DOES PROBATION LEAD TO HIGHER STARTING WAGE? EVIDENCE FROM JAPANESE ONLINE JOB ADS

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Abstract

Firms commonly use probation to evaluate new hires before making long-term commitments. Workers accepting jobs with a high initial risk of dismissal may expect compensation for this risk. Utilizing an original dataset of Japanese online job ads, this study employs propensity score matching and regression analysis to compare wages at the start of employment for jobs without probation and upon probation completion for jobs with probation. The findings reveal no statistically significant difference in starting wages, suggesting that workers are not rewarded for undergoing probation in terms of higher wages at the start of long-term contracts.

JEL classification: J31, J41, M5

Keywords: wage, probation, job ads, Japan

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1. Introduction

Instituting a probation period on new hires is a prevalent practice in the labor market. Workers possess private information about their ability and are free to quit a job at any time, but they become difficult to terminate once a long-term contract commences. Probation allows firms to test the quality of a post-hiring job-worker match before committing to a long-term contract with relevant employment protections, benefiting the employer while imposing costs on the worker. During probation, workers face higher risk of dismissal, which may result in not recuperating job hunting costs, costs associated with possible relocation, or the forfeiture of other job opportunities with lower dismissal risks. Workers may expect to be rewarded for accepting this risk.

Literature suggests that probation can serve as a mechanism to induce workers to reveal their skill level through self-selection (Loh, 1994a) or their willingness to bear the cost of probation (Wang and Weiss, 1998). If firms expect workers who subject themselves to probation to be of a higher quality, the wage upon probation completion may reflect this belief. However, studies focusing on worker behavior during probation indicate that probation might not fulfill this role due to bad workers imitating good ones (Riphahn and Thalmaier, 2001; Ichino and Riphahn, 2005; Pfeifer, 2010), possibly weakening firms' incentives to reward workers for successful probation completion. Importantly, the evidence regarding whether workers are compensated for undergoing probation in the form of higher wages is mixed (Loh, 1994b; Brunner and Imazeki, 2010).

This paper examines the case of Japan, a country characterized by high employment protections for full-time workers and high incidence of probationary practices. A 2012 survey of firms with over 50 full-time workers revealed that 87% of them employed probation for new full-time hires, typically lasting three months. Among these firms, 67% reported having terminated employment during or at the completion of probation, most often citing the reasons of absenteeism, lack of knowledge or ability, and worker's conduct (The Japan Institute for Labour Policy and Training,

2014). While probation is a regular feature of employment in Japan, and firms actively use it to terminate unsatisfactory workers, it is neglected in economic literature.

The aim of this paper is to investigate whether workers are rewarded for undergoing probation by receiving higher wages at the start of long-term contracts, as suggested by Wang and Weiss (1998). To achieve so, this paper examines the difference in starting wages for jobs without probation and for jobs with probation upon its completion utilizing an original dataset of online job ads for full-time sales positions collected between July 2018 and June 2021. The sales occupation does not typically require any specialized education, qualification, or expertise, making for a good approximation of a general labor market. Moreover, the use of job ads offers two main advantages: first, probation, starting wages, job characteristics and any requirements on applicants are observed independently of the selected workers, mitigating concerns related to endogenous sorting and sample attrition due to quits. Second, by focusing on a single recruiting channel, source and occupation, this study ensures a high level of comparability, reducing the risk of omitted-variable bias. However, this approach limits the external validity of the results; the findings should, therefore, be understood within the given context.

This paper adopts a two-step methodology. First, a balanced dataset is constructed using propensity score matching to guarantee comparability between starting wages for jobs with and without probation. Subsequently, regression analysis is employed to control for potential confounding factors. The results reveal no statistically significant difference in starting wages between jobs with and without probation across all employed models. Although the scope of this finding is limited, this study provides the first analytical look at probation and its effect on starting wages in Japan, which is the main contribution of this paper.

2. Previous literature

The topic of new hires undergoing probation has received limited attention in empirical economic literature, despite its prevalence in labor markets. Loh (1994a) proposed firms use probation as a

tool to induce worker self-selection. Using 1982 US data covering predominately workers in low-wage, low-level jobs, the author demonstrated that workers in jobs with probation exhibited higher wage growth and lower quit rates, suggesting that high-ability workers self-select into jobs with probation, effectively revealing their skill level prior to any on-the-job monitoring. Loh (1994b) further explored the determinants of probation use and duration within the same dataset. The study concluded that the likelihood and length of probation increased with training costs, firm size, and pre-hire screening intensity. Additionally, the author found that jobs with probation offered lower wages at the start of employment, equivalent to the start of probation for jobs with probation. Wang and Weiss (1998) developed a model to determine optimal probation lengths and wage profiles that discourage low-ability workers from applying in a setting where all workers are subject to probation. Their model suggested that firms pay lower wages than workers' expected utility during probation, followed by higher wages upon completion of probation, with longer probation periods serving as a stronger deterrent to low-ability workers. Their model thus aligns with Loh's (1994b) findings regarding wages.

Next, research using data from Germany (Riphahn and Thalmaier, 2001; Pfeifer, 2010) and Italy (Ichino and Riphahn, 2005), countries with strong employment protections akin to Japan, provided evidence indicating drop in worker effort upon completion of probation, as measured by absenteeism. Bad-type workers mimicked good-type workers during the period of heightened monitoring and limited protections, thus rendering probation ineffective as a screening device and possibly weakening firms' incentives to reward workers for subjecting themselves to probation.

Finally, Brunner and Imazeki (2010) examined the US labor market for elementary and secondary school teachers subject to extended probationary periods. Their findings revealed that teachers in districts located in states with longer probation, up to five years, received higher wages at the start of employment, a result inconsistent with Wang and Weiss's (1998) model. The protracted probation duration and the dynamics of the teacher labor market make their study distinct from

the setting examined in Loh (1994b) as well as the present study. However, neither Loh (1994b) nor Brunner and Imazeki (2010) investigated the wage differential at the start of long-term contracts, that is upon completion of probation for jobs with probation.

To the best of the author's knowledge, no empirical economic study has investigated the use of probation in Japan. This paper thus aims to fill this research gap and contribute to the literature on probation in countries with high employment protections by adopting a novel approach utilizing job ads as a data source.

3. Data

This study utilizes an original dataset of online job ads for full-time sales positions collected from a popular Japanese mid-career online job ad site Doda (http://doda.jp) between July 2018 and June 2021. Doda is a general job ad platform that claimed to host the highest number of job ads among Japanese commercial job ad portals at the beginning of the collection period. The sales job ad category represents occupation that is typically not considered highly skilled, making it an appropriate source for this study as an approximation of a general labor market.

The dataset comprises the initial occurrences of job ads with a PR page and job ad page. Instances where firms repeatedly posted identical ads are excluded. A job ad is considered a repost if it matches a previous ad by the same firm in terms of job attributes, including location and starting wage, irrespective of the time gap between postings. The final dataset consists of 4,054 job ads from 2,264 firms operating across 11 industries, as classified on the job ad site. The typical firm posting a job ad in this dataset tends to be larger, younger, and possess higher capital than the average Japanese firm, as presented by the Ministry of Economy, Trade and Industry (2018).

Utilizing job ads as the primary data source offers distinct advantages. Job ads are a rich source of information revealing firms' decisions and preferences. Unlike studies relying on individual worker data, job ads allow for observing probation, starting wage, along with job and desired

applicants' characteristics independently of the hired worker. This setting is thus not sensitive to endogenous sorting into jobs, probation, and individual negotiations during the hiring process, as well as potential issues arising from workers quitting before being observed. Furthermore, focusing on job ads for a specific occupation from a single source, while not representative of the entire labor market, ensures high comparability within the given context. The job ads target the same pool of jobseekers, and the skills required for a specific occupation remain relatively consistent across different industries.

However, this approach limits the analysis to the information provided in the job ad. Workers may be rewarded not immediately upon probation completion or in other, non-monetary, ways. This study uses data identical to the information available to the jobseekers at the point of application. If this information does not suggest compensation for probation-associated risks, jobseekers might prefer comparable jobs without probation regardless of their skill level, making this setting suitable to study the effects of probation.

4. Empirical framework

In the sample used for this study, 70.2% of ads stated employment starts with probation or a temporary contract serving as probation, with 57.5% of these ads specifying a length of three months. All ads included the starting wage, here defined as the starting wage for jobs without probation and the wage upon probation completion for jobs with one. If starting wage was presented as a range, the lower bound was recorded. In 50% of the ads, the wage incorporated overtime pay for a specific amount of overtime hours, with the number of included hours ranging from 10 to 80 with an average of 36.5. The starting wage was, therefore, recalculated from a monthly to an hourly basis, assuming a standard 165 working-hour month, the average for full-time jobs in 2018 (Ministry of Health, Labour and Welfare of Japan, 2019). The hourly wage was then weighed by the minimum wage in the prefecture of the job's location to account for regional differences, producing a key variable wage ratio.

Although the sample consists of job ads for a single occupation, firms may set probation according to more detailed criteria, such as job characteristics, required work experience, or educational level. To account for this, a two-step analysis is adopted. First, a balanced sample of 2,414 ads is constructed using one-to-one propensity score matching without replacement (PMS) using logistic regression as proposed by Rosenbaum and Rubin (1983). The goal of the matching step is to reduce pre-existing differences in starting wage between ads with and without probation (considered control and treated groups, respectively). This sample is then examined using regression analysis to account for possible remaining confounding factors.

Ads are matched following Imbens and Rubin's (2015) and Harris and Horst's (2016) proposed procedures, matching on job characteristics and requirements on applicants. The job characteristics matching variables are specifically whether the job is B-to-C (B-to-C, dummy), follows a standard shift schedule of 2 days per week and bank holidays off (Standard shift, dummy), and starts at a typical morning time (Start at 9, dummy). The applicant requirements matching variables are a previous work experience requirement (Experience, dummy) and a 4-year university degree requirement (University, dummy). Notably, Japanese job ads typically do not specify skill requirements; these characteristics are, therefore, unavailable.

Table 1 presents the means and the balanced sample test results for the matching variables in the original unmatched and the matched samples. No statistically significant after-matching differences are found. Moreover, the value of Rubin's B statistic is 18, well below the maximum recommended value of 25. These results indicate a well-balanced sample and a successful matching procedure. The matching process and balancing testing are conducted using the psmatch2 and pstest packages in Stata 18.

To retrieve the average treatment effect on the treated (ATET), PMS relies on the conditional independence assumption (CIA), which posits that treatment assignment is independent of potential outcomes when conditioning on observed variables. If this assumption holds, the

difference in means between treated and untreated groups is equivalent to the ATET. Although Table 1 demonstrates that PMS achieved balance in the matching variables, several concerns remain.

Variable	Unmatched Matched	Mean		Bias (%)	|bias| reduction (%)	t-test p>|t|
		Treated	Control			
B-to-C	U	0.356	0.312	9.5		0.005
	M	0.356	0.355	0.2	98.1	0.966
Standard shift	U	0.472	0.551	-15.8		0.000
	M	0.472	0.471	0.2	98.9	0.967
Start at 9	U	0.328	0.352	-5		0.144
	M	0.328	0.326	0.3	93.1	0.931
Experience	U	0.238	0.280	-9.7		0.005
	M	0.238	0.238	0	100	1.000
University	U	0.085	0.091	-2.2		0.532
	M	0.085	0.082	0.9	59.4	0.825

Table 1: Balanced sample test

The sample was collected over three years, partially overlapping with the COVID-19 pandemic, a period of dynamic changes in the labor market. Firms may adjust the starting wage and probation practices in response to the labor market they face at the time of posting an ad for otherwise identical jobs. Moreover, industry practices and the impact of the pandemic may vary, possibly resulting in compositional or firm-behavior changes throughout the sample-collection period. Furthermore, firms may exhibit different behavior even for comparable job openings based on their specific characteristics, such as firm size, as observed in previous research (Loh, 1994b). Lastly, while 1,515 firms are represented in the sample by a single job ad, the remaining 749 firms posted several. A firm may have a set probation policy regardless of the job to be filled, yet no restriction regarding firm-ad matching was imposed. If any of these factors lead to CIA violation, the ATET would be biased.

To address this concern, the average treatment effect (ATE) is additionally obtained through linear regression (OLS) controlling for the above-mentioned factors, constituting the second step of the

analysis. The log of the wage ratio for job ad i is regressed on a probation use dummy variable and a set of controls for both the non-matched and matched samples, following the linear regression model:

$$Log(Wage\ ratio_i) = \beta_1 + \beta_2 * Probation_i + \beta_3 * Controls_i + \delta + \varepsilon_i.$$

The parameter of interest is β_2, the estimate of the effect of probation on starting wage. The control variables include indicators describing the local labor market, industry, and firm characteristics. The local labor market is described for job location by the monthly prefectural ratio of job openings to jobseekers, city population, and city average population age. Industry controls consist of dummy variables representing each industry the firms operate in. Firm controls capture firm characteristics, including size (capital, number of employees), age, and ownership structure (publicly traded firm, subsidiary of a publicly traded firm, domestic firm). PMS matching covariates are included as additional control variables for all estimations using the non-matched sample. Term δ represents a fixed effect for the month of sample collection, and ε is the error term. Standard errors are clustered at the firm level.

5. Results and discussion

Results from the first step of the analysis, PMS, are presented in Figure 2, which displays the distribution of wage ratios categorized by probation use in the non-matched sample in Panel A and the matched sample in Panel B. The corresponding means and t-test p-values are also reported. The t-test results indicate a statistically significant difference in means for the non-matched sample at a 10% level, with jobs without probation offering a higher starting wage. However, the focus of interest is the matched sample in panel B, where the mean difference represents the ATET, assuming the CIA is satisfied. In the matched sample, although the effect of probation remains negative in direction, it loses statistical significance. Regardless of significance, the mean gap between jobs with and without probation in this sample is 0.017 for the wage ratio and 0.008 for

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its log. This analysis does not confirm any statistically significant difference in starting wages based on probation use.

A. Wage ratio by probation use
Full sample

Mean:
  Probation: 1.398
  No probation: 1.417
T-test p>|t| = 0.054
N = 4054

B. Wage ratio by probation use
Matched sample

Mean:
  Probation: 1.400
  No probation: 1.417
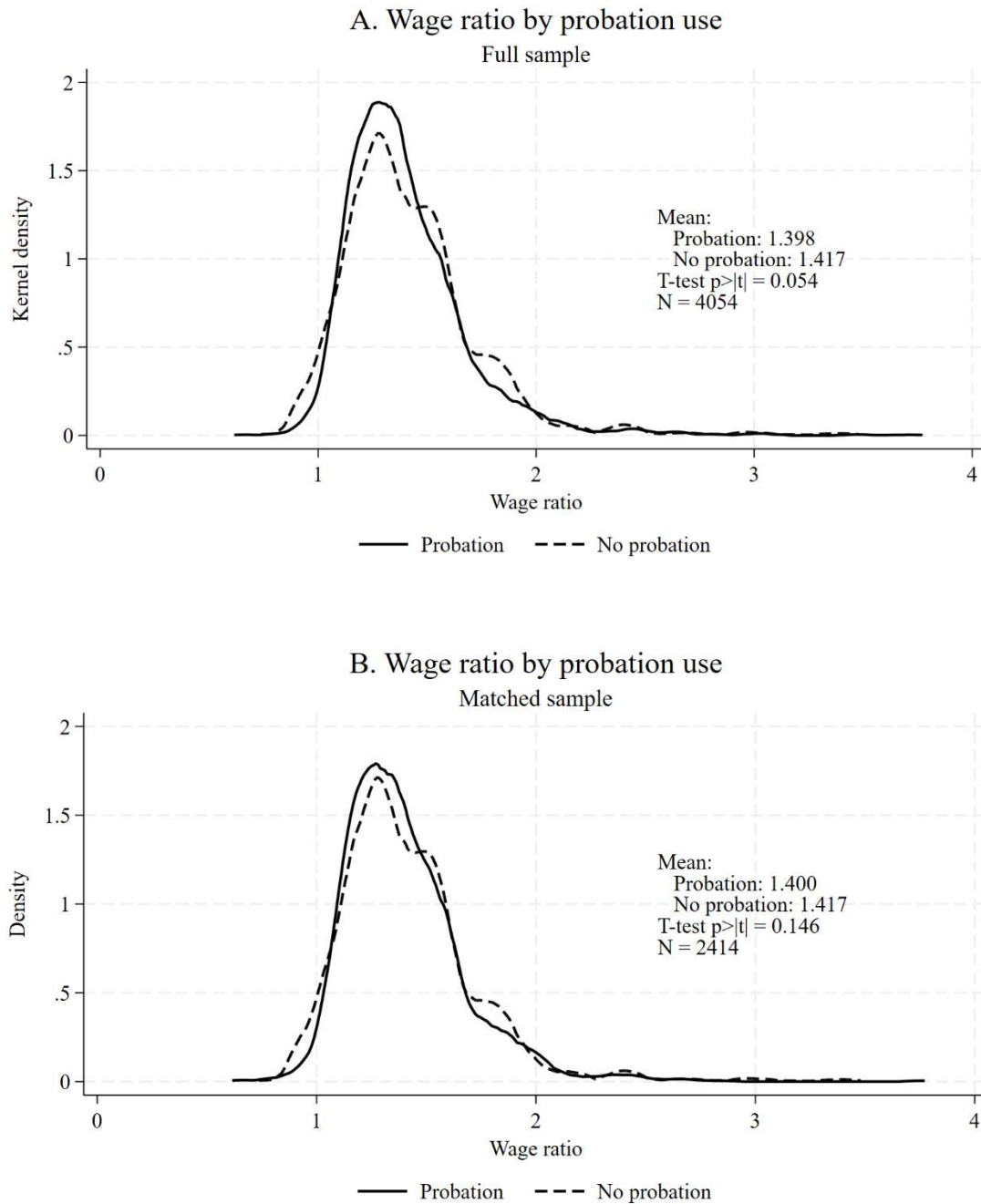T-test p>|t| = 0.146
N = 2414

Figure 2: Wage ratio distribution by probation use

Next, results from the second step of the analysis, OLS, are summarized in Figure 3, displaying the estimates of the impact of probation on starting wages, measured by the log of the wage ratio. Panel A and B respectively show the estimates for the non-matched and matched samples, indicating the inclusion of controls. Independent of the sample and specification, no significant difference in starting wages for jobs with and without probation is observed at any conventional level. The marginal significance of the means difference in the non-matched sample from Figure 2 disappears in this step.

Although not statistically significant, the impact of probation is consistently negative in both samples. The point estimates for the non-matched sample range from -0.003 to -0.014, with an average treatment effect of -0.008 when employing a complete set of controls. In the matched sample, the inclusion of additional control variables has a negligible impact on the magnitude of the treatment effect, ranging from -0.003 to -0.007. These results closely align with the ATET of -0.008 obtained in the previous step and indicate a successful matching procedure.
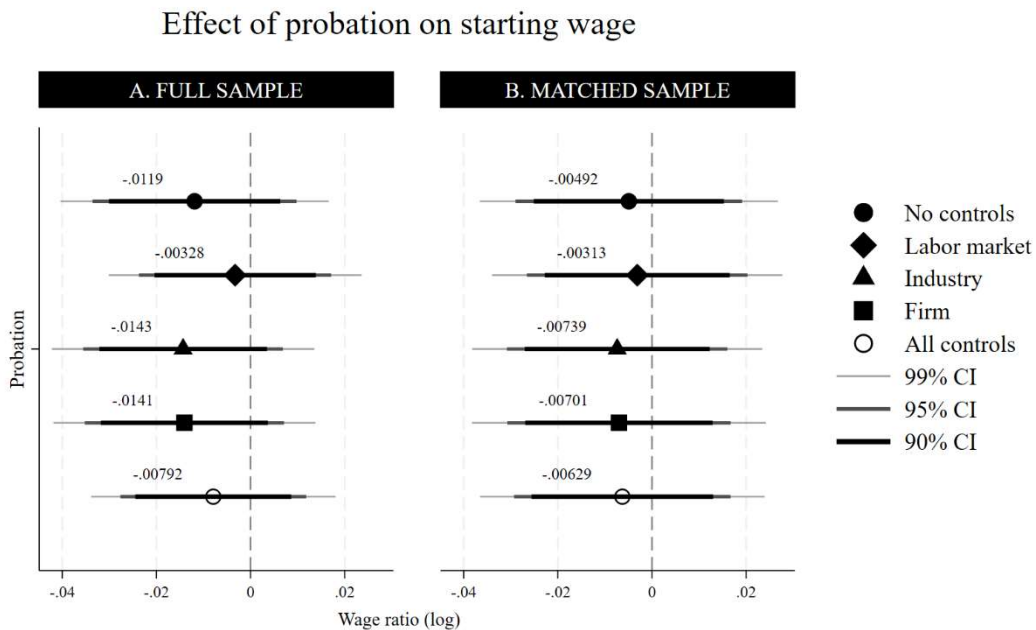

Figure 3: Effect of probation on starting wage

To summarize, the estimated effect of probation use on starting wages consistently demonstrates stability and statistical non-significance across different models and specifications. This null result suggests that, within the context of this study, firms do not provide higher starting wages at the start of long-term contracts to workers subject to probation, contradicting the theoretical result by Wang and Weiss (1998). Although the time point of interest is not identical, this finding adds new empirical evidence to the yet to be settled debate on the effect of probation on wages, with negative impact in Loh (1994b) and positive impact in Brunner and Imazeki (2010). The use of probation is likely highly dependent on the country-specific legal environment and employment practices, yet its significance should be more pronounced in countries with strong employee protections like Japan. However, workers may not be rewarded at the start of long-term contracts but over a non-observed tenure period, or in other ways, such as working alongside other workers subjected to probation. Other factors may also explain this result, such as other unobserved aspects of a job with probation being attractive to jobseekers despite the associated risks, differences in prescreening selection process between jobs with and without probation, or firms utilizing probation for reasons other than sorting. Additionally, firms facing difficulties in recruitment may abstain from using probation in order to attract workers. Further research is needed to ascertain the determinants and impact of probation in a broader context.

6. Robustness

A key concern regarding the robustness of the results is the potential influence of the COVID-19 pandemic. Although the exact timing of when the Japanese economy began experiencing its effects is unclear, the first public information about the pandemic emerged in December 2019, and the first case in Japan was confirmed in the following month. The sample used in this study was collected between July 2018 and June 2021; January 2020, therefore, splits the sample collection period in half and serves as the approximate starting point of the COVID-19 pandemic. For this analysis, the sample is divided into two periods: the pre-COVID period, covering July

2018 to December 2019 with 2,177 job ads, and the COVID period, covering the remainder of the collection period with 2,240 job ads. If a job ad was initially posted in the pre-COVID period and reposted during the COVID period, it is included in both samples as a first occurrence during the relevant period. An analysis equivalent to the main one is conducted for these two sub-samples, with a reduction in the number of matching variables to account for the smaller sample size.[1] The results of the sample balancing test are omitted for conciseness.

Figures 4 and 5 present the distribution of wage ratios by probation use for the pre-COVID and COVID samples, respectively, with Panel A representing the non-matched and Panel B the matched sample. The findings consistently align with the main analysis, indicating a negligible impact of the pandemic. In all samples, jobs with probation offer on average lower starting wages compared to those without probation. However, this wage gap is statistically significant only in the pre-COVID non-matched sample and only marginally so. Assuming the CIA is satisfied, probation does not appear to bring a starting wage reward in either period.

Moving to the second step, Figures 6 and 7 present the OLS estimates of the effect of probation on the log of wage ratio in the pre-COVID and COVID periods, respectively. For both periods, Panel A again depicts the estimates for the non-matched sample and Panel B for the matched sample. Consistent with the main analysis and the patterns observed in Figures 4 and 5, no statistically significant effect of probation on starting wage is confirmed in either sample. Despite the lack of significance, the impact of probation remains negative for all samples and

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[1] Specifically, matching covariates for the pre-COVID sample do not include variable Experience due to insufficient variation. No after-matching statistically significant difference in matching covariates is found in either sample and the value of Rubin's B statistic is 25.5 for the pre-COVID, and 19.2 for the COVID sample. Collectively, these tests indicate a successful matching procedure for both samples.

specifications, although slightly weaker for the COVID sample. Nonetheless, the overall results do not appear to be affected by the pandemic.
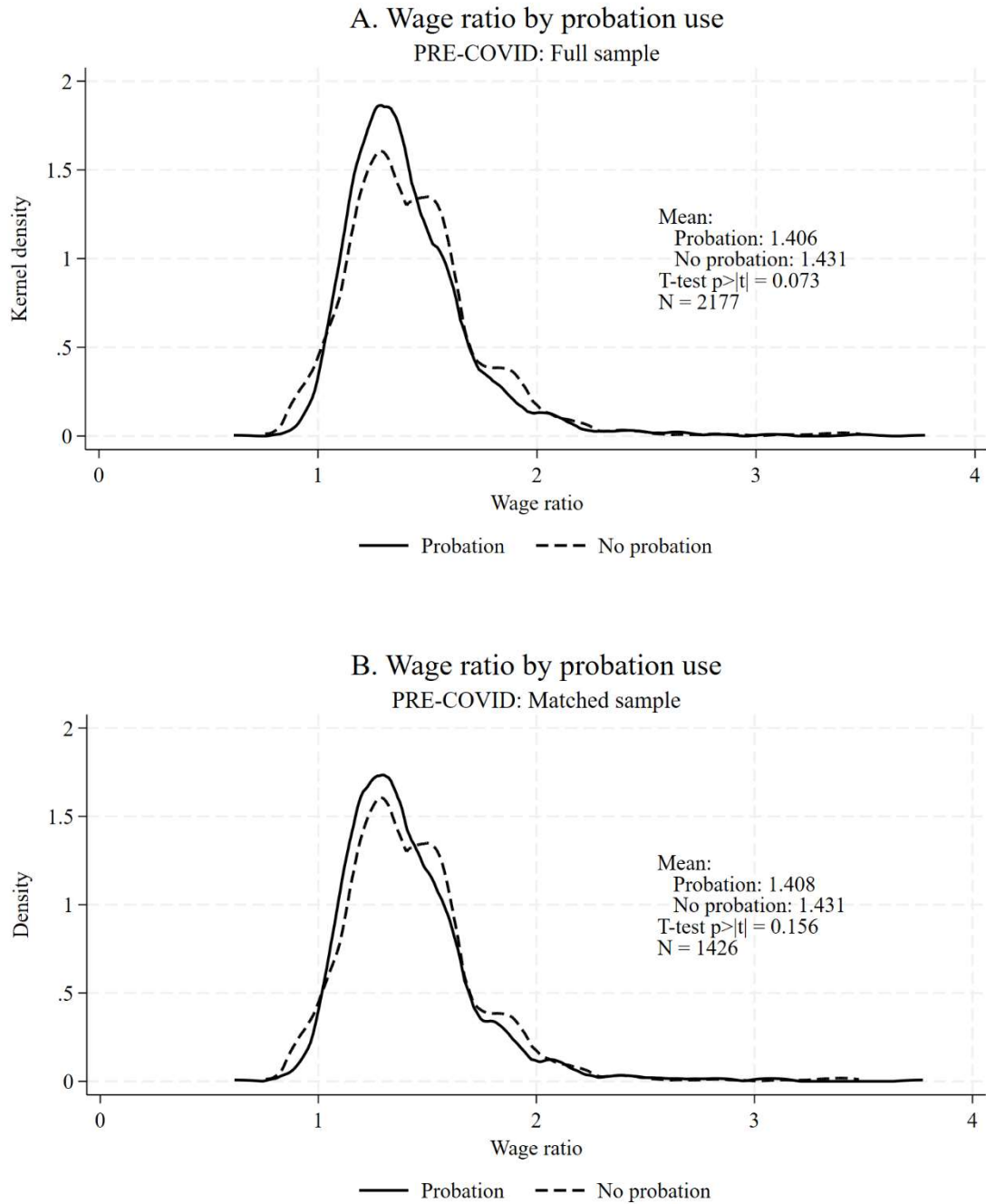
A. Wage ratio by probation use
PRE-COVID: Full sample

Mean:
Probation: 1.406
No probation: 1.431
T-test p>|t| = 0.073
N = 2177

B. Wage ratio by probation use
PRE-COVID: Matched sample

Mean:
Probation: 1.408
No probation: 1.431
T-test p>|t| = 0.156
N = 1426

Figure 4: Wage ratio distribution by probation use – pre-COVID sample

A. Wage ratio by probation use
COVID: Full sample

Mean:
  Probation: 1.384
  No probation: 1.402
T-test p>|t| = 0.169
N = 2240

—— Probation   - - - No probation

B. Wage ratio by probation use
COVID: Matched sample

Mean:
  Probation: 1.382
  No probation: 1.402
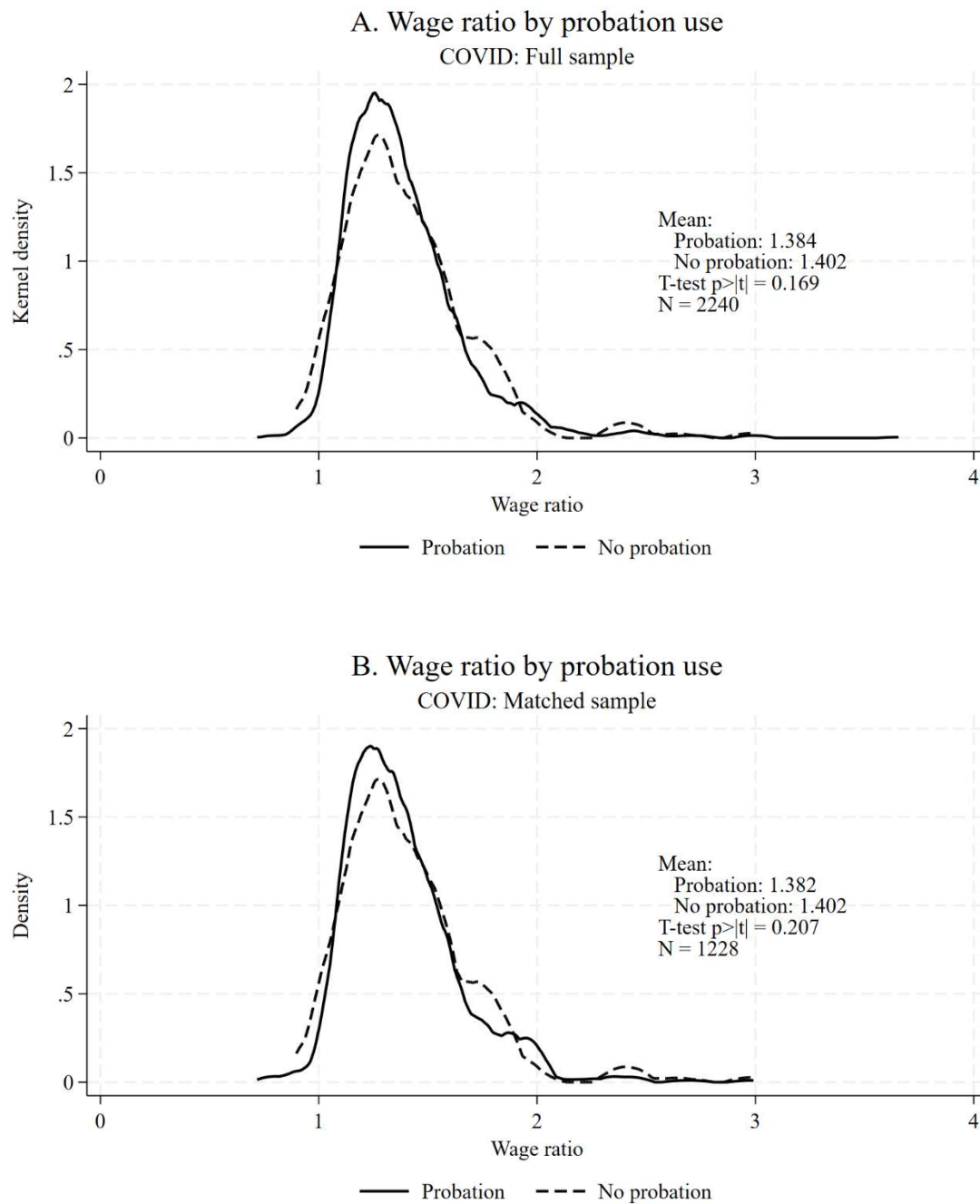T-test p>|t| = 0.207
N = 1228

—— Probation   - - - No probation

Figure 5: Wage ratio distribution by probation use – COVID sample

In summary, although some weak pandemic-related factors may be present, they do not alter the conclusions drawn from the main analysis. The null effect is robust across samples, specifications, and time periods, suggesting that probation does not have a statistically significant impact on starting wages.

Effect of probation on starting wage
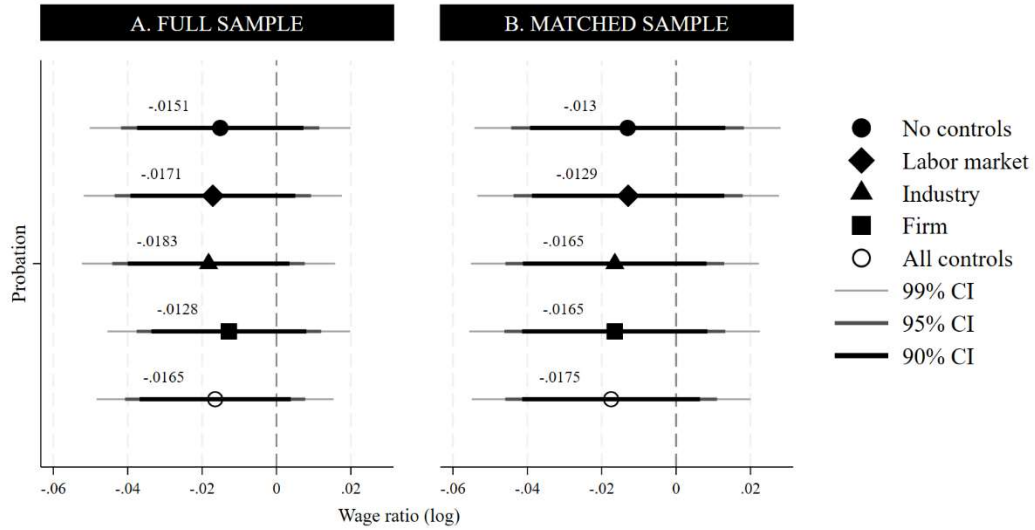### PRE-COVID

Figure 6: Effect of probation on starting wage – pre-COVID sample

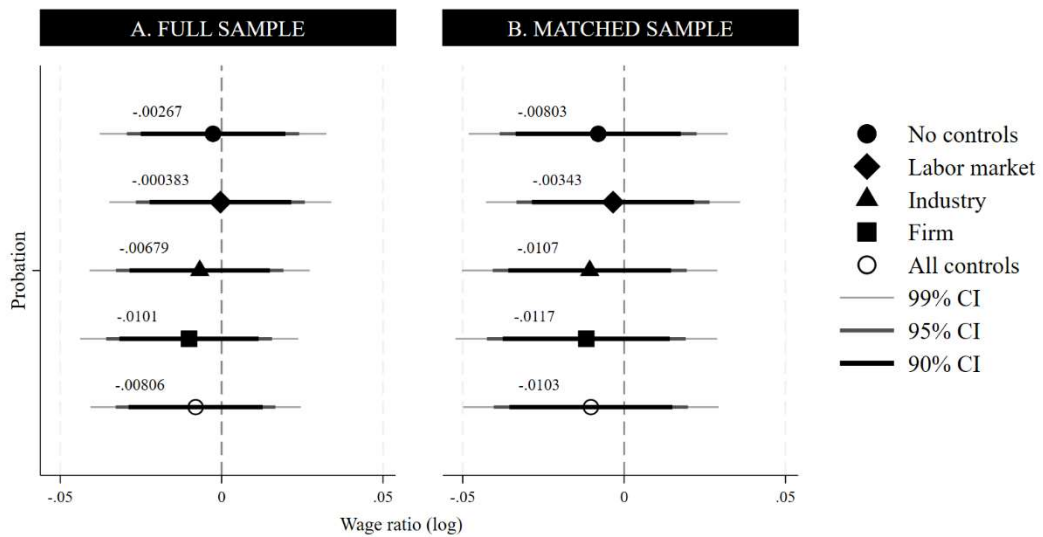## Effect of probation on starting wage
COVID

Figure 7: Effect of probation on starting wage – COVID sample

7. Conclusion

This paper uses matching approach to examine the impact of probation on starting wages utilizing an original dataset of job ads for full-time sales positions collected between July 2018 and July 2021 from a Japanese online job ad site. Japan has strong employment protections, making probation a vital and frequently used tool to prevent firm-perceived job-worker mismatch. Within the sample, 70% of job ads featured probation, providing sufficient variation to examine its effect. The advantage of using job ads in this analysis lies in the rich information they provide in addition to probation use and starting wage, such as detailed job characteristics and applicant requirements. Furthermore, using job ads avoids endogeneity concerns associated with relying on individual worker data, as the stated starting wages and probation decisions are independent of the eventual hires and any negotiations that may occur. Additionally, concentrating on a single recruitment channel, single source and one occupation only, while limiting the external validity of the results, guarantees a high degree of comparability of the control and treatment groups.

The theoretical literature suggests that jobs with probation should offer higher wages (Wang and Weiss, 1998). However, the findings of this study do not support this hypothesis, as no statistically significant difference in starting wages between jobs without probation and with probation upon its conclusion is observed. However, this result is specific to the context of this study and does not examine the actual wage profile of hired workers. Despite the limited setting, this study provides the first analytical evidence regarding probation and its impact on starting wages in Japan.

However, workers may be compensated for undergoing probation with its risks in other ways than by receiving higher wages at the start of long-term contracts. Such compensations may manifest over a long tenure or through the opportunity to work with coworkers who were also subjected to a period of intensive monitoring. Nevertheless, if these alternative rewards are not evident from the job ad and jobseekers do not expect them, the rational choice would be to prefer comparable

positions without probation. The coexistence of jobs with and without probation, with no difference in starting wages, may indicate that firms drop the probation requirement for otherwise less desirable positions. However, this study is not designed to address these questions. Further research is needed to document the use of probation and its effect on wages in a broader context and to clarify the underlying mechanisms driving probation use decisions.

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