

**PREFERENCE FOR YOUNG WORKERS  
IN MID-CAREER RECRUITING  
USING ONLINE ADS FOR SALES JOBS:  
EVIDENCE FROM JAPAN**

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# Preference for Young Workers in Mid-career Recruiting Using Online Ads for Sales Jobs: Evidence from Japan

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## Abstract

This study uses an original dataset of online mid-career job ads for full-time sales jobs collected from July 2018 to December 2019 to examine the use of explicit and implied age limits on job applicants and the characteristics of firms that set them. Although Japanese law prohibits age discrimination in employment, several exemptions, such as hiring young workers without prior work experience on regular contracts, are allowed. Firms can set an age limit, require job-related experience, or search broadly; however, they can also express their age preference in other ways. In the sample, 24% of ads included explicit age limits generally capped at 35 years, 26% set experience requirements, and nearly all contained some form of implied age preference. Consistent with theoretical predictions, the results show that firms with higher capital, those with fewer employees, older firms and those located in urban centers tended to set requirements on applicants. Further, domestic firms, firms with fewer employees, in urban centers and firms using probation periods for new hires were more likely to set age limits. Moreover, firms setting either requirement did not seem to be sensitive to local labor market conditions. Firms searching broadly responded to population age-related increased wage expectations while reducing labor costs by increasing the number of working hours covered by a baseline wage.

Keywords: Mid-career recruiting; Age discrimination; Job ads; Japan

JEL Classification: J42, J63, J71

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## 1. Introduction

The aging population and the surplus of vacancies over jobseekers have been some of the persistent features of the Japanese labor market. Yet, looking at job ads aimed at mid-career jobseekers, explicit age limits for applicants are not uncommon. In many countries, restricting applicant eligibility based on age would be considered illegal discrimination. Although Japanese law prohibits age discrimination in employment, it allows for a few loosely defined exceptions, such as hiring young individuals on long-term contracts while treating them as fresh graduates. Preferential hiring of fresh graduates is another longstanding feature of the Japanese labor market and is not legally considered discriminatory under the relevant legislation. Exploiting this regulatory exemption allows direct analysis of what type of firms set age limits in recruiting, without the need to prove the presence of discriminatory practices first using the typical methods of experiments or firm surveys. As setting age limits on applicants is legal in Japan under the circumstances examined in this paper and as the word discrimination generally has a negative connotation, the term age targeting is used instead.

The aim of this paper is to describe the firm characteristics associated with age targeting practices utilizing an original sample of online job ads for sales jobs. To do so, this paper proposes and tests a theoretical framework of employee search, hypothesizing that firms able to conduct more costly search select targeted search strategy. The sample was collected from Doda, an online job ad site aimed at mid-career jobseekers, over an 18-month period from July 2018 to December 2019, ending prior to the outbreak of the COVID-19 pandemic. The sales occupation allows for a seamless application of a young-age-related regulatory exemption. 23.6% of the 2,683 unique ads collected included age limits. However, age limits are not the only way to convey a preference regarding applicants' ages; up to 96% of the ads included other age targeted content. The empirical results of this study are generally consistent with the theoretical predictions.

For the duration of the data collection period, the regional prefectural vacancy ratio was above 1, indicating an excess of vacancies over jobseekers. Voluntarily limiting the pool of potential applicants in a tight labor market may appear counterintuitive on the firm side and may also have serious social consequences. Job mobility in Japan remains low.<sup>2</sup> Job advertisements are a crucial source of information for workers considering a job change and for individuals considering entering the labor market. Age restrictions in job advertisements, particularly easily accessible online job ads hosted on heavily advertised commercial sites, might discourage older workers from changing jobs, thereby contributing to their continued employment in unfavorable working conditions. Moreover, workers who entered the labor market during the 1990s economic downturn, known as the “employment ice age,” had limited access to stable jobs and related stable income and social benefits, hindering their ability to start families and plan for retirement. These workers are now middle aged, and despite the higher number of vacancies than jobseekers, they may no longer be eligible. Individuals who dropped out of the labor force during their productive years, for example, to raise children or become caregivers, might also find it difficult to return to their employment of choice. Furthermore, although the elderly population is growing and living longer and healthier lives, the elderly may have limited employment options while the pension system is struggling. Kitao and Mikoshiba (2020) proposed that higher labor participation of women and the elderly, especially in regular, higher-paying jobs, could help mitigate the negative impact of demographic changes on the Japanese macroeconomy and fiscal stability while transitionally lowering equilibrium wages.

This study makes several contributions. The theoretical framework proposes three mechanisms of targeted employee search: search costs related, appreciation for young age related, and wage related. The empirical results confirm that, in general, firms able to choose more costly targeted search and

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<sup>2</sup> Regardless of contract type, the job change rate in Japan in 2018 was 10% with significant differences based on age and gender. Although 17.5% of males under the age of 19 changed jobs, this rate dropped to 7.7% for males aged 35–39 and 4.7% for those aged 45–49. For females, the job change rates were higher, driven up by a higher ratio of part-timers who changed jobs more frequently, peaking in the 25–29 age group at 18.3% and decreasing to 13.1% and 11.3% in the 35–39 and 45–49 age groups, respectively (Ministry of Health, Labour and Welfare of Japan (MHLW), 2019d).

those highly valuing young age tended to set requirements on applicants. Firms with higher capital, older firms and firms hiring in urban areas tended to search narrowly, setting either experience requirements or age limits on applicants. Next, domestic firms, smaller firms, those hiring in urban areas and those implementing a probation period were more likely to set age limits. The use of indirect age targeting was variable, as it was used both alongside and in place of age limits. Further, analyzing the sensitivity of firms' wage setting behavior to the local labor market conditions based on the selected search strategy, only firms not setting either requirement partially responded to labor market changes. Although ample research on age limits in recruiting exists in Japan, to the best of the author's knowledge, this study is the first to use the rich information found in online job ads to directly analyze the characteristics of firms in Japan that practice both direct and indirect age targeting in mid-career recruiting.

## 2. Related literature

The economic literature on discrimination is extensive. However, because nearly all OECD countries have passed laws prohibiting employment discrimination, including age discrimination (OECD, 2019), explicit discriminatory practices in the workplace are uncommon in developed countries. Empirical studies must thus rely on indirect methods, typically including experiments or correspondence studies, such as sending out fictitious resumes that differ only in the aspect of interest and comparing callback rates (Bertrand and Mullainathan, 2004). The primary goal of these studies is to identify discrimination. Using data with stated preference for specific types of workers allows for skipping this step and focusing directly on determinants of firm behavior. This paper belongs to this stream of literature. Arrowsmith and McGoldrick (1993) examined explicit and inferred age limits in job advertisements published in newspapers and magazines in the United Kingdom during 1981–1991 prior to the passage of anti-age discrimination legislation. Kuhn and Shen (2013) studied firms' preferences for gender, age, height, and beauty of applicants using job ads from a Chinese online job ad site in a country where employment discrimination is mostly unregulated. In a subsequent study Helleseter et al. (2020) expanded their dataset to include data from Mexico. Burn et al. (2021) discovered that age stereotypes in job ads sometimes predicted age discrimination by combining the mining of US job ads for ageist language with correspondence studies.

Turning to Japan, appreciation for young age in employment, lifetime employment for regular employees, and the corresponding low job mobility are some of the defining features of the Japanese postwar labor market. This system is dependent on firms' ability to hire young workers, particularly fresh graduates. Ono (2010) demonstrated that lifetime employment was a persistent practice, particularly among highly educated male regular employees in large corporations and the public sector. On the other hand, Hamaaki et al. (2012) argued that lifetime employment and seniority-based wage practices were eroding, as evidenced by the flattening wage curve for older workers and related lower retention rates of university-educated younger workers.

Preferential hiring of young workers as a long-standing practice in Japan has been extensively researched, with most studies depending on firm surveys. Firm surveys provide information on the firm's internal operations; however, they tend to suffer from low response rates and response bias, particularly regarding sensitive topics. Okunishi (2008) discovered that younger firms and those that did not practice on-the-job training hired more mid-career workers, whereas larger firms expanded mid-career recruitment in the three years preceding the survey. Similarly, Ōta and Yasuda (2010) concluded that firms with well-developed training programs and high levels of firm-specific knowledge hired more fresh graduates than they did mid-career workers, thereby indicating a preference for younger workers. Finally, Kambayashi and Ōta (2010) using survey data found that firms with more employees and firms with higher quit rates tended to search for more workers. They further found differences in age limits in recruiting between industries and occupations.

Using job ads to study age targeting in Japan around the introduction of anti-age discrimination legislation, Kitaura (2003) found that only 1.6% of job ads registered with the public employment office in September 2001, before the implementation, excluded age restrictions on applicants, with

this number increasing to 12.7% in October 2002, after a weak version of the legislation took effect. Tokunaga (2008) examined job ads from the 1985, 1995, and 2005 issues of a women-oriented job ad magazine and reported that around 97% of ads contained age limits at all three time points, with the maximum eligible age increasing over time. This current study adds to their findings by investigating the prevalence and determinants of job limits in job ads after the implementation of the current, strictest anti-age discrimination legislation yet. To the best of the author's knowledge, this paper is the first to use online job ads to investigate the characteristics of firms practicing age targeting in mid-career recruiting in Japan.

### **3. Institutional setting**

Discrimination in employment is governed by the Employment Measures Act (EMA), originally implemented in 1966. Age as a basis for discrimination was first referenced in the 2001 EMA revision, which stipulated duty to endeavor to provide equal opportunity to prospective workers regardless of age. The 2007 EMA amendment changed this duty to endeavor into an obligation with six exemptions. Every sampled job ad stipulating age limit cited the following exemption:

“Recruit only new graduates who are youth, or below certain ages, in order to give them the opportunity to develop and improve their occupational abilities over a long period of service.” (Sakuraba, 2009)

This exemption protects the traditional recruiting process focused on recent graduates. Firms may set upper age limits when hiring youth on indefinite contracts; however, they cannot simultaneously require any work-related experience, licenses, or qualifications obtained only during employment, thereby effectively treating applicants as fresh graduates. Firms seeking to hire workers on a regular, non-fixed-term, contracts have three options: set an age limit for applicants, set experience requirements, or set neither. The exemption does not define “youth” or “below certain ages”; however, official explanatory materials frequently mention the age of 35, in some cases up to 45 (MHLW, 2016, 2019a). Furthermore, firms are free to express their preference in other ways and are thus, in practice, permitted to require applicants to have both work experience and be of a specific age.

The current remaining exemptions allow age targeting in cases of hiring for artistic reasons, for jobs with statutory age limits, to comply with mandatory retirement age, when a given age category is underrepresented in the firm, and hiring seniors or other individuals whose employment is encouraged by government policies.

### **4. Data**

The data for this study were gathered over an 18-month period from July 2018 to December 2019 from the Japanese online job ad site Doda (<https://doda.jp/>), a website aimed at mid-career jobseekers. In total, 3,573 ads from 1,342 firms were collected; however, this sample contains reposts. Firms posting multiple ads often use a mix of targeting strategies for an otherwise identical ad. An ad is considered a repost if it matches a previously posted ad by the same firm in all its job characteristics and search strategy attributes. Jobseekers are assumed to recognize a repost and always reject it if the terms are undesirable but are assumed to consider an ad that meets their criteria regardless of their possibly having rejected another ad by the same firm. This study thus adopts an ad-based approach instead of a firm-based approach, excluding duplicates of the previously posted ads while keeping multiple ads from firms not considered reposts. After excluding reposts the sample consists of 2,683 unique ads by 1,342 firms. Appendix A details the sample collection process and discusses the representatives of the sample. Table 1 presents the descriptive statistics.

| Variable                    | N     | Mean      | Std. Dev. | Min     | Max      |
|-----------------------------|-------|-----------|-----------|---------|----------|
| Age limit                   | 2,683 | 0.236     | 0.425     | 0       | 1        |
| Under 40                    | 2,683 | 0.209     | 0.407     | 0       | 1        |
| Under 35                    | 2,683 | 0.157     | 0.364     | 0       | 1        |
| Experience                  | 2,683 | 0.250     | 0.433     | 0       | 1        |
| Age index 1                 | 2,683 | 3.131     | 1.510     | 0       | 6        |
| Age index 2                 | 2,683 | 2.367     | 1.322     | 0       | 5        |
| Capital (yen)               | 2,683 | 1.35E+10  | 1.49E+11  | 100,000 | 5.40E+12 |
| Employees                   | 2,683 | 3,297.353 | 20,956.62 | 2       | 307,275  |
| Foundation year             | 2,683 | 1992.281  | 21.771    | 1880    | 2019     |
| Listed firm                 | 2,683 | 0.141     | 0.348     | 0       | 1        |
| Subsidiary of listed firm   | 2,683 | 0.192     | 0.394     | 0       | 1        |
| Japanese firm               | 2,683 | 0.947     | 0.223     | 0       | 1        |
| Tokyo, Osaka location       | 2,683 | 0.694     | 0.461     | 0       | 1        |
| Probation period            | 2,683 | 0.659     | 0.474     | 0       | 1        |
| Wage ratio                  | 2,683 | 1.552     | 0.299     | 0.615   | 3.772    |
| Wage ratio without overtime | 2,683 | 1.409     | 0.301     | 0.615   | 3.772    |
| Vacancy ratio               | 2,683 | 1.567     | 0.126     | 1.240   | 2.210    |
| Population age              | 2,683 | 44.965    | 0.810     | 40.543  | 51.007   |

*Table 1: Descriptive statistics*

Regarding search type strategy, 48.6% of ads adopted narrow search, with 25.0% requiring prior work experience and 23.6% setting an age limit. For this paper, two types of age targeting are defined: direct and indirect. Firms that impose an explicit age limit on applicants citing EMA's young-age-related exemption are considered to engage in direct age targeting. Indirect age targeting is defined as specifying a preference for young workers in the ad in ways other than explicitly setting an age limit. Within the highly standardized structure of the ads, six patterns were identified and summarized into two variables: Age index 1, ranging from 0 to 6, and Age index 2, ranging from 0 to 5. Variable Age index 2 excludes visual-based age targeting. The average number of indirect age targeting types used was 3.1 for Age index 1 and 2.4 for Age index 2. A detailed discussion on both types of age targeting is provided in Appendix B.

Of the 1,342 firms in the sample, 790 posted a single unique ad. The 10 most active firms posted 483 ads in total, 216 of which were identified as unique. The average registered capital of a firm posting an ad was 13.5 billion yen, with a median of 63.0 million yen. With a median of 215 employees, the average number of employees was 3,297. The average firm was founded in 1992, whereas the median year of founding was 1999. Larger, older firms tended to post a variety of ads, pushing the sample means higher. Furthermore, publicly traded firms posted 14.1% of the ads, and subsidiaries of one posted 19.2% of the ads. Domestic Japanese firm posted 94.7% of the ads and 69.4% of ads were advertising jobs in Tokyo or Osaka. A probation period was required in 66.0% of the ads.

All job ads collected contained a monthly wage offer upon completion of the probation period. In 48.3% of ads this wage included overtime pay, with the number of overtime hours covered ranging from 10 to 80.<sup>3</sup> To describe the wage offer, two variables were created: hourly wage ratio and hourly wage ratio without overtime. Hourly wage rate respectively not reflecting and reflecting the included

<sup>3</sup> Unpaid overtime and the inclusion of overtime pay in baseline wage are a standard practice in Japan. Kuroda and Yamamoto (2016) reported that in a survey of regular employees working in firms with more than 100 employees in Japan, half of their overtime hours were unpaid.

overtime hours was weighted by the minimum wage of the prefecture the job is located in to account for regional differences. The average hourly wage ratio was 1.55 and 1.41 for hourly wage ratio without overtime, with the minimum and maximum values for both variables standing at 0.62 and 3.77, respectively. In some cases, the convoluted system of incentive pay pushed the hourly base rate below the legal minimum hourly wage.

Finally, the local labor market, the definition of which is limited by data availability, is described by two variables: vacancy ratio and population age. The vacancy ratio is the number of job openings per jobseeker, published monthly at the prefectural level, in the prefecture of job's location. The vacancy ratio ranged from 1.24 to 2.21, indicating more jobs than jobseekers were available for all months and locations. Next, population age represents the average population age in the city the job is in, as determined by the 2015 census.

## 5. Theoretical framework

In this non-sequential search model, a firm with an opening chooses the type of candidate to invite based on perceived productivity and corresponding search costs. Firms can search broadly, with no requirements, or narrowly, with age or experience requirements imposed on applicants. Although the choice between age and experience is binary, the underlying preferences are not mutually exclusive.

This framework assumes that firms operate in a monopsonic local labor market. Manning (2003, 2011) proposed that firms' wage-setting power stems from the existence of search frictions, such as the costs associated with a job change or reservation wages. In a monopolistic setting, worker discrimination can be consistent with profit maximization as firms can set wages lower than workers' marginal product.

### 5.1. Jobseekers

On the supply side, each jobseeker  $i$  is assumed to possess several characteristics:

- 1) productivity  $x_i$  defined as  $x_i = \bar{x} + \varepsilon_i$ , where  $\bar{x}$  is the average productivity for the advertised job after undergoing relevant training and  $\varepsilon_i$  is  $i$ 's deviation from  $\bar{x}$
- 2) reservation wage  $W_i$
- 3) experience  $e_i$  relevant to the advertised job
- 4) age  $y_i$
- 5) location  $l_i$  the jobseeker is willing to work in.

These attributes have the following probability distribution functions:

- 1) productivity distribution function  $F(x)$
- 2) reservation wage distribution function  $G(W)$
- 3) experience distribution function  $H(e)$
- 4) age distribution function  $J(y)$ .

The probability  $P_i$  of a jobseeker  $i$  applying for an opening  $v$  with an offered wage  $W_v$ , productivity requirement  $\bar{x}_v$ , experience requirement  $e_v$  and age requirement  $y_v$  by a firm located in location  $k$  is

$$P_i = (1 - F_i(\bar{x}_v))G_i(W_v)(1 - H_i(e_v))J_i(y_v).$$

The number of applicants  $A$  for opening  $v$  is then

$$A = PL_k$$

where  $L_k$  is the total number of available jobseekers in a location  $k$ . As such,  $A$  is an increasing function of  $L$ ,  $W$ ,  $y$  and is decreasing in  $\bar{x}$  and  $e$ .

Introducing the attractivity coefficient  $\mu$ ,  $0 \leq \mu \leq 1$ , which reflects attractivity of the firm and the opening, the number of arrivals is modified to the following:

$$A = \mu P L_k.$$

Firms searching broadly see a higher number of suitable applicants arriving

$$A_B = \mu P_B L_k, P_B = (1 - F(\bar{x}))G(W)$$

than firms searching narrowly do, targeting either age or experience with the corresponding number of applicants  $A_Y$  and  $A_E$

$$A_Y = \mu P_Y L_k, P_Y = (1 - F(\bar{x}))G(W)J(y)$$

$$A_E = \mu P_E L_k, P_E = (1 - F(\bar{x}))G(W)(1 - H(e)).$$

Because there is always at least one opening in location  $k$ , higher local vacancy ratio leads to a lower number of jobseekers arriving:

$$\lim_{vacancy\ ratio_k \rightarrow \infty} A(L_k) = 0.$$

Additionally, the existence of retirement age guarantees that the higher the average population age in a location  $k$ , the fewer jobseekers are available even in the absence of age limits.

$$\lim_{average\ population\ age_k \rightarrow \infty} A(y) = 0$$

## 5.2. Firms

The number of job separations firm faces,  $s(n)$ , is assumed to be a non-decreasing function of the number of employees  $n$ :

$$s'(n) \geq 0.$$

For a firm to maintain its size, each quit is turned into an opening, the number of openings is thus a non-decreasing function of the number of employees. This setting is consistent with Kambayashi and Ōta (2009), who found that firms with more regular employees and firms with higher quit rates post more mid-career job ads in Japan.

Further, the total search cost  $\sum SC$  firm is willing to spend searching for workers to fill all their openings is at maximum a fixed portion  $t$ ,  $0 < t < 1$ , of their assets  $c$ :

$$\sum SC \leq tc.$$

Broad search is associated with search cost  $SC(A_B)$ , targeted search results in search cost  $SC(A_Y)$  or  $SC(A_E)$ . Search costs are decreasing in the number of applicants  $A$ ,  $SC'(A) < 0$ , reflecting the additional costs of targeted search, such as the costs needed to reach jobseekers with specific characteristics or the smaller pool of applicants and thus likely longer time the opening goes unfilled. Hence search costs decrease with higher wages, higher age limits, a larger jobseeker population, and a higher attractivity coefficient, and increase with tighter productivity or experience requirements. Costs incurred during the subsequent stages of the hiring process, such as interviews, are not considered.

For a single opening, firm chooses the type of applicant to invite based on maximizing the following profit function  $\pi$ :

$$\pi = \max\{E[R(U_i; D^j)] - D^j(W^j + SC(A_j) + TC^j)\}$$

$$\text{where } U_i = x_i + D^j x^j, j \in (B, Y, E), x^B = 0$$

$$\text{s. t. } A_j \geq 1$$

$$SC(A_j) \leq tc$$

where  $R(U_i)$  is a revenue function,  $R'(U_i) > 0$  and  $R''(U_i) < 0$ . The variable of choice is  $D^j$ , a search type indicator equal to 1 if the strategy is chosen and 0 otherwise,  $j \in (B, Y, E)$ , where  $B$  stands



for broad search,  $Y$  for age-targeted search and  $E$  for experience-targeted search. The term  $x^j$  is a firm's perceived bonus in productivity associated with a given type of worker. A firm's perceived young-age productivity bonus  $x^Y$  can stem both from taste-based or statistical discrimination,  $x^E$  is firm's perceived productivity bonus from relevant experience and  $x^B = 0$ .  $TC^j$  is the cost of training allocated to a worker hired through the respective type of search, where  $TC^Y > TC^B > TC^E$ .  $W^j$  is the wage associated with the productivity level  $\bar{x}$  and  $W^Y < W^B < W^E$ .

A firm facing  $q$  number of openings  $v$  chooses a mix of search strategies to jointly maximize profit  $\Pi$ , subject to constraints on the minimum number of wanted applicants and the maximum affordable search costs.

$$\Pi = \max \sum_{v=1}^q \{E[R_v(U_{vi}; D_v^j)] - D_v^j(W_v^j + SC_v(A_{vj}) + TC_v^j)\}$$

$$s. t. \sum_{v=1}^q A_{vj} \geq s(n)$$

$$\sum_{v=1}^q SC_v(A_{vj}) \leq tc$$

The dataset compiled for this study allows for a direct observation of the chosen search strategy  $D^j$ .

Based on this model, three hypotheses are proposed:

Hypothesis 1: Firms for which targeting is comparatively more costly tend to target less.

This includes firms that can allocate fewer resources to search activities, firms experiencing more quits, or firms struggling to attract applicants, such as those in locations with fewer jobseekers or firms with low attractivity coefficient.

Hypothesis 2: Firms highly valuing young age tend to age target more.

These are firms with a high perceived young age productivity bonus  $x^Y$ . Firms with highly developed on-the-job training programs or those with an established rigid inner structure might place more value on young age. Firms investing heavily in training workers, which might be observed as utilization of a probation period, might want to gain the benefits over a long period of employment. The impact of unobserved firm inner structure or culture might manifest as a difference between younger and older firms or between domestic Japanese and foreign-owned firms.

Hypothesis 3: Firms able to offer lower wages without discouraging potential applicants tend to search narrowly.

A firm able to set wage offer  $W^j$  lower than a corresponding competitive wage without the loss of arriving jobseekers can use this difference to cover additional costs stemming from targeted search.

Besides search type, firms reveal their preference for young age by employing indirect age targeting practices. In ads that set experience requirements but are unable to set age limits simultaneously, indirect age targeting may be used as a substitute for age limits. In ads with an age limit, indirect age targeting may be used to target specific age groups more precisely.

## 6. Narrow search and firm characteristics

### 6.1 Narrow search and firm characteristics – empirical strategy

This section examines the association between firm characteristics and a narrow employee search strategy. Narrow search dummy variable for job ad  $i$  is regressed on firm characteristics and a set of controls using the following linear probability model:

$$\text{Narrow search}_i = \alpha_0 + \alpha_1 * \text{Firm characteristics}_i + \alpha_2 * \text{Controls}_i + \varepsilon_i \quad (1)$$

Narrow search takes five forms based on the type of targeting used: Age limit + experience indicating narrow search in general, Experience for experience-targeted narrow search, Age limit for age-targeted narrow search, Under 40 for age-targeted search with the maximum eligible age of 40 and Under 35 for age-targeted search with the maximum eligible age of 35. The coefficient of interest is  $\alpha_1$ , a vector of parameter estimates of variables describing firm characteristics. Controls is a vector of control variables always including local labor market variables, posting month and industry dummy variables, and a combination of variables describing job characteristics, or search intensity. For all models, the error term  $\varepsilon_i$  is clustered at a firm level.

Further, Indirect age targeting categorical variable for job ad  $i$  is similarly regressed on firm characteristics and a set of controls in a linear regression model:

$$\begin{aligned} \text{Indirect age targeting}_i \\ = \beta_0 + \beta_1 * \text{Firm characteristics}_i + \beta_2 * \text{Controls}_i + \beta_3 * \text{Narrow search}_i \\ + \varepsilon_i \end{aligned} \quad (2)$$

including Narrow search in the form of age-targeted and experience-targeted search dummy variables. Indirect age targeting takes the form of Age index 1 (0–6 range) and Age index 2 (0–5 range). The error term  $\varepsilon_i$  is analogously clustered at the firm level. Furthermore, models (1) and (2) for all outcomes were additionally estimated using probit (model (1)) and ordered logit (model (2)) to check the robustness of the results, producing generally qualitatively identical results with higher statistical power.

## 6.2 Narrow search and firm characteristics – results and discussion

Table 2 displays the results of the narrow search model from equation (1) with a variable set of controls and an outcome variable Age limit in columns (1)-(3) and Experience in columns (4)-(6). Additionally, Appendix C Table A9 reports corresponding familywise error rate (FWER) adjusted p-values for multiple hypothesis testing using the Holm-Bonferroni method. Columns (1) and (4) show the estimation results including only controls common to all specifications. Without controlling for job characteristics and search intensity, Japanese firms and firms hiring for jobs located in Tokyo and Osaka were highly significantly more likely to target age than their respective counterparts, consistent with hypotheses 1 and 2. Firms targeting experience were of the type assumed to be able to select more costly search strategies (hypothesis 1): wealthier firms, firms with fewer quits, and older firms, which may have higher recognition value than young firms. Furthermore, firms assumed to have a more flexible internal structure, foreign-owned firms, and subsidiaries of publicly traded firms were also significantly more likely to target experience. However, firms may be inclined to target only specific types of sales jobs; the addition of job-related controls in columns (2)-(3) and (5)-(6) filters this effect out, weakening the significance of the effect of firm characteristics for both types of targeted search. Columns (3) and (6) show results with the addition of search-related controls that separate out the effect of search intensity. Column (3) results show that the firm characteristics associated with age targeting survive the inclusion of search-related control variables, generally gaining significance. On the other hand, controlling for search intensity for experience targeting in column (6) causes little change. While the significance of the coefficient estimates varies with the controls, their direction and effect sizes generally remain stable. The specification used in columns (3) and (6), including the complete set of control variables, thus revealing underlying preferences, is selected for the remainder of this section. Results of models including firm characteristics variables

separately without additional controls and with the job and search-related controls are presented in Appendix C Tables A10 and A11.

Table 3 displays the results for all the introduced narrow search dummy variables (equation 1) and age indices (equation 2). FWER-adjusted p-values are reported in Appendix C Table A12. Column (1) shows the results of an overall narrow search, columns (2) and (3) show the results of mutually exclusive types of narrow searches, and columns (4) and (5) show the results of age targeting by eligibility cut-off ages (40, 35). Columns (6) and (7) show the relationship between the firm characteristics and the revealed preference for young age at the top of the selected search type.

The results in Table 3 generally align with the proposed hypotheses. Firms with higher capital are highly significantly more likely to choose an overall narrow search. However, the effect on experience and all types of age targeting is only marginal or non-significant. This result suggests that wealthier firms undergo a more costly search, while not necessarily preferring young age or experience specifically. Further, the effect of the number of employees is similarly consistent with hypothesis 1, as the increasing number of employees, understood as more vacancies to fill, shows the expected opposite trend to capital size. Bigger firms do not differ from smaller firms in terms of targeting experience or showing a preference for young age indirectly but are less likely to choose an overall narrow search and target age at all thresholds. Experience is assumed to bring a realized productivity bonus, possibly offsetting higher search costs. Comparing the effect sizes across eligibility cut-off ages, a 1% increase in the number of employees results in a 2.5% lower likelihood of targeting age overall but a 3.3% and 3.1% lower probability of setting the maximum eligible age to 40 and 35, respectively, estimated with higher precision with decreasing cut-off age. This finding suggests that larger firms are more likely to broaden eligibility before abandoning age targeting. Further, younger firms are less likely to select narrow search than older firms; yet are highly significantly more likely to engage in indirect age targeting practices. They display a strong preference for young age without acting on it, possibly due to low attractiveness caused by low name recognition or uncertainty about the future.

Analyzing the role of firm ownership type, publicly listed firms and their subsidiaries do not significantly differ from private firms in terms of likelihood to target overall and age at all thresholds. Yet, subsidiaries of publicly traded firms are more likely to target experience and tend to use fewer indirect age-targeting practices than private firms. One possible application of indirect age targeting practices is to signal young-age preference when age limits cannot be set due to the inclusion of experience requirements. This result thus suggests that subsidiaries of publicly traded firms are more welcoming to outside experience regardless of applicant's age. Examining the ownership origin, domestic Japanese firms are more likely to target age overall and ages 40 and younger than foreign-owned firms. This trend may indicate a firm culture that places a premium on youth. However, the precision of the estimates decreases with the lower targeted age and no difference is found in the preference for very young workers. Furthermore, foreign-owned firms tend to use more indirect age targeting methods, consistent with practices used in an environment where age limits are illegal, as examined in Burn et al. (2021).

Next, firms filling a vacancy in Tokyo or Osaka have a 15.1% higher likelihood of targeting age overall and a 16.0% and 10.7% higher likelihood of targeting the 40 and younger and the 35 and younger age groups, respectively, than in other locations. However, they do not differ in terms of experience targeting. Firms in these urban centers have access to a larger pool of applicants, making targeted searches with the uncertain realization of perceived productivity bonuses less costly. Firms also use more indirect age-targeting practices in urban areas, possibly taking advantage of the large jobseeker pool to reach age groups more precisely defined than age limits allow.

Finally, firms that use a probation period interpreted as an indicator of intensive training practices are more likely to target age at all thresholds, with the effect sizes ranging from 6.2% to 7.2%, and to employ indirect age targeting to a greater extent. The use of a probation period is, albeit marginally, negatively associated with experience-targeted search, which supports the hypothesis associating training costs with young-age appreciation. Okunishi (2008) and Ōta and Yasuda (2010) support this interpretation by linking more developed in-firm training practices to a preference for young workers.

In conclusion, 48.6% of the ads employed a narrow search strategy, roughly evenly split into experience and age-targeted search. The determinants of overall narrow search and specific types of targeted search generally agree with the hypotheses derived from the presented theoretical framework: firms that can afford more costly narrow search are more likely to search narrowly. However, as this study does not have information about the inner workings of the observed firms and is limited by the data source, more detailed research into the determinants of preference for a young age is needed.

| <b>NARROW SEARCH – IDENTIFICATION</b> |                        |                         |                         |                           |                          |                         |
|---------------------------------------|------------------------|-------------------------|-------------------------|---------------------------|--------------------------|-------------------------|
|                                       | <b>AGE LIMIT</b>       |                         |                         | <b>EXPERIENCE</b>         |                          |                         |
|                                       | (1)                    | (2)                     | (3)                     | (4)                       | (5)                      | (6)                     |
| Capital (log)                         | 0.00124<br>(0.00938)   | 0.00741<br>(0.00922)    | 0.00998<br>(0.00924)    | 0.0241***<br>(0.00907)    | 0.0138*<br>(0.00837)     | 0.0157*<br>(0.00865)    |
| Employees (log)                       | 0.0181<br>(0.0122)     | 0.00723<br>(0.0119)     | -0.0252**<br>(0.0119)   | -0.0360***<br>(0.0101)    | -0.0217**<br>(0.00917)   | -0.00889<br>(0.0100)    |
| Foundation year                       | 0.000308<br>(0.000776) | -0.000129<br>(0.000704) | -0.000632<br>(0.000692) | -0.00246***<br>(0.000686) | -0.00134**<br>(0.000671) | -0.000976<br>(0.000666) |
| Listed firm                           | -0.0744<br>(0.0676)    | -0.0589<br>(0.0584)     | -0.0815<br>(0.0521)     | 0.0549<br>(0.0518)        | 0.0422<br>(0.0454)       | 0.0654<br>(0.0452)      |
| Subsidiary of listed firm             | -0.0211<br>(0.0481)    | -0.00647<br>(0.0475)    | -0.00196<br>(0.0423)    | 0.113***<br>(0.0437)      | 0.0756**<br>(0.0350)     | 0.0706**<br>(0.0355)    |
| Japanese firm                         | 0.179***<br>(0.0578)   | 0.114*<br>(0.0583)      | 0.137**<br>(0.0574)     | -0.222***<br>(0.0693)     | -0.0958<br>(0.0658)      | -0.113*<br>(0.0656)     |
| Tokyo, Osaka location                 | 0.114***<br>(0.0330)   | 0.133***<br>(0.0350)    | 0.151***<br>(0.0333)    | 0.0239<br>(0.0250)        | -0.0194<br>(0.0227)      | -0.0150<br>(0.0230)     |
| Probation period                      | 0.0539*<br>(0.0297)    | 0.0600**<br>(0.0287)    | 0.0718***<br>(0.0273)   | -0.0234<br>(0.0266)       | -0.0339<br>(0.0220)      | -0.0415*<br>(0.0215)    |
| Job Search                            |                        | ✓                       | ✓                       |                           | ✓                        | ✓                       |
| <i>N</i>                              | 2,683                  | 2,683                   | 2,683                   | 2,683                     | 2,683                    | 2,683                   |
| <i>R</i> <sup>2</sup>                 | 0.111                  | 0.151                   | 0.189                   | 0.138                     | 0.242                    | 0.253                   |

*Notes:* Coefficient estimates from linear probability model. Dependent variable is an indicator of the presence of targeting. Labor market controls, and Month and industry dummies included in all models. Inclusion of variables controlling for type of advertised job (Job) and search intensity (Search) indicated. Job controls are Starting wage, Inclusion of overtime in wage, Education, B-to-B, B-to-C, 9AM shift, Flextime, Days off schedule, Transfer possibility. Search controls are Ads per firm, Number of reposts, Posting period, Number of locations, Number of locations squared, Hiring 5+ workers. Robust standard errors in parentheses clustered at firm level. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

*Table 2: Narrow search – identification*

| NARROW SEARCH             |                           |                         |                         |                         |                         |                        |                         |
|---------------------------|---------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|
|                           | AGE LIMIT +<br>EXPERIENCE | EXPERIENCE              | AGE<br>LIMIT            | UNDER 40                | UNDER 35                | AGE INDEX<br>1         | AGE INDEX<br>2          |
|                           | (1)                       | (2)                     | (3)                     | (4)                     | (5)                     | (6)                    | (7)                     |
| Capital (log)             | 0.0257***<br>(0.00840)    | 0.0157*<br>(0.00865)    | 0.00998<br>(0.00924)    | 0.00253<br>(0.0119)     | -0.00108<br>(0.00801)   | -0.0526*<br>(0.0309)   | -0.0507*<br>(0.0285)    |
| Employees (log)           | -0.0341***<br>(0.0127)    | -0.00889<br>(0.0100)    | -0.0252**<br>(0.0119)   | -0.0334***<br>(0.0120)  | -0.0308***<br>(0.0103)  | 0.0701*<br>(0.0396)    | 0.0476<br>(0.0364)      |
| Foundation year           | -0.00161**<br>(0.000743)  | -0.000976<br>(0.000666) | -0.000632<br>(0.000692) | -0.00163*<br>(0.000837) | -0.000710<br>(0.000627) | 0.0110***<br>(0.00240) | 0.00961***<br>(0.00218) |
| Listed firm               | -0.0161<br>(0.0524)       | 0.0654<br>(0.0452)      | -0.0815<br>(0.0521)     | -0.0941<br>(0.0598)     | 0.0182<br>(0.0523)      | 0.141<br>(0.178)       | 0.109<br>(0.168)        |
| Subsidiary of listed firm | 0.0686<br>(0.0432)        | 0.0706**<br>(0.0355)    | -0.00196<br>(0.0423)    | -0.0547<br>(0.0386)     | 0.00630<br>(0.0370)     | -0.622***<br>(0.131)   | -0.547***<br>(0.121)    |
| Japanese firm             | 0.0238<br>(0.0707)        | -0.113*<br>(0.0656)     | 0.137**<br>(0.0574)     | 0.0975*<br>(0.0522)     | 0.0640<br>(0.0481)      | -0.363**<br>(0.172)    | -0.249<br>(0.154)       |
| Tokyo, Osaka location     | 0.136***<br>(0.0354)      | -0.0150<br>(0.0230)     | 0.151***<br>(0.0333)    | 0.160***<br>(0.0293)    | 0.107***<br>(0.0259)    | 0.253**<br>(0.111)     | 0.212**<br>(0.0948)     |
| Probation period          | 0.0303<br>(0.0284)        | -0.0415*<br>(0.0215)    | 0.0718***<br>(0.0273)   | 0.0621**<br>(0.0277)    | 0.0637**<br>(0.0254)    | 0.228**<br>(0.0894)    | 0.208***<br>(0.0801)    |
| <i>N</i>                  | 2,683                     | 2,683                   | 2,683                   | 2,683                   | 2,683                   | 2,683                  | 2,683                   |
| <i>R</i> <sup>2</sup>     | 0.201                     | 0.253                   | 0.189                   | 0.141                   | 0.116                   | 0.245                  | 0.229                   |

*Notes:* Coefficient estimates from linear probability model in columns (1) – (5), linear regression model for columns (6) – (7). Dependent variables in columns (1) – (5) are dummy variables, dependent variable in columns (6) ranges from 0 – 6, in column (7) from 0 – 5. All models control for labor market characteristics, month, industry, job characteristics and search intensity. Robust standard errors in parentheses are clustered at firm level. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

*Table 3: Narrow search*

## 7. Narrow search and wage offer

This section addresses hypothesis 3 from Section 5, proposing that firms able to suppress wages choose more costly narrow search, by analyzing the relationship between search type and wage setting behavior based on local labor market conditions. A firm offering a competitive wage should theoretically increase this offer in face of a tightening labor market. Using US online job ads, Azar et al. (2020) examined the association between labor market concentration and wage offers and observed lower wage offers in markets with fewer firms. Assessing the relationship between local labor market conditions and the wage offer may thus provide some evidence as to whether firms utilizing different search strategies respond differently to labor market conditions. This analysis uses both the sample of unique ads and the original dataset containing reposts to capitalize on the dynamic nature of the labor market.

The aim of this analysis is to examine the current sample for the presence of indicators consistent with hypothesis 3; it does not intend to detect or measure market power. Additionally, this analysis assumes low job mobility, which is consistent with the observed mobility in the Japanese labor market, assuming that mid-career jobseekers generally search for jobs in the city of their residence or in cities with comparable average population age. Because of these considerations, this analysis is limited and should be interpreted accordingly.

### 7.1 Narrow search and wage offer – empirical strategy

To examine the association between the wage offer and the local labor market conditions, Wage offer variables Hourly wage ratio and Hourly wage ratio without overtime of a unique job ad  $i$  or a job ad  $j$  are regressed by a linear regression model on variables describing the local labor market and a set of controls using the following model:

$$\begin{aligned} \text{Log}(Wage\ offer_k) \\ = \alpha + \beta * \text{log}(\text{Vacancy\ ratio}_k) + \gamma * \text{Population\ age}_k + \delta * \text{Controls}_k + \mu \\ * \text{Narrow\ search}_k + \varepsilon_k \end{aligned} \tag{3}$$

where  $k \in (i, j)$ , using full samples and search type subsamples.

Hourly wage ratio and Hourly wage ratio without overtime depict the wage offer as an hourly wage weighted by the local minimum wage, respectively, ignoring and accounting for the number of overtime hours included in the wage offer. Vacancy ratio is the number of vacancies to the number of jobseekers in the prefecture of job's location 1 month before the posting month. Population age represents the average population age in the city the job is in. Controls is a vector of control variables including month and industry dummy variables and a combination of variables describing firm, job characteristics and search intensity. Equivalently to equation (2), Narrow search is a vector of age-targeted and experience-targeted search dummy variables. The error term  $\varepsilon$  is clustered at the company level for the sample of unique ads  $i$  and two-way clustered at the company level and a job ad level for the sample of all ads  $j$ .

### 7.2 Narrow search and wage offer – results and discussion

For all ads the local labor market is characterized by an excess of vacancies over jobseekers, with on average 1.57 openings per jobseeker. A higher vacancy ratio indicates a tighter labor market, the expected sign on the vacancy ratio estimates in equation (3) for both outcomes is thus positive. A negative or statistically insignificant result would imply that the firm does not respond to labor market tightness. Similarly, the expected impact of average population age on both outcomes is either null or positive. Firms in locations with older workers may reflect the average level of productivity of potential applicants in the wage offer, as productivity generally increases with experience and correspondingly age.

Table 4 shows the estimation results using equation (3) with an expanding set of controls. Panels A and B present the results for the sample of unique ads, reflecting the circumstances at the time of the

initial ad posting. Panels C and D contain identical analysis for the sample containing reposts, leveraging the dynamics of the labor market. The mechanism behind not reposting an ad is unclear from the available data; a firm may stop posting an ad once the advertised position is filled, when they deem the cost of advertising to be too high, or when they update an ad that is not attracting desirable applicants, resulting in a new type of ad. While the sample used for analysis in panels C-D more accurately showcases a casual jobseeker's experience on Doda, it likely includes multitudes of comparatively unpopular ads or ads that have not been updated to match jobseekers' demands. Panels A-B and C-D thus analyze different firm behavior with panels C-D expected to show a weaker link between wage offer and labor market conditions. Further, panels A and C show results for the variable Hourly wage ratio, not considering overtime hours in the hourly wage calculation, and panels B and D display the results for Hourly wage ratio without overtime, clearing the hourly wage of included overtime hours.

While the direction of the effect of the vacancy ratio on both wage offer measures is as expected for all models and samples, neither estimate reaches statistical significance, implying that on average firms do not respond to the tightness of the local labor market by increasing wage offer. However, examining the time of the initial posting in panels A and B, higher population average age is associated with a higher wage offer, especially when job characteristics and search intensity are controlled for. One year increase in average population age resulted in 1.30% increase in Hourly wage ratio in column (4) and 1.36% increase in Hourly wage ratio without overtime in column (8) estimated with less precision. As expected, this trend no longer holds for the sample containing reposts in panels C and D once overtime hours are considered. While the sample firms were not sensitive to local labor market tightness, which is more transient than population age profile, they appear to consider the likely heightened wage expectations of prospective applicants, with the inclusion of overtime pay weakening this association. Furthermore, the inclusion of a specific number of overtime hours that results in a weakening or effectively erasing of the relationship suggests that the use of overtime hours in wage offer is strategic.



| <b>WAGE SETTING BEHAVIOR</b> |  |                      |                       |                       |  |                      |                      |                      |
|------------------------------|--|----------------------|-----------------------|-----------------------|--|----------------------|----------------------|----------------------|
|                              | <b>PANEL A: OVERTIME NOT CONSIDERED<br/>UNIQUE ADS</b> |                      |                       |                       | <b>PANEL B: CLEARED OF OVERTIME HOURS<br/>UNIQUE ADS</b> |                      |                      |                      |
|                              | (1)  | (2)                  | (3)                   | (4)                   | (5)  | (6)                  | (7)                  | (8)                  |
| Vacancy ratio (log)          | 0.0984<br>(0.0740)                                     | 0.0920<br>(0.0774)   | 0.0905<br>(0.0727)    | 0.0808<br>(0.0683)    | 0.0723<br>(0.0705)                                       | 0.0742<br>(0.0754)   | 0.0829<br>(0.0727)   | 0.0797<br>(0.0743)   |
| Population age               | 0.0125*<br>(0.00653)                                   | 0.00968<br>(0.00654) | 0.0127**<br>(0.00605) | 0.0130**<br>(0.00579) | 0.0124<br>(0.00792)                                      | 0.00944<br>(0.00782) | 0.0125*<br>(0.00741) | 0.0136*<br>(0.00706) |
| Firm                         |  | ✓                    | ✓                     | ✓                     |  | ✓                    | ✓                    | ✓                    |
| Job                          |  |                      | ✓                     | ✓                     |  |                      | ✓                    | ✓                    |
| Search                       |  |                      |                       | ✓                     |  |                      |                      | ✓                    |
| <i>N</i>                     | 2,683  | 2,683                | 2,683                 | 2,683                 | 2,683  | 2,683                | 2,683                | 2,683                |
| <i>R</i> <sup>2</sup>        | 0.042  | 0.099                | 0.177                 | 0.190                 | 0.060  | 0.095                | 0.168                | 0.184                |
|                              | <b>PANEL C: OVERTIME NOT CONSIDERED<br/>ALL ADS</b>    |                      |                       |                       | <b>PANEL D: CLEARED OF OVERTIME HOURS<br/>ALL ADS</b>    |                      |                      |                      |
|                              | (9)  | (10)                 | (11)                  | (12)                  | (13)   | (14)                 | (15)                 | (16)                 |
| Vacancy ratio (log)          | 0.124<br>(0.0896)                                      | 0.123<br>(0.102)     | 0.116<br>(0.0853)     | 0.113<br>(0.0870)     | 0.0576<br>(0.0772)                                       | 0.0673<br>(0.0909)   | 0.0769<br>(0.0853)   | 0.0780<br>(0.0850)   |
| Population age               | 0.0143**<br>(0.00727)                                  | 0.00938<br>(0.00698) | 0.0132**<br>(0.00644) | 0.0133**<br>(0.00636) | 0.0107<br>(0.00880)                                      | 0.00621<br>(0.00843) | 0.0101<br>(0.00791)  | 0.0113<br>(0.00754)  |
| Firm                         |  | ✓                    | ✓                     | ✓                     |  | ✓                    | ✓                    | ✓                    |
| Job                          |  |                      | ✓                     | ✓                     |  |                      | ✓                    | ✓                    |
| Search                       |  |                      |                       | ✓                     |  |                      |                      | ✓                    |
| <i>N</i>                     | 3,573  | 3,573                | 3,573                 | 3,573                 | 3,573  | 3,573                | 3,573                | 3,573                |
| <i>R</i> <sup>2</sup>        | 0.058  | 0.117                | 0.196                 | 0.217                 | 0.077  | 0.110                | 0.177                | 0.196                |

*Notes:* Coefficient estimates from linear regression model. Dependent variable in panels A and C is log of Hourly wage ratio, in panels B and D log of Hourly wage ratio without overtime. Vacancy ratio (log) is log of vacancy ratio in prefecture of job location 1 month before ad posting. Population age is average population age in city of job location. Posting month and industry dummy variables included in all models. Inclusion of variables controlling for firm characteristics (Firm), type of job advertised (Job) and search intensity (Search) indicated. Robust standard errors in parentheses are clustered at firm level for panels A and B and two-way clustered at firm and ad level for panels C and D. Significance levels: \*\*\* p<0.010, \*\* p<0.05, \* p<0.10.

*Table 4: Wage setting behavior*

To further test these findings, Table 8 shows the results of the specification from Table 5 columns (4), (8), (12), and (16) for targeting type-based subsamples. The chosen model accounts for the main factors influencing search type selection revealing baseline firm behavior. In accordance with Table 7, the results presented in panels A-B and C-D use the sample of unique ads and sample containing reposts, respectively. Columns (1), (5), (9), (13) show the results for a sample of ads with age limits, columns (2), (6), (10), (14) for a sample of ads with experience requirements, columns (3), (7), (11), (15) for these two samples combined for a sample of ads searching narrowly, and finally columns (4), (8), (12), (16) for a sample of ads with neither requirement.

Columns (1)-(3), (5)-(7), (9)-(11), and (13)-(15) do not confirm any association between either measure of wage offer and local labor market conditions for all targeted subsamples. The relationship between wage offer and average population age in Table 7 appears driven by non-targeted ads, lending support to the hypothesis that firms able to suppress wages choose more costly narrow search strategies regardless of targeting type. Furthermore, the trend of firms nominally raising wage offers while compensating for higher labor costs by increasing working hours is more pronounced in the non-targeted subsamples compared to the original full samples. For the sample of unique non-targeted ads, one year increase in average population age leads to 1.97% increase in Hourly wage ratio, and 1.90% in Hourly wage ratio without overtime, with the significance decreasing from 1% to 5% level. While firms not targeting their ads appear to raise wages in face of age-related higher wage expectations, they seem to include overtime pay in baseline wage to suppress the hourly rate.

The collective evidence presented in this section aligns with hypothesis 3. Indirectly analyzing the link between wage setting behavior and targeted search practices, firms directly targeting their searches do not seem to respond to labor market tightness by increasing wages. Likewise, firms searching broadly do not react to labor market tightness but seem to adjust their wage offers to jobseekers' average wage expectations based on population age, while strategically using overtime hours to push the per hour rate downward. These results are consistent with the hypothesis proposing that firms able to keep wages low adopt more costly targeted search strategies. However, the analysis in this section is limited and more direct methods are needed to ascertain how firms adjust wage offers in response to changing labor market conditions.

| WAGE SETTING BEHAVIOR AND SEARCH STRATEGY |  |                      |                      |                        |  |                     |                     |                       |
|---|--|----------------------|----------------------|------------------------|--|---------------------|---------------------|-----------------------|
| Subsample                                 | PANEL A: OVERTIME HOURS NOT INCLUDED<br>UNIQUE ADS |                      |                      |                        | PANEL B: OVERTIME HOURS INCLUDED<br>UNIQUE ADS |                     |                     |                       |
|   | Age limit  | Experience           | Narrow search        | Broad search           | Age limit                                      | Experience          | Narrow search       | Broad search          |
|   | (1)  | (2)                  | (3)                  | (4)                    | (5)  | (6)                 | (7)                 | (8)                   |
| Vacancy ratio (log)                       | 0.204<br>(0.168)                                   | -0.0501<br>(0.131)   | 0.0366<br>(0.105)    | 0.117<br>(0.0712)      | 0.129<br>(0.213)                               | 0.0984<br>(0.146)   | 0.114<br>(0.125)    | 0.0880<br>(0.0779)    |
| Population age                            | 0.0219<br>(0.0139)                                 | 0.000888<br>(0.0122) | 0.00552<br>(0.00926) | 0.0197***<br>(0.00695) | 0.0167<br>(0.0138)                             | 0.00527<br>(0.0148) | 0.00782<br>(0.0101) | 0.0190**<br>(0.00849) |
| <i>N</i>                                  | 634  | 670                  | 1,304                | 1,379                  | 634  | 670                 | 1,304               | 1,379                 |
| <i>R</i> <sup>2</sup>                     | 0.380  | 0.256                | 0.291                | 0.174                  | 0.363  | 0.262               | 0.299               | 0.151                 |
| Subsample                                 | PANEL C: OVERTIME HOURS NOT INCLUDED<br>ALL ADS    |                      |                      |                        | PANEL D: OVERTIME HOURS INCLUDED<br>ALL ADS    |                     |                     |                       |
|   | Age limit  | Experience           | Narrow search        | Broad search           | Age limit                                      | Experience          | Narrow search       | Broad search          |
|   | (9)  | (10)                 | (11)                 | (12)                   | (13)   | (14)                | (15)                | (16)                  |
| Vacancy ratio (log)                       | 0.231<br>(0.155)                                   | -0.0119<br>(0.131)   | 0.0663<br>(0.101)    | 0.132*<br>(0.0764)     | 0.162<br>(0.195)                               | 0.158<br>(0.151)    | 0.162<br>(0.123)    | 0.0452<br>(0.0872)    |
| Population age                            | 0.0216<br>(0.0143)                                 | -0.00250<br>(0.0124) | 0.00441<br>(0.0100)  | 0.0187**<br>(0.00743)  | 0.0177<br>(0.0127)                             | 0.00281<br>(0.0145) | 0.00853<br>(0.0101) | 0.0144<br>(0.00947)   |
| <i>N</i>                                  | 869  | 795                  | 1,664                | 1,909                  | 869  | 795                 | 1,664               | 1,909                 |
| <i>R</i> <sup>2</sup>                     | 0.414  | 0.271                | 0.308                | 0.233                  | 0.457  | 0.285               | 0.347               | 0.162                 |

*Notes:* Coefficient estimates from linear regression model. Dependent variable in panels A and C is log of Hourly wage ratio, in panels B and D log of Hourly wage ratio without overtime. Vacancy ratio (log) is log of vacancy ratio in prefecture of job location 1 month before ad posting. Population age is average population age in city of job location. Month, industry, firm, job and search intensity control variables included. Robust standard errors in parentheses are clustered at firm level for panels A and B and two-way clustered at firm and ad level for panels C and D. Significance levels: \*\*\* p<0.010, \*\* p<0.05, \* p<0.10.

*Table 5: Wage setting behavior and search strategy*

## 8. Conclusion

The labor market in rapidly aging Japan is generally characterized by low job mobility and a persistent excess of vacancies over jobseekers. However, under certain circumstances firms in Japan can legally set explicit age limits on applicants. One permitted exemption is the hiring of young workers on regular contracts without requiring previous job-related experience, a statute protecting the traditional practice of preferentially hiring fresh graduates. Firms thus face a choice between setting age or experience requirements or neither. Using an original sample of job ads for regular contract sales jobs collected from July 2018 to December 2019 from a large Japanese online job ad site targeting mid-career jobseekers, this study analyzes the firm characteristics related to the use of age limits and other practices showing age preference on applicants. Out of the 2,683 unique job ads from 1,342 firms, 23.6% included explicit age limits, with the most frequent eligibility cut-off age standing at 35 years of age. Additionally, up to 96% of ads included other content revealing preference for young age, depending on the definition. Online job ad sites are an easily accessible source of information for people contemplating a job change or entering the workforce. This tool designed to promote job mobility might thus come to discourage jobseekers if they find themselves excluded from visible job offers.

Theoretical framework of targeted employee search proposes three mechanisms behind targeted search: search costs related, appreciation for young age related, and wage related. Empirically testing the model's implications, this paper observes that in general, firms that can afford more costly search strategies tend to search narrowly, setting either age or experience requirements on applicants. Firms with fewer employees, firms hiring in urban centers and firms that use a probation period for new hires were more likely to set age limits than their counterparts. Yet, the use of indirect age targeting did not show a clear trend, implying that the inclusion of young-age references in the body of a job ad is situational. Further, indirectly analyzing the link between wage setting behavior and employee search strategy, consistent with theoretical predictions, firms conducting narrow search do not seem to respond to changing labor market conditions.

In 2019, the Japanese government announced a plan to promote mid-career hiring, increase household income, and secure employment opportunities until the age of 70 (Cabinet Office of Japan, 2019a). The practice of large firms traditionally once a year hiring fresh graduates was also called out, highlighting the need for more flexible hiring practices. The government implemented a three-year program to support the employment of the now middle-aged “employment ice age” generation, who struggled to find secure jobs as fresh graduates, as part of its policy to increase household income (Cabinet Office of Japan, 2019b). As a result, the “employment ice age” generation was added to the EMA exemption permitting the use of age restrictions on applicants whose employment is encouraged by government policies, allowing businesses to specifically target this age group. Because of the timing of the legislative change, no conclusions can be drawn about this specific exemption application in this study; however, no job ad in the sample cited the broad employment-encouragement exemption as a basis for age limits. Using a previous amendment to the EMA, Sasaki and Yasui (2014) investigated the impact of stricter anti-age discrimination rules adopted in 2007 and concluded that the legislative tightening resulted in increased employment of the elderly in both part-time and full-time jobs without displacing younger workers. While the Japanese government appears aware of the difficult situation many mid-career workers face due to limited and age-restricted employment opportunities, perhaps fewer rather than more exemptions from anti-age discrimination legislation should be the way forward.

While this study, to the best of the author's knowledge, provides the first evidence on the link between age targeting in Japanese online job ads and firm characteristics, and targeting practices and wage setting behavior, the results are limited by the data source which is not representative of the overall labor market. As this paper analyzed only a specific section of the job market, it cannot provide a discussion of larger trends. More research is needed to generalize the findings to other occupations and recruiting channels on the demand side and examine the supply side: jobseekers' abilities, needs, and limitations related to age targeting.

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## Appendix A: Sample collection and representativeness

The sample was collected from July 2018 to December 2019 from the Japanese mid-career online job ad site Doda. A firm with an opening to be filled with a mid-career worker is faced with a choice of a recruiting channel, such as the public employment office, referrals, or online job ad sites. Although the selection likely depends on the job itself, the jobseekers the firm wants to reach, and the corresponding costs, the popularity of online job ad sites in Japan is growing, evidenced by an increasing number of registered Doda users. Doda, founded in 2007, claimed to have approximately 4,100,000 registered users as of March 31<sup>st</sup>, 2018, with this number growing to 5,450,000 by March 31<sup>st</sup>, 2020. (Persol, 2018, 2020). Kambayashi and Ota (2010) found that vacancies advertised using a job ad attracted more applicants while pointing out that these vacancies could be for less specialized jobs, which would be expected to attract more applicants than highly specialized positions. Since 2010, Internet usage and overall digitalization of all aspects of society further increased and the number of online job ad sites in Japan with it. It is likely that accordingly, the choice of the online job ad site channel for a firm looking to fill a sales, not a highly specialized, position became more widespread. However, as this study only examines the online job ad site recruiting channel, its conclusions can only be viewed in the appropriate context.

Doda was chosen as the data source for the following three reasons. First, Doda is a general job board that, in contrast to some of its primary competitors, does not operate sister sites aimed at a specific subset of jobseekers based on age, occupation, or industry. Second, Doda claimed to host the most job ads among popular Japanese online job ad sites at the start of the sample collection period. Finally, the structure of the job ad itself is appropriate for this study because it provides employers with substantial space and is thus a rich source of information. Doda-affiliated firms draft the ads, thereby resulting in highly standardized language and ad structure while ensuring the ad complies with applicable legal requirements. Except for job ads for entities without capital, such as religious institutions or municipalities announcing job fairs, all new complete ads, ads with both firm press page and job ad page, for full-time positions uploaded to the sales (*eigyō*, 営業) category were collected.

Doda allows businesses using its services to select from various ad formats. Ads with a dedicated firm PR page and a dedicated job-posting page, as collected for this study, appear preferentially in both the overall list of ads regardless of posting date and the criteria-based search using filters. Doda categorizes job postings into 15 categories based on occupation. This study chose the sales category because sales jobs can generally be transitioned into without specific education, licenses, or other qualifications, thereby allowing for compliance with the young-age-related EMA exemption. The sales category was the largest at the beginning of the sample collection period. Additionally, Doda divides postings into three categories based on employment contract type: regular employee, contract employee, and other. Approximately 95% of the ads posted in the sales category during the sample collection period advertised regular contract jobs. If the firm's characteristics were not described in the ad, the information was obtained elsewhere, such as on the firm's website or in job ads on other job ad sites. In all cases, the ad included information about the industry wherein the firm operates.

Doda does not reveal the age breakdown of all registered users, only those who have recently registered. From October 2017 to March 2018, 19.5% of users registered during this period were under the age of 25, 30.9% were aged 25–29 years, 18.7% were 30–34 years, 11.6% were 35–39 years, and 19.4% were 40 and older. As previously registered users age, the average age of all Doda users is likely higher. All job ads collected contained a monthly wage offer upon completion of the probation period, with 48.2% of ads including overtime pay in the offer. When wage offer was presented as a range, the lower bound was used, and for ads advertising vacancies in multiple locations, the wage offer corresponding to the reported firm location was recorded. Table A1 shows the average monthly wage offer broken down by age, experience, and educational requirements. Panel A describes the



wage offer in its current form, and Panel B reports it cleared of overtime using the following formula<sup>4</sup>:

$$\text{Wage offer without overtime} = \text{wage offer} * \frac{165}{165 + \text{overtime hours}}$$

#### A. OVERTIME NOT CONSIDERED

| REQUIREMENT<br>EDUCATION   | NONE<br>(N = 1,379) | AGE LIMIT<br>(N = 634) | EXPERIENCE<br>(N = 670) |
|----------------------------|---------------------|------------------------|-------------------------|
| All                        | 238,279             | 233,827                | 263,923                 |
| No requirement             | 239,858             | 241,018                | 258,314                 |
| High school                | 231,073             | 215,465                | 247,936                 |
| Vocational, 2-year college | 229,432             | 221,853                | 265,613                 |
| University                 | 245,664             | 231,813                | 285,513                 |

#### B. CLEARED OF OVERTIME

| REQUIREMENT<br>EDUCATION   | NONE<br>(N = 1,379) | AGE LIMIT<br>(N = 634) | EXPERIENCE<br>(N = 670) |
|----------------------------|---------------------|------------------------|-------------------------|
| All                        | 216,052             | 209,907                | 243,081                 |
| No requirement             | 217,644             | 213,665                | 232,663                 |
| High school                | 206,104             | 195,274                | 235,565                 |
| Vocational, 2-year college | 218,264             | 214,092                | 258,429                 |
| University                 | 231,824             | 227,310                | 268,792                 |

Table A1: Average monthly wage offer – sample

To assess the data's representativeness, Table A2 shows the average monthly wage in Japan in Japanese yen by the age group and contract type in Panel A and the average first job starting monthly wage by educational level in Panel B.

#### A. BY AGE GROUP AND CONTRACT TYPE

|          | 2018    |         | 2019    |         |
|----------|---------|---------|---------|---------|
|          | REGULAR | OTHER   | REGULAR | OTHER   |
| Under 19 | 179,200 | 165,500 | 180,200 | 168,000 |
| 20 – 24  | 213,200 | 182,100 | 214,600 | 180,800 |
| 25 – 29  | 245,700 | 198,200 | 249,500 | 198,900 |
| 30 – 34  | 282,400 | 204,900 | 284,800 | 204,700 |
| 35 – 39  | 313,300 | 207,700 | 317,100 | 207,600 |
| 40 – 44  | 342,100 | 205,600 | 344,400 | 208,200 |
| 45 – 49  | 372,800 | 206,100 | 368,900 | 208,100 |
| 50 – 54  | 400,000 | 204,300 | 398,600 | 206,600 |
| 55 – 59  | 400,200 | 206,200 | 396,300 | 205,500 |
| 60 – 64  | 316,700 | 236,500 | 325,100 | 237,900 |
| 65 – 69  | 283,300 | 208,200 | 286,500 | 216,500 |
| Over 70  | 281,000 | 199,500 | 274,700 | 195,800 |
| Average  | 323,900 | 209,400 | 325,400 | 211,200 |

MHLW (2019b, 2020b)

<sup>4</sup> The average number of standard hours in a regular contract in 2018 was 165 (MHLW, 2019b).

## B. FIRST JOB BY EDUCATIONAL LEVEL

|                          | 2018    | 2019    |
|--------------------------|---------|---------|
| <b>High school</b>       | 165,100 | 167,400 |
| <b>Vocational school</b> | 181,400 | 183,900 |
| <b>Bachelor's degree</b> | 206,700 | 210,200 |
| <b>Master's degree</b>   | 238,700 | 238,900 |

MHLW (2019e)

*Table A2: Average monthly wage – population*

Comparing Tables A1 and A2, the offered wage in job ads on Doda is likely to attract predominantly young regular workers, especially when overtime hours are taken into account, and non-regular workers of all ages. The average offered wage in ads with an age limit and requiring university education is for master's degree holders lower than the average first job wage. Age restrictions may thus be intended to discourage primarily non-regular workers from applying. Even job advertisements with the most stringent requirements, such as experience and a university degree, offer a lower wage than that a worker on a regular contract in the 35–39 age group earns on average. The job offers posted in the sales category on Doda generally seem to be aimed at younger workers, specifically those below the age of 30 in the case of regular workers.

In terms of the data's main limitations, because the sample was collected from a single source, for regular contract jobs in a single occupational category only, it is not representative of the Japanese mid-career job market. In 2018, 37.8% of workers in Japan were in non-regular jobs (Statistics Bureau of Japan, 2019). In 2016, 96.6% of firms in Japan had fewer than 50 employees (Ministry of Economy, Trade and Industry, 2018), well below the sample median of 215. Further, Tokunaga (2008) reported that while in 2005, 96.1% of ads in a women-oriented job ad magazine contained job limits, for public employment office the percentage of ads setting explicit age limit was 46.7% with additional 12.1% referencing an upper limit, and these numbers decreased to 29.9% and 10.4%, respectively, by September 2007. Although the period covered in Tokunaga (2008) ended almost 11 years before the start of the sample collection period for the current study, it shows the marked difference between the public employment office and a targeted job ad medium. The prevalence of age limits in ads posted on Doda is also likely much higher than in ads available through the public employment office and by extension in the universe of job ads. Furthermore, firms that do not set age limits in their job ads may engage in age discrimination later in the recruiting process, particularly if they choose to set experience requirements while preferring to hire young applicants.

## Appendix B: Age targeting

This study defines two types of age targeting: direct and indirect. First, direct age targeting, citing EMA young-age related exemption, was present in 23.6% of ads with varying eligibility cut-off ages. Examining the maximum eligible age, 3.7% of all ads accepted only applicants aged 30 or younger, 15.7% accepted only applicants aged 35 or younger, and 20.9% of ads set the maximum eligible age to 40 or younger. Figure A3 depicts the maximum eligible age distribution in ads with age restrictions. In 39.0% of these ads, the cut-off age was 35, with the lowest limiting age being 25 and the highest being 49.

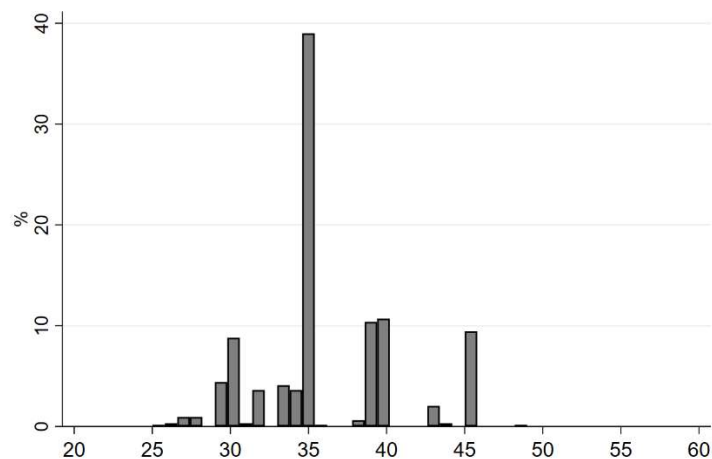


Figure A3: Age limit by cut-off age

Compared to the previous literature, which primarily focused on the prevalence of age targeting, not its determinants, the use of age limits decreased from close to 100% (Kitaura, 2003; Tokunaga, 2008) to about one-fourth of ads. Although the ad source for each study differed, prohibiting direct comparison, it is an expected result following the implementation and tightening of anti-ageism legislation. Regarding the eligibility cut-off ages, Kitaura (2003) reported that before the implementation of 2001 EMA revision, the maximum eligibility was, on average, set to 43.9 years of age (September 2001) and increased to 46.3 years of age afterward (October 2002). Tokunaga (2008) also reported that the eligibility cut-off age increased over time. For regular workers in 1985, 76.1% of surveyed ads allowed applicants 35 and younger and 93.9% 40 and younger. For 1995, these numbers decreased to 62.7% and 85.8%, and 42.9% and 78% in 2005. The prevalence of age limits set to any age and the cut-off ages of 40 and 35 in the 2005 Tokunaga sample compared to the current sample is 4.1, 3.7, and 2.7 times larger, respectively. The much larger decrease in the overall use of age limits compared to the specific eligibility cut-off ages is a consequence of the 2007 EMA amendment banning age discrimination yet allowing, among others, young-age-related exception. However, up to 96% of the ads in the current sample used indirect age targeting, almost identical to the prevalence of direct age targeting for all the surveyed years in Tokunaga (2008).

Next, indirect age targeting refers to the practice of indicating a preference for young workers in a job ad in ways other than explicitly setting an age limit. Within the highly standardized job ad structure, six patterns were identified, five written, and one visual.

The first type of indirect age targeting is the inclusion of the term “recent graduate” (*dai ni shinsotsu*, 第二新卒) in the body of the ad, in expressions such as the position being suitable for recent graduates, a large number of recent graduates joining the firm, or that recent graduates are encouraged to apply. The term “recent graduate” was used in 47.9% of the sample.

The second type of indirect age targeting is a reference to a specific age group in the ad's text. The typical language referencing age was pointing out the young age of employees, using phrases such as young employees playing an active role in the firm or that all employees being approximately the same young age creates a comfortable work environment. Figure A4 depicts the distribution of the

referenced average age (age if a specific age is mentioned, average age for age range, none if only the words “young” and similar were used), revealing that it is concentrated in the late 20s and early 30s. According to the actual use of age limits, where the maximum cut-off age was set at 49, ads containing references to people in their 50s and up were not considered targeted. This type of indirect age targeting was present in 58.2% of ads. The lowest average age mentioned in targeted ads was 22, the average was 29.8, and the maximum was 48.

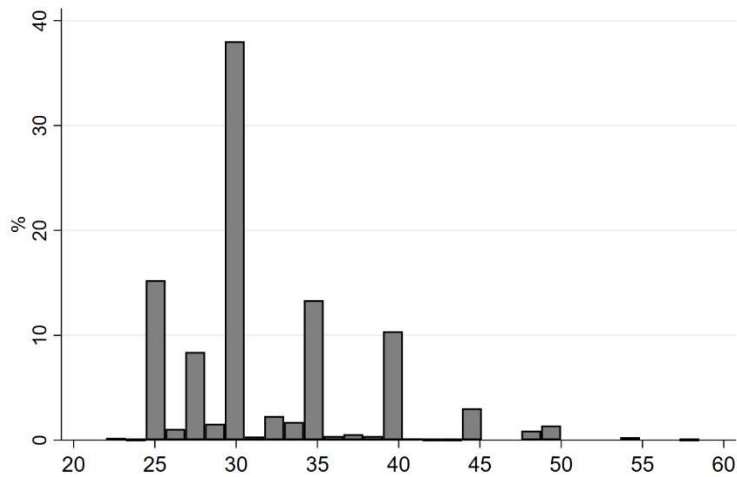


Figure A4: The average age mentioned in the ad's body

Similarly, mentioning a young age on an ad's PR page is considered a separate, third type of indirect age targeting. Interviews with employees, typically including their ages, were frequently featured on the PR page. When a specific age of an employee was mentioned, the maximum age considered as targeted was set to 44 years old to provide leeway for assessing indirect age targeting in visuals used on the PR page. Other references to youth, such as the words “young,” “new graduate,” or “recent graduate,” are also considered examples of age targeting. On the PR page, 42.9% of ads referred to a young age.

The inclusion of average employee age in firm overview is the fourth type of indirect age targeting. This information was included in 31.4% of the ads. Figure A5 depicts its distribution in these ads. Assuming a typical retirement age of 60, only ads with a posted average employee age younger than 40 were classified as targeted. Out of all ads, 28.9% stated that the average age of employees was under 40, which corresponds to 92.0% of ads containing this information, indicating that it is used strategically to age target. In targeted ads, the minimum average employee age was 24, the average was 31, and the maximum was 39.6.

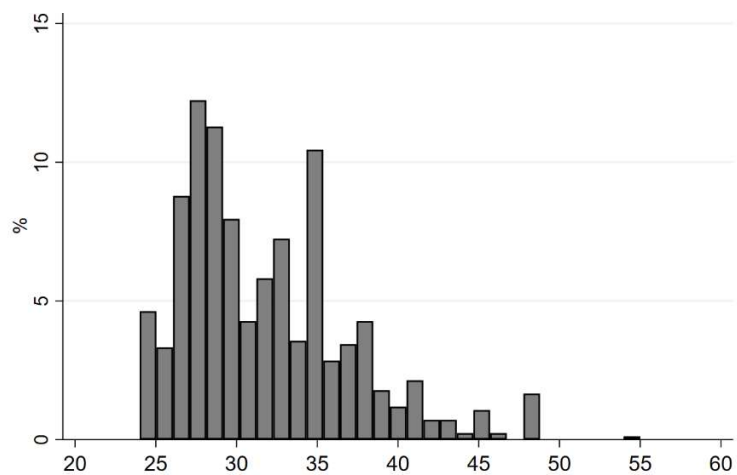


Figure A5: Average in-firm age

The inclusion of age in model wage is the fifth type of indirect age targeting. Job ads typically showed examples of wage growth that an applicant could expect, with most ads including age in addition to the length of employment and some ads only including age. Age in model wage was used in 58.8% of ads. The distribution of maximum age included is presented in Figure A6. Out of the ads including age in model wage, 69.5% of them set the maximum age to 35 or younger. A maximum age higher than 45 was included in 5% of the ads, and over 50 in 0.8% of the ads. However, when the length of employment was considered, indicating the age an applicant would need to join the firm to earn the example wage, all ads with age in model wage were classified as targeted. In model wage, the minimum, average and maximum ages were 22, 33.8, and 67, respectively.

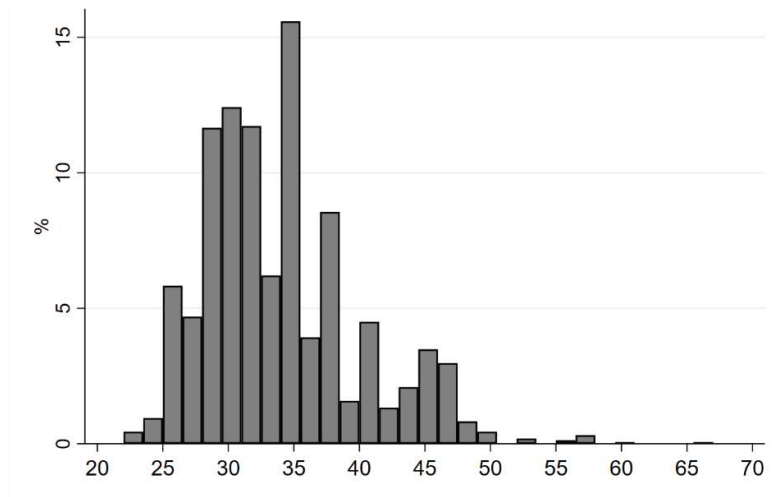


Figure A6: Maximum age in model wage

The sixth and final type of indirect age targeting takes into account the visuals that the firm used on its PR page. If only images of young people are shown, it is considered targeted. In terms of the graphics used on the PR page, the firm posting an ad has several options. Some firms choose not to include photographs of their employees and instead highlight their products, offices, or customers, whereas others use illustrations or photographs with no visible faces. After opening a full ad on Doda, the PR page appears first, creating a first impression of the firm. As a result, the choice of visuals is an important tool for conveying information, including preferences regarding the age of applicants. However, all ads were evaluated by the author only, resulting in a high degree of subjectivity. As previously stated, some firms disclose the age of employees featured on the PR page; in this case, the maximum targeted age was set at 44. When age was not disclosed and the pictures were not of clearly young individuals, information from the ad's body was used as a guide. If no age-related information was available, the ad was deemed untargeted. To ensure consistency, ads from the same firm were cross-referenced. However, the issue of subjectivity remains unresolved, therefore any analysis utilizing indirect age targeting employs indicators both with and without this type. Pictures of only young workers were included in 76.4% of ads.

Table A7 shows the prevalence of each type of indirect age targeting in the sample – the total sample, the sample of ads with age limits, the sample of ads requiring experience, and finally the non-targeted sample. In general, ads that set age limits make the most use of indirect age targeting, possibly to target more precisely within the eligible age range.

|                             | <b>ALL</b> | <b>AGE<br/>LIMIT</b> | <b>EXPERIENCE</b> | <b>NO<br/>REQUIREMENT</b> |
|-----------------------------|------------|----------------------|-------------------|---------------------------|
|                             | (2,683)    | (634)                | (670)             | (1,379)                   |
| <b>Recent graduate</b>      | 47.9%      | 52.5%                | 28.5%             | 55.2%                     |
| <b>Age in text (ad)</b>     | 58.2%      | 65.3%                | 51.5%             | 58.2%                     |
| <b>Age in text (PR)</b>     | 42.9%      | 55.2%                | 34.9%             | 41.2%                     |
| <b>Age in model wage</b>    | 58.8%      | 67.5%                | 50.0%             | 59.1%                     |
| <b>Average in-firm age</b>  | 28.9%      | 35.6%                | 27.3%             | 26.5%                     |
| <b>Targeted PR pictures</b> | 76.4%      | 84.2%                | 75.5%             | 73.2%                     |

*Table A7: Indirect age targeting in subsamples*

The various types of age targeting are added together to form a categorical variable age index, which shows the extent to which the firm indirectly targets its ads. Variable Age index 1 includes all six types and thus ranges from 0 to 6, whereas Age index 2 excludes targeting in PR images and thus ranges from 0 to 5. Table A8 describes Age index 1 and Age index 2. The most frequently used number of indirect age targeting types was three (23.3%) for Age index 1, and more ads used all 6 types (5.4%) than none (3.8%). In terms of Age index 2, the most ads (26.7%) used two types, with 5.5% using all five and 7.6% using none. Comparing subsamples, correspondingly to Table A7, the least indirect age targeting was generally observed in the sample of ads requiring experience and the most in ads containing an age limit.

| <b>PANEL A</b>     | <b>ALL</b> | <b>AGE<br/>LIMIT</b> | <b>EXPERIENCE</b> | <b>NO<br/>REQUIREMENT</b> |
|--------------------|------------|----------------------|-------------------|---------------------------|
| <b>Age index 1</b> | (2,683)    | (634)                | (670)             | (1,379)                   |
| <b>0</b>           | 3.8%       | 1.4%                 | 6.4%              | 3.6%                      |
| <b>1</b>           | 11.8%      | 5.2%                 | 16.0%             | 12.8%                     |
| <b>2</b>           | 19.3%      | 16.4%                | 23.3%             | 18.6%                     |
| <b>3</b>           | 23.3%      | 23.0%                | 24.9%             | 22.6%                     |
| <b>4</b>           | 21.9%      | 23.7%                | 19.3%             | 22.3%                     |
| <b>5</b>           | 14.6%      | 23.0%                | 7.5%              | 14.2%                     |
| <b>6</b>           | 5.4%       | 7.3%                 | 2.7%              | 5.9%                      |
| <b>Total</b>       | 100%       | 100%                 | 100%              | 100%                      |

| <b>PANEL B</b>     | <b>ALL</b> | <b>AGE<br/>LIMIT</b> | <b>EXPERIENCE</b> | <b>NO<br/>REQUIREMENT</b> |
|--------------------|------------|----------------------|-------------------|---------------------------|
| <b>Age index 2</b> |            |                      |                   |                           |
| <b>0</b>           | 7.6%       | 4.3%                 | 13.4%             | 6.2%                      |
| <b>1</b>           | 20.5%      | 14.2%                | 26.4%             | 20.5%                     |
| <b>2</b>           | 26.7%      | 24.0%                | 28.4%             | 27.3%                     |
| <b>3</b>           | 23.6%      | 23.7%                | 20.9%             | 24.9%                     |
| <b>4</b>           | 16.1%      | 26.5%                | 8.1%              | 15.3%                     |
| <b>5</b>           | 5.5%       | 7.4%                 | 2.8%              | 5.9%                      |
| <b>Total</b>       | 100%       | 100%                 | 100%              | 100%                      |

*Table A8: Indirect age targeting indices*

Appendix C:

| IDENTIFICATION                           |           |       |       |            |       |       |
|--|-----------|-------|-------|------------|-------|-------|
| HOLM-BONFERRONI METHOD ADJUSTED P-VALUES |           |       |       |            |       |       |
|  | AGE LIMIT |       |       | EXPERIENCE |       |       |
|  | (1)       | (2)   | (3)   | (4)        | (5)   | (6)   |
| Capital (log)                            | 0.897     | 1     | 0.937 | 0.073      | 0.53  | 0.424 |
| Employees (log)                          | 0.755     | 1     | 0.233 | 0.005      | 0.187 | 0.777 |
| Foundation year                          | 1         | 1     | 0.788 | 0.014      | 0.348 | 0.541 |
| Listed firm                              | 1         | 1     | 0.547 | 0.904      | 0.744 | 0.688 |
| Subsidiary of listed firm                | 1         | 0.896 | 0.963 | 0.071      | 0.299 | 0.360 |
| Japanese firm                            | 0.026     | 0.424 | 0.152 | 0.018      | 0.493 | 0.570 |
| Tokyo, Osaka location                    | 0.003     | 0.003 | 0.003 | 0.686      | 0.395 | 0.513 |
| Probation period                         | 0.494     | 0.334 | 0.079 | 0.395      | 0.561 | 0.464 |

*Notes:* Holm-Bonferroni method familywise error rate adjusted p-values of OLS estimates from *Table 2: Narrow search – identification*. Obtained using Stata command “mhtreg”.

*Table A9: FWER adjusted p-values to Table 2*

| AGE LIMIT                 |                      |                        |                     |                      |                         |                        |                      |                      |                      |                     |                      |                      |                    |                      |
|---------------------------|----------------------|------------------------|---------------------|----------------------|-------------------------|------------------------|----------------------|----------------------|----------------------|---------------------|----------------------|----------------------|--------------------|----------------------|
|                           | (1)                  | (2)                    | (3)                 | (4)                  | (5)                     | (6)                    | (7)                  | (8)                  | (9)                  | (10)                | (11)                 | (12)                 | (13)               | (14)                 |
| Capital (log)             | 0.00614<br>(0.00710) | -0.000218<br>(0.00722) |                     |                      |                         |                        |                      |                      |                      |                     |                      |                      |                    |                      |
| Employees (log)           |                      |                        | 0.0127<br>(0.00914) | -0.0123<br>(0.00927) |                         |                        |                      |                      |                      |                     |                      |                      |                    |                      |
| Foundation year           |                      |                        |                     |                      | -4.74e-05<br>(0.000677) | 0.000159<br>(0.000705) |                      |                      |                      |                     |                      |                      |                    |                      |
| Listed firm               |                      |                        |                     |                      |                         |                        | -0.00791<br>(0.0580) | -0.0486<br>(0.0487)  |                      |                     |                      |                      |                    |                      |
| Subsidiary of listed firm |                      |                        |                     |                      |                         |                        | 0.00666<br>(0.0451)  | -0.00566<br>(0.0404) |                      |                     |                      |                      |                    |                      |
| Japanese firm             |                      |                        |                     |                      |                         |                        |                      |                      | 0.167***<br>(0.0519) | 0.135**<br>(0.0548) |                      |                      |                    |                      |
| Tokyo, Osaka location     |                      |                        |                     |                      |                         |                        |                      |                      |                      |                     | 0.127***<br>(0.0297) | 0.151***<br>(0.0303) |                    |                      |
| Probation period          |                      |                        |                     |                      |                         |                        |                      |                      |                      |                     |                      |                      | 0.0402<br>(0.0310) | 0.0569**<br>(0.0288) |
| Job                       |                      | ✓                      |                     | ✓                    |                         | ✓                      |                      | ✓                    |                      | ✓                   |                      | ✓                    |                    | ✓                    |
| Search                    |                      | ✓                      |                     | ✓                    |                         | ✓                      |                      | ✓                    |                      | ✓                   |                      | ✓                    |                    | ✓                    |
| <i>N</i>                  | 2,683                | 2,683                  | 2,683               | 2,683                | 2,683                   | 2,683                  | 2,683                | 2,683                | 2,683                | 2,683               | 2,683                | 2,683                | 2,683              | 2,683                |
| <i>R</i> <sup>2</sup>     | 0.078                | 0.150                  | 0.079               | 0.151                | 0.076                   | 0.150                  | 0.076                | 0.151                | 0.083                | 0.154               | 0.093                | 0.172                | 0.078              | 0.153                |

Notes: Coefficient estimates from linear probability model. Dependent variable is an indicator of the presence of age limit. Labor market controls, and Month and industry dummies included in all models. Inclusion of variables controlling for type of advertised job (Job) and search intensity (Search) indicated. Robust standard errors in parentheses clustered at firm level. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A10: Age limit – extended identification



| EXPERIENCE                |                        |                        |                     |                       |                           |                          |                      |                       |                       |                      |                      |                    |                     |                     |
|---------------------------|------------------------|------------------------|---------------------|-----------------------|---------------------------|--------------------------|----------------------|-----------------------|-----------------------|----------------------|----------------------|--------------------|---------------------|---------------------|
|                           | (1)                    | (2)                    | (3)                 | (4)                   | (5)                       | (6)                      | (7)                  | (8)                   | (9)                   | (10)                 | (11)                 | (12)               | (13)                | (14)                |
| Capital (log)             | 0.0215***<br>(0.00698) | 0.0197***<br>(0.00645) |                     |                       |                           |                          |                      |                       |                       |                      |                      |                    |                     |                     |
| Employees (log)           |                        |                        | 0.0116<br>(0.00839) | 0.0179**<br>(0.00802) |                           |                          |                      |                       |                       |                      |                      |                    |                     |                     |
| Foundation year           |                        |                        |                     |                       | -0.00237***<br>(0.000721) | -0.00138**<br>(0.000675) |                      |                       |                       |                      |                      |                    |                     |                     |
| Listed firm               |                        |                        |                     |                       |                           |                          | 0.106**<br>(0.0500)  | 0.106**<br>(0.0418)   |                       |                      |                      |                    |                     |                     |
| Subsidiary of listed firm |                        |                        |                     |                       |                           |                          | 0.143***<br>(0.0394) | 0.0880***<br>(0.0322) |                       |                      |                      |                    |                     |                     |
| Japanese firm             |                        |                        |                     |                       |                           |                          |                      |                       | -0.272***<br>(0.0670) | -0.128**<br>(0.0640) |                      |                    |                     |                     |
| Tokyo, Osaka location     |                        |                        |                     |                       |                           |                          |                      |                       |                       |                      | 0.0582**<br>(0.0252) | 0.0105<br>(0.0224) |                     |                     |
| Probation period          |                        |                        |                     |                       |                           |                          |                      |                       |                       |                      |                      |                    | -0.0110<br>(0.0268) | -0.0330<br>(0.0219) |
| Job Search                |                        | ✓                      |                     | ✓                     |                           | ✓                        |                      | ✓                     |                       | ✓                    |                      | ✓                  |                     | ✓                   |
| <i>N</i>                  | 2,683                  | 2,683                  | 2,683               | 2,683                 | 2,683                     | 2,683                    | 2,683                | 2,683                 | 2,683                 | 2,683                | 2,683                | 2,683              | 2,683               | 2,683               |
| <i>R</i> <sup>2</sup>     | 0.100                  | 0.242                  | 0.088               | 0.237                 | 0.098                     | 0.238                    | 0.103                | 0.242                 | 0.103                 | 0.238                | 0.089                | 0.234              | 0.086               | 0.235               |

Notes: Coefficient estimates from linear probability model. Dependent variable is an indicator of the presence of experience requirements. Labor market controls, and Month and industry dummies included in all models. Inclusion of variables controlling for type of advertised job (Job) and search intensity (Search) indicated. Robust standard errors in parentheses clustered at firm level. Significance levels: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A11: Experience – extended identification

| <b>NARROW SEARCH</b>                            |                                   |                   |                      |                 |                 |                        |                        |
|---|-----------------------------------|-------------------|----------------------|-----------------|-----------------|------------------------|------------------------|
| <b>HOLM-BONFERRONI METHOD ADJUSTED P-VALUES</b> |                                   |                   |                      |                 |                 |                        |                        |
|   | <b>AGE LIMIT +<br/>EXPERIENCE</b> | <b>EXPERIENCE</b> | <b>AGE<br/>LIMIT</b> | <b>UNDER 40</b> | <b>UNDER 35</b> | <b>AGE INDEX<br/>1</b> | <b>AGE<br/>INDEX 2</b> |
|   | (1)                               | (2)               | (3)                  | (4)             | (5)             | (6)                    | (7)                    |
| Capital (log)                                   | 0.037                             | 0.516             | 0.908                | 0.861           | 0.892           | 0.455                  | 0.368                  |
| Employees (log)                                 | 0.082                             | 0.759             | 0.228                | 0.089           | 0.051           | 0.352                  | 0.695                  |
| Foundation year                                 | 0.202                             | 0.521             | 0.759                | 0.501           | 1               | 0.003                  | 0.003                  |
| Listed firm                                     | 0.783                             | 0.687             | 0.603                | 0.514           | 1               | 0.651                  | 0.724                  |
| Subsidiary of listed firm                       | 0.481                             | 0.472             | 0.969                | 0.350           | 1               | 0.002                  | 0.002                  |
| Japanese firm                                   | 1                                 | 0.525             | 0.184                | 0.475           | 1               | 0.303                  | 0.638                  |
| Tokyo, Osaka location                           | 0.008                             | 0.526             | 0.003                | 0.003           | 0.003           | 0.077                  | 0.068                  |
| Probation period                                | 0.880                             | 0.481             | 0.084                | 0.218           | 0.142           | 0.044                  | 0.046                  |

Notes: Holm-Bonferroni method familywise error rate adjusted p-values of OLS estimates from *Table 3: Narrow search*. Obtained using Stata command “mhtreg”.

*Table A12: FWER adjusted p-values to Table 3*