



Center for Social Research and Data Archives,
Institute of Social Science, The University of Tokyo



CSRDA supports the Sustainable Development Goals

SUSTAINABLE
DEVELOPMENT
GOALS

CSRDA Discussion Paper

Gender gap in the ask salaries: evidence from larger administrative data



No. <p style="text-align: center;">93</p>	Date <p style="text-align: center;">August.2024</p>	SDGs <div style="display: flex; justify-content: space-around;"> <div data-bbox="1117 2060 1260 2195"> <p>5 GENDER EQUALITY</p>  </div> <div data-bbox="1276 2060 1420 2195"> <p>8 DECENT WORK AND ECONOMIC GROWTH</p>  </div> </div>
Name <p>Taiyo Fukai, Keisuke Kawata, Mizuki Komura, Takahiro Toriyabe</p>		

Gender gap in the ask salaries: evidence from larger administrative data*

Taiyo Fukai[†] Keisuke Kawata[‡] Mizuki Komura[§]
Takahiro Toriyabe[¶]

This study analyzes the gender gap in ask salaries using large administrative data of public job referrals, which allows us to look at the ask salaries of individuals from a wider wage distribution. We conduct a decomposition analysis using available information on age, desired work region, and desired occupation. We find that of the three factors, desired occupation is the most important in generating differences in ask salaries; however, the residuals are the largest outside of the three factors. A heterogeneity analysis is also conducted to understand the factors behind the residuals when only the available data are used.

Keywords: Gender wage gap; gender ask gap; administrative data

JEL classification codes: J16; J31; J64

*The authors are grateful to Hiroaki Miyamoto, Fumio Ohtake, Hideo Owan, and Masaru Sasaki for their insightful and constructive comments. We also thank all the participants of the JEA Spring Meeting in 2024. This study was conducted based on data provided by Ministry of Health, Labour and Welfare. This study is supported by JSPS KAKENHI (Grant Numbers 18K01661, 22H00854 and 23K01418). There are no conflicts of interest to declare. All errors are our own.

[†]Faculty of Economics, Gakushuin University, 1-5-1 Mejiro, Toshima-ku, Tokyo 171-8588, Japan, Email:taiyo.fukai@gakushuin.ac.jp

[‡]Institute of Social Sciences, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan, Email:keisukekawata@iss.u-tokyo.ac.jp

[§]School of Economics, Kwansai Gakuin University, 1-155, Uegahara Ichibancho, Nishinomiya 662-8501, Japan, Email:m.komura@kwansai.ac.jp

[¶]Graduate School of Economics, Hitotsubashi University, 2-1, Naka, Kunitachi, Tokyo, 186-8601, Japan. Email:t.toriyabe@r.hit-u.ac.jp

1 Introduction

The issue of the wage gap between men and women persists despite ongoing efforts. Since the work of Albrecht, Björklund, and Vroman (2003), advancements in quantitative analysis methods have revealed that the wage gap does not exist uniformly; rather, the differences are more pronounced among certain groups. In addition to the well-known glass ceiling wage gap prevalent in management and higher positions, there is also a concerning phenomenon known as the sticky floor effect, which particularly affects lower-wage brackets; these patterns have been observed in various countries (Arulampalam, Booth, and Bryan 2007; De la Rica, Dolado, and Llorens 2008; Nicodemo 2009; Christofides, Polycarpou, and Vrachimis 2013). Japan, which ranks among the developed countries with the largest gender gap, is no exception. The gender wage gap persists even after accounting for factors such as workers' human capital, and it tends to be more significant at both the top and bottom ends of the wage distribution (Hara 2018).

Much of the research to date has analyzed data from workers who are already employed. Analyzing data from the employed, who make up the bulk of the population, has many social and policy implications. Yet, those entering the workforce, especially those coming out of unemployment, may have fewer years of experience in the firm and may be more likely to be on the lower end of the wage scale. Indeed, the importance of focusing on the extensive margin segment of the labor market to understand the full extent of the gender gap has been pointed out (Olivetti and Petrongolo 2008)¹. If people transition from unemployment, which comprises the weakest position in the job market, but a wage gap persists between men and women with similar characteristics, then women remain exposed to further vulnerable economic circumstances.

The latest research has begun to use ask salaries as a key variable with which to understand these unexplained gender wage gaps. Ask salaries are statements made by workers when seeking a job and have been found to differ between men and women. Scholars typically interpret these differences as indicative of variations in bargaining attitudes and skills between the genders. Roussille (2024) used information from a job search website for workers considering a full-time cloud IT position to determine whether the existence of the ask gap contributes to the actual differences in contract wages between men and women. She further utilized a natural experiment involving changes in website specifications to investigate the mechanism behind the ask gap and interpreted it as insufficient information on market wages for women relative to their experience². While her study provides many new insightful implications, it is limited due to using high-skilled job seekers looking for a job as the target population of the analysis.

¹They note that women may tend to be left out of the sample for low-skill groups when it comes to understand gender disparities. Importantly, however, although we focus on these women, our study does not address the issue Olivetti and Petrongolo (2008) raised because we do not endogenize their job search activities.

²Previously, the website only permitted job seekers to specify their desired wage; however, it now also offers information on the median wage received by similar workers, serving as a benchmark. The study revealed that the reform reduced the ask gap.

The purpose of this study is to estimate the gender gap in the ask salaries among those in broader groups of the wage distribution using data from the large administrative dataset of public job referrals, namely, Japan’s Employment Security Office. Our data selection will allow us to analyze high-quality data that covers a wider range of jobs, including both high- and low-skill job vacancies, whereas prior studies have concentrated on high-skill jobs. The empirical analysis takes full advantage of the uniqueness of the data; while the number of individual-level variables is limited, the sample size is large. By targeting broader groups in the wage distribution, the analysis helps clarify the role of the gender ask gap in a way that complements previous studies. Moreover, compared with cloud IT jobs, another potential strength of our data is the addition of a regional dimension. By definition, cloud jobs are not affected by local labor supply and demand, whereas service sectors, for example, are more local in nature; therefore, it might be interesting to examine the role of discrimination and monopsony in the ask wage gap.

The analysis results reveal the presence of a gender ask gap, highlighting a substantial value of 17.6 percentage points compared with the value of 6.8 percentage points found among the skilled working population in the U.S. While this may be a country-by-country difference, it is also consistent with the results of her heterogeneity analysis, which shows a larger difference for the unemployed in the U.S. (as we discuss in Section 2 for the targeted population of the public job referrals in Japan). We further conduct a decomposition analysis to see how gender differences in the available variables of age, desired region, and desired occupation affect the ask gap. We find that among the three factors, differences in desired occupation contribute significantly. However, the findings also reveal that the unexplained factor is more prominent than the other three factors, with a value of 14.8 percent. points. To comprehend the significance of the substantial residuals in the results, we conduct heterogeneity analyses and discover a significant level of heterogeneity, prompting a discussion about the ask gap.

Our results contribute to the literature that seeks to understand the gender gap through the ask gap in various ways. First, our results show that the ask gap exists despite the presence of a social context in which wage bargaining is unlikely to occur (as explained in Section 2). Second, we conduct a decomposition and heterogeneity analysis of the factors that cause the ask gap. The decomposition analysis reveals that the most explanatory factor that can be observed is the difference in the distribution of occupations. The heterogeneity analysis also reveals that when controlling for other observable factors, the ask gap widens in middle age, and that women’s ask salaries are lower even in female-specific jobs. Given these results, for a wide range of occupations not restricted to high-skilled jobs, we find indirect evidence that gives a new interpretation of the ask gap by the compensation wage hypothesis or reference wage hypothesis rather than the differences in wage bargaining attitudes and skills.

The rest of the paper is organized as follows: Section 2 presents the institutional setting in Japan. Section 3 explains the data we used, while Section 4 provides descriptive statistics. Section 5 presents the estimation strategy. Section 6 presents the main results, while Section 7 presents the heterogeneity analysis. In Section 8, we discuss the results, and Section 9 concludes the paper.

2 Institutional setting

2.1 Gender wage gap and Japanese employment system

The wage gap between men and women in Japan has been gradually decreasing over the long term. In 2021, women's pay reached 75.2 compared with the general pay level for men, which is set at 100. However, when compared with the OECD countries' average of 88.4, the gender wage gap in Japan remains relatively large in terms of international standards.

Existing studies on the gender wage gap in Japan have highlighted its connection to the country's distinctive employment system³, including features such as lifetime employment, the seniority wage system, and the initial promotion system (A. Kawaguchi 2015). Moreover, the nonperformance-based wage system has also been identified as a contributing factor (Chiang and Ohtake (2014)). However, it is worth noting that these studies primarily concentrate on employed workers and utilize realized wages as the basis for their wage information. Thus, they do not provide insights into ask salaries.

An essential aspect of the Japanese labor market when discussing salary expectations is the method of wage determination upon entry into the workforce. Developed countries such as the U.S. often rely on wage negotiations between employers and job seekers (Hall and Krueger 2012); however, this practice is not widespread in Japan. According to a survey conducted by the Recruitment Work Institute in 2020, which focused on job changers, a significant majority (58%) reported accepting the wage offered by their employer, which is in notable contrast to practices in other developed nations⁴. Consequently, from an economic standpoint, wage posting, rather than bargaining, is the prevalent mode of wage determination in Japan. This implies that job seekers typically have the choice of either accepting or rejecting the wage proposed by the employer.

2.2 Public employment security office

The data utilized in this study, including information on “ask salaries,” is sourced from job application forms submitted to public employment security offices. These offices, which number 544 across Japan, offer three main services, namely, job placement, employment insurance, and employment measures such as corporate guidance and support. In 2022, these offices handled a total of 4,586,000 cases, with 10,052,800 new job openings and 1,226,000 job placements⁵.

³For an excellent survey on the relationship between the gender wage gap and Japanese employment system, see Hara (2018)

⁴This report summarizes the results of a survey of college graduates in their 30s and 40s working in the private sector in Japan, the United States, France, Denmark, and China. In the other countries, less than 30% of the respondents reported accepting the wage offered by their employers, and many reported telling their employers what they wanted to be paid. (https://www.works-i.com/research/works-report/item/multi_5.pdf)

⁵<https://www.mhlw.go.jp/content/000935626.pdf>

According to a 2020 survey conducted by the Ministry of Health, Labor, and Welfare, job changers employ various methods in their jobs search activities⁶. The results reveal that 38.4% utilize “job websites, job information magazines, newspapers, flyers, etc.,” while 34.3% rely on “public institutions such as Hello Work (public employment security office),” and 26.8% seek opportunities through “nepotism.”

While private employment agencies generate their profits through commissions and introduction fees from employers, public employment security offices, such as Hello Work, do not charge such fees. Hello Work serves as a safety net for employment, with the government offering free support, primarily targeting individuals who are facing challenges in securing employment through private agencies. It also extends assistance to small, medium, and micro-sized enterprises that are experiencing a shortage of labor.

Therefore, importantly, users of Hello Work are not necessarily highly skilled or advantaged in the labor market. Additionally, the sample population includes unemployed individuals engaged in off-the-job searches, as they are required to follow specific procedures, such as applying to Hello Work, to qualify for unemployment insurance benefits.

3 Data

We use forms submitted by full-time job seekers from January through December 2019. This form is the initial step that a job seeker completes when utilizing public job referrals in their job search; the subsequent job consultation is conducted on the basis of the information provided on this form. While the form asks for detailed information about the worker, we have only been provided with some of the collected data. The available data attributes include gender, age, desired region to work, and desired occupation. We use data from this period because, first, 2019 is the most recent year not affected by the COVID-19 pandemic, and second (as shown in Appendix B), there is some seasonality at the monthly level for job search activity for men and women; hence, it is preferable not to rely on specific month-based information. The sample size is 2,905,952.

The form inquires about the desired wage in two ways; one requests the desired monthly income for individuals seeking full-time employment, while the other requests the desired hourly wage for those pursuing part-time positions. The primary analysis uses the monthly income information; thus, we consider individuals seeking full-time work as our sample. The form prompts respondents to specify their desired monthly income as “X yen or more.’ For our analysis, we utilize the lower bound of the ask salaries. This approach is adopted because the lower bound is more reliable given that some individuals might express a desire for extremely high salaries. Moreover, we can interpret the lower bound as a reservation wage in the context of economics.

⁶<https://www.mhlw.go.jp/toukei/list/dl/6-18c-r02-2-03.pdf>

Age information is calculated from the year of birth. The information on desired region is provided at the prefecture level, and there are no deficiencies in prefectures. For desired occupation, the data consist of those who answered regarding the subdivisions (maximumly 5-digit), those who did not, and those whose data were missing.

4 Descriptive statistics

In this section, we present the average ask gap and the ratio of female job seekers for each descriptive statistic group using the analyzed data. To divide these groups, we first estimate each region and occupation's average wage (lower bound) using the job offer data. Note that, for ease of interpretation, we refer to the offered wage for males. Then, groupings are made via quintiles for the regions (5 groups of regions) and occupations (5 groups of occupations + nonrespondents), and quintiles are also used for age (5 groups of ages). The result is a total of 150 (=5 x 6 x 5) groups with average ask salaries and percentages of women according to gender. The following is a description of each of the groups classified by quintile.

4.1 Classification of groups

First, age in the job seeker form is divided into five quintiles. The fifth quintile of 80–100% includes two prefectures in the Tokyo metropolitan area, while the fourth quintile of 60–80% includes Osaka, Aichi, and other metropolitan centers, indicating that the larger the the population size of a prefecture is, the higher the offered wage is. Finally, the quintiles of average offered wages by desired occupations obtained from the job postings and the groups that did not answer the desired occupations are classified.

4.2 Wages - background attributes/gender

Figure 1 shows the ask wage gap by quartile according to the background attributes presented above in a single figure (for the overall distribution of ask salaries by gender, see Appendix A). The way to look at this figure is as follows. The labels on the upper side line up the quintiles of the regions spanning from left to right. The labels on the right side line up with the occupational quintiles running from top to bottom. The horizontal axis at the bottom of the figure shows the age quintiles within each quintile of the region. Finally, the vertical axis in each cell on the left side shows the average ask salary in units of 1,000 yen for each subgroup. The red dots denote males, and the blue dots denote females. From this figure, we can see the following.

Let us look at each characteristic separately. First, focusing on the regional part, the ask salaries are higher according to the offered wage. Second, by occupation, the difference in the level of ask salaries between men and women is small for occupations with low-wage offers;

however, the difference tends to be large for occupations with high offered wages. A large difference is also observed in the group with no desired occupation. Third, in terms of age, a gender difference is observed in the middle-aged group.

In summary, these characteristics show no gender differences across regions or occupations with low-wage offers (upper left). This finding implies that the minimum wage could influence individuals' ask salaries, leading to a narrowing of the ask gap; this is similar to the phenomenon whereby the minimum wage can narrow the gender (actual) wage gap through the change in the wages of those in the lower wage distribution (Blau and Kahn 1997). On the other hand, the gender difference opens up when the wages offered tend to be high (toward the lower right), and a large difference is observed, especially in the middle-aged group.

4.3 The ratio of women to men - background attributes

This section shows the ratio of women within each background attribute to facilitate the interpretation of the generalized KOB-Duncan method. Each plotted point in Figure 2 shows the ratio of women to men in the corresponding group; at a value of 0.5, the ratio of men to women is the same. Figure 2 shows the following.

First, there are no large differences by desired region. Second, the ratio of women declines in desired occupations with higher offered wages. Third, there is a sharp decrease in the ratio of women in the fifth quantile of age.

4.4 Comparison with the actual wage in the labor market

In this subsection, we aim to elucidate the discrepancies between the ask wage gathered through Hello Work and the actual labor market wages. The Ministry of Health, Labor and Welfare (MHLW) annually conducts the Basic Survey on Wage Structure, which is a statistical survey that aims to elucidate the real wages of workers across major industries. They also publish aggregate data on monthly salaries categorized by employment status, gender, age group (in 5-year intervals), and other demographics; thus, we use this data to draw comparisons with the ask salaries of our sample.

To understand the relationship between wages in the actual labor market and the ask wages in our specific sample, Figure 3 illustrates a box-and-whisker plot. This visual representation highlights the difference between the logarithm of the average wage for full-time workers in 2019, categorized by gender and age group (as per our sample), and the logarithm of the ask wage for individual job applicants within the same gender and age group. Specifically, it illustrates the logarithmic value of each worker's ask monthly salary minus the logarithmic value of the average actual monthly salary.

Figure 3 indicates that the median value consistently falls to the left of 0 across all groups. Additionally, there is a consistent trend of the median value being lower in the top 75th

percentile, except for the youngest group. This suggests that the ask salaries reported at Hello Work tend to be lower than the wages observed in the labor market for individuals with similar demographic characteristics.

Nonetheless, it is important to consider that the actual average of salaries incorporates individuals with longer tenure; this factor may contribute to the difference in the ask salaries of job seekers. To address this issue, we further examine the average wage of workers with zero years of tenure, which is a group that is more closely aligned with the job seeker’s average wage. Figure 4 presents a box-and-whisker plot illustrating the disparity between the logarithm of each job seeker’s ask monthly salary and the logarithm of the average monthly salaries for workers with zero years of tenure, categorized by sex and age group (the latter minus the former as Figure 3).

Figure 4 suggests that even when considering the actual wages of workers with zero years of tenure, their ask salaries continue to exhibit a tendency to be lower, which is consistent with the observations highlighted in Figure 3. However, it should also be mentioned that while the ask gap is lower than the actual wage, it is not that far off in terms of average.

5 Estimation strategy

This study attempts to answer two main questions. The first question focuses on the extent to which each observable attribute contributes to the ask wage gap. The second question focuses on the extent to which factors other than observable attributes contribute to the ask wage gap between men and women. In the following subsections, we explain how to answer each question.

5.1 Decomposition

To answer the first question, we first use the generalized KOB-Duncan method. In decomposition analysis, the overlap assumption necessitates that all the treatments of interest are observed in every subgroup. However, as we discuss in Section 4, there are subgroups where female applicants are not observed (for example, older women are less likely to actively seek employment and are virtually absent in certain occupations). Therefore, we only utilize the subsamples that meet the positivity assumption criteria by excluding subgroups with a male ratio exceeding 99.9%. Decomposition analyses are thus carried out by aligning the distribution of men with that of women.

The estimand in this analysis is the ask gap between men and women adjusted for the gender gap in covariates X , which is defined as follows:

$$\phi(X) = \int_X \left[E[Y|D = 1, X] - E[Y|D = 0, X] \right] \times f(X|D = 1) dX, \quad (1)$$

where (D=1) means female and (D=0) means male, and $f(X|D=1)$ is the distribution function of (X) in females. The above can be interpreted as the average ask gap when the distribution of males attributes is matched to that of female attributes.

The (X) to be adjusted is increased sequentially from (X_1) to (X_4):

- $X_1 = [Month]$
- $X_2 = [Month, Age]$
- $X_3 = [Month, Age, Desired Region to Work]$
- $X_4 = [Month, Age, Desired Region to Work, Desired Occupation]$

The above estimation allows us to identify within which covariates the gender gap leads to the gender ask gap. The estimation is carried out using the moment conditions presented in Hahn (1998).

5.2 Heterogeneity analyses

Even after controlling for month of employment, age, desired region, and desired occupation, there is a possibility that a residual gender ask gap may remain. To deepen the understanding of the residual gender ask gap, we conduct two heterogeneity analyses. One is the best linear predictor (BLP) on the residual gender ask gap, and the other is the subgroup analysis for pink-collar jobs on the basis of decomposition analysis above (for the latter, see Appendix C).

To determine for which groups the gap is larger, we estimate a BLP of $(\phi(X_4))$. Specifically, we estimate a linear approximate model for ($Z =$ age, desired region to work, and desired occupation). In the analysis, the data are divided into quantiles for age, desired region, and desired occupation (we add an unknown category for desired occupation to create 6 quantiles). Dummy variables are then created for each. When dividing into quantiles for the desired region and the desired occupations, the average offered wage for the job is used.

Referencing Semenova and Chernozhukov (2021), the moment conditions are as follows:

$$0 = \int Z(\phi(Z) - \beta Z)f(Z)dZ,$$

where

$$\begin{aligned} \phi(Z) &= \int E[Y|D = 0, X]f(X|Z, D = 1)dX \\ &= \int E[Y|D = 0, X] \frac{f(D = 1|X)f(X|Z)}{f(D = 1|Z)}dX. \end{aligned}$$

Using the Hines et al. (2022) method, the estimates can be derived as follows:

$$\begin{aligned}
0 = \sum Z & \left(E[Y|D = 0, X] \frac{f(D = 1|X)}{f(D = 1|Z)} \right. \\
& + (1 - D) \frac{Y - E[Y|D = 0, X]}{f(D = 0|X)} \frac{f(D = 1|X)}{f(D = 1|Z)} \\
& + E[Y|D = 0, X] \frac{1}{f(D = 1|Z)} (D - f(D = 1|X)) \\
& \left. - E[Y|D = 0, X] \frac{f(D = 1|X)}{f(D = 1|Z)^2} [D - f(D = 1|Z)] - \beta Z \right).
\end{aligned}$$

5.3 Estimation of nuisance functions

Both the decomposition and the BLP on the residual gender gap require the estimation of several nuisance functions. Specifically, $E[Y|d, X]$, $f(D = 1|X)$, $f(D = 1|Z)$ should be estimated. In this paper, the estimation is conducted by cross-estimation using LASSO, OLS, and random forest stacking methods.

5.4 Embedding method

In the analyses, the embedding method is used, a dummy for missing values is created, and the median of the embedded values is substituted. Generating many dummies is generally inefficient in terms of estimation and increases the computation time (indeed, it is quite a serious problem since the sample exceeds 500,000 cases). Therefore, the following two methods are used to “embed” them in a two-dimensional vector space. First, we estimate and use predicted wages (the lower bound of the offered wage) from job postings by both prefecture and by occupation. For occupations with many categories, LASSO estimation is used. Then, we compute and use the means of each category for the other variables in the data (here, only age). There is an argument that this method can be justified as sufficient representation (Johannemann et al. 2019).

Note that the embedded value will also be deficient for respondents who had missing information on their desired occupation. In this case, simply dropping the missing sample from the analysis will skew the sampling. This is because, for example, if the deficiency is due to the lack of the desired occupation, etc., then the deficiency contains important information. Thus, we use the median value in combination with missing dummies.

6 Results

6.1 Average ask wage gap between men and women

Figure 5 shows the results of the raw ask wage gap and the ask wage gap with all attributes aligned based on the data. Based on Figure 5, the following findings can be determined for each result. First, the raw ask wage gap results show that the average wage asked for by women is 17.6 percent. points lower than that asked for by men. Second, the result of the ask wage gap controlled for all attributes shows that the average ask wage for women is 14.8 percentage points lower than that for men, even when age, region, and desired occupation are controlled for.

Compared with Roussille (2024), who analyzed the ask wage gap for skilled workers in the United States and found an overall raw ask wage gap of 8 percentage points, the magnitude of 17.6 percentage points found herein is quite large. However, this difference may be due to differences between countries, including cultural backgrounds and the demographic of workers (skilled workers vs. job seekers who are not necessarily high-skilled), which is the subject of the analysis. (Her results show that the ask wage gap for unemployed workers is larger than the average ask wage gap.)

Let us now compare these results with the gender wage gap in Japan. It has been noted that the average (actual) wage gap in Japan is 24.8 percent points (as discussed in Section 2). Compared to this value, the difference in ask salaries is 17.6 percentage points, suggesting that the ask wage gap may have some effect on the actual wage gap.

Finally, given the difference between the raw ask wage gap of 17.6 percent points and the controlled ask gap of 14.8 percentage points, one might think the observed characteristics is not informative for gender ask gap. However, the observed characteristics of this difference may be masked by counteracting factors. In the following subsection, we check this by decomposition analysis.

6.2 Decomposition analysis

In this section, we perform a decomposition analysis of the ask gap. Specifically, we estimate Eq. (1) using the generalized KOB-Duncan method. Recall that, as discussed in Section 5, this analysis allows us to see how the ask gap changes when the distribution of male attributes is aligned with that of female attributes.

The results of the analysis are shown in Figure 6. We can see that the ask salaries for men decrease if the distributions of each factor of desired occupation and desired region are equal for women. The difference is largely due to the effect of the former factor of the occupational category. Second, if the distribution of age is equal to that of women, then there is instead a tendency for the male wage to increase. Thus, age is a factor that reduces the ask wage

gap between men and women, while the desired region and desired occupation are factors that increase the gap. Finally, there is still a gap of approximately 15 percentage points such that the observed factors cannot be explain.

The interpretation behind these results can be discussed as follows. As seen in Figure 6, the ask wage tends to be lower in the older age group. However, as seen in Figure 2, since the proportion of women is higher in the lower age group, we expect the results to show higher ask salaries for men when their age distribution is aligned with that of women. Next, we consider why the desired occupation is the main factor that widens the difference in ask wages. This may be because fewer women apply for jobs that tend to have higher ask salaries. Relatedly, it is expected based on Figure 2 that the ratio of women is lower in jobs with higher offered wages.

In summary, as expected in the previous section, the differences in the gender distributions of the two factors have opposite effects on the ask gap such that they cancel each other out. Specifically, they are roughly -20% for desired occupation and +10% for age compared with the overall gender gap; thus, the distributional differences in desired occupation and age are nonnegligible.

7 Heterogeneity

It is clear that the residuals of factors other than age, desired region, and desired occupation, i.e., residuals, are large with respect to the ask gap between men and women. Unfortunately, due to data limitations, it is not possible to directly identify these factors. However, it is possible to estimate which combinations of age, desired region and desired occupation have greater residuals among men and women and to obtain indirect implications for analogizing the factors.

We perform a subgroup analysis to gain an intuitive understanding of the heterogeneity within the residuals. Figure 7 shows the coefficients of the gender gap in ask salaries for each subgroup presented in Section 3. However, it is notable that we control for age, desired region, and desired occupation in a semiparametric way.

Several things can be learned from this figure. First, the residuals differ markedly with respect to age. Specifically, as in the case of labor supply, there is a U-shaped relationship with a drop-off in the middle age. This may be due to the same reasons for the labor supply (intra-household division of labor, career interruption for women). Second, we see that the residuals are smaller among the younger subgroup. Drawing on these heterogeneity results and the decomposition analysis, we delve into a comprehensive discussion of the gender gap in ask salaries in the following section.

8 Disucussions

8.1 Possible explanations

There is a substantial body of research on the gender wage gap, which is extensively summarized in Blau and Kahn (2017), among others. Various factors have been identified to explain differences in labor outcomes between men and women. In this section, we organize and present the existing findings, focusing on disparities in occupation, age, and region between men and women that can affect the ask gap. Additionally, we explore existing findings regarding gender differences within groups with similar characteristics.

8.1.1 Occupation

First, it has been suggested that there is a difference in the distribution of occupations among male and female workers. According to Blau and Kahn (2017), 17% and 32% of the gender wage gap in the US can be accounted for by industry and occupation, respectively. England, Levine, and Mishel (2020) offered an overview of gender disparity in the U.S., noting a decline in occupational segregation from 1970 to 2015; however, such segregation remains significant, with a Duncan index of 0.42. Some studies have interpreted job segregation as stemming from differences in domestic responsibilities, such as child-rearing. Goldin (2014), who explored the persistent gender wage gap in the U.S., found that the cost of adjusting work hours, both in terms of length and timing, varies across occupations. She regarded this as a crucial factor that contributes to the gender wage gap between different occupations, known as the compensated wage differentials. Kleven, Landais, and Sogaard (2019) analyzed the “motherhood dip” phenomenon in Denmark, revealing that occupational downgrading tends to occur when individuals become parents, with many transitioning to the public sector, which is often referred to as the “mommy track.” Given such occupational segregation among workers, there is likely to be segregation in terms of desired occupations among job seekers.

8.1.2 Age

Second, it has been proposed that there are differences in the age distribution of workers and job seekers between men and women. A widely acknowledged pattern is that women tend to exit the labor market during middle age. Earlier work by Killingsworth and Heckman (1986), which examined labor participation among men and women across ages and cohorts, revealed that gender disparities typically arise in the middle age bracket. According to Goldin and Mitchell (2017) and OECD (2018), labor market exit among middle-aged workers has diminished in the United States and other developed nations, with labor participation rates leveling off. However, within the OECD, only Japan and South Korea continue to exhibit an M-shaped curve. Similar findings have been observed in numerous studies in Japan, indicating that this difference has not been fully eradicated in the latest market (OECD 2019).

8.1.3 Region

Third, it is expected that differences in the regional distribution of employment and job-seeking activities exist between men and women. For instance, if various regions exhibit distinct norms and industries, then it is likely that the employment rates and numbers of job seekers will vary between genders. If these regional characteristics are correlated with labor productivity and wages, they could contribute to the gender gap in ask salaries. Studies such as Fortin (2005), which was conducted among OECD countries, and Fernández, Fogli, and Olivetti (2004) and Boelmann, Raute, and Schonberg (2021), which were conducted within the same country (US and Germany, respectively), have shown the relationship between norms and labor outcomes. However, in contrast, Blau and Kahn (2017) focused on the United States, and suggested that gender differences in regional distribution have limited explanatory power in the U.S. gender wage gap.

8.1.4 Other factors

While we have outlined three hypotheses that can be examined using the available data, importantly, these hypotheses are interconnected. This interconnection may contribute to the gender differences observed among groups with similar characteristics. For example, the differences in family responsibilities already mentioned can affect differences within the same variable (i.e., occupation, age, and region) that we cannot observe. Bertrand, Goldin, and Katz (2010) analyzed differences in career paths between men and women for MBA holders in the U.S. at the top of the wage distribution. They showed that there is almost no gender wage gap at the beginning of MBA holders' careers but that the gender gap increases with age. Studies have also highlighted women's career interruptions and working time adjustment. Daniel, Lacuesta, and Rodríguez-Planas (2013) showed that working time adjustment explains about two-thirds of the motherhood dip in Spain. Cooke et al. (2009) analyzed family migration, women's labor income, and the wage gap between married couples in the U.S. and the U.K. and reported that migration tends to increase household income at the cost of the wife's income, especially in the U.S.; this suggests that migration is the cause of the gender gap within the region. These effects could affect the gap in ask salaries in groups with similar characteristics.

Second, differences in preferences and attitudes may also play a significant role in contributing to unobservable gender differences. It has been observed that men and women exhibit disparities in risk preferences, competitiveness, attitudes toward bargaining, and social preferences (Croson and Gneezy 2009; Marianne 2011)⁷. For instance, Niederle and Vesterlund (2007) conducted laboratory experiments in the U.S. to investigate whether and why women tend to be more hesitant to engage in competition than men. They reported that women display

⁷On average, women tend to shy away from competition and may be less inclined or less skilled in negotiating than men (Babcock and Laschever 2003); numerous studies have confirmed these trends (Leibbrandt and List 2015; Dittrich, Knabe, and Leipold 2014; Card, Cardoso, and Kline 2016).

lower levels of competitiveness and that gender differences in performance and risk preferences do not account for this, with male overconfidence emerging as an explanatory factor. In fact, Cortés et al. (2023) reported that risk preference and overconfidence play nonnegligible roles in explaining gender differences in job search behavior through the formation of reservation wages. Card, Cardoso, and Kline (2016) analyzed the gender wage gap in Portugal in terms of firm sorting (between-firm gap) and bargaining (within-firm gap) and concluded that sorting (between-firm gap) explains approximately 15%-20% of the gender wage gap, whereas bargaining (within-firm gap) is less influential but still explains approximately 6% of the gender gap, depending on the specification. These variations in preferences and attitudes may contribute to differences in ask salaries.

Third, in line with the second factor of preference and attitudes, disparities in beliefs between men and women may also influence the ask gap. For instance, individuals may hold differing beliefs regarding their own abilities and evaluation (Exley and Kessler 2022), or they may adjust their wage expectations on the basis of the earnings of others as reference points (Clark, Frijters, and Shields 2008; Clark and d'Ambrosio 2015). If individuals reference the labor market conditions or the wages of workers with similar attributes, then the wage progression and promotions experienced by men and women currently in the workforce, although not directly tied to the job seeker's salaries, may serve as benchmarks for ask salaries (Fehr, Goette, and Zehnder 2009; Godechot and Senik 2015; Noy and Sin 2021). Loprest (1992) examined differences in wage growth and the returns to job mobility between men and women in the U.S. They found that the wage growth among those who remain at their jobs is relatively similar between genders or even slightly greater for women, while male job changers experience more than twice the wage growth when compared with that of female job changers. Blau and Kahn (2017) noted that 14% of the gender wage gap in the U.S. can be attributed to differences in years of experience. The importance of gender differences in the probability of promotion to management positions is also emphasized in explaining the gender wage gap in Japan, which is our country of interest, where long working hours and other factors that are contrary to work-life balance are required to be promoted to management positions (Yamaguchi 2016).

Fourth, policies can affect wage differentials among workers in the same group. Blau and Kahn (2013) examined the impact of family policies on labor outcomes for men and women. They demonstrated that the absence of such policies tend to decrease the likelihood of American women transitioning to lower-income occupations while also affecting differences in age distribution. Additionally, although not specifically targeting gender disparities, minimum wage policies can also affect the gender wage gap (Blau and Kahn 1997). Typically, women are disproportionately represented among minimum wage workers. D. Kawaguchi and Mori (2009) discussed the characteristics of minimum wage workers in Japan, noting that approximately 70% of them are women. They highlighted that these women are more likely to be employed in retail, wholesale, and restaurant industries. Thus, improvements in the minimum wage level could potentially impact the gender wage gap within the same region.

Finally, monopsony power within the relevant market can also contribute to gender disparities within regions and firms (Manning 2011). Webber (2016) examined the gender wage gap in

the U.S. through Manning (2003)’s monopsony framework. Women tend to exhibit lower firm-level labor supply elasticity, enabling firms to exert greater monopsonic power. Their research revealed that, upon decomposing labor supply elasticity, women’s greater search friction stems from lower wage offers.

8.2 Our results

Let us delve into the trends in the “ask gap” within our sample-based on the findings from our analysis thus far. Our factor decomposition analysis highlights that among the three observable factors that explain the overall gender differences in ask salaries, the most influential factor is the difference in the distribution of desired occupations. In studies of gender inequality using actual wages, it has long been argued that the effect of occupational segregation is significant (Blau and Kahn 2017). While ask salaries may not directly dictate actual wages, it is plausible that in the Japanese context, where job search activities often involve job postings, men and women might harbor distinct preferences regarding their desired occupations. In this scenario, female job seekers may be more inclined to accept wage disparities, acknowledging the differences that may exist within their preferred jobs or occupations. Herein, the analysis further reveals that the residuals of the unexplained portion are greater than those of the three observable factors. Roussille (2024) also explored this unexplained aspect of the gap. She ruled out several hypotheses on the basis of the findings and interpreted the absence of information regarding the market wage of job seekers themselves as the primary factor contributing to the ask gap⁸. Here, we also discuss how differences in ask salaries affect the unexplained gender gap on the basis of the results of two heterogeneity analyses.

The first outcome of the heterogeneity analysis reveals that in a within-group analysis of the 150 groups categorized by quartiles for each factor, the gender gap in ask salaries widens notably in the middle age group. Upon the close examination of Figure 1 regarding the descriptive statistics outlined in Section 4, it becomes evident that this difference is driven primarily by men increasing their ask salaries rather than by women decreasing their incomes in middle age.

Importantly, these men are not seeking higher wages while employed but rather when they are changing or finding jobs. This suggests that during the job-seeking stage in Japan, where the significance of the career track within a company is underscored, men might have relinquished the expectation of a promotion effect. However, this effect seems unlikely if they are utilizing Hello Work rather than relying on nepotism or private agencies. As a result, it is plausible

⁸She found that when women are given information about the average wage offered to workers with similar characteristics, they tend to ask for higher wages, thereby eliminating the gender difference. First, Roussille (2024) results indicate no gender differences among job seekers in regard to their preferences for firm characteristics, which contradicts the compensating wage hypothesis for high-skilled individuals in the U.S. On the other hand, our findings do not explicitly reject this hypothesis. Second, if differences in preferences and conforming to gender norms make it easier for women to obtain a job, then their choices should not change after a reform. However, the result found by Roussille (2024) was that women do change their choice, which led her to reject this hypothesis. Our results do not support differences in preferences and attitudes, either.

that women, on the basis of their specialization within the household and their role in child rearing, may not adjust their ask salaries with age; instead, they may choose not to relocate and value the flexibility of their working hours. On the other hand, men, acting as breadwinners, may actively seek higher wages corresponding to their age or life events. Therefore, the compensation wage differential, as suggested by Goldin (2014), among others, could serve as one of the potential explanations for the ask gap.

Actual experience may also be an unobservable factor at work. While men, on average, tend to have similar ages and years of experience, women's age is often greater than their years of experience due to childbearing, childcare, and other factors. As a result, this discrepancy is greater among men and women in their 30s to 40s. In this case, the age profile of ask wages for women could be flat even if the experience profile of the ask wage is the same between men and women.

Furthermore, the fact that job seekers' ask salaries may be related to information on employed workers implies the possibility of reference wages hypothesis; this aligns with the behavioral economics perspective, which suggests that individuals expect their appropriate earnings by comparing them to those of others. Fehr, Goette, and Zehnder (2009) noted that workers looking for a new job react strongly to the labor market conditions at the time.

Considering the reference wages hypothesis, the prevalent seniority-based wage system in Japan could contribute to the growing disparity between men and women as they reach middle age. The average wage structure by gender reveals a similar trend to that of ask salaries, albeit at different levels. While women's average actual wages are relatively flat throughout their lives, men's average actual wages have an inverted U-shaped curve with a peak in their 50s. While in many countries, wages are based on professional experience, in Japan, the relatively strong seniority-based wage system makes it easier to predict what people of similar demographic characteristics, such as age and gender, would be paid, rather than such salaries being based on professional experience. Thus, even if a person is at job-seeking stage and not working for a company, it may be possible for a gender ask gap to open up among job seekers by referring to the wages of employed people (Clark, Frijters, and Shields 2008; Clark and d'Ambrosio 2015; Godechot and Senik 2015; Noy and Sin 2021), where a gender wage gap has developed due to traditional employment systems (Chiang and Ohtake 2014; A. Kawaguchi 2015).

As we discussed, Roussille (2024) interpreted the lack of information as a possible explanation for her results based on a natural experiment. While our findings partially align with the idea that people rely on references for one's market value, there is a distinct difference. In her study, the change in the website system provided information on the offered wages for similar workers on the basis of combinations of the desired region, job title, and experience, relying more on professional experience. In contrast, our study suggests that demographic information, including gender, serves to define a reference group. One possible explanation for this difference could be attributed to the difference in the samples of workers targeted by the two studies and the fact that incumbent workers typically compare their fair wage to their existing status quo, whereas newly job-seeking individuals tend to gauge their prospects against the broader labor market (Fehr, Goette, and Zehnder 2009). However, it would be interesting to examine if the

gender difference disappears when job seekers receive new reference information that does not rely on gender, as seen in Roussille (2024) study. If it is true, then we may be able to specify which compensating wage hypothesis or reference wage hypothesis is the source for the ask gap in our sample.

Moreover, the other heterogeneity analysis shows that (see Appendix C), even in jobs traditionally occupied by more women, ask salaries are lower than for men. As we have discussed in Section 8.1, one significant factor that cannot be accounted for by differences in human capital is the varying preferences and attitudes toward competition and bargaining between genders (Croson and Gneezy 2009). These tendencies also appear to be influenced by social contexts⁹, being more pronounced in mixed-gender competitions than in female-only settings (Booth and Nolen 2012) and more prominent in tasks traditionally associated with males (competitiveness according to Günther et al. (2010); Große and Riener (2010); Shurchkov (2012), and self-evaluation for Exley and Kessler (2022))¹⁰. However, our result suggests that women are not holding back because of so-called “masculine occupations”, or because their competitors are men. Roussille (2024) also rejects the preference difference and is consistent with our results.

By combining these two findings from our heterogeneity analyses, we obtain indirect evidence regarding the mechanism behind gender disparities in ask salaries. In our sample of job seekers, which encompasses a diverse range of skill levels, it appears that distinctions in the roles of married couples within households, rather than variations in competitive attitudes, may be responsible for the differences in ask salaries. These results imply not only that the gender gap in actual wages and ask salaries can interact but also that if gender differences in ask salaries do indeed impact the actual gender wage gap, then implementing affirmative action solely within companies may not be sufficient to address the issue and narrow the gap. For a wider range of workers, achieving a more equitable distribution of responsibilities within households could also play a role in contributing to a solution.

9 Conclusion

This study investigates the salary disparity between men and women in Japan using administrative data. Unlike previous research, our analysis benefits from data that include various occupations that are not necessarily high-skilled. We initially estimate the difference in average ask salaries to gauge the full extent of the ask gap, revealing a notable 17.6 percentage point disparity. Given that the gender gap in the average actual wage is 24.8 percentage points, this substantial value indicates that the ask gap contributes significantly to Japan’s overall wage gap (although our ask gap result includes the unemployed population).

⁹Some studies have suggested that social structure, whether male or female dominated, has an impact (Gneezy, Leonard, and List 2009).

¹⁰Flory, Leibbrandt, and List (2015).

To further understand these differences, a decomposition analysis using the generalized KOB-Duncan method is conducted using information on the three variables available, namely, age, desired region to work, and desired occupation. The analysis reveals that a portion of the ask gap could be explained by differences in the distribution of each variable between men and women, i.e., -1.2 percentage points by age, 0.5 percentage points by desired region, 3.5 percentage points by desired occupation, and 14.8 percentage points by other unexplained factors. Among the differences in the distribution of the available information, the primary influence of the desired occupation is consistent with the general discussion of the wage gap between men and women (Blau and Kahn 2017).

Finally, we conduct a heterogeneity analysis to estimate the ask gap within the three-factor combination groups to better understand the impact of the unobservable factor, which is the largest factor in the factor decomposition of the ask gap. Specifically, when we test 150 group combinations for the three variables, we find that the difference widens in the middle-aged group. This result suggests that factors such as compensating for the wage differential and gap in actual experience from intrahousehold specialization, or/and differences in reference wages may amplify the ask gap during this particular life stage. Furthermore, we observe that women’s ask salaries are also low among those who want to work in traditionally female-dominated occupations.

Notably, our study has several limitations. First, it is constrained by the availability of only three pieces of information on workers. Future analyses could benefit from incorporating more detailed information on individuals to enhance the depth and accuracy of the study. Second, a valuable avenue for improvement involves comparing the findings with actual wage differentials derived from representative data on workers. Such a comparison would provide a valuable benchmark, enabling a more comprehensive understanding of the relationship between gaps in ask wages and actual wages in the labor market.

Appendices

Appendix A: Summary Statistics

Table 1 is here

In the table, “Ask Salary” is the respondents’ ask salary (unit is 1000 yen). “Occupation” is the average offered wage for the desired occupation, while “Unknown” is a sample in which the respondent does not have a desired occupation. “Region” represents the average offered wage for the prefecture. The numbers in the table indicate the median (bottom 25%, top 25%).

Appendix B: Five-year trend of ask salaries

This appendix discusses the transition, specifically examining asking salaries and related variables for the five years leading up to the 2019 data utilized in the primary analysis.

Figure 8 and Figure 9 are around here.

First, we look at the number of new job seekers. Figure 8 shows the number of new job seekers by gender, with the vertical axis representing the number of new job seekers, and the horizontal axis represents the corresponding year and month. There is an overall downward trend in the number of job seekers. Second, seasonality can be observed. For example, a spike is observed in March for both men and women. This may be because the Japanese fiscal year runs from April to March, which may affect the ask salaries of those looking for a job upon retirement.

Next, let us look at the trends in ask salaries, which are of interest to us. In Figure 9, the vertical axis is the average monthly ask salaries, and the horizontal axis is the corresponding year and month. Looking at Figure 9, we observe an overall increasing trend. Furthermore, we observe seasonality similar to that seen in Figure 8, which may be due to the demographics of new job seekers, as previously discussed.

To understand the factors behind the change in ask salaries, we attempt to interpret it on the basis of the available data. First, we examine the age of job seekers. Figure 10 illustrates the average age of job seekers by gender on the vertical axis against the corresponding year on the horizontal axis. It is evident from Figure 10 that, overall, the average age of job seekers is increasing for both men and women. This trend is likely attributable to the aging population.

Figure 10 is around here.

Second is the changes in desired occupations. Figure 11 displays the average offered wage for job seekers' desired occupations by gender on the vertical axis, with the corresponding year and month on the horizontal axis. The average offered wage presented here is calculated solely from data drawn from the initial dataset (May 2015). While the offered wages for men's desired occupations have remained relatively stagnant, there has been a steady increase in those for women. Notably, women are shown to be gradually transitioning to jobs with higher wage offers.

Figure 11 is around here.

Finally, let us look at regional trends. Figure 12 shows the average offered wage in the job seeker's desired region to work (prefecture) by gender on the vertical axis and the corresponding year and month on the horizontal axis. Here, the average offered wage is calculated using only data from the initial period (May 2015). Although seasonality can be observed for the desired region (at a minor magnitude, however), there is no significant trend in the overall change.

Figure 12 is around here.

Taken together with the three characteristics mentioned above, the shift in desired occupations can be seen as a factor that influences the overall trend. Regarding the wages offered for these desired jobs, there has been a decreasing trend present over the past five years. However, the primary outcome from the latest 2019 data indicates that a discrepancy exists in regard to asked salaries, which suggests that desired occupations continue to have a certain impact.

Appendix C: Subgroup analysis for pink-collar jobs

The primary findings in Section 6 indicate that across the entire sample, women’s ask salaries are typically lower than men’s. However, do these findings remain consistent for “pink-collar” jobs, which are traditionally occupied by women? As discussed in Section 8.1, previous research has suggested that women tend to be less competitive and less inclined to negotiate salaries than men, but this inclination is understood to be influenced by the specific context or environment. It has been observed that the gender disparity vanishes when the competitor, the employer or supervisor with whom one is negotiating is a woman. The analysis in this appendix investigates gender disparities in ask salaries among individuals seeking pink-collar jobs in an environment where these women can be more proactive in competition and wage negotiations.

Here, we focus on the subgroup consisting of childcare workers, nurses, and caregivers among the pink-collar jobs. The reasons for focusing on these three occupations are as follows. First, these occupations traditionally employ a large percentage of women. Second, these three occupations are in high demand and have a large effect on the labor market. Third, these occupations are professional positions that require qualifications, which is expected to make them relatively unaffected by career intervals such as childbearing and to make it easier for them to understand their market value.

The analysis follows the decomposition procedure described in Section 5 within the subgroup consisting of the three occupational subgroups. The point estimator (and standard error) is 0.088 (0.001) for the subgroup, suggesting that the women’s ask salaries are still lower than those of men even in these occupations.

Tables

Table 1: Summary Statistics

Characteristic	Men, N = 1,517,680¹	Women, N = 1,388,272¹
Ask Salary	200 (180, 250)	180 (150, 200)
Age	44 (31, 56)	38 (28, 49)
Region	187 (176, 204)	186 (175, 203)
Occupation	181 (174, 197)	174 (167, 183)
Unknown	124,453	72,971

¹ Median (IQR)

Note: Ask Salary is the respondents' ask salary (unit is 1000 yen). Occupation is the average offered wage for the desired occupation, while Unknown is a sample in which the respondent does not have a desired occupation. Region represents the average offered wage for the prefecture. The numbers in the table indicate the median (bottom 25%, top 25%).

Figures

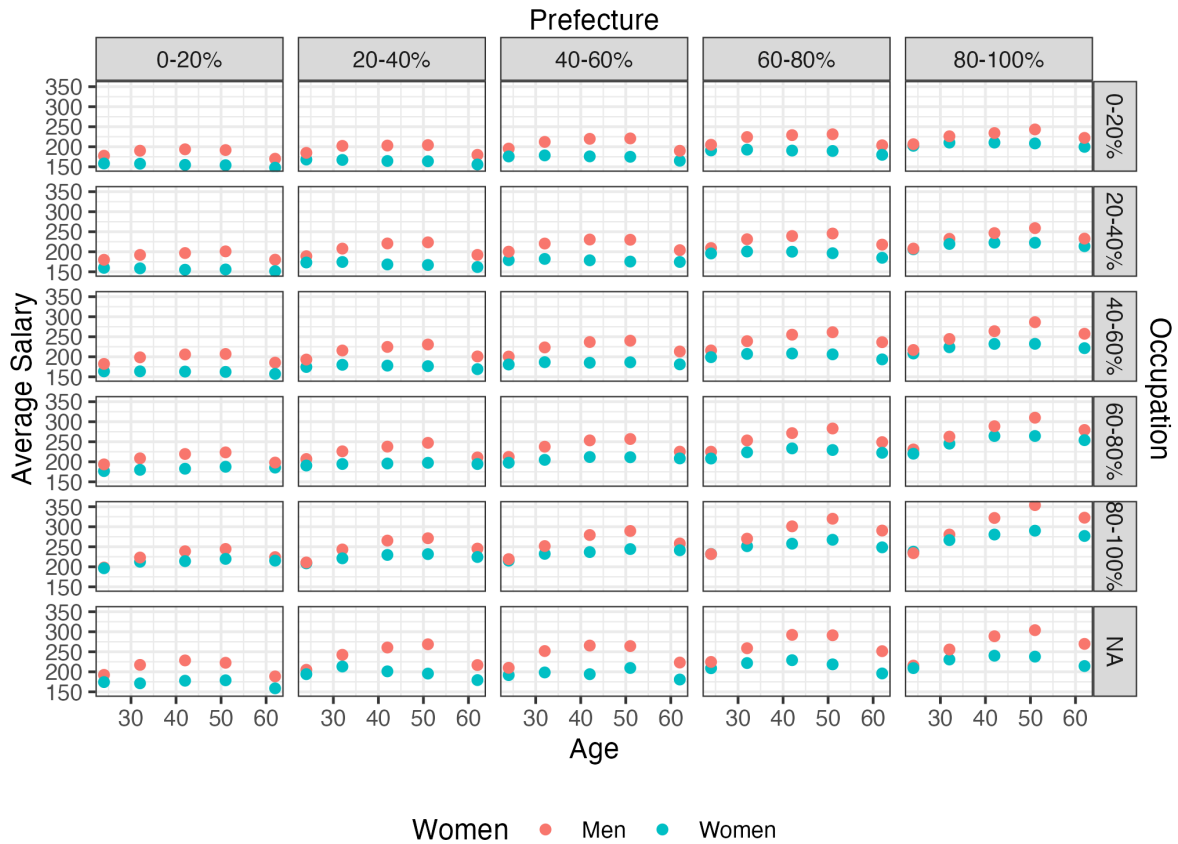


Figure 1: The ask salaries of men and women

Notes: This figure shows the ask salaries by quartile of background attributes presented above in a single figure. The labels on the upper side line up with the quintiles of the regions running from left to right. The labels on the right side line up with the occupational quintiles running from top to bottom. The horizontal axis at the bottom of the figure shows the age quintiles within each quintile of the region. The vertical axis in each cell on the left side shows the average ask salary in units of 1,000 yen. for each subgroup. The red and blue dots denote males and females, respectively.

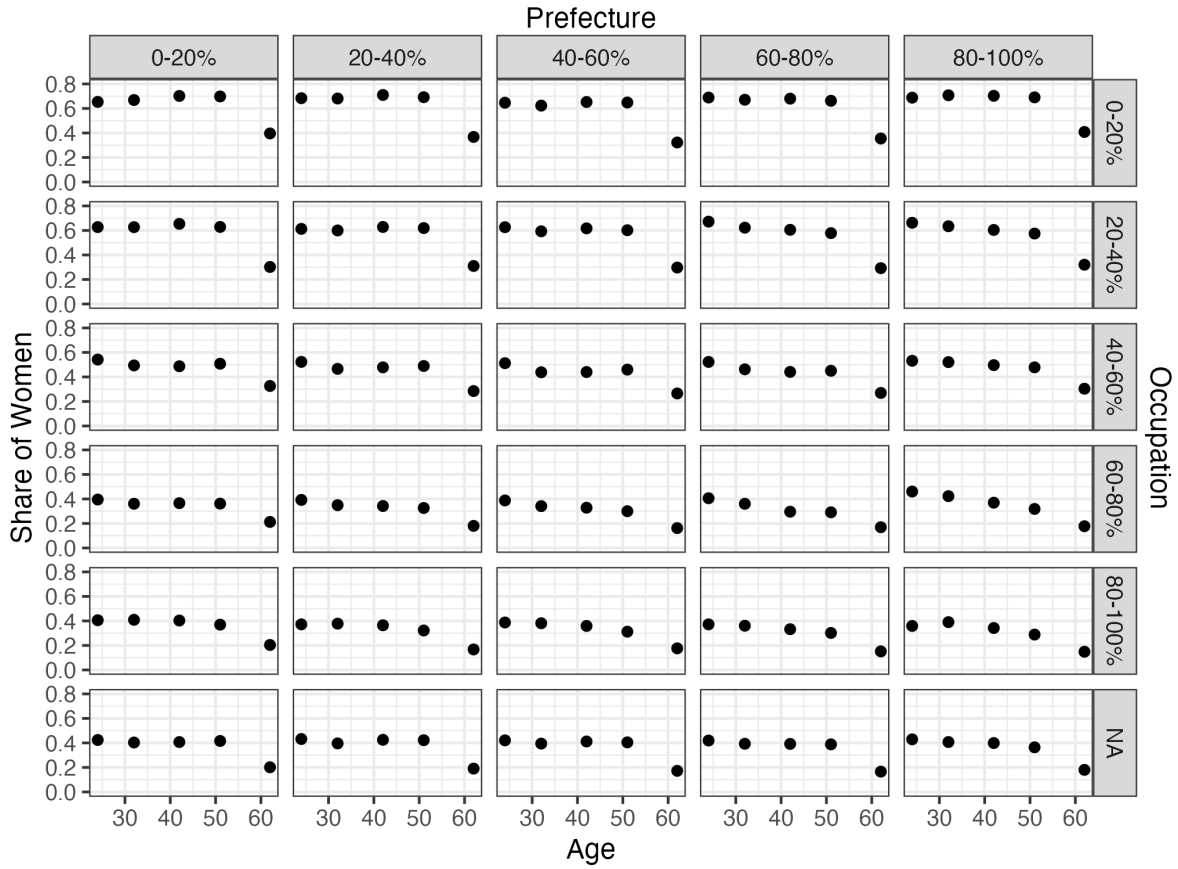


Figure 2: The ratio of women to men

Notes: This figure shows the ratio of women within each background attribute to facilitate the interpretation of the generalized KOB-Duncan method. The labels on the upper side line up with the quintiles of the regions running from left to right. The labels on the right side line up the occupational quintiles running from top to bottom. The horizontal axis at the bottom of the figure shows the age quintiles within each quintile of the region. Each plotted point in this figure shows the ratio of women to men in the corresponding group; at a value of 0.5, the ratio of men to women is the same.

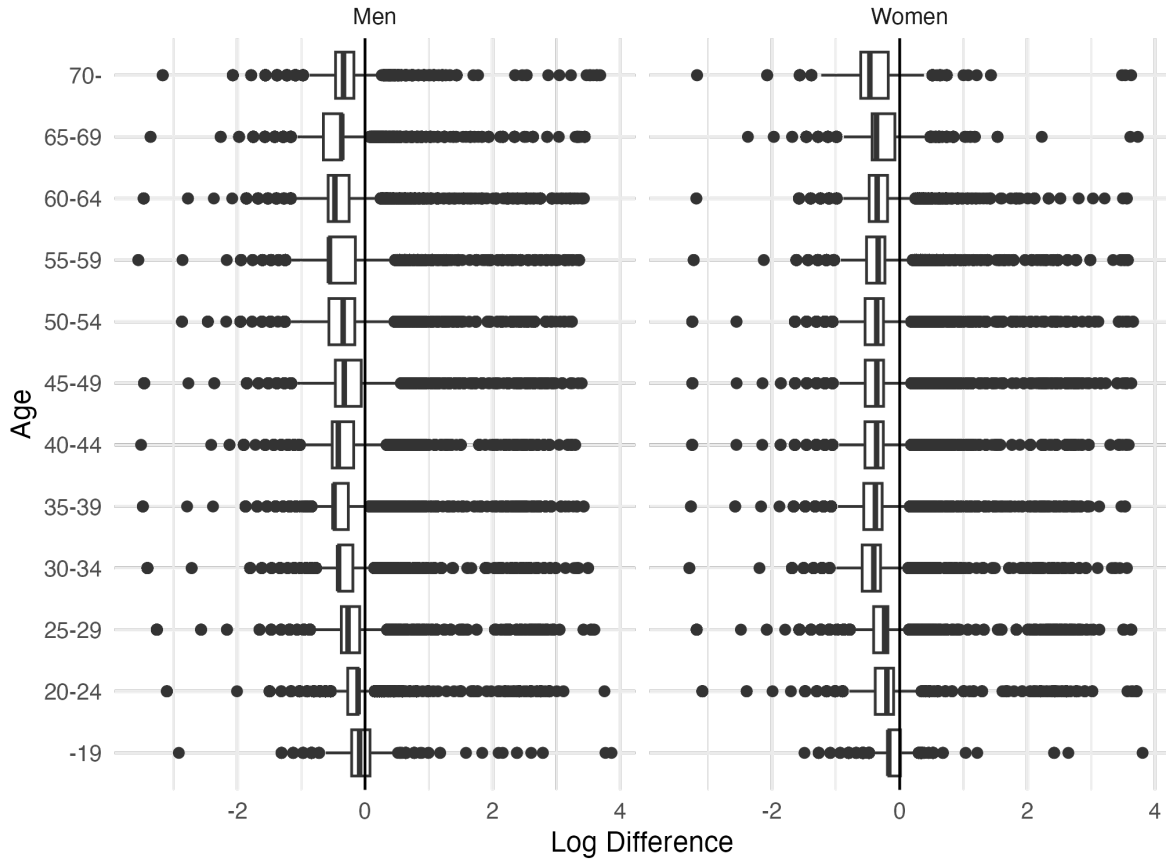


Figure 3: The comparison with the actual wages (all sample)

Note: This figure illustrates a box-and-whisker plot. This visual representation showcases the difference between the logarithm of the average wage for full-time workers in 2019, categorized by gender and age group (as per our sample), and the logarithm of the ask wage for individual job applicants within the same gender and age group. Specifically, it illustrates the logarithmic value of each worker's ask monthly salaries minus the logarithmic value of the average actual monthly salaries.

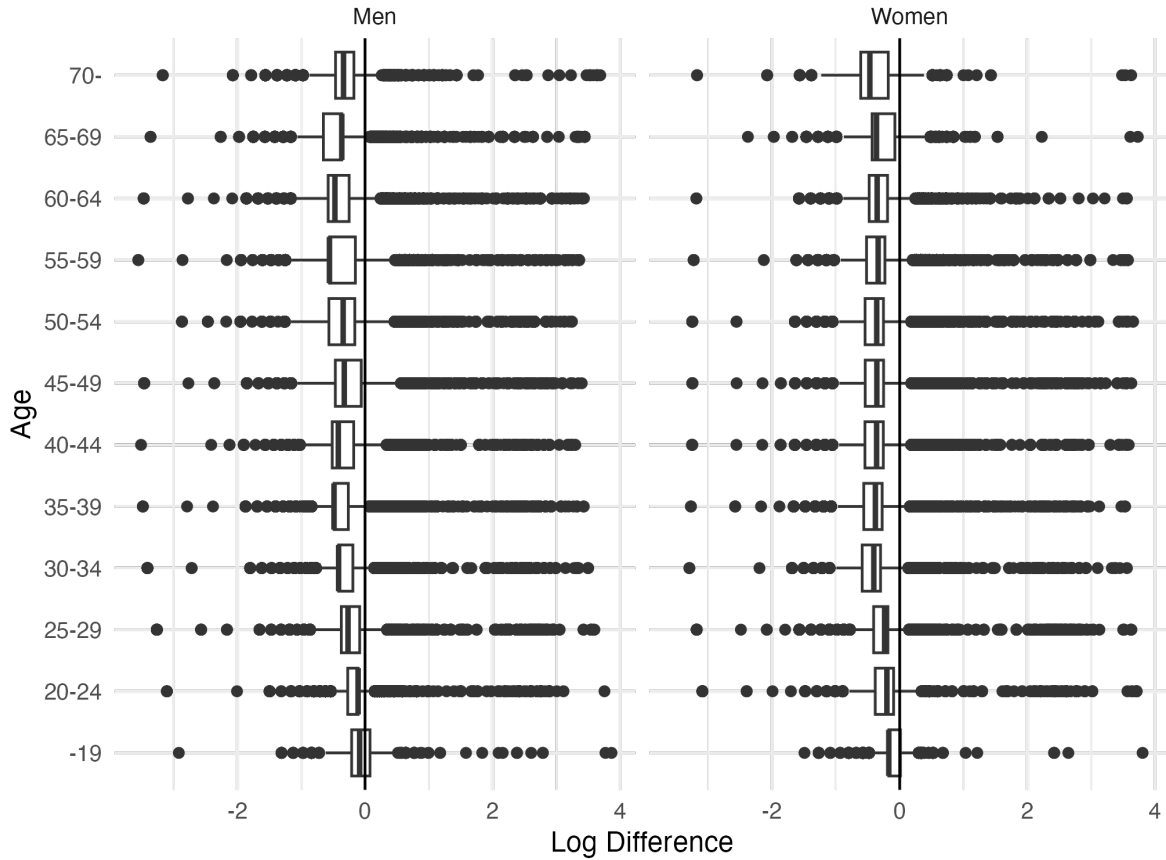


Figure 4: The comparison with the actual wages (sample of workers with zero years of tenure)

Note: This figure illustrates a box-and-whisker plot. This visual representation showcases the difference between the logarithm of the average wage for full-time workers with zero years of tenure in 2019, categorized by gender and age group (as per our sample), and the logarithm of the ask wage for individual job applicants within the same gender and age group. Specifically, it illustrates the logarithmic value of each worker's ask monthly salary minus the logarithmic value of the average actual monthly salary.

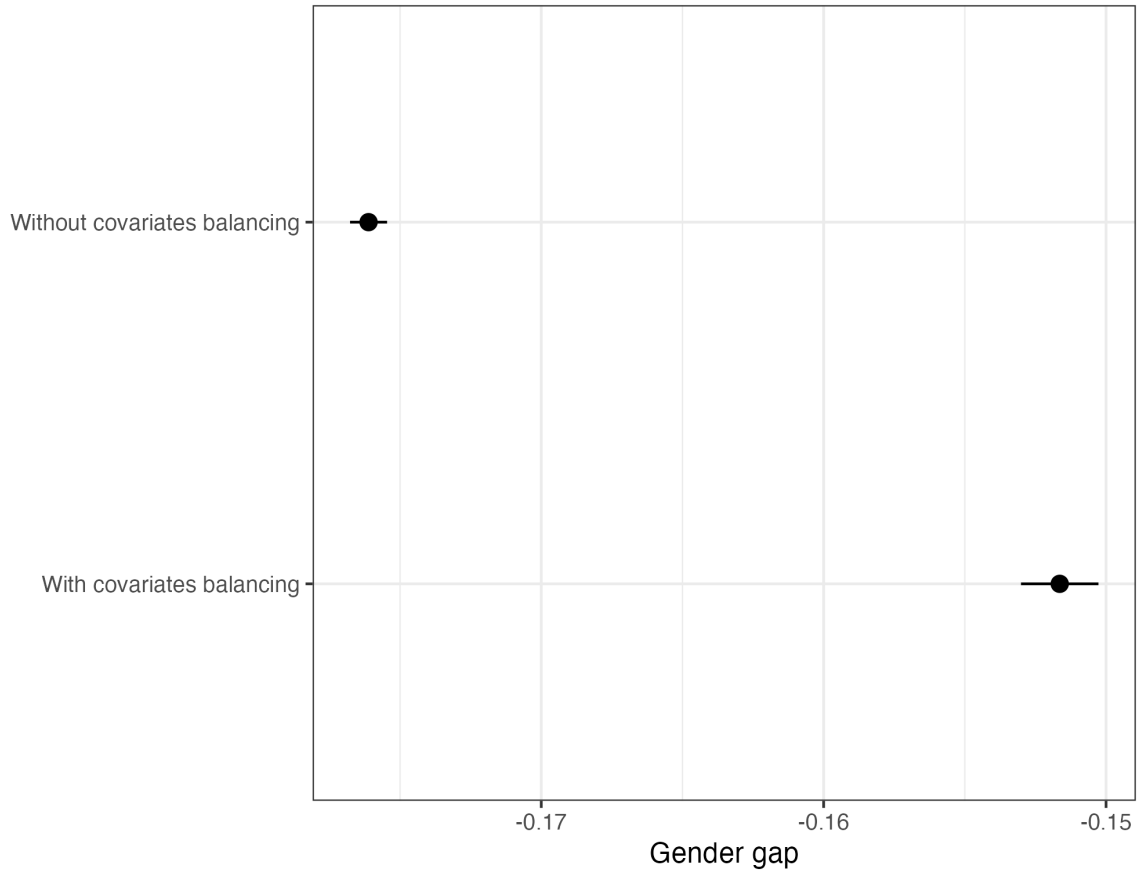


Figure 5: The raw ask wage gap and the ask wage gap with all attributes controlled

Notes: This figure shows the results of the raw ask wage gap and the ask wage gap with all attributes aligned based on the data (i.e., age, desired region to work, and desired occupation).

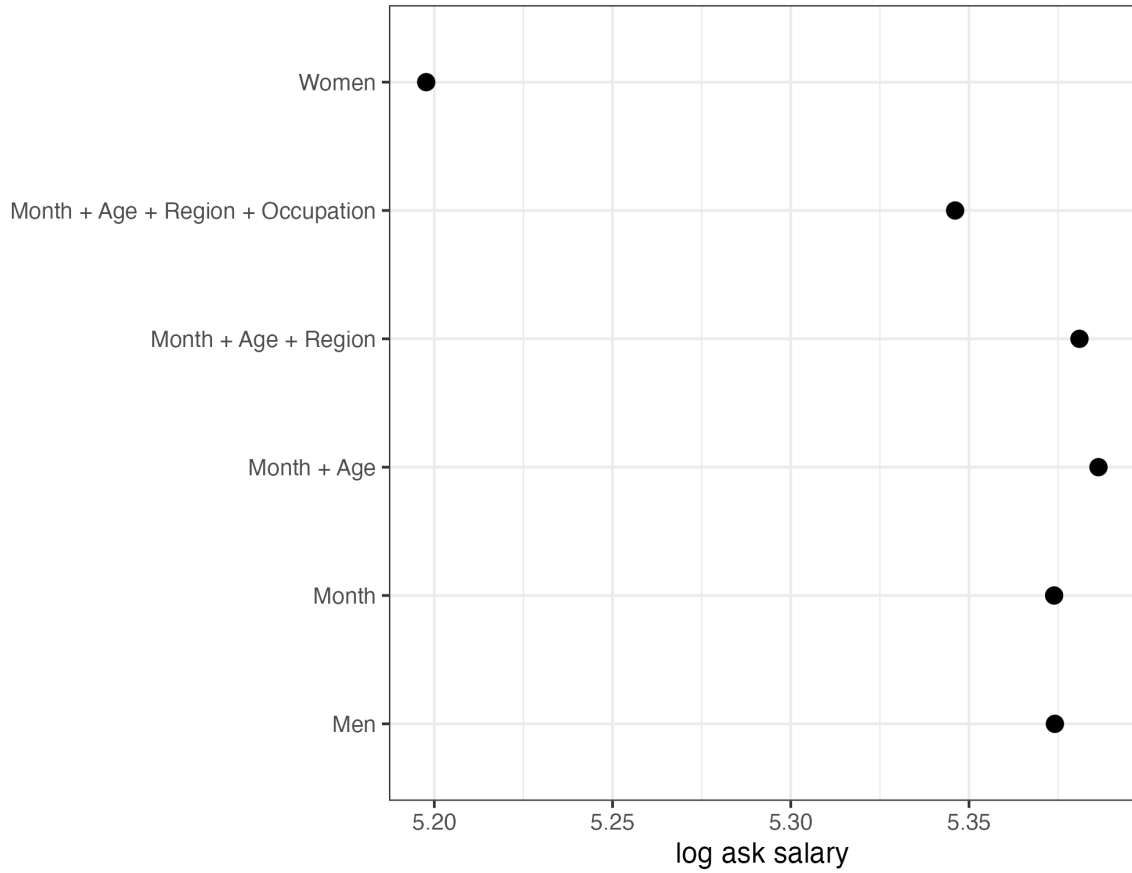


Figure 6: The results of Generalized KOB-Duncan method

Notes: This figure shows the results of the generalized KOB-Duncan method. Specifically, we estimate Eq. (1) using the generalized KOB-Duncan method. In the analysis, we utilize only the subsamples that meet the positivity assumption criteria by excluding subgroups with a male ratio exceeding 99.9%. Decomposition analyses are thus carried out by aligning the distribution of men with that of women.

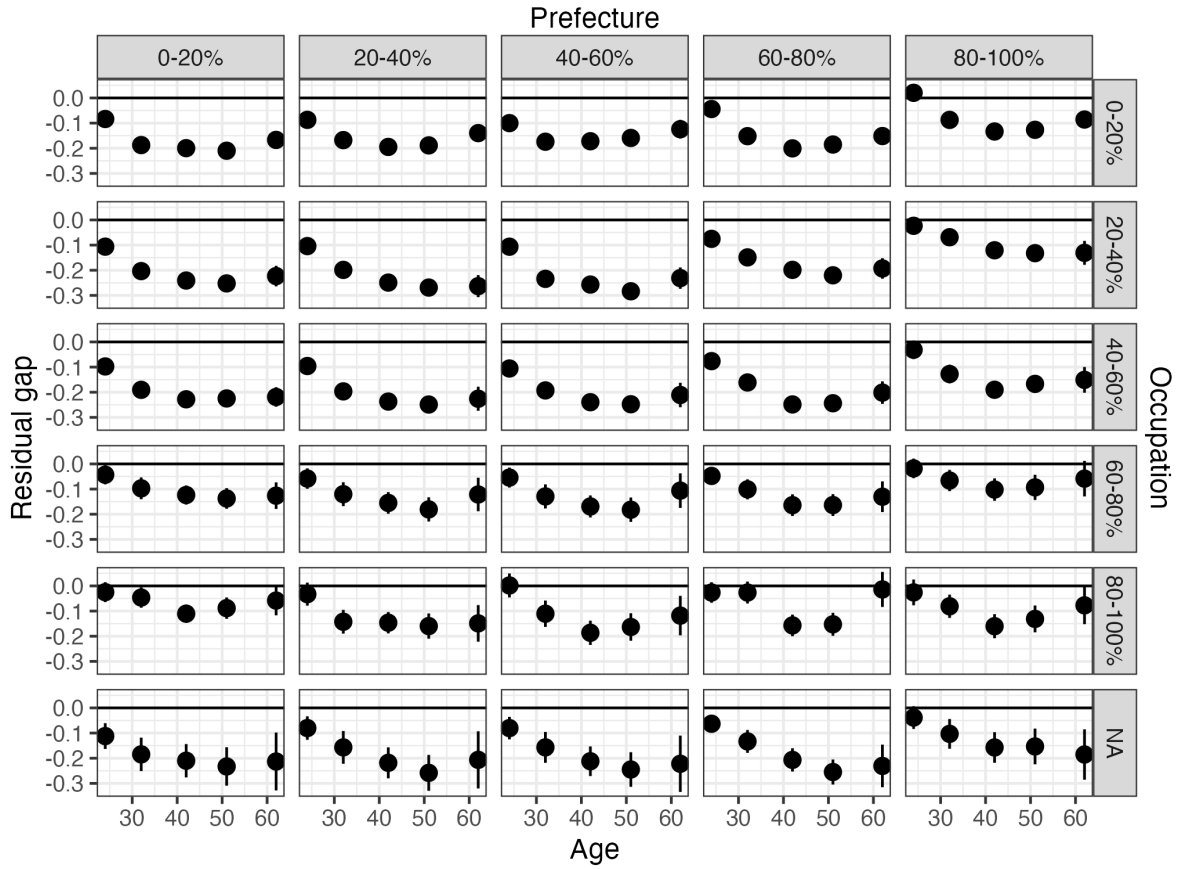


Figure 7: Conditional average treatment effect

Notes: This figure shows the coefficients of the ask gap in salaries between men and women for each subgroup presented in Section 3. However, it is notable that we control for age, desired region, and desired occupation in a nonparametric way.

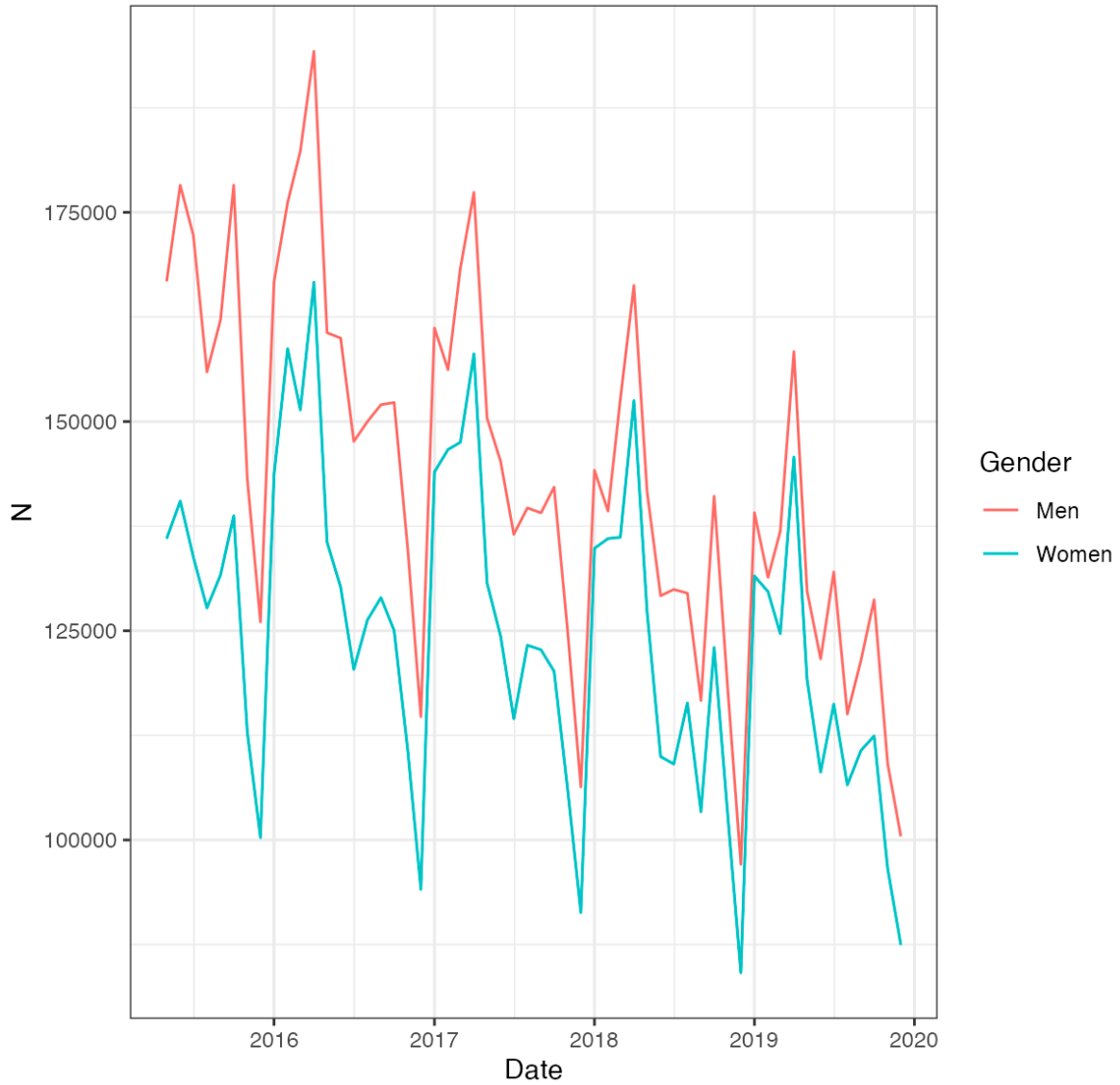


Figure 8: Number of job seekers in five years

Notes: This figure shows the number of new job seekers by gender, with the vertical axis representing the number of new job seekers and the horizontal axis representing the corresponding year and month.

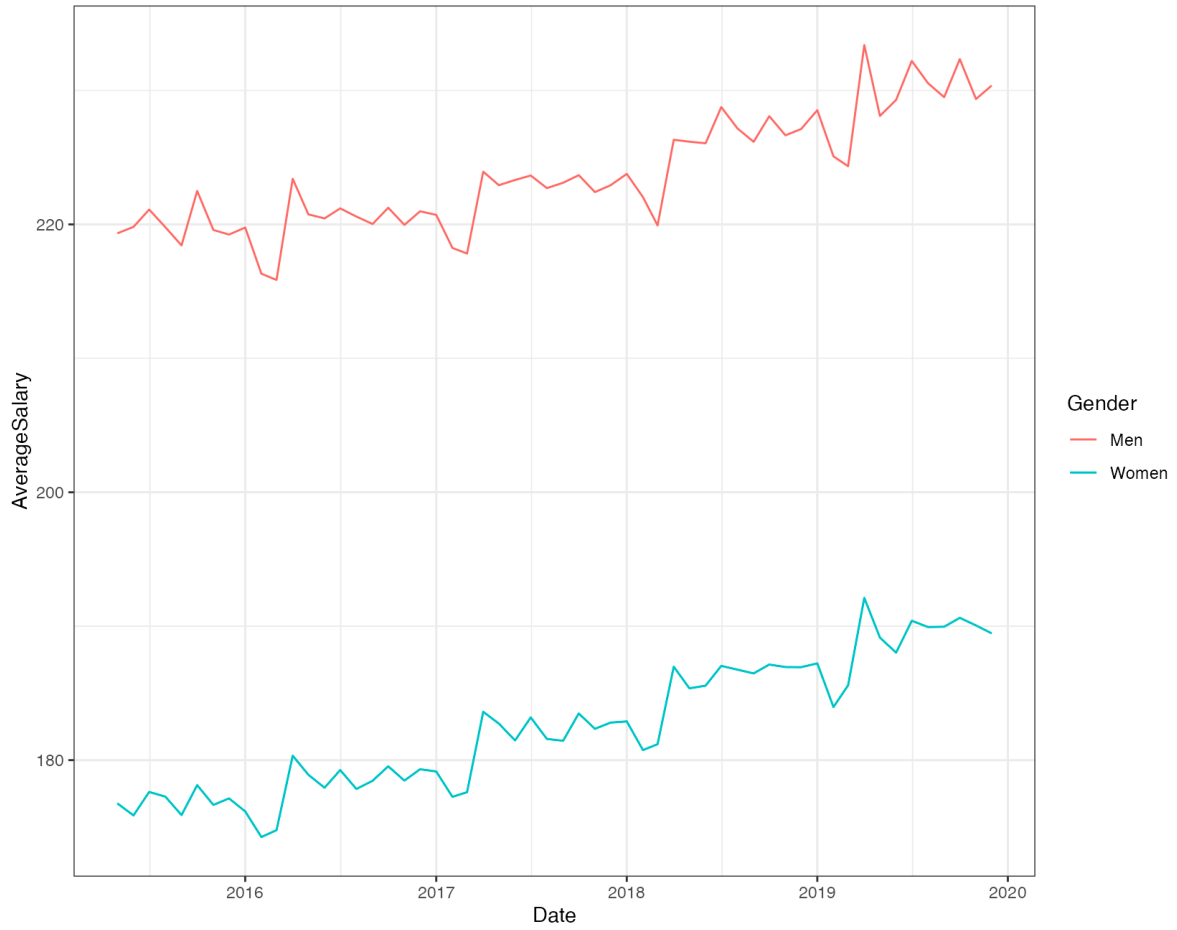


Figure 9: Trends of ask salaries in five years

Notes: In this figure, the vertical axis represents the average monthly ask salaries, and the horizontal axis represents the corresponding year and month.



Figure 10: Trends of job seekers' age in five years

Notes: This figure illustrates the average age of job seekers by gender on the vertical axis against the corresponding year on the horizontal axis.

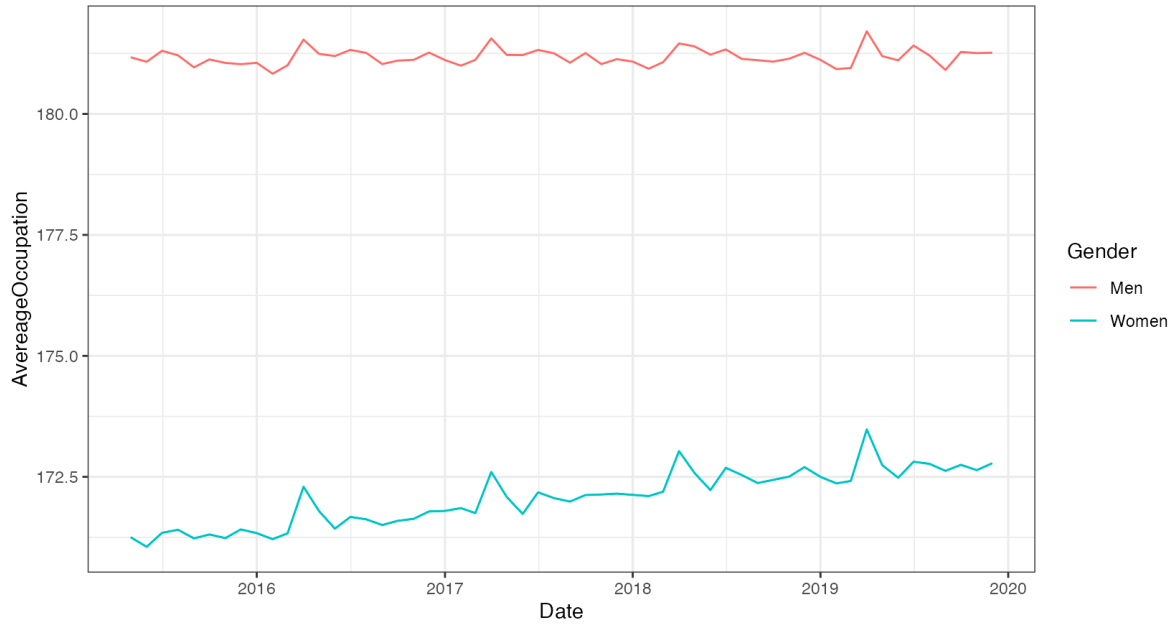


Figure 11: Trends of job seekers' desired occupation in five years

Notes: This figure displays the average offered wage for the job seekers' desired occupations by gender on the vertical axis, with the corresponding year and month shown on the horizontal axis. The average offered wage presented here is calculated solely using data from the initial dataset (May 2015).

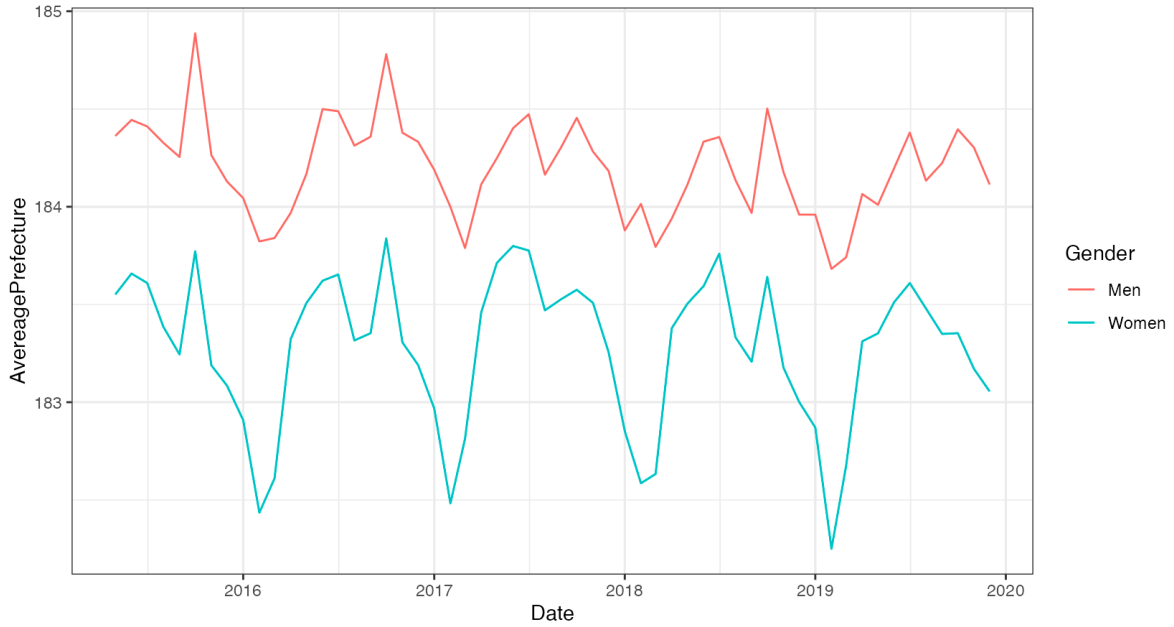


Figure 12: Trends of job seekers' desired region in five years

Notes: This figure shows the average offered wage in the job seeker's desired region to work (prefecture) by gender on the vertical axis and the corresponding year and month on the horizontal axis. The average offered wage here is calculated using only data from the initial period (May 2015).

References

- Albrecht, James, Anders Björklund, and Susan Vroman. 2003. "Is There a Glass Ceiling in Sweden?" *Journal of Labor Economics* 21 (1): 145–77.
- Arulampalam, Wiji, Alison L Booth, and Mark L Bryan. 2007. "Is There a Glass Ceiling over Europe? Exploring the Gender Pay Gap Across the Wage Distribution." *Ilr Review* 60 (2): 163–86.
- Babcock, Linda, and Sara Laschever. 2003. *Women Don't Ask: Negotiation and the Gender Divide*. Princeton University Press.
- Bertrand, Marianne, Claudia Goldin, and Lawrence F Katz. 2010. "Dynamics of the Gender Gap for Young Professionals in the Financial and Corporate Sectors." *American Economic Journal: Applied Economics* 2 (3): 228–55.
- Blau, Francine D, and Lawrence M Kahn. 1997. "Swimming Upstream: Trends in the Gender Wage Differential in the 1980s." *Journal of Labor Economics* 15 (1, Part 1): 1–42.
- . 2013. "Female Labor Supply: Why Is the United States Falling Behind?" *American Economic Review* 103 (3): 251–56.
- . 2017. "The Gender Wage Gap: Extent, Trends, and Explanations." *Journal of Economic Literature* 55 (3): 789–865.
- Boelmann, Barbara, Anna Raute, and Uta Schonberg. 2021. "Wind of Change? Cultural Determinants of Maternal Labor Supply."
- Booth, Alison, and Patrick Nolen. 2012. "Choosing to Compete: How Different Are Girls and Boys?" *Journal of Economic Behavior & Organization* 81 (2): 542–55.
- Card, David, Ana Rute Cardoso, and Patrick Kline. 2016. "Bargaining, Sorting, and the Gender Wage Gap: Quantifying the Impact of Firms on the Relative Pay of Women." *The Quarterly Journal of Economics* 131 (2): 633–86.
- Chiang, Hui-Yu, and Fumio Ohtake. 2014. "Performance-Pay and the Gender Wage Gap in Japan." *Journal of the Japanese and International Economies* 34: 71–88.
- Christofides, Louis N, Alexandros Polycarpou, and Konstantinos Vrachimis. 2013. "Gender Wage Gaps, 'sticky Floors' and 'Glass Ceilings' in Europe." *Labour Economics* 21: 86–102.
- Clark, Andrew E, and Conchita d'Ambrosio. 2015. "Attitudes to Income Inequality: Experimental and Survey Evidence." In *Handbook of Income Distribution*, 2:1147–1208. Elsevier.
- Clark, Andrew E, Paul Frijters, and Michael A Shields. 2008. "Relative Income, Happiness, and Utility: An Explanation for the Easterlin Paradox and Other Puzzles." *Journal of Economic Literature* 46 (1): 95–144.
- Cooke, Thomas J, Paul Boyle, Kenneth Couch, and Peteke Feijten. 2009. "A Longitudinal Analysis of Family Migration and the Gender Gap in Earnings in the United States and Great Britain." *Demography* 46 (1): 147–67.
- Cortés, Patricia, Jessica Pan, Laura Pilossoph, Ernesto Reuben, and Basit Zafar. 2023. "Gender Differences in Job Search and the Earnings Gap: Evidence from the Field and Lab." *The Quarterly Journal of Economics* 138 (4): 2069–2126.
- Croson, Rachel, and Uri Gneezy. 2009. "Gender Differences in Preferences." *Journal of Economic Literature* 47 (2): 448–74.

- Daniel, Fernández-Kranz, Aitor Lacuesta, and Núria Rodríguez-Planas. 2013. “The Motherhood Earnings Dip: Evidence from Administrative Records.” *Journal of Human Resources* 48 (1): 169–97.
- De la Rica, Sara, Juan J Dolado, and Vanesa Llorens. 2008. “Ceilings or Floors? Gender Wage Gaps by Education in Spain.” *Journal of Population Economics* 21: 751–76.
- Dittrich, Marcus, Andreas Knabe, and Kristina Leipold. 2014. “Gender Differences in Experimental Wage Negotiations.” *Economic Inquiry* 52 (2): 862–73.
- England, Paula, Andrew Levine, and Emma Mishel. 2020. “Progress Toward Gender Equality in the United States Has Slowed or Stalled.” *Proceedings of the National Academy of Sciences* 117 (13): 6990–97.
- Exley, Christine L, and Judd B Kessler. 2022. “The Gender Gap in Self-Promotion.” *The Quarterly Journal of Economics* 137 (3): 1345–81.
- Fehr, Ernst, Lorenz Goette, and Christian Zehnder. 2009. “A Behavioral Account of the Labor Market: The Role of Fairness Concerns.” *Annu. Rev. Econ.* 1 (1): 355–84.
- Fernández, Raquel, Alessandra Fogli, and Claudia Olivetti. 2004. “Mothers and Sons: Preference Formation and Female Labor Force Dynamics.” *The Quarterly Journal of Economics* 119 (4): 1249–99.
- Flory, Jeffrey A, Andreas Leibbrandt, and John A List. 2015. “Do Competitive Workplaces Deter Female Workers? A Large-Scale Natural Field Experiment on Job Entry Decisions.” *The Review of Economic Studies* 82 (1): 122–55.
- Fortin, Nicole M. 2005. “Gender Role Attitudes and the Labour-Market Outcomes of Women Across OECD Countries.” *Oxford Review of Economic Policy* 21 (3): 416–38.
- Gneezy, Uri, Kenneth L Leonard, and John A List. 2009. “Gender Differences in Competition: Evidence from a Matrilineal and a Patriarchal Society.” *Econometrica* 77 (5): 1637–64.
- Godechot, Olivier, and Claudia Senik. 2015. “Wage Comparisons in and Out of the Firm. Evidence from a Matched Employer–Employee French Database.” *Journal of Economic Behavior & Organization* 117: 395–410.
- Goldin, Claudia. 2014. “A Grand Gender Convergence: Its Last Chapter.” *American Economic Review* 104 (4): 1091–1119.
- Goldin, Claudia, and Joshua Mitchell. 2017. “The New Life Cycle of Women’s Employment: Disappearing Humps, Sagging Middles, Expanding Tops.” *Journal of Economic Perspectives* 31 (1): 161–82.
- Große, Niels Daniel, and Gerhard Riener. 2010. “Explaining Gender Differences in Competitiveness: Gender-Task Stereotypes.” Jena Economic Research Papers.
- Günther, Christina, Neslihan Arslan Ekinici, Christiane Schwieren, and Martin Strobel. 2010. “Women Can’t Jump?—an Experiment on Competitive Attitudes and Stereotype Threat.” *Journal of Economic Behavior & Organization* 75 (3): 395–401.
- Hahn, Jinyong. 1998. “On the Role of the Propensity Score in Efficient Semiparametric Estimation of Average Treatment Effects.” *Econometrica*, 315–31.
- Hall, Robert E, and Alan B Krueger. 2012. “Evidence on the Incidence of Wage Posting, Wage Bargaining, and on-the-Job Search.” *American Economic Journal: Macroeconomics* 4 (4): 56–67.
- Hara, Hiromi. 2018. “The Gender Wage Gap Across the Wage Distribution in Japan: Within-

- and Between-Establishment Effects.” *Labour Economics* 53: 213–29.
- Hines, Oliver, Oliver Dukes, Karla Diaz-Ordaz, and Stijn Vansteelandt. 2022. “Demystifying Statistical Learning Based on Efficient Influence Functions.” *The American Statistician* 76 (3): 292–304.
- Johannemann, Jonathan, Vitor Hadad, Susan Athey, and Stefan Wager. 2019. “Sufficient Representations for Categorical Variables.” *arXiv Preprint arXiv:1908.09874*.
- Kawaguchi, Akira. 2015. “Internal Labor Markets and Gender Inequality: Evidence from Japanese Micro Data, 1990–2009.” *Journal of the Japanese and International Economies* 38: 193–213.
- Kawaguchi, Daiji, and Yuko Mori. 2009. “Is Minimum Wage an Effective Anti-Poverty Policy in Japan?” *Pacific Economic Review* 14 (4): 532–54.
- Killingsworth, Mark R, and James J Heckman. 1986. “Female Labor Supply: A Survey.” *Handbook of Labor Economics* 1: 103–204.
- Kleven, Henrik, Camille Landais, and Jakob Egholt Sogaard. 2019. “Children and Gender Inequality: Evidence from Denmark.” *American Economic Journal: Applied Economics* 11 (4): 181–209.
- Leibbrandt, Andreas, and John A List. 2015. “Do Women Avoid Salary Negotiations? Evidence from a Large-Scale Natural Field Experiment.” *Management Science* 61 (9): 2016–24.
- Loprest, Pamela J. 1992. “Gender Differences in Wage Growth and Job Mobility.” *The American Economic Review* 82 (2): 526–32.
- Manning, Alan. 2003. “The Real Thin Theory: Monopsony in Modern Labour Markets.” *Labour Economics* 10 (2): 105–31.
- . 2011. “Imperfect Competition in the Labor Market.” In *Handbook of Labor Economics*, 4:973–1041. Elsevier.
- Marianne, Bertrand. 2011. “New Perspectives on Gender.” In *Handbook of Labor Economics*, 4:1543–90. Elsevier.
- Nicodemo, Catia. 2009. “Gender Pay Gap and Quantile Regression in European Families.”
- Niederle, Muriel, and Lise Vesterlund. 2007. “Do Women Shy Away from Competition? Do Men Compete Too Much?” *The Quarterly Journal of Economics* 122 (3): 1067–1101.
- Noy, Shakked, and Isabelle Sin. 2021. “The Effects of Neighbourhood and Workplace Income Comparisons on Subjective Wellbeing.” *Journal of Economic Behavior & Organization* 185: 918–45.
- OECD. 2018. “Starting Close, Growing Apart: Why the Gender Gap in Labour Income Widens over the Working Life.” In *OECD Employment Outlook 2018: https://www.oecd-ilibrary.org/content/component/empl_outlook-2018-10-en*.
- . 2019. “LMF1.4: Employment Profiles over the Life-Course.” In *OECD Employment Database: <https://www.oecd.org/Els/Family/Database.htm>*.
- Olivetti, Claudia, and Barbara Petrongolo. 2008. “Unequal Pay or Unequal Employment? A Cross-Country Analysis of Gender Gaps.” *Journal of Labor Economics* 26 (4): 621–54.
- Roussille, Nina. 2024. “The Role of the Ask Gap in Gender Pay Inequality.” *The Quarterly Journal of Economics*, qjae004.
- Semenova, Vira, and Victor Chernozhukov. 2021. “Debiased Machine Learning of Conditional Average Treatment Effects and Other Causal Functions.” *The Econometrics Journal* 24 (2):

264–89.

Shurchkov, Olga. 2012. “Under Pressure: Gender Differences in Output Quality and Quantity Under Competition and Time Constraints.” *Journal of the European Economic Association* 10 (5): 1189–1213.

Webber, Douglas A. 2016. “Firm-Level Monopsony and the Gender Pay Gap.” *Industrial Relations: A Journal of Economy and Society* 55 (2): 323–45.

Yamaguchi, Kazuo. 2016. “Determinants of the Gender Gap in the Proportion of Managers Among White-Collar Regular Workers in Japan.” *Japan Labor Review* 13 (3): 7–31.