
How Important Is Occupational Experience in Current Japan?: Analysis with Focus on Occupation-Specific Human Capital*

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In this paper, I focus on occupation-specific human capital and analyze to what extent firms value and utilize such human capital that is formed through the experience within occupation, using publicly available data. The results can be summarized as follows. First, since the 1990s, the percentage of job changers who stay in the same occupation has increased for those who were formerly specialist and technical workers, or clerical workers, but it has remained almost at the same level for those who were formerly in the other occupations. Second, in the analysis of factors that determine the percentage of job changers who stay in the same occupation, it turns out that job changers formerly in occupations that requires a larger accumulation of human capital are more likely to stay in the same occupation, both for male and female workers. Third, a worker's experience within occupation has a larger effect on wages than his or her age, both for male and female workers, and in the case of females, this occupational experience effect for specialist and technical workers relative to that for other occupational groups has risen in recent years.

I. Introduction

Firms' ability to guarantee employment is said to be on the decline due to the sluggish economic growth and the structural changes in the economic environment including the economic globalization trend and the aging of the population since the 1990s. In line with the lessening of firms' ability to guarantee employment, individuals have faced the need to increase their market value in order to preserve their employment; and to this end, they have come to acquire marketable job skills that may be valued highly not only by their current employers, but also by their potential employers. For example, the Special Committee on Education set up in the then Keidanren (Japan Federation of Economic Organizations) proposed the concept of "Japanese-style employability" (Nikkeiren 1999). This concept, while acknowledging that firms have some ability to guarantee employment, defines the "employability (of individuals)" as having two meanings: the ability that enables a worker to move within the labor market and the ability demonstrated in the current firm that enables a worker to retain employment. It is also around this time that attention was drawn to the behavior of acquiring "qualifications," which serve as a signal showing that a worker has more than a certain level of marketable job skills (Abe, Kurosawa, and Toda 2005).

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The one of the approaches that can be assumed for acquiring marketable job skills is to learn through the process of acquiring qualifications. Qualifications serve as a signal that indicates a skill level that has been achieved as a result of human investment, and they are expected to have an effect of facilitating job changes or job finding. However, workers are required to obtain other skills than those obtained through acquisition of qualifications. As in the case of on-the-job training, experiences acquired through work are also important. In Japan where workers are often recruited without the occupation being specified, as represented by the case of recruiting new graduates for a management-track career, workers are likely to acquire the knowledge necessary for work in the course of engaging in the actual work.

Under the argument of standard labor economics, human capital, which is a generic term for the skills and knowledge necessary for work, is discussed with a distinction made between general human capital and firm-specific human capital (Becker 1962). Whether human capital is general or firm-specific is explained by the specificity of the skills and knowledge. Since this two-category system is insufficient, however, studies have been made to classify the specificity of human capital into more detailed categories (Neal 1995; Hisamoto 1999). Specifically, the following concepts were introduced: industry-specific human capital that is specific to an industry and is not transferable to any another industry; and occupation-specific human capital that is specific to an occupation and is not transferable to any other occupation. This paper focuses on occupation-specific human capital, which represents marketable job skills in the sense that it is transferable to other firms in the same occupation.¹ This paper identifies what extent firms value and utilize such human capital that is formed through the experience within occupation, through carrying out the following two analyses using publicly available data.

Firstly, the paper studies the changes in the percentage of job changers who did not switch their occupations upon the job change.² If occupational experience is an essential factor in work, a switch of occupation upon a job change could lead to a substantial drop in wages due to the need to accumulate occupational experience from scratch. Therefore, job changers are expected to find a new job in the same occupation. Thus, the paper inquires into how the percentage of job changers who stay in the same occupation has changed, and what the determinant factors are.

Secondly, the paper studies how much the accumulation of occupational experience is reflected in wages. If occupation-specific human capital is to be substantially reflected in

¹ As a matter of course, it is meaningful to also focus on industry-specific human capital and verify whether it is industry-specific human capital or occupation-specific human capital that can better enhance productivity, and such study has already been carried out by Sullivan (2010). However, this report does not focus on industry-specific human capital due to a lack of sufficient data for analyzing the importance of industry-specific human capital.

² In this paper, the term “job change” is used to refer to a change of employer. While such change may be more correctly called “employer change,” this paper consistently uses the term “job change” since these two terms are generally used in the same meaning.

Table 1. Changes in the Number of Workers by Occupation

(A) Male	Upper figure: 1,000 persons; lower figure: % to total				
	1987	1992	1997	2002	2007
Specialist and technical workers	3,808 (10.5%)	4,569 (11.8%)	4,782 (12.1%)	4,849 (12.7%)	5,094 (13.3%)
Administrative and managerial workers	2,051 (5.6%)	2,139 (5.5%)	2,075 (5.3%)	1,821 (4.8%)	1,597 (4.2%)
Clerical workers	4,789 (13.2%)	5,169 (13.3%)	5,340 (13.5%)	4,914 (12.9%)	5,174 (13.6%)
Sales workers	5,442 (15.0%)	5,744 (14.8%)	5,897 (14.9%)	5,848 (15.4%)	5,478 (14.3%)
Service workers	1,610 (4.4%)	1,799 (4.6%)	1,930 (4.9%)	2,165 (5.7%)	2,283 (6.0%)
Security workers	716 (2.0%)	770 (2.0%)	889 (2.3%)	982 (2.6%)	1,028 (2.7%)
Agriculture, forestry and fisheries workers	2,644 (7.3%)	2,276 (5.9%)	2,008 (5.1%)	1,736 (4.6%)	1,625 (4.3%)
Transport and communication workers	2,249 (6.2%)	2,264 (5.8%)	2,254 (5.7%)	2,093 (5.5%)	2,025 (5.3%)
Production process and related workers	12,982 (35.7%)	13,773 (35.5%)	14,008 (35.5%)	13,100 (34.4%)	12,726 (33.3%)
Total	36,372	38,776	39,508	38,034	38,175

(B) Female	Upper figure: 1,000 persons; lower figure: % to total				
	1987	1992	1997	2002	2007
Specialist and technical workers	2,769 (11.5%)	3,322 (12.3%)	3,766 (13.7%)	4,148 (15.4%)	4,553 (16.4%)
Administrative and managerial workers	196 (0.8%)	237 (0.9%)	236 (0.9%)	226 (0.8%)	201 (0.7%)
Clerical workers	6,260 (25.9%)	7,779 (28.8%)	8,235 (30.0%)	7,839 (29.1%)	8,158 (29.3%)
Sales workers	3,249 (13.5%)	3,573 (13.2%)	3,485 (12.7%)	3,527 (13.1%)	3,409 (12.3%)
Service workers	2,847 (11.8%)	3,178 (11.8%)	3,575 (13.0%)	4,112 (15.2%)	4,419 (15.9%)
Security workers	19 (0.1%)	27 (0.1%)	43 (0.2%)	53 (0.2%)	66 (0.2%)
Agriculture, forestry and fisheries workers	2,326 (9.6%)	1,940 (7.2%)	1,611 (5.9%)	1,242 (4.6%)	1,086 (3.9%)
Transport and communication workers	120 (0.5%)	112 (0.4%)	135 (0.5%)	102 (0.4%)	91 (0.3%)
Production process and related workers	6,295 (26.1%)	6,619 (24.5%)	6,191 (22.5%)	5,353 (19.8%)	5,008 (18.0%)
Total	24,130	26,980	27,495	26,975	27,803

Source: Statistics Bureau, Ministry of Internal Affairs and Communications, *Employment Status Survey*.

Note: The total figures include occupations that cannot be classified.

individuals' productivity and, as a result, in wages, the longer the occupational tenure that leads to the accumulation of human capital, the higher the wages will be. Accordingly, the importance of occupational experience can be studied by analyzing the effect of occupational experience on wages.

Before making the analyses, let us look at the changes in the composition of workers in Japan by occupation. Table 1 shows that the percentage of specialist and technical workers has increased from 10.5% in 1987 to 13.3% in 2007 for males, and from 11.5% in 1987 to 16.4% in 2007 for females. The share of service workers has also increased from 4.4% in 1987 to 6.0% in 2007 for males, and from 11.8% in 1987 to 15.9% in 2007 for females. On the other hand, the shares of agriculture, forestry and fisheries workers and production process and related workers have decreased. Meanwhile, the shares of clerical workers and sales workers have hardly changed over the past 20 years.

The subsequent part of this paper is composed as follows. Section II takes an overview look at preceding studies on occupational experience and occupational mobility. Section III analyzes the percentage of job changers who stay in the same occupation. Section IV explains an empirical analysis on the effects of occupational experience on wages, and indicates the analysis results. Finally, Section V gives the conclusion to this paper and presents issues to be studied in the future.

II. Literature Review

In the context of economics, the importance of occupational experience has been pointed out in relation to analyses on wage changes following job changes and on the cost of job changes. Kishi (1998) confirmed that wage decline is smaller when changing the job in the same occupation.³ Meanwhile, Bognanno and Kambayashi (2006) used the data of the Survey on Employment Trends published by the Ministry of Health, Labour and Welfare to investigate how wage changes following job changes are affected by a change in the firm size, industry, and occupation of the new job. As a result, they found that a change in the firm size, industry, and occupation upon job changes led to wage losses, but there were differences in the degrees of such effects during the sample period from 1991 to 2002. Specifically, they pointed out that the degree of wage losses resulting from a change in industry showed no change during the sample period, but that of wage losses resulting from a change in occupation grew toward the latter half of the sample period.

In addition, Higuchi (2001) made a comprehensive analysis on the costs of job changes from the viewpoints of the time period required for reemployment and the wage changes as the result of the job changes. According to the results of a probit analysis on job changes within the same occupation, job changes within the same occupation were charac-

³ Japanese studies on changes in wage levels before and after job changes include Abe (1996), Muramatsu (2000), Ohashi and Nakamura (2002), Chae and Morishima (2002), Yugami (2005), and Higuchi, Kodama, and Abe (2005).

terized by the fact that a larger number of workers change jobs within the same occupation as the age becomes higher, and a larger number of workers switch occupations as the unemployed period becomes longer. Moreover, job changers moving from larger firms have a stronger tendency to stay in the same occupation. As for wage losses as the result of job changes, wage losses of job changers who stay in the same occupation are smaller than those of job changers who switch occupations. Looking by occupation of the former jobs, specialist and technical workers, administrative and managerial workers, security workers, transport and communication workers, and production process and related workers who stayed in the same occupations suffered smaller wage losses than those who switched occupations, but clerical workers and service workers who stayed in the same occupation suffered larger wage losses than those who switched occupations. Based on these findings, Higuchi (2001) indicated that occupation-specific labor markets are more easily established for specialist and technical work since the details of the occupation are relatively clearly defined and can be easily standardized beyond firm differences.

In studies outside Japan, Shaw (1984, 1987) was early to indicate that occupation-specific human capital strongly affects determination of wages. Later, Kambourov and Iourii (2009) analyzed the effects of occupational tenure on wages. In that process, the study applied an estimation method that minimizes the problem of endogeneity bias in earnings functions that had been indicated by Altonji and Shaktoko (1987), Topel (1991), and Altonji and Williams (2005).⁴ Kambourov and Iourii (2009) found through an analysis that “everything else being constant, five years of occupational tenure are associated with an increase in wages of 12% to 20%” and “when occupational experience is taken into account, tenure with an industry or employer has relatively little importance in accounting for the wage one receives,” and concluded that human capital is occupation specific. Sullivan (2010) discovered that whether or not human capital is occupation specific varies across occupations. It stated that human capital is primarily occupation specific in production process and related work, but is primarily industry specific in administrative and managerial work, and concluded that in other occupations such as specialist and technical work, both occupation-specific human capital and industry-specific human capital are key determinants of wages. To the extent of the author’s knowledge, there are no previous studies that have analyzed the effects of occupational experience on wages using Japanese data. This is considered to be largely due to the lack of long-term panel data sets that allow for control of the endogeneity bias in earnings functions and with which the occupational experience of workers can be identified. The estimation of an earnings function that controls for occupational experience, attempted in Section IV, has some problems that need to be tackled, but it is considered to have some contributions as the first step of study for elucidating the actual

⁴ A possibility that a worker who receives higher wages due to a better employer match is more likely to stay with the firm longer and, as a result, have higher employer tenure causes the problem of endogeneity bias in earnings functions. The same argument applies to occupational tenure.

conditions in Japan.⁵

Looking at studies on occupational mobility, many U.S. studies focus on such aspects as occupational choice and occupational matching. McCall (1990) theoretically and empirically indicated that, “if occupational matching is significant,” “for those who have switched jobs but remained in the same occupation, increased tenure in the previous job lowers the likelihood of separation from the current job.” Neal (1999) argued that young people adopt a two-stage search strategy in which they first look for a good match with a career (occupation), and then look for an employer that provides a suitable job for them, and obtained empirical results supporting that hypothesis. Kambourov and Iourii (2008) studied the actual conditions of industry mobility and occupational mobility in the United States over the 1968 to 1997 period. As a result, occupational and industry mobility rates were found to increase over the entire sample period, although with some fluctuations, both at the one-digit level of occupation codes (from 10% to 15%) and at the three-digit level (from 16% to 20%). However, Kambourov and Iourii (2008) have only presented some hypotheses such as technological changes and globalization as reasons for the increase in occupational mobility, and have not gone as far as testing the hypotheses.

III. Analysis on the Percentage of Job Changers Who Stay in the Same Occupation

As discussed in Section I, if occupational experience is significant, job changers are likely to find a new job in the same occupation. This section focuses on occupational mobility upon job changes, and examines how the percentage of job changers who stay in the same occupation has changed as compared to the past, and what the factors are that determine the percentage of job changers who stay in the same occupation.

1. Occupational Mobility of Job Changers

As information on job changers, this section uses the data of persons hired after a job change during the 1991 to 2007 period provided in the Survey on Employment Trends published by the Ministry of Health, Labour and Welfare.⁶ In the Survey on Employment Trends, persons hired after a job change are defined as workers newly hired in each survey year with working experience within one year before being hired.

Table 2 shows the occupational mobility matrix of persons hired after a job change

⁵ Studies that have attempted to minimize the endogeneity bias in earnings functions using Japanese data include Toda (2008).

⁶ The Survey on Employment Trends has included construction in the target industries since the 1991 survey, as well as school education, social education, etc. since the 2004 survey. In order to identify the trend in as long a term as possible, the only measure taken in this paper is to exclude from the analysis the survey period that does not cover the construction industry. Attention should be paid to the fact that the 2003 data and the 2004 data are not consecutive in a strict sense.

Table 2. Occupational Mobility Matrix of Persons Hired after a Job Change (2007)

	Occupation of the previous job								
	Specialist and technical workers	Administrative and managerial workers	Clerical workers	Sales workers	Service workers	Security workers	Transport and communication workers	Production process and related workers	Others
(A) Male									
Occupation of the current job									
Specialist and technical workers	74.4%	6.8%	4.1%	5.5%	8.1%	12.6%	3.1%	4.9%	11.0%
Administrative and managerial workers	1.8%	56.3%	4.1%	2.2%	1.1%	1.3%	1.1%	1.5%	2.4%
Clerical workers	2.4%	12.1%	72.4%	6.4%	3.3%	8.6%	2.0%	1.8%	3.1%
Sales workers	3.2%	8.5%	6.3%	61.8%	10.5%	2.3%	3.6%	4.8%	0.0%
Service workers	5.5%	6.5%	3.5%	8.4%	56.8%	12.6%	4.5%	6.6%	14.2%
Security workers	1.7%	1.1%	0.4%	1.7%	2.1%	30.8%	2.1%	2.0%	1.6%
Transport and communication workers	2.3%	1.3%	2.2%	3.5%	5.5%	10.6%	68.1%	6.8%	9.4%
Production process and related workers	8.4%	5.9%	6.4%	10.3%	11.8%	19.2%	14.9%	71.4%	30.7%
Others	0.4%	1.5%	0.8%	0.3%	0.9%	2.0%	0.8%	0.2%	28.3%
(B) Female									
Occupation of the previous job									
Specialist and technical workers	Administrative and managerial workers	Clerical workers	Sales workers	Service workers	Security workers	Transport and communication workers	Production process and related workers	Others	
Occupation of the current job									
Specialist and technical workers	81.6%	28.7%	3.3%	5.2%	4.9%	20.0%	10.7%	9.5%	25.3%
Administrative and managerial workers	0.1%	22.8%	0.3%	0.0%	0.7%	0.0%	0.0%	0.2%	1.3%
Clerical workers	7.9%	39.7%	77.5%	17.5%	13.6%	7.7%	46.3%	8.3%	24.0%
Sales workers	2.2%	0.7%	7.5%	51.3%	13.3%	1.5%	1.7%	5.9%	9.3%
Service workers	6.4%	2.9%	7.4%	19.1%	59.3%	6.2%	5.8%	14.2%	8.0%
Security workers	0.0%	0.7%	0.0%	0.2%	0.6%	55.4%	0.0%	1.5%	0.0%
Transport and communication workers	0.2%	0.0%	0.3%	0.2%	0.5%	1.5%	20.7%	0.8%	0.0%
Production process and related workers	1.4%	2.9%	3.5%	6.1%	6.7%	6.2%	12.4%	59.1%	24.0%
Others	0.3%	0.0%	0.3%	0.3%	0.4%	0.0%	2.5%	0.2%	8.0%

Source: Ministry of Health, Labour and Welfare, *Survey on Employment Trends*.

Note: Figures in the table show the percentages to the total number of workers in the respective occupations of the previous job.

for 2007. The table reveals that, in the case of males, the percentage of job changers who stayed in the same occupation was higher than the percentage of those who switched occupations, as represented by specialist and technical workers (74.4%), clerical workers (72.4%), and production process and related workers (71.4%). Although only about 30% of former security workers stayed in the same occupation, more than 50% of job changers who were formerly in other occupations stayed in the same occupation. In the case of females, higher percentages of former specialist and technical workers (81.6%) and clerical workers (77.5%) stayed in the same occupation. Except for former transport and communication workers (20.7%) and former administrative and managerial workers (22.8%), more than 50% of job changers stayed in the same occupation.

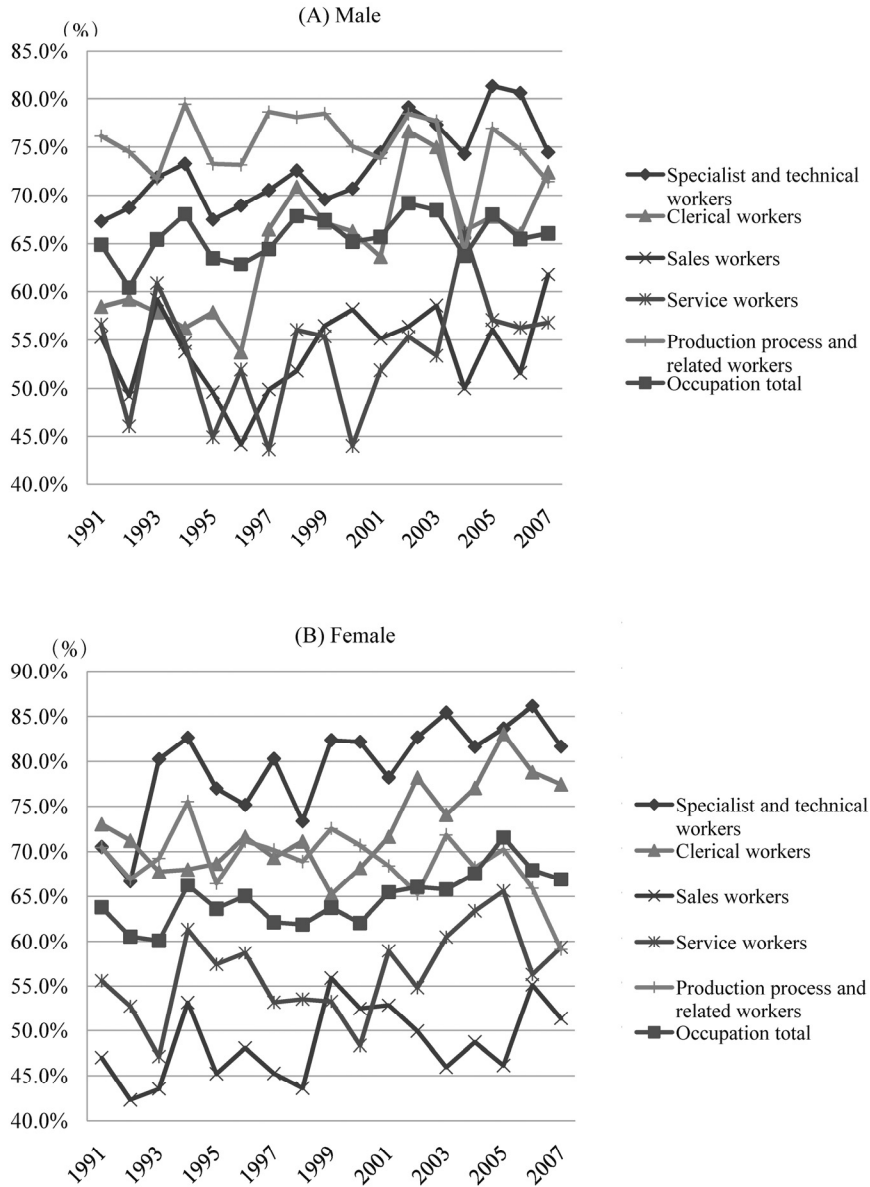
Has such tendency existed in the past? Figure 1 shows changes in the percentages of job changers who stayed in the same occupation. Although the percentages vary substantially by year, in the case of males, the percentage for production process and related workers has shifted around 75%, while the percentages for service workers and sales workers have stayed slightly above 50%. At least for the past 20 years or so, the percentages for speare some fluctuations. In the case of females as well, the percentages of job changers staying in the same occupation have been increasing for specialist and technical workers and clerical workers over the past 20 years, although with some fluctuations. While the percentage for production process and related workers is not as high as in the case of males, the cialist and technical workers and clerical workers have been on an increase although there percentages for service workers and sales workers are on a par with those of males, and the percentage for service workers seems to have increased slightly over the past 20 years.

In this manner, job changes within the same occupation have increased over the past 20 years for some occupations, but for most occupations, the frequency of such job changes has hardly changed, although there were some fluctuations. Even when taking into account the slight difference in the sample periods, it is interesting that this result differs from the U.S. data showing a decline in the percentage of job changers staying in the same occupation. The next part discusses the determinant factors for the percentage of job changers who stay in the same occupation.

2. Empirical Analysis of the Percentage of Job Changers Who Stay in the Same Occupation

This part inquires into the determinant factors for the percentage of job changers who stay in the same occupation, using publicly available data such as the Survey on Employment Trends and the Special Survey of the Labour Force Survey. The model to be estimated is as follows:⁷

⁷ Since this section makes arguments on the premise of changing jobs, the analysis implicitly assumes a process of starting job hunting and finding a job after leaving the former job. Therefore, if there is an increase in job-to-job transitions in which job changers find a new job before leaving the former job, and such transitions come to account for most of the job changers, the analysis in this



Source: Ministry of Health, Labour and Welfare, *Survey on Employment Trends*.

Note: Data on administrative and managerial workers and security workers are not included in this figure. Data on security workers for 2000 through 2003 has not been published. A possible factor behind the substantial changes in the percentages for some occupations between 2003 and 2004 is that the target industries were expanded in 2004 to include school education, social education, etc.

Figure 1. Percentages of Job Changers Who Stayed in the Same Occupation

chapter will not be valid. The analysis is made under an assumption that an increase in job-to-job transitions does not affect the results.

$$R_{it} = \alpha_0 + \alpha_1 A_{it-1} + \alpha_2 U_{it-1} + \alpha_3 L_{it-1} + \alpha_4 N_{it} + \delta_i + \eta_t + \varepsilon_{it} \quad (1)$$

where R_{it} is the percentage of job changers who stay in the same occupation, A_{it-1} is the percentage of those aged 35 or over, U_{it-1} is the percentage of university graduates, L_{it-1} is the percentage of firms with 500 or more workers, N_{it} is the new opening rate, and the suffix i denotes the occupation, and t denotes the year. While equation (1) estimated separately for males and females, no suffix denoting sex is used for the purpose of simplification. δ_i represents occupation-specific factors, and η_t represents year-specific factors. Both a case that controls for η_t and a case that does not control for η_t are estimated.

The details of the variables are as follows. Attached Table 1 (p.75) shows the basic statistics of the variables used. The dependent variable R_{it} denotes the percentage of persons who were hired after having changed their job within the past one year and who stayed in the same occupation to the total job changers in the respective occupations of their former jobs. The chronological changes are shown in Figure 1. Before explaining the explanatory variables in detail, their sources are given below. Variables A_{it-1} , U_{it-1} , and L_{it-1} are created from the Special Survey of the Labour Force Survey (up to 2001) and the Labour Force Survey (Detailed Tabulation, Yearly Average) (2002 onward) both published by the Statistics Bureau, Ministry of Internal Affairs and Communications. It should be noted that, due to data limitations, these variables are designed not as indices on job changers alone, but as indices on all workers engaged in the relevant occupation. The new opening rate N_{it} is as of August for regular workers, excluding new school graduates and part-time workers, provided in the Report on Employment Service released by the Ministry of Health, Labour and Welfare.⁸

The percentage of those aged 35 or over in each occupation is controlled for, taking into account the following circumstances. In the case of occupations with older workers, job changers are more likely to stay in the same occupation in order to prevent loss of the human capital that has been accumulated. Conversely, in the case of occupations with younger workers, job changers may switch to another occupation since they still have a long time to accumulate human capital in the new job. A similar circumstance is assumed for the percentage of university graduates. In occupations with a higher percentage of university graduates, the workers are more likely to have a larger accumulation of human capital, and are likely to stay in the same occupation upon a job change. The age and academic background, which are controlled for based on the above assumptions, are deemed to be variables that represent the job changers' status of possession of human capital. However, this analysis has its limitations in that these indices do not necessarily represent occupational experience. Meanwhile, the percentage of firms with 500 or more workers indicate the percentage of workers working for firms or public agencies with 500 or more workers to the total number of workers in each occupation. In this manner, we also controlled for the firm size. A

⁸ Values as of August are used because only values for August were available for the period until 1994.

one-year lag is applied to these three variables since they indicate the status of the former occupation.⁹

The new opening rate, which represents the supply-and-demand status of the labor market, is controlled for, in light of the possibility that job changers are likely to stay in the same occupation if the opening rate for the same occupation becomes high and the environment is such that it allows job seekers to find a new job easily. Since the value of the new opening rate cannot be obtained separately for males and females, the total value for males and females combined is used for both males and females. In addition to these variables, occupation-specific factors and year-specific factors are controlled for by using dummy variables.

Let us suppose that the percentage of persons hired after a job change who stay in the same occupation were decided completely at random. In such a situation, job changers would receive job offers for various occupations at random, and, as a result, they would select occupations at random. If such situation exists, and if we control for occupation-specific factors and year-specific factors, the job changers' status of accumulation of human capital and the supply-demand status of the labor market are not likely to affect determination of the occupation. If so, variables denoting such factors would be insignificant.

However, if such percentage were decided not at random, but was affected by the status accumulation of human capital and/or the supply-demand status of the labor market, it would be possible to examine the presence or absence of the two effects; in other words, whether job changes within the same occupation are affected by the status of accumulation of human capital or by the supply-demand status of the labor market. If the status of accumulation of human capital affects job changes within the same occupation, job changers with a large accumulation of occupation-specific human capital would suffer a great loss by switching occupations, so the outcome would be consistent with a hypothesis that they will try to avoid switching occupation. Also, if the supply-demand status of the labor market were the only factor having substantial effects, a high percentage of job changers who stay in the same occupation would be attributed to the fact that there are many job offers for the same occupation, which is separate from the factor that job changers try to stay in the same occupation in order to avoid a loss of occupation-specific human capital. These two hypotheses can be ascertained.

Table 3 shows the estimation results of equation (1). The estimation uses a data set covering six occupations and 18 years.¹⁰ In the case of males, the percentage of university

⁹ In order to prevent the endogeneity bias between variables, it may be necessary to apply a one-year lag to the new opening rate. Thus, the same analysis was conducted by applying a one-year lag to the new opening rate as well, but no differences were observed in the analysis results.

¹⁰ Administrative and managerial workers are not covered in the analysis since they differ considerably from other occupations in terms of position classification, etc. Also, security workers are excluded from the analysis because the related data is not available in the Survey on Employment Trends for the 2000 to 2003 period.

Table 3. Empirical Analysis of the Percentage of Job Changers Who Stay in the Same Occupation

	Males		Females	
	(1)	(2)	(3)	(4)
Percentage of those aged 35 or over (one-year-lagged)	0.113 (0.200)	-0.080 (0.192)	0.194 (0.213)	0.158 (0.216)
Percentage of university graduates (one-year-lagged)	0.798 *** (0.184)	1.278 ** (0.509)	0.928 ** (0.387)	1.515 *** (0.480)
Percentage of firms with 500 or more workers (one-year-lagged)	-0.181 (0.318)	-0.212 (0.400)	-0.317 (0.254)	-0.384 (0.235)
New opening rate	-0.011 (0.012)	0.045 ** (0.021)	-0.017 (0.013)	-0.027 (0.032)
Occupational dummy (Reference: clerical workers)				
Specialist and technical workers	-0.057 (0.068)	-0.228 * (0.131)	-0.036 (0.072)	-0.134 (0.088)
Sales workers	-0.106 (0.111)	-0.157 (0.116)	-0.208 *** (0.032)	-0.181 *** (0.044)
Service workers	0.106 (0.115)	0.167 (0.137)	-0.140 ** (0.058)	-0.100 (0.065)
Transport and communication workers	0.281 ** (0.132)	0.405 ** (0.170)	-0.163 ** (0.075)	-0.103 (0.078)
Production process and related workers	0.331 ** (0.145)	0.421 *** (0.157)	-0.033 (0.077)	0.014 (0.079)
Constant term	0.331 (0.294)	0.230 (0.277)	0.632 *** (0.110)	0.652 *** (0.117)
Year dummy	No	Yes	No	Yes
R-squared	0.786	0.846	0.847	0.878

Note: Sample size = 102 (6 occupations × 18 years). Estimation method is OLS (Ordinary Least Squares). Figures in parentheses are heteroskedasticity-robust standard errors. Dependent variable is the percentage of job changers who were formerly engaged in the respective occupations and who stayed in the same occupation. *** denotes that the coefficient is significant at the 1% level, ** denotes that the coefficient is significant at the 5% level, and * denotes that the coefficient is significant at the 10% level.

graduates had significant and positive coefficients both with and without control for the year dummy. This revealed the possibility that job changers were selecting the same occupation according to the status of accumulation of human capital. In addition, only when we controlled for the year dummy were coefficients on the new opening rate positive and sig-

nificant. Since the supply-demand status of the labor market for each occupation is found to be affecting the selection of the same occupation even when we control for year-specific effects, we cannot deny the possibility that job changers are receiving many job offers for the same occupation. Coefficients on the occupational dummy were positive and significant for transport and communication workers and production process and related workers. Job changers formerly engaged in these occupations are considered to stay in the same occupation due to a lack of skills that are transferable to other occupations.

In the case of females, similar to the case of males, the percentage of university graduates had significant and positive coefficients. However, coefficients on the new opening rate were insignificant, suggesting that the supply-demand status of the labor market has not affected the selection of occupation. Therefore, as in the case of males, there is a tendency among females to try to avoid an occupational switch, since workers with a large accumulation of occupation-specific human capital suffer a considerable loss through a switch to another occupation. Coefficients on the occupational dummy were negative and significant for sales workers, indicating their relatively higher tendency to choose another occupation upon a job change.

These results revealed that the status of accumulation of human capital affects the selection of occupation upon a job change in the cases of both males and females, and that, in the case of males in particular, the possibility of their selecting the same occupation depending on the supply-demand status of the labor market cannot be denied. The next section takes a different viewpoint, and examines the importance of occupational experience by estimating an earnings function so as to see whether accumulation of experience in the same occupation is reflected in wages.

IV. Analysis on the Effects of Occupational Experience on Wages

This section observes how much wages would rise by accumulating occupational experience. The Basic Survey on Wage Structure published by the Ministry of Health, Labour and Welfare includes a tabulation called “scheduled cash earnings, annual bonus and other special cash earnings by occupation, sex, age group and length of experience” which provides information on wages by occupational tenure.¹¹ The analysis below uses this tabulation data.

1. Empirical Analysis of an Earnings Function that Takes into Account Occupational Experience

The following earnings function is assumed below. Suffixes denoting sex and year are

¹¹ Since the Basic Survey on Wage Structure is a survey targeting business establishments, the occupational tenure could be deemed to be the occupational tenure at the current business establishment or firm, but since the questionnaire clearly states “including experience in other firms,” it is deemed here to be an individual’s occupational tenure throughout his/her lifetime.

omitted for the purpose of simplification.

$$\log(w_{aik}) = \beta_0 + \sum_j \beta_j E_{aik}^j + \sum_s \beta_s age_{aik}^s + \sum_p \beta_p occu_{aik}^p + \varepsilon_{aik} \quad (2)$$

Here, the suffix a denotes the age group, i denotes the occupation, and k denotes the occupational tenure.

The dependent variable is the logarithmic value of the wage, which is obtained by adding one-twelfth of the annual bonus and other special cash earnings to the scheduled cash earnings, and then taking the natural logarithm. E_{aik}^j is a dummy variable for the occupational tenure. The relevant table in the Basic Survey on Wage Structure is tabulated by categorizing the occupational tenure into five groups: “0 years,” “1-4 years,” “5-9 years,” “10-14 years,” and “15 years or more.” E_{aik}^j is a dummy variable which takes a value of 1 if the occupational tenure j is equal to k , and otherwise takes a value of 0. age_{aik}^s is a dummy variable for age. The relevant table in the “Basic Survey on Wage Structure” categorizes the age groups into “up to age 17,” “age 18-19,” “age 20-24,” “age 25-29,” followed by subsequent five-year groups, and finally “age 65 or over.” This analysis excludes the group “age 65 or over” from its target. age_{aik}^s is a dummy variable which takes a value of 1 if the age group s is equal to a , and otherwise takes a value of 0. $occu_{aik}^p$ is an occupational dummy.¹²

In the often used Mincer earnings function, it is common to include the academic background and the employer tenure as explanatory variables (Mincer 1974; Mincer and Higuchi 1988). However, since the relevant table in the Basic Survey on Wage Structure does not provide data on the employer tenure and academic background, we assume the above model to conduct the analysis, and supplement the interpretation of the results by using additional data.

We estimate equation (2), and compare the wage increase by accumulation of occupational tenure and the wage increase with advance in age.

2. Estimation Results of the Earnings Function

Table 4 shows the results of estimation of equation (2).¹³ In order to observe the chronological changes of coefficients, estimations are made separately for each year, and the results for 1987, 1992, 1997, 2002, and 2007 are shown in the table.

In the case of males, coefficients on the occupational tenure generally declined from

¹² This analysis uses the occupational classification used in the Basic Survey on Wage Structure. For the occupational classification used in the Basic Survey on Wage Structure, see the report of the survey. Since the occupational classification used in the survey does not coincide with that used in the Labour Force Survey and the Survey on Employment Trends, the data of these surveys cannot be combined in an analysis. The occupational classification used in the Basic Survey on Wage Structure is considered to be a problem of the survey which needs to be addressed in the future.

¹³ The estimation faced not only the problem of the endogeneity bias in earnings functions, but also a sample selection bias resulting from a lack of observation of non-worker samples, particularly in the estimation of the earnings function for females.

Table 4. Estimation Results of Earnings Function (1)

	Male					Female				
	1987	1992	1997	2002	2007	1987	1992	1997	2002	2007
Occupational tenure dummy (Reference: "0 years")										
1-4 years	0.192 *** (0.020)	0.210 *** (0.022)	0.203 *** (0.015)	0.182 *** (0.013)	0.180 *** (0.012)	0.313 *** (0.046)	0.303 *** (0.045)	0.272 *** (0.025)	0.243 *** (0.019)	0.178 *** (0.017)
5-9 years	0.293 *** (0.019)	0.296 *** (0.021)	0.278 *** (0.014)	0.262 *** (0.013)	0.287 *** (0.013)	0.494 *** (0.051)	0.454 *** (0.049)	0.422 *** (0.019)	0.351 *** (0.019)	0.286 *** (0.016)
10-14 years	0.368 *** (0.019)	0.343 *** (0.020)	0.324 *** (0.014)	0.316 *** (0.013)	0.352 *** (0.013)	0.621 *** (0.054)	0.564 *** (0.052)	0.511 *** (0.034)	0.459 *** (0.022)	0.382 *** (0.019)
15 years or more	0.447 *** (0.019)	0.422 *** (0.019)	0.435 *** (0.019)	0.411 *** (0.018)	0.457 *** (0.017)	0.761 *** (0.054)	0.691 *** (0.051)	0.654 *** (0.031)	0.602 *** (0.026)	0.562 *** (0.023)
Age dummy (Reference: "age 20-24")										
Up to age 17	-0.279 *** (0.024)	-0.302 *** (0.026)	-0.313 *** (0.047)	-0.256 *** (0.055)	-0.381 *** (0.055)	0.049 (0.041)	0.018 (0.047)	-0.038 (0.040)	-0.127 ** (0.061)	-0.380 *** (0.110)
Age 18-19	-0.163 *** (0.024)	-0.178 *** (0.026)	-0.173 *** (0.019)	-0.151 *** (0.017)	-0.144 *** (0.016)	0.006 (0.041)	-0.019 (0.037)	-0.029 (0.031)	0.004 (0.026)	-0.022 (0.027)
Age 25-29	0.134 *** (0.023)	0.144 *** (0.026)	0.144 *** (0.016)	0.134 *** (0.013)	0.097 *** (0.013)	-0.015 (0.031)	0.003 (0.034)	0.013 (0.022)	0.044 *** (0.016)	0.039 ** (0.015)
Age 30-34	0.229 *** (0.020)	0.222 *** (0.022)	0.245 *** (0.015)	0.240 *** (0.014)	0.175 *** (0.013)	-0.061 (0.038)	-0.058 (0.042)	-0.005 (0.027)	0.030 (0.020)	0.019 (0.016)
Age 35-39	0.314 *** (0.020)	0.292 *** (0.021)	0.293 *** (0.016)	0.301 *** (0.015)	0.220 *** (0.015)	-0.033 (0.035)	-0.031 (0.037)	-0.011 (0.025)	0.004 (0.023)	-0.025 (0.019)
Age 40-44	0.375 *** (0.020)	0.354 *** (0.022)	0.307 *** (0.018)	0.332 *** (0.017)	0.240 *** (0.016)	0.001 (0.032)	0.017 (0.036)	0.002 (0.026)	0.015 (0.020)	-0.027 (0.019)
Age 45-49	0.396 *** (0.020)	0.395 *** (0.022)	0.326 *** (0.021)	0.348 *** (0.019)	0.251 *** (0.018)	-0.004 (0.035)	0.027 (0.034)	0.031 (0.024)	0.033 (0.020)	-0.037 ** (0.019)
Age 50-54	0.386 *** (0.021)	0.398 *** (0.022)	0.349 *** (0.021)	0.356 *** (0.019)	0.247 *** (0.021)	-0.026 (0.033)	0.020 (0.038)	0.023 (0.026)	0.038 * (0.022)	-0.026 (0.019)
Age 55-59	0.321 *** (0.021)	0.336 *** (0.023)	0.309 *** (0.024)	0.336 *** (0.022)	0.216 *** (0.019)	-0.038 (0.038)	-0.013 (0.042)	-0.004 (0.030)	0.031 (0.023)	-0.036 (0.027)
Constant term	6.339 *** (0.059)	5.253 *** (0.045)	6.401 *** (0.050)	5.233 *** (0.037)	5.274 *** (0.040)	4.574 *** (0.056)	4.882 *** (0.070)	4.927 *** (0.049)	5.366 *** (0.048)	4.871 *** (0.071)
Observations	3727	3686	3238	3121	3656	1385	1398	1571	1502	1601
R-squared	0.929	0.920	0.896	0.911	0.879	0.914	0.910	0.877	0.896	0.883

Note: Estimation method is OLS. Figures in parentheses are heteroskedasticity-robust standard errors. Although not indicated in the table, the occupational dummies are also included in the explanatory variables. *** denotes that the coefficient is significant at the 1% level, ** denotes that the coefficient is significant at the 5% level, and * denotes that the coefficient is significant at the 10% level.

1987 through 2002, apart from some exceptions, but increased slightly from 2002 through 2007. We can say that the wage return to occupational experience has remained stable, staying at almost the same level. As for the effects of age, the effects have been stable from 1987 through 2002, constantly shifting around the same level. Comparing the results for 2002 and 2007, coefficients are smaller in 2007 for age 20 and over. This proves that the age-wage profile has become flatter.¹⁴

Next, comparison is made between the wage increase with advance in age and the wage increase by accumulation of occupational tenure. Since they cannot be strictly compared due to the difference in the grouping intervals of the respective dummy variables, the following style of comparison is attempted. In the age group “age 20-24,” we focus on age 22, which is the mean value of the upper limit and lower limit of the age group, and consider the case where a person aged 22 becomes five years older and the case where that person has accumulated another five years of occupational tenure.¹⁵ In the results for 1987, the wage increase with an advance of five years of age is 0.134, and the wage increase by accumulation of five years of occupational tenure is in the middle of the coefficient on “1-4 years” which is 0.192 and that on “5-9 years” which is 0.293. Since the coefficient on “1-4 years” of accumulation of occupational tenure is larger than the wage increase with an advance of five years of age, the effects of occupational experience were relatively larger than the effects of age. When making the same comparison for the results for 2007, the wage increase with an advance of five years of age is 0.097, and the wage increase by accumulation of five years of occupational tenure is in the middle of the coefficient on “1-4 years” which is 0.180 and that on “5-9 years” which is 0.287. Accordingly, the effects of occupational experience were relatively larger also in 2007.

Next, the results for females are studied. Although coefficients on occupational tenure have constantly declined from 1987 through 2007, they were positive and statistically significant even in 2007. This result is contrastive to the result that coefficients on age were mostly insignificant. An upward sloping age-wage profile that exists for males cannot be observed for females. One possible reason is that a wage increase through continuous employment cannot be observed at the aggregate level since many females leave their jobs upon marriage or childbirth.¹⁶

The analysis revealed that occupational experience is linked to wage increase, but does the degree of such effect differ by occupation? The following part examines whether or not there is difference in the extent of wage increase by accumulation of occupational experience.

¹⁴ Studies including Nakamura and Ohashi (2002) have confirmed that the slant of the wage profile has become notably flatter since the collapse of the bubble economy.

¹⁵ Here, the comparison is made on an assumption that the mean value of the upper limit and lower limit of the age group corresponds to the coefficient on the relevant variable. In other words, where the coefficient on the age group “age 25-29” is 0.134, the wage return of a person whose age is 27, which is the mean value of age 25 and age 29, is deemed to be 0.134.

¹⁶ Kawaguchi (2005) clarified that women’s wages decrease by childbirth and marriage, and that such decrease is caused by unobservable personal attributes.

Table 5. Estimation Results of Earnings Function (2)

	Male					Female				
	1987	1992	1997	2002	2007	1987	1992	1997	2002	2007
Occupational tenure dummy (Reference: "0 years")										
1-4 years	0.188 *** (0.020)	0.204 *** (0.022)	0.200 *** (0.016)	0.170 *** (0.014)	0.177 *** (0.013)	0.318 *** (0.061)	0.313 *** (0.063)	0.266 *** (0.040)	0.219 *** (0.032)	0.130 *** (0.025)
5-9 years	0.282 *** (0.019)	0.288 *** (0.021)	0.270 *** (0.014)	0.252 *** (0.013)	0.278 *** (0.014)	0.501 *** (0.064)	0.465 *** (0.064)	0.439 *** (0.040)	0.336 *** (0.030)	0.229 *** (0.026)
10-14 years	0.351 *** (0.018)	0.325 *** (0.020)	0.308 *** (0.015)	0.300 *** (0.013)	0.338 *** (0.015)	0.616 *** (0.066)	0.568 *** (0.066)	0.508 *** (0.049)	0.439 *** (0.034)	0.311 *** (0.030)
15 years or more	0.430 *** (0.019)	0.404 *** (0.019)	0.416 *** (0.019)	0.386 *** (0.018)	0.435 *** (0.018)	0.748 *** (0.067)	0.686 *** (0.066)	0.624 *** (0.048)	0.554 *** (0.044)	0.508 *** (0.038)
Interaction term between the occupational tenure dummy and the specialist and technical worker dummy (D)										
1-4 years × D	0.045 (0.042)	0.058 * (0.032)	0.032 (0.032)	0.076 ** (0.031)	0.012 (0.027)	-0.018 (0.064)	-0.032 (0.066)	0.016 (0.042)	0.051 (0.035)	0.092 *** (0.029)
5-9 years × D	0.099 ** (0.042)	0.104 *** (0.037)	0.084 *** (0.033)	0.062 * (0.032)	0.040 (0.026)	-0.011 (0.062)	-0.034 (0.064)	-0.043 (0.041)	0.038 (0.032)	0.110 *** (0.029)
10-14 years × D	0.201 *** (0.038)	0.215 *** (0.035)	0.145 *** (0.032)	0.105 *** (0.033)	0.074 *** (0.027)	0.057 (0.062)	0.008 (0.065)	0.012 (0.049)	0.050 (0.036)	0.136 *** (0.033)
15 years or more × D	0.257 *** (0.039)	0.272 *** (0.033)	0.207 *** (0.033)	0.178 *** (0.035)	0.124 *** (0.030)	0.084 (0.061)	0.036 (0.065)	0.069 (0.051)	0.103 ** (0.046)	0.105 ** (0.042)
Observations	3727	3686	3238	3121	3656	1385	1398	1571	1502	1601
R-squared	0.934	0.926	0.900	0.914	0.881	0.916	0.911	0.879	0.898	0.886

Note: Estimation method is OLS. Figures in parentheses are heteroskedasticity-robust standard errors. Although not indicated in the table, the age dummy, the occupational dummy, and the constant term are also included in the explanatory variables. *** denotes that the coefficient is significant at the 1% level, ** denotes that the coefficient is significant at the 5% level, and * denotes that the coefficient is significant at the 10% level.

rience between specialist and technical workers and other occupations.¹⁷ For this purpose, equation (2) includes the interaction term between the occupational tenure dummy and the specialist and technical worker dummy as an explanatory variable, and the results are observed.

The results are shown in Table 5. In the case of males, coefficients on the interaction term were positive and significant until 2002, but coefficients on five years or more of occupational tenure showed a decline from 1992 through 2007. This suggests that the premium on specialist and technical workers has decreased during that period. On the other hand, in the case of females, the interaction term was not at all significant until 1997. Later, in 2002, only coefficients on 15 years or more of occupational tenure became significant, and by 2007, all interaction terms became significant along with an increase in the coefficients. This indicates that, in the case of females, extra premium was attached to specialist and technical workers from 2002 through 2007.

V. Closing Remarks

In this paper, I focus on occupation-specific human capital and analyze to what extent firms value and utilize such human capital that is formed through the experience within occupation, using publicly available data.

Firstly, the percentage of job changers who stay in the same occupation has increased with regard to job changers who were formerly specialist and technical workers or clerical workers, but has remained almost at the same level, though with some fluctuations, with regard to job changers formerly engaged in other occupations. This result differs from the result presented by Kambourov and Iourii (2008) that the percentage of job changers who stay in the same occupation has decreased in the United States.

Secondly, as a result of investigating the factors that determine the percentage of job changers who stay in the same occupation, it was found that, in the cases of both males and females, job changers formerly engaged in occupations with larger accumulation of human capital are more likely to stay in the same occupation. This suggests that jobs are not selected at random upon job changes. Meanwhile, the analysis also revealed a possibility that, in the case of males, job changers choose to stay in the same occupation according to the supply-demand status of the labor market. The question as to whichever factor has a larger

¹⁷ Specialist and technical workers shall be the following workers. However, some of these occupations are not cited as categories for some survey years.

Scientific researcher, chemical analyst, professional engineer, first grade architect, surveying engineer, system engineer, computer programmer, medical doctor, pharmacist, professional nurse, auxiliary nurse, nursing aid, clinical X-ray technician, clinical examination technician, physical therapist or occupational therapist, dental hygienist, dental technician, dietitian, nursery teacher, care manager, kindergarten teacher, high school teacher, professor of college and university, assistant professor of college and university, college lecturer, miscellaneous school teacher, tutor, cram school lecturer, and journalist.

effect remains as an issue to be studied in the future.

Thirdly, as a result of inquiring into the effects of occupational experience on wages, it was found that occupational experience has a larger effect on wages than the worker's age, both in the case of males and females. Also, in the case of males, the wage return to occupational experience showed a slight increase from 2002 through 2007. In the case of females, the wage return to occupational experience was found to be rising higher than females' average wage return, particularly for specialist and technical workers. We pointed out the possibility that these effects may incorporate the effect of accumulation of employer tenure, and confirmed that the effect of employer tenure is small by examining the distribution of employer tenure.

Although these analyses have several limitations, their results collectively suggest that occupational experience has also an important role in Japan. In particular, the fact that the wage return for female specialist and technical workers is rising higher than females' average wage return is considered to be a useful finding for promoting women's social participation.

Lastly, the author would like to mention the limitations of this paper and the issues that need to be studied in the future.

The first point is the definitions of occupations. While this paper used the major-level categories of occupational classification, a question remains as to how useful this is for determining the importance of occupational experience. As already pointed out by Kambourov and Iourii (2008) and other studies, efforts should be made in the future to use indices of minor-level categories that better reflect the actual conditions of the occupations. The only statistics in Japan that tabulates the number of workers for minor-level categories of occupation is the Population Census. We hope that other statistics will also come to aggregate data in more detailed-level occupational categories and that such data will come to be used more actively in the future. At the same time, there is a problem that the Basic Survey on Wage Structure uses its original occupational classification. We hope that the occupational classification will be standardized among surveys in the future.

The second point is accumulation of panel data. As in the case of Kambourov and Iourii (2009), U.S. studies investigate occupational tenure by using long-term panel data. Although retrospective data is also effective for identifying occupational tenure and employer tenure, long-term panel data would be required in order to carry out more sophisticated analysis. Due to the growing need for Japanese panel data, efforts have started to be made in Japan to collect it, although Japan is still greatly behind Europe and the United States in this respect. The second best solution would be to carry out detailed surveys by limiting the occupations. Such surveys, though limited in scope, would be useful for investigating the importance of occupational experience.

The third point is the explanation as to why the changes in the percentage of job changers who stay in the same occupation differ between Japan and the United States. While Kambourov and Iourii (2008) have proposed some hypotheses, an in-depth study on

what kind of structural differences between the Japanese and U.S. labor markets bring such differences in trend would be important also from the viewpoint of clarifying the labor market structure.

Attached Table 1. Basic Statistics of the Analysis on the Percentage of Job Changers Who Stay in the Same Occupation

Male				
	Average	Standard deviation	Minimum value	Maximum value
Percentage of job changers who stay in the same occupation	0.646	0.099	0.437	0.813
Percentage of those aged 35 or over (one-year-lagged)	0.670	0.050	0.575	0.807
Percentage of university graduates (one-year-lagged)	0.286	0.210	0.018	0.648
Percentage of firms with 500 or more workers (one-year-lagged)	0.353	0.130	0.190	0.618
New opening rate	1.373	0.613	0.330	2.990
Female				
	Average	Standard deviation	Minimum value	Maximum value
Percentage of job changers who stay in the same occupation	0.609	0.155	0.172	0.861
Percentage of those aged 35 or over (one-year-lagged)	0.635	0.108	0.417	0.818
Percentage of university graduates (one-year-lagged)	0.089	0.095	0.000	0.321
Percentage of firms with 500 or more workers (one-year-lagged)	0.286	0.131	0.106	0.667
New opening rate	1.373	0.613	0.330	2.990

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