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**AN EMPIRICAL EVIDENCE OF  
MORAL HAZARD DUE TO  
UNEMPLOYMENT BENEFIT**

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# An Empirical Evidence of Moral Hazard due to Unemployment Benefits \*)

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## Abstract

This paper examines how the unemployment benefit (UB) affects the intensity or search effort of the unemployed, which is measured by the working conditions of a new job resulting from search behavior, controlling for the endogeneity of the duration of unemployment. Estimation results show that the hiring probability of UB recipients is significantly lower than that of non-recipients, with the magnitude being approximately halved. Additionally, the working conditions of new jobs of UB recipients are significantly worse than those of non-recipients with regard to wages, occupation and firm size. This implies that there is very strong moral hazard in the UB system.

JEL Classifications: J63, J64, J65

Keywords: Unemployment Benefit, Duration of Unemployment, Moral Hazard, Search Effort, Working Conditions

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# 1 Introduction

In Japan the unemployment rate rose rapidly in the 1990s and reached 4% in 1998. The official labor white paper of the Ministry of Labor of the Japanese Government in 1999 indicated that the structural and frictional unemployment rate was more than 3%, and that economic policy to counter recession could not solve this high unemployment problem, at least in the short term. Among the OECD countries, Japan has not had the lowest unemployment rate. The Netherlands in 1998 and the USA in 1999 caught up with and then surpassed Japan. In the recent period of high unemployment in Japan, the shortcomings in the Employment Insurance System<sup>1)</sup> should be remarkable, as this had been based on the long low unemployment rate. This paper focus on the unemployment benefit (UB) solely among several aspects of the Employment Insurance System, and examine its effects on search behavior of the unemployed<sup>2)</sup>.

There are many investigations evaluating the UB effect on the behavior of the unemployed. Even though simple international comparisons without care are dangerous because of different UB systems and backgrounds<sup>3)</sup>, the elasticities of UB levels with respect to unemployment duration of about 0.3 in UK (Narendrannathan, Nickell and Stern (1985)) and about 0.4 in the USA are suggestive, and imply that the unemployment period is extended by about 10 days if the UB level increases by 10% (Moffitt (1985))<sup>4)</sup>. On the other hand, the effect of potential UB duration on unemployment duration is larger. Katz and Meyer (1990) predicts that this elasticity is twice as large as that of the UB level. Christofields and McKenna (1995) also finds that the hiring rate significantly increases in the last month of the UB period in Canada. Similar patterns are confirmed in Japan (Tcahibanaki (1984)). Moreover, Ehrenberg and Oaxzca (1976) find that the replacement rate effect on wage gains is limited: for female it is significant but not for male. Overall, these studies indicate some evidence of moral hazard in the UB recipient's behavior.

However, even if the UB extends the duration of unemployment, it may not be that

moral hazard is directly implied. As the UB loosens the budget constraint of its recipients unambiguously, it should extend the duration of unemployment. The problem is whether the recipients depress their intensity of search behavior, rather than simply experiencing increases in their duration of unemployment. Although the unemployed experience a longer duration of unemployment, if they do not lower the intensity of their search behavior, they will receive good conditions in their new jobs and thus should not be judged to be in moral hazard. Therefore, moral hazard of the recipients should be measured by the conditions of the new jobs in comparison with those of previous jobs rather than by examining the duration of unemployment or the unemployment rate. This paper examines this aspect of moral hazard in the UB.

The paper is organized as follows. The next section explains the data in detail, and Section 3 presents the testable hypotheses. Section 4 describes the estimation model and its results are shown in Section 5. Finally, the results are summarized and suggestions for further research are made.

## 2 Data

The following analysis uses micro-data from the Survey of Job Changers (*Tenshokusha Sougou Jittai Chosa* in Japanese) of 1998 conducted by the Ministry of Labor. This survey contains detailed information including individuals' characteristics, the condition of previous and current jobs, unemployment benefits, and unemployment duration of 10,000 regular workers. The surveyed workers had the following three characteristics:

- They were hired in the past 12 months.
- They had worked in another firm in the past 12 months before they were hired in the current firm.
- They are regular workers.

The feature of this survey is that the conditions (including wages, occupation, rank, industry and firm size) of both the previous job and the current job are available. Thus any change in working conditions is easily measured.

As the main purpose of this paper is to test the UB effect, those individuals in the sample who had not experienced unemployment are excluded in the following analysis. Hence the sample size is 7842.

The summary statistics are shown in Table 1. The index of changing conditions between the previous and current job is defined as follows. Concerning rank and firm size, it is set at 3 if the new job has better conditions, 2 if there is no change in conditions and 1 if otherwise. Better conditions mean larger firm scale and higher rank. Concerning occupation and industry, as there is no clearly defined good or bad occupation (industry), the index is defined as 1 if the unemployed change their occupation (industry) and 0 otherwise, as their experience in the previous job is more useful in the same occupation (industry) than in another one. Note that ‘better conditions’ refers to a defined lower value in spite of a larger value in wage, firm size and rank.

### **3 The Testable Hypothesis**

The testable hypothesis is simply whether the UB reduces intensity of search. The main problem for this test is that intensity of search is not directly observable for the econometrician. If intensity of search can be observed, there is no room for moral hazard. Thus it is evaluated indirectly, in the following manner.

As the UB loosens the budget constraint of the recipients and reduces the disutility from the extended duration of unemployment, the recipients’ duration of unemployment should increase unambiguously. If there is no moral hazard, the recipients can enjoy finding a job with better conditions. Conversely, as non-recipients cannot enjoy UB, they may accept a job with worse conditions so as to shorten the unemployment duration. Therefore, the

recipients should get better jobs than the non-recipients.

If there is moral hazard, then, as the recipients depress the intensity of search, the difference of the new job condition for recipients and non-recipients depresses in comparison with the no moral hazard case. In the extreme case, if there is no difference between the new job condition for recipients and non-recipients, the intensity of search would be greatly reduced to cancel out any effect of extended unemployment duration. In the worst case, if the conditions in the new job for recipients are worse than for non-recipients, there is strong evidence of deep moral hazard. Therefore, moral hazard is defined as the change in conditions between a previous and current job, which defines the outcome of search behavior, controlling for unemployment duration.

## 4 The Estimation Model

A two step strategy is employed to estimate the effect of the UB, because the duration of the unemployed period is endogenous. At first, duration analysis, in particular, Cox's (1972) proportional hazard model for the duration of unemployment is applied. This model is represented as:

$$h(t) = h_0(t)e^{X_i\alpha} \quad (1)$$

where  $h(t)$  is the hazard function and  $h_0(t)$  is the base hazard function.

Duration is defined as the duration of the unemployed. By this definition of duration, workers who do not experience unemployment are excluded because their duration is 0. Duration of search, which includes on-the-job search time, is a potential alternative candidate, but as this paper's main focus is to evaluate the effect of the UB and its justification is difficult *a priori*, on-the-job search time is included to the definition of duration. Hence on-the-job search is only included as an explanatory variable. Another candidate is the duration of the UB. However, because this excludes UB non-recipients by definition, it is not appropriate for evaluating the effect of the UB.

The explanatory variables  $X_i$  are: dummies for UB recipients, gender, a quadratic form for age and tenure, education level, duration of on-the-job search, number of turnover, occupation, position, industry, scale of firm, a dummy for a voluntary quitter, a dummy for any licenses, and regional dummies. Tenure, occupation, position, industry, and scale of firm apply to the previous job.

In principle, if we could use household structure and income, the marginal utility of income is easily defined. Unfortunately, such useful information is not available, so gender and age are used as their proxies. Moreover, age and tenure affect unemployment duration in several ways. The most direct way is through the potential duration of the UB, which is determined by age and tenure in the previous job, and the level of the UB, which is determined by the average wage in the last six months. Of course, these effects would extend the duration of unemployment because of the relaxed budget constraint. Moreover, age and tenure (and education level) represent the level of human capital and its composition, either general or firm-specific. The unemployed with more general human capital would more easily find a new job. Conversely, if they have more firm-specific human capital, because it is not useful in new job, they would not find new jobs easily and thus their duration of unemployment would be extended. However, as these effects are represented by a few variables, and it is impossible to separate them.

The duration of on-the-job search implies heterogeneity in the preparation for job search before unemployment. Moreover, number of turnover can lead to mental damage or predictability due to turnover and unemployment. Workers who have quit frequently would become used to job search and would experience less damage from turnover. Since occupation, position, industry and scale of firm are defined for the previous job, these coefficients means their inertia. Namely, the difficulty of changing occupation reduces hiring probability.

The dummy for the UB recipients is the most important variable for this research; it extends the duration of unemployment. For a worker who voluntarily quits the previous

job, the UB is prolonged for three months, and so they would like to get a new job as soon as possible or extend their unemployed duration for three months. Moreover, they could prepare for a long time before quitting. However, as workers who have not experienced unemployment are excluded, the sample does not contain those who quit voluntarily to take up a better job.

The dummy for licenses represents their speciality. So as to overcome the problem of its endogeneity, this variable is the one only the case they have licenses before they are unemployed. The regional dummies may exclude differences in the regional labor market.

From the estimated coefficient  $\hat{\alpha}$  and  $h_0(t)$ , the hazard function and survival function are calculated as:

$$\begin{aligned}\hat{h}(t) &= \hat{h}_0(t)e^{X_i\hat{\alpha}} \\ \hat{S}(t) &= 1 - \int_0^t \hat{h}(\tau)\hat{S}(\tau)d\tau.\end{aligned}\tag{2}$$

Using these relationships, the expected unemployment duration is calculated as:

$$\hat{D}_i = \int_0^t \tau\hat{h}(\tau)\hat{S}(\tau)d\tau.\tag{3}$$

In the second step, the change in the working conditions for wages, occupation, position, industry and firm size is regressed on  $X_i$  and  $\hat{D}_i$ . In the case of wages, position and firm size, the dependent variable is a trinomial variable which is set to 3 if the conditions improve in the current job, 2 if the conditions of the current job are the same as in the previous job, and 1 if the conditions in the current job are worse than in the previous job. Concerning firm size, a larger firm defines a good condition. In the case of occupation and industry, as it is hard to define a good or bad occupation (industry), the dependent variable is a binomial one which is set to 1 if the previous and current jobs are in the same occupation (industry). If experience in the previous job has some value for the workers, changing occupation (industry) means a bad condition. Hence, if a variable has a positive coefficient, it is interpreted as improving the working condition in the case of wage level,



position, and firm size. Conversely, it is interpreted as worsening the working condition in the case of occupation and industry.

The estimation method used is the ordered probit method for the case of wages, position, and firm size, and the probit method for occupation and industry. Both methods employ a heteroscedasticity consistent estimator. The estimation equation is

$$\Delta C_i^j = \beta_0^j + X_i \beta^j + \beta_D^j \hat{D}_i + \varepsilon_i^j \quad (4)$$

where  $j$  indicates estimation for wage, position, firm size, occupation and industry, and  $\Delta C_i^j$  means change in these conditions between the previous and the current job. The explanatory variable  $X_i$  is the same as in the first step.

The second step adds  $\hat{D}_i$  to the list of explanatory variables. As  $\hat{D}_i$  is a highly non-linear function of  $X_i$ , there is no problem of identification, even if there are no additional explanatory variables in the first step. The coefficients of the UB recipients' dummy precisely demonstrate the effect of the UB on the job conditions, controlling for the extended effect of unemployment duration by the UB. This is the most important factor in this paper. If these coefficients imply worse conditions than those for UB non-recipients, there is powerful support for moral hazard from the UB.

## 5 Estimation Results

The estimation results for the unemployment duration are shown in Table 2, and the change in conditions, which are defined by wage level, occupation, rank, industry and firm size, are shown in Tables 3 to 7, respectively.

As the estimated coefficients in Table 3 are  $\alpha$  in eq. (1), if they are positive, the associated variable raises the hiring probability and shortens the unemployment duration. The table shows that on-the-job search duration, being female, a high school or technical school graduate, a clerical, sales, service, or production and construction worker, or a reg-

ular worker in the previous job are associated with significantly lower hiring probabilities. Conversely, the unemployed who are executives of corporations, and from firms with 30–99 employees in the previous job, enjoy significantly higher hiring probabilities.

The negative effect of on-the-job search on hiring probabilities implies that the intensity in these activities would be very low and it is harmful for early hiring. The lack of any significant age and tenure effect may imply that there is variable contamination, and canceling out of each other by the effects through the UB system, household structure and human capital.

The dummy for UB recipients is significantly negative, which is consistent with theoretical prediction. Its magnitude shows that the hiring probability of UB recipients is lower than by an amount of 45%, which is an exponential transformation of the estimated coefficient of -0.78. As the hiring probability for UB recipients is almost half that of no UB recipients, the duration of unemployment should be twice as large.

Those workers who quit voluntarily from the previous job suffered significantly lower hiring probabilities. This is consistent with the fact that the definition of voluntary quitting excludes those who to quit to move to a better job. There is no effect of licenses.

Next, the estimation results for the second step are summarized as follows. As there are many tables and coefficients, we display only the important coefficients. First, the estimates of unemployment duration are not significant in all cases. This means that short unemployment duration is not a favorable factor and that long unemployment duration is not an unfavorable factor leading to a better job condition. This result presents negative evidence for the hypothesis that the search intensity is constant over the unemployment period.

Secondly, in the wage, occupation and firm size estimations, the UB recipients significantly change to worse job conditions. The effect of this is that the UB recipients experience an 8% points lower probability of a wage increase in the new job, a 3.8% points higher probability of a change in occupation, and a 2.8% points lower probability of a firm size decrease

in comparison with UB non-recipients. Conversely, they enjoy better job conditions; UB recipients have a 2% points higher probability of promotion in the new job in comparison with the previous job. However it is noted that meaning of positions vary widely over firm size and other conditions. For example, the same positions do not the same responsibility, tasks, and so on in large firms and small firms. Thus we should not pay so much attention this results of position. In the industry equation, there is no significant relation. Since industry classification in this estimation is very imprecise, the industrial specificity in human capital cannot be defined, which leads to an unclear result. Overall, we can conclude that UB recipients suffer from worse conditions even though they enjoy longer unemployment durations than UB non-recipients. This is powerful evidence of moral hazard by UB<sup>5</sup>).

Voluntarily quitting workers have experienced better conditions with respect to wages and worse conditions for position, occupation and industry in comparison with the previous job. These results imply that they gain higher wages by changing voluntarily and eagerly their position, occupation and industry. Though license holders cannot enjoy good conditions with respect to wages and firm size, they do not suffer from changes in occupation and industry. Moreover, they are significantly promoted in their current jobs from the previous ones. Hence, license-holding enhances a stable working condition.

## 6 Concluding Remarks

This paper examines how the UB affects intensity or search effect of the unemployed, which is measured by the working conditions of a new job, being the outcome of search behavior, controlling for the endogeneity of the duration of unemployment. The estimation results show that the hiring probability of UB recipients is significantly lower—about half that of non-recipients. Thus the duration of unemployment of UB recipients should be twice that of UB non-recipients, *ceteris paribus*.

Additionally, the estimation results in the second step show that unemployment duration,

which is estimated in the first step, does not significantly affect the change in working conditions of new jobs over previous jobs with respect to wages, occupation, position, industry and firm size. Moreover, UB recipients are significantly worse off than non-recipients as far as wages, occupation and firm size are concerned. This is very strong evidence of moral hazard stemming from the unemployment benefit system.

Finally, we make some remarks about further research. Firstly, the sample in this paper excludes those who are non-regular workers and not currently in the labor force. Because outflow to non-regular workers in the labor market and outflow to outside labor market are very important aspects of the unemployment situation and the functioning of the UB, it is necessary to consider this effect in evaluating the UB scheme. Secondly, further research would control for the omitted variables in this analysis, such as household assets, income from other members of the household, and household structure, which are not available from this data set. Moreover, so as to more directly evaluate the inertia in required wages, occupation, and so on, panel analysis of the effect of these variables on unemployment duration would be very important.

Overall, as this research shows that UB undoubtedly induces moral hazard, more data needs to be collected, refined in definition and improved in measurement, so as to evaluate the inefficiencies in the UB system more rigorously, to suggest ways of moving to a more efficient UB system.

## Footnotes

- \*) This paper have permission to use and analysis the micro data of the Survey of Job Changers (*Tenshokusha Sougou Jittai Chosa* as a part of the outcome of the study group, represented by Prof. Mitani at Kobe University. I thank him, Prof. Muramatsu at Nazan University and Prof. Ohta at Nagoya University for useful support and discussions. This paper was presented at Labor Study Group Meeting in 2000. I also thank to the participants of this meeting, especially Prof. Ohtake, my colleague, for useful suggestion and discussions. Finally I thank Ms. Kazuko Matsumoto for her helpful support to my research. Needless to say, any remaining errors are mine.
- 1) In Japan, unemployment insurance is called the Employment Insurance System, and includes not only unemployment benefits, but also subsidies for temporarily declining industries, training costs for certain occupations, payment for childcare leave, and so on.
  - 2) Yashiro and Futagami (1998) discuss aspects of the Employment Insurance System other than UB.
  - 3) Atkinson and Micklewright (1991) is a good survey of this field.
  - 4) Ohtake (1987) examines the relationship between UB levels and unemployment rates using macro data, but is unable to find any close relationship.
  - 5) This result holds even in the case where those more than 60 years of age are excluded from the sample.

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Table 1 : Summary Statistics

	Mean	Standard Deviation	Minimum	Maximum
Duration of Unemployment	3.168709	3.555293	.5	12
Duration of Job Search	5.860248	6.424305	.5	36
Female Dummy	.3740526	.4839079	0	1
Age	34.19846	11.21833	16	69
Tenure (previous)	4.64676	4.074059	.25	12.5
High School Graduate	.482188	.4997142	0	1
Covation School Graduate	.1292319	.3354777	0	1
Two Tear College Graduate	.097524	.2966887	0	1
University Graduate	.2249874	.4176004	0	1
Number of Turnover	2.401619	1.639915	1	22
Occupation type2(previous)	.0386559	.1927856	0	1
Occupation type3(previous)	.237241	.4254181	0	1
Occupation type4(previous)	.1110409	.3142027	0	1
Occupation type5(previous)	.0976503	.29686	0	1
Occupation type6(previous)	.0160435	.1256505	0	1
Occupation type7(previous)	.0535624	.2251663	0	1
Occupation type8(previous)	.3050783	.4604697	0	1
Occupation type9(previous)	.0037898	.0614484	0	1
Occupation type2(current)	.0509096	.2198269	0	1
Occupation type3(current)	.22524	.4177667	0	1
Occupation type4(current)	.139338	.3463208	0	1
Occupation type5(current)	.1139464	.3177663	0	1
Occupation type6(current)	.011622	.107184	0	1
Occupation type7(current)	.061521	.2402986	0	1
Occupation type8(current)	.2553057	.4360605	0	1
Occupation type9(current)	.0072006	.0845557	0	1
Position type2(previous)	.0210992	.1437241	0	1

( Table 1: continue)



( Table 1: continue)

Position type3(previous)	.0381554	.1915834	0	1
Position type4(previous)	.0207202	.1424549	0	1
Position type5(previous)	.0349968	.1837834	0	1
Position type6(previous)	.1180038	.322633	0	1
Position type7(previous)	.7626027	.4255147	0	1
Position type2(current)	.0247725	.1554409	0	1
Position type3(current)	.0485339	.214905	0	1
Position type4(current)	.0379171	.1910078	0	1
Position type5(current)	.0618049	.240816	0	1
Position type6(current)	.119186	.3240278	0	1
Position type7(current)	.6937563	.4609613	0	1
Regular Worker(previous)	.8327438	.373228	0	1
Mining(previous)	.0054341	.0735204	0	1
Construction(previous)	.0877038	.2828815	0	1
Manufacturing(previous)	.2917983	.4546187	0	1
Gas and Electric Power(previous)	.0211045	.1437419	0	1
Trans. and Comm.(previous)	.0684949	.2526092	0	1
Wholesale and Retail(previous)	.1486162	.3557322	0	1
Bank and Insurance(previous)	.0461266	.2097725	0	1
Real estate(previous)	.0113737	.106046	0	1
Service industry(previous)	.2767598	.447425	0	1
Government(previous)	.0353848	.1847621	0	1
Construction(current)	.0389085	.1933892	0	1
Manufacturing(current)	.3965387	.4892095	0	1
Gas and Electric Power(current)	.0161698	.1261362	0	1
Trans. and Comm.(current)	.0409298	.19814	0	1
Wholesale and Retail(current)	.1848156	.3881724	0	1
Bank and Insurance(current)	.0169277	.1290089	0	1
Real estate(current)	.0160435	.1256505	0	1
Service industry(current)	.2690753	.4435072	0	1
Firm Size 500~999(previous)	.0622789	.2416767	0	1
Firm Size 300~499(previous)	.0649318	.246421	0	1
Firm Size 100~299(previous)	.1759727	.380821	0	1
Firm Size 30~99(previous)	.2299141	.420804	0	1
Firm Size 5~29(previous)	.2488631	.4323816	0	1

(Table 1: continue)

(Table 1: continue)

~4(previous)	.04333	.2036117	0	1
Firm Size (current)	195.0393	609.0668	5	14967
Dummy for UB Recipient	.2610234	.4392204	0	1
Duration of UB Receive	24.28488	54.32623	0	450
Dummy for Voluntary Quitters	.8046993	.396457	0	1
Dummy for License Holder	.3988125	.489685	0	1
Rate of Change in Wage	-.0269707	.1696776	-.3	.3
Dummy for Change in Occupation	.3721577	.4834106	0	1
Dummy for Change in Industry	.5687216	.4952861	0	1
Change in Firm Size	1.869126	.8501358	1	3
Change in Position	2.079383	.4730603	1	3

Note: This table omits junior high school graduates from the education background, professional and technical workers (occupation type1) in occupation, executives in position, agriculture in industry (previous), mining in industry (current) in the industry and those firms with over 1000 employees in firm size. Change in firm size is 3 if firm size in the current job is larger than in the previous job, 2 if firm size in the current job is the same as in the previous job, and 0 otherwise. Change in position is 3 if position in the current job is higher than in the previous job, 2 if position in the current job is the same as in the previous job, and 0 otherwise.

The types of occupation are: 1) professional and technical workers, 2) managers and officials, 3) clerical and related workers, 4) sales workers, 5) service workers, 6) protective service workers, 7) workers in transport and communications occupations, 8) craftsmen, mining, production process and construction workers and laborers, and 9) others.

The types of position are: 1) executive of corporations, 2) heads of department, 3) heads of section, 4) subsection chief, 5) manager, 6) specialist, 7) routine worker.

Industry classifications are Mining, Construction, Manufacturing, Gas and Electric Power, Transportation and Communication (in short, Trans. and Comm.), Wholesale and Retail, Bank and Insurance, Real Estate, Service industry and Government.

Table 2: Duration Estimation for Unemployment

	Estimated Coef.	$z$ value	p-value
Female Dummy	-.1292168	-4.469	0.000
Age	.0120892	1.389	0.165
Age <sup>2</sup>	-.0001624	-1.357	0.175
Tenure (previous)	.0175959	1.231	0.218
Tenure (previous) <sup>2</sup>	.0001485	0.151	0.880
Age·Tenure (previous)	-.0005928	-1.619	0.105
High School Graduate	-.0877143	-1.766	0.077
Covation School Graduate	-.136156	-2.281	0.023
Two Tear College Graduate	-.0791194	-1.250	0.211
University Graduate	-.0946776	-1.635	0.102
Duration of On-the-Job Search	-.0370096	-14.307	0.000
Number of Turnover	.009894	1.175	0.240
Occupation type2(previous)	-.0511267	-0.603	0.546
Occupation type3(previous)	-.1240269	-2.750	0.006
Occupation type4(previous)	-.1049634	-2.021	0.043
Occupation type5(previous)	-.1101175	-2.071	0.038
Occupation type6(previous)	-.3004563	-3.013	0.003
Occupation type7(previous)	-.0629823	-0.966	0.334
Occupation type8(previous)	-.1241396	-2.676	0.007
Occupation type9(previous)	-.2042104	-1.089	0.276
Position type2(previous)	-.3155505	-1.673	0.094
Position type3(previous)	-.3241059	-1.798	0.072
Position type4(previous)	-.3572895	-1.874	0.061
Position type5(previous)	-.54853	-2.976	0.003
Position type6(previous)	-.5218918	-2.926	0.003
Position type7(previous)	-.5684531	-3.246	0.001
Regular Worker(previous)	-.0085236	-0.260	0.795
Mining(previous)	-.1028412	-0.504	0.614
Construction(previous)	.0430046	0.308	0.758
Manufacturing(previous)	.0537256	0.396	0.692
Gas and Electric Power(previous)	.0374852	0.242	0.809

(Table 2: continue)

(Table 2: continue)

Trans. and Comm.(previous)	-.0189335	-0.134	0.893
Wholesale and Retail(previous)	.0178834	0.130	0.896
Bank and Insurance(previous)	-.0286312	-0.198	0.843
Real estate(previous)	.0213294	0.124	0.901
Service industry(previous)	-.030959	-0.227	0.820
Government(previous)	-.1711204	-1.157	0.247
Firm Size 500~999(previous)	-.0555677	-1.015	0.310
Firm Size 300~499(previous)	.0189805	0.350	0.726
Firm Size 100~299(previous)	.0128645	0.312	0.755
Firm Size 30~99(previous)	.0697418	1.742	0.082
Firm Size 5~29(previous)	.0442434	1.097	0.273
Firm Size ~4(previous)	-.0154371	-0.238	0.812
Dummy for UB Recipient	-.7824282	-27.405	0.000
Dummy for Voluntary Quitters	-.1747492	-5.252	0.000
Dummy for License Holder	.0160505	0.655	0.512

Note: This table shows estimation results of duration of unemployment by using Cox's (1972) proportional hazard model. Prefecture dummies and the firm size dummy in the previous job are included as explanatory variables. The log-likelihood is -64538.733. The null hypothesis that all coefficients are 0 is rejected at the 1% significance level.

Table 3: Estimation Result for Change in Wage

	Estimated z value Coef.	p-value	marginal effect increase	marginal effect no change	
Female Dummy	.09724	2.792	0.005	.03120	.00312
Age	.01865	1.810	0.070	.00598	.00060
Age <sup>2</sup>	-.00033	-2.361	0.018	-.00010	-.00001
Tenure (previous)	.02276	1.329	0.184	.00730	.00073
Tenure (previous) <sup>2</sup>	-.00231	-2.008	0.045	-.00074	-.00007
Age·Tenure (previous)	-.00100	-2.297	0.022	-.00032	-.00003
High School Graduate	-.22885	-3.869	0.000	-.07343	-.00736
Covation School Graduate	-.37797	-5.330	0.000	-.12128	-.01215
Two Tear College Graduate	-.33836	-4.501	0.000	-.10857	-.01088
University Graduate	-.24609	-3.558	0.000	-.07897	-.00791
Duration of On-the-Job Search	-.00379	-1.177	0.239	-.00121	-.00012
Number of Turnover	-.03851	-3.924	0.000	-.01236	-.00123
Occupation type1(previous)	-.21340	-2.066	0.039	-.06848	-.00686
Occupation type3(previous)	-.16654	-3.112	0.002	-.05344	-.00535
Occupation type4(previous)	-.08896	-1.460	0.144	-.02854	-.00286
Occupation type5(previous)	-.12686	-2.033	0.042	-.04070	-.00408
Occupation type6(previous)	-.15164	-1.253	0.210	-.04866	-.00487
Occupation type7 (previous)	.04452	0.581	0.562	.01428	.00143
Occupation type8(previous)	-.15879	-2.898	0.004	-.05095	-.00510
Occupation type9(previous)	.00699	0.030	0.976	.00224	.00022
Position type2(previous)	-.14834	-0.651	0.515	-.04760	-.00477
Position type3(previous)	-.28952	-1.322	0.186	-.09290	-.00931
Position type4(previous)	-.43652	-1.878	0.060	-.14007	-.01404
Position type5(previous)	-.38044	-1.664	0.096	-.12208	-.01223
Position type6(previous)	-.75091	-3.388	0.001	-.24096	-.02415
Position type7(previous)	-.69560	-3.177	0.001	-.22321	-.02237
Regular Worker(previous)	-.46557	-12.098	0.000	-.14939	-.01497
Mining(previous)	.06519	0.262	0.793	.02091	.00209
Construction(previous)	-.12132	-0.719	0.472	-.03893	-.00390
Manufacturing(previous)	.11532	0.701	0.483	.03700	.00371

(Table 3: continue)

(Table 3: continue)

Gas and Electric Power(previous)	-.11128	-0.596	0.551	-.03571	-.00358
Trans. and m.(prevs)	-.04287	-0.251	0.802	-.01375	-.00137
Wholesale and Retail(previous)	.05206	0.313	0.754	.01670	.00167
Bank and Insurance(previous)	-.03083	-0.175	0.861	-.00989	-.00099
Real estate(previous)	-.44057	-2.121	0.034	-.14137	-.01417
Service industry(previous)	.08404	0.510	0.610	.02697	.00270
Government(previous)	-.17355	-0.857	0.391	-.05569	-.00558
Firm Size 500~999(previous)	.16050	2.464	0.014	.05150	.00516
Firm Size 300~499(previous)	.28227	4.414	0.000	.09057	.00908
Firm Size 100~299(previous)	.31029	6.304	0.000	.09957	.00998
Firm Size 30~99(previous)	.40696	8.486	0.000	.13059	.01309
Firm Size 5~29(previous)	.48036	9.927	0.000	.15414	.01545
Firm Size ~4(previous)	.49298	6.515	0.000	.15819	.01585
Dummy for UB Recipient	-.27527	-5.766	0.000	-.08833	-.00885
Dummy for Voluntary Quitters	.17106	4.313	0.000	.05489	.00550
Dummy for License Holder	-.02036	-0.711	0.477	-.00653	-.00065
Duration of Unemployment(estimated)	-.01556	-0.277	0.782	-.00499	-.00050
threshold(lower)	-1.35650				
threshold(upper)	-.59100				

Note: This table shows estimation results of the change in wages by using the ordered probit model with heteroscedasticity consistent. The dependent variable of change in wage is 3 if wage in the current job is higher than in the previous job, 2 if wage in the current job is the same as in the previous job, and 0 otherwise. Prefecture dummies are included as explanatory variables. The log-likelihood is -7947.0864 and pseudo  $R^2$  is 0.0688. The null hypothesis that all coefficients are 0 is rejected at the 1% significance level.

Table 4: Estimation Results for Change in Occupation

	Estimated Coef.	z value	p-value	marginal effect
Female Dummy	-.09603	-2.440	0.015	-.03584
Age	-.00733	-0.626	0.531	-.00275
Age <sup>2</sup>	-9.62e-6	-0.059	0.953	-3.61e-6
Tenure (previous)	-.07020	-3.619	0.000	-.02632
Tenure (previous) <sup>2</sup>	.00180	1.379	0.168	.00067
Age·Tenure (previous)	.00118	2.406	0.016	.00044
High School Graduate	.37259	5.407	0.000	.13932
Covation School Graduate	.25267	3.080	0.002	.09725
Two Tear College Graduate	.34482	3.986	0.000	.13384
University Graduate	.46480	5.858	0.000	.17930
Duration of On-the-Job Search	.00026	0.074	0.941	.00009
Number of Turnover	-.00539	-0.488	0.626	-.00202
Occupation type1(previous)	.00695	0.061	0.951	.00261
Occupation type3(previous)	.01338	0.220	0.826	.00502
Occupation type4(previous)	.26770	3.942	0.000	.10328
Occupation type5(previous)	.38432	5.523	0.000	.14948
Occupation type6(previous)	1.25052	9.014	0.000	.45522
Occupation type7 (previous)	.27695	3.274	0.001	.10732
Occupation type8(previous)	.18257	2.936	0.003	.06919
Occupation type9(previous)	1.03406	4.232	0.000	.39020
Position type2(previous)	-.48700	-1.945	0.052	-.16265
Position type3(previous)	-.13405	-0.564	0.573	-.04905
Position type4(previous)	-.01911	-0.076	0.940	-.00714
Position type5(previous)	-.12068	-0.484	0.628	-.04427
Position type6(previous)	-.21149	-0.874	0.382	-.07671
Position type7(previous)	-.03001	-0.126	0.900	-.01128
Regular Worker(previous)	-.18201	-4.238	0.000	-.06950
Mining(previous)	-.40301	-1.524	0.128	-.13746
Construction(previous)	-.53994	-2.987	0.003	-.18116
Manufacturing(previous)	-.83759	-4.767	0.000	-.28492

(Table 4: continue)

(Table 4: continue)

Gas and Electric Power(previous)	-0.47113	-2.349	0.019	-0.15810
Trans. and m.(prevs)	-0.19569	-1.072	0.284	-0.07088
Wholesale and Retail(previous)	-0.26474	-1.491	0.136	-0.09544
Bank and Insurance(previous)	-0.32365	-1.720	0.085	-0.11363
Real estate(previous)	-0.18535	-0.839	0.401	-0.06697
Service industry(previous)	-0.37995	-2.162	0.031	-0.13711
Government(previous)	-0.39582	-1.810	0.070	-0.13615
Firm Size 500~999(previous)	0.07688	1.077	0.281	0.02915
Firm Size 300~499(previous)	-0.02279	-0.322	0.748	-0.00851
Firm Size 100~299(previous)	-0.06067	-1.117	0.264	-0.02258
Firm Size 30~99(previous)	-0.20098	-3.760	0.000	-0.07372
Firm Size 5~29(previous)	-0.00368	-0.069	0.945	-0.00138
Firm Size ~4(previous)	0.09089	1.079	0.281	0.03454
Dummy for UB Recipient	0.10257	1.956	0.050	0.03876
Dummy for Voluntary Quitters	0.16188	3.607	0.000	0.05953
Dummy for License Holder	-0.16015	-4.963	0.000	-0.05965
Duration of Unemployment(estimated)	-0.00210	-0.034	0.973	-0.00079
constant	0.06302	0.177	0.859	

Note: This table shows the estimation results of the change in occupation by using the probit model with heteroscedasticity consistent. The dependent variable, change in occupation, is 1 if occupation in the current job is not the same as in the previous job, and 0 otherwise. Prefecture dummies are included as explanatory variables. The log-likelihood is -4839.7302 and pseudo  $R^2$  is 0.0718. The null hypothesis that all coefficients are 0 is rejected at the 1% significance level.



Table 5: Estimation Result for Change in Position

	Estimated z value Coef.	p-value	marginal effect up	marginal effect no change	
Female Dummy	-.50233	-12.079	0.000	-.10022	.04693
Age	.01640	1.367	0.171	.00327	-.00153
Age <sup>2</sup>	-.00002	-0.140	0.889	-4.60e-6	2.15e-6
Tenure (previous)	.04050	2.051	0.040	.00808	-.00378
Tenure (previous) <sup>2</sup>	.00490	3.776	0.000	.00097	-.00045
Age·Tenure (previous)	-.00051	-1.063	0.288	-.00010	.00004
High School Graduate	.41178	5.961	0.000	.08215	-.03847
Covation School Graduate	.57869	6.976	0.000	.11545	-.05406
Two Tear College Graduate	.53942	6.097	0.000	.10762	-.05040
University Graduate	.66860	8.355	0.000	.13339	-.06247
Duration of On-the-Job Search	.00239	0.661	0.509	.00047	-.00022
Number of Turnover	.03714	3.283	0.001	.00741	-.00347
Occupation type1(previous)	.33737	3.087	0.002	.06730	-.03152
Occupation type3(previous)	-.03890	-0.635	0.526	-.00776	.00363
Occupation type4(previous)	-.06915	-0.993	0.321	-.01379	.00646
Occupation type5(previous)	-.08564	-1.195	0.232	-.01708	.00800
Occupation type6(previous)	-.30632	-2.345	0.019	-.06111	.02862
Occupation type7 (previous)	-.37406	-4.211	0.000	-.07463	.03495
Occupation type8(previous)	-.22955	-3.659	0.000	-.04579	.02144
Occupation type9(previous)	.05784	0.224	0.823	.01153	-.00540
Position type2(previous)	1.23045	4.678	0.000	.24548	-.11496
Position type3(previous)	1.35701	5.313	0.000	.27073	-.12679
Position type4(previous)	1.64743	6.133	0.000	.32867	-.15392
Position type5(previous)	1.78870	6.720	0.000	.35686	-.16712
Position type6(previous)	2.81205	10.757	0.000	.56103	-.26274
Position type7(previous)	3.66406	14.089	0.000	.73102	-.34234
Regular Worker(previous)	.15388	3.361	0.001	.03070	-.01437
Mining(previous)	-.85703	-3.023	0.003	-.17098	.08007
Construction(previous)	-.13251	-0.705	0.481	-.02643	.01238
Manufacturing(previous)	-.29773	-1.628	0.103	-.05940	.02781

(Table 5: continue)

(Table 5: continue)

Gas and Electric Power(previous)	-.19314	-0.920	0.357	-.03853	.01804
Trans. and m.(prevs)	-.36847	-1.930	0.054	-.07351	.03442
Wholesale and Retail(previous)	-.07903	-0.427	0.669	-.01576	.00738
Bank and Insurance(previous)	-.14577	-0.743	0.458	-.02908	.01362
Real estate(previous)	-.13603	-0.594	0.553	-.02713	.01270
Service industry(previous)	-.03572	-0.195	0.845	-.00712	.00333
Government(previous)	-.19662	-0.865	0.387	-.03922	.01837
Firm Size 500~999(previous)	.11272	1.535	0.125	.02249	-.01053
Firm Size 300~499(previous)	.05404	0.736	0.462	.01078	-.00504
Firm Size 100~299(previous)	.05799	1.035	0.301	.01157	-.00541
Firm Size 30~99(previous)	.16347	2.995	0.003	.03261	-.01527
Firm Size 5~29(previous)	.10393	1.894	0.058	.02073	-.00971
Firm Size ~4(previous)	.06117	0.704	0.482	.01220	-.00571
Dummy for UB Recipient	.10213	1.890	0.059	.02037	-.00954
Dummy for Voluntary Quitters	-.15148	-3.371	0.001	-.03022	.01415
Dummy for License Holder	.08707	2.630	0.009	.01737	-.00813
Duration of Unemployment(estimated)	.09815	1.561	0.119	.01958	-.00917
threshold(lower)	2.74019				
threshold(upper)	5.76996				

Note: This table shows the estimation results of change in position by using the ordered probit model with heteroscedasticity consistent. The dependent variable, change in position, is 3 if position in the current job is higher than in the previous job, 2 if position in the current job is the same as in the previous job, and 0 otherwise. Prefecture dummies are included as explanatory variables. The log-likelihood is -4323.6349 and pseudo  $R^2$  is 0.2008. The null hypothesis that all coefficients are 0 is rejected at the 1% significance level.

Table 6: Estimation Result for Change in Industry

	Estimated Coef.	z value	p-value	marginal effect
Female Dummy	-.11628	-2.812	0.005	-.04552
Age	-.01933	-1.586	0.113	-.00754
Age <sup>2</sup>	.00016	0.980	0.327	.00006
Tenure (previous)	-.06157	-3.064	0.002	-.02404
Tenure (previous) <sup>2</sup>	.00167	1.244	0.214	.00065
Age·Tenure (previous)	.00109	2.178	0.029	.00042
High School Graduate	.18422	2.668	0.008	.07180
Covation School Graduate	.08810	1.058	0.290	.03414
Two Tear College Graduate	.25940	2.907	0.004	.09832
University Graduate	.23218	2.870	0.004	.08910
Duration of On-the-Job Search	.00542	1.433	0.152	.00212
Number of Turnover	-.00905	-0.799	0.424	-.00353
Occupation type1(previous)	.30511	2.523	0.012	.11418
Occupation type3(previous)	.50902	7.947	0.000	.18980
Occupation type4(previous)	.29245	4.097	0.000	.11050
Occupation type5(previous)	.19777	2.730	0.006	.07563
Occupation type6(previous)	.51778	3.724	0.000	.18442
Occupation type7 (previous)	.27716	3.077	0.002	.10441
Occupation type8(previous)	.20313	3.110	0.002	.07852
Occupation type9(previous)	.67751	2.611	0.009	.23015
Position type2(previous)	-.39174	-1.441	0.149	-.15526
Position type3(previous)	-.35423	-1.358	0.174	-.14045
Position type4(previous)	-.09519	-0.345	0.730	-.03747
Position type5(previous)	-.17505	-0.647	0.518	-.06920
Position type6(previous)	-.26416	-1.004	0.316	-.10451
Position type7(previous)	-.00559	-0.022	0.983	-.00218
Regular Worker(previous)	-.16731	-3.615	0.000	-.06439
Mining(previous)	-5.22823	-12.932	0.000	-.59332
Construction(previous)	-5.15090	-15.323	0.000	-.75035
Manufacturing(previous)	-6.64153	-19.824	0.000	-.98670

(Table 6: continue)

(Table 6: continue)

Gas and Electric Power(previous)	-4.53564	-12.281	0.000	-.62017
Trans. and m.(prevs)	-5.25164	-15.354	0.000	-.71859
Wholesale and Retail(previous)	-5.90307	-17.514	0.000	-.86792
Bank and Insurance(previous)	-5.09331	-14.689	0.000	-.67334
Real estate(previous)	-5.60329	-15.249	0.000	-.60748
Service industry(previous)	-6.0057	-17.898	0.000	-.97306
Firm Size 500~999(previous)	-.00899	-0.119	0.905	-.00351
Firm Size 300~499(previous)	-.23616	-3.198	0.001	-.09349
Firm Size 100~299(previous)	-.12891	-2.266	0.023	-.05069
Firm Size 30~99(previous)	-.27180	-4.897	0.000	-.10712
Firm Size 5~29(previous)	-.14609	-2.603	0.009	-.05738
Firm Size ~4(previous)	-.00491	-0.055	0.956	-.00191
Dummy for UB Recipient	.04557	0.812	0.417	.01775
Dummy for Voluntary Quitters	.12360	2.633	0.008	.04859
Dummy for License Holder	-.14654	-4.330	0.000	-.05735
Duration of Unemployment(estimated)	-.03586	-0.543	0.587	-.01400
constant	6.45195	2.011	0.044	

Note: This table shows estimation results of change in industry by using the probit model with heteroscedasticity consistent. The dependent variable, change in occupation, is 1 if industry in the current job is not the same as in the previous job, and is 0 otherwise. Prefecture dummies are included as explanatory variables. The log-likelihood is -4350.9134 and pseudo  $R^2$  is 0.1698. The null hypothesis that all coefficients are 0 is rejected at the 1% significance level.

Table 7: Estimation Result for Change in Firm Size

	Estimated z value Coef.	p-value	marginal effect increase	marginal effect no change	
Female Dummy	-.01156	-0.291	0.771	-.00218	-.00033
Age	-.00424	-0.365	0.715	-.00079	-.00012
Age <sup>2</sup>	.00003	0.214	0.831	6.44e-6	1.00e-6
Tenure (previous)	.04726	2.423	0.015	.00891	.00138
Tenure (previous) <sup>2</sup>	-.00165	-1.271	0.204	-.00031	-.00004
Age·Tenure (previous)	-.00054	-1.113	0.266	-.00010	-.00001
High School Graduate	.00800	0.121	0.904	.00150	.00023
Covation School Graduate	.07155	0.894	0.371	.01348	.00209
Two Tear College Graduate	.19598	2.307	0.021	.03694	.00573
University Graduate	.41562	5.335	0.000	.07834	.01216
Duration of On-the-Job Search	.00430	1.180	0.238	.00081	.00012
Number of Turnover	-.03188	-2.870	0.004	-.00600	-.00093
Occupation type1(previous)	-.03902	-0.326	0.744	-.00735	-.00114
Occupation type3(previous)	-.13616	-2.240	0.025	-.02566	-.00398
Occupation type4(previous)	-.24402	-3.486	0.000	-.04600	-.00714
Occupation type5(previous)	-.19756	-2.796	0.005	-.03724	-.00578
Occupation type6(previous)	.00938	0.069	0.945	.00176	.00027
Occupation type7 (previous)	-.15174	-1.747	0.081	-.02860	-.00444
Occupation type8(previous)	-.23453	-3.771	0.000	-.04421	-.00686
Occupation type9(previous)	.04338	0.177	0.859	.00817	.00126
Position type2(previous)	.16807	0.584	0.559	.03168	.00492
Position type3(previous)	.33179	1.197	0.231	.06254	.00971
Position type4(previous)	.58572	2.022	0.043	.11041	.01714
Position type5(previous)	.47352	1.657	0.097	.08926	.01386
Position type6(previous)	.45284	1.629	0.103	.08536	.01325
Position type7(previous)	.42381	1.541	0.123	.07989	.01240
Regular Worker(previous)	.03629	0.800	0.424	.00684	.00106
Mining(previous)	.21660	0.768	0.443	.04083	.00634
Construction(previous)	.25655	1.378	0.168	.04836	.00751
Manufacturing(previous)	.32085	1.769	0.077	.06048	.00939

(Table 7: continue)

(Table 7: continue)

Gas and Electric Power(previous)	.36846	1.779	0.075	.06945	.01078
Trans. and m.(prevs)	.36354	1.927	0.054	.06853	.01064
Wholesale and Retail(previous)	.37677	2.053	0.040	.07102	.01102
Bank and Insurance(previous)	.41941	2.108	0.035	.07906	.01227
Real estate(previous)	.26723	1.171	0.242	.05037	.00782
Service industry(previous)	.34420	1.898	0.058	.06488	.01007
Government(previous)	.44702	1.995	0.046	.08426	.01308
Firm Size 500~999(previous)	.45783	5.183	0.000	.08630	.01340
Firm Size 300~499(previous)	.76649	9.176	0.000	.14448	.02243
Firm Size 100~299(previous)	1.26604	18.972	0.000	.23865	.03706
Firm Size 30~99(previous)	2.26259	33.994	0.000	.42651	.06623
Firm Size 5~29(previous)	3.48503	48.737	0.000	.65695	.10201
Firm Size ~4(previous)	11.4397	0.000	1.000	2.15646	.33487
Dummy for UB Recipient	-.13148	-2.418	0.016	-.02478	-.00384
Dummy for Voluntary Quitters	-.00929	-0.206	0.837	-.00175	-.00027
Dummy for License Holder	.02847	0.868	0.386	.00536	.00083
Duration for Unemployment(estimated)	.03689	0.585	0.558	.00695	.00108
threshold(lower)	2.13112				
threshold(upper)	3.37422				

Note: This table shows estimation results of change in firm size by using the ordered probit model with heteroscedasticity consistent. The dependent variable, change in firm size, is 3 if firm size in the current job is larger than in the previous job, 2 if firm size in the current job is the same as in the previous job, and is 0 otherwise. Prefecture dummies are included as explanatory variables. The log-likelihood is -5355.7874 and pseudo  $R^2$  is 0.3691. The null hypothesis that all coefficients are 0 is rejected at the 1% significance level.