Recruit Works Institute

Works Discussion Paper Series No.83

The Impacts of Wage on Recruitment and Retention: Evidence from Japanese Chain Stores and Restaurants

Kazutomo Komae
Hiroyuki Motegi

RECRUIT リクルートワークス研究所 http://www.works-i.com/

Works Discussion Paper No.83

The Impacts of Wage on Recruitment and Retention: Evidence from Japanese Chain Stores and Restaurants

Kazutomo Komae（Recruit Works Institute）
Hiroyuki Motegi（National Institute of Population and Social Security Research）

September 30, 2025

Abstract

This paper analyzes the impact of wages on the recruitment and retention of part-time and temporary workers by matching store data with job advertisements in the retail and food service industries to construct a unique dataset. For the recruitment analysis, we proposed constructing store panel data as one strategy to overcome challenges identified in previous studies. This yielded an elasticity of 4.7% for the number of applicants and 1.9% for the number of hires. In the retention analysis, while some evidence suggested higher wages reduce turnover, the results were mixed.

Keywords: wage, recruitment elasticity, retention, alternative data

1. Introduction

How do workers respond to wages? In other words, wage elasticity of labor supply is a major theme in labor economics, and a large body of research has accumulated. Blundell and MaCurdy (1999), Keane (2011), Keane and Rogerson (2015), and others summarize the findings of previous studies. However, most conventional research measures elasticity at the final equilibrium point of supply and demand. That is, it does not account for the possibility that, before the final hiring decision, workers may react strongly to wage increases, but supply is constrained by demand-side factors. Conventional observational data can only observe the final labor quantity, which is a mix of demand-side factors and supply-side decisions. To see a more accurate wage elasticity of labor supply, it would be more appropriate to look at workers' application behavior in response to wage changes.

This study analyzes the impact of wages on recruitment and retention among part-time and temporary workers, estimating elasticities for both recruitment and retention. We constructed a unique dataset by matching store-level data from the retail and food service industries with job advertisements. Over a quarter-century has passed since the widespread adoption of the internet, and alongside ICT advancements, the presence of alternative data has grown. In addition to this trend, observations suggest COVID-19 significantly accelerated digitalization (Amankwah-Amoah et al. 2021). In recent years, its use has expanded even among policymakers, as seen in “GDPNow” (Federal Reserve Bank of Atlanta).

Research has also explored the potential of alternative data. Previous studies measuring recruitment elasticity using alternative data like job advertisements and employment agency data include Dal Bó et al. (2013), Banfi and Villena-Roldán (2019), Azar et al. (2022), and Kambayashi et al. (2025). While the body of research is gradually growing, the number of studies remains limited.

Furthermore, as mentioned earlier, much of the existing research estimates elasticity at the equilibrium point of supply and demand. They analyze job postings or job seekers to measure the effect of wages, leaving unaddressed the challenge of measuring elasticity at the point of entry into the labor market. Recently, papers estimating application elasticity have begun to emerge, though they remain few in number. Banfi and Villena-Roldán (2019) note that highly skilled job seekers respond well to experience requirements when applying, while low-skilled job seekers respond well to wages. Kambayashi et al. (2025) suggest that job seekers who were originally offered low wages tend to avoid high-wage job openings. They further argue that the relatively low elasticity of job applications is largely influenced by neoclassical buyer monopoly arising from job differentiation

(Manning 2020). Based on these discussions, unobservable processes exist for individual job postings and job seekers, making it difficult to identify the pure effect of wages. This is because postings are withdrawn once filled, and job seekers are off the market once hired, making it impossible to fully eliminate the impact of these processes.

This study analyzes the impact of wages on the recruitment and retention of part-time and temporary workers and estimates their elasticity. We obtained monthly personnel data from three cooperating firms and created monthly store panel data on hiring by matching it with data from Japan's largest job advertising site, the National Census, and publicly available municipal tax data. We then estimated elasticity by regressing the number of applicants and the number of people employed at a store against the posted wage. As an identification strategy, we applied fixed-effects estimation using panel data. Since the jobs handled are entry-level positions (essentially the same job) at the same store, we believe that by controlling for store fixed effects, we can measure the effect of the wages offered. Following the analysis of recruitment elasticity, the analysis of the effect of wages on reducing turnover focused on two of the partner firms for which we could also obtain employee data. We created monthly employee panel data by matching monthly data on non-regular employees assigned to stores with data from the job advertising site.

It is particularly noteworthy that, given the elasticity of part-time and temporary workers, the posted wage directly corresponds to the actual wage. In contrast, for regular employees, there is often room for negotiation between the posted wage and the final wage negotiated upon hiring, meaning the actual final wage frequently differs from the posted wage. This concern does not exist in this study.

The contributions of this study are as follows. First, by utilizing alternative data, it represents a rare study estimating wage elasticity of demand. This allows us to understand how workers' willingness to accept a job is determined by wages. Furthermore, the analysis unit being the store is also uncommon; most studies use either the individual or the firm as the unit. Additionally, analyzing retention is a distinctive feature; to the author's knowledge, there is no previous study on this topic.

The structure of this paper is as follows. Section 2 analyzes recruitment elasticity. After constructing the data and observing descriptive statistics, we discuss the results of the regression analysis. Section 3 analyzes the effect of wages on reducing turnover. Section 4 presents the summary and future research directions.

2. Recruitment elasticity

2.1 Data

First, we analyze the recruitment elasticity of posted wages. The analysis covers a total of 25,686 store-months across three cooperating firms: Firm A in retail, and Firms B and C in food service. The analysis period spans March 2019 to May 2023. While the data provision periods differ by firm, data for all firms is complete from January 2021 to May 2023.

Although the period included the spread of COVID-19, creating store-specific panel data over the long term enabled reliable analysis results. Furthermore, this period coincided with relatively large minimum wage increases in Japan. Excluding 2020, when the spread of COVID-19 was significant, the nationally weighted average minimum wage increased by at least 3% annually. These continuous increases could amplify the impact of the minimum wage on the wages offered by firms in job postings. Indeed, examining the wage distribution for the entire country and for the municipalities (cities, wards, towns, and villages) where the analyzed stores are located during the study period (Figure 1) shows that approximately one-quarter of job postings nationwide and in the store locations (hereinafter referred to as “store locations”) listed wages less than 20 yen above the minimum wage. Considering that Japan adopts regional minimum wages set by prefecture and that minimum wages rose significantly during this period, the figures created for this study use the deviation from the minimum wage as the axis. Furthermore, the minimum wage was included as a control variable in the regression analysis.

The partner firms' stores are distributed across 42 prefectures and 393 municipalities, showing a relative concentration in urban areas. Figure 1 indicates that store locations are skewed closer to the minimum wage than the national average. This stems from the higher minimum wage levels set in urban areas.

To analyze the elasticity of posted wages, we combine the partner firms' personnel data with data from Japan's largest job advertisement site (hereinafter referred to as “job advertisements”). These job advertisements represent the largest share of advertising operated by private firms in Japan. While the Ministry of Health, Labour and Welfare's “Employment Security Business Statistics” is the largest source of job information in Japan, it only publishes aggregated data by prefecture and does not disclose posted wages.

For the analysis of recruitment elasticity, we panelized the monthly and store-specific information from the cooperating firms (hereinafter referred to as “store panel data”). The store panel data includes: store location (prefecture, city/town/village), posted wage, number of applicants, number of hires (for the month the hire applied), minimum wage applicable to that store, number of job advertisements in the municipality where the store is located, their average

wage, and the number of job advertisements in the same industry (medium classification) and the municipality. For some firms and stores, it also includes sales revenue and the total working hours of employees (including regular employees) assigned to that store. Furthermore, average yearly earnings were calculated using resident tax data from the municipality where the store is located and added to the dataset.

Table 1 presents descriptive statistics for the store panel data. The store panel data consists of 37,905 store-months, but job openings occurred in only 25,686 store-months. Therefore, 67.8% of stores posted job openings during the target period. Data from the month of a store's new opening was excluded from this dataset. This exclusion aims to eliminate unobservable biases arising from differences in recruitment methods compared to normal operations and the typically higher number of new hires during store openings.

The average recruitment wage was 976.7 yen, with an average deviation from the minimum wage of 36.2 yen. However, as shown in Figure 2, the deviation from the minimum wage varied significantly by firm. While Firm A's wages clustered near the minimum wage, Firms B and C had most frequent values of 40-59 yen and 60-79 yen above the minimum wage, respectively. The average number of job postings published in the same month and municipality was 644.7. Narrowing the focus to the same industry (medium classification) yielded 160.9 postings, with an average posted wage of 999.0 yen, slightly higher than that of the cooperating firms.

Figure 3 shows the relationship between monthly and firm-specific posted wage levels. Reflecting the annual October minimum wage increase during the analysis period, Firm A significantly raised its recruitment wages in October, with minimal fluctuation in other months. Firm B also saw its largest increase in October but tended to raise wages in April as well. Firm C did not raise wages in October, instead increasing recruitment wages in March and August. Firms B and C exhibit greater fluctuations in posted wages outside October compared to Firm A. This is because the food service industry experiences relatively large monthly variations in business volume.

2.2 Estimation of recruitment elasticity

We estimate recruitment elasticity estimates by the following econometric model.

$$ln\#ofPeople_{it} = \alpha + \beta_0 lnPostedWage_{it} + X'_{it}\beta_1 + \theta_i + \delta_t + u_{it}$$

Here, the dependent variable $ln\#ofPeople_{it}$ is either the logarithm of the monthly number of applicants at the store i during the t period (where “period” refers to one month) or the logarithm of the number of hires at the store i during the t period (the number of hires during the month in

which the applicant applied). $lnPostedWage_{it}$ is the logarithm of the minimum posted wage at the store during the period. The control variables X_{it} include the logarithm of the average advertised wage in the municipality where the store is located, the logarithms of the number of job advertisements and the number of job advertisements in the same industry (medium classification), the logarithm of the minimum wage applicable to the store, and the logarithm of the average yearly earnings in the municipality. θ_i represents the store fixed effect, and δ_t represents the month fixed effect. The analysis covers stores that posted the job openings listed in Table 1. The target parameter is β_0.

According to the estimation results in Table 2, a 1% increase in the posted wage led to an average 4.7% increase in the number of applicants across the three firms. Looking at individual firms, Firm A, Firm B, and Firm C saw increases of 3.0%, 4.8%, and 4.0% respectively. While there is some variation, all three showed a significant increase in the number of applicants. Regarding hires, however, a 1% increase in posted wages resulted in an average increase of 1.9% across the three firms. Examining individual firms, Firm B (2.3%) and Firm C (2.4%) showed significant increases, while Firm A (0.6%) did not.

The values obtained in Table 2 are larger than the elasticities reported in previous studies. As mentioned earlier, this analysis utilizes store panel data, measuring the effect of changes in posted wages for nearly identical jobs. This suggests that individual circumstances of job postings and job seekers, as noted by Banfi and Villena-Roldán (2019) and Kambayashi et al. (2025), are unlikely to significantly influence the estimation results. However, the unique characteristics of the period under study must also be considered. Figure A1 presents rolling regression analysis conducted in 12-month intervals (similar to Ohta and Komae 2022). The results show that elasticity values declined when comparing 2019, just before the COVID-19 pandemic, to the latter half of the analysis period. This suggests the possibility of reaching the Lewis turning point, as pointed out by Ozaki and Genda (2020) and Furukawa (2023). Conversely, it could also be due to the analysis focusing on the period when elasticity was measured at its highest.

An increase in the average posted wage or job openings within the same municipality was expected to have a negative effect on the dependent variable, as it would heighten the influence of competing firms in recruitment activities. However, the increase in average posted wages showed a significant negative effect only on the number of new hires at Firm B, and was not significant in most analyses. An increase in the number of job openings yielded significant results for the same industry (medium classification), but contrary to expectations, an increase in the number of job

openings within the same municipality was found to increase the number of applicants to partner firms' stores.

Furthermore, minimum wage increases could potentially have a positive effect on the dependent variable by raising the level of posted wages, thereby increasing the leisure-income substitution effect for job seekers. Conversely, they could have a negative effect by raising the wage levels of competing firms in the hiring market. Firms B and C, which have a large number of job openings at levels somewhat above the minimum wage, were predicted to be more significantly affected by the former impact. Firm A, which has a large number of job openings near the minimum wage level, was predicted to be more significantly affected by the latter impact. As a result, only the number of applicants for Firm B was significant and consistent with predictions, while most analyses were insignificant.

The average taxable income standard within the same municipality can be considered a proxy indicator for the income level of households in that area. Considering that many part-time and temporary workers engage in employment to supplement household income, it was predicted that this would reduce the probability of application through an income effect. As a result, no significant effect was observed on the number of applicants, but an effect reducing the number of hires was observed.

Thus far, we have examined firm-specific results. Does elasticity vary depending on wage levels or local labor supply and demand around stores? Table 3 presents results from subsamples divided by conditions. Panels A and B analyze data split into upper and lower groups based on median deviation from the minimum wage.

For Firm A, stores with small deviations from the minimum wage showed no significant effect, whereas stores with large deviations showed a significant effect and relatively high elasticity. For Firm A, most posted wages were equal to the minimum wage, and they raised posted wages around the same time as the October minimum wage revision (Figure 3). Consequently, raising posted wages did not increase the number of applicants or hires. However, offering wages somewhat above the minimum wage clearly showed the effect of the wage increase.

Firm B showed significant positive values in both store groups. Firm C was significant for applicant elasticity in both store groups, but for new hires elasticity, it was significant only in the store group with larger wage gaps. As confirmed in Figures 1 and 2, most posted wages were close to the minimum wage. Offering wages slightly above this level likely increased recruitment elasticity and enhanced statistical significance.

Panel C and Panel D in Table 3 show the job concentration index calculated by dividing the number of job advertisements within the same municipality by the total number of job advertisements in that municipality, broken down by month and municipality. This index was used to analyze the top and bottom tiers of job concentration.

$$Job\ Posting\ Concentration = \frac{1}{\#\ of\ job\ advertisements\ at\ the\ store\ location}$$

Many previous studies use the Herfindahl-Hirschman Index (HHI) as an indicator of market concentration (Azar et al. 2020; Izumi et al. 2023). However, for the job advertisements used in this study, the number of positions per individual ad or the number of hires (new employees) cannot be obtained. Against this background, the aforementioned index was substituted as a measure of job posting concentration. Low job posting concentration indicates a competitive market, while high concentration suggests conditions closer to buyer monopoly.

Firm A showed no significant results for either number of applicants or number of hires in either the group of stores with high job posting concentration or the group with low concentration. Firm B showed significant results for both the number of applicants and the number of hires in both the high-concentration and low-concentration store groups. Firm C showed significant results for the number of applicants in both the high-concentration and low-concentration store groups, while for the number of hires, significant results were only observed in the low-concentration store group.

3. Effects of wage on retention

3.1 Data

The latter half analyzes the relationship between wages and turnover rates. The analysis covers a total of 590,840 person-months from two partner firms: Firm A in the retail industry and Firm B in the food service industry. The analysis period spans March 2019 to May 2023. While the data provision periods differ by partner firm, data for both firms is complete from July 2020 to May 2023. To exclude resignations due to store closures, the month of closure was excluded from the analysis.

For the turnover rate analysis, monthly and employee-specific information belonging to the cooperating firms' stores was converted into panel data (hereafter, “employee panel data”). The employee panel data includes the store location (prefecture, city/town/village), the employee's age, hourly wage, length of service in months, monthly working hours, a dummy variable (1 if the employee left, 0 otherwise), the minimum wage applicable to the store, the number of job

advertisements in the municipality where the store is located and their average wage, their average wage, the number of job advertisements in the same industry (medium classification) and the municipality, sales revenue of the store and the total working hours of employees (including regular employees) assigned to that store.

Table 4 shows descriptive statistics for the employee panel data. The average age was 28.3 years, with Firm A at 32.4 years and Firm B at 25.7 years. Examining the composition in Figure 4 reveals that both Firm A and Firm B have a high proportion of employees aged 15-19 and 20-24. Young people, primarily students, form the main workforce for part-time and temporary positions. Notably, those under 25 years old account for approximately 70% of Firm B's workforce, a demographic characteristic reflected in its average age.

The average tenure is 33.3 months, or just under 3 years. Firm A's average tenure is 53.0 months, while Firm B's is 20.8 months. Figure 5 shows the next-month turnover rate by months of tenure. Firm A shows a high turnover rate in the 0-5 month range, but for those with six months or more of tenure, the monthly turnover rate generally stabilizes around 5%. The rate increases for 42-47 months of tenure but declines for 48 months or more.

The average wage level was 991.1 yen, with Firm A at 947.1 yen and Firm B at 1019.0 yen. Looking at the deviation from the minimum wage by length of service in Figure 6, Firm B shows a larger increase with seniority compared to Firm A. However, during the analyzed period, the minimum wage was raised by over 3% annually, meaning Firm A also saw wage increases. Furthermore, social insurance enrollment rates increased with longer tenure, meaning the overall compensation growth due to seniority at Firm A was greater than the apparent wage increase.

Finally, in descriptive statistics, the average monthly working hours were 63.0 hours overall, with 70.2 hours at Firm A and 58.4 hours at Firm B. While Firm A had longer average working hours, examining working hours by length of service shows a trend of increasing hours with longer tenure, with both the level and rate of increase being similar (Figure 6).

3.2 Analysis

The analysis of wage stickiness estimates the following econometric model.

$$Separation_{it+1} = \alpha + \beta_0 lnWage_{it} + X'_{it}\beta_1 + \theta_i + \delta_t + u_{it}$$

Here, the dependent variable $Separation_{it}$ indicates the state of an individual i employed during period (where “period” denotes a calendar month) in the subsequent month t+1. It takes the value 1 if the individual leaves employment in the next month, and 0 otherwise. The right-hand side $lnWage_{it}$ is the logarithm of the individual's i hourly wage during period t. The control

variables X_{it} include the logarithm of the employee's tenure in months, the logarithm of the average advertised wage in the municipality where the employee is located, the logarithms of both the number of job advertisements and the number of job advertisements in the same industry (medium classification), and the logarithm of the minimum wage applicable to the store. It also includes “sales per man-hour,” calculated by dividing the store's sales revenue by the total labor hours of its employees. In employee panel data, sales per man-hour can be interpreted as an indicator of a store's busyness, considering it reflects labor productivity at the store where the employee works or assumes no significant short-term changes in the store's machinery and equipment. θ_i represents the individual fixed effect, δ_t and represents the monthly fixed effect. The target parameter is β_0. This analysis was conducted using a linear probability model because the logit model failed to converge.

Table 5 shows that the combined analysis of Firms A and B did not reveal a statistically significant effect of wages on turnover rates. When analyzing separate subsamples by firm, Firm A showed that higher hourly wages reduced turnover rates. The magnitude of this effect was a 7.8% reduction in turnover for every 1% increase in wages. Firm B, however, showed that higher hourly wages increased turnover rates. This result was contrary to the expected direction of the effect. Regarding the impact of social insurance enrollment, this was observable only for Firm A, where enrollment was found to reduce turnover.[1]

Table 6 presents the subsequent analysis by subsample. Panel A analyzes employees grouped by their wage level relative to the minimum wage. For Firm A, higher wages lead to lower turnover in both groups of stores. However, when analyzing by subsample, no statistically significant effect was observed for Firm B.

Panel B divides the subsamples based on the concentration of job openings in the store location. For Firm A, the effect was significant in the group with low job concentration, but not in the group with high job concentration. For Firm B, the effect was significant in the group with high job concentration, but here too, higher wages were associated with higher turnover rates.

Panel C subdivides the data based on the level of sales per man-hour. As mentioned earlier, if sales per man-hour are considered an indicator of store busyness, it is plausible that the effect of wages

[1] This is because Firm B's workforce consists largely of young students, and no changes in social insurance enrollment status were observed during the target period. Note that at the time of this analysis, eligibility for social insurance in Japan required: (1) not being a student, (2) working at least 20 hours per week, (3) earning a monthly salary of ¥88,000 or more, and (4) intending to work for more than two months (additional requirements include the number of social insurance enrollees at the employer).

varies depending on store activity levels. For Firm A, only the group of stores with high sales per man-hour showed a decrease in turnover rate when wages were high. In Firm B, while higher wages reduced turnover in the group of stores with low sales per man-hour, higher wages actually increased turnover in the group of stores with high sales per man-hour.

Although we conducted analyses by subsample up to this point, the results for Firm B were not necessarily consistent with the theory. Considering the results in Table 6 Panel C, it is possible that while wages are set higher in stores with high workload, this does not sufficiently suppress turnover. However, further analysis based on the data obtained this time is difficult, and it will be necessary to explore the causes by adding new data in the future. Possible approaches for adding new analysis include introducing indicators that can more accurately measure actual workload or conducting surveys such as engagement surveys among employees and linking them to panel data.

4. Conclusion

In recent years, research utilizing alternative data has accumulated. This study created a dataset using data from Japan's largest job advertisement site and personnel data from cooperating firms in the retail and food service industries.

For analyzing recruitment elasticity, monthly store panel data were created. Estimation results showed that the elasticity of applicant numbers with respect to posted wage averaged 4.7% across the three partner firms, ranging from 3.0% to 4.8% by firm. Furthermore, the elasticity of hires was 1.9% on average across the three firms, with statistically significant results observed in only two of the three firms.

These values were larger compared to results from previous studies. Factors contributing to this include the ability to exclude the influence of individual circumstances in job postings and job searches, which had been pointed out in previous studies. Additionally, the period under study may have coincided with a time when labor supply elasticity for part-time and temporary workers was particularly high. Further verification is needed on this point.

Next, we analyzed the effect of wages on reducing turnover. While higher wages are expected to reduce turnover, our results showed that a 1% increase in wages reduced the turnover rate by 7.8% at Firm A, but at Firm B, turnover actually increased. We analyzed subsamples using store-level information, but the results were not always consistent with theory. Further analysis based solely on the data obtained this time is difficult, but it is possible to explore the causes by adding new data in the future. Specifically, introducing indicators that can more accurately measure the

actual workload or conducting surveys like engagement surveys among employees and linking them to panel data are potential approaches.

Acknowledgement

We extend our deepest gratitude to the cooperating firms that understood the purpose of this research and provided valuable data, to those who provided data from job advertisement websites, and to all other related parties for their support in conducting this study.

References

Amankwah-Amoah, J., Khan, Z., Wood, G.R. and Knight, G.A. (2021), "COVID-19 and digitalization: the great acceleration", Journal of Business Research, Vol. 136, pp. 602-611.

Azar, J. Berry, S. and Marinescu, I. E. (2022) "Estimating Labor Market Power," SSRN Electronic Journal, 30365.

Azar, J. Marinescu, I. Steinbaum, M. Taska, B. (2020) "Concentration in US labor markets: Evidence from online vacancy data" Labour Economics, 66, 101886.

Banfi, S. and Benjamín Villena-Roldán (2019) "Do High-Wage Jobs Attract More Applicants? Directed Search Evidence from the Online Labor Market," Journal of Labor Economics, 37 (3), pp. 715–746.

Blundell, R., & MaCurdy, T. (1999). Labor supply: A review of alternative approaches. Handbook of labor economics, 3, 1559-1695.

Bó, E. D. Finan, F. and Rossi, M. A. (2013) "Strengthening State Capabilities: The Role of Financial Incentives in the Callto Public Service," The Quarterly Journal of Economics, 128 (3), pp. 1169–1218.

Izumi, A. Kodama N. and Kwon, H. U. (2023) "Labor market concentration and heterogeneous effects on wages: Evidence from Japan" Journal of the Japanese and International Economies, 67, 101242.

Kambayashi, R., Kawaguchi, K. and Otani, S. (2025) "Decomposing Recruitment Elasticity in Job Matching," IZA Discussion Paper, No. 17613, IZA Institute of Labor Economics.

Kawaguchi, D. Mori, Y. (2009) "Is Minimum Wage an Effective Anti-Poverty Policy in Japan?" Pacific Economic Review, pp. 532-554

Keane, M. P. (2011). Labor supply and taxes: A survey. Journal of Economic Literature, 49(4), 961-1075.

Keane, M., & Rogerson, R. (2015). Reconciling micro and macro labor supply elasticities: A structural perspective. Annu. Rev. Econ., 7(1), 89-117.

Manning, A. (2020) "Monopsony in Labor Markets: A Review," ILR Review, June2020, 74 (1), pp. 3–26.

Ohta, S. Komae, K. (2022) "Vacancies, Job Seekers, and Minimum Wages:Evidence from Public Employment Placement Service Data," Keio-IES Discussion Paper Series, DP2022-004.

Ozaki, T and Genda, Y (2020) " Mechanism for suppressing wage increases"『Financial Research』 39(4), pp. 55-106.

Table 1: Descriptive Statistics in the Analysis of Recruitment elasticity

	Obs.	Mean	Std. dev.	Min	Max
Prefectures	42	-	-	-	-
municipalities	393	-	-	-	-
All firms					
Posted wage (yen)	25,686	976.7	67.2	781	1350
Difference between posted wage and the minimum wage (yen)	25,686	36.2	46.9	0	400
Number of applications	25,686	7.0	9.8	0	158
Number of hires	25,686	1.4	2.6	0	30
Number of job advertisements in the municipality	25,686	644.7	683.6	1	9126
Number of job advertisements in the same industry and the municipality	25,686	160.9	212.0	1	3473
Average wage of job advertisements in the municipality (yen)	25,686	999.0	63.4	795	1908
Firm A					
Posted wage (yen)	13,246	943.5	48.3	781	1100
Difference between posted wage and the minimum wage (yen)	13,246	5.7	17.4	0	164
Number of applications	13,246	2.9	5.3	0	87
Number of hires	13,246	0.5	0.8	0	8
Number of job advertisements in the municipality	13,246	583.5	689.1	1	9126
Number of job advertisements in the same industry and the municipality	13,246	89.1	92.4	1	1024
Average wage of job advertisements in the municipality (yen)	13,246	988.1	57.6	795	1908
Firm B					
Posted wage (yen)	10,194	999.6	60.8	850	1300
Difference between posted wage and the minimum wage (yen)	10,194	64.5	44.6	0	400
Number of applications	10,194	12.8	12.0	0	158
Number of hires	10,194	2.7	3.6	0	30
Number of job advertisements in the municipality	10,194	708.8	672.1	2	6646
Number of job advertisements in the same industry and the municipality	10,194	243.3	278.3	1	3473
Average wage of job advertisements in the municipality (yen)	10,194	1002.6	66.0	800	1261
Firm C					
Posted wage (yen)	2,246	1068.1	62.0	950	1350
Difference between posted wage and the minimum wage (yen)	2,246	87.0	52.1	7	287
Number of applications	2,246	4.9	5.2	0	80
Number of hires	2,246	1.4	1.6	0	14
Number of job advertisements in the municipality	2,246	714.3	670.4	37	7362
Number of job advertisements in the same industry and the municipality	2,246	209.7	220.4	2	1854
Average wage of job advertisements in the municipality (yen)	2,246	1046.8	60.6	830	1310

※Stores with job openings, excluding those for new establishments.

Table 2: Wage Elasticity of Employment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ln # of applications	Ln # of applications	Ln # of applications	Ln # of applications	Ln # of new hires	Ln # of new hires	Ln # of new hires	Ln # of new hires
Subgroup	All	Firm A	Firm B	Firm C	All	Firm A	Firm B	Firm C
Ln of posted wage	4.659 ***	3.009 *	4.775 ***	4.027 ***	1.906 ***	0.620	2.324 ***	2.366 ***
	(0.457)	(1.781)	(0.515)	(0.674)	(0.297)	(0.634)	(0.387)	(0.726)
Ln of average wage of job advertisements in the municipality	0.119	0.265	-0.241	0.182	-0.004	0.109	-0.646 **	0.475
	(0.255)	(0.314)	(0.340)	(0.598)	(0.126)	(0.137)	(0.287)	(0.588)
Ln of minimum wage	0.692	-7.190	12.391 *	12.610	2.550	1.388	-0.109	5.773
	(5.383)	(9.967)	(6.604)	(11.556)	(2.449)	(3.256)	(4.009)	(10.566)
Ln of # of advertisements in the municipality	0.016	0.057	-0.018	-0.180	0.021	0.022	0.015	0.024
	(0.029)	(0.038)	(0.044)	(0.113)	(0.014)	(0.016)	(0.033)	(0.086)
Ln of # of advertisements in the same industry and the municipality	0.036 **	-0.035	0.141 ***	-0.002	0.052 ***	-0.001	0.132 ***	-0.055
	(0.018)	(0.023)	(0.029)	(0.055)	(0.009)	(0.009)	(0.022)	(0.042)
Ln of average yearly earnings in same municipality	0.012	-1.476	0.660	-0.012	-0.166 **	-1.752 *	0.529	-0.171 **
	(0.098)	(2.588)	(2.475)	(0.097)	(0.077)	(0.993)	(1.474)	(0.080)
Number of observations	25,686	13,246	10,194	2,246	25,686	13,246	10,194	2,246
R2	0.029	0.018	0.084	0.229	0.042	0.024	0.088	0.115

※Stores with job openings, excluding those for new establishments.

※The values in parentheses below represent cluster-robust standard errors: * p<0.1, ** p<0.05, *** p<0.01.

Table 3: Wage Elasticity by Subsample

	Panel A: Difference between the posted wage and the minimum wage					
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Ln # of applications	Ln # of applications	Ln # of applications	Ln # of applications	Ln # of applications	Ln # of applications
Subgroup	Firm A's smaller group	Firm A's bigger group	Firm B's smaller group	Firm B's bigger group	Firm C's smaller group	Firm C's bigger group
Ln of posted wage	-11.186	8.106 ***	5.718 ***	4.358 ***	4.333 ***	3.631 **
	(13.786)	(2.098)	(1.107)	(0.734)	(1.498)	(1.448)
Number of observations	9,894	3,352	5,508	4,686	1,176	1,070
R2	0.018	0.050	0.080	0.093	0.244	0.202
	Panel B: Difference between the posted wage and the minimum wage					
	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable	Ln # of new hires	Ln # of new hires	Ln # of new hires	Ln # of new hires	Ln # of new hires	Ln # of new hires
Subgroup	Firm A's smaller group	Firm A's bigger group	Firm B's smaller group	Firm B's bigger group	Firm C's smaller group	Firm C's bigger group
Ln of posted wage	1.946	2.224 **	1.905 **	2.329 ***	1.558	2.598 *
	(4.294)	(1.034)	(0.749)	(0.572)	(1.458)	(1.502)
Number of observations	9,894	3,352	5,508	4,686	1,176	1,070
R2	0.023	0.046	0.081	0.098	0.119	0.133
	Panel C: Job posting concentration					
	(13)	(14)	(15)	(16)	(17)	(18)
Dependent variable	Ln # of applications	Ln # of applications	Ln # of applications	Ln # of applications	Ln # of applications	Ln # of applications
Subgroup	Firm A's lower group	Firm A's higher group	Firm B's lower group	Firm B's higher group	Firm C's lower group	Firm C's higher group
Ln of posted wage	3.118	2.972	4.677 ***	4.856 ***	3.611 ***	3.960 ***
	(2.687)	(2.216)	(0.750)	(0.723)	(0.826)	(1.106)
Number of observations	7,191	6,055	5,275	4,919	1,217	1,029
R2	0.021	0.023	0.074	0.095	0.238	0.240
	Panel D: Job posting concentration					
	(19)	(20)	(21)	(22)	(23)	(24)
Dependent variable	Ln # of new hires	Ln # of new hires	Ln # of new hires	Ln # of new hires	Ln # of new hires	Ln # of new hires
Subgroup	Firm A's lower group	Firm A's higher group	Firm B's lower group	Firm B's higher group	Firm C's lower group	Firm C's higher group
Ln of posted wage	1.413	0.570	2.661 ***	1.830 ***	2.752 ***	1.996
	(1.014)	(0.879)	(0.534)	(0.564)	(1.006)	(1.228)
Number of observations	7,191	6,055	5,275	4,919	1,217	1,029
R2	0.030	0.018	0.076	0.076	0.136	0.121

※Stores with job openings, excluding those for new establishments.

※Control variables: ln of average advertised wage in the municipality, ln of the minimum wage, ln of # of job advertisements in the municipality, ln of # of job advertisements in the same industry and the municipality, ln of average yearly earnings in the municipality.

※Standard errors in parentheses below are cluster-robust: * p<0.1, ** p<0.05, *** p<0.01.

Table 4: Descriptive Statistics in the Analysis of Retention Effects

	All employees				
	Obs.	Mean	Std. dev.	Min	Max
Hourly wage (yen)	590,840	991.1	73.0	781	1632
Age	590,840	28.3	13.7	15	82
Length of service in months	590,840	33.3	48.1	1	629
Monthly hours working (hour)	590,840	63.0	39.9	0	312
Social insurance enrollment rate	590,840	0.067	0.251	-	-
Turnover rate at the following month	590,840	0.038	0.191	-	-
	Employees at firm A				
	Obs.	Mean	Std. dev.	Min	Max
Hourly wage (yen)	229,334	947.1	51.2	781	1360
Age	229,334	32.4	14.9	15	77
Length of service in months	229,334	53.0	65.7	1	629
Monthly hours working (hour)	229,334	70.2	37.9	0	222
Social insurance enrollment rate	229,334	0.163	0.369	-	-
Turnover rate at the following month	229,334	0.025	0.158	-	-
	Employees at firm B				
	Obs.	Mean	Std. dev.	Min	Max
Hourly wage (yen)	361,506	1019.0	71.0	800	1632
Age	361,506	25.7	12.2	15	82
Length of service in months	361,506	20.8	25.3	1	324
Monthly hours working (hour)	361,506	58.4	40.5	0	312
Social insurance enrollment rate	361,506	0.007	0.084	-	-
Turnover rate at the following month	361,506	0.046	0.209	-	-

※Excluding employees of stores that closed the following month.

Table 5: Wage Effects on Reducing Employee Turnover

	(1)	(2)	(3)
Dependent variable	Separate following month=1 oterwise=0	Separate following month=1 oterwise=0	Separate following month=1 oterwise=0
Subgroup	All	Firm A	Firm B
Ln of hourly wage	0.018	-0.078 **	0.027 *
	(0.015)	(0.033)	(0.016)
Social insurance dammy	-0.007 ***	-0.012 ***	
	(0.002)	(0.002)	
Mean of the turnover rate	0.038	0.0255	0.0460
Number of observations	590,840	229,334	361,506
R2	0.115	0.034	0.201

※Excluding employees of stores that closed the following month.

※Control variables: ln of length of service in months, ln of average advertised wage in the municipality, ln of # of job advertisements in the municipality, ln of # of job advertisements in the same industry and the municipality, ln of sales per man-hour.

※Standard errors in parentheses below are cluster-robust: * p<0.1, ** p<0.05, *** p<0.01.

Table 6: Effect of Wages on Reducing Turnover (Subsample)

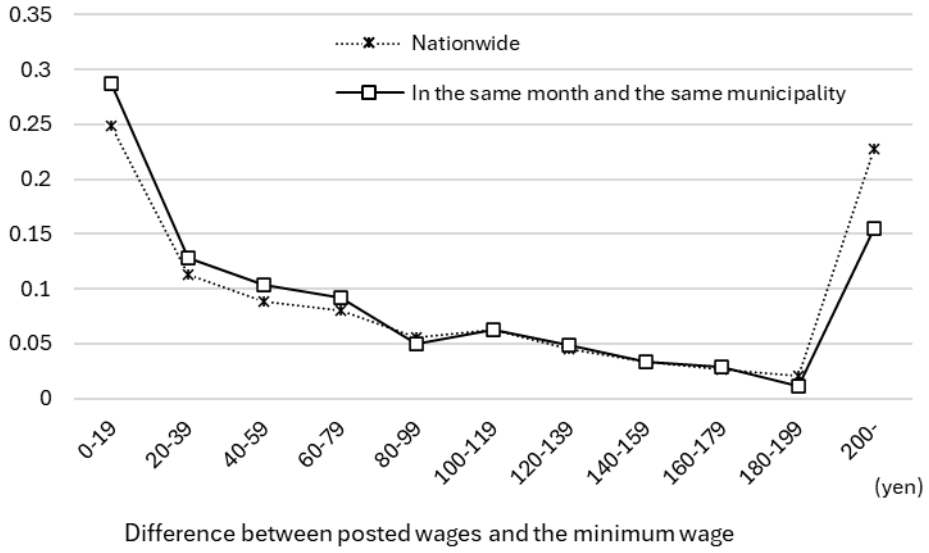
	Panel A: Difference between the posted wage and the minimum wage			
	(1)	(2)	(3)	(4)
Dependent variable	Separate following month=1 oterwise=0	Separate following month=1 oterwise=0	Separate following month=1 oterwise=0	Separate following month=1 oterwise=0
Subgroup	Firm A's lower group	Firm A's higher group	Firm B's lower group	Firm B's higher group
Ln of hourly wage	-3.597 **	-0.128 ***	0.062	0.010
	(1.662)	(0.038)	(0.040)	(0.022)
Social insurance dammy	-0.013 ***	-0.006 *		
	(0.004)	(0.003)		
Mean of the turnover rate	0.032	0.019	0.048	0.044
Number of observations	121,380	107,954	187,907	173,599
R2	0.035	0.026	0.194	0.215
	Panel B: Job posting concentration			
	(5)	(6)	(7)	(8)
Dependent variable	Separate following month=1 oterwise=0	Separate following month=1 oterwise=0	Separate following month=1 oterwise=0	Separate following month=1 oterwise=0
Subgroup	Firm A's lower group	Firm A's higher group	Firm B's lower group	Firm B's higher group
Ln of hourly wage	-0.108 **	-0.084	-0.001	0.072 ***
	(0.045)	(0.056)	(0.024)	(0.023)
Social insurance dammy	-0.012 ***	-0.012 ***		
	(0.003)	(0.003)		
Mean of the turnover rate	0.026	0.025	0.045	0.047
Number of observations	121,996	107,338	184,923	176,583
R2	0.033	0.033	0.201	0.209
	Panel C: Sales per total monthly working hours of employees			
	(9)	(10)	(11)	(12)
Dependent variable	Separate following month=1 oterwise=0	Separate following month=1 oterwise=0	Separate following month=1 oterwise=0	Separate following month=1 oterwise=0
Subgroup	Firm A's lower group	Firm A's higher group	Firm B's lower group	Firm B's higher group
Ln of hourly wage	-0.072	-0.118 **	-0.070 **	0.051 **
	(0.044)	(0.055)	(0.029)	(0.023)
Social insurance dammy	-0.015 ***	-0.010 ***		
	(0.003)	(0.003)		
Mean of the turnover rate	0.027	0.024	0.045	0.047
Number of observations	113,603	115,731	177,680	183,826
R2	0.036	0.031	0.16	0.256

※Excluding employees of stores that closed the following month.

※Control variables: ln of length of service in months, ln of average advertised wage in the municipality, ln of # of job advertisements in the municipality, ln of # of job advertisements in the same industry and the municipality, ln of sales per man-hour.

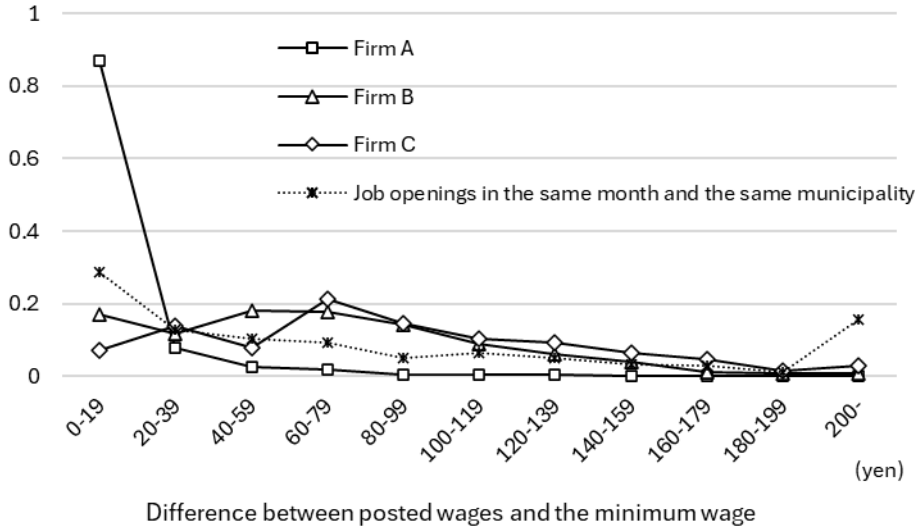
※Standard errors in parentheses below are cluster-robust: * p<0.1, ** p<0.05, *** p<0.01.

Figure 1: Distribution of advertised wages (deviation from minimum wage)



※Source: Data from one of Japan's largest job advertising sites.

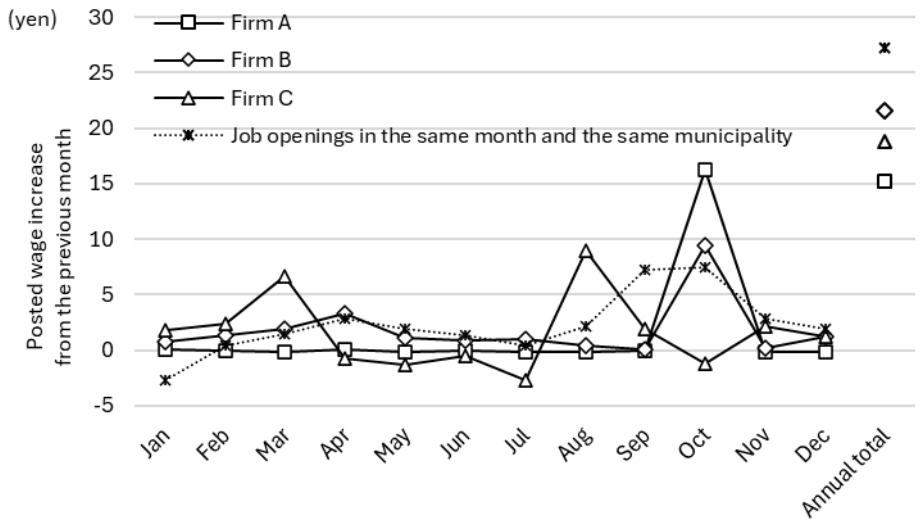
Figure 2: Distribution of Posted Wages at Partner Firms (Deviation from Minimum Wage)



※Source: Data from one of Japan's largest job advertising sites.

※Stores with job openings, excluding those for new establishments.

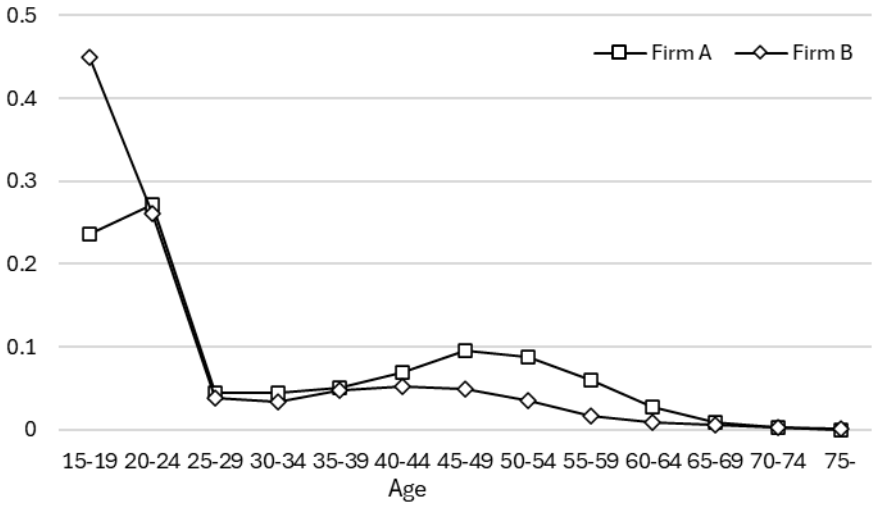
Figure 3: Monthly Fluctuations in Job Posting Wages



※Source: Data from one of Japan's largest job advertising sites.

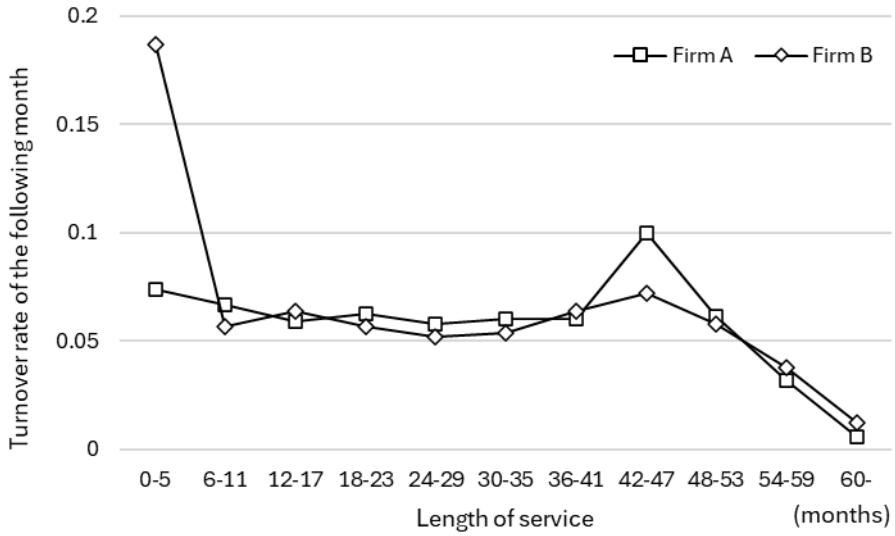
※Stores with job openings, excluding those for new establishments.

Figure 4: Age distribution



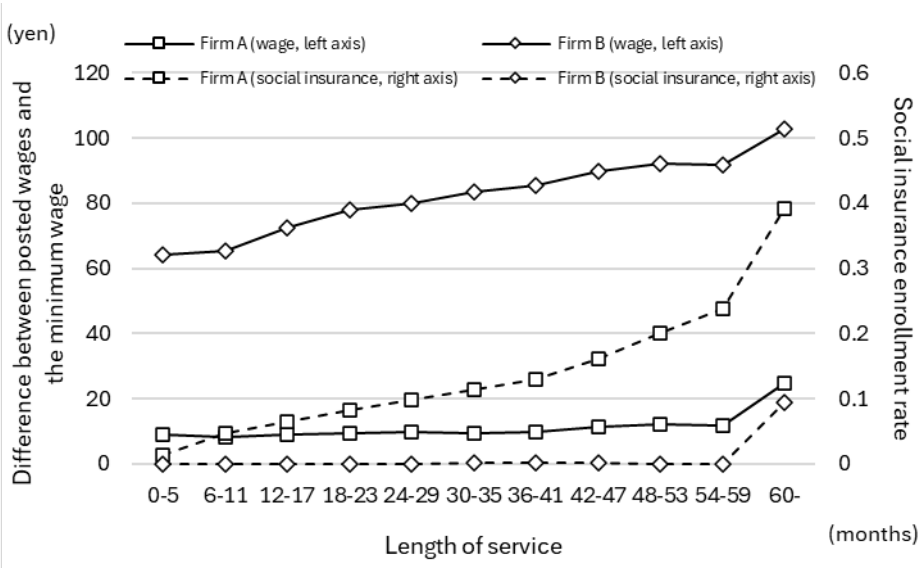
※Excluding employees of stores that closed the following month.

Figure 5: Length of Service and Turnover Rate in the Following Month



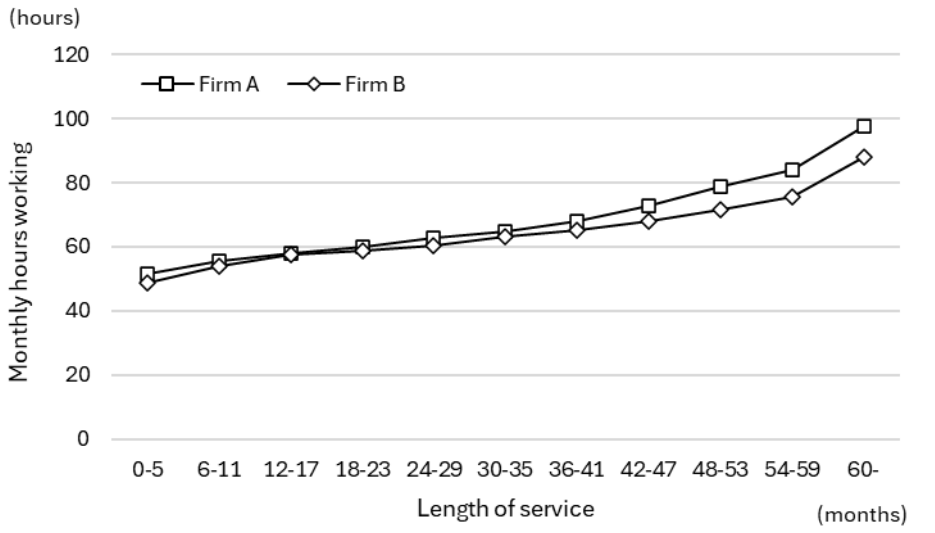
※Excluding employees of stores that closed the following month.

Figure 6: Relationship between Length of Service, Wages (Deviation from Minimum Wage), and Social Insurance Enrollment Rate



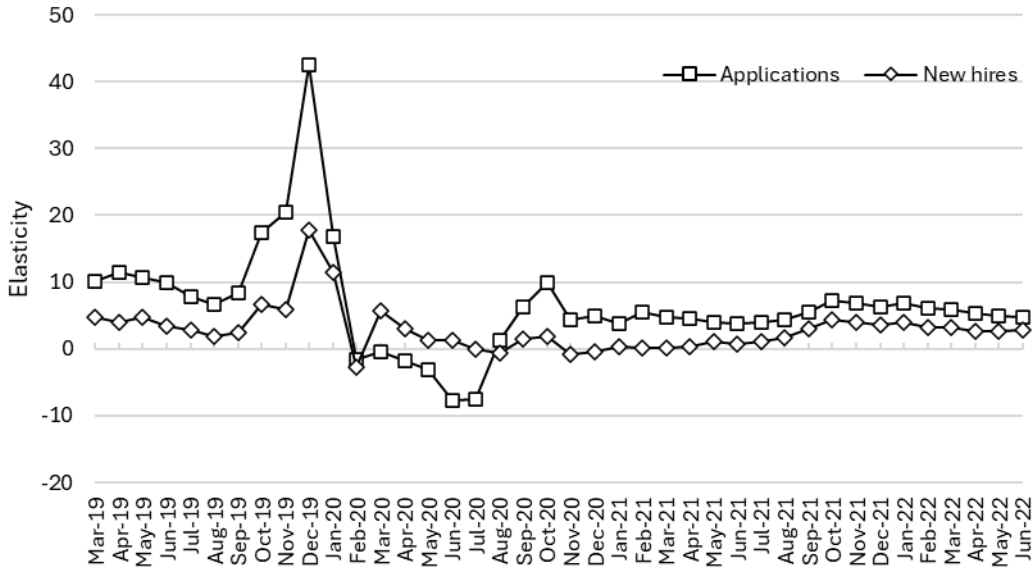
※Excluding employees of stores that closed the following month.

Figure 7: Length of Service and Monthly Working Hours



※Excluding employees of stores that closed the following month.

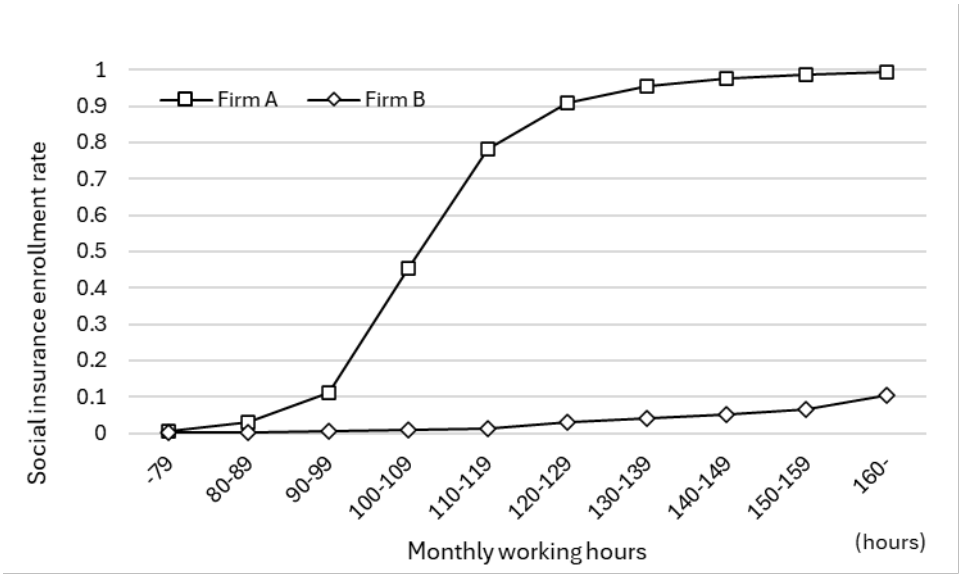
Figure A1: Results of Rolling Regression Analysis



※The rolling regression estimates are calculated over 12-month periods starting from the years and months indicated in the figure.

※Control variables: ln of average advertised wage in the municipality, ln of the minimum wage, ln of # of job advertisements in the municipality, ln of # of job advertisements in the same industry and the municipality, ln of average yearly earnings in the municipality.

Figure A2:



※Excluding employees of stores that closed the following month.

Table A1: Recruitment Elasticity by using instrumental variables

	(1)	(2)	(3)	(4)	(5)	(6)
被説明変数	応募者数（対数）	応募者数（対数）	応募者数（対数）	入社者数（対数）	入社者数（対数）	入社者数（対数）
対象	総数	企業A	企業B	協力企業3社	企業A	企業B
Ln of posted wage	-30.824 **	-90.467	10.621	-4.993	42.932	-23.174
	(12.302)	(70.940)	(10.319)	(4.586)	(44.954)	(15.381)
Ln of average wage of job advertisements in the municipality	0.829 **	1.126	-0.626	0.127	-0.260	0.760
	(0.399)	(0.852)	(0.741)	(0.159)	(0.481)	(1.179)
Ln of minimum wage	-29.778 *	-123.756	29.056 ***	-1.817	54.169	0.122
	(15.663)	(93.501)	(8.899)	(5.455)	(58.780)	(10.469)
Ln of # of advertisements in the municipality	0.052	-0.025	0.009	0.031 *	0.061	0.058
	(0.043)	(0.093)	(0.063)	(0.017)	(0.047)	(0.091)
Ln of # of advertisements in the same industry and the municipality	0.003	-0.069	0.212 ***	0.054 ***	0.016	0.214 ***
	(0.024)	(0.043)	(0.036)	(0.010)	(0.022)	(0.048)
Ln of average yearly earnings in same municipality	-6.520 *	-16.148	5.106	-2.517 **	4.902	-8.570
	(3.806)	(12.894)	(4.938)	(1.263)	(7.442)	(7.450)
Number of observations	19,417	13,124	6,293	19,417	13,124	6,293
R2						

※Stores with job openings, excluding those for new establishments.

※IV: ln of sales per total monthly working hours of employees.

Table A2: Recruitment Elasticity (Subsamples by Timing of Emergency Declarations, etc.)

Panel A: Outside states of emergency								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	Ln num. applications	Ln num. applications	Ln num. applications	Ln num. applications	Ln num. new hires	Ln num. new hires	Ln num. new hires	Ln num. new hires
Subgroup	All	Firm A	Firm B	Firm C	All	Firm A	Firm B	Firm C
Ln of posted wage	5.110 ***	3.167 *	5.136 ***	4.105 ***	2.439 ***	0.710	2.564 ***	2.529 ***
	(0.452)	(1.712)	(0.516)	(0.687)	(0.303)	(0.693)	(0.388)	(0.761)
Number of observations	22,745	11,356	9,479	1,910	22,745	11,356	9,479	1,910
R2	0.035	0.02	0.093	0.231	0.041	0.026	0.075	0.115
Panel B: During states of emergency								
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Dependent variable	Ln num. applications	Ln num. applications	Ln num. applications	Ln num. applications	Ln num. new hires	Ln num. new hires	Ln num. new hires	Ln num. new hires
Subgroup	All	Firm A	Firm B	Firm C	All	Firm A	Firm B	Firm C
Ln of posted wage	15.036 **	35.685 ***	0.000	-0.076	2.401	3.030	0.000	2.243
	(7.442)	(8.049)	(.)	(2.495)	(3.399)	(2.031)	(.)	(5.073)
Number of observations	2,941	1,890	715	336	2,941	1,890	715	336
R2	0.021	0.031	0.007	0.299	0.013	0.015	0.041	0.058
Panel C: Outside states of emergency and priority measures to prevent the spread								
	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Dependent variable	Ln num. applications	Ln num. applications	Ln num. applications	Ln num. applications	Ln num. new hires	Ln num. new hires	Ln num. new hires	Ln num. new hires
Subgroup	All	Firm A	Firm B	Firm C	All	Firm A	Firm B	Firm C
Ln of posted wage	4.825 ***	3.017 *	5.085 ***	4.066 ***	2.399 ***	0.610	2.599 ***	2.609 ***
	(0.471)	(1.656)	(0.541)	(0.798)	(0.319)	(0.680)	(0.403)	(0.825)
Number of observations	20,122	10,396	8,130	1,596	20,122	10,396	8,130	1,596
R2	0.035	0.022	0.098	0.168	0.041	0.026	0.078	0.106
Panel D: During states of emergency or priority measures to prevent the spread								
	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)
Dependent variable	Ln num. applications	Ln num. applications	Ln num. applications	Ln num. applications	Ln num. new hires	Ln num. new hires	Ln num. new hires	Ln num. new hires
Subgroup	All	Firm A	Firm B	Firm C	All	Firm A	Firm B	Firm C
Ln of posted wage	4.555 ***	10.099	3.953 **	-0.069	-0.859	2.352	0.086	0.377
	(1.448)	(6.330)	(1.827)	(1.445)	(0.973)	(1.555)	(1.784)	(1.782)
Number of observations	5,564	2,850	2,064	650	5,564	2,850	2,064	650
R2	0.019	0.017	0.039	0.327	0.042	0.02	0.126	0.079

※Stores with job openings, excluding those for new establishments.

※Control variables: ln of average advertised wage in the municipality, ln of the minimum wage, ln of # of job advertisements in the municipality, ln of # of job advertisements in the same industry and the municipality, ln of average yearly earnings in the municipality.