI exhaustion. Using these information, we identify "late appliers" who started applying for a job later during the duration of UI benefits. We compare the results for the entire sample to those restricted to the late appliers, considering that the latter set and kept high reservation wages and/or low search efforts in the beginning of the search period and changed them at the end of the search period in response to the expiration of UI.[3]

Note that a shorter period of time until the expiration of UI benefits implies not only a decreased reservation wage or increased search effort in the latter period of UI benefits, but also worker's other characteristics. For example, it may be a proxy for lower worker productivity, which leads to a shorter subsequent job duration as well as longer unemployment duration. In this case, it is not a

[3] As the theory suggests, job seekers raise their search effort/intensity as well as lower their reservation wage, when the time gets closer to the expiration date of UI benefits. Here we do not distinguish between the changes in search efforts and reservation wages, but rather examine how these two changes together affect job matching. Krueger and Mueller (2008) directly measure search intensity by the number of hours devoted to job search per day, and find that it falls as unemployment benefits become more generous, and rises prior to benefit expiration. Unfortunately, our data do not contain any information on specific time devoted to job searching.

change in search behaviors but a worker's potential ability that causes a bad job match. Although tracing long unemployment duration to its source (either a change in search behaviors or unobserved heterogeneity such as ability) is interesting, we cannot completely distinguish between the two by its nature: search behaviors during unemployment are simultaneously determined by the worker's potential characteristics. We thus do not conduct an empirical investigation controlling for unobservable heterogeneity directly in this paper. For reference, we tried estimating subsequent job duration allowing for unobserved heterogeneity by setting the hazard function to $\lambda(t_i|x_i)u_i$ instead of $\lambda(t_i|x_i)$, where u_i is the unobservable multiplicative error term following a gamma distribution with an expectation of 1 and a variance of θ. We confirmed that the variance component θ is near zero and statistically insignificant and that the estimates shown later in Section IV have hardly changed. Further consideration of unobserved heterogeneity, for example using a mixed hazard model and a regression discontinuity approach, remains as a topic of future research.[4]

We assume that the number of job offers is not different over the sample period, or their differences among individuals are controlled for by explanatory variables. However, the effect of unemployment duration on post-unemployment job duration may be different between young and senior job seekers. In order to investigate this age difference, we separate the whole sample into two groups. One group is composed of job seekers between 16 and 44, and the other group is

[4] Note that we use the amount of time remaining until the expiration of UI, but not the duration of UI benefits. In fact, the former is less obviously related to unobserved heterogeneity such as worker's ability and thus to post-unemployment job duration, although the latter is related to post-unemployment job duration because the potential duration of UI benefits is determined mostly by the worker's tenure before unemployment, which can be related to the ability. This is discussed later in Results section.

composed of job seekers between 45 and 64.[5]

III. The Data

We use two administrative data sets compiled by the Japanese public employment security offices. One is an administrative data set on unemployment insurance, and the other is an administrative data set on job findings. We merged them using the UI identification number. The target is the unemployed who lost their jobs in August 2005. Among them, we use the sample that started working after the unemployment period, because our focus is job duration after unemployment. Since we use information in UI-administrative data, the samples are all eligible for UI. Thus, our sample is composed of individuals who lost their jobs in August 2005, spent at least one day unemployed, qualified for UI, and worked for at least one day upon finding a job by the final survey point in July 2006. We do not include job-to-job mobility. See Appendix for details.

Figure 1 summarizes the timing of the survey. One of the most important variables in this paper is unemployment duration, which is shown as a black dotted line in the figure. This is defined as the period from the day of stopping the previous job until the day prior to starting the subsequent job. Another important variable in our study is job tenure after unemployment, which is shown as a thick black line in the figure. If the worker had already ceased working at the final survey point, his or her job tenure is not truncated but completed, and equals to the period from the first day of starting a job until the last working day. Individual 1 in the figure is an example of this.

[5] Dividing the sample by other characteristics, such as educational attainments and gender, will be an important examination point in future work.

If the worker continued working at the survey point, his or her *temporally-measured* tenure, which is the period from the first day of starting a job until the survey point, is truncated. Individuals 2 and 3 are examples of this. As mentioned in the last section, we analyze a hazard rate of getting out of a job at one time point, t conditional on surviving until $t-1$, considering the right censored sample.

After conducting the estimate in the entire sample, we restrict them to "late appliers". Our data shows when job seekers apply for job openings, and when UI benefits expire. We identify late appliers as those who do not apply for a job opening 59 days prior to the UI expiration date, which is a possible threshold observed from the sample as is shown in Appendix. They are considered to have kept high reservation wage and low search effort while receiving UI benefits, and changed them later in response to UI expiration. In Japan, there is not a public financial assistance for the unemployed after a lapse of UI.

Upward arrows in Figure 1 show the example timings of applying for job openings for the first time during unemployment, and the triangles show the timing of UI expiration. Individual 3 is a late applier. Our focus is not just on the timing of the first application (the place of the upward arrow during unemployment), but also the distance of the first application from the end of UI benefits (how far the upward arrow is located from the triangle). Individuals 2 and 3 have identical lengths of unemployment and subsequent truncated job tenure, while they are very different in the sense that Individual 3 changed search behaviors, say reservation wage and/or search intensity, in response to the expiration of UI benefits. In order to find the effects of a change in search behaviors, we clarify the existence of the difference between Individuals 2 and 3. That is, we examine whether the relationship between the length of unemployment and the length of subsequent job tenure would remain unchanged even after restricting the sample to late appliers.

There are several notes on our data sets. First, the unemployed can finally find job vacancies

not through public employment offices but through other sources such as advertisements on newspapers, internet etc., and/or personal connections. Our data do not include these samples who found jobs in the methods other than through public employment offices. According to Ministry of Health, Labour and Welfare, the percentage of job matches through public employment offices is 19% of all the unemployed in 2008. Although we need to interpret the results carefully for such a limited sample, our sample of the unemployed who found jobs through employment offices do not over-estimate a negative relationship between unemployment and post-unemployment job duration. This is partly because job seekers who come to employment security offices are no heterogeneous. For example, those who seek for jobs at employment security offices are both workers with high and low abilities: job seekers who can receive UI may have high potential for work since Japanese workers are not qualified unless they have worked for at least six months, while job seekers who find jobs through the employment security office may be those who cannot find jobs through other methods. The former could make a negative relationship weaker, although the latter could make it stronger.[6]

Second, the available time window is limited to one year after unemployment, which may be short for an analysis. Note, however, that this setting does not always induce a mechanical negative correlation between unemployment and post-unemployment job duration in our sample. Workers who experienced short unemployment do not always stay longer in post-unemployment jobs: descriptive statistics say that unemployment duration is about 66 days for those who stop ex-unemployment job less than 6 months, while it is about 128 days in the entire sample.[7] In

[6] We hardly believe that the jobs filed in the employment security offices are of lower quality than the jobs offered in other places. Thus, heterogeneities of job seekers and job offers matched in employment security offices do not induce a systematic negative effect of unemployment on job matching.

[7] A mechanical negative correlation may be avoided by limiting the sample into those who have been

addition, even if there is a mechanical negative correlation, our discussion on an association between search behaviors and job matching is valid in some senses. Firstly, we estimate the hazard rate taking right-censoring into account to avoid a simple negative relationship: we analyze potential but not *temporary* tenure. In our sample, about twenty four percent are completed observations who had found jobs, started working, and lost jobs by the final survey point, and the other seventy six percent are censored. Secondly, in the case of Japanese regular workers, many unemployed experience an unemployment duration of less than 6 months. In our sample, the average unemployment duration is 4 months, so that one-year is not too short to be examined. Finally and more importantly, our concern is not just the existence of the negative relationship between the two lengths, but how this negative effect is affected by search behaviors during unemployment. Even if a negative relationship is caused by the limited time window, the same relationship should be found even after restricting the sample to late appliers, since the late appliers exist regardless of the length of unemployment.

As for the explanatory variables, we add control variables suggested in the existing literature, avoiding variables inducing multicollinearity problems. We control for worker characteristics such as age, a dummy variable indicating gender, a dummy variable indicating a married worker, and years of education. For the information on a job before unemployment, we control for the job tenure of the previous job, a dummy variable indicating whether or not the worker quit a job involuntarily, monthly wage when the worker stopped the previous job, and the monthly wage difference before and after unemployment. To control for market labor conditions, we include

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unemployed for at most 6 months during the observation window, or by censoring all job durations of 6 months after unemployment. Since we are not allowed to re-use our data sets and carry out these attempts, we leave them for the future study.

effective job rates in the local labor market when the worker started a job after unemployment.[8]

IV. The Results

Before examining the relationship between unemployment duration and subsequent job duration, we determine the specification of a hazard function for job separation. Several statistics such as Akaike's information criterion and plots of residuals suggest a log-normal distribution for the hazard function. The job separation rate in our data increases progressively, and once the rate reaches its highest value, it starts declining gradually.

Table 2 shows the results using the entire sample. The coefficient on unemployment duration has a negative sign and is significant at the 1% level. The longer unemployment duration becomes, the shorter job duration is after unemployment. That is, assuming that long job duration reflects a high quality job match, a long period of unemployment lowers the quality of the job match. We obtain similar results for both the group of younger workers aged from 16 to 44 and the group of older workers aged from 45 to 64. The estimates are larger for the latter group, which means that the negative effect unemployment duration has on subsequent job tenure is stronger for older

[8] Post-unemployment occupations or industries are not included in the estimation, since some of them are anyway dropped in the estimation probably by perfect collinearity. The differential in labor market conditions among occupations and industries can be, however, controlled by regional job vacancy rates and the wage difference, although this is not a sufficient control. Post-unemployment wage is assumed to be exogenous for simplification, although the problem of its endogeneity should be considered in future studies. As for the possibility of getting job training, it is not included in explanatory variables, but rather assumed to be controlled for by the other explanatory variables. This is the same assumption made in many other empirical studies. Our job duration after unemployment is a maximum of one year, so that the effect of accumulation of human capital may be small. The simultaneity of post-unemployment job tenure and wage (and/or training) should be considered in the future work.

workers.

As for the other explanatory variables, the time at a job after unemployment becomes shorter as the workers grow older when they are below the age of 44, and longer as the workers grow older when they are above the age of 45. Note that the individuals in our sample are those who experienced unemployment at least once. The results may suggest that the younger workers who came back to work from unemployment may quit their job sooner than before – job duration for the younger workers becomes shorter when they quit jobs repeatedly. This tendency is not found in older workers, who know that they face lower demand for their labor once they stop working.

Married workers and male workers over 45 years old stay longer at post-unemployment jobs, because they may have dependents. The more educated people may have higher job match quality because of higher productivity, although this effect is not found in the workers over 45 years old. Job matching for senior workers may be influenced by other factors such as job experience rather than education level. Those who worked for a long period in their previous job work for a longer period again in the subsequent job. Those who ceased the previous job involuntarily have shorter job duration after unemployment. In other words, job quitters have high job separation rates. The significantly positive sign of the coefficient on effective job rates suggests that good labor market conditions lead to higher quality job matching. Finally, the wage of the current job makes younger workers stay in the job, although wage incentives may not exist for older workers.

How is the change in reservation wages related to the quality of job matching? In order to examine this, we restrict the sample to the late appliers. Table 3 shows the results obtained for those who had not started job seeking until 59 days before UI expiration during their unemployment periods. The coefficients on unemployment duration are negative and significant at the 1% significance level for both the younger and older samples. The magnitude of the

estimates is much larger than in the case of the entire sample unrestricted to late appliers, which was shown in Table 2. That is, job seekers who have started applying for job openings in less than 59 days before UI expiration separate from their subsequent jobs earlier than the others. This is found not only in younger workers, but also in senior workers. The prolonged duration of unemployment harms post-unemployment job stability more seriously if the job seekers have lowered their reservation wage and raised their search intensities because of UI expiration.

Note that a larger negative effect of unemployment on subsequent job stability is obtained for those who started applying for a job close to the expiration. This result confirms the implication by Belzil (2001) for Canadian data, and Caliendo, Tatsiramos and Uhlendorff (2009) for German data: those who found jobs close to or after the exhaustion of UI benefits stay shorter in subsequent jobs after unemployment. Our results further emphasize that it is the change in search behaviors – lowered reservation wage and raised search intensity – that makes the unemployed rush into the subsequent work, and come back early to unemployment again.

It might be thought that a larger negative relationship between the length of unemployment duration and the length of subsequent job duration for late appliers has arisen for reasons other than changes in search behaviors. For example, late appliers may have low value of working, and thus have longer unemployment and shorter job duration. However, individual characteristics unrelated to remaining days to UI expiration cannot explain our results, since our late appliers are those who changed search behaviors in response to UI expiration. As another point, it may be thought that late appliers can get better jobs: the longer the unemployed wait, the better offer they gain. However, possibilities of getting a better job do not have any relation to UI expiration. As described in Data section, a simple mechanical negative relationship possibly caused by sample setting of short time window or by sample restriction of job finders through employment security

offices is not always the case at least in our sample.

Further econometric consideration on heterogeneity, and further controls such as splitting the estimation sample by gender and/or educational attainments are necessary. These are remained in the future work. Our attempt in this paper is the first step to examine the relationship between changes in search behaviors during unemployment and quality of job matching measured by job stability after unemployment. It has been noticed that our results are considered to be robust for heterogeneity in some senses. First, our sample is restricted to UI recipients, which removes heterogeneity to some extent. Second, our sample is restricted to those who experienced unemployment less than one year. As past literature suggests, many problems are caused by heterogeneity of the unemployed with longer unemployment. Third, our sample consists of all the unemployed who started unemployment during the same month within a country, so that we control for market conditions at least. Fourth, we also have enough observations to obtain robust results.

In summary, there is a negative relationship between unemployment duration and job duration after unemployment in Japan. Moreover, longer unemployment duration does hurt job stability more seriously if a job seeker kept reservation wages at a high level and search effort at a low level based on the remained length of UI benefits. The important implication of our results is not that a negative relationship between unemployment and post-unemployment job duration exists, but that the situation would be worse by individual's search behaviors, which is affected by institutional UI settings. Prolonged unemployment duration will result in shorter job duration after unemployment if job seekers lower their reservation wage and raise their search intensity in response to the imminent expiration of UI benefits.

V. Conclusion

This paper examined whether or not a prolonged unemployment period can raise the quality of job matching after unemployment. We focused on job tenure as an indicator of a good job match after unemployment. We matched two Japanese administrative data sets compiled by public employment security offices using an identification number related to unemployment insurance.

Our empirical investigation first showed a negative relationship between unemployment duration and the subsequent job duration. The paper then showed this negative effect could be greater for the job seekers who put high reservation wage and low search intensity in the beginning of job search and changed them later in the final 59 days before the expiration of UI. The importance lies not only in the duration of unemployment. Prolonged unemployment duration will not be rewarded with longer job duration after unemployment, especially when job seekers change search behaviors in response to the expiration of UI. If we consider that job duration is one of the indicators of a good quality job match, longer unemployment duration with higher reservation wage or lower search intensity do not lead to a better job match.

There had been little research that examined the matching quality and controlled for the change in search behaviors during unemployment. In addition, there had been little research that investigated job match quality focusing on post-unemployment job stability. The number of empirical examinations for Japanese cases had been especially limited. Our results, which are based on the extensive administrative data compiled by the Japanese government, and which utilize information regarding the timing of applications for jobs as well as the timing of expiration of unemployment insurance benefits, may prove as valuable evidence concerning the negative effect that long unemployment with a lowered reservation wage has on subsequent job stability. The UI

benefits could make the unemployed keep their reservation wage higher and search intensity lower, and thus lead to longer unemployment and shorter subsequent job tenure.

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Appendix

Two Administrative Data Used in This Paper

We use registered data on unemployment insurance (*Koyo Hoken Gyomu Tokei*), and on job findings (*Shokugyo Antei Gyomu Tokei*). These are compiled separately for different administrative purposes, and we merged them using the UI identification number. We remove those who are over 65 years old, seasonal workers (*Tanki Tokurei Hi- Hokensha*), and day workers (*Hiyatoi Rodosha*) because their job seeking behaviors and/or the job market conditions for them may be different from the other individuals. Most part-time workers (those who work fewer than 20 hours per week), the self-employed, and civil servants are also removed, because they are not usually covered by the UI system. The workers in fixed-term employment after unemployment are also removed because some of them choose short-term employment as an appropriate job for them.

In Japan, job seekers qualified for UI benefits need to come to a public employment security office to seek for job vacancies when they receive UI benefits. Since about 550 public employment security offices are located all over the country, our sample consists of the country-wide unemployed. At the office, they can search for openings mainly on computers and/or in written documents. If a job seeker finds a suitable job, he or she goes to a counter to get direct counsel from a counselor. A counselor provides detailed information on the job, and provides advice as to whether or not to apply for the job. If the job seeker decides to apply for the job, the counselor introduces him or her to the employer as an applicant. The job seeker, who is now a job applicant, has an interview, and the employer decides to hire him or her. The job applicant has to inform the public employment security office of receiving an acceptance, and starts working shortly after receiving a formal notice of being hired.

A rejected job seeker will continue to search for a job. The potential periods of UI benefit

depend on worker's age and tenure in the previous job, and whether or not he/she stopped a previous job voluntarily. One of the main focuses of this paper, the late-applier, is the unemployed who started applying for job-openings after the remained dates till the UI expiration are less than or equal to 59 days. The reason for focusing on 59 days is that it can be a threshold to judge the change in reservation wages, since first-applications for a job opening rise between 60 and 89 days before the UI expiration date: about 19.4% of job seekers in our estimated sample applied for a job opening for the first time more than 90 days before the expiration date, 24.6% did between 60 and 89 days before the expiration date, 15.8% did between 30 and 59 days before the expiration date, 16.7% did between 0 and 29 days before or after the expiration date, and 21.1% did 30 days after the expiration date. Thus, the job seekers that we defined as lowering reservation wages and raising search intensity in the later stages of UI benefits are 56% of the whole sample. The other thresholds such as 29 days before the UI expiration date, and anytime after the UI expiration date, can also be examined. The problem of focusing on these thresholds is that the estimate sample, and thus the test power, is decreased.

Unemployment and Job Duration in Our Sample

As summarized in Table 1, the average age at unemployment is 36 years old, about 51% are male, and 42% are married. The average tenure before unemployment is 1586 days (about 52.9 months), and the average monthly wage before unemployment is about 201 thousand yen. These numbers are smaller than the averages in all of Japan (the average tenure is 13.4 years, and the average monthly wage is 372 thousand yen in 2005, according to the *Basic Survey on Wage Structure* compiled by the Statistics Bureau of Japan), which is not surprising since our data includes more young, female workers.

The average unemployment duration, which is also the search period, is about 128 days (4

months). More specifically, the job seekers who found jobs during the first 29 days of their job search make up 10.8%, those between 31 and 60 days are 17.6%, those between 61 and 90 days are 14.2%, those between 91 and 150 days are 17.7%, those between 150 and 210 days are 16.6%, those between 180 and 210 days are 8.2%, and those more than 210 days are 23.2%. All the job seekers in our sample were once qualified for UI benefits during unemployment, and about 76.7% receive 90 days, 8.5% receive 120 days, 3.7% receive 150 days, 4.2% receive 180 days, and the remaining 7.0% receive either 210, 240, 270, or 360 days. About 48% get out of unemployment with at least one day of UI benefits remaining.

The separation rates 6 and 12 months after starting work at a post-unemployment job are 22.4% and 27.3%, respectively. Appendix Figure 1 shows the empirical survivor function at post-unemployment jobs, $\hat{S}(t) = \Pi_{s<t}(1 - \lambda(s))$, where $\lambda(s)$ is the hazard function. The figures are shown separately by categories of the number of days of unemployment. The longer the unemployment duration, the more workers separate from jobs after unemployment. The two time periods may not be linearly correlated, so we use logarithms of unemployment duration in our estimation.

As we saw in Table 1, our late appliers are often young, female, and unmarried compared to the entire sample. Their previous job tenure before unemployment is shorter, and most of them quit the job voluntarily (only 2% stop previous jobs involuntarily), suggesting that they are quitting jobs repeatedly. Their monthly wage in the previous job before unemployment is also lower. Their unemployment duration is longer, and their job duration after unemployment is shorter compared to the entire sample.

Figure 1. Timing of the Data

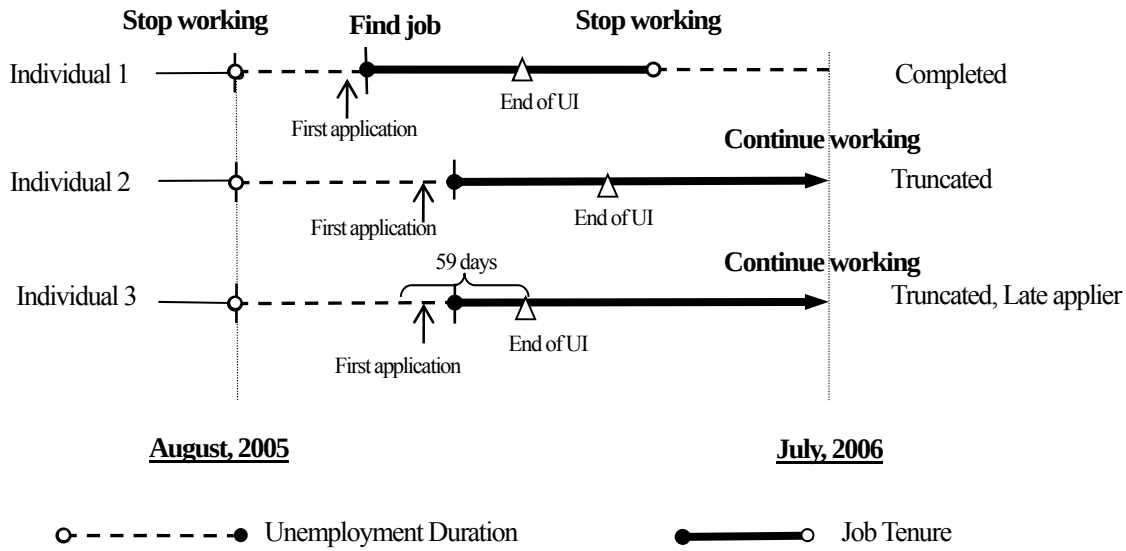

Table 1. Descriptive Statistics

	Panel A. The entire sample (for Table 2)				Panel B. The sample of late appliers (for Table 3)			
	Mean	Standard deviation	Minimum	Maximum	Mean	Standard deviation	Minimum	Maximum
job tenures after unemployment	163.5199	89.1002	1	343	132.6334	76.9224	1	311
unemployment durations (days)	127.8522	85.66801	1	344	166.1999	76.7777	1	336
(log of days)	4.4949	1.0464	0	5.8406	4.9764	0.5664	0	5.817111
age (years old)	36.49833	11.21567	16	65	34.6749	10.7338	16	64
(log of years old)	3.5514	0.3017	2.7726	4.1744	3.5017	0.2932	2.7726	4.1589
a dummy variable of male respondent	0.5085	0.4999	0	1	0.4562	0.4981	0	1
a dummy variable of married respondent	0.4160	0.4929	0	1	0.3536	0.4781	0	1
education years (years)	13.00106	1.959289	9	18	13.0448	1.8818	9	18
(log of years)	2.5537	0.1511	2.1972	2.8904	2.5581	0.1436	2.197225	2.890372
job tenures before unemployment (days)	1586.826	2067.493	1	16132	1503.6760	1703.3840	7	15152
(log of days)	6.6014	1.3872	0	9.6886	6.8471	0.9668	1.9459	9.6259
a dummy variable of stopping a job involuntarily before unemployment	0.1103	0.3133	0	1	0.0258	0.1584	0	1
monthly wage in a job after unemployment (thousands of yen)	200.5270	101.4319	1	8210	184.9648	66.3315	1	1400
(log of thousands of yen)	5.2245	0.3896	0	9.0131	5.1593	0.3629	0	7.244227
monthly wage difference before and after unemployment (thousands of yen)	5.5419	114.1484	-8015	8020	-0.5295	78.2763	-3050	1260
effective job rates when started a job after unemployment (log of percentage)	-0.0349	0.3283	-0.9162907	0.6418539	-0.0316	0.3307	-0.8915981	0.6418539

* The numbers of the observations are 76,565 and 22,204 respectively in the whole sample (Panel A) and in the restricted sample of late appliers (Panel B).

Table 2. The effect of unemployment duration on retention rates at post-unemployment jobs

	The entire age group	(a) Age 16-44	(b) Age 45-64
log of unemployment duration	-0.0687***	-0.0597***	-0.0902***
	(0.0067)	(0.0079)	(0.0126)
age (years of old)	-0.194***	-0.3749***	0.8572***
	(0.0272)	(0.0436)	(0.1596)
a dummy variable of male respondent	0.0083	-0.0302	0.0939***
	(0.0162)	(0.0186)	(0.0342)
a dummy variable of married respondent	0.1199***	0.1152***	0.1832***
	(0.0165)	(0.0195)	(0.0308)
education years	0.4674***	0.7382***	0.0754
(log of years)	(0.0503)	(0.0626)	(0.0866)
pre-unemployment job tenures	0.1250***	0.1211***	0.1251***
(log of days)	(0.0053)	(0.0065)	(0.0093)
post-unemployment wage	0.0705***	0.1163***	0.0408
(log of thousands of yen)	(0.0227)	(0.0293)	(0.0379)
wage difference before and after unemployment	-0.0001	-0.0001	-0.00005
(thousands of yen)	(0.0001)	(0.0001)	(0.00009)
a dummy variable of stopping pre-unemployment	-0.0686***	-0.0771***	-0.0998**
job involuntarily	(0.0228)	(0.0266)	(0.0450)
effective job rates when started	0.2368***	0.2456***	0.2242***
post-unemployment job (log of percentage)	(0.0248)	(0.0315)	(0.0400)
constant	4.6841***	4.3674***	1.6755***
	(0.1948)	(0.2446)	(0.7406)
Number of the observations	76565	56984	19581
Log likelihood	-62483.12	-46507.788	-15892.774
Likelihood ratio test: all the parameters are zero.	957.71***	695.56***	427.13***

Table 3. The effect of unemployment duration on retention rates at post-unemployment jobs :for the samples who started applying for jobs in the final 59 days before expiration of UI

	(a) Age 16-44	(b) Age 45-64
log of unemployment duration	-0.4190***	-0.2537***
	(0.0276)	(0.0495)
age (years of old)	-0.5451***	0.972***
	(0.0817)	(0.3330)
a dummy variable of male respondent	-0.0588*	0.0883
	(0.0337)	(0.0709)
a dummy variable of married respondent	0.0652*	0.1088*
	(0.0364)	(0.0615)
education years	0.7796***	0.1731
(log of years)	(0.1168)	(0.1856)
pre-unemployment job tenures	0.0950***	0.0642**
(log of days)	(0.0173)	(0.0270)
post-unemployment wage	-0.1321**	-0.1114
(log of thousands of yen)	(0.0570)	(0.0876)
wage difference before and after unemployment	-0.0002	-0.0009**
(thousands of yen)	(0.0002)	(0.0004)
a dummy variable of stopping pre-unemployment	0.0060	-0.0681
job involuntarily	(0.0480)	(0.0934)
effective job rates when started	-0.0344	-0.2879
post-unemployment job (log of percentage)	(0.0975)	(0.1899)
constant	7.9824***	2.7881*
	(0.4784)	(1.5537)
Number of the observations	17823	4381
Log likelihood	-13815.352	-3583.570
Likelihood ratio test: all the parameters are zero.	343.61***	69.98***

Appndix Figure 1. Post-unemployment job stability by length of unemployment duration