THE IMPACT OF FIRM-PROVIDED TRAINING ON PRODUCTIVITY, WAGES AND
TRANSITION TO REGULAR EMPLOYMENT: USING JAPANESE WORKERS IN
FLEXIBLE WORK ARRANGEMENTS FOR IDENTIFICATION

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Abstract

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JEL: J23, J24, J31

1. Introduction

The purpose of this paper is to examine the incidence and intensity of firm-provided training and the impact of this training on skills, productivity, and wage growth among workers in flexible arrangements, using a unique survey of Japanese workers.

Employers' use of contingent workers - i.e., temporary, part-time, and fixed contract employment - is widespread in many countries,[1] and evidence suggests that the percentage of employees in flexible arrangements is growing. (Houseman 2001, Houseman and Polivka 2000, Morishima 2001) The share of Japanese workers in flexible arrangements has also been growing, along with other OECD countries. The total number of employees in Japan for 2008 was approximately 51 million, and can be largely divided into 2 categories: approximately 34 million regular employees and approximately 17 million contingent workers, i.e., workers in flexible arrangements. Until the 1980's, most Japanese employees were regular employees. In 1984, immediately after the "Labor Survey" began to gather employee data by employment format, the percentage of contingent workers, excluding officers, was 15.3%. In 1988 (approximately 20 years ago) contingent workers were still only 18.3%, but in 2003 they exceeded 30%, and in 2008 they

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[1] The share of temporary jobs in total employment has risen significantly between 1985 and 2000 in France, Italy, the Netherlands, Portugal and especially in Spain. (OECD 2002)

reached a high of 34.1%.

Regular employees (*sei-shain*) are people within the framework of long-term employment contracts, and most work on a full-time basis. Contingent workers are those with fixed-term contracts or those who work on a part-time basis. Contingent workers can be further divided into those who are directly hired by their companies and are on the companies' payrolls, called "non-regular workers", and workers who have employment contracts with temporary help agencies and are not on the firms' payrolls, called "temporary help agency workers". The analysis in this paper deals with the former, i.e., non-regular workers. In the fourth quarter of 2008, these non-regular workers numbered 1.65 million of the 1.796 million contingent workers – an overwhelming 91.9%.[2]

Firm-provided training has played an important role in Japanese economic growth and in the human resource management of Japanese firms since the 1970's. (Hashimoto and Raisian 1979, Mincer and Higuchi 1988) However, according to the "Basic Survey of Human Resources Development" (Ministry of Health, Welfare and Labour), the training participation rate for non-regular workers in Japan is roughly half that of regular employees, reaching only 31% even in its

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[2] Non-regular employees can be further divided into "part-timers" (*paa-to*), "side-job workers" (aru-bai-to), "contract workers", "commissioned" and "other". In Japan, some of *"paa-to"* and *"aru-bai-to"* work full-time. The working formats of *"paa-to"* and *"aru-bai-to"* are almost identical, with the main difference being that most *paa-to* are housewives and middle age workers, while most *aru-bai-to* are young workers of 20 to 30 years in age.

highest year of 2005. In the UK, Germany, Spain and other European countries, it has been shown that workers with short-term employment contracts, and those working part-time or with temporary contracts, are less likely to participate in work-related training when compared to regular or permanent employees. (This is after controlling for various individual as well as job characteristics.) The same results have also been obtained for Japan. (Spain: Albert et al. 2004. Germany: Sauermann 2006. UK: Arulampalam and Booth 1998, Booth et al. 2002. OECD: OECD 2002. Japan: Kurosawa and Hara 2009.)

This increase in workers with fewer opportunities for firm-provided training, namely the increase in non-regular workers, gives rise to two concerns. One is a decrease in the accumulation of human capital for society as a whole, especially if there is friction in the labor market and a firm's investment in training falls short of optimal levels, as has been shown in previous studies.[3] Secondly, there is the potential for a further widening of wage differentials. It is known that wages for non-regular workers are currently lower than for regular employees, and if work skill acquisition is not taking place, their wages could stagnate, causing wage differentials to grow.

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[3] Acemoglu and Pischke (1999a, 1999b) show that in oligopsonistic labor markets, some of the predictions of the human capital model are overturned. Due to labor market imperfections and monopsony, workers are not being paid for their full marginal productivity even when the skills are general.

The Japanese government is concerned about the lack of firm-provided training opportunities for non-regular workers, and various policies have been introduced to promote such training. The April 2008 revision of the Part-Time Employment Act and the introduction of the Job-Card System[4] in 2008 are a couple such policies. Although social awareness of the need for firm-provided training of non-regular workers is high and new policies have been introduced, few studies provide comprehensive information on the extent and effects of training among non-regular workers.[5] This paper attempts to fill this void by examining the primary determinants for training participation and analyzes its impact among non-regular workers in order to provide a foundation for future policy debates.

According to human capital theories, training is an investment in human capital and should enhance the individual's work skills and productivity.[6] Because

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[4] The "Job-Card system" is a policy for people who have difficulty finding new jobs, i.e. job-hopping part-timers ("*freeters*" in Japanese), women who have finished raising children, and mothers of single parent families. It allows for such workers to be supported while participating in job training programs and finding new permanent employment. "Job-Cards" record the results of career counseling, the participation in job training programs, as well as evaluations issued to participants. Achievements from skill tests or past jobs, and completion certificates from job training programs, may also be entered into "Job-Cards" for use in job seeking activities. This system allows for obtaining job skills, and for the visual presentation of skills and past work. Through this means, the way is paved for the Job-Card holders to become employed, or to become regular employees.

For details see the following: http://www.mhlw.go.jp/english/policy/affairs/dl/job_card_eng.pdf.

[5] As I will mention below, there are studies which have found that firm-provided training has a positive effect on wage growth with respect to regular employees and female workers in Japan. (Kurosawa (2001) , Kawaguchi (2006) , Toda and Higuchi (2008))

[6] Becker (1975).

the trainee shoulders part of the training costs, the worker receives a lower wage than their actual productivity during the training, but receives a wage in keeping with the enhanced productivity after the training. Therefore, receiving training should raise a worker's wages.[7] There have been many attempts to directly measure the effects of accumulating human capital through training, and many papers deal with taking into account unobserved heterogeneity when studying the impact of various forms of training on the wage profile. (Parent (1999), Bartel (1995), Booth (1993)) Recently, some studies found a positive effect of firm-provided training on wage growth for regular employees as well as for female workers in Japan.[8]

However, as previously mentioned, the impact of firm-provided training on workers in flexible arrangements has not been examined. Therefore this paper attempts to fill this void by examining the determinants of who receives training, how much training they receive, and what effect the training has, using Japanese non-regular workers for identification. Similar analysis will be done for regular employees, and these results will be provided as appropriate for comparative purposes.

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[7] For example, Borjas (2005, Chapter 7).
[8] Kurosawa (2001) did an analysis using micro-data from firms in Kitakyushu City, an industrial district in the southern part of Japan, and showed that informal training raised the wages of workers. Kawaguchi (2006), Toda and Higuchi (2008) analyzed panel data for Japanese female workers to show that off-the job training raised a worker's wages. These results can be interpreted as firm-provided training having raised productivity.

The structure of this paper is as follows: Section 2 characterizes non-regular workers in Japan. Section 3 introduces a framework for empirical analysis and explains the data used in this study. Section 4 reports the estimation results of the determinants for firm-provided training as well as the impact of training. Section 5 discusses the estimation results, and the final section presents the conclusion and its policy implications.

2. Workers in flexible arrangements in Japan

In Japan, businesses have been in decline during the long stagnation after the economic bubble burst in the early 1990's. The intensification of international competition has further heightened uncertainties in product markets, and the simultaneous spread of IT has brought about changes in human resource needs as well as in work content.

One human resource strategy that came about in response to such changes in the economic environment is the active use of flexible staffing.[9] In the context of increasing market uncertainty, Japanese companies have moved away from long-term employment and turned to employing contingent workers to allow for easier work force adjustments and cost cutting. The spread of IT has also contributed to

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[9] Morishima (2001) and Houseman (2001) report on why employers use various types of flexible staffing arrangements in Japan and the US.

the increase in flexible staffing – the use of part-timers and fixed-term workers - through the standardization of tasks. In addition, legal changes in Japan, such as the revisions of the Labor Standards Act and the Worker Dispatch Law, made it easier for companies to engage contingent workers in the early 2000's. The combination of these trends caused Japan's labor market to see a large increase in the number of contingent workers, beginning the 1990's.

As I explained, contingent workers are divided into "non-regular workers" and "temporary employment agency workers". The main analysis of this paper concerns what I am calling non-regular workers, referring to workers who are hired directly by the firm they work for.

Non-regular employees make up more than 30% of the Japanese work force, and refer to those who are outside the framework of what is known as "the Japanese employment system", a lifetime employment system based on full-time permanent employment contracts. In other words, non-regular workers are predominantly workers with part-time or with fixed-term contracts. They are further divided into "part-timers"(*pa-ato*), "side job workers" (*aru-bai-to*), "contract employees"(*keiyaku-shain*), "commissioned workers" (*syokutaku*) and "other". Non-regular workers receive fewer benefits than regular employees - most notably they receive no unemployment insurance and have no employment

security.[10] The section below uses government survey data to provide a brief overview of these non-regular workers in Japan.

According to a survey of individuals done by the Ministry of Health, Labour and Welfare (2006)[11], 83.3% of non-regular workers work on a part-time basis and average 5.8 hours of work per day. 44.1% of part-time non-regular workers have fixed-term contracts, averaging 10.3 months in length, and 68.7% of full-time non-regular workers have fixed-term contracts averaging 12.4 months in length.[12] This shows that most Japanese non-regular workers are part-time workers with short-term employment contracts.

However, many employers repeatedly renew fixed-term contracts, making it appear as if some of the fixed-term workers have permanent employment. According to the MHLW (2005),[13] over 30% of the firms renew fixed-term contracts automatically, and more than 60% of the firms renew contracts more than 3 times. For part-time and fixed-term workers, about 20% of the firms renew contracts more than 11 times.

Turning to wages, the "Basic Survey on Wage Structure (MHLW)" shows an

[10] In Japan, there is an implicit understanding that non-regular workers will be fired before regular workers if employment adjustments become necessary. (Osawa , 2010)

[11] 2006 General Survey of Part-time Workers.

[12] The "General Survey of Part-time Workers" surveyed ordinary workers. Ordinary workers are defined as: 1. workers without a defined time contract, or with a defined time contract of over one month, 2. day laborers or those employed for less than one month but working over 18 days during each month between August and September in 2006.

[13] 2005 General Survey on Fixed-term Employees.

average hourly wage of 1257 yen (about 14.80 US$) for regular employees and 993 yen (about 11.90 US$) for non-regular workers. This means that non-regular workers receive less than 80% of regular employees' wages.

In addition, according to a survey of establishments done by MHLW (2006), only about 55% of the establishments with part-time workers raised their wages in the prior year. This is significantly lower than the ratio of establishments giving raises to their regular-workers (72.9%). Among the establishments that raised part-time workers' wages, the proportion that used standard pay-raise criteria such as age, promotions, and competencies to determine pay raises was lower for part-time workers than for regular workers. Instead, firms appeared to rely more on regional market wages, the prevailing wages for specific occupations, or the length of work experience when determining pay-raises for part-time workers as compared to regular workers (regular workers: 4.0%, part-time workers: 14.1%).

Finally, the MHLW (2007)[14] surveyed the reasons for why workers chose non-regular employment. In response to a multiple-choice question, 18.9% answered that they "cannot find regular employment". However, "wanted more discretionary money" (42%), "can work at convenient times" (34.8%), "because of family commitments" (25.3%) and "short commute time" (28.1%), all ranked higher than "cannot find regular employment". This suggests that while some are

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[14] 2007 General Survey on the Diversification of Work Formats.

forced into becoming non-regular workers, many appear to choose this employment format for a variety of reasons - financial, time flexibility, or proximity of location.

3. Econometric Analysis

(1) Model

The first analysis examines the characteristics of the workers who took firm-provided training from April 2007 to March 2008 (FY2007), using non-regular workers who were already working at their current company in April 2007 as the basis for analysis. Let T_i be a dummy variable which takes 1 if worker i receives training, and 0 if no training is received. The conditional expectation of T_i is assumed to be as follows:

$$E(T_i \mid Z_i) = P(T_i = 1 \mid Z_i) = \Phi(Z_i \delta_i) \tag{1}$$

where Z_i is the individual attributes including work characteristics such as length of expected tenure, full or part-time work, and external attributes such as age, sex, education, marital status, and the firm's characteristics.

Next, let me examine the analysis model for the effect of training on wages. The effect of training participation on hourly wages for March 2007, namely at the end of FY2006 (hereafter referred to as "2006 wages"), and hourly wages for

September 2008 (hereafter referred to as "2008 wages"), are specified as:

$$\ln w_{i,2006} = X_i \beta_{2006} + \gamma \left[\sum_{t=s}^{2006} T_{it} \right] + c_i + u_{i,2006} \tag{2}$$

$$\ln w_{i,2008} = X_i \beta_{2008} + \gamma \left[\sum_{t=s}^{2007} T_{it} \right] + c_i + u_{i,2008} \tag{3}$$

where $ln\ w_i$ is the log of hourly wages and s expresses the year when the worker began work at the current firm. The treatment variable T_{it} is the dummy variable that indicates participation in firm-provided training in the fiscal year t. The vector X_i is the time invariant variable such as sex and education, etc., c_i is the time-constant unobserved heterogeneity, and u_{it} is the idiosyncratic error term. Here it is assumed that fiscal year-end wages reflect the impact of training received that year, and wages during the year reflect only the impact of training in the previous fiscal year. Also, it is assumed that the impact of training is the same for all years - in other words, γ is a constant.

Actually, $E(c_i \mid X_i, T_{it}, u_{it}) = 0$ is a strong assumption that precludes the correlation between unobserved heterogeneity, such as ability and training participation. To deal with this possible endogeneity, from (3) - (2) I get,

$$\ln w_{i,2008} - \ln w_{i,2006} = \Delta \ln w_{i,2008} = X_i \beta + \gamma T_{i,2007} + \Delta u_{it} \tag{4}$$

where $\beta = \beta_{2008} - \beta_{2006}$, and I can estimate this equation (4) because the OLS

estimator is an unbiased estimator under the exogeneity assumption,

$E(\Delta u_{it} \mid X_i, T_{i,2007}) = 0$.[15]

Next, if γ is no longer assumed to be constant, and it is assumed that the year in which training was received changes the impact on wages, or even if the training is in the same year, the impact differs depending on the year the wages are paid, then (2) and (3) can be rewritten as:

$$\ln w_{i,2006} = X_i \beta_{2006} + \left[\eta_t \sum_{t=s}^{2006} T_{it} \right] + c_i + u_{i,2006} \ , \tag{2'}$$

$$\ln w_{i,2008} = X_i \beta_{2008} + \left[\gamma_t \sum_{t=s}^{2007} T_{it} \right] + c_i + u_{i,2008} \ , \tag{3'}$$

and (3)' - (2)' gives

$$\Delta \ln w_{i,2008} = X_i \beta + \gamma_{2007} T_{i,2007} + \lambda_{2006} T_{i,2006} + \cdots + \lambda_s T_{i,s} + \Delta u_{it} \tag{5}$$

where $\lambda_t = \gamma_t - \eta_t$ and $\beta = \beta_{2008} - \beta_{2006}$. Moreover, I construct a dummy variable indicating whether the worker has received training at the current firm before FY2007 ($CURT$), then when the past training is replaced with $CURT$, I obtain,

$$\Delta \ln w_{i,2008} = X_i \beta + \gamma_{2007} T_{i,2007} + \lambda \cdot CURT + \Delta u_{it} . \tag{6}$$

In the following section, I estimate the effect of training by estimating the equations (4) and (6). I will explain the estimation model of skills, productivities

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[15] As a matter of computational convenience, when implementing an estimation I replace $X_i \beta$ with $X_{i,2008} \beta$, that is, the worker and firm's information from 2008.

and transition to regular employment in section 4, providing the result.

(2) Data

In this paper, I have used data from the "Survey on Work and Learning" conducted from October to December 2008.[16] This survey was designed in order to understand how Japanese workers were working, and how skill development was being implemented. It used a national representative sample of Japanese workers (excluding full time housewives and students) who were over 25 and less than 45 years in age, and included 4,024 observations.[17]

This survey combined self-administered questionnaires and interviews. The standard questions concerned work place attributes, work formats, working conditions, and firm-provided training at the time of the survey (hereafter referred to as "current" or "now"), as well as basic personal attributes and family structure. The interview format was used to learn about work history and life events

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[16] The "Survey on Work and Learning" was designed and carried out by The Japan Institute for Labour Policy and Training under the direction of Hiromi Hara, Mei Kagawa, Reiko Kosugi, Masako Kurosawa, Hiroki Sato, Yoshihide Sano and Yuzo Yamamoto. This research project was conducted by request from the Ministry of Health, Labour and Welfare in Japan.

[17] This survey was implemented using the area sampling method. We used as a sampling frame the 2005 Population Census of Japan, and chose survey locations with a high probability of proportional representation for ages and workers being surveyed. (Number of places surveyed: 300, excluding islands, mountains, and isolated locations). We set the target recovery number at 4000. Sex and ages were divided into 8 categories: 25-29 years old, 30-34, 35-39 and 40-44 for male and female. Worker ratios for these 8 categories were calculated for each location, and recovery numbers in each location were set to match worker ratios and represent the actual sex and age composition of the sampling frame.

covering the time from junior high school graduation to the present. Turnover, movement between companies, changes in work format, occupations, and training, as well as marital and family status were asked. While the answers for firm-provided training were solicited by year, the other data was collected by quarter. The information for fiscal year-end was used as that fiscal year's data, and analysis was done by fiscal year.

The original sample includes 2,205 observations of workers who were regular employees in FY2007 and 785 observations for non-regular workers. I restricted the analysis sample to those working in the private sector, and who were directly employed by a firm. Those hired by temporary employment agencies were excluded. Therefore the focus of this paper is on non-regular workers, but for comparative purposes, results for regular employees will be reported where appropriate. To analyze the firm-provided training during April 2007 - March 2008 (FY2007), I excluded those not working at their current company in FY2007.[18] The resulting sample size for regular employees was 2,042, and 754 for non-regular workers.

The descriptive statistics of the analysis sample are tabulated in Table 1. Over 80% of non-regular workers are female, and their tenure is 3.92 years - less than

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[18] This paper deals with the impact of training within the firm where training was received, and does not deal with the impact of training before and after a job change to a different firm.

half the regular workers' tenure. The union participation rate is 9.77%. Education levels consist of half (49%) middle school graduates, 37.75% high school/junior college/technical school graduates, and 23.45% college graduates, plus a few who attended graduate school. Occupations were predominately in the fields of service, office work, and sales. In terms of industries, wholesale and retail businesses were the highest with 21.01%, followed by lodging/food (13.56%) and medical/welfare (12.63%). In terms of firm size, nearly 70% of the non-regular employees were at small to midsized companies with less than 100 employees.

*** Table 1

To better understand the characteristics of the analysis sample, let me confirm several points. First, in terms of the number of firms a person worked for, or the number of job changes, 44.42% of regular workers had no job changes, followed by 26.15% with 2 jobs, and 14.35% with 3 jobs. In other words 85% of the regular workers had worked at less than 3 firms. On the other hand, non-regular workers showed the highest number of people having had 3 jobs (29.31%), followed by 2 jobs (27.32%), and 4 jobs (16.98%). This indicates that non-regular workers have a much higher number of work places/job changes than regular workers.

As for when employment commenced at the current firm, most workers, both regular and non-regular, started after 2000, and among the non-regular workers over 70% started after 2004.

Finally, in terms of the work format at their current firm, 96% of the regular employees who began work as regular employees have been working continuously as regular employees. Similarly, 96% of the non-regular workers have been working continuously as non-regular workers, showing that a high percentage of all workers have continued to work in the same format.

(3) Variables relating to firm-provided training

In this paper I will deal with two forms of firm-provided training. One is done while working on-site (on-the-job training or OJT), and involves learning from supervisors and colleagues etc. The other is done away from the job site (off-the-job training or Off-JT), and involves training implemented away from the workplace**.** (This may include training in a classroom at the firm but separate from the actual work place.)

First let me define the variables associated with OJT. In the questionnaires given in this survey concerning OJT from April 2007 - March 2008 (FY 2007) the following 5 categories were surveyed: "Received instructions or advice from

superiors or colleagues" (received advice), "Gave instructions or advice to subordinates or colleagues" (advised others), "Learned from watching superiors or colleagues as they worked" (learned from watching), "Experienced work in other areas that helped in the current job" (experienced other areas), "Learned information useful for work in meetings" (shared information).[19] Those that answered "frequently" or "occasionally" were assigned a value of 1, and other responses were assigned a value of 0. In this paper, OJT is taken to include all activities at the work site, contributing to improvements in skills and productivity. This may include informal learning and teaching, observing others and being observed, as well as experiencing different job assignments.

*** Table 2

Table 2 shows the results of a principal factor analysis for these 5 OJT questions. The results suggest that it is appropriate to divide them into the following: received advice and learned by watching, which explain Factor 1 well, and advised others and experienced other areas, which explain Factor 2 well, and shared information, which does not explain either of these factors. On the basis of

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[19] For each question the respondents are asked to choose one from the following five options, "frequently", "occasionally", "seldom", "never", and "there was no such person".

this result, I constructed 3 variables for OJT: (1) If either of the variables explaining Factor 1 (received advice or learned by watching) are indicated, it takes 1, and if not, it takes 0. This evaluates the "learn from others" variable. (2) Similar treatment is given for Factor 2, i.e., if either of the variables explaining Factor 2 (advised others or experienced other areas) are indicated, it takes 1, and if not it takes 0. This evaluates the "learn through participation" variable. (3) "Shared information" is defined in the same manner. In addition, to examine the impact of frequent OJT, I constructed a variable that combines the responses to all 5 questions, and have called it the "OJT number". This number indicates how many of the 5 types of OJT were received, - in other words it indicates the breadth of OJT received. These are the 4 variables I will use for OJT in the following analysis.

Next let me define the Off-JT variable. In this survey, there is a question asking, "Did your company send you to a workshop, training session, or somewhere else to acquire knowledge or skill between April 2007 and March 2008 (FY2007)?" The Off-JT variable is "1" if the respondent answers "yes" to this question, otherwise it is "0". In addition, the number of days of Off-JT will be used to study the training density.[20]

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[20] For those answering "yes" to this question, the survey asked how many days of training the workers received during April 2007 – March 2008. The response options were as follows: 1. about

*** Table 3

Table 3 summarizes the descriptive statistics of training variables. Columns 1-5 present the average statistics for non-regular workers, and column 6 is for regular workers. A comparison of columns 1 and 6 reveals that for all activities the percentage of regular workers who received training is higher than for non-regular workers. The probability of Off-JT for non-regular workers is 21%, and this is less than half the probability for regular workers (45%). When the number of days of Off-JT is examined, the difference between regular workers and non-regular workers expands to a factor of three - 0.76 days for non-regular workers, 2.50 days for regular workers. If we focus on the workers who participated in Off-JT, the gap between regular and non-regular workers shrinks - 3.66 days for non-regular workers, 5.64 days for regular workers - but the number of days non-regular workers receive is still low.

Lastly, to confirm the validity of the data, I compared the participation rate of Off-JT in the "Survey on Work and Learning" with that in the "2007 Employment

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1/2 day, 2. about 1 day, 3. more than 2 days but less than 1 week, 4. more than a week but less than 2 weeks, 5. more than 2 weeks but less than 1 month, and 6. over 1 month. For answers covering a range, the variable uses the median value. This variable assigns "0" to those who did not participate in Off-JT.

Status Survey (ESS)"[21]. The participation rate of Off-JT for workers 25-44 years of age was 33.67% in ESS, and when the survey is broadened to include all workers and recalculated, the Off-JT training percentage is comparable at 36.25%, affirming the information's validity.

4. Results

(1) The incidence and density of firm-provided training

Because firm-provided training is an investment in human capital, firms make employees take training only when a return is expected. A theoretical argument can be made that training is costly to provide and workers can leave the firm or not work long enough at a workplace for the firm to capture the benefits from having provided training. Therefore the "expected remaining tenure" and working enough hours to reap a return on investment are factors taken into consideration even for non-regular employees. This also means that those who have long expected tenures or who work full-time are more likely to participate in the firm-provided training. I will examine the validity of this hypothesis for both OJT and Off-JT.

First let me define the variable for "expected remaining tenure". In this

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[21] The "Employment Status Survey" is national governmental data, collected by the Ministry of Internal Affairs and Communications every 5 years. It is considered one of the most accurate surveys for capturing work activities in Japan. While it surveys the participation rate of Off-JT, it does not survey for OJT.

survey the non-regular workers were asked whether they had a fixed contract period, and whether there was the possibility for contract renewal. The expected remaining tenure variable is constructed from the responses to these questions. Those without a termination date for employment or who did not know of such a date, plus those who had a termination date but were quite certain that it will be extended, were considered to have a long "expected remaining tenure". Others[22] were defined as workers with short expected remaining tenure, and the former was assigned a variable of "1", and the later a variable of "0".

Next, a variable for work hours, called the "full-time" variable, was defined. The weekly work hours were taken from the question about the work hours for the last week of March 2007. Over 35 hours became "1", and less than 35 hours became "0", giving a variable for full-time work.

The average participation rate for OJT and Off-JT, sorted by "expected remaining tenure" and "full-time work", is tabulated in Table 3. (Shown above.) The participation rates of full-time non-regular workers are higher for "learned through participation", "shared information" and OJT number when compared to part-time non-regular workers. (Shown in columns 2 and 3.) Off-JT participation rates and the days of Off-JT are also higher for full-time non-regular workers. On

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[22] Those who do not know if there is a fixed period for their contract, those who have a defined contract period, those with a high likelihood of renewal, a 50/50 possibility of renewal, a low probability of renewal, and those who don't know.

the other hand, as the "expected remaining tenure" lengthens, only the rate of "learning from others" and "learning from participation" rises. (Columns 4 and 5)[23]

*** Table 4

Table 4 shows the estimation results for the determining factors of training for non-regular workers. This analysis takes into account expected remaining tenure, the full-time variable, other control variables for individual and firm attributes such as sex, age, tenure, a less than one year tenure variable for identifying new hires, education, marriage, industry/firm size/occupation category variable, union membership, and regional unemployment rates to adjust for regional economic differences.[24]

Column 1 reports the OLS regressions of the OJT number and indicates that non-regular workers who work full-time receive more OJT than those who work

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[23] There is a possible estimation error in the "expected long tenure" variable. To check for this, I substituted the frequency of job changes for "expected remaining tenure" and did the same regression analysis as in Table 4 (shown below). This was done because job changes can be an indicator of a worker's retention propensity (the more frequently a worker changes jobs, the less likely they will stay with their current firm). Job changes also provide a more objective data base than the "expected remaining tenure" variable. The analysis showed no difference between the two estimation results, and therefore the estimation error of the "expected remaining tenure" variable can be considered small.

[24] Most variables expressing individual attributes use information from the same period of 2007 when firm-provided training was received.

part-time**.** Column 2, 3 and 4 report the marginal effects of each OJT incidence obtained from probit analysis using equation (4). The results in column 2 show that non-regular workers who have a long expected tenure were more likely to learn from colleagues or supervisors. In addition, column 4 reports that non-regular workers who work full-time have a higher probability of participating in opportunities for sharing useful information.

When the factors determining Off-JT participation (column 5) are examined, factors such as expected remaining tenure or full-time working conditions do not show a statistically significant influence. I also examined the influence of the previously received training, including the variables of having had Off-JT at a current work place prior to FY2007, using equation (6). Columns 5 and 6 indicate that both these factors raise the Off-JT participation rate in a statistically significant manner.[25] These results suggest the possibility that training is being done selectively and in a concentrated manner. Or, to put it another way, firms may have repeatedly sent the same highly-skilled non-regular workers to training, because the firms can expect to gain higher returns from these workers.

Column 7 reports the marginal effect using Tobit analysis for the number of days of Off-JT received, with column 8 included in the variables for previous Off-

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[25] For those who were not working at their current workplace before 2006, both prior Off-JT and prior years' Off-JT were defined as "0".

JT. If they did not participate in Off-JT, the number of days is "0". Column 8 and 9 show that non-regular workers who work full-time have a higher number of training days, and the workers who had prior experiences of Off-JT as being more likely to participate in Off-JT at the current work site in FY2007.

To summarize the results obtained above, non-regular workers who are full-time workers have a higher concentration of firm-provided training in both OJT and Off-JT when compared to part-time non-regular workers. It can also be seen that those who expect to continue working at the current firm for long periods are more likely to learn from others on the job. Moreover, past training experiences appear to heighten the probability of taking Off-JT at the current firm, suggesting that selection is taking place.

(2) The effects of firm-provided training

Next, let me examine the impact of firm-provided training. Here I would like to consider not only the impact on wages but also the impact of firm-provided training on work skills and productivity. Three variables will be used for this purpose: wage increases, changes in work skills, and changes in productivity. The representative indicator for the latter two variables is a variable based on subjective changes in evaluations.

The changes in work skills come from the self-evaluation of changes in "skill level" and "job performance" as given in the survey covering April 2007 to September 2008. These dummy variables are constructed from the questions: "Do you think you have personally changed since April 2007 regarding the areas given below (i.e. skill level/job performance)?" A dummy variable of "1" was assigned if the answer was "improved" or "somewhat improved" and "0" was assigned to "no change", "somewhat declined", and "declined".

The variable for the change in productivity was more complicated. In this survey there were no questions asking for an objective evaluation of numerical productivity data. However, larger work assignments, higher work levels, and enhanced responsibilities can be interpreted as improved productivity. Therefore I will use changes in "work assignments", "work levels", and "level of responsibility" during April 2007 - March 2008 as indicating increased productivity. Each response indicating that "work assignments were increased", "work levels were elevated" and "work responsibilities were broadened" will be assigned a variable of "1" and all other responses a "0".[26] It is important, however, to be aware that because the period being examined for productivity changes is the same as for training, there is the possibility that in this analysis we are seeing a

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[26] The response options were as follows: "Work assignments"- 1. increased, 2. no change, 3. narrowed. "Work level"- 1. higher, 2. no change, 3. lowered. "Level of responsibility" - 1. broadened, 2. no change, 3. narrowed.

correlation, not a causal relation.

The difference in the logarithm for hourly wages in FY2008 and FY2006 is the variable of wage increases. Respondents were asked their monthly income (excluding bonus and overtime wages) in September 2008 and March 2007 and the number of work hours in the last week of September 2008 and March 2007. Monthly work hours were calculated by multiplying the work hours from the last week of September 2008 and March 2007 by 4. The hourly wage in 2008 is constructed from their monthly income and monthly work hours for September 2008 (FY2008). The same was done for March 2007 – representing FY2006 because it is the last month of FY2006. Because the work hours of FY2006 were asked as a range, the central value of each range was used to transform weekly work hours into a continuous variable. This calculation of hourly wages for FY2006 is potentially erroneous, but it is the only way to calculate an hourly wage in a manner consistent with FY2008. I would expect to see the effect of training received in FY2007 to show a wage increase between FY2006 and FY2008. Therefore this analysis sample will consist of those who were at their current work place in FY2006.

*** Table 5

First, let me examine the relationship between firm-provided training and work skill levels, changes in productivity, and wage increases, as seen in the statistical data. Table 5 Panel A shows the descriptive statistics of the subjective evaluation for changes in skill levels from receiving OJT and Off-JT. Those who received either OJT or Off-JT show higher evaluations of their work skill levels and their ability to execute jobs.

Column 1-6 in Table 5 Panel B shows that in all 3 productivity variables - work assignments, work levels, and responsibility levels - those who had OJT or Off-JT do better than those who did not. Finally, Columns 7 and 8 in Panel B summarize the mean value of wage increases from having received OJT and Off-JT, but a clear relationship between wage increases and OJT/Off-JT cannot be observed.

*** Table 6

Table 6 shows the results of probit analysis for the change in job skills resulting from training, while at the same time controlling for sex, age, age

squared, tenure, tenure squared[27], education, marriage, type of work, occupation, union membership, firm size, and industry. The economic conditions of a region were taken into account by controlling the unemployment rate by prefecture.

Those with more OJT (columns 1 and 5), those with more Off-JT participation (columns 3 and 7), and those with higher numbers of Off-JT days (columns 4 and 8) show statistically significant increases in skill levels and job performance. When the individual items of OJT are examined (columns 2 and 6), the experience of sharing information seems to have a statistically significant positive impact on the growth of "skill level" and "job performance". While there is the possibility that subjective evaluations do not necessarily indicate an actual improvement in work skills, it does suggest that this type of firm-provided training can be effective in enhancing job capabilities.

*** Table 7

Table 7 reports the estimation results for the impact of training on productivity. The OJT numbers in columns 1, 5 and 9 show that those who experienced different types of OJT have enhanced work assignments, work levels, and work responsibilities. Looking at the individual OJT items, all items raise the

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[27] Age and years of work were taken from 2008.

three productivity indicators (columns 2, 6, 10). As for Off-JT, it also raises work levels and work responsibilities in a statically significant manner (columns 7, 11).

*** Table 8

*** Table 9

Finally, let me confirm the impact of firm-provided training on wage increases. [28] Columns 1 and 2 of Table 8 are estimation results using the specifications of equation (4) in section 3, and neither the OJT number, nor individual OJT items show a significant impact on wages. A summary of the Off-JT estimation results for non-regular workers are shown in columns 1 and 2 of Table 9. They are roughly the same as for OJT, and there appears to be no statistically significant impact on wage increases from either Off-JT or from the number of days of Off-JT. [29]

For comparison, the estimation results for regular workers are tabulated in columns 7 and 8 of Table 8 for OJT, and in columns 7-10 of Table 9 for Off-JT. These results show that the more regular workers participate in OJT, the higher

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[28] When the difference between wages for FY2006 and FY2008 exceeded the average value +/- 4α, it was considered an outlier, and excluded.

[29] The estimation results for both Off-JT and number of days of Off-JT using the specifications of equation (6) are the same as the results of columns 1-6 in Table 9, and no significant effects from OJT or Off-JT are seen on wage increases.

their wages become. For Off-JT, however, it can be seen that it has no impact on regular or non-regular workers' wages. (Columns 7 and 8) However, when the number of days of Off-JT were controlled for previous training (columns 10 of Table 9), followed by the specification of equation (6), it can be seen that higher densities of Off-JT did lead to wage increases.[30]

To summarize the results, it appears that while OJT and Off-JT raise non-regular workers' skills and productivity, this is not reflected in their wages. When the analysis results are confirmed using regular workers, those with more OJT and more days of Off-JT show statistically significant increases in wages, a very different situation than for non-regular workers. These results suggest a difference in wage structure between regular employees and non-regular workers.

Before concluding that firm-provided training does not impact the wages of non-regular workers, I would like to turn to one more examination. So far the analysis has been with non-regular workers who continued to work as non-regular workers at the same work place between 2006 and 2008. From this point forward I would like to expand the analysis sample to all non-regular workers in 2007. In other words, the analysis sample is expanded to include those who changed jobs or

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[30] This specification is to avoid incurring the negative bias of the OLS estimator γ when there is no previous training, due to the serial correlation between current training participation and the previous training participation. The statistically significant negative coefficient for prior Off-JT (yes, no) and number of years of training can be understood as having had a positive influence on wages in FY2006, giving a negative rate of increase in FY2008.

changed work formats in FY2008. Here I will examine the impact training could have on wages, including the precipitation of a job change or a change to regular employment.[31]

The estimation results of this analysis are summarized in columns 3-6 of Table 8, and in columns 3-6 of Table 9. These results suggest that even when job changes and changes in work format are taken into account, the number of OJT sessions, the type of OJT, and having received Off-JT do not show a statistically significant impact on wages. However, if the analysis results are confirmed by examining whether or not there was a transition to regular employment, (columns 5 and 6 of both of Table 8 and Table 9), it shows that those who had higher OJT numbers, Off-JT participation, and a high density of Off-JT have higher rates of transitioning to regular employment. From the above it appears that while firm-provided training does not impact wages immediately, it does impact the transition to regular employment, and therefore a wage increase could be anticipated in the future because regular workers have been shown to have higher wages.

5. Discussion

The analysis in Section 4 indicates that training for non-regular workers

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[31] The variable for a transition to regular employment is constructed as follows: "1" if they convert to being a regular worker in FY2008, "0" for all others.

increases their job skills and productivity, but does not increase their wages. On the other hand, for regular employees it has been shown that training increases their wages. In this section, I will discuss possible reasons for this difference between regular employees and non-regular workers.

One reason for this discrepancy may come from a distortion in the outside wages of non-regular workers. Acemoglu and Pischke (1999a, 1999b) have shown that if the labor market is imperfect, a firm has an incentive to offer general training because an outside option is not commensurate with the workers' productivities. If there is no friction in the labor market, workers can quit and work for another firm, and still receive the same wages. However, as I explained in Section 2, it is known that Japanese firms take into consideration the market wages of other firms in the same industry and region when they set wages for non-regular workers. If the employer knows that other employers in the local area are not paying a wage commensurate to a non-regular worker's productivity, they might not increase wages even when productivity is enhanced.

Let me look specifically at part-time female workers who are married (housewife part-timer, *shu-fu paato*). These workers prefer to work near their homes because the family commitments they have make it inefficient to commute a long distance for part-time work. In other words, they have a heterogeneous

preferences for the work location. If I assume that each firm has a unique location, and the market is assumed to have monopsonistic competition, it can be shown that the impact of firm-provided training on wages is smaller than that of a perfect labor market - as Acemoglu and Pischke (1999a, 1999b) predicted.

Furthermore, it may be a disadvantage for workers to seek new jobs if the only experience they have is as a non-regular worker. If past experiences as a non-regular worker have a negative impact on finding a new job, these factors can exacerbate labor market imperfections causing their wages to fall below their actual productivity.

Another possible explanation for the wage increases regular workers realize from firm-provided training may come from receiving better training than non-regular workers. Namely, there could be a qualitative difference between the training of regular and non-regular workers. This difference could be making the productivity of regular workers higher than that of non-regular workers, and thereby increasing their wages. On the other hand, it is also a common practice for Japanese firms to send regular workers to training before a promotion, making it possible that their wage increase are due to promotions.

Yet another possibility comes from the tax code. In Japan, if a spouse's annual income is over 1.3 million yen, the partner cannot claim a spousal

exemption. This could lead non-regular workers to want to limit their income to less than 1.3 million yen, and therefore refuse offers of wage increases.

6. Conclusion

In this paper, I have examined the impact of firm-provided training on Japanese non-regular workers. I found that those who work on a full-time basis have a greater breadth of OJT and a higher density Off-JT. It can also be seen that those who expect long employment tenure, learn more from others at the work site. Furthermore, having received training previously correlates to receiving training currently, suggesting that firms, anticipating higher returns, send the same highly-skilled workers to training repeatedly.

I have shown that firm-provided training enhances non-regular workers' skill levels and there is a statistically significant correlation between firm-provided training and productivity. However, for non-regular workers, a statistically significant impact of OJT or Off-JT on wages has not been found, although firm-provided training does appear to raise the probability of transitioning from non-regular to regular employment. Therefore while the results suggest that training does not have a positive impact on wages, it can be interpreted as having a positive effect on career development, which could lead to wage increases in the future.

My results suggest that non-regular workers who work in a manner similar to regular employees - on a full-time basis, or with long expected tenures – are selectively receiving firm-provided training in anticipation of higher returns. This means that for a non-regular worker, choosing to work full-time hours can become a means of obtaining skill development opportunities.

Acemoglu and Pischke (1999a, 1999b) show that the internal wage structure is distorted only when the external wage structure is, and while a distorted wage structure encourages firms to pay for general training, the training equilibrium is less than optimal. My results do not directly stipulate that training is less than optimal, but in the context of these previous studies, the results can be seen as suggesting the existence of labor market imperfections for non-regular workers.

The accumulation of human capital is critical to any economy, and as the proportion of non-regular workers increases, it is imperative that they receive the training required to stay current and enhance their employability. My analysis suggests that support for current part-time non-regular workers may be needed to achieve this end. In addition, because expected long tenure has been shown to be a positive factor, attempts to lengthen the contract period may also be desirable. While we may not be able to turn the tide of increasing numbers of non-regular workers, we should be able to enhance their employability, and I hope this paper

has pointed the way to some of the steps we might consider adopting.

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Table 1: Descriptive Statistics (%)

	Non-regular	Regular
Female (=1 if female)	83.15	24.77
Age	34.09	3.93
Tenure	3.92	9.35
Union (=1 if unionized)	9.77	42.86
Full-time (=1 if full-time)	33.06	85.48
Fixed-term contract (=1 if fixed)	33.29	-
Expected length of tenure (=1 if long)	73.39	-
<Education>		
Middle school/high school	49.00	39.28
Technical/junior college or vocational school	37.75	26.17
University	12.45	31.74
Graduate school	0.80	2.81
<Occupation>		
Professional, Technical	12.08	19.35
Managerial	0.00	4.65
Clerical	22.31	19.01
Sales	22.31	17.69
Service	23.51	7.20
Technician, Production	12.35	23.37
Transportation, Communication	4.52	5.93
Security	0.40	0.93
Agriculture, Forestry, Fishery	0.66	0.49
Other	1.86	1.37
<Industry>		
Agriculture, Forestry, Fishing, Mining	0.66	0.93
Construction	2.66	8.64
Manufacturing	9.57	23.11
Electricity, Gas, Heat, Water,	0.27	2.26
Information, Communication	1.99	5.05
Transportation, Mail	5.85	6.23
Wholesale, Retail	21.01	13.98
Finance, Insurance	2.93	6.08
Real estate, Leasing	0.80	1.23
Research, Specialized & technical services	1.86	3.58
Hotel, Restaurants	13.56	2.89
Life services, Entertainment	7.45	3.14
Education, Learning support,	5.45	2.89

Medical, Welfare	12.63	8.98
Other services	9.31	7.16
Other	3.99	3.83
<Firm size>		
1 - 4 employees	8.28	4.16
5 - 9	17.52	7.88
10 - 29	24.36	13.90
30 - 99	19.75	17.51
100 - 299	11.46	16.46
300 - 999	8.44	15.40
1000 -	10.19	24.69

Data: "Survey on Working and Learning". (Same for tables below)

Table 2: Results of principal factor analysis for OJT items

	Factor 1	Factors
Received advice	0.7163	-0.2262
Learned by watching	0.7223	-0.2133
Shared information	0.6156	0.1799
Experienced other areas	0.4356	0.2278
Advised others	0.4199	0.2525
Eigenvalue	1.7799	0.2447
Proportion	1.1339	0.1559
Cumulative	1.1339	1.2897

Note: "Received advice" refers to receiving advice from superiors or colleagues. "Advised others" refers to giving advice or guidance to subordinates or colleagues. "Learned by watching" refers to learning through observing how subordinates and colleagues do the job. "Experienced other areas" refers to experiences outside what is directly useful in the current job. "Shared information" refers to the sharing of work-related information through meetings and other forums.

Table 3: Descriptive statistics for firm-provided training by employment format

	(1)	(2)	(3)	(4)	(5)	(6)
						Regular employees
		Non-regular employees				
	All	Full-time		Expected remaining tenure		All
		Yes	No	Long	Short	
	N:738	N: 197	N: 399	N: 603	N: 81	N:2028
Learned from others	0.78	0.76	0.77	0.78	0.77	0.82
Learned through participation	0.57	0.63	0.55	0.59	0.54	0.79
Shared information	0.45	0.51	0.43	0.44	0.48	0.65
OJT number	2.59	2.73	2.48	2.57	2.59	3.17
Off-JT yes/no	0.21	0.23	0.18	0.20	0.23	0.45
Days of Off-JT						
〈including non-participants〉	0.76	1.09	0.42	0.64	0.76	2.50
〈not including non-participants〉	3.66	4.67	2.36	3.24	3.33	5.64

Note: "Learned from others" assigns "1" to those who either "received advice" or "learned by watching", and "0" to all other responses. "Learned through participation" assigns "1" to those who "advised others" or "experienced other areas", and "0" to all other responses. The OJT number combines the answers from the 5 questions about OJT training. A "yes" to any category would take 1 for a maximum total of 5.

Table 4: Analysis of determining factors for OJT and Off-JT (non-regular employees)

(1): OLS analysis, (2)~(7): Probit analysis (marginal effect), (8)~(10): Tobit analysis (marginal effect)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OJT number	Learned from others	Learned through participation	Shared information	Off-JT		Days of Off-JT	
Full-time (if full-time=1)	0.330*	0.010	0.071	0.135**	0.056	0.057	0.481**	0.497**
	[1.956]	[0.217]	[1.182]	[2.260]	[1.359]	[1.381]	[2.008]	[2.120]
Expected remaining tenure (if long=1)	0.374	0.197**	0.109	0.057	-0.074	-0.058	-0.177	-0.106
	[1.586]	[2.562]	[1.293]	[0.687]	[-1.397]	[-1.107]	[-0.606]	[-0.377]
Off-JT (pre-FY2006) (if yes=1)						0.389***		1.522***
						[4.665]		[3.180]
Female	0.251	0.094	0.046	-0.019	0.035	0.016	0.276	0.171
	[0.940]	[1.117]	[0.487]	[-0.197]	[0.532]	[0.244]	[0.752]	[0.466]
Age	-0.002	0.025	0.017	-0.041	-0.009	-0.025	-0.056	-0.109
	[-0.011]	[0.516]	[0.277]	[-0.683]	[-0.227]	[-0.626]	[-0.246]	[-0.489]
Age^2	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.002
	[-0.104]	[-0.624]	[-0.443]	[0.710]	[0.357]	[0.724]	[0.320]	[0.540]
Tenure	-0.194***	-0.052**	-0.025	-0.059**	-0.030*	-0.031	-0.185**	-0.160**
	[-2.697]	[-2.573]	[-0.951]	[-2.205]	[-1.838]	[-1.548]	[-2.335]	[-2.065]
$Tenure^2$	0.007	0.002	0.001	0.003	0.002*	0.002	0.013***	0.010**
	[1.458]	[1.532]	[0.585]	[1.477]	[1.832]	[1.322]	[3.054]	[2.509]
Tenure less than 1 year (if yes=1)	-0.060	0.021	0.046	-0.138	-0.027	-0.008	-0.206	-0.082
	[-0.240]	[0.267]	[0.506]	[-1.573]	[-0.490]	[-0.142]	[-0.678]	[-0.267]
Technical/junior college or vocational school	-0.028	-0.010	-0.019	-0.040	-0.012	-0.023	-0.162	-0.219
	[-0.172]	[-0.218]	[-0.322]	[-0.687]	[-0.308]	[-0.589]	[-0.720]	[-0.993]
University/graduate school	-0.069	-0.019	-0.195**	-0.039	-0.022	-0.012	-0.133	-0.078
(Middle school/high school)	[-0.274]	[-0.246]	[-2.158]	[-0.436]	[-0.372]	[-0.211]	[-0.399]	[-0.236]

47

Married	-0.055	-0.065	0.069	0.040	0.042	0.039	0.230	0.194
	[-0.148]	[-0.653]	[0.488]	[0.302]	[0.521]	[0.486]	[0.500]	[0.430]
Female * (married)	-0.102	-0.027	-0.132	0.011	0.028	0.048	0.019	0.123
	[-0.240]	[-0.228]	[-0.845]	[0.071]	[0.286]	[0.508]	[0.035]	[0.231]
Agriculture, Forestry, Fishing, Mining, Construction	0.355	0.107	-0.352**	0.062	-0.017	-0.077	-0.540	-0.824**
	[0.772]	[1.060]	[-2.119]	[0.363]	[-0.179]	[-0.939]	[-1.168]	[-2.030]
Electricity, Gas, Geat, Water, Transportation, Mail	-0.428	-0.037	-0.368***	0.059	0.028	0.036	-0.213	-0.165
	[-1.095]	[-0.347]	[-2.609]	[0.419]	[0.338]	[0.438]	[-0.512]	[-0.403]
Information, Communication	-0.430	0.086	-0.332	0.087	-0.063	-0.095	-0.687	-0.886**
	[-0.689]	[0.553]	[-1.530]	[0.391]	[-0.659]	[-1.077]	[-1.400]	[-1.999]
Wholesale, Retail	-0.076	0.049	-0.184	0.059	-0.214***	-0.207***	-1.522***	-1.454***
	[-0.223]	[0.540]	[-1.470]	[0.472]	[-3.591]	[-3.478]	[-4.399]	[-4.312]
Finance, Insurance, Real estate, Leasing	0.463	0.054	-0.061	0.173	-0.013	-0.030	-0.349	-0.414
	[0.985]	[0.495]	[-0.365]	[1.021]	[-0.153]	[-0.356]	[-0.780]	[-0.978]
Hotel, Restaurants	0.619	0.107	0.205	0.037	-0.108	-0.128*	-1.097***	-1.216***
	[1.510]	[1.112]	[1.497]	[0.249]	[-1.356]	[-1.752]	[-2.718]	[-3.253]
Life services, Entertainment	0.133	0.049	0.044	0.081	0.094	0.046	-0.160	-0.397
	[0.326]	[0.466]	[0.304]	[0.544]	[0.929]	[0.472]	[-0.342]	[-0.948]
Education, Learning support, Research, Specialized & technical services	0.404	0.118	-0.094	0.259*	0.019	-0.014	-0.246	-0.415
	[0.989]	[1.256]	[-0.632]	[1.793]	[0.214]	[-0.161]	[-0.542]	[-0.995]
Medical, Welfare	0.611	0.141	-0.094	0.290**	0.027	-0.010	-0.198	-0.372
	[1.584]	[1.635]	[-0.682]	[2.127]	[0.319]	[-0.122]	[-0.455]	[-0.922]
Other service industries	0.228	0.033	-0.090	0.093	-0.102	-0.114	-0.802**	-0.896**
	[0.595]	[0.327]	[-0.644]	[0.658]	[-1.368]	[-1.618]	[-1.987]	[-2.381]
Other	0.631	0.157*	-0.189	0.296*	0.008	-0.010	0.109	-0.012
(Manufacturing)	[1.362]	[1.651]	[-1.096]	[1.890]	[0.080]	[-0.104]	[0.193]	[-0.022]
Firm size: 5-9 employees	0.301	0.057	0.098	0.148	0.157	0.119	0.781	0.590
	[0.935]	[0.709]	[0.901]	[1.257]	[1.219]	[0.955]	[0.977]	[0.793]

10-29	0.626**	0.095	0.255***	0.085	0.215*	0.173	1.296	1.080
	[2.078]	[1.298]	[2.626]	[0.765]	[1.777]	[1.485]	[1.638]	[1.460]
30-99	0.566*	0.097	0.185*	0.191*	0.255**	0.215*	1.302	1.096
	[1.805]	[1.286]	[1.790]	[1.662]	[2.005]	[1.741]	[1.588]	[1.429]
100-299	0.924***	0.134*	0.292***	0.221*	0.217*	0.135	1.197	0.804
	[2.781]	[1.805]	[2.891]	[1.836]	[1.690]	[1.120]	[1.434]	[1.073]
300-999	1.083***	0.198***	0.156	0.325***	0.170	0.114	0.757	0.521
	[2.986]	[2.849]	[1.343]	[2.587]	[1.245]	[0.886]	[0.909]	[0.685]
1000-	0.771**	0.083	0.190*	0.313**	0.360**	0.289**	1.917*	1.465
(less than 4)	[2.166]	[0.973]	[1.654]	[2.521]	[2.558]	[2.111]	[1.928]	[1.641]
Professional, Rechnical, Managerial	0.360	0.056	0.124	-0.001	-0.033	-0.022	0.061	0.152
	[1.159]	[0.642]	[1.158]	[-0.005]	[-0.538]	[-0.346]	[0.159]	[0.391]
Sales	0.356	0.054	-0.050	0.115	0.344***	0.312***	1.359**	1.159**
	[1.309]	[0.716]	[-0.502]	[1.183]	[3.636]	[3.280]	[2.500]	[2.261]
Service	-0.241	-0.070	-0.211**	-0.003	-0.047	-0.032	-0.020	0.088
	[-0.848]	[-0.831]	[-2.001]	[-0.030]	[-0.721]	[-0.478]	[-0.051]	[0.217]
Technician, Production process, Transportation, Communication, Security	-0.503*	-0.094	-0.314***	-0.133	-0.017	-0.023	-0.196	-0.229
	[-1.816]	[-1.173]	[-3.132]	[-1.359]	[-0.273]	[-0.380]	[-0.555]	[-0.669]
Agriculture, Forestry, Fishery, other	-1.048**	-0.302**	-0.354**	-0.297**	-0.073	-0.040	-0.489	-0.281
(Clerical)	[-2.416]	[-2.043]	[-2.184]	[-1.962]	[-0.750]	[-0.380]	[-0.861]	[-0.472]
Union	0.372	0.069	0.130	0.139	0.054	0.077	0.203	0.292
	[1.415]	[0.955]	[1.403]	[1.496]	[0.894]	[1.235]	[0.588]	[0.841]
Unemployment rate by prefecture	-0.047	-0.034	-0.031	0.005	-0.010	-0.002	0.013	0.048
	[-0.538]	[-1.333]	[-0.935]	[0.149]	[-0.462]	[-0.076]	[0.111]	[0.407]
Constant	2.461							
	[0.843]							
Observations	436	442	436	436	507	507	507	507
R-squared	0.200							
F stats	2.772							

F test	0.000						
Pseudo R-squared		0.139	0.144	0.094	0.140	0.185	0.065	0.081
Log Lik		-206.600	-251.200	-272.600	-217.600	-206.400	-469.800	-462.100
Chi-square test		0.001	0.000	0.015	0.000	0.000	0.002	0.000

Note: t-statistics in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Changes in job skills, productivity and wages from training participation

Panel A: Changes in job skills (Mean)

	(1)	(2)	(3)	(4)
	Skill level		Job performance	
Total	0.28		0.30	
	yes	no	yes	no
Learned from others	0.32	0.15	0.34	0.14
Learned through participation	0.35	0.21	0.36	0.22
Shared information	0.40	0.19	0.43	0.20
	#>=3	#<3	#>=3	#<3
OJT number	0.37	0.16	0.40	0.16
	yes	no	yes	no
Off-JT	0.45	0.24	0.46	0.25

Panel B: Changes in productivity and wages (Mean)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Work assignments		Work levels		Responsibility levels		Wage increases	
Total	0.38		0.33		0.29		0.01	
	yes	no	yes	no	yes	no	yes	no
Learned from others	0.43	0.19	0.38	0.13	0.34	0.11	0.01	0.02
Learned through participation	0.47	0.27	0.41	0.22	0.38	0.17	0.02	0.003
Shared information	0.46	0.32	0.42	0.26	0.37	0.22	0.01	0.01
	#>=3	#<3	#>=3	#<3	#>=3	#<3	#>=3	#<3
OJT number	0.47	0.26	0.42	0.20	0.38	0.17	0.01	0.02
	yes	no	yes	no	yes	no	yes	no
Off-JT	0.45	0.36	0.47	0.29	0.41	0.25	0.02	0.01

Note: #>=3 means that OJT number is more than 3, and #<3 means that OJT number is less than 2.

Table 6: Marginal effect of OJT and Off-JT on the change in job skills (non-regular employees)

Probit analysis (1: raised, somewhat raised, 0: lowered, somewhat lower, no change)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Skill levels				Job performance		
OJT number	0.060***				0.075***			
	[4.223]				[5.125]			
Learned from others		0.010				0.015		
		[0.174]				[0.253]		
Learned through participation		0.063				0.076*		
		[1.402]				[1.659]		
Shared information		0.142***				0.179***		
		[3.349]				[4.103]		
Off-JT (yes/no)			0.220***				0.210***	
			[4.193]				[3.961]	
Days of Off-JT				0.044***				0.027***
				[3.474]				[3.097]
Observations	547	547	552	551	547	547	552	551
Pseudo R-squared	0.123	0.123	0.125	0.131	0.125	0.126	0.109	0.103
Log Lik	-281.000	-280.900	-279.900	-277.000	-288.400	-288.100	-293.500	-294.500
Chi-square test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001

Note:
1. t-statistics in brackets. *** p<0.01, ** p<0.05, * p<0.1.
2. The same variables as Table 4 except the "tenure less than 1 year" variable is controlled in all equations.

Table 7: Marginal effect of OJT and Off-JT on the change in productivity (non-regular employees)

Probit analysis (1: raised, somewhat raised, 0: lowered, somewhat lower, no change)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Work assignments				Work levels				Responsibility levels			
OJT number	0.106***				0.107***				0.106***			
	[6.446]				[6.840]				[7.055]			
Learned from others		0.163***				0.151***				0.142***		
		[2.713]				[2.662]				[2.617]		
Learned through participation		0.098**				0.097**				0.120***		
		[1.988]				[2.076]				[2.716]		
Shared information		0.111**				0.119***				0.110***		
		[2.376]				[2.709]				[2.646]		
Off-JT (yes/no)			0.080				0.123**				0.132***	
			[1.458]				[2.367]				[2.596]	
Days of Off-JT				0.011				0.004				0.011
				[1.272]				[0.542]				[1.571]
Observations	557	557	562	561	558	558	563	562	558	558	563	562
Pseudo R-squared	0.123	0.102	0.069	0.068	0.140	0.113	0.076	0.067	0.133	0.104	0.060	0.053
Log Lik	-325.900	-333.500	-347.200	-346.500	-299.100	-308.500	-321.800	-323.600	-286.500	-296.100	-310.600	-311.600
Chi-square test	0.000	0.000	0.028	0.032	0.000	0.000	0.022	0.073	0.000	0.001	0.240	0.428

Notes:
1. t-statistics in brackets. *** p<0.01, ** p<0.05, * p<0.1.
2. The same variables as Table 4 except the "tenure less than 1 year" variable is controlled in all equations.

Table 8: Effect of OJT on wage growth and on the transition to regular employment

(1)~(4)(7)~(8): OLS analysis, (5)(6): Probit analysis (marginal effect)

	(1) (2)		(3) (4)	(5) (6)	(7) (8)	
	Non-regular employees		Non-regular employees (FY2007)		Regular employees	
	Δlog wage		Δlog wage	Rate of transition to regular employment	Δlog wage	
OJT number	-0.005		-0.005	0.005**	0.009*	
	[-0.629]		[-0.651]	[0.048]	[1.668]	
Learned from others		-0.030	-0.040	0.005		-0.002
		[-0.976]	[-1.246]	[0.700]		[-0.121]
Learned through participation		0.040	0.034	0.003		0.020
		[1.548]	[1.256]	[0.728]		[1.034]
Shared information		-0.019	-0.008	0.009		0.018
		[-0.771]	[-0.307]	[0.380]		[1.054]
Observations	437	437	491 491	424 424	1555	1555
R-squared	0.051	0.058	0.049 0.053		0.050	0.050
F stats	0.640	0.679	0.688 0.708		1.904	1.818
F test	0.944	0.922	0.909 0.898		0.000	0.001
Pseudo R-squared				0.268 0.254		
Log Lik				-63.350 -64.570		
Chi-square test				0.022 0.063		

Notes:
1. t-statistics in brackets. *** p<0.01, ** p<0.05, * p<0.1
2. The same variables as Table 4 except the "tenure less than 1 year" variable is controlled in all equations.
3. The analysis sample in columns (1)-(2) and (7)-(8) are those who worked as non-regular or regular employees between FY2006 and FY2007 at the same firm. The analysis sample in columns (3)-(6) are those who worked as non-regular employees in FY2007 regardless of the firm.

Table 9: Effect of OJT on the wage growth rate and on the transition to regular employment

(1)~(4)(7)~(12): OLS analysis, (5)(6): Probit analysis (marginal effect)

|	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Non-regular employees		Non-regular employees (FY2007)				Regular employees			
	△log wage		△log wage		Rate of transition to regular employment		△log wage			
Off-JT (if yes=1)	-0.015		-0.030		0.056**		0.019	0.025		
	[-0.497]		[-0.703]		[0.047]		[1.235]	[1.631]		
Days of Off-JT		-0.003		-0.001		0.0003*			0.002	0.003*
		[-0.577]		[-0.269]		[0.073]			[1.631]	[1.932]
Off-JT (pre-FY2006) (if yes=1)								-0.029*		-0.029*
								[-1.727]		[-1.712]
Years of Off-JT(pre-FY2006)										
Observations	440	440	498	497	436	435	1562	1562	1558	1558
R-squared	0.049	0.049	0.050	0.049			0.049	0.051	0.050	0.052
F stats	0.617	0.619	0.719	0.705			1.873	1.901	1.887	1.914
F test	0.957	0.955	0.881	0.894			0.001	0.000	0.001	0.000
Pseudo R-squared					0.265	0.272				
Log Lik					-64.070	-61.250				
Chi-square test					0.023	0.025				

Notes:
1. t-statistics in brackets. *** p<0.01, ** p<0.05, * p<0.1
2. The same variables as Table 4 except the "tenure less than 1 year" variable is controlled in all equations.
3. The analysis sample in columns (1)-(2) and (7)-(8) are those who worked as non-regular or regular employees between FY2006 and FY2007 at the same firm. The analysis sample in columns (3)-(6) are those who worked as non-regular employees in FY2007 regardless of the firm.

Appendix

Figure A1: Changes in firm-provided training (off-the-job training) rates by employment status
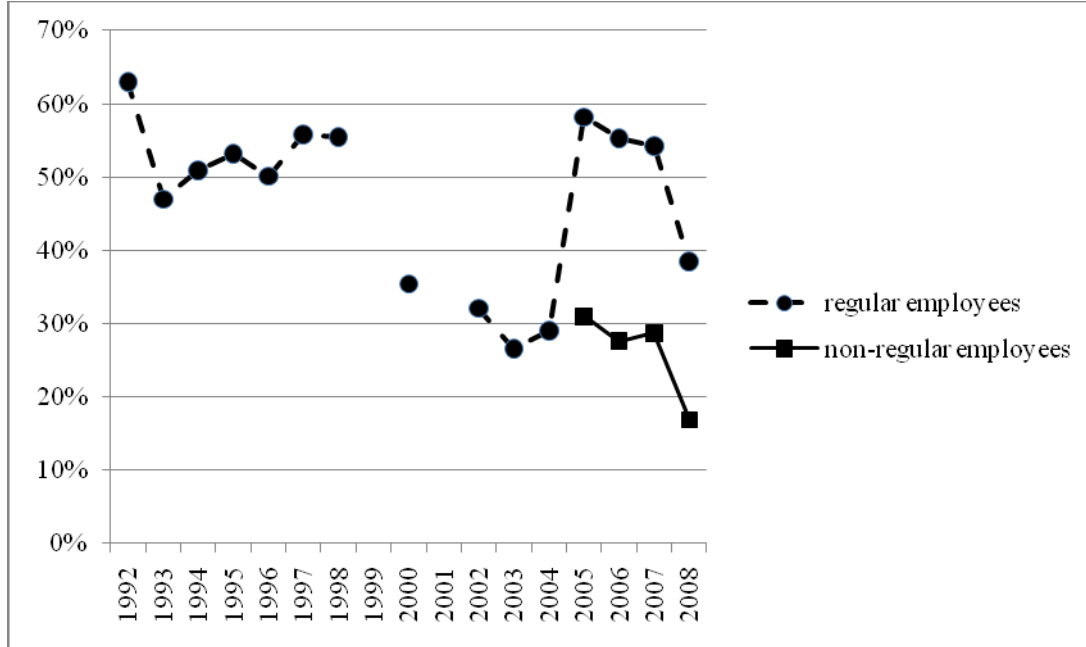
Data: After 2001, Ministry of Health, Labour, and Welfare "Basic Survey of Skill Development". Before 2000, Ministry of Labour "Survey of Training in the Private Sector".