Recruit Works Institute

Works Discussion Paper Series No.10

日本の二重労働市場における賃金プロファイル

照山 博司・戸田 裕之

RECRUIT

リクルートワークス研究所 http://www.works-i.com/

Works Discussion Paper No.10

日本の二重労働市場における賃金プロファイル

照山博司・戸田裕之

2016 年 4 月

要約

本研究では、日本の賃金形成の二重構造を正規・非正規という 2 部門に関して分析する。首都圏で 2002 年から 2014 年に実施されたサーベイ調査の結果を利用し、両部門の賃金決定および労働者が 2 部門に分かれる仕組みを同時に推定する。推定の結果、以下のような日本の新たな二重労働市場についての事実が示された。正規労働者の賃金は勤続年数と外部労働市場経験年数とともに上昇するが、非正規労働者の賃金は外部労働市場経験年数のみを反映する。この経験年数のもたらす賃金上昇については、女性正規労働者を除くと、正規・非正規の形態間で大きな差はない。また、企業規模や学歴による賃金差は正規雇用労働者の賃金のみに存在する。さらに、正規労働者の賃金-勤続年数プロファイルは、2000 年代初から 10 年以上安定している。

Wage Profiles in the Japanese Dual Labor Market*

Hiroshi Teruyama† and Hiroyuki Toda‡

April, 2016

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 metropolitan area during 2002–2014, sectoral-wage determination and sector-separation mechanism are estimated simultaneously. The estimated results reveal several facts in the new era of the Japanese dual labor market. While the regular workers' wages rise with years of tenure and external experience, only the latter affects non-regular workers' wages. The wage increases owing to experience are of 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 stable over more than 10 years since the early 2000s.

1 Introduction

The share of non-regular employees in Japan continues to increase since the 1990s and it has recently reached more than 30%. It has been argued that this increase induces the dual structure in the Japanese labor market and expands income inequality. Indeed, several studies find the persistence of non-regular employment status, suggesting the polarization in the labor market.[1] Non-regular employees are thought to receive limited 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 regular workers, who benefit from the Japanese seniority-wage system. However, few empirical attempts have thus far been made to examine the differentials of wage profiles between these two employment statuses based on micro data.[2]

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 continue to work for the same employer since their graduation. Then, we are interested in whether the reduction in the slopes of wage profiles has been progressing in the 2010s.[3]

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 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 estimate the wage functions for the primary and secondary sectors while determining the sector to which a worker belongs. They find different characteristics in wage functions in the primary and secondary sectors, and involuntary rationing in the primary sector. Apart from the examined period, both the notion of dual labor market and

*This work was supported by JSPS KAKENHI Grant Numbers 24243035 and 24330074. We thank Masahiro Abe, Daiji Kawaguchi and Soichi Ohta for their helpful comments.

†Kyoto University

‡Kyoto University and Osaka University

[1] See Teruyama and Toda (2016).

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

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

the type of switching regression model used in this study are not the same with those of Ishikawa and Dejima (1994). In the Dickens-Lang (or Ishikawa-Dejima) model, the two sectors are not observable in advance and the sector to which a worker belongs must be determined in the estimation process, while in our model the classification of workers into the two sectors (whether one is 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. We 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. Then, 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.

2 Estimation of Wage Functions in the Segmented Labor Markets

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

$$w_{1i} = \beta_1^\top X_i + u_{1i} \quad \text{if} \quad I_i = 1, \tag{2.1}$$

$$w_{2i} = \beta_2^\top X_i + u_{2i} \quad \text{if} \quad I_i = 2, \tag{2.2}$$

where w_{ji} is the log of wage rate (i.e., 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 employment status is j. I_i is an index for employment status and determined by

$$I_i = 1\big(I_i^* = \delta^\top X_i + \gamma^\top Z_i + u_i > 0\big) \tag{2.3}$$

where $1(\cdot)$ denotes an indicator function with $1(s) = 1$ if $s > 0$ 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 (2.3) as the switching equation. All the determinants of wage rates (i.e., 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 a non-regular job is the function of the present wage differentials between the two employment statuses (i.e., $w_{1i} - w_{2i}$). In addition, relative expected present value of lifetime costs of working in a regular job to a non-regular job, or involuntary factors that prohibit a worker from having a regular job are assumed to depend on determinants of wage rates X_i and other variables Z_i.

The disturbance in the switching equation u_i is allowed to correlate with those in the wage functions u_{i1} and u_{2i}. Under the assumption that X_i and Z_i are exogenous and 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 is conducted every two years in September since 2000. The purpose of the WPS is to reveal the status of working individuals and their attitudes towards employment. To this aim, the survey asks respondents about subjective recognition and objective attributes related to their present and past jobs. The key questions (e.g., position, age, 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 sex, age, and employment area. Subjects are resampled every survey year. Thus, the WPS does not have a panel structure.

The coverage of the WPS is as follows. First, respondents must be aged between 18 and 59 years; students are excluded.[4] Second, respondents must have worked at least one day during the past week in the month before the survey. Third, respondents must be a "regular employee", "contract or entrusted employee", "temporary worker", "part-time worker", "dispatched worker", or "outsourced worker or freelancer"[5] ; self-employed workers are excluded. Fourth, respondents must work in the metropolitan area.[6]

In this study, we adopt the survey results from 2002 through 2014, since most of the variables explained below can be constructed from respondents' answers to the questions 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 the statistics published by the Japanese government, the definition of non-regular employment can be based on three criteria: contract length, working hours, and title/description of workplace.[7] The definition available throughout the survey years is based on the title/description. The respondents are asked about the "type of employment"[8] (title/description), which consists of "regular employment" and 6 other categories as stated in Section 3.1. Depending on their answers, we divide the respondents into regular and non-regular employees. Those who choose other alternatives 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 (i.e., from April in the previous year to March in the survey year). Temporary and side revenues are excluded from the revenues. As for working hours, the survey asks the average hours currently worked in a week. The hours worked include hours of overtime work and exclude hours of 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 answers to these questions, we define the wage rates (i.e., hourly wages) by dividing the annual revenue by annual working hours, which is estimated as 365/7 times the average hours worked in a week. Note that a period in which revenues are earned does not correspond to a period in which working hours are estimated, and 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 1 percentile and over 99 percentile are dropped. Of course, these sample treatments to solve the data precision problem is 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 (2.1) and (2.2) are selected as follows. Following the Mincer-type wage equations, we include years of tenure, years of external experience and their squares.[9] Here, years of external experience is defined as the number of years from the year of obtaining a worker's 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 a school,

[4]Only the 2014 survey includes individuals aged from 60 to 69 years. We exclude respondents over aged 59 in this study.
[5]The description "freelancer" only appears in the 2014 survey.
[6]This area consists of 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 metropolitan area in these surveys are excluded in this study.
[7]Kambayashi (2013) summarizes different definitions of non-regular employees based on the Japanese government statistics.
[8]This is a direct translation of the Japanese term used in the survey question.
[9]Kawaguchi (2011) examines an estimation of the Mincer-type wage equation using Japanese data.

and about the age at which the respondent found the current job.[10] Based on this information, 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.[11] A critical difference in wage determination between the primary and secondary markets is an opportunity of human capital investments on the job and proper rewards to them. If we cannot find such a property in one of the segmented labor markets, the market is interpreted as secondary.

In addition, the firm size is considered as a determinant of wages. The WPS asks about the firms' total number of employees where the respondent is working. A respondent chooses one of thirteen firm-size categories, so we construct the firm-size dummy variables by setting the size of 5 to 9 employees as the base category. It is often stressed that large-sized firms generally pay higher compensation than small-sized firms 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, an 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 a junior high school graduate is the base category. An academic career is regarded as a process of accumulating general human capital. The higher or longer education might correspond to higher productivity, which is converted into the wage rate. It may also work 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.[12]

The differences by sex in evaluation of tenure (firm-specific human capital) and external experience (general human capital) are considered in the estimation. The female dummy variable and 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 sexes.

Other variables (i.e., Z_i) added to the determinants of wages in the switching equation (2.3) 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 (2.1), (2.2), and (2.3) for each survey year. Let us start with wage-tenure profiles. Regarding regular workers' wage functions, 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 have positive and decreasing slopes. However, in non-regular workers' wage functions, the estimated coefficients of years of tenure and their squares are not significant even at the 10 % levels in most years.[13] Therefore, we can conclude that the wages of non-regular workers do not increase with tenure length. This feature is a sharp contrast to the case of regular workers.

Contrary to the wage-tenure profiles, the estimated wage-experience profiles show a significantly positive

[10] 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. Because 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.

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

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

[13] An exception is the estimates of 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.

and decreasing slope for regular and non-regular workers in most years.[14] The values of the estimated coefficients of these terms are stable among survey years and are close between employment statuses.[15] That is, external experience (general human capital) is reflected in wage increases equally among 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 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 female dummy are also not significant in most cases. Therefore, we find little evidence on wage disparities regarding tenure between sexes. As for regular workers' wage-experience profiles, female workers' profiles lie below male workers' since the estimated coefficients of cross-terms between female dummy and 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 for female workers except for the regular workers' wage-experience profiles.) Wage profiles of regular employees are quite stable for over 10 years since the early 2000s. Tenure length raises wages more than external experience. If a worker continues to work under the same employer for thirty 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 thirty-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.[16] 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 coincide with the regular workers'.

Regarding the effects of the firm size and educational background, the regular and non-regular wage functions also show sharp contrasts. These factors increase wages of regular workers only. Large-sized firms pay more wages than small- or medium-sized firms. 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 the university degree or higher receive wage rates 20–50% higher than 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 (2.3). 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 long tenure has a high probability of being a regular employee, $\Pr(I_i = 1)$. It might simply reflect 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 squares of tenure length are significant at the 1% level and have negative signs. 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 cross-term of tenure and female dummy, which are negative in all survey years and significant at the 5% level in several cases.

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.[17] This effect may appear more strongly in

[14]Exceptions are non-regular workers' wage functions in 2010 and 2012. The estimated coefficients of years of external experience and their squares in the former are both non-significant, and that of squared years of experience in the latter is non-significant at the 10% levels.

[15]In non-regular workers' wage functions, the significance levels of estimated coefficients of squared external experience are not so high and around 10%.

[16]Increases in wage rates owing to external experience for female regular workers are smaller than for male regular workers as suggested by the estimated coefficients of cross-terms between female dummy and years of external experience or its squares.

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

the female case. The estimated coefficients of cross-terms between the female dummy and years of external experience are significantly negative at the 1% level. Its pace becomes moderate as indicated by the significant positive sign of the estimated coefficient of their squares.[18]

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, such tendency disappears 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 the largest category 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 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 natural in Japan since a sizable proportion of married women are homemakers and they are not the primary providers of household income even when they work. The unemployment rates at the time of entry to the labor market show significant negative effects in several years. That is, a worker can have regular position more easily at present if the labor market conditions at his or her time of graduation are better. It represents "cohort effects," which means that the temporary business-cycle conditions at a worker's time of entry to 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 (2016) 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 on actual determination of employment status.[19]

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 (the number 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, the negative correlations might be interpreted that a worker who has abilities to earn more wages in regular and non-regular jobs is more likely to take a non-regular job, *ceteris paribus*. However, it seems implausible to think that a more able worker selects a low-paying job more often either voluntarily or involuntarily. Therefore, the disturbances in the wage functions might reflect 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 some reason (e.g., higher productivity or greater demand) could expand opportunities for non-regular jobs whose wage levels exceed the individuals' reservation levels and attract more workers. Among workers belonging to such a market, the probability of working in non-regular jobs will be higher.

[18]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 itself does not necessarily mean that women have higher probability of regular employment, since it represents only a constant wage gap between male and female workers. In our formulation of the switching equation, the differences in I^* in (2.3) between sexes 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 a regular employee, we calculate the predicted explained variable I_i^* in the switching equation (2.3) for various 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.)

[19]We cannot find 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 they 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 of each estimate by relating to the unusual employment adjustment. See Hijzen et al. (2015) for the employment adjustments in Japan during the global financial crisis.

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 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 the 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 sources 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 distinct labor market situation from that before the 1990.[20] 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 (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 estimation periods and data sources.

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 Ishikawa and Dejima did. 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 cannot find clear evidence on neither the firm-size nor 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 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 the lower-tier of primary sector and the proper secondary sector in the sense of Piore.[21] However, the modern secondary sector found in our study is closer to more traditional notion of dual labor market. To explain the different characteristics of the duality between periods examined by Ishikawa and Dejima and by us, it seems plausible to think that the segmented labor market consists of more than two sectors and the relative sizes of 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.[22]

[20]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.

[21]See, for example, Piore (1975).

[22]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 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.

As for differentials between sexes, Ishikawa and Dejima 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 estimation period is the mid-2000s (i.e., 2004 and 2005). They show that the wage rates of non-regular workers do not reflect tenure and (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 are on the effects of past experiences, which this study does not examine. They report that only experience in regular work increases wages of regular workers. This suggests the lack of opportunity of general human capital accumulation in non-regular jobs. Note that this implication contradicts to our results, which observe significant positive evaluation of external experience in non-regular workers' wages. However, Genda (2008) finds that past work experiences in non-regular and regular jobs have significant positive effects on annual income of non-regular workers. His finding seems consistent with ours. To sum, 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 had conclusive evidence on the influence of past experiences on 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 who were hired immediately upon graduation and have been working for the same employer ever since. They use micro data from the Basic Survey on Wage Structure, which is the same data source used by Ishikawa and Dejima, for the period 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 of the continuation of the flattening of wage-tenure profiles between the period from the 2000s and the former half of the 2010s.[23]

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 metropolitan area during 2002–2014, we estimate an endogenous switching regression model where two sectoral wage functions and a sector separation 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, the 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 wages of regular employees.

The length of tenure, firm size, and educational level are the determinants of employment status. Among them, the effects of firm size have recently changed pattern and do not show a monotonic relation with the probability of regular employment. There is little difference in the effects of tenure on wages between male and female workers. Rather, wage differentials between sexes 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 on female workers.

[23] 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 for the period 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 wage-tenure profiles of regular workers were progressing in the 1990s although the data sources and methods are different between these studies.

An essential property of 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) examines the rationing of the primary jobs by testing coefficient restrictions induced by the voluntary choice condition in the model and obtain 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 worker's decision making. Instead, we examine the persistency of employment status by controlling individual attributes and preferences in a companion paper, where we find evidence on the involuntary nature of non-regular employment (see Teruyama and Toda, 2016).

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.[24] In addition, the form of switching equation depends on the idea of static decision making on 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 (i.e., the previous period's employment status in explanatory variables), which again rises 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 of the future research.[25] Finally, the sample of respondents in the WPS is restricted to workers in the metropolitan area, which might introduce bias into the results. It would be desirable to extend this study to use the sample that covers all areas in Japan.

[24] 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 thought 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.

[25] Bucinsky 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

	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	.296	.193	.278	.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)

	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 $\times$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 $\times$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 $\times$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 $\times$External experience^2	-.000359	-.000571	-.00094	4.9e-06	.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]

	Switching equation						
	2014 survey	2012 survey	2010 survey	2008 survey	2006 survey	2004 survey	2002 survey
Tenure	.1207	.1318	.1675	.106	.1	.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.

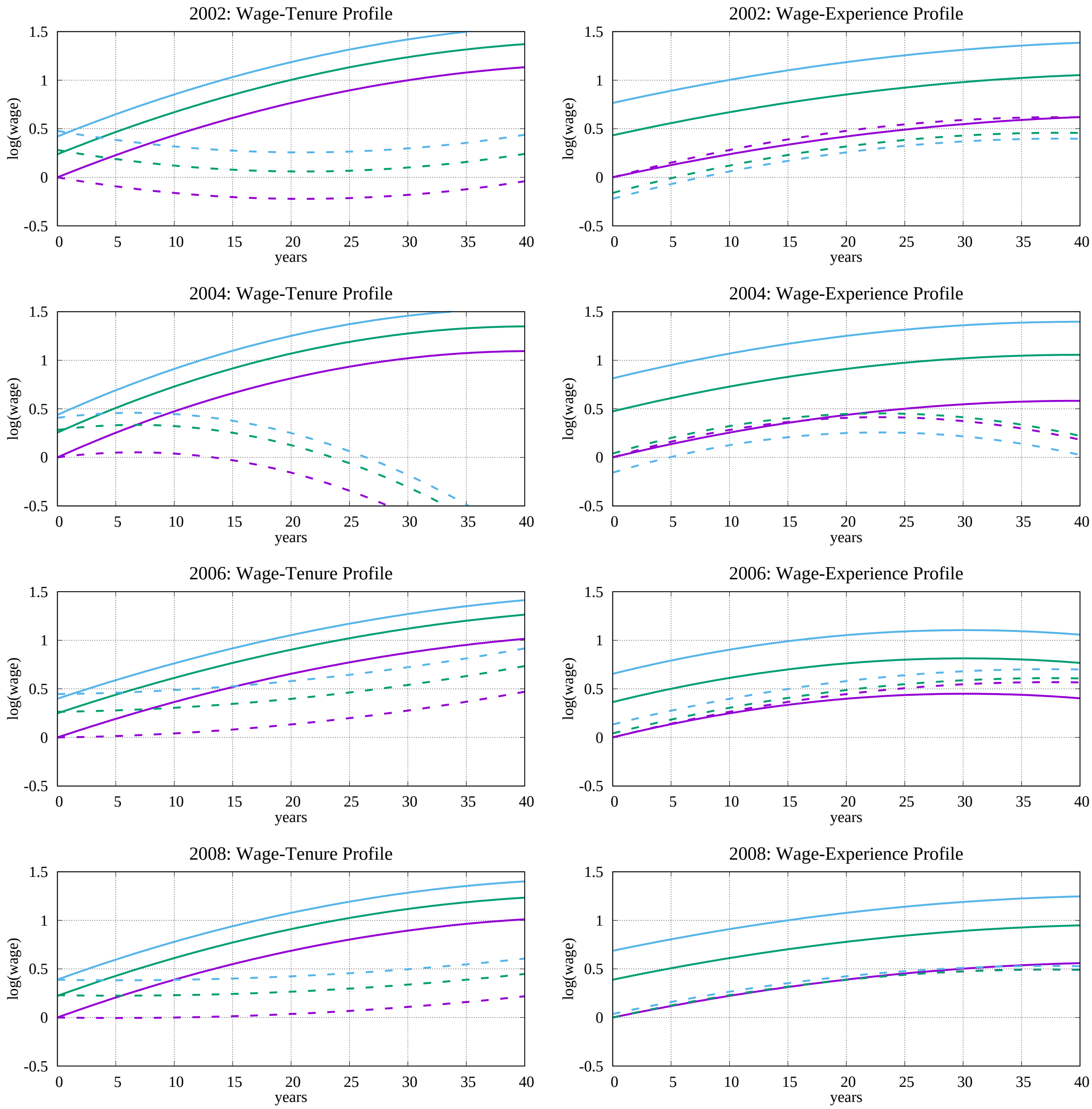

Figure 1: Wage-Tenure and Wage-Experience Profiles of Male Regular and Non-regular Workers

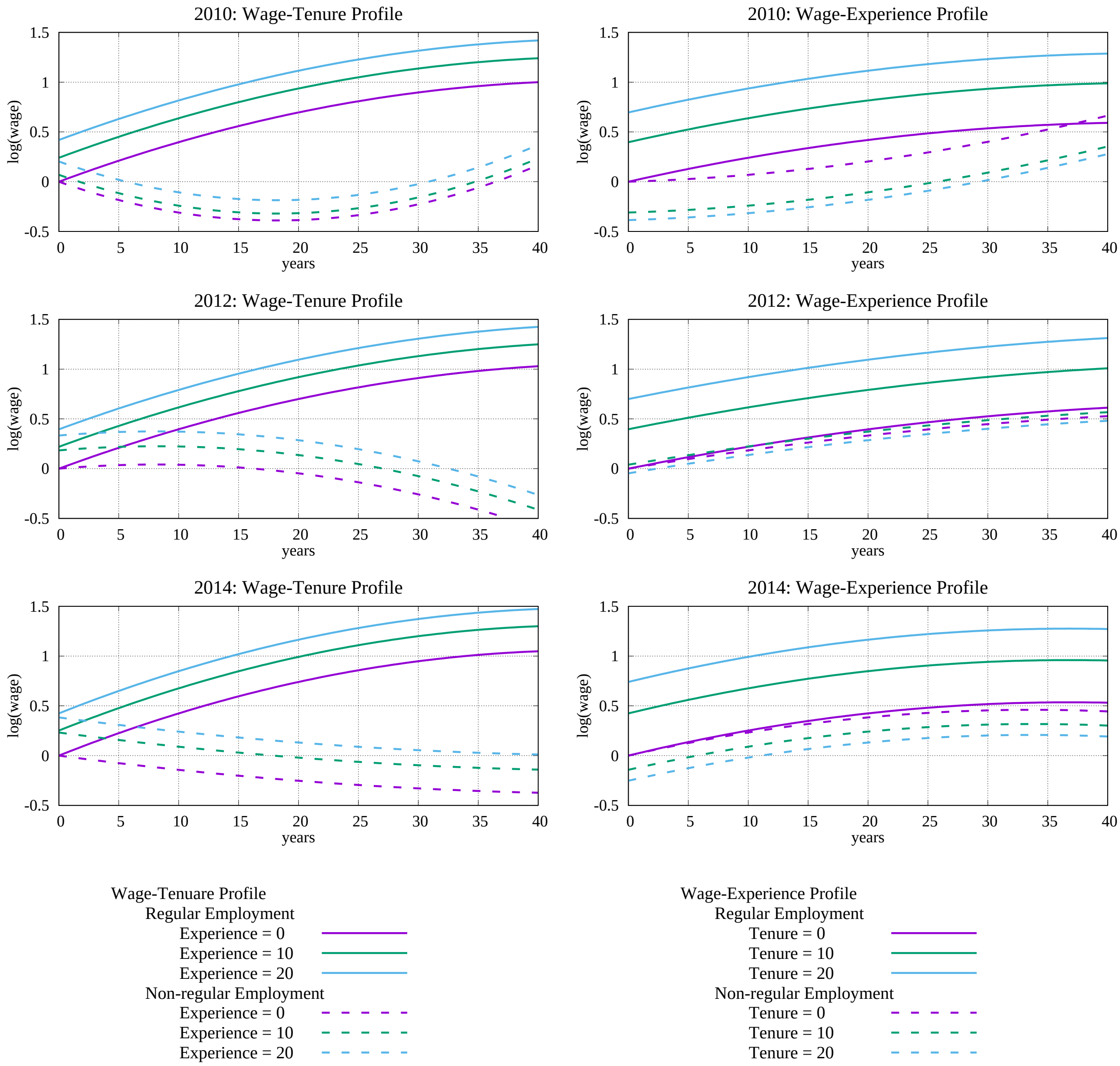

Figure 1 (continued)

References

Abraham, K.G., and H. S. Faber (1987): “Job Duration, Seniority, and Earnings,” *American Economic Review*, 77(3), 278–297.

Altonji, J. P., and Shakotko (1987): “Do Wage Rise with Seniority?” *Review of Economic Studies*, 54(3), 437–459.

Buchinsky, M., D. Fougère, F. Kramarz, and R. Tchernis (2010): "Interfirm Mobility, Wages and the Returns to Seniority and Experience in the United States," *Review of Economic Studies* 77(3), 972–1001.

Dickens, W. T., and K. Lang (1985): "A Test of Dual Labor Market Theory," *American Economic Review* 75(4), 792–805.

Fernandéz-Kranz, D., M. Paul and N. Rodríguez-Planas (2015): "Part-Time Work, Fixed-Term Contracts, and the Return to Experience," *Oxford Bulletin of Economics and Statistics* 77(4), 512–541.

Genda, Y., (2008): "Naibu Roudou Shijo Kaiso To Shite No Hiseiki (Irregular Employment as the Lower Tier of Internal Labor Market)," *The Economic Review* 59(4), 340–356 (in Japanese).

Hamaaki, J., M. Hori, S. Maeda and K. Murata (2012): "Changes in the Japanese Employment System in the Two Lost Decades," *Industrial Relations Review* 65(4), 810–846.

Hijzen, A., R. Kambayashi, H. Teruyama and Y. Genda (2015): "The Japanese Labour Market during the Global Financial Crisis and the Role of Non-standard Work: A Micro Perspective," *Journal of the Japanese and International Economies* 38, 260–281.

Ishikawa T., and T. Dejima (1994): "Rodo Shijo No Niju Kozo (Dual Structure in the Labor Market)," in *Nihon No Shotoku To Tomi No Bunpai* (*Income and Wealth Distribution in Japan*), ed. by T. Ishikawa, Ch.6, 169–209, Tokyo: the University of Tokyo Press (in Japanese).

Kambayashi, R. (2013): "Differences in Definitions of Non-Regular Employee in Government Statistics," *Japan Labor Review* 10(4), 55–66.

Kawaguchi, D. (2011): "Mincer-gata Chingin Kansuu No Nihon No Rodo Shijo Heno Tekiyo (Applying the Mincer Wage Equation to Japanese Data)," RIETI Discussion Paper Series 11-J-026 (in Japanese).

Lokshin, M., and Z. Sajaia (2004): "Maximum Likelihood Estimation of Endogenous Switching Regression Models," *The Stata Journal* 4(3), 282–289.

Piore, M., (1975): "Note for a Theory of Labour Market Stratification," in *Labor Market Segmentation*, ed. by R. Edward, M. Reich and D. Gordon , 125–150, Mass: D.C.Heath.

Rebick, M. (2005). *The Japanese Employment System: Adapting to a New Economic Environment*, Oxford: Oxford University Press.

Teruyama, H., and H. Toda (2016): "Polarization and Persistence in the Japanese Labour Market," Works Discussion Paper Series No.9, the Recruit Works Institute.

Toda, A. (2008): "Nihon No Paneru Deta Wo Riyo Shita Chingin Purofairu No Jissho Bunseki (Empirical Analysis of Wage Profiles Using a Panel Data in Japan)," KUMQRP Discussion Paper Series DP2007-016, Keio University (in Japanese).

Topel, R. (1991): "Specific Capital, Mobility, and Wages: Wages Rise with Job Seniority," *Journal of Political Economy*, 99(1), 145–176.

Yanagida, S. and K. Miyoshi (2006): "Nihon Ni Okeru Chingin Ha Hontoni Kinzoku Nensuu To Tomoni Agaru Noka (Do Wages Really Increase with Years of Tenure in Japan?)," in *Nihon No Kakei Kodo No Dainamizumu* (*Dynamism of Household Behavior in Japan*) [II], ed. by Y. Higuchi, Ch.6, 153–167, Tokyo: Keio University Press (in Japanese).