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"Wage Profiles in the Japanese Dual Labor Market"

Hiroshi Teruyama and Hiroyuki Toda

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Wage Profiles in the Japanese Dual Labor Market*

Hiroshi Teruyama† and Hiroyuki Toda‡

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Abstract

This study examines the dual structure of wage formation in regular and non-regular employment sectors in Japan. By using data from a series of surveys conducted in the Tokyo metropolitan area during 2002–2014, two sectoral wage functions and an employment status determination function are estimated simultaneously. The estimated results reveal several facts regarding the new era of the Japanese dual labor market. While the wages of regular workers rise with years of tenure and external experience, those of non-regular workers increase only with the latter. The wage increases owing to experience are of a similar magnitude between employment statuses (except for female regular workers), and the firm-size and educational-background premiums exist only in the regular employees' wages. The study also shows that the slopes of regular workers' wage-tenure profiles have been rather stable for more than 10 years since the early 2000s.

JEL Classification: J31, J42, J70, C34.

Keywords: dual labor market, wage profiles, non-regular workers, Japanese labor market, switching regression model.

1 Introduction

The share of non-regular employees in Japan has been increasing since the 1990s and exceeded 30% by around 2010. It is argued that this increase induces the dual structure in the Japanese labor market and expands income inequality.[1] Indeed, several studies have indicated the persistence of a non-regular employment status, suggesting the polarization in the labor market[2] Non-regular employees are considered to receive limited

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†Kyoto University

‡Kyoto University and Osaka University

[1]Recently, researchers have started searching for the causes of the increase in the number of non-regular workers. See Ariga and Okazawa (2011), Kalantzis et al. (2012), Asano et al. (2013), Kitagawa (2014), and Miyamoto (2016).

[2]See Teruyama and Toda (2016).

opportunities for long-term contracts and human capital accumulation. Consequently, wages of such workers do not increase with tenure and remain at low levels compared to those of regular workers, who benefit from the Japanese seniority-wage system. However, few empirical attempts have thus far been conducted to examine the differentials of wage profiles between these two employment statuses based on micro data.[3]

Meanwhile, the collapse of the traditional Japanese employment system has been demonstrated in relation to the changes in the seniority-wage system among regular employees. Hamaaki et al. (2012) show that the age-wage profiles had been gradually flattening during the 1990s and 2000s, among workers who continued to work for the same employer since their graduation. Therefore, we focus on determining whether or not the reduction in the slopes of wage profiles has been progressing in the 2010s.[4]

This study focuses on two empirical arguments: (i) the contrasting properties of wage profiles between regular and non-regular workers, and (ii) the flattening of the wage profiles of regular workers. To this aim, we simultaneously estimate the wage functions of the regular and non-regular employment, and the allocation mechanism of workers into these two employment statuses by using an endogenous switching regression model.

An econometric test on the dual labor market hypothesis in Japan was pioneered by Ishikawa and Dejima (1994). Adopting a switching regression approach by Dickens and Lang (1985), they estimated the wage functions for the primary and secondary sectors while determining the sector to which a worker belongs. They found different characteristics among the wage functions in the primary and secondary sectors, and also found involuntary rationing in the former. Apart from the examined period, neither the notion of dual labor market nor the type of switching regression model used in this study are the same as those of Ishikawa and Dejima (1994). In the Dickens-Lang or the Ishikawa-Dejima model, the two sectors are not observable in advance. The sector to which a worker belongs must be determined in the estimation process. In our model, the classification of workers into the two sectors (whether a regular or non-regular employee) is known. We find similarities and dissimilarities between our results and theirs regarding the dual structure of wage profiles, and discuss these points in Section 5.

The remainder of this paper proceeds as follows. Section 2 presents the method used to estimate the wage functions in the segmented labor markets. Subsequently, our data source and the construction of variables are explained. Section 3 provides the estimated results and Section 4 discusses them in comparison with some related studies. Section 5 concludes.

[3] An exception is Yanagida and Miyoshi (2006).

[4] See Rebick (2005) for the long-run transition of wage-age or wage-tenure profiles in Japan since the 1960s.

2 Estimation of Wage Functions in Segmented Labor Markets

To estimate the wage functions in segmented labor markets, we employ the endogenous switching regression model, which is described as follows. There are two types of wage function according to the type of employment status (regular and non-regular). Let us denote the wage function of regular (non-regular) employees with subscript 1 (subscript 2). The wage functions are represented by:

$$w_{1i} = \beta_1^\top X_i + u_{1i} \quad \text{if} \quad I_i = 1, \tag{1}$$

$$w_{2i} = \beta_2^\top X_i + u_{2i} \quad \text{if} \quad I_i = 2, \tag{2}$$

where w_{ji} is the log of wage rate, that is, the log of hourly wages, for worker i when he or she works in a regular (non-regular) job if $j = 1$ ($j = 2$), X_i is the vector of determinants for worker i's wage rate, and u_{ji} is the disturbance when the employment status is j. I_i is an index for the employment status and is determined by

$$I_i = 1\Big(I_i^* = \delta^\top X_i + \gamma^\top Z_i + u_i > 0\Big) \tag{3}$$

where $1(\cdot)$ denotes an indicator function with $1(s) = 1$ if s is true and $1(s) = 2$ otherwise. Note that I_i is observable, while I_i^* is not, and if $I_i = 1$ ($I_i = 2$), then worker i is in a regular (non-regular) employment status voluntarily or involuntarily.

Let us refer to (3) as the switching equation. All the determinants of wage rates, that is, X_i, are also included in the switching equation. This is based on the idea that the expected present value of lifetime benefits from a regular job relative to that of a non-regular job, is the function of the present wage differentials between the two employment statuses, that is, $w_{1i} - w_{2i}$. In addition, the relative expected present value of the lifetime costs of working in a regular job to that of a non-regular job, and the involuntary factors that prohibit a worker from having a regular job, are assumed to depend on the determinants of wage rates X_i and other variables Z_i.

Disturbance in the switching equation, u_i, is allowed to correlate with those in the wage functions, u_{1i} and u_{2i}. Assuming that X_i and Z_i are exogenous and the disturbances u_i, u_{1i}, and u_{2i} have a joint normal distribution with zero means, the model can be estimated by the full-information maximum likelihood.

3 Data and Variables

3.1 Working Person Survey

We use the results of the Working Person Survey (WPS) carried out by the Recruit Works Institute. It has been conducted biennially every September since 2000. The purpose of the WPS is to reveal the status of working individuals and their attitude toward employment. To this aim, the survey asks respondents about subjective recognition and the objective attributes related to their present and past jobs. The key

questions, for example, those regarding their position, age, and working hours, are kept unchanged although various questions change across the survey years.

The data are gathered by an online survey via a dedicated website. The sample size varies from about 6,000 to 17,000, and participants are chosen by random sampling from each population segmented by gender, age, and employment area. Subjects are re-sampled every survey year. Thus, the WPS does not have a panel structure.

The coverage of the WPS is as follows. First, the respondents must be aged between 18 and 59 years; students are excluded.[5] Second, respondents must have worked at least one day during the past week in the month before the survey. Third, respondents must be "regular employees," "contract or entrusted employees," "temporary workers," "part-time workers," "dispatched workers," or "outsourced workers or freelancers"[6] ; self-employed workers are excluded. Fourth, respondents must work in the Tokyo metropolitan area.[7]

In this study, we adopt the survey results from 2002 through 2014, as some essential variables used in the analysis can be constructed from respondents' answers to the questions only in these survey years.

3.2 Employment Status

As explained in Section 2, in this study, workers are divided into regular and non-regular workers. In Japan, the so-called non-regular employment has several definitions. From the viewpoint of different statistical surveys published by the Japanese government, the definition of non-regular employment could be based on three criteria: contract length, working hours, and title/description of the workplace.[8] The definition available throughout the survey years is based on the title/description. The respondents are asked about the "type of employment" (i.e., title/description), which consists of "regular employment" and six other categories as stated in Section 3.1.[9] Depending on their answers, we divide the respondents into regular and non-regular employees. Those who choose alternatives other than "regular employment" are classified as non-regular employees.

3.3 Wage Rates

The WPS asks questions on revenues, including taxes in the previous fiscal year, that is, from April in the previous year to March in the survey year. Temporary and side

[5]Only the 2014 survey includes individuals aged from 60 to 69 years. We exclude respondents aged above 59 years in this study.

[6]The description "freelancer" appears only in the 2014 survey.

[7]This area consists of the Tokyo, Kanagawa, Chiba, and Saitama prefectures. The surveys before 2004 include respondents who work in the other large city areas (Kansai and Tokai). The respondents who work in areas other than the Tokyo metropolitan area, as included in these surveys, are excluded in this study.

[8]Kambayashi (2013) summarizes different definitions of non-regular employees based on the representative Japanese government statistical surveys.

[9]"Type of employment" is a direct translation of the Japanese term used in the survey question.

revenues are excluded from the revenues. Regarding working hours, the survey enquires about the average hours currently worked in a week. The hours worked include hours of overtime work and exclude hours that involve commuting, mealtime, and breaks. When a respondent works at more than two workplaces, he or she must report the total hours worked across them. Based on the answers to these questions, we define the wage rates, that is, hourly wages, by dividing the annual revenue by the annual working hours, which is estimated at 365/7 times the average hours worked in a week. Note that a period in which revenues are earned does not correspond to that in which the working hours are estimated. In addition, these answers are personal statements with no documentary evidence. Hence, we expect considerable estimation and reporting errors in our wage rate data.

In estimating the model, we exclude individuals who report that the annual revenue is zero. From the remaining sample, those with annual revenues under the first percentile and over the 99th percentile are dropped. Evidently, these sample treatments to solve the data precision problem are limited. Nevertheless, the estimated wage profiles reported in Section 4 reveal that the estimated parameters are stable over the years, and their signs and sizes are plausible.

3.4 Explanatory Variables

The explanatory variables, X_i, in wage functions (1) and (2) are selected as follows. Following the Mincer-type wage equations, we include years of tenure, years of external experience, and their squares.[10] The years of external experience are defined as the number of years from the year a worker obtains the first job to the year of finding the current job. Although the WPS is not a panel survey, it has many retrospective questions. The questionnaire asks about the year when the respondent obtained the first job after finishing school, and the age at which the respondent found the current job.[11] Based on this information, the years of tenure and external experience are calculated.

Years of tenure and years of external experience represent the firm-specific and general human capital, respectively.[12] Workers in the primary sector have an opportunity of human capital investments on the job, and their wages reflect the proper rewards to them. This property of wage determination critically distinguishes the primary market. If we cannot find such a property in one of the segmented labor markets, then the market is interpreted as secondary. Another explanation is possible for the positive effect

[10] Kawaguchi (2011) examines an estimation of the Mincer-type wage equation using Japanese data.

[11] The WPS also reports the *year* when the respondent found the current job. There exist respondents whose reported age and year of entering the current work place are inconsistent. As we expect that the memory based on age is generally more accurate, we measure years of tenure as the number of years from the age at which he or she found the current job to the age as of the survey.

[12] Both general as well as firm-specific human capital may be accumulated under the current employer. Thus, a part of the wage increases with tenure may belong to the general human capital. Nevertheless, we use the length of external experience instead of the total labor market experience, which include the length of the current tenure, as years of tenure and years of total market experience are usually highly correlated.

of tenure on wages. That is, a seniority-wage system works as an incentive device in the primary market, facing competitive wages in the secondary market. Note that this incentive view could be consistent with the human capital view.

In addition, firm size is considered a determinant of wages. The WPS asks about the total number of employees in the firm where the respondent is working. A respondent chooses one of 13 firm-size categories, so we construct the firm-size dummy variables by setting the size of five to nine employees as the base category. It is often stressed that large-sized firms generally pay higher compensation than small-sized firms do, even after the discrepancy of individual employees' productivity is adjusted. The source of the "firm-size premium" can be explained in several ways. For example, it may be because a large firm has more efficient technology or economies of scale to raise each employee's productivity regardless of the worker's innate ability.

Furthermore, the educational background is also considered. The WPS has seven categories of educational backgrounds: junior high school, senior high school, vocational school, junior college, technical college, college or university, and graduate school. We construct six education dummies for which the junior high school graduate is the base category. An academic career is regarded as a process of accumulating general human capital. Higher or longer education might correspond to higher productivity, which is converted into the wage rate. It may also function as a signal for a worker's innate ability. Another proxy for abilities is a respondent's self-assessment of his or her record in the final junior high school grade. A respondent chooses an answer from five ranked alternatives: upper, upper-middle, middle, lower-middle, and lower. We then construct four dummy variables for which the lower rank is the base.[13]

The differences by gender in the evaluation of tenure (firm-specific human capital) and external experience (general human capital) are considered in the estimation. The female dummy variable, and the cross-terms between the female dummy and years of tenure or years of external experience are included. Thus, a constant wage gap and the different slope of wage profile are allowed between genders.

Other variables, that is, Z_i, added to the determinants of wages in the switching equation (3), are the marital status dummy (which takes 1 if married and 0 otherwise), the cross-term between the female dummy and the marital status dummy, and the unemployment rate in the year of the respondent's entry into the labor market. The unemployment rate at entry is included to examine "cohort effects," which is explained in the next section.

4 Empirical Results

Table 1 shows the estimation results of equations (1), (2), and (3) for each survey year. Let us start with wage-tenure profiles. Regarding regular workers' wage functions, shown in Panel (1), the estimated coefficients of years of tenure and their squares are significant at the 1% level for all the years. Their signs suggest that wage-tenure profiles

[13]This question appears only in the 2012 and 2014 surveys.

have positive and decreasing slopes. However, in non-regular workers' wage functions, shown in Panel (2), the estimated coefficients of years of tenure and their squares are not significant even at the 10 % level in most years.[14] Therefore, we can conclude that the wages of non-regular workers do not increase with tenure length. This feature is in sharp contrast to the case of regular workers.

Contrary to the wage-tenure profiles, the estimated wage-experience profiles show a significantly positive and decreasing slope for both regular and non-regular workers in most years.[15][16] The values of the estimated coefficients of these terms are stable among the survey years and are close between the employment statuses. That is, external experience (general human capital) is reflected in the wage increases equally among both regular and non-regular workers. This result suggests that firms offer non-regular jobs that require general skills, and that opportunities exist for non-regular workers to accumulate such human capital.

The differences in the slopes of wage-tenure profiles between men and women cannot be observed for regular and non-regular workers in most years. The estimated coefficients of the female dummy are also not significant in most cases. Therefore, we find little evidence on wage disparities regarding tenure between the genders. As for regular workers' wage-experience profiles, female workers' profiles lie below male workers' profiles since the estimated coefficients of the cross-terms between the female dummy and either external experience or its square are significantly negative in most years. This feature is not found in non-regular workers' wage-experience profiles.

We draw wage profiles in two dimensions: tenure and external experience. Figure 1 indicates the two wage profiles by using the estimates for male workers in each survey year. (The profiles can also be applied to female workers except for the regular workers' wage-experience profiles.) Wage profiles of regular employees have been quite stable for over 10 years since the early 2000s. Tenure length raises wages more than external experience does. If a worker continues to work under the same employer for 30 years, his or her wage rate increases up to about 2.5 to 2.7 times as large as that at the beginning (the log difference in the wage rates between 0 and 30 years' tenure is around 0.9). If a worker has a 30-year work experience in the labor market, his or her wage rate becomes about 1.6 to 1.7 times as large as that at the beginning (the log difference in the wage rates between 0 and 30 years' tenure is around 0.5).[17] For non-regular workers, Figure 1 shows that the wage-tenure profiles are unstable, although not statistically significant. However, the wage-experience profiles are stable among years and the profiles almost

[14] An exception is the estimates of the wage function in 2010 where the coefficient of the tenure is significantly negative, and that of its square is significantly positive, both at the 5% levels.

[15] In non-regular workers' wage functions, the significance levels of the estimated coefficients of squared external experience are around 10%.

[16] Exceptions are non-regular workers' wage functions in 2010 and 2012. The estimated coefficients of the years of external experience and their squares in the former are both insignificant. That of the squared years of experience in the latter is insignificant with large p-values.

[17] For female regular workers, increases in wage rates owing to external experience are smaller than those for male regular workers, as suggested by the estimated coefficients of cross-terms between the female dummy and years of external experience or their squares.

coincide with the regular workers' wage-experience profiles.

Regarding the effects of the firm size and educational background, the regular and non-regular wage functions also show sharp contrasts. These factors increase the wages of regular workers only. Large-sized firms pay more wages than small- or medium-sized firms do. Overall, the wage rates in firms with more than 299 employees are 10–30% higher than those in firms with less than 20 employees. Workers with a university degree or higher receive wage rates 30–50% higher than the junior high school graduates. In addition, good junior high school records increase the wage rates. However, there is no influence of such firm-size or educational factors in non-regular wages.

Let us turn to the switching equation (3), shown in Panel (3). The estimated coefficients of tenure length are significant at the 1% level with positive signs, and the estimated values are rather stable over the survey years. This result implies that a worker with a long tenure has a high probability of being a regular employee, $\Pr(I_i = 1)$. It might simply imply that the employment status is fixed at the beginning of the current employment and that a regular worker changes jobs less frequently. However, the estimated coefficients of the squares of the tenure length are negative and significant at the 1% level. That is, the marginal effect of tenure on the probability is diminishing, although the coefficients of square terms are not so large relative to those of tenure length. This property may suggest that non-regular workers have chances of switching to regular positions within the same firm during the early years of their employment, and the chances diminish after a certain tenure length. In addition, this tendency might be weakened for women as suggested by the estimated coefficients of the cross-term of tenure and female dummy, which are negative in all survey years and significant at the 1% or 5% level in most years.

On the contrary, external experience tends to reduce the possibility of obtaining a regular job. That is, either the estimated coefficient of years of external experience or their squares show a significantly negative sign at the 5% level in most years. This negative external-experience effect possibly reflects the disadvantage of increasing age, which dominates the human capital effect.[18] This effect may appear more strongly for females, as the estimated coefficients of the cross-terms between the female dummy and years of external experience are significantly negative at the 1% level. The pace of increase in the negative effect of years of external experience along with age become moderate for females, as indicated by the significant positive sign of the estimated coefficients of their squares.[19]

[18]The current age is not included in the explanatory variables since years of tenure, external experience, and age are almost collinear.

[19]Related to these points, the estimated coefficients of female dummies are consistently positive across the survey years, although the estimates are not always significant. However, note that the significantly positive coefficient of that variable itself does not necessarily mean that women have a higher probability of regular employment, as it represents only a constant wage gap between male and female workers. In our formulation of the switching equation, the differences in I^* in (3) between the genders should be evaluated with the cross-terms with tenure, external experience, and their square terms as well as the female-dummy term. To assess the difference between men's and women's probabilities of being regular employees, we calculate the predicted explained variable I_i^* in the switching equation (3) for various

The effects of firm size on the regular-employment probability change their tendencies after 2008. Until 2008, workers in large-sized firms generally have greater opportunities for regular employment. However, this tendency is observed to disappear after 2008. There is no clear relation between the possibilities of regular employment and firm sizes, and in some cases, the possibilities of regular employment are lower in large-sized firms. For example, the estimated coefficients of firm-size dummies for both the smallest and largest categories show significantly negative signs at the 1% level in the 2012 or 2014 survey. An educational background affects the determination of employment status throughout the survey years. It is more possible for workers with a university or higher degree to work in a regular employment status.

The probability of regular employment increases for married male workers and reduces for married female workers. The reverse signs of marital status dummies seem plausible in Japan since a sizable proportion of married women are homemakers, and are not the primary providers of household income even when they work. The unemployment rates at the time of entry into the labor market show significant negative effects in several years. That is, a worker can have a regular position more easily at present if the labor market conditions during his or her time of graduation are better. This represents "cohort effects," which means that the temporary business-cycle conditions at a worker's time of entry into the labor market have a long-lasting influence on his or her lifetime working conditions, such as earnings and employment stability. This finding is consistent with Teruyama and Toda's (2017) results. They find the existence of cohort effects by using the WPS of 2012 and 2014, although they conclude that cohort effects are not so influential quantitatively.[20]

The bottom of Table 1 shows the estimated correlation coefficients between the disturbances of the switching equation (u_i) and each wage function (u_{ji}). The correlation coefficients are denoted by $\rho_j; j = 1, 2$, where the number 1 (2) corresponds to the wage function of regular (non-regular) workers. The estimates of both ρ_1 and ρ_2 are negative and the t-values show that they are significant at the 5% level in each survey year. If we consider that the disturbances in the wage functions represent workers' abilities, then the negative correlations might be interpreted as that a worker who has the ability to earn more wages in both regular and non-regular jobs is more likely to take up the latter, *ceteris paribus*. However, it seems implausible to consider that a more able worker

combinations of years of tenure and external experience with the corresponding estimated coefficients (including the female-dummy coefficient) omitting other variables' effects. As a result, we find that the probability of regular work for men dominates that for women in most of the realistic combinations of years of tenure and external experience. (Here, "realistic" means that the tenure length is not so long for non-regular workers.)

[20]We cannot determine the reason for the significant and positive estimated coefficient of the unemployment rate at entry in the 2010 survey. As we have seen, the estimation results for the 2010 survey show several different characteristics from those in other survey years, and are overall contrary to the intuition. The results for 2010 might reflect the "unusual" adjustment process of non-regular employment in response to the global financial crisis, although we cannot point out a concrete reason for the difference in each estimate by simply relating to the unusual employment adjustment. See Hijzen et al. (2015) for the employment adjustments in Japan during the global financial crisis.

selects a low-paying job more often either voluntarily or involuntarily. Therefore, we should consider another possibility. One is that the disturbances in the wage functions might reflect the unobserved characteristics of a subdivided labor market (such as area, occupation, or industry type) to which a worker belongs. If the non-regular labor market is more competitive than the regular labor market since the latter is rationed, workers in the former will be more sensitive to the wage levels. Consequently, a subdivided market that pays more wages to its workers for reasons, such as higher productivity or greater demand, could expand the opportunities for non-regular jobs whose wage levels exceed the individuals' reservation levels, and attract more workers. For the workers belonging to such a market, the probability of working in non-regular jobs will be higher.

5 Discussion

This section compares our results with previous related studies. Ishikawa and Dejima's (1994) work is closely related to our study. They estimate the wage functions in segmented labor markets in the 1980s. They use micro data from the Basic Survey on Wage Structure (BSWS) conducted by the Ministry of Health, Labour and Welfare in 1980 and 1990. Before the 1990s, the share of non-regular workers was small and the dualism in the Japanese labor market was mainly attributed to differences in firm size. That is, large-sized firms formed the primary market and small-sized firms formed the secondary market. However, Ishikawa and Dejima do not regard firm size as the only factor for market segmentation. They do not specify in advance a factor causing the market duality. Instead, following Dickens and Lang (1985), they adopt a switching regression model that defines the sectors in the estimation process. Their results confirm the coexistence of different types of wage functions. Educational background, age, and firm size are identified as major factors for dividing workers into different sectors.

A switching regression model adopted in our study specifies the ex-ante factor to classify workers. This is because we consider that employment status is evidently the most critical factor to polarize the current Japanese labor market, where the share of non-regular employees is increasing markedly. That is, we are interested in the dual structure formed by expanding the non-regular status of employment, a labor market situation distinct from that before the 1990s.[21] Nevertheless, the estimated wage functions in our study reveal some similarities to those by Ishikawa and Dejima. First, we find the existence of distinct wage functions between the two sectors. Second, wage-tenure profiles have steeper slopes than wage-experience profiles in the primary sector do (regular employment sector in our study). Third, the so-called "firm-size premium" and "educational-background premium" are found in the wage functions of the primary sector. That is, the properties of the primary-sector wage functions are similar between these two studies despite the divergences in the estimation periods and data sources.

[21] Indeed, part-time workers are dropped from the sample in Ishikawa and Dejima's (1994) estimation, and they report that there is no large difference in their results by this treatment.

Conversely, our results display contrasting properties to Ishikawa-Dejima's regarding the secondary-sector wage functions. In Ishikawa-Dejima's secondary-sector wage function, positive slopes of both the wage-tenure and wage-experience profiles are observed, although these slopes are much flatter than those in the primary-sector wage function. However, in our estimation, no stable relation is found between the wage rate and tenure for non-regular workers, although we find positive slopes of wage-experience profiles in the non-regular wage functions, as did Ishikawa and Dejima. A contrasting finding in our results is that the slopes of non-regular workers' wage-experience profiles are close to those of (male) regular workers' wage-experience profiles. Furthermore, we could not find clear evidence on both the firm-size and the educational-background premiums in non-regular wages, in contrast to Ishikawa-Dejima's finding of these premiums in the secondary sector (with smaller values than those in the primary sector).

The above comparison reveals the possibility of transfiguration of the dual structure after the 1990s along with the marked expansion of the non-regular employment sector. Based on their findings that the wage rate in the secondary sector increases moderately both with tenure and experience, Ishikawa and Dejima (1994) demonstrate that the secondary sector they detect may correspond to a set of the lower-tier of primary sector and the proper secondary sector in the sense of Piore.[22] However, the modern secondary sector found in our study is closer to the more traditional notion of the dual labor market. To explain the different characteristics of the duality between the periods examined by Ishikawa and Dejima and by us, it seems plausible to consider that the segmented labor market comprises more than two sectors, and that the relative sizes of the sectors are changing by reacting to the economic circumstances. In such a situation, the characteristics of two major sectors are detected if the exact two sectors are assumed in a switching regression model. For further investigation, it might be useful to extend the switching regression model to allow more than two sectors, as Ishikawa and Dejima suggest.[23]

Regarding the differentials between the genders, Ishikawa and Dejima (1994) find that female workers' tenure and external experience are less valued in wage determination. However, we find no such evidence except for regular workers' wage-external profiles. Rather, in our estimation, female workers have disadvantages in the possibility of obtaining regular jobs, which worsens with tenure and external experience.

Another related study is by Yanagida and Miyoshi (2006). They estimate the wage functions of regular and non-regular employees separately by using micro data from a panel survey conducted by Keio University (Keio Household Panel Survey). Their

[22]For the lower-tier primary sector, see, for example, Piore (1975).

[23]Genda (2008) finds a positive relation between annual revenue and tenure length among non-regular workers even in the 2000s by using data from an originally conducted web survey in 2008, and also from the Employment Status Survey (Statistics Bureau, Ministry of Internal Affairs and Communications) in 2002. The above discussion suggests that the discrepancy in his finding as compared to ours might arise from the difference in the composition of the types of non-regular workers in the samples. That is, the properties of the wage function might differ among the types of non-regular workers, such as part-time, dispatched, temporary workers, and so on.

estimation period is the mid-2000s (i.e., 2004 and 2005). They show that the wage rates of non-regular workers do not reflect the tenure and the (total) labor market experience, and that the wage rates of regular workers grow with tenure and regular employment experience. Their results on the wage-tenure profiles are similar to ours. Their interesting findings pertain to the effects of past experiences, which this study does not examine. They report that only experience in regular work increases the wages of regular workers. This suggests the lack of opportunity of general human capital accumulation in non-regular jobs. Note that this implication contradicts our results, which observe a significant positive evaluation of external experience in non-regular workers' wages. On the contrary, Genda (2008) finds that past work experiences in non-regular and regular jobs have significant positive effects on the annual income of non-regular workers. His finding seems consistent with ours. To summarize, the effects of past work experiences on non-regular (secondary-sector) wages have been differently defined and estimated in the literature. Thus, it is fair to say that we have not yet obtained conclusive evidence on the influence of past experiences on the wage determination of non-regular workers.

Next, let us consider the transition of the slope of wage profiles in the regular (or primary) sector. Hamaaki et al. (2012) estimate age-wage profiles of "lifetime" employees. These are the workers hired immediately upon graduation and have been working for the same employer ever since. Thus, the implication of ages on wages for lifetime employees corresponds to that of tenure. They use micro data from the BSWS, which is the same data source used by Ishikawa and Dejima, for the period from 1989 to 2008. They show a clear result that a flattening of the profile (especially in later career stages) gradually progresses in the 1990s. On the other hand, we do not find the evidence for the continuation of the flattening of wage-tenure profiles between the 2000s and the former half of the 2010s. More precisely, Figure 1 shows that wage-tenure profiles in 2002 and 2004 might be slightly steeper than those after 2006. However, the gaps among the slopes of wage-tenure profiles from 2006 to 2014 are rather small. This comparison suggests that the flattening of wage-tenure profiles had progressed until the middle of the 2000s, and then stabilized.[24][25]

[24]The estimated coefficient of tenure (the square of tenure) in the primary-sector wage equation in the 1980s by Ishikawa and Dejima (1994) is 0.0768 (-0.000698). Our corresponding estimates for the regular employment sector from 2002 to 2014 are between 0.0401 and 0.05402 (-0.000667 and -0.000368). This comparison supports the assertion that a flattening of the wage-tenure profiles of regular workers was progressing in the 1990s although the data sources and methods are different between these studies.

[25]Yamada and Kawaguchi (2015) estimate male full-time workers' wage-tenure profile by quantiles in some years between the 1990s to the 2000s by using the BSWS. The tendency to decrease found in their estimated slopes of wage-tenure profiles is not as evident as that in Hamaaki et al. (2012). Interestingly, they show that wage-experience profiles had been clearly flattened, which we do not find in our estimation. To discuss the reason for the difference is beyond the scope of this study.

6 Concluding Remarks

In this study, we examine the existence of the dual structure of wage formation in the current labor market in Japan regarding regular and non-regular employment status as a determinant of the sector. By using data from a series of surveys conducted in the Tokyo metropolitan area during 2002–2014, we estimate an endogenous switching regression model where two sectoral wage functions and a sector switching equation are estimated simultaneously. In particular, we focus on the patterns of wage-tenure and wage-experience profiles between employment statuses across years.

The results are close to the dual labor market view. Several properties of wage determination in the dual structure are revealed. The regular workers' wages increase with years of tenure and external experience and the former shows larger effects. In contrast, non-regular workers' wages increase only with external experience. The size of wage increase due to experience for non-regular workers is found to be almost similar to that for male regular workers. Moreover, the slopes of regular workers' wage-tenure profiles are stable over more than 10 years since the early 2000s. In addition, the firm-size and the educational-background premiums exist only in the wages of regular employees.

The length of the tenure, firm size, and educational level are the determinants of employment status. Among them, the effects of firm size have recently changed their pattern and do not show a monotonic relation with the probability of regular employment. There is little difference in the effects of tenure on the wages between male and female workers. Rather, wage differentials between the genders arise from the differences in the probability of obtaining a regular job, where weaker effects of tenure and external experience on the probability are found for female workers.

An essential property of the dual labor market is the rationing of primary jobs. This property implies that labor mobility between the primary and secondary sectors is involuntarily inactive. Following Dickens and Lang (1985), Ishikawa and Dejima (1994) examined the rationing of the primary jobs by testing coefficient restrictions induced by the voluntary choice condition in the model and obtained evidence in support of rationing. Our study does not pursue that direction, since the test seems to depend on restrictive assumptions on the structure of individual workers' decision making. Instead, we examine the persistency of employment status by controlling for individual attributes and preferences in a companion paper, where we find the evidence for the involuntary nature of non-regular employment (see Teruyama and Toda, 2017).

Finally, some issues remain for future research. Note that there is a long history of debates on the possibility of endogeneity of tenure length in the wage equations.[26] In addition, the form of switching equation depends on the idea of static decision making on

[26]See, for example, Abraham and Faber (1987), Altonji and Shakotko (1987), Topel (1991), and Buchinsky et al. (2010). See also Toda (2008) for wage profiles in Japan. In the literature, endogeneity is considered to be caused by unobservable individual workers' abilities or quality of job match. However, our results suggest the necessity to consider the heterogeneity in the demand side of labor, as mentioned in Section 4.

the employment status and may be inadequate to capture a realistic dynamic decision. A critical difference between our switching equation and that induced by the individual dynamic maximization is the existence of the state dependence, that is, the previous period's employment status in explanatory variables, which again increases the possibility of an endogeneity problem. Extending the model by accounting for a dynamic structure of forward-looking decision making and individual heterogeneity, and estimating it by using a panel data is a promising direction for future research.[27] Finally, the sample of respondents in the WPS is restricted to workers in the Tokyo metropolitan area, which might introduce bias into the results. It would be desirable to extend this study to use a sample that covers all areas in Japan.

[27]Buchinsky et al. (2010) and Fernández-Kranz et al. (2015) are examples of this line of research.

Table 1: Results of Endogenous Switching Regression Models for Regular and Non-regular Wage Determination

	Panel (1): Regular workers						
	2014 survey	2012 survey	2010 survey	2008 survey	2006 survey	2004 survey	2002 survey
Tenure	.04780	.04421	.04459	.04343	.0401	.05402	.04821
	(18.19) [0.000]	(15.69) [0.000]	(16.26) [0.000]	(18.00) [0.000]	(13.63) [0.000]	(19.68) [0.000]	(26.48) [0.000]
Tenure^2	-.000540	-.000462	-.00049	-.000454	-.000368	-.000667	-.000497
	(-7.65) [0.000]	(-5.84) [0.000]	(-6.56) [0.000]	(-7.22) [0.000]	(-5.23) [0.000]	(-9.07) [0.000]	(-10.56) [0.000]
External experience	.02913	.02419	.02714	.02503	.02975	.02916	.02654
	(10.55) [0.000]	(8.20) [0.000]	(9.34) [0.000]	(9.94) [0.000]	(11.09) [0.000]	(10.42) [0.000]	(12.96) [0.000]
External experience^2	-.000396	-.000222	-.000309	-.000276	-.000492	-.000365	-.000276
	(-3.79) [0.000]	(-1.80) [0.072]	(-3.00) [0.003]	(-2.95) [0.003]	(-5.08) [0.000]	(-3.51) [0.000]	(-3.57) [0.000]
Women ×Tenure	-.01646	-.003902	-.009892	.005349	.002939	.000525	-.000299
	(-3.22) [0.001]	(-0.78) [0.434]	(-1.88) [0.060]	(1.02) [0.306]	(0.58) [0.562]	(0.08) [0.937]	(-0.07) [0.944]
Women ×Tenure^2	.000312	-.00004	.00012	-.000319	-.000229	-.000138	-.000031
	(1.94) [0.052]	(-0.27) [0.787]	(0.72) [0.469]	(-1.93) [0.054]	(-1.54) [0.125]	(-0.56) [0.572]	(-0.19) [0.850]
Women ×External experience	.003407	.00891	-.001047	-.01754	-.02333	-.01629	-.01354
	(0.70) [0.482]	(1.68) [0.092]	(-0.21) [0.830]	(-3.90) [0.000]	(-4.82) [0.000]	(-2.71) [0.007]	(-3.47) [0.001]
Women ×External experience^2	-.000382	-.000540	-.000262	.000123	.000341	.000197	-.000044
	(-2.22) [0.027]	(-2.63) [0.008]	(-1.58) [0.114]	(0.79) [0.427]	(2.14) [0.032]	(0.88) [0.381]	(-0.28) [0.779]
Firm size (Number of employees)							
–4	-.1247	-.0865	-.1137	-.07845	-.05246	.009577	.01086
	(-2.22) [0.020]	(-1.88) [0.060]	(-2.15) [0.031]	(-1.87) [0.062]	(-1.29) [0.196]	(0.21) [0.836]	(0.35) [0.730]
10–19	.06482	.03416	-.001871	-.0429	.04093	.1645	-.02861
	(1.65) [0.099]	(0.90) [0.366]	(-0.05) [0.963]	(-1.43) [0.152]	(1.39) [0.165]	(4.54) [0.000]	(-1.22) [0.221]
20–29	.1346	.05265	.03283	.000453	.06109	.1274	.000306
	(3.18) [0.001]	(1.34) [0.180]	(0.82) [0.412]	(0.01) [0.990]	(1.70) [0.090]	(3.35) [0.001]	(0.01) [0.991]
30–49	.09263	.1070	.01533	.02242	.08987	.1387	.03451
	(2.51) [0.012]	(2.72) [0.007]	(0.41) [0.685]	(0.71) [0.481]	(3.03) [0.002]	(3.80) [0.000]	(1.50) [0.134]
50–99	.1260	.08875	.04131	.009685	.1231	.1439	.06419
	(3.49) [0.000]	(2.49) [0.013]	(1.11) [0.265]	(0.32) [0.753]	(4.00) [0.000]	(4.28) [0.000]	(2.80) [0.005]
100-299	.1514	.1283	.05146	.06284	.1146	.1731	.06015
	(4.57) [0.000]	(3.88) [0.000]	(1.59) [0.112]	(2.23) [0.025]	(4.18) [0.000]	(5.40) [0.000]	(2.85) [0.004]
300–499	.1986	.1921	.1208	.09476	.1481	.1631	.09129
	(5.55) [0.000]	(5.05) [0.000]	(3.20) [0.001]	(3.09) [0.002]	(4.67) [0.000]	(4.09) [0.000]	(3.68) [0.000]
500–999	.226	.2232	.1165	.1251	.1254	.2063	.1228

	(6.52) [0.000]	(6.20) [0.000]	(3.22) [0.001]	(3.83) [0.000]	(3.57) [0.000]	(5.70) [0.000]	(5.31) [0.000]
1000–1999	.2463	.2901	.1891	.1574	.1846	.2448	.1265
	(6.92) [0.000]	(7.28) [0.000]	(5.05) [0.000]	(4.73) [0.000]	(6.10) [0.000]	(6.63) [0.000]	(5.61) [0.000]
2000–4999	.2534	.2671	.1396	.1466	.2261	.2393	.172
	(6.82) [0.000]	(7.32) [0.000]	(3.92) [0.000]	(4.41) [0.000]	(7.34) [0.000]	(6.47) [0.000]	(7.42) [0.000]
5000–	.3058	.3111	.2960	.1930	.2780	.3351	.2016
	(9.21) [0.000]	(9.13) [0.000]	(8.94) [0.000]	(6.59) [0.000]	(9.47) [0.000]	(9.77) [0.000]	(9.54) [0.000]
Public agencies	.2767	.2526	.2561	.2329	.3068	.3778	.2311
	(7.66) [0.000]	(7.09) [0.000]	(6.66) [0.000]	(7.43) [0.000]	(9.63) [0.000]	(10.23) [0.000]	(10.43) [0.000]
Junior high school record							
Upper	.1897	.1843					
	(4.81) [0.000]	(5.37) [0.000]					
Upper middle	.1227	.122					
	(3.12) [0.002]	(3.53) [0.000]					
Middle	.1216	.1133					
	(3.06) [0.002]	(3.28) [0.001]					
Lower middle	.1193	.1012					
	(2.79) [0.005]	(2.55) [0.011]					
Educational background							
High school	.2146	.04465	.06584	.1565	.1117	.1251	.1435
	(1.61) [0.108]	(0.34) [0.733]	(0.61) [0.540]	(4.31) [0.000]	(3.48) [0.001]	(3.61) [0.000]	(5.44) [0.000]
Vocational school	.2896	.1320	.1546	.2131	.1357	.1948	.219
	(2.16) [0.031]	(1.01) [0.312]	(1.43) [0.153]	(5.59) [0.000]	(3.96) [0.000]	(5.18) [0.000]	(7.72) [0.000]
Junior college	.2713	.1714	.1452	.2055	.2039	.2001	.2457
	(2.01) [0.045]	(1.29) [0.198]	(1.32) [0.186]	(4.47) [0.000]	(4.90) [0.000]	(4.51) [0.000]	(7.94) [0.000]
Technical college	.3428	.1580	.1828	.1714	.2697	.2414	.2292
	(2.47) [0.014]	(1.16) [0.245]	(1.59) [0.113]	(3.38) [0.001]	(5.71) [0.000]	(4.80) [0.000]	(6.00) [0.000]
University	.4057	.2293	.3036	.3658	.3442	.3256	.3663
	(3.05) [0.002]	(1.77) [0.077]	(2.84) [0.005]	(9.93) [0.000]	(10.35) [0.000]	(9.02) [0.000]	(13.60) [0.000]
Graduate school	.5687	.4089	.422	.5088	.5097	.5392	.5218
	(4.25) [0.000]	(3.12) [0.002]	(3.86) [0.000]	(9.67) [0.000]	(9.92) [0.000]	(10.65) [0.000]	(14.48) [0.000]
Women	.04425	-.09493	-.03151	-.05614	-.04062	-.06815	-.1103
	(1.20) [0.229]	(-2.63) [0.008]	(-0.78) [0.435]	(-1.58) [0.115]	(-1.15) [0.250]	(-1.76) [0.078]	(-4.15) [0.000]
Constant	-2.766	-2.52	-2.348	-2.479	-2.494	-2.64	-2.458
	(-19.53) [0.000]	(-17.40) [0.000]	(-20.54) [0.000]	(-53.27) [0.000]	(-46.85) [0.000]	(-55.75) [0.000]	(-72.59) [0.000]

	Panel (2): Non-regular workers						
	2014 survey	2012 survey	2010 survey	2008 survey	2006 survey	2004 survey	2002 survey
Tenure	-.01592	.01025	-.04269	-.001857	.001602	.01567	-.02108
	(-0.89) [0.374]	(0.64) [0.525]	(-2.09) [0.037]	(-0.09) [0.926]	(0.10) [0.923]	(0.42) [0.674]	(-0.69) [0.492]
Tenure^2	.000165	-.000629	.001171	.000183	.000254	-.001176	.000502
	(0.34) [0.737]	(-1.15) [0.249]	(2.10) [0.036]	(0.34) [0.734]	(0.65) [0.517]	(-1.02) [0.308]	(0.76) [0.447]
External experience	.02727	.02007	.003715	.0265	.03047	.03616	.0324
	(3.37) [0.001]	(3.07) [0.002]	(0.44) [0.659]	(3.73) [0.000]	(3.49) [0.000]	(2.96) [0.003]	(4.25) [0.000]
External experience^2	-.000404	-.000172	.000322	-.000355	-.000408	-.00079	-.000424
	(-1.62) [0.106]	(-0.85) [0.397]	(1.32) [0.188]	(-1.65) [0.099]	(-1.61) [0.108]	(-2.18) [0.029]	(-1.69) [0.090]
Women ×Tenure	.02077	-.008340	.03565	-.000187	.007512	.007785	-.01398
	(1.30) [0.193]	(-0.57) [0.565]	(2.10) [0.036]	(-0.01) [0.992]	(0.48) [0.631]	(0.20) [0.839]	(-0.66) [0.510]
Women ×Tenure^2	-.000515	.000617	-.000994	-.00039	-.000619	-.001016	.000605
	(-0.79) [0.430]	(0.99) [0.321]	(-1.67) [0.095]	(-0.59) [0.552]	(-1.13) [0.258]	(-0.64) [0.523]	(0.80) [0.426]
Women ×External experience	.01032	.01601	.02935	-.005588	-.01297	-.02232	.007853
	(0.87) [0.382]	(1.30) [0.192]	(2.06) [0.039]	(-0.46) [0.644]	(-0.86) [0.391]	(-0.89) [0.374]	(0.33) [0.738]
Women ×External experience^2	-.000359	-.000571	-.000940	0.000000	.000187	.000761	-.000145
	(-1.10) [0.271]	(-1.73) [0.084]	(-2.59) [0.010]	(0.02) [0.987]	(0.51) [0.611]	(1.32) [0.188]	(-0.29) [0.773]
Firm size (Number of employees)							
–4	.2776	.000428	.002529	-.02736	-.07561	-.06662	.04627
	(3.15) [0.002]	(0.01) [0.995]	(0.03) [0.974]	(-0.45) [0.650]	(-1.28) [0.200]	(-0.76) [0.448]	(0.68) [0.497]
10–19	.1320	-.1276	-.01665	-.025	-.05237	.02656	.005979
	(1.91) [0.057]	(-2.12) [0.034]	(-0.28) [0.780]	(-0.53) [0.599]	(-1.05) [0.293]	(0.35) [0.727]	(0.10) [0.916]
20–29	.02386	-.0515	.01401	-.05155	-.05238	.000341	.06288
	(0.32) [0.752]	(-0.80) [0.430]	(0.20) [0.840]	(-0.94) [0.346]	(-0.85) [0.396]	(0.00) [0.997]	(0.87) [0.385]
30–49	.04729	-.1146	.02462	-.009267	-.0179	-.03312	.01865
	(0.72) [0.471]	(-1.94) [0.052]	(0.38) [0.704]	(-0.17) [0.865]	(-0.32) [0.748]	(-0.40) [0.692]	(0.33) [0.744]
50–99	-.06047	-.09561	-.007303	.01416	-.1117	-.009995	.003721
	(-1.02) [0.307]	(-1.68) [0.094]	(-0.12) [0.903]	(0.28) [0.778]	(-1.91) [0.056]	(-0.12) [0.901]	(0.06) [0.956]
100-299	.01345	.01143	.1081	.04011	-.06787	-.01427	-.08507
	(0.24) [0.810]	(0.21) [0.836]	(1.96) [0.050]	(0.74) [0.459]	(-1.16) [0.246]	(-0.18) [0.860]	(-1.13) [0.259]
300–499	.08890	-.03311	-.02354	-.05709	-.1329	.1141	.03829
	(1.21) [0.228]	(-0.57) [0.568]	(-0.34) [0.731]	(-0.69) [0.487]	(-1.31) [0.189]	(1.07) [0.286]	(0.40) [0.688]
500–999	.03602	-.07199	.01515	-.03153	-.09849	-.003093	-.01727
	(0.56) [0.578]	(-1.13) [0.259]	(0.24) ([0.807]	(-0.40) [0.688]	(-1.16) [0.248]	(-0.03) [0.977]	(-0.19) [0.850]

1000–1999	.07531	.03295	.06664	.02871	-.05744	.000772	.03444
	(1.21) [0.228]	(0.51) [0.609]	(0.94) [0.346]	(0.44) [0.663]	(-0.63) [0.530]	(0.01) [0.994]	(0.37) [0.711]
2000–4999	.0677	.01368	.06805	.07595	-.1478	.04308	-.004315
	(1.01) [0.315]	(0.23) [0.821]	(1.01) [0.311]	(0.93) [0.352]	(-2.01) [0.044]	(0.38) [0.702]	(-0.04) [0.969]
5000–	.1333	.07837	.07634	.005979	-.0264	.08388	.05289
	(2.23) [0.026]	(1.36) [0.174]	(1.26) [0.206]	(0.08) [0.939]	(-0.35) [0.726]	(0.91) [0.363]	(0.52) [0.602]
Public agencies	.02110	-.1669	-.0254	-.2656	-.1631	-.07181	-.1263
	(0.26) [0.793]	(-2.04) [0.041]	(-0.32) [0.746]	(-2.24) [0.025]	(-1.66) [0.098]	(-0.46) [0.647]	(-0.70) [0.483]
Junior high school record							
Upper	-.04615	.06579					
	(-0.67) [0.504]	(1.16) [0.247]					
Upper middle	-.07369	-.00499					
	(-1.10) [0.270]	(-0.06) [0.950]					
Middle	-.05604	.01290					
	(-0.86) [0.390]	(0.25) [0.805]					
Lower middle	-.007678	.02144					
	(-0.12) [0.905]	(0.36) [0.719]					
Educational background							
High school	-.09624	-.1958	-.2268	-.03825	-.01235	.0765	.1102
	(-0.96) [0.340]	(-1.84) [0.066]	(-2.10) [0.036]	(-0.79) [0.429]	(-0.24) [0.812]	(0.91) [0.364]	(1.87) [0.062]
Vocational school	-.1227	-.1325	-.2209	-.0305	.02303	.1163	.1124
	(-1.14) [0.254]	(-1.21) [0.228]	(-1.95) [0.051]	(-0.46) [0.644]	(0.34) [0.731]	(1.31) [0.189]	(1.45) [0.148]
Junior college	-.1042	-.1880	-.2207	-.05712	.004633	.1075	.009057
	(-0.96) [0.339]	(-1.70) [0.089]	(-1.90) [0.058]	(-0.95) [0.342]	(0.07) [0.948]	(1.00) [0.316]	(0.10) [0.922]
Technical college	-.1561	-.2868	-.3591	-.0575	.2266	.2544	.027
	(-0.78) [0.473]	(-1.62) [0.106]	(-1.83) [0.067]	(-0.51) [0.610]	(1.54) [0.123]	(1.56) [0.119]	(0.18) [0.857]
University	-.08650	-.1238	-.2185	.006228	.03617	.1137	.07286
	(-0.72) [0.473]	(-1.06) [0.288]	(-1.73) [0.084]	(0.07) [0.943]	(0.45) [0.653]	(1.03) [0.301]	(0.64) [0.524]
Graduate school	.03086	.05036	-.03578	-.09025	.2271	.05857	.3411
	(0.18) [0.860]	(0.33) [0.742]	(-0.19) [0.848]	(-0.17) [0.866]	(0.79) [0.428]	(0.20) [0.841]	(1.57) [0.117]
Women	.02462	.07665	-.08248	-.1038	-.03473	.02986	-.2417
	(0.37) [0.715]	(1.24) [0.215]	(-1.14) [0.253]	(-1.47) [0.140]	(-0.49) [0.623]	(0.21) [0.832]	(-1.98) [0.048]
Constant	-2.828	-2.729	-2.562	-2.706	-2.837	-3.149	-3.124
	(-21.50) [0.000]	(-19.44) [0.000]	(-18.33) [0.000]	(-29.50) [0.000]	(-28.93) [0.000]	(-18.97) [0.000]	(-20.06) [0.000]

	Panel (3): Switching equation						
	2014 survey	2012 survey	2010 survey	2008 survey	2006 survey	2004 survey	2002 survey
Tenure	.1207	.1318	.1675	.1060	.1000	.1315	.1011
	(10.71) [0.000]	(11.28) [0.000]	(15.20) [0.000]	(7.82) [0.000]	(5.76) [0.000]	(6.76) [0.000]	(8.53) [0.000]
Tenure^2	-.002230	-.002295	-.003498	-.002099	-.001876	-.002579	-.002494
	(-6.34) [0.000]	(-6.04) [0.000]	(-11.12) [0.000]	(-5.46) [0.000]	(-4.20) [0.000]	(-5.57) [0.000]	(-10.22) [0.000]
External experience	-.01855	-.004722	.01543	-.00764	-.005687	-.01389	-.04419
	(-1.98) [0.047]	(-0.54) [0.589]	(1.70) [0.089]	(-0.63) [0.529]	(-0.36) [0.720]	(-0.85) [0.393]	(-3.76) [0.000]
External experience^2	-.000317	-.03562	-.00088	-.000646	-.000846	-.000243	.00013
	(-1.00) [0.316]	(-2.50) [0.013]	(-3.49) [0.000]	(-1.97) [0.049]	(-2.27) [0.023]	(-0.59) [0.553]	(0.48) [0.629]
Women ×Tenure	-.01991	-.03584	-.05324	-.04092	-.02931	-.1136	-.02193
	(-1.33) [0.184]	(-2.51) [0.012]	(-3.85) [0.000]	(-2.33) [0.020]	(-1.54) [0.123]	(-4.19) [0.000]	(-1.48) [0.140]
Women ×Tenure^2	.000332	.000714	.001406	.001425	.000574	.004634	.000171
	(0.69) [0.491]	(1.49) [0.136]	(3.30) [0.001]	(2.39) [0.017]	(0.93) [0.353]	(4.06) [0.000]	(0.37) [0.708]
Women ×External experience	-.05618	-.07988	-.07601	-.03627	-.039	-.06376	-.05517
	(-4.96) [0.000]	(-7.47) [0.000]	(-7.20) [0.000]	(-2.57) [0.010]	(-2.63) [0.008]	(-3.59) [0.000]	(-4.59) [0.000]
Women ×External experience^2	.001734	.002547	.002178	.001236	.001184	.001212	.001013
	(4.67) [0.000]	(7.60) [0.000]	(6.76) [0.000]	(2.94) [0.003]	(2.67) [0.008]	(2.25) [0.025]	(2.56) [0.011]
Firm size (Number of employees)							
–4	-.6597	-.2239	-.2105	-.1942	-.1556	.08516	-.1069
	(-6.08) [0.000]	(-2.08) [0.037]	(-1.99) [0.047]	(-1.74) [0.081]	(-1.46) [0.143]	(0.64) [0.525]	(-1.26) [0.209]
10–19	-.3340	-.08251	-.08066	-.07749	.04766	.03836	.03605
	(-3.54) [0.000]	(-0.91) [0.363]	(-0.99) [0.324]	(-0.90) [0.370]	(0.55) [0.582]	(0.35) [0.724]	(0.51) [0.612]
20–29	-.2011	-.2598	-.05826	.1047	.08042	.3011	-.01989
	(-1.94) [0.051]	(-2.65) [0.008]	(-0.63) [0.530]	(1.03) [0.303]	(0.79) [0.427]	(2.44) [0.015]	(-0.24) [0.811]
30–49	-.01457	-.1335	-.01406	.1827	.1485	.2163	.05085
	(-0.16) [0.877]	(-1.39) [0.165]	(-0.17) [0.869]	(1.99) [0.047]	(1.66) [0.098]	(1.89) [0.059]	(0.68) [0.494]
50–99	-.02024	-.02642	-.119	.24	.245	.3509	.1405
	(-0.23) [0.817]	(-0.30) [0.761]	(-1.47) [0.140]	(2.60) [0.009]	(2.65) [0.008]	(2.95) [0.003]	(1.86) [0.063]
100-299	-.05627	-.2447	-.02442	.2264	.3547	.3142	.2195
	(-0.67) [0.500]	(-2.99) [0.003]	(-0.32) [0.747]	(2.57) [0.010]	(4.23) [0.000]	(2.82) [0.005]	(3.04) [0.002]
300–499	-.1014	-.04483	.05968	.2889	.5148	.1853	.2881
	(-1.05) [0.296]	(-0.48) [0.629]	(0.69) [0.491]	(2.37) [0.018]	(4.11) [0.000]	(1.29) [0.197]	(3.16) [0.002]

500–999	.000668	-.1709	-.04184	.3531	.3743	.5609	.2375
	(0.01) [0.994]	(-1.86) [0.063]	(-0.49) [0.626]	(3.05) [0.002]	(3.35) [0.001]	(3.97) [0.000]	(2.62) [0.009]
1000–1999	-.1812	-.2308	-.05489	.2859	.4095	.1736	.2319
	(-1.84) [0.066]	(-2.49) [0.013]	(-0.62) [0.537]	(2.46) [0.014]	(3.39) [0.001]	(1.22) [0.222]	(2.37) [0.018]
2000–4999	-.06885	-.2399	.06596	.4647	.3569	.5283	.2536
	(-0.66) [0.509]	(-2.48) [0.013]	(0.73) [0.468]	(3.75) [0.000]	(3.06) [0.002]	(3.62) [0.000]	(2.52) [0.012]
5000–	-.2532	-.3665	-.111	.4264	.3241	.1679	.3224
	(-2.84) [0.005]	(-4.43) [0.000]	(-1.40) [0.162]	(4.04) [0.000]	(3.10) [0.002]	(1.29) [0.198]	(3.83) [0.000]
Public agencies	.009975	-.07127	.04016	.6084	.3082	.5129	.4686
	(0.09) [0.927]	(-0.67) [0.505]	(0.40) [0.689]	(4.27) [0.000]	(2.03) [0.042]	(2.50) [0.012]	(4.16) [0.000]
Junior high school record							
Upper	.3079	.2025					
	(3.54) [0.000]	(2.27) [0.023]					
Upper middle	.3052	.2131					
	(3.59) [0.000]	(2.42) [0.015]					
Middle	.2798	.1160					
	(3.37) [0.001]	(1.36) [0.174]					
Lower middle	.09467	.000034					
	(1.04) [0.298]	(0.00) [1.000]					
Educational background							
High school	.4232	.3347	.4647	.1723	.245	-.02683	.1322
	(2.39) [0.017]	(1.88) [0.060]	(3.16) [0.002]	(1.72) [0.086]	(2.76) [0.006]	(-0.24) [0.809]	(1.84) [0.066]
Vocational school	.5182	.4026	.6252	.44	.4106	.1069	.2196
	(2.88) [0.004]	(2.23) [0.026]	(4.20) [0.000]	(4.03) [0.000]	(4.11) [0.000]	(0.89) [0.376]	(2.74) [0.006]
Junior college	.5071	.4278	.6352	.3681	.4522	.2127	.331
	(2.77) [0.006]	(2.35) [0.019]	(4.16) [0.000]	(3.14) [0.002]	(4.12) [0.000]	(1.55) [0.122]	(3.68) (0.000]
Technical college	.9918	.7627	1.044	.4573	.1825	-.07129	.1506
	(4.05) [0.000]	(3.00) [0.003]	(5.04) [0.000]	(2.18) [0.029]	(0.90) [0.368]	(-0.32) [0.751]	(1.08) (0.281]
University	.7581	.6623	.8798	.6912	.5464	.4147	.452
	(4.25) [0.000]	(3.71) [0.000]	(6.01) [0.000]	(6.27) [0.000]	(5.46) [0.000]	(3.41) [0.001]	(5.70) (0.000]
Graduate school	.9602	.9878	1.201	1.158	.6535	.9642	.3612
	(4.87) [0.000]	(5.03) [0.000]	(7.12) [0.000]	(4.07) [0.000]	(2.65) [0.008]	(3.10) [0.002]	(2.26) [0.024]
Female	.008616	.1302	.2088	.1589	.1162	.5184	.4838
	(0.11) [0.915]	(1.63) [0.103]	(2.75) [0.006]	(1.57) [0.117]	(1.15) [0.249]	(4.37) [0.000]	(6.45) [0.000]
Constant	-.3604	-.3770	-.9104	-.2977	.1816	.3637	.9893
	(-1.74)[0.081]	(-1.56) [0.120]	(-4.29) [0.000]	(-1.34) [0.180]	(0.63) [0.529]	(1.30) [0.193]	(4.69) [0.000]

Married	.8134	.9278	.7727	.9899	.7528	.73	.5692
	(8.05) [0.000]	(12.35) [0.000]	(10.09) [0.000]	(9.01) [0.000]	(7.03) [0.000]	(5.28) [0.000]	(5.61) [0.000]
Female×Married	-1.252	-1.428	-1.334	-1.455	-1.347	-1.183	-.937
	(-7.90) [0.000]	(-12.50) [0.000]	(-10.99) [0.000]	(-9.44) [0.000]	(-7.91) [0.000]	(-6.68) [0.000]	(-6.01) [0.000]
Unemployment rate at entry	-.04778	.01233	.05353	-.03117	-.1343	-.1305	-.2432
	(-2.33) [0.020]	(0.45) [0.652]	(2.10) [0.036]	(-0.91) [0.364]	(-2.59) [0.010]	(-2.89) [0.004]	(-5.42) [0.000]
r_1	-.1950	-.2428	-.1074	-.1754	-.3248	-.2207	-.1186
	(-4.09) [0.000]	(-4.61) [0.000]	(-4.08) [0.000]	(-2.97) [0.003]	(-2.40) [0.016]	(-2.28) [0.023]	(-3.99) [0.000]
r_2	-1.135	-.8960	-.9851	-1	-1.065	-1.088	-1.294
	(-3.21) [0.001]	(-3.28) [0.001]	(-3.37) [0.001]	(-2.61) [0.009]	(-2.49) [0.013]	(-1.95) [0.051]	(-2.28) [0.022]
ρ_1	-.1925	-.2382	-.1070	-.1736	-.3138	-.2172	-.1180
ρ_2	-.8129	-.7143	-.7553	-.7616	-.7875	-.7961	-.8603
Number of observations	8,463	9,236	9.428	5,435	5,397	4,232	10,376

Notes:
1. Numbers in parentheses are t-values. Numbers in square brackets are p-values.
2. The endogenous switching regression models were estimated by using the `movestay` command in Stata (see Lokshin and Sajaia, 2004).
3. ρ_j, $(j = 1, 2)$ indicates the correlation coefficient between u_{ji} and u_i. The `movestay` command maximizes the likelihood function with respect to the Fisher transformations r_j of ρ_j (and other parameters), not the correlation coefficients ρ_j themselves, and reports r_j's p-values only $(j = 1, 2)$. Since the transformation is monotonic, the significance of ρ_j can be judged from r_j's p-values.

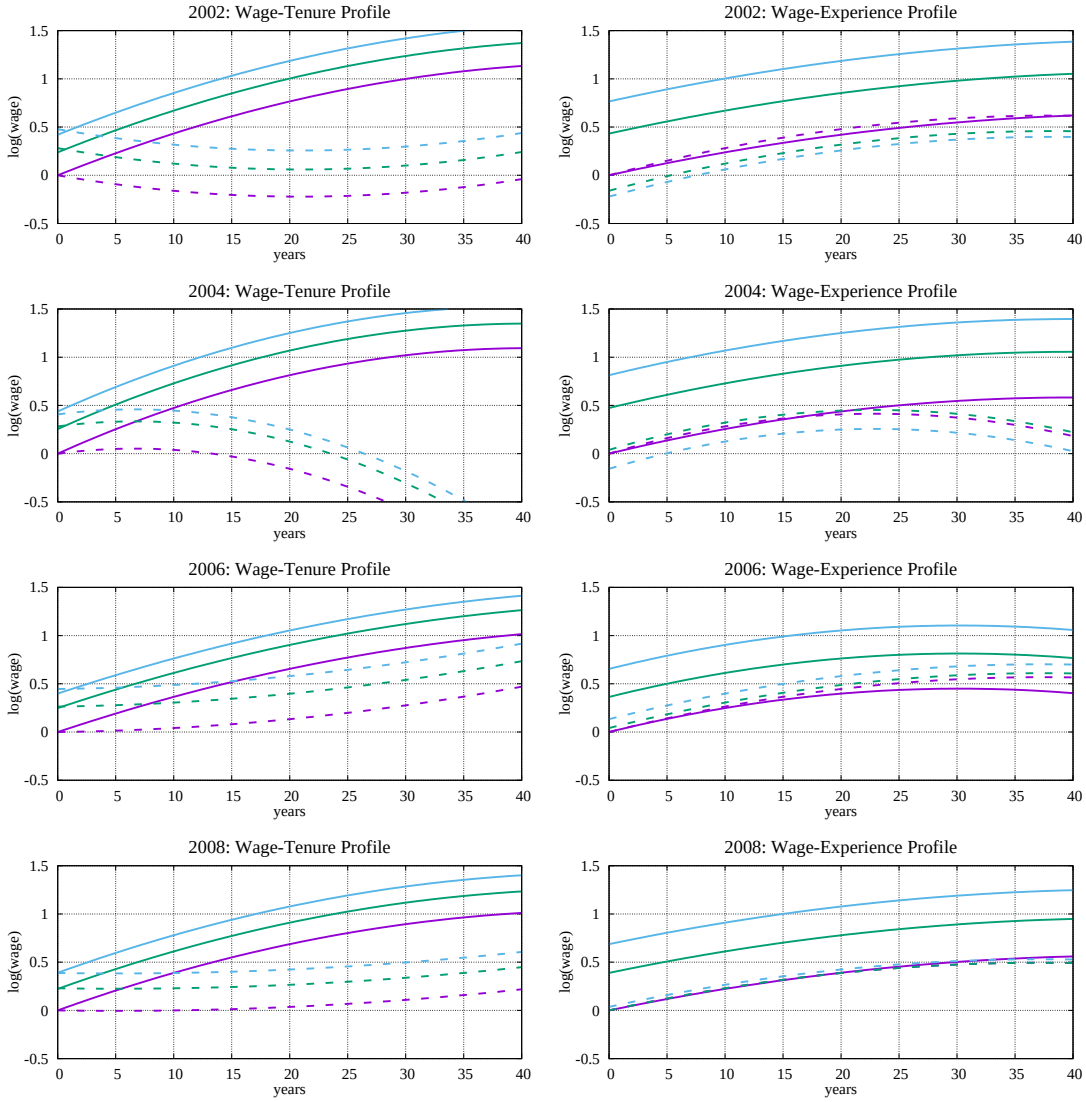

Figure 1: Wage-Tenure and Wage-Experience Profiles of Male Regular and Non-regular Workers

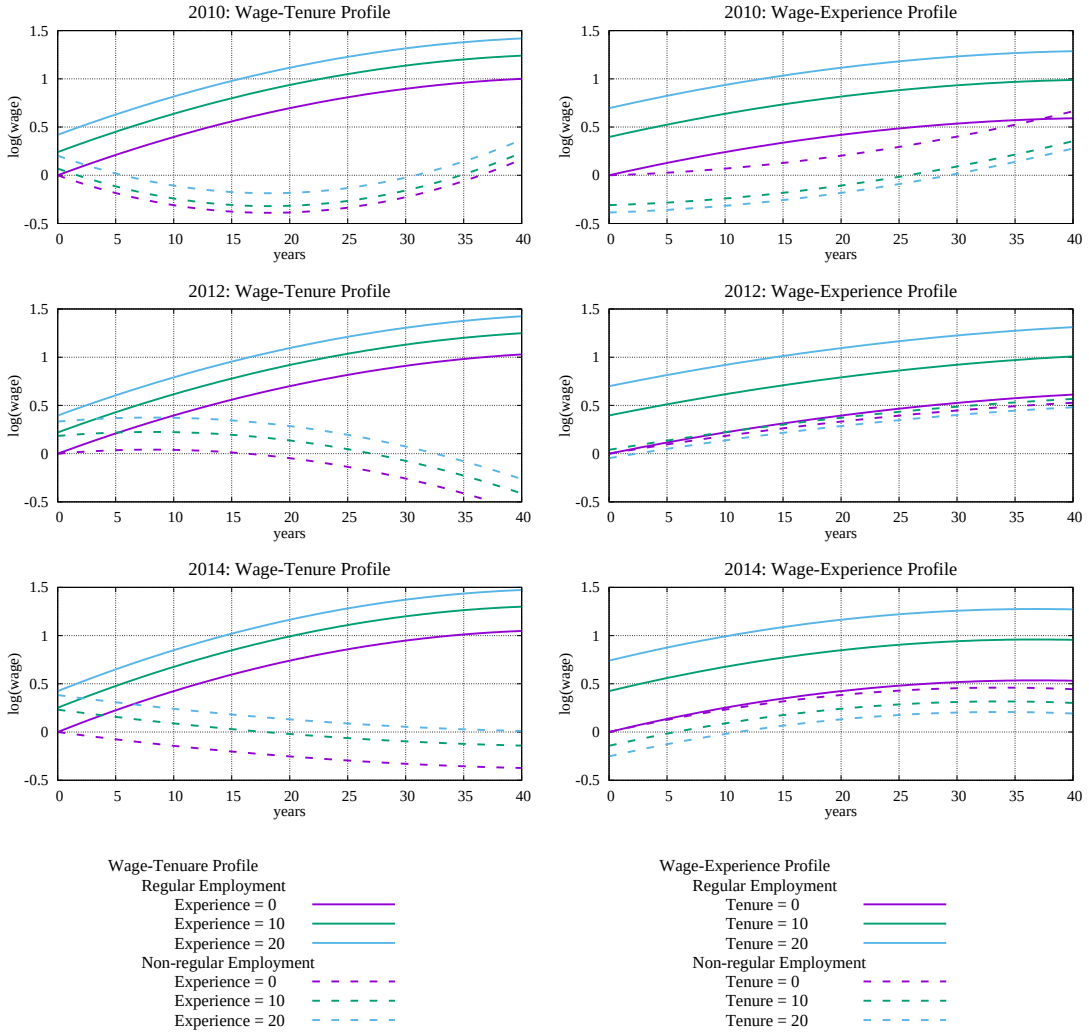

Figure 1 (continued)

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