Changes Experienced by Intermediate-Age Workers in Japan's Labor Market

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This paper examines changes in the Japanese labor market experienced by full-time workers in intermediate age groups (ages 35–50) during the two decades since the collapse of the bubble economy. The results suggest that the opportunity cost of job transfers is lower than it used to be, and that the fluidity of the labor market is also spreading among intermediate-age workers to a certain extent. Moreover, internal competition for promotion to managerial positions may have become more intense at the same time. Specifically, a panel dataset for business establishments was created for this study by linking microdata from the "Basic Survey on Wage Structure" and the "Survey on Employment Trends." The relationship between rewards for promotion to management and turnover ratios was empirically studied, with the result that a generally positive correlation was found between the two. These changes are consistent with the rank-order-tournament theory, and in that sense, even intermediate age groups, the core of Japanese employment practices, are not entirely unaffected by changes in the structure of the labor market. However, this paper also finds that experience of changes in the labor market is diverse in intermediate age groups, depending on the stage of career advancement and age, that changes in competition for promotion have not spread universally among them, and that it is difficult to explain the whole consistently by using a simple model.

I. Problem Awareness

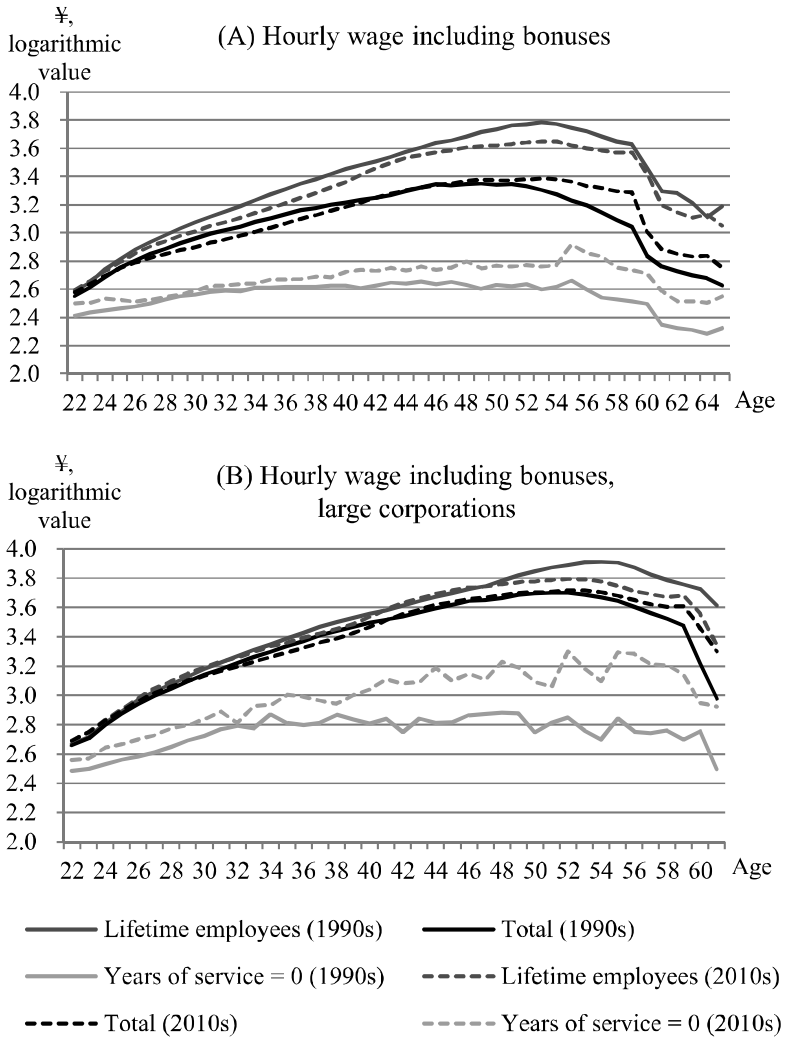
This paper discusses changes in the labor market experienced over the last two decades by workers in intermediate age groups between the mid-30s and the 40s (hereinafter "intermediate-age workers"), with particular focus on full-time workers among them.

In careers based on the long-term employment system, full-time intermediate-age workers represent an age group that has amassed company-specific human capital through a variety of OJT opportunities; they have conventionally been regarded as forming the core of the corporate labor force. The larger the investment in this human capital, the stronger the motivation for employers to keep intermediate-age workers within their organizations. At the same time, intermediate-age workers have reached a stage in their lives when opportunities for advancement to management-level posts rapidly expand. This means that they also have to take account of huge opportunity costs if opting for voluntary career changes. As a result, intermediate-age workers have consistently been regarded as a stable age group from the perspective of both labor and management, and have thus not been a subject of particu-

lar concern until now. In fact, the focus of labor policies over the past half-century since the era of low growth has shifted first to the elderly then to women and young people; intermediate-age workers have been left outside the frame. Over the two decades since the collapse of the economic bubble, the point has been made, in various contexts, that changes are gradually occurring in Japan's labor market in its systems of long-term employment and seniority-based wages. In spite of that, it seems to have been tacitly assumed that the impact of these changes is relatively minor when it comes to intermediate-age workers.

This paper will attempt to challenge these generally accepted perceptions and analyze changes affecting intermediate-age workers in recent years. There are several reasons for this. The first is that changes in skill structure in recent years have not yielded the same effects for all workers, but have tended to create disparity amongst them. For example, the two decades under discussion in this paper were not only a time when the economic growth rate fell on average compared to before, but also ushered in various other changes. These included the emergence of new technologies in the ICT field, and related changes in the industrial structure evolving in tandem with changes in companies' organizational structure. As a result, while more sectors and occupations required the development of company-specific human capital, there may also have been cases when the opportunity cost of labor mobility between companies became smaller for intermediate-age workers as the importance of company-specific human capital conversely decreased in relative terms. From the employees' side, too, changes in the attributes of groups comprising intermediate-age workers (such as the age composition, gender ratio and educational backgrounds) also progressed during the period in question. Seen from these two sides of labor demand and supply alone, there are plenty of factors that could have changed the status of intermediate-age workers in the labor market, and it is easy to imagine that these workers were not uniquely unaffected by change. Moreover, as full-time intermediate-age workers represent the core of Japanese employment practices, thus the appraisal of changes in the labor market as a whole must be affected by the nature of changes in that group.

From the next section onwards, therefore, data will be used to identify changes experienced by intermediate-age workers, as well as the factors that could conceivably lie behind them. Specifically, in Section II below, shifts in aggregated wage curves and changes in wage levels and labor turnover rates will be observed, and the overall image of the labor market for full-time intermediate-age workers will be defined. The results suggest structural change in competition for promotion associated with increased fluidity in the labor market, and this point is examined using microdata in Section III onwards. A basis for understanding competition for promotion in terms of economics is provided by the rank-order-tournament theory. Recent developments in this area are summarized in Section III, based on a simple perusal of the relevant literature. Section IV is devoted to explaining the two types of data used in this paper, namely the Ministry of Health, Labour and Welfare (MHLW) "Basic Survey on Wage Structure" (abbreviated below to "Wage Census") and the MHLW "Survey on Employment Trends" (abbreviated to "Employment Trends"). The



Source: Calculated by the authors from the *Wage Census*.

Figure1. Changes in Wage Curves (Comparison between 2010–2012 and 1991–1993)

relationship between employees' increased fluidity and tournament structure will be studied in Section V. Finally, Section VI will summarize the estimation results and serve as a conclusion to this paper.

II. Changes Experienced by Intermediate-Age Workers in Japan's Labor Market

As changes in the environment surrounding intermediate-age workers, changes in wage trends will be examined first of all. Figure 1 shows changes in wage curves by age

from the beginning of the 1990s to the beginning of the 2010s. The data are taken from Wage Census microdata, pooled into 3-year segments from 1991 to 1993 for the beginning of the 1990s and from 2010 to 2012 for the beginning of the 2010s, respectively. On this basis, the average logarithmic hourly wages by age have been plotted to depict the so-called "seniority curve." For comparison, profiles specific to the "lifetime employee" group, i.e. workers who are thought to continue working for the same establishment after leaving education, and those of career changers (shown as having 0 years of service) are also included. Finally, hourly wages have been calculated by dividing total earnings including bonuses and overtime pay by total working hours.

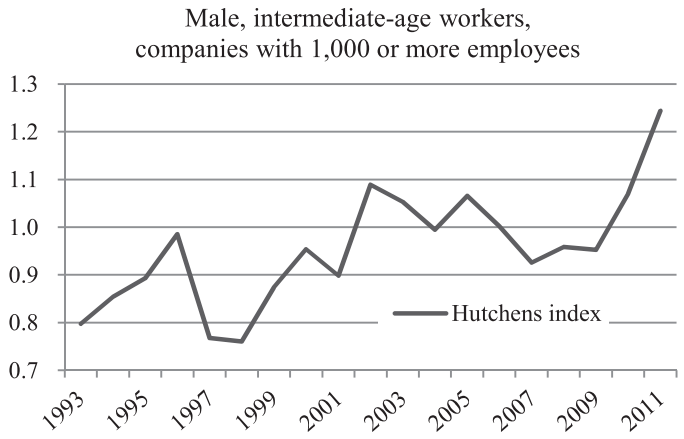
Quite in contrast to the wage curve of the lifetime employee group, which has generally shifted downwards over the last two decades, that of career changers has shifted upwards, particularly in age groups above intermediate age. For example, at age 53, the hourly wage of the lifetime employee group had decreased by about 14%, while that of mid-career recruits had increased by about 16%. As a result, the overall wage curve shifts downwards until around 40 years of age, but shifts upwards from the 40s onwards, and the 1990s and 2010s wage curves cross at around 40 years of age. Although it has long been asserted in general that the so-called seniority wage is a thing of the past, at first sight the wage curves appear to have grown more extreme, if anything.

If the sample is restricted to large corporations only, we find that, while the increase in wages for career changers is pronounced in intermediate age and onwards, the decrease in wages for lifetime employees is very limited. For example, while the increase for the former is about 42% at age 53, the decrease for the latter is only about 12%. As is well known, large corporations have developed their own internal labor markets, meaning that fewer employees are hired mid-career in their 50s. Thus, the impact on wage rises for career changers as a whole may be limited, but in reality the hourly wage has risen on average for workers in intermediate age.

In parallel with improved wage conditions for career changers, increased fluidity of intermediate-age workers has gradually progressed on a volume basis as well. Figure 2 shows the labor turnover rate of male intermediate-age workers between the ages of 35 and 49 in large corporations in time series, as gathered from Employment Trends microdata. Here, the labor turnover rate is based on the ratio of sum of job leavers and new recruits over one year to the total number of workers at the beginning of the year. Generally speaking, if this ratio were 2, it would mean that all employed workers have been replaced over the space of a year. To evaluate the turnover rate of intermediate-age workers, Figure 2 shows trends of this rate relative to that of all workers (the Hutchens index[1]).

In the 1990s, we see that the Hutchens index was generally less than 1. The turnover

[1] Hutchens (1986) devised the "Hutchens index" as an indicator to ascertain corporate behavior when hiring older workers, defining it as the ratio between the recruitment rate of older workers and the overall recruitment rate. In this paper, the concept is expanded to examine the turnover of intermediate-age workers.



Source: Calculated by the authors from the *Employment Trends*.

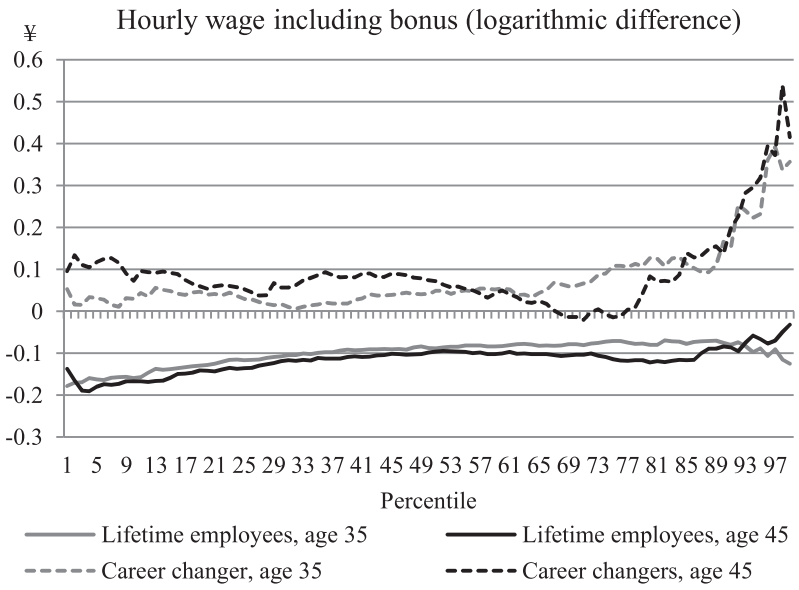
Figure 2. Trends in the Turnover Rate of Intermediate-Age Workers in Large Corporations (Ratio Compared to the Turnover Rate of All Workers)

rate of intermediate-age workers was smaller than that of the whole, and these workers thus formed a stable core of corporate organization. From the start of the 2000s, however, the rate started to increase, and has been significantly higher than 1 since the Lehman collapse. Seen in relative terms, this shows that the turnover of intermediate-age workers has risen.

Although wage disparity between lifetime employees and mid-career recruits in intermediate age has decreased as shown in Figure 1, Figure 2 reflects an increase in mid-career recruits, whose wage level was low in the first place. As a result, the ratio of wage dispersion among intermediate-age workers to that among all workers shows an increasing trend, and relative disparity in wages in this age group has widened. To examine this point in detail, shifts in the quantile points in wage distribution are shown in Figure 3.[2] Specifically, data from the Wage Census were narrowed down to those for lifetime employees as against career changers aged 35 and 45, and the hourly wage percentile was calculated for each target period. Changes in the hourly wage level for the same quantile point over the two decades were then examined on this basis.

This shows that, for intermediate-age lifetime employees, the hourly wage has fallen more or less uniformly at all quantile points, and that the wage distribution has shifted to the left overall. Also, the decrease on the left edge of the distribution is larger than that on the right edge, albeit only slightly, suggesting that the variance grew larger as the left edge grew longer. By contrast, the hourly wage for career changers rose in nearly all quantile points, showing that the distribution shifted to the right. At the same time, it can be seen that wages rose conspicuously at the right edge of the distribution and the right edge has grown longer and thicker. This would suggest that the distribution of hourly wages for intermediate-age

[2] Trends in wage dispersion are summarized in Appendix Figure 1.



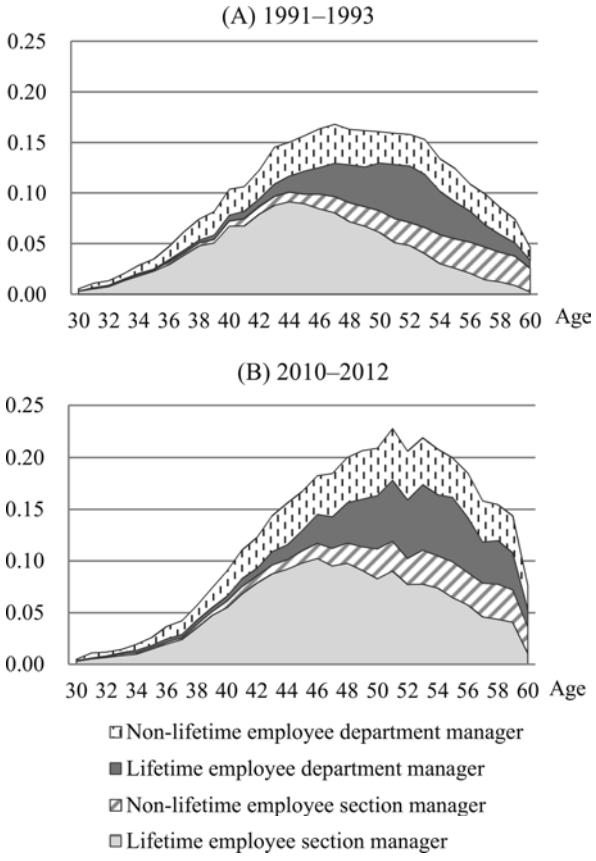
Source: Calculated by the authors from the *Wage Census*.

Figure 3. Changes in Hourly Wage (Comparing 2010–2012 with 1991–1993): Full-Time Males, Lifetime Employees vs. Career Changers

workers has widened, but a different mechanism could be at work for lifetime employees and mid-career recruits.

Taking Figures 1 to 3 as a whole, there would appear to have been a general increase in fluidity for intermediate-age workers, but at the same time an increase in the number of mid-career recruits earning a reasonable hourly wage. Thus, to consider the background to these changes in wage distribution and fluidity, we will need to confirm trends in labor mobility regarded as "headhunting," or in other words trends in managerial posts. To this end, Figure 4 compares the share of department and section managers by age at the beginning of the 1990s and the beginning of the 2010s.

For lifetime employees graduating from university, intermediate age corresponds to a period between about 10 and 25 years of service. This is a time when the likelihood of promotion to section manager increases, followed by an increased likelihood of promotion to department manager from the mid-40s onwards. As Figure 4 shows, there has been no great change in the timing of promotions over the last two decades, but the share of department managers takes rather longer to reach a peak. Moreover, the ratios of intermediate-age department and section managers are clearly in a rising trend, particularly around the age of 50. As to the ratio of lifetime employees among department and section managers, the ratio is nearly zero among section managers with up to 10 years of service and among department manager with up to 20 years of service. After this, the shares of lifetime employees increase

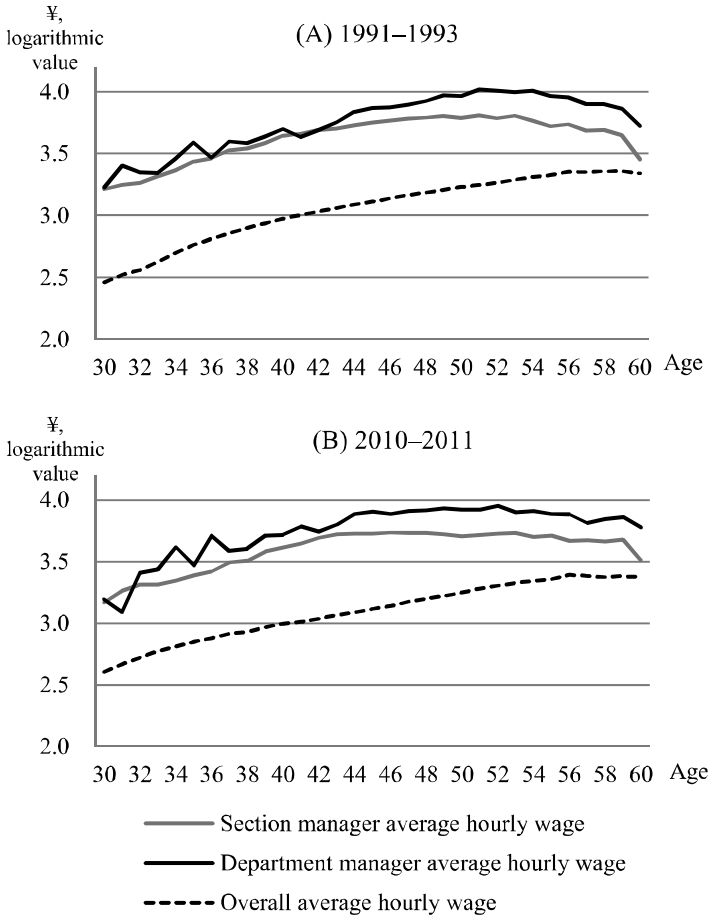


Source: Calculated by the authors from the *Wage Census*.

Figure 4. Shares of Department and Section Managers by Age: Lifetime vs. Non-Lifetime

rapidly until eventually reaching a majority (see also Appendix Figure 2). Actually, no great difference can be seen in this trend over the last two decades. At age 45, for example, the ratio of section managers among lifetime employees rises from 8.9% to 9.8% and that among non-lifetime employees from 0.9% to 1.2%, but the two periods in question show no great difference in the relative component ratios of the two. The same applies to changes in the ratio of department managers among lifetime employees (−0.3 percentage points) and the ratio of department managers among non-lifetime employees (+0.2 percentage points) at age 45.

Figure 5 compares changes in the wages of employees promoted to department and section manager, showing that the logarithmic hourly wage has decreased among intermediate-age workers for both department and section managers; the decrease is markedly large among section managers in the higher age range of intermediate-age workers (about −0.25



Source: Calculated by the authors from the *Wage Census*.

Figure 5. Average Wages of Department and Section Managers by Age (Hourly Wage Including Bonuses)

points for section managers aged 49). Though not shown in the graph, the standard deviation in the hourly wage is larger if the years of service are fewer, for both department and section managers, which could be because they are mainly hired from the outside. Among department managers there has been a rising trend but no major change over the last two decades. For section managers, an upward trend in external recruits with less than 10 years of service is seen, but the figure has gone down, if anything, among lifetime employee section managers with more than 10 years of service. In other words, the wages of lifetime employees who are not promoted to department manager but continue as section manager for a long time seem to have gone down on average, while at the same time the disparity among them has narrowed.

To summarize the foregoing, it would appear that the following changes are gradually

progressing in Japan's labor market for intermediate-age workers. Firstly, although there is an increased likelihood of lifetime employees being promoted to section manager, more of them are subsequently not being promoted to department manager but are remaining as section manager. In tandem with the increased likelihood of promotion, the wages of section and department managers are in a downward trend, and in large corporations, the wage dispersion compared to other age groups is widening. That is, the number of employees who are promoted to section manager but have no prospect of taking the next step, or whose wage increase accompanying promotion is relatively small, is gradually increasing. It may be, therefore, that competition in internal labor markets has intensified. By contrast, the proportion of externally hired section and department managers, i.e. those other than lifetime employees, is more or less unchanged in all age groups. This must mean that lifetime employees do not necessarily face more intensely competitive conditions in terms of competition for promotion with external recruits compared to 20 years ago. In conjunction with these changes, the fluidity of intermediate-age workers in large corporations is in a relatively increasing trend. Compared to the beginning of the 1990s, moreover, the wages of career changers had risen in all age groups of intermediate-age workers at the beginning of the 2010s. This would appear consistent with the fact that the conditions for career changes by intermediate-age workers have improved over that period.

III. Previous Research and Hypotheses Examined in This Paper

As stated in the previous section, structural changes in internal labor markets appear to have been in progress over the two decades from the beginning of the 1990s to the beginning of the 2010s. This is thought to have been manifest as a change in the likelihood of promotion to management and a shift in wage curves, due to the increased intensity of internal competition for promotion and ongoing competition with external recruits.

One general model that explains the relationship between promotion within a company and wage structure is the rank-order-tournament theory of Lazear and Rosen (1981). They demonstrated that this theoretical model can achieve the same efficient distribution of resources as incentive schemes in response to an individual's output, by offering workers a predetermined remuneration structure based on rank, on the premise that companies cannot adequately observe the level of effort by workers. Risks for the employer can be avoided, as the wage amounts can be fixed in advance (unlike with performance-based pay). Moreover, because this takes the form of a tournament, it suffices merely to select the right person from among the candidates, meaning that there is no need to measure absolute levels of individuals' output. Another advantage is that the only information needed is the relative merits of the candidates. Conversely, this method has the disadvantage that participants who know they cannot win the tournament drop out of the competition from the beginning and end up making no effort at all, but that wages in line with the promised minimum rank still have to be paid.

Wage increases accompanying promotion are normally explained by increased productivity due to the accumulation of human capital. However, it is known, particularly in the US, that the volume of wage increase expands as the employee's position rises higher in the hierarchy, and it has been considered difficult to explain this in terms of the accumulation of human capital. This is because, as long as the normal formulation for accumulating human capital is assumed, the additional increase in productivity is thought to decrease as the employee amasses more human capital. The tournament theory can be used to explain that the more evenly matched the competition in terms of ability, the larger the prize needs to be when winning. This theory attracted interest as a method of explaining remuneration schemes inside companies rather than one focusing on human capital.

Main, O'Reilly, and Wade (1993) used data on executive remunerations in American companies, among other statistics, to show that remuneration increases exponentially as the employees rise through the upper echelons of companies. While this produced a result consistent with tournament theory, it also showed that the rationale on wage compression presented by Lazear (1989), holding that a remuneration scheme that reduces wage disparity between individuals is efficient in upper echelons, cannot be described as consistent with the data. Chan (1996) expanded this rationale on rank-order-tournament to include competition with externally hired mid-career workers as well as competition for promotion among lifetime employees, and theoretically examined the impact of intensified competition on promotion prizes. According to Chan (1996), increasing promotion prizes leads to greater incentives for workers but also increases the potential for moral hazard. This is said to provide a reason why companies give relatively advantageous treatment to promotions of lifetime employees by setting handicaps when hiring external recruits compared to internally promoted staff. As the background to why internally promoted staff are relatively easier to promote than external recruits, in addition to the factors highlighted by Chan (1996), it has been pointed out that lifetime employees have acquired company-specific human capital and that companies have little information on external recruits. For example, Bayo-Moriones and Ortin-Angel (2006) discovered, as a result of using data from Spanish manufacturing companies to analyze the likelihood of promotion, that company-specific human capital is the most important factor. Bognanno (2001) used microdata from executives of large American corporations to analyze whether corporate salary schemes and hiring are consistent with the tournament theory, and in particular whether there is negative correlation between the likelihood of promotion and prizes accompanying promotion. The result showed that the more intense the tournament competition, the higher the promotion prize is set in order to encourage effort. On prizes for CEO promotion, results generally consistent with the theoretical model on an empirical level have been obtained. Audas, Barmby, and Treble (2004) used data on employees of companies in the UK financial sector to estimate the likelihood of promotion, arriving at the implication that increasing promotion prizes and reducing promotion risks serve to enhance motivation for workers. Finally, DeVaro (2006) used data on American business establishments, among others, to make

structural estimations of the impact on workers' motivation by companies' decision-making on promotions and the wage spread accompanying promotion, using workers' performance, salary systems and promotion as endogenous variables. The results obtained support the tournament model.

To interpret changes in the labor market facing intermediate-age workers on the premise of the debate in this existing research, as pointed out in Section II, it appears to have become easier for workers to experience promotion to section manager as the first step in promotion, but the following promotion to department manager has become more difficult owing to an increase in tournament participants. Accompanying the greater likelihood of promotion to section manager, the wages offered by companies for section manager posts have fallen. Moreover, even though these employees stay a long time in section manager posts, the portion of wage increase based on seniority has been reduced from former levels. This kind of change is more likely to result from structural factors internal to the company (for example, the age composition is weighted toward intermediate-age workers and upwards, progressively higher educational backgrounds of intermediate-age workers, etc.) rather than the increased intensity of competition with external recruits. Even if promoted to section manager, some workers who feel their chances of further promotion not to be high will pull out of the tournament. Thus, the effect of increased fluidity, whereby workers change jobs to another company where conditions seem better in the medium to long term, is gradually advancing among intermediate-age workers and others in large corporations. Enhanced wage conditions for mid-career recruits would appear to be supporting this trend.

In this paper, therefore, the emphasis will be on examining two hypotheses based on the tournament theory—that is, (i) the relationship between section or department manager wage increases as promotion prizes and business establishment turnover, for which a positive correlation is envisaged, and (ii) the relationship between the likelihood of promotion to section or department managers and business establishment turnover, for which a negative correlation is envisaged.

IV. Data

Data used in the introductory part of this paper consist of microdata from the Wage Census and Employment Trends surveys. The empirical analysis discussed in Section V is based on datasets constructed by linking these two surveys via the establishment codes.

The Wage Census is a survey of business establishments conducted in June every year, targeting all establishments in all industries except agriculture. As well as surveying the attributes of each establishment, respondents are asked to give details of the June wages and working hours of randomly selected employees, based on the payroll ledger. The survey also enables each employee's employment format, working regime, years of service, occupation, job class and other details to be ascertained. Job classes are divided into four categories, namely director (department manager), section manager, chief and foreman. For the

analysis in this paper, department managers and section managers were regarded as executives corresponding to managerial posts, and the examination focused on whether workers are in these posts or not. With regard to wages, the hourly wage was used in logarithmic form. When estimating the hourly wage, the contractual wage (excluding overtime allowance) divided by contractual working hours was taken as the hourly wage on a contractual basis. At the same time, the sum of contractual wage and bonuses (converted to a monthly equivalent) was divided by the total of contractual working hours and overtime hours to produce an hourly wage including bonuses. Both of these were used to confirm the consistency of the results. Around 60,000–70,000 establishments respond to each survey, and microdata from private businesses between 1991 and 2012 were used for the analysis this time.

"Employment Trends," meanwhile, surveys business establishments twice a year (at the end of June and the end of December). Its main objective is to ascertain employee trends (the number of employees, component ratios for each attribute, etc.) at the point of the survey as well as details of incoming and outgoing career changes (new recruits, job leavers, staff reassignments, etc.) in the six months immediately prior to the survey. Using the results of this survey enables us to calculate the turnover, new recruit ratio, job leaver ratio, job creation ratio and job loss ratio for each establishment in each six-month period. These flow indicators can be worked out for both full-time and part-time workers[3] among the regular workers[4] targeted by the survey. The parent set of survey targets consists of establishments with five or more regular workers in 16 major industries, while selected establishments are continuously surveyed throughout the year. More than 10,000 establishments respond to each survey, and microdata from private businesses between 1993 and 2011 were used in the analysis this time.

In this paper's empirical analysis, microdata from these two surveys were matched for each establishment, and panel data were constructed at establishment level. When constructing data sets, sampling from both the Employment Trends and the Wage Census was based on a list of establishments created from the "Establishment and Enterprise Census" conducted by the Ministry of Internal Affairs and Communications. Thus, using name list information based on the latter from the 2001, 2004 and 2006 Census, establishments were linked in a cross-section between the Employment Trends and Wage Census for each year, while panel data were created as far as possible for establishments that are continuously targeted by the survey. Since name list information for establishments surveyed by Em-

[3] In this survey, "part-time workers" are defined as regular employees who have fewer scheduled working hours per day than ordinary workers in the same business establishment, or the same scheduled working hours per day but fewer scheduled working days per week than ordinary workers in the same establishment.

[4] In this survey, "regular employees" are defined as answering to any one of (i) persons employed with no defined period, (ii) persons employed for defined periods of more than 1 month, and (iii) persons employed for defined periods of 1 month or less or on a daily basis, who were employed for 18 days or more in each of the previous 2 months.

ployment Trends are only available for years from 2005 onwards, the survey years covered by the panel data were limited to the seven years between 2005 and 2011. During this time, the results of both surveys could be linked for around 2,000–2,500 establishments per year, producing an overall total of around 16,000 establishments. Of these, there were around 6,000 establishments with managerial posts of interest to this paper (i.e. both department and section managers). To align the survey frequency with that of the Wage Census, the information obtained from Employment Trends was converted to annualized rates. A point to note in connection with the panel data is that only establishments effectively coming under enterprises with 100 or more workers were analyzed, because samples are replaced every year and hardly any small-scale business establishments with large parent set numbers are included. This panelization of establishments means, on the one hand, that the majority of samples included in both surveys are placed outside the scope of analysis. However, the advantages of this method are that linking data from Employment Trends and Wage Census enables us to ascertain each establishment's promotion trends, wage system, external recruitment and worker outflow to other establishments, while the fixed effects of establishments can also be controlled.

V. Results of Empirical Analysis

1. Relationship between Executive Promotion Premium and Turnover

In the data, the executive promotion premium is reflected both in the fact that the inclination of the seniority wage curve becomes steeper upon promotion to a management-equivalent post, and in the effect whereby the wage curve itself shifts upwards (moves up to a higher wage curve). In this paper, this promotion premium is understood as an effect specific to each business establishment. Specifically, workers' microdata are used to estimate the following wage function (I) for full-time workers representing the potential pool of promotion competitors,[5] and the establishment average of the residuals is regarded as the expected value of establishment-specific effect (i.e. establishment premium).

$$\ln (w_{it}^{j}) = \alpha + \mathrm{B}X_{it} + \varepsilon_{it}^{j} \quad \ldots\ldots \text{(I)}$$

w_{it}^{j} : hourly wage (contractual or bonus-inclusive basis) of worker *i* working for establishment *j* in time period *t*

X_{it} : attributes of worker *i* (age, age squared, years of education dummy, gender dummy) or (age, age squared, years of education dummy, gender dummy, years of service, years of service squared) in time period *t*

ε_{it}^{j} : error term

[5] Specifically, samples are limited to those whose working regime is categorized as "regular" and those whose average working hours per day are fewer than 7, or those whose working days per month are fewer than 18 have been removed.

α, B : parameters

Since this establishment premium is thought to include factors specific to each establishment in reality, the ratio between the expected value of the residuals obtained from managerial post samples in a given establishment and the expected value of the residuals obtained from non-managerial post samples in the same establishment $\left[E(\varepsilon_t^{EXj})/E(\varepsilon_t^{NEXj})\right]$ ($E(\varepsilon_t^{EXj})$: expected value of the residuals obtained from managerial post samples, $E(\varepsilon_t^{NEXj})$: expected value of the residuals obtained from white collar non-managerial post samples[6]) is used in the estimations that follow as the managerial post premium in that establishment.

If years of service are added as explanatory variable X in equation (I), the establishment premium would not include the wage curve inclination in the labor market as a whole, and only the shift in the curve due to differences between establishments would be ascertained. But if years of service are not controlled, the estimation results would mean that both the difference in the curve shift and the difference in the wage curve inclination would be reflected in the premium.

The focus of this paper lies in whether a positive correlation, as envisaged in tournament theory, is seen between the managerial post premium specific to an establishment obtained in this way and the establishment's turnover. Therefore, from the need to handle the managerial post premium defined at an establishment level, we do not estimate the coefficient of the turnover rate per establishment in the normal wage function that takes individual worker's wages as an explained variable. Instead, after first estimating equation (I) using data on individual workers, we convert the data at an establishment level, and the relationship between the expected value of managerial post premium and turnover is verified in the 2nd stage. When doing so, the advantages of establishment panel data are exploited and the individual effects of business establishments are taken into account. (See [II] as an equation for estimating the fixed effect model.)

$$P_t^j = \gamma_j + \delta Y_t^j + \widetilde{\varepsilon_t^j} \quad \cdots\cdots \text{(II)}$$

P_t^j : managerial post premium obtained from estimation equation (I) (ratio of fixed effects for employees in managerial posts and those not in managerial posts)

Y_t^j: business establishment attributes (turnover rate, job reallocation rate (the sum of the job creation rate and the job destruction rate), part-time ratio, full-time employment change ratio,[7] difference between part-time and full-time turnover[8])

[6] Here, employees with specialized skills have been removed from the comparison targets.

[7] A proxy variable for the change in tournament size in which employees participate.

[8] Turnover is normally higher for part-timers than for full-timers, but the larger this difference, the more employment adjustment is mainly targeted at part-time workers at times of economic fluctuation,

γ_j : establishment fixed effects, δ : parameter

$\widetilde{\varepsilon_t^j}$: error term

Estimation equation (II) was used to estimate normal OLS in addition to the fixed effect model to confirm the consistency of the result. For OLS, the sector dummy and company scale to which the establishment belongs were added to the explanatory variables as business establishment attributes.

Table 1 and 2 show estimation results of the fixed effect model and OLS with control of establishment attributes on the basis of estimation equation (II), in connection with both the contractual hourly wage and the hourly wage including bonuses for the section manager and department manager premium, respectively. As stated above, the coefficients of establishment turnover and job reallocation rates envisaged by the theoretical model are positive, but the results do not necessarily always produce a significantly positive sign.

Viewing the results of Table 1 in detail, no significant relationship is seen between the department manager premium and turnover of full-time workers, etc., when premiums are measured in terms of the contractual hourly wage. As for the section manager premium, a significantly positive relationship is seen between premium and turnover when the impact of years of service is controlled and the shift in the wage curve is taken as a premium. Moreover, the estimated coefficient is larger in the fixed effect model than in OLS, and the interpretation could be that the difference between establishments in the tournament structure may have generated an apparent correlation.

As for the hourly wage including bonuses (Table 2), the same result was obtained for the department manager premium as for the section manager premium in terms of the contractual hourly wage. That is, a positive correlation with turnover is seen if we focus on the upward shift in the wage curve, and just as expected, the coefficient is larger when fixed effects are controlled. For the section manager premium, conversely, the coefficient of turnover is only significantly positive with OLS when years of service are controlled, and only with the fixed effect model when they are not controlled.

To summarize the above, while significant results have not been obtained for all models, there is reasonable ground to suggest that there could be a positive correlation between business establishment turnover, on the one hand, and department and section manager premiums on the other.

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etc. It is thought possible to regard this as a proxy variable for caution in employment adjustment of full-time workers.

Table 1. Determinants of Managerial Post Premium (Contractual Hourly Wage)

Estimation period: 2005−2011 (Annual)

Explained variables: Contractual hourly wage (logarithm) (1st stage), ratio between the expected value of the residuals obtained from observations in a management post in a given establishment and the expected value of the residuals obtained from observations in a non-management post in the same establishment (2nd stage)

Department Managers

Estimation I (Explanatory variable: worker's attributes)	Gender, age, age squared, education (1)	Gender, age, age squared, education (2)	Gender, age, age squared, education (3)	Gender, age, age squared, education, years of service, years of service squared (1)	Gender, age, age squared, education, years of service, years of service squared (2)	Gender, age, age squared, education, years of service, years of service squared (3)
Estimation II	OLS	OLS	Fixed effect model	OLS	OLS	Fixed effect model
Turnover rate (full-time)	0.285		-0.864	0.735		0.960
	(0.458)		(1.103)	(0.488)		(1.166)
Job reallocation rate (full-time)		-0.596			-0.655	
		(0.555)			(0.622)	
Employment change rate (full-time)	1.832 *	1.667	4.086 **	-0.596	-1.063	-4.623 *
	(1.071)	(1.089)	(2.045)	(0.594)	(1.151)	(2.188)
Difference in job reallocation rate (part-time – full-time)	-0.009	-0.052	0.139	-0.215 **	-0.253 **	-0.262
	(0.101)	(0.105)	(2.542)	(0.108)	(0.114)	(0.197)
Part-time ratio	-1.182 *	-1.130	1.296	-0.736	-1.207	1.386
	(0.624)	(0.726)	(2.542)	(0.651)	(0.770)	(2.720)
Sample size	4,063	3,609	4,063	4,100	3,641	4,100
Adjusted R squared	0.0491	0.0477	-	0.0353	0.030	-
R squared (fixed effect model)	-	-	0.0000	-	-	0.0013

Note: Includes annual dummy. 2nd stage OLS estimation includes establishment attributes among explanatory variables.
In parentheses: standard error. *, **, *** show significance at levels of 10%, 5% and 1%, in that order.

Explained variables: Contractual hourly wage (logarithm) (1st stage), ratio between the expected value of the residuals obtained from observations in a management post in a given establishment and the expected value of the residuals obtained from observations in a non-management post in the same establishment (2nd stage)

Section Managers

Estimation I (Explanatory variable: worker's attributes)	Gender, age, age squared, education (1)	Gender, age, age squared, education (2)	Gender, age, age squared, education (3)	Gender, age, age squared, education, years of service, years of service squared (1)	Gender, age, age squared, education, years of service, years of service squared (2)	Gender, age, age squared, education, years of service, years of service squared (3)
Estimation II	OLS	OLS	Fixed effect model	OLS	OLS	Fixed effect model
Turnover rate (full-time)	-0.045		-0.322	0.558 *		1.449 **
	(0.295)		(0.590)	(0.316)		(0.644)
Job reallocation rate (full-time)		-0.261			0.006	
		(0.412)			(0.435)	
Employment change rate (full-time)	1.009	1.073	-1.819	-0.423	-0.599	0.387
	(0.722)	(0.802)	(1.233)	(0.758)	(0.848)	(1.343)
Difference in job reallocation rate (part-time – full-time)	0.008	0.016	0.031	0.015	0.008	0.107 *
	(0.042)	(0.044)	(0.056)	(0.045)	(0.047)	(0.061)
Part-time ratio	-0.715 *	-1.012 **	-0.398	-0.128	-0.208	2.004
	(0.375)	(0.435)	(1.476)	(0.402)	(0.469)	(1.641)
Sample size	6,237	5,486	6,237	6,203	5,464	6,203
Adjusted R squared	0.0263	0.0274	-	0.0114	0.0109	-
R squared (fixed effect model)	-	-	0.001	-	-	0.000

Note: Includes annual dummy. 2nd stage OLS estimation includes establishment attributes among explanatory variables.
In parentheses: standard error. *, **, *** show significance at levels of 10%, 5% and 1%, in that order.

Table 2. Determinants of Managerial Post Premium (Hourly Wage Including Bonuses)

Estimation period: 2005−2011 (Annual)

Explained variables: Hourly wage including bonuses (logarithm) (1st stage), ratio between the expected value of the residuals obtained from observations in a management post in a given establishment and the expected value of the residuals obtained from observations in a non-management post in the same establishment (2nd stage)

	Department Managers					
Estimation I (Explanatory variable: worker's attributes)	Gender, age, age squared, education (1)	Gender, age, age squared, education (2)	Gender, age, age squared, education (3)	Gender, age, age squared, education, years of service, years of service squared (1)	Gender, age, age squared, education, years of service, years of service squared (2)	Gender, age, age squared, education, years of service, years of service squared (3)
Estimation II	OLS	OLS	Fixed effect model	OLS	OLS	Fixed effect model
Turnover rate (full-time)	-0.260		-0.376	0.907 **		1.784 *
	(0.365)		(0.754)	(0.400)		(0.968)
Job reallocation rate (full-time)		-0.427			0.057	
		(0.442)			(0.496)	
Employment change rate	1.445 *	1.454 *	1.513	0.244	-0.481	1.121
(full-time)	(0.854)	(0.868)	(1.395)	(0.946)	(0.976)	(1.845)
Difference in job reallocation	-0.061	-0.052	(0.069)	-0.015	-0.039	0.190
rate (part-time – full-time)	(0.080)	(0.083)	(0.124)	(0.088)	(0.093)	(0.160)
Part-time ratio	-0.981 **	-1.049 *	0.094	-0.228	-0.310	-0.362
	(0.499)	(0.580)	(1.752)	(0.550)	(0.647)	(2.264)
Sample size	4,108	3,650	4,108	4,097	3,639	4,097
Adjusted R squared	0.0502	0.0521 -		0.0279	0.0255	-
R squared (fixed effect model)	-	-	0.0018	-	-	0.002

Note : Includes annual dummy. 2nd stage OLS estimation includes establishment attributes among explanatory variables.
In parentheses: standard error. *, **, *** show significance at levels of 10%, 5% and 1%, in that order.

Explained variables: Hourly wage including bonuses (logarithm) (1st stage), ratio between the expected value of the residuals obtained from observations in a management post in a given establishment and the expected value of the residuals obtained from observations in a non-management post in the same establishment (2nd stage)

	Section Managers					
Estimation I (Explanatory variable: worker's attributes)	Gender, age, age squared, education (1)	Gender, age, age squared, education (2)	Gender, age, age squared, education (3)	Gender, age, age squared, education, years of service, years of service squared (1)	Gender, age, age squared, education, years of service, years of service squared (2)	Gender, age, age squared, education, years of service, years of service squared (3)
Estimation II	OLS	OLS	Fixed effect model	OLS	OLS	Fixed effect model
Turnover rate (full-time)	0.238		0.842 *	0.554 **		0.200
	(0.244)		(0.509)	(0.259)		(0.537)
Job reallocation rate (full-time)		0.457			-0.020	
		(0.340)			(0.357)	
Employment change rate	0.108	0.089	0.537	0.654	0.598	0.754
(full-time)	(0.590)	(0.662)	(1.074)	(0.627)	(0.695)	(1.118)
Difference in job reallocation	-0.063 *	-0.045	-0.007	-0.031	-0.038	0.036
rate (part-time – full-time)	(0.035)	(0.037)	(0.048)	(0.038)	(0.039)	(0.052)
Part-time ratio	-0.344	-0.365	1.127	-0.381	-0.232	-1.205
	(0.309)	(0.365)	(1.260)	(0.332)	(0.388)	(1.383)
Sample size	6,280	5,528	6,280	6,228	5,476	6,228
Adjusted R squared	0.027	0.0270	-	0.023	0.02	-
R squared (fixed effect model)	-	-	0.0003	-	-	0.002

Note : Includes annual dummy. 2nd stage OLS estimation includes establishment attributes among explanatory variables.
In parentheses: standard error. *, **, *** show significance at levels of 10%, 5% and 1%, in that order.

2. Relationship between Promotion Likelihood and Turnover: With Focus on Lifetime Employees

In the previous section, we examined how the promotion premium as a prize in competition for promotion is related to the increased fluidity of business establishments, based on tournament theory. As a result, it was shown that increased fluidity of employment could serve to push up promotion premiums, particularly in connection with promotions to section manager class. Another aspect of competition for promotion is the likelihood of being promoted, and this point will be investigated here. However, considering the Figures in this paper so far, whether or not there are changes in competition for promotion among lifetime employees could be more important when discussing changes in so-called Japanese employment practices and the functions of internal labor markets. To address this, Table 3 shows the result of estimating determinants behind the likelihood of lifetime employees being promoted to section manager.

Using a binary variable (i.e. '1' if a lifetime employee is a section manager, '0' if below section manager level) as explained variables, and the attributes of both the individual and the establishment as explanatory variables, workers' microdata were used to estimate the effect for business establishments by means of controlled OLS. The focus of this estimation is on whether the coefficient of turnover at establishment level is negatively significant to the likelihood of promotion, and the derived signs were negative in all models. This was invariably the case, whether using the turnover, recruitment rate, or job leaving rate of full-time workers as explanatory variables. That is, the implication is that it is harder for lifetime employees to be promoted to section manager in establishments with a rapid turnover of full-time workers. Figure 4 above showed the share of section managers among lifetime employees and non-lifetime employees by age, revealing that, although the share of section managers increases after passing 45, non-lifetime employees are also increasingly promoted to section manager. At this time, competition between external recruits and lifetime employees intensifies in establishments that have high ratios of external recruits and rapid staff turnover, suggesting that promotion becomes harder for lifetime employees.

Though the results are not expressed graphically here, if we make the same estimation for the likelihood of promotion to department manager, this time the signs are positive in all models. The same applies whether using the turnover, recruitment rate, or job leaving rate as an explanatory variable. This could be because lifetime employees do not necessarily share the same arena of competition with external recruits, since, in contrast to section managers, most young department managers in their 30s to mid-40s are external recruits, while the share of lifetime employee department managers overtakes that of external recruit department manager from the mid-40s onwards. There is no uniform trend in turnover itself during the estimation period. After 2005, however, both the turnover and the job reallocation rate peaked in around 2008 and 2009, corresponding to the Lehman collapse and the ensuing economic downturn (Table 4). This suggests that changes in the labor market for intermediate-age workers seen so far could have been in progress during the period of

Table 3. Factors in the Promotion of Lifetime Employees to Section Manager

	Section Manager							
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	OLS	OLS	OLS	OLS + establishment effect	OLS	OLS	OLS	OLS + establishment effect
Establishment attributes								
Employment change rate (full-time)	-0.115 ***	-0.110 ***	-0.137 ***	-0.301 ***	-0.122 ***	-0.112 ***	-0.139 ***	-0.173 ***
	(0.008)	(0.008)	(0.009)	(0.017)	(0.008)	(0.009)	(0.009)	(0.014)
Part-time ratio	0.017 ***	0.018 ***	0.017 ***	-0.213 ***	-0.047 ***	-0.047 ***	-0.047 ***	-0.160 ***
	(0.004)	(0.004)	(0.004)	(0.017)	(0.004)	(0.004)	(0.004)	(0.014)
Difference in job reallocation rate	0.0297 ***	0.0300 ***	0.0296 ***	0.00496 **	0.0256 ***	0.0257 ***	0.0255 ***	0.00568 ***
(part-time − full-time)	(0.001)	(0.001)	(0.001)	(0.002)	(0.008)	(0.001)	(0.001)	(0.002)
Corporate scale 5,000 or more employees	-0.0008	-0.0018	-0.0004	-	0.0824	0.0819 ***	0.0826 ***	-
	(0.003)	(0.003)	(0.003)		(0.003)	(0.003)	(0.003)	
Corporate scale 1,000−5,000 employees	0.00798 ***	0.00747 ***	0.00811 ***	-	0.0833 ***	0.0831 ***	0.0833 **	-
	(0.003)	(2.730)	(0.003)		(0.003)	(0.003)	(0.003)	
Corporate scale 500−999 employees	-0.0065 **	-0.0065 **	-0.0067 **	-	0.0574 **	0.0575 ***	0.0573 ***	-
	(0.003)	(0.003)	(0.003)		(0.003)	(0.003)	(0.003)	
Corporate scale 300−499 employees	0.0432 ***	0.0421 ***	0.0441 ***	-	0.104 ***	0.104 ***	0.105 ***	-
	(0.004)	(0.004)	(0.004)		(0.004)	(0.004)	(0.004)	
Corporate scale 300 or less employees	-	-	-	-	-	-	-	-
Turnover rate (full-time)	-0.0137 ***	-	-	-0.177 ***	-0.0146 ***	-	-	-0.136 ***
	(0.003)			(0.007)	(0.003)			(0.006)
Recruitment rate (full-time)	-	-0.0066	-	-	-	-0.0175 ***		-
		(0.006)				(0.006)		
Job leaving rate (full-time)	-	-	-0.0397 ***	-	-	-	-0.0334 ***	-
			(0.005)				(0.005)	
Other controls (worker's attributes)	Age, age squared, years of service, years of service squared, years of education				Age, age squared, years of education			
Sample size	626,204	626,204	626,204	626,204	626,204	626,204	626,204	626,204
Pseudo coefficient of determination	0.2014	0.2013	0.2014	0.4023	0.1482	0.1481	0.1482	0.3251

Table 4. Trends in Turnover and Job Reallocation Rates

Explained variable	Turnover rate (full-time)	Job reallocation rate (full-time)
Trend	0.0174 **	0.0181 **
	(0.007)	(0.007)
Trend squared	-0.00237 ***	-0.00218 **
	(0.001)	(0.001)
Peak theoretical value (year)	3.68	4.15
Sample size	5,458	4,933

Note: Results of estimation using the fixed effect model. Estimation period 2005–2011. Explained variables are the turnover and job reallocation rate for each business establishment.

economic expansion before the Lehman collapse. As such, differentiating factors that arise from business cycles is an issue that remains to be addressed.

VI. Interpretation of Estimation Results and Conclusion

The main focus of this paper lay in ascertaining what sort of structural changes have been experienced in the labor market by intermediate-age workers, who represent the core of the long-term employment system, over the two decades since the collapse of the bubble economy. As a result of examination in terms of both the wages of intermediate-age workers and trends in their promotion to executive posts, it became clear that even within the cohort of intermediate-age workers, trends in such changes varied depending on the workers' individual attributes. Specifically, different structural changes appear to have occurred in cases of internal promotion from section manager to department manager and those of internal promotion from below section manager to section manager. On the promotion to section manager, the posterior likelihood of being promoted has increased as the share of section managers has increased overall, while wages after promotion have decreased, albeit by a small margin. Meanwhile, if establishment fixed effects are controlled and other conditions are made constant, the section manager premium tends to rise as the impact of competition with external recruits grows stronger, while at the same time the likelihood of internal promotion tends to fall. These changes are consistent with the tournament structure discussed in the rank-order-tournament model. Although it is uncertain whether increased fluidity of the labor market at the point of promotion to section manager can be said to have advanced so far as to destroy Japanese employment practices, the suggestion is that frameworks discussed in economics can be applied to the mechanism behind this. We also know that the increased fluidity of the labor market and the promotional structure of intermediate-age workers are not unrelated.

On promotions to department manager, meanwhile, here again the share of depart-

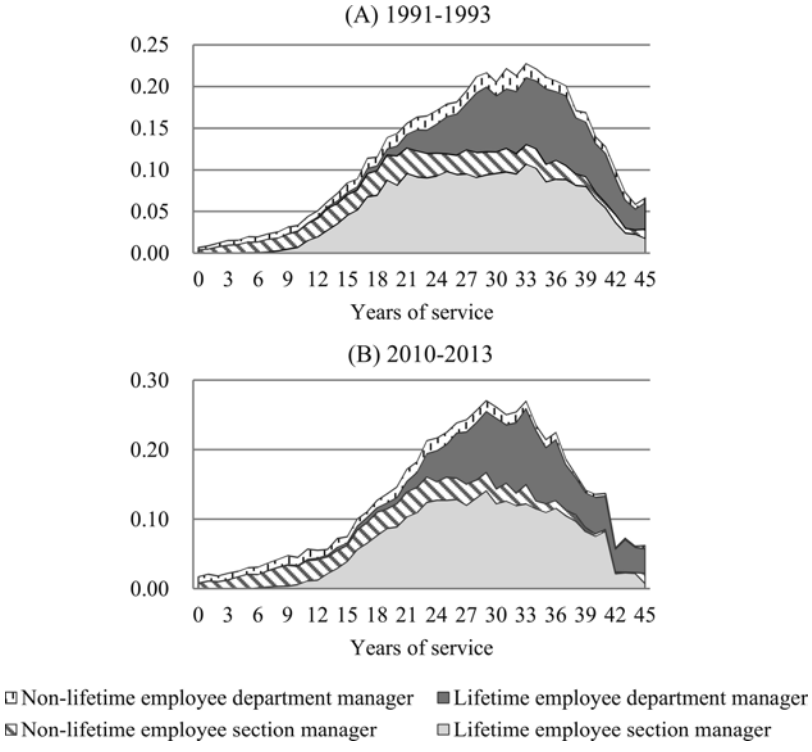
ment managers has risen and wages have also fallen somewhat, but the degree of these changes is far more limited than in the case of section managers. If the establishment fixed effects are controlled, the premium tends to be higher if the impact of competition with external recruits is stronger, just as with section managers. However, the likelihood of internal promotion is conversely higher if the impact of competition with external recruits is stronger. Therefore, the estimation results are not necessarily consistent with the tournament model. Behind this lies the fact that, while non-lifetime department managers are hired as such at a relatively early age, other non-lifetime employees have a low likelihood of being promoted to department manager even after amassing long years of service; instead, lifetime employees have a relatively greater likelihood of promotion to department manager as their age increases. We may therefore point to the possibility that there is still not much competition within companies between external recruits and lifetime employees beyond a certain age when it comes to department manager posts. In that sense, the relationship between the lifetime employee group and the mid-career recruit group is not a completely competitive one as far as department manager posts are concerned; rather, the pre-existing structure of intermediate-age workers does not seem to have changed greatly.

To examine the group of workers who form the core of labor power in Japanese companies, in this paper the term “intermediate-age workers” has been used for convenience to describe full-time workers in a certain age bracket, and their trends have been observed. It has been suggested, however, that the mechanisms behind the promotions and wage setting of these intermediate-age workers are diverse.

This kind of diversity cannot be explained easily by using a single, simple model such as the rank-order-tournament. However, the result obtained from analysis in this paper, i.e. that promotion to department manager is not necessarily consistent with the tournament model, could become explainable by expanding the model. Specifically, tournaments within companies should be understood as having an inherently multi-staged structure, and the promotion of lifetime employees to department manager, as the next step after promotion to section manager, is thought to require ongoing examination. The authors therefore aim to make this a task for future study.

Source: Calculated by the authors from the *Wage Census*.
Note: Wage dispersion ratio = (Wage dispersion of intermediate-age workers) / (Overall wage dispersion)

Appendix Figure 1. Trends in Wage Dispersion among Intermediate-Age Workers in Large Corporations



Source: Calculated by the authors from the *Wage Census*.

Appendix Figure 2. Shares of Department and Section Managers by Years of Service: Lifetime Employees vs. Others

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