Did Working with Women Change the Workplace? Evidence from Wartime Tokyo *

Keitaro Ninomiya,† Yuya Aikawa,‡ Yoko Okuyama,§ and Yoko Yamasaki ¶

Abstract

This paper studies how wartime exposure to female coworkers shaped the long-run integration of women in the Tokyo civil service. We assemble a new personnel panel covering more than 330,000 public servants over 35 years and link wartime assignments to postwar workplace composition and careers. Identification exploits office-level shocks from military conscription: when men were drafted, managers reshuffled staff and hired replacements, creating plausibly exogenous variation in contact with women. We find that offices led by managers with greater wartime exposure were more likely to hire and retain women after restrictions were lifted, and that exposure increased the likelihood that veterans later worked with women. These effects persist, suggesting that temporary disruptions can change workplace norms and accelerate organizational diversification.

Keywords: Female representation, Long-term effects, Personnel economics

JEL Codes: J71, M51, M54, N45

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†University of Illinois at Urbana Champaign, Email: keitaro2@illinois.edu

‡Doshisha University, Email: yuaikawa@mail.doshisha.ac.jp

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1 Introduction

Organizational responses to policies promoting women vary across workplaces. These responses come not only from leaders but also from employees at different ranks. Men's prior experience working with women shapes how they accommodate female hires and how much influence they exert over hiring and promotion. As a result, the existing hierarchy and attitudes inside an office largely determine whether diversification succeeds.

We study the rapid integration of women into the Tokyo civil service by asking whether postwar entry was concentrated in offices where male incumbents had greater wartime exposure to female coworkers. During World War II, the civil service hired many women to fill posts vacated by men who left for wartime industry or were drafted, while managerial positions remained closed because women were barred from the national exam for elite civil servants. After the war, the ban was lifted and policy expanded women's employment, but diversification and the retention of women in managerial roles varied widely across departments, positions, and workplaces.

We study how men's wartime exposure to female coworkers shaped postwar integration of women after hiring restrictions were lifted, and whether these effects persisted in diversifying the Tokyo civil service. We assemble a new personnel record covering the universe of public servants over 50 years, with prewar, wartime, and postwar assignments, occupations, wages, and other biographical details. These data let us measure each man's wartime coworker exposure to women and link it to his subsequent assignments and the gender composition of those workplaces. For identification, we exploit exposure induced by conscription shocks: when men were drafted, managers rapidly reshuffled staff and hired replacements, creating plausibly exogenous variation in contact with women. We then test whether men with greater exposure—especially those with more hiring discretion—later facilitated the integration and retention of women, and whether these women helped open pathways for future cohorts.

We provide three sets of results. First, offices that hired more women were more likely to be led by managers who had greater wartime exposure to female coworkers. A 10 percentage point increase in a manager's wartime exposure is associated with nearly a 7 percent higher likelihood

of working with any women in the postwar period, corresponding to about 0.2 additional women. Second, exposure to women causally increased the likelihood that wartime veterans worked with women after the war. A 10 percentage point increase in a veteran's wartime exposure raised the number of women he later worked with by about 0.5, with larger effects for veterans who held non-managerial positions in the postwar period. Third, we find [long-term impacts].

To examine office-level adjustments in workforce composition, we construct a novel panel of personnel records on public servants in Tokyo spanning four decades.[1] The dataset contains rich biographical information on employees, including their occupations, positions, and wartime drafting experiences.

We interpret our findings as evidence that the conscription of male workers during the war changed the gender composition of affected workplaces, primarily through the relocation of existing staff around the vacated positions. Since conscription targeted workers regardless of their rank or status in the civil service, we infer that when a key individual was drafted, their position was typically filled either by male hires with relevant experience or by transfers from nearby offices. Nevertheless, conscription generated a statistically significant shift in gender composition across employees.

Our second result suggests that the disruption caused by conscription led the coworkers of drafted employees to work in more gender-balanced offices later in their careers. Several mechanisms could explain this pattern. Greater exposure to women during the war may have reduced bias and increased men's willingness to work alongside female colleagues—particularly in roles with hiring discretion. Alternatively, affected workers may have been reassigned to offices with higher female representation because they were perceived as more accommodating toward women.

Our findings contribute to the economic history literature examining the effects of the World Wars on gender balance in the postwar economy. Recent work by Aneja et al. (2024) and Bianchi

[1] The data spans over the pre-war period (from 1928) to post periods (1958).

and Giorcelli (2022) documents how the wartime experiences of male employees continued to shape their labor market outcomes after the war. Our paper is the first to provide evidence of such persistence in wartime experiences within an organization. Previous research, including Acemoglu et al. (2004), Goldin and Olivetti (2013), and Doepke et al. (2015), shows that regions with higher male casualties during the Second World War subsequently absorbed more women into their labor markets.[2] We find that this persistence also holds when the analysis is decomposed to the smallest peer unit—the office level. However, our current analysis cannot fully disentangle the mechanisms behind this persistence: workplace diversification may have resulted either from the preferences and behaviors of affected workers or from management decisions to reassign them to more gender-diverse environments.

Our paper also contributes to the literature estimating the replacement costs of workers following sudden employee exits (Jäger et al. (2025)). A large body of research examines the costs employers face in replacing lost labor (Ordway (1919), Oi (1962), Alan (2011)). We extend this work by emphasizing how replacement costs depend on the internal composition of the workplace—particularly the distribution of positions across employees relative to exiting worker. Moreover, unlike traditional analyses based on private firms, we study a public sector organization characterized by rigid promotion structures and capped wages.

Our paper also contributes to the literature on how peers shape workers' future career trajectories. Recent studies such as Minni (2025) and Cullen and Perez-Truglia (2023) show that assignment to high-performing managers or peers can significantly influence subordinates' career outcomes[3]. We extend this literature by providing evidence on the long-term effects of working with managers who differ exogenously in their prior experience with female colleagues and examining the lasting implications of such exposure.

Section 2 provides background on the Tokyo civil service and their personnel policies, as well as the drafting rules during World War II. Section 3 describes the data sources and the digitization process. Section 4 discusses the empirical model, Section 5 reports the results, and Section 6

[2]Related literature finds evidence of persisting shifts in labor market composition for blacks (Ferrara (2022)).

[3]Arai and Nakazawa (2025) discuss the effect of peer effects in the context of civil servants in Japan.

concludes.

2 Background

2.1 Institutional Details of Tokyo Civil Service

The Tokyo public service, comprising the *Tokyo-Fu* and *Tokyo-Shi*, managed public good provision across geographically distinct areas of Tokyo. Although these bodies operated over separate regions, their main offices were centrally located in downtown Tokyo (Figure 1).

In 1944, under intensifying war pressures and facing repeated military defeats, the central government mandated the amalgamation of *Tokyo-Fu* and *Tokyo-Shi* into a single entity, named *Tokyo-To*, through a federal bill. This merger, driven by operational inefficiencies and resource allocation challenges during the war, resulted in significant layoffs, particularly affecting *Tokyo-Shi* employees.

Tokyo-To employed approximately 15,000 highly educated staff, with 30 percent hired through national exams and the remainder locally. The organizational structure was hierarchical, dividing departments based on the public services provided, with some departments split into as many as four layers. Employees were assigned an occupation, such as engineers, managers, clerks, or assistants, along with a classification reflecting their professional expertise and experience. These assignments were determined upon entry into the organization, although transitions across occupations occasionally occurred. The recruitment process for non-assistant employees was merit-based, relying on competitive examinations and internal assessments. Within the civil service, workers were further categorized into upper and lower classes, with managers representing the upper class and clerks or engineers forming the lower class. Leadership positions, such as department heads, were typically filled by personnel recruited from the central government. For many employees, the typical career path involved progressing step by step up the job ladder, with clerks serving as the standard entry point for civil servants aiming to advance. However, the level of competition for promotions among employees was likely influenced by the conscription of a significant portion of

the workforce into military service, which temporarily reduced the pool of available candidates. This shift may have also led to substantial changes in both the promotion process and the speed of advancement for positions such as clerks and managerial staff. In fact, many staff members were conscripted as soldiers, resulting in a severe manpower shortage for managing wartime administration (Tokyo Metropolitan Government 2013).

2.2 Drafting Process of the Japanese Military Service

The Japanese military assembled its forces by calling active service troops and reservists, a process pivotal to our study's analysis of workforce dynamics during and post-conflict periods. The conscription system was designed to ensure a steady supply of personnel by mandating physical examinations for all eligible men upon reaching the age of 20, with those meeting the criteria randomly selected for service.

The drafting process, as outlined in Figure 3, was structured into several stages to efficiently classify conscripts based on their physical capabilities and the military's operational needs. Initially, all eligible men underwent a physical examination to determine their fitness for active duty. Those deemed fit were assigned to active service, where they served as soldiers for a fixed period. Upon completing active duty, these individuals transitioned to the reservist category, ensuring they remained available for military recall during national emergencies. For individuals who did not meet the physical standards for active duty, an alternative route, termed replacement service, was established. These men received training but were not immediately deployed, instead forming a reserve pool for supplementary support when required. Additionally, a subset of candidates was fully exempted from military obligations due to severe health conditions or other qualifying factors.

As the war intensified, particularly in the wake of Japan's challenges during the Second Sino-Japanese War (1937–1945), the drafting system underwent significant modifications to address the military's increasing personnel demands. In 1943, reserve obligations were extended: the period of reserve service following active duty increased from 5–6 years to 15 years, and the secondary reserve period was prolonged until the age of 45. These changes ensured that the military could

rely on a broader pool of trained personnel over an extended timeframe, providing critical support for wartime operations.

2.3 The Impact of the War on Tokyo-To

The war significantly altered the workforce composition within *Tokyo-To*, particularly affecting female participation rates and the distribution of staff across various offices. The conscription system, which required eligible men to serve in the military, had profound implications for public institutions, especially in urban centers like Tokyo. Male workers in administrative, engineering, and clerical roles were not exempt from military obligations, leading to their systematic removal from public service positions as they were drafted into active or reserve duty. This mass conscription created substantial disruptions in the operations of public offices and left critical gaps in the workforce that urgently needed to be addressed.

During the war period, the entry of female workers also became a notable feature of *Tokyo-To's* workforce. Before the war, female employees were largely concentrated in specific departments and were almost absent from the core administrative divisions of the metropolitan government. Their roles were typically limited to auxiliary or supporting tasks, reflecting the gendered labor practices of the time. However, the rapid expansion of labor demand driven by conscription accelerated the entry of women into the workforce. Units were generally structured to include a manager, clerks or engineers, and assistants. Female workers were primarily hired as assistants to support unit leaders in their tasks, often in offices with a lower concentration of engineers. Their continuation and promotion within the organization depended heavily on the approval of their respective unit managers, with their relationships with male incumbents—such as direct subordinates to unit managers or co-workers to clerks and engineers—playing a significant role. In addition to conscription, the demands of wartime administration likely necessitated an increase in the number of staff employed by *Tokyo-To*. The rising responsibilities of the metropolitan government during the war made it essential to expand its workforce. Historical evidence suggest that both the city and the prefecture increased the number of employees and departments during this period (Tokyo

Metropolitan Government 2013).

To compensate for the depletion of male workers, *Tokyo-To* rapidly increased the recruitment of women, who were not subject to military service. Women entered the public workforce in unprecedented numbers, particularly in assistant roles, as highlighted in Figure 5. Panel (a) illustrates the sharp increase in the population of female public civil servants during the World War II (WWII) period, marked by the shaded red area. The count of female employees rose significantly between 1938 and 1944, reflecting a direct response to the conscription of men. However, this trend reversed immediately after the war as male workers returned to their civilian roles, leading to a sharp decline in the number of female public civil servants.

Panel (b) of Figure 5 provides further insight by examining the share of women in the public sector workforce during the same period. The proportion of female public civil servants also increased markedly during WWII, albeit remaining relatively small compared to the overall workforce. The rise in this share highlights not only the increasing reliance on women but also the gendered constraints of wartime employment policies, which often relegated women to lower-ranking and temporary roles within the organizational hierarchy. This unequal distribution persisted even after the war, as men resumed their pre-war positions, and women were often pushed out of public service.

Table 1 shows the difference between offices in 1936 with and without employees that were drafted 2 years later. We find a statistically significant different between the share of female workers between offices categories. Workers in future drafted offices were more likely to be occupied with male. Since the Japanese military service only conscripted males, the difference in gender balance between offices validates the drafting pattern. The two office categories matches each other with respect to its share of new workers and share of higher-ranked workers. We fail to reject similarities between the at least at the 15th confidence level. Drafted and non-drafted employees worked in offices with nearly half of their peers hired at most 4 years before. Also they did not differ in the share of higher-class public servants that they reported to.

3 Data

Our primary data set comes from a historical archive of directory of staff of the Tokyo public servants. The archives include information about the name of the employee, their positions, and their home address. We infer the gender of the staff by using an algorithm trained on historical Japanese names. The personnel record covers from 1928 to 1958.

The directory of staff was published annually with a full list of their employees. The two co-governing institutions (*Tokyo-Shi* and *Tokyo-Fu*) both published separately until the merger of the two institutions in 1943. The Tokyo-Fu directory contains a list of the employees that was drafted into the war. Since we observe the positions of all the employees in a institution, we identify the drafted individual and their surrounding co-workers in a directory.

Our secondary data is the biographical directory of staff at 1942. The biography lists detailed information about higher ranked employees. It includes (1) Date of birth, (2) Prefecture of origin, (3) Education attainment (name of graduating institution) (4) Starting date of entering the public servant system, (5) hobbies, and (6) Physical address. However, the directory was not published annually like the directories, but only published in some years. Also only the Tokyo-Shi and Tokyo-To published biographical directories of their employees. In addition the biographical directory only reports the details for employees at least in positions higher than a clerk.

We develop an algorithm that integrates multiple neural networks and computer vision technologies to detect complex layout structures in archival records and extract categorized text data. Given that most modern optical character recognition (OCR) systems are primarily trained on the English language, we utilize a neural network-based OCR developed by the National Diet Library in Japan. This OCR is adept at identifying texts within a document page, which we further analyze using named entity recognition technology to categorize information based on content and layout. We apply this algorithm to a series of historical documents to augment the biographical details of employees. This process generates a comprehensive panel data set of public sector employees in historic Tokyo, detailing their internal assignments by occupation and rank, along with biographic details for a subset of these employees.

Our OCR works better for the recent years than the older years. Since the calligraphy of Japanese letters changed after the war, a modern OCR fails to accurately identify the letters in the directory. Eventhough we use the NDL OCR, which is trained on historical Japanese letters, due to the resolution of the scanned images, the OCR sometimes fail to identify the content. However, we di recover approximately 70% of employees in the historic era, and almost everyone for those in the more modern era (Figure 7).

We predict the gender of the employee by using an external named entity recognition algorithm that predicts the gender of the name. In contrast to Western names, Japanese names tend to reveal the gender of the employee easily. We measure the size and share of female workers of each office unit by aggregating over the pool of employees belonging to a given group. We measure the length of tenure for each employee that we identify in the directory by searching for the first and last year of the directory that we identify their name. Consequently, if an employee is missing in a directory between two directories in which the employee is detected, we treat the employee to be hired in the missing directory. We also infer the location of the office that an employee commuted to by referring to the name of the office unit.

The digitization of the historical archival documents leaves us with a sample of 333,000 observations across 35 years. The data identifies 126,372 unique names and 15,406 female names.

4 Empirical Model

4.1 First-stage: Draft-induced hiring

Before turning to the main IV specification, we document that military drafting led to hiring at the position and office level. Because the number of new hires is a count outcome, we estimate Poisson models with fixed effects. Let $Y_{j,p,t}$ denote the number of new hires (or new female hires) in position p within office j in year t. The conditional expectation is

$$\mathbb{E}[Y_{j,p,t} \mid X] = \exp\left(\beta_1 D_{j,p,t} + \beta_2 \log(M_{j,p,t}+1) + \gamma_j + \delta_p + \lambda_t\right), \tag{1}$$

where $D_{j,p,t}$ is the number of male workers drafted from that position (or, for spillover specifications, from neighboring positions within the same kakari or ka), $M_{j,p,t}$ is the cumulative male stock (baseline), and γ_j, δ_p, and λ_t are office, position, and year fixed effects. The coefficient β_1 is a semi-elasticity: a one-unit increase in drafts is associated with a $100 \times \beta_1\%$ change in expected hires. We also estimate spillover effects by defining neighboring drafts as (a) drafts in other positions within the same kakari (subsection) but different occupation (engineer, non-engineer, yato), and (b) drafts in positions of the same occupation within the same ka (section). Finally, we allow the immediate draft effect to vary by whether the position is engineer-type or not.

4.2 OLS approach

I estimate the following OLS model.

$$Y_{i,j,p,t} = X_{i,j,p}\beta + \iota_{i,j} + \mu_{i,p} + \lambda_t + \epsilon_{i,j,p,t} \tag{2}$$

$Y_{i,j,p,t}$ is the share of female employees measure of employee i at time $t+k$. $X_{i,j,p,t}$ is the share of drafted workers in office j of position p at time t. $\iota_{i,j}$ and $\mu_{i,p}$ denotes the position and occupation fixed effects for the employee during the war period. λ_t denotes the time fixed effect.

We control for occupation and office fixed effects to avoid confounding the results with different female entry patterns across different departments in the Tokyo-public sector. As discussed in the background section, the entry of female workers happened only in occupations that was occupied by lower tier public servants. By controlling for the occupations and their affiliated departments through the fixed effects, we avoid confounding the results with correlation of female exposure and positional attributes.

4.3 Instrumental variable approach

We estimate the causal effect of office diversification on future outcomes using a instrumental variable strategy.

$$Y_{i,j,p,t} = X_{i,j,p}\beta + \iota_j + \mu_p + \lambda_t + \epsilon_{i,j,p,t} \tag{3}$$

$$X_{i,j,p} = Z_{i,j,p}\delta + \iota_j + \mu_p + \lambda_t + \varsigma_{i,j,p,t} \tag{4}$$

$Z_{i,j,t}$ is the share of employees drafted at t. We define $X_{i,j,p,t}$ and $Z_{i,j,p,t}$ as the mean share of female and drafted workers in an office during the war period.

The identification accures from the cross-sectional variation across workers with different war-time experienced from the war. We are comparing workers in an office with any of their fellow employees getting drafted against those without any disruptions in the workplace and compare their future outcomes.

The interpretation of the IV estimate differs from the OLS estimate. Firstly the estimate avoids committed variable bias and recovers the direct causal impact of working with more women on future career trajectories. However, the IV only recovers estimates for sample with a high probability of getting drafted in the military force. As we covered in the background section, government officials were exempt from drafting and only lower-tier workers who occupied positions as clerk with part-time contracts were non-exempt. Therefore, the IV estimate only recovers the LATE for a subset of the population. Nevertheless the IV estimates do have a causal interpretation, so that the signs of the OLS estimates could be interpreted with more confidence.

The IV estimator will only be estimated through the employees with information on their peers drafting experience. As we discussed in the Data section, only the Tokyo-Fu directory contains the list of drafted employees and their peer in their position and office. However, even after removing the Tokyo-Shi workers from the sample, we remain with approximately 9,000 unique employees from Tokyo-Fu that we can fully measure their peers composition through out the war period.

In addition, the higher exposure to women during the war may lead employees to leave the

workplace than others without exposure. This attrition in the data breaks the balanced-ness of the treated and controlled group based on the treatment status. Aneja, Farina, and Xu 2024 documents that the daughters of male workers exposed to more women during the war were more likely to participate in the labor market compared to their counterparts. Such intergenerational transfer of leniency towards womens' entry to the labor markets could also exists across household partners. The husband exposed to women may become more acceptive towards their partners to enter the labor force, which may also lead to the men to exit the labor force. To account for such scenarios, the estimates should be seen with more caution especially for samples at the end of the time span covered by the data set.

4.4 Over-identified 2SLS approach (In progress)

We also provide estimates of β through a over-identified 2SLS approach. Since we can measure the share of military drafted workers and their co-workers in 5 separated years, we can corroborate the estimated system of equations by adding additional instruments. Wooldridge (2010) provides the arguments that when 2SLS with many instruments is more efficient than the IV that aggregates the exogenous variation. We include separate instruments the each measure the share of drafted workers in each office and position pair. The number of instruments in such case would be more than the number of parameters estimated in the second stage regression equation.

$$
\begin{aligned}
Y_{i,j,p,t} &= \sum_{k \in T} X_{i,j,p,k}\beta + \iota_j + \mu_p + \lambda_t + \varepsilon_{i,j,p,t} \\
X_{i,j,p,k} &= \sum_{l \in T} Z_{i,j,p,l}\delta + \iota'_j + \mu'_p + \lambda'_t + \varsigma_{i,j,p,l} \\
T &\equiv \{1938, 1939, 1940, 1944\}
\end{aligned}
\tag{5}
$$

For the 2SLS to be more efficient than the the IV, the all the instruments needs have explanatory power on the regressor. We provide estimates

4.5 Discussion of Identification Strategy for IV and 2SLS

The identification strategy relies on the randomness of the drafting process, conditional on observable controls. We provide a historical background of the drafting procedure and present balanced test results that compare the drafted and non-drafted populations. The exogenous removal of employees from offices led to changes in office composition, thereby altering the working environment for remaining employees. This removal was orthogonal to the employees' unobserved attributes, strengthening our identification strategy. We attribute observed differences in future outcomes among employees to these draft-driven changes in co-working experiences, interpreting these as causal effects on office composition.

We provide balanced tables that highlights the randomness of the drafting process.

5 Results

5.1 Short term impacts of drafting

Table 4 reports Poisson and OLS estimates of draft-induced hiring at the position level. Columns 1 and 2 show that drafting in a position increased both total new hires and new female hires: one additional draft is associated with approximately 4–6% more expected new hires (semi-elasticities). The effect on female hires is larger in percentage terms (5.9%) than on total hires (4.3%), consistent with women being hired into newly created or vacated positions. Columns 4–6 document spillover effects: drafting in neighboring positions within the same kakari (across occupation) or the same ka (within occupation) also raised hiring, with coefficients around 0.8–0.9%. Column 7 shows heterogeneity by position type: the immediate draft effect is smaller for engineer positions than for non-engineers; the interaction term is negative and significant. The OLS specification in column 3 yields an insignificant coefficient for female hires, which is expected for count data where the Poisson model is better suited; we emphasize the Poisson results.

Table [] reports regression results on the share of women among new hires in offices with

drafted and undrafted offices. Impacted offices were 18% less likely to hire a woman to fill a vacant position than nonimpacted offices. We infer that vacancies due to drafting were more likely filled by male workers rather than female workers, since incumbent's limited experience with working with females dissuaded managers to fill the position with a female employee. This indicates offices with no drafted employees included more female workers among their new hires. The ongoing war over-burdened the Tokyo public sector and expanded their payroll to provide support to the overstrained city. We infer that women were assigned to such incremental positions and did not immediately substitute the positions traditionally held by male employees. Column 2 reports the results using the share of men drafted. The treatment effect coefficient does not change between the two different measures of the impact of the design. This indicates that male and female workers were not substitutable during the war. The number of women hired was driven by the share of drafted men rather than the share of the overall employee in an office. Columns 3 and 4 report the results with only position fixed effects or only division fixed effects. Both columns report coefficient estimates that are statistically significantly different in magnitude than the coefficient with two fixed effects. This suggests that positions and divisions/offices differed in their reactions toward hiring women to fill vacancies created by the drafted.

We provide evidence of draft-induced hiring in Table []. The affected offices increased the number of hires by roughly 20% more than the non-impacted offices. Additionally, we provide evidence that the share of men among employees drives the rehiring, rather than the the share of drafted employees on total number of employees (column 2). The estimates between the two share measures match each other. We strengthen our hypothesis that female and male workers were complements during the war. Lastly, the increments are similar across positions and offices. Column 3 and 4 reports estimates that exclude one of the two fixed effects, respectively. This removal changes the comparison of division-position pairs, addressing the concern that certain occupations-positions complemented their workers differently. We find similar treatment effects across both specifications and conclude that different offices and positions complemented their office size similarly to each other. However, as shown in Table [], the composition of the new hires

differed between offices and positions.

Table [] reports positive effects on the number of new female employees. Although the coefficient is insignificant across all specifications with different measures of drafted shares or fixed effect structures, drafted offices hired more female workers than non-impacted offices. Impacted offices filled their vacancies with new hires, which occasionally included women, although men filled the sudden vacancy more likely than women.

Table [] reports regression results on the number of new hires among the total number of workers in an office. The affected offices increased their share of new hires by 20% per unit of decrease in the share of drafted workers. Column 2 reports the results using the share of men drafted. The treatment effect coefficient does not change between the two different measures of the impact of the design.

5.2 Long term impacts of working with female entrants

We provide evidence that the experience of co-working during the war did not change the share of women among their future co-workers (Table []). The first stage column conveys that the military drafting created differences in share of female among new hires during the war. The F-stat of the first stage indicates that the drafting accounts for meaningful differences in workers' war-time labor force experience. However, the IV estimate does not indicate that there is a relationship between experience and gender composition in future assignment groups. The IV estimate reports a non-statistically significant negative effect on the share of women in the employees future assignments. In particular, the OLS estimate reports a positive effect, suggesting that employees who worked with more women during the war differed from others in attributes. Hence, the introduction of female workers into the Tokyo public sector did not mitigate the skewed gender composition through wartime experiences.

We also find that the effect is partly driven by differences in retention probabilities (Table 2). Employees from impacted offices have a lower probability of retaining a job in 1944 after the merger. The OLS and IV estimates suggest a negative effect on retention. The effect could be that

exposure to women caused the employee to leave the workplace by letting their partner participate in the labor market (Aneja, Farina, and Xu 2024). If the exit was correlated with leniency towards female workers, the OLS and IV estimates should be underbiased due to the truncation of treated workers who are more willing to work with women in their workplace.

6 Conclusion

This paper examines the long-term effects of gender diversification in the workplace, leveraging a unique historical shock: the mass conscription of male workers during World War II in Tokyo. Using a novel, detailed personnel dataset, we explore how the forced entry of women into public service roles during wartime influenced gender dynamics and organizational structures in the years that followed.

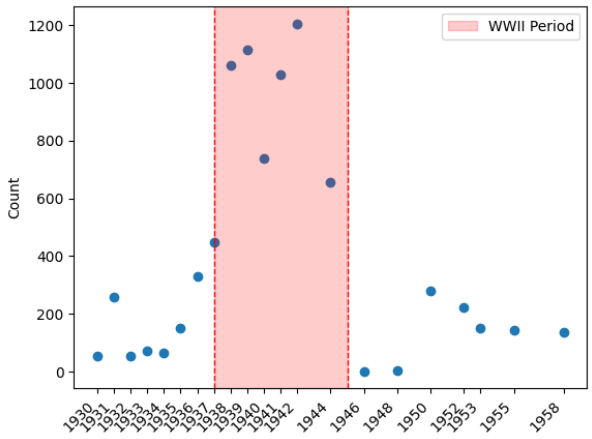
Our findings reveal three key insights. First, wartime drafting disrupted existing workplace gender compositions, compelling organizations to rely on female employees. This resulted in a measurable and persistent increase in female representation within affected offices, even after the war ended. Second, our instrumental variable estimates demonstrate that exposure to higher female shares during the war significantly influenced long-term gender diversity within organizations. These effects likely stem from changes in attitudes toward gender integration and the normalization of female participation in professional environments.

Third, the benefits of diversification were unevenly distributed. Female employees remained concentrated in lower-tier positions and faced limited opportunities for advancement. Additionally, structural reversals occurred post-war as men reclaimed their positions, highlighting the fragility of gains achieved under temporary shocks.

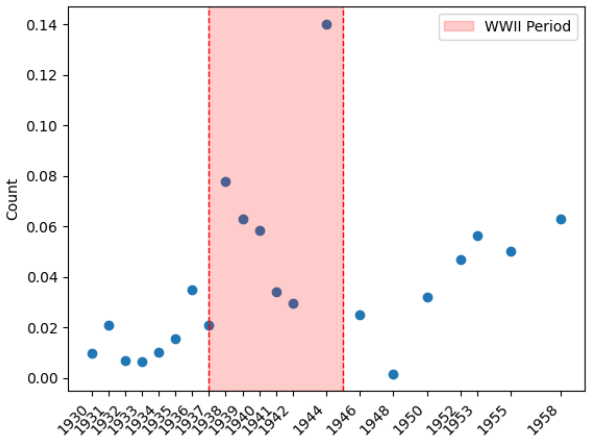
By demonstrating the causal relationship between exposure to female coworkers and subsequent workplace diversification, this study contributes to the literature on labor markets, gender inequality, and the economics of organizational behavior. Our results emphasize the potential for temporary shocks to drive persistent changes in workplace diversity, while also underscoring the

role of institutional and societal constraints in shaping these outcomes.

Figure 1: Impact of the War on Female Employment



(a) Population of Female Public Civil Servants



(b) Share of Female Public Civil Servants

7 Tables and Figures

Figure 2: Map of Tokyo-To

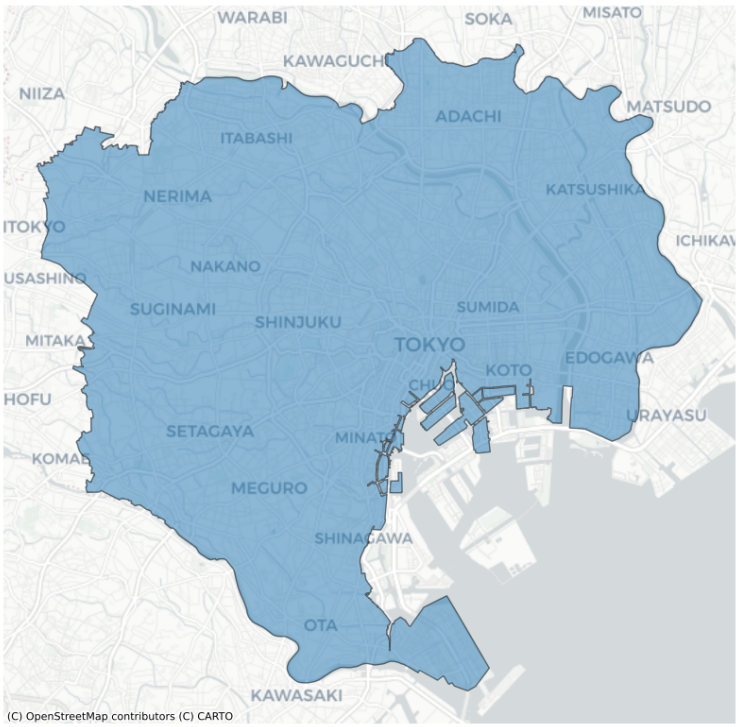


Figure 3: Length of tenure

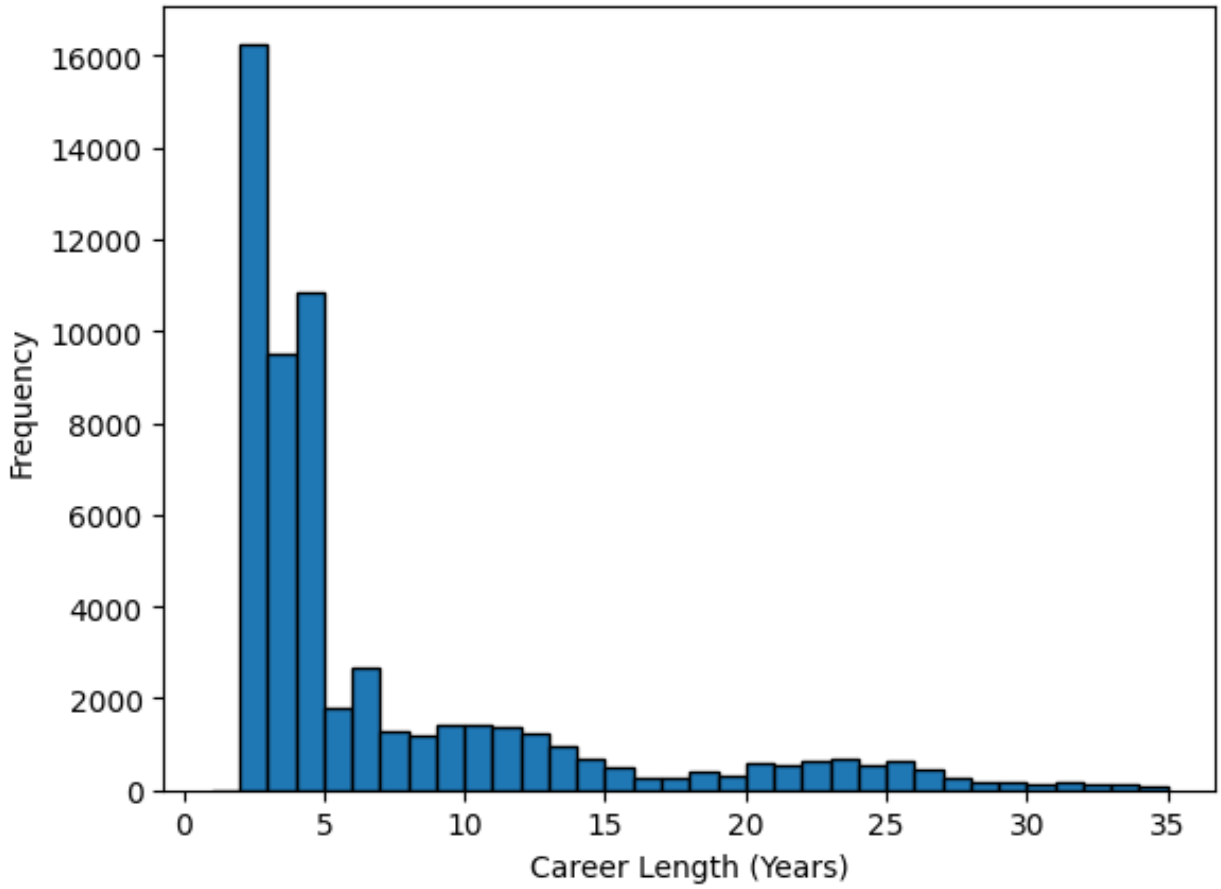
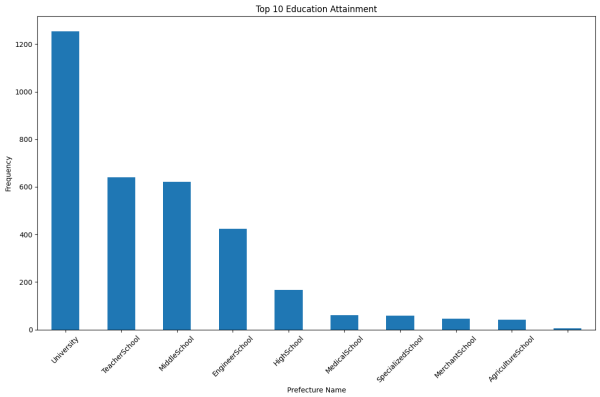
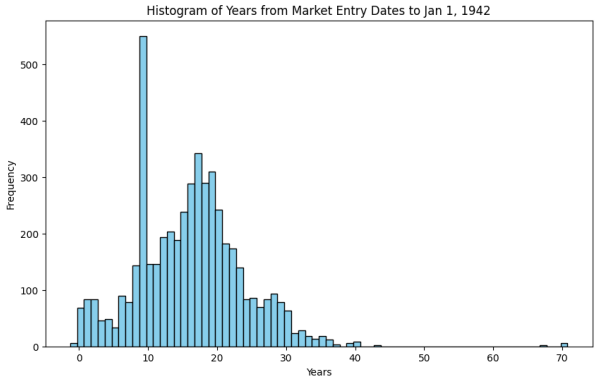


Figure 4: Education Attainment and Job Tenure



(a) Distribution of Education Levels



(b) Average Job Tenure

Figure 5: Drafting Process

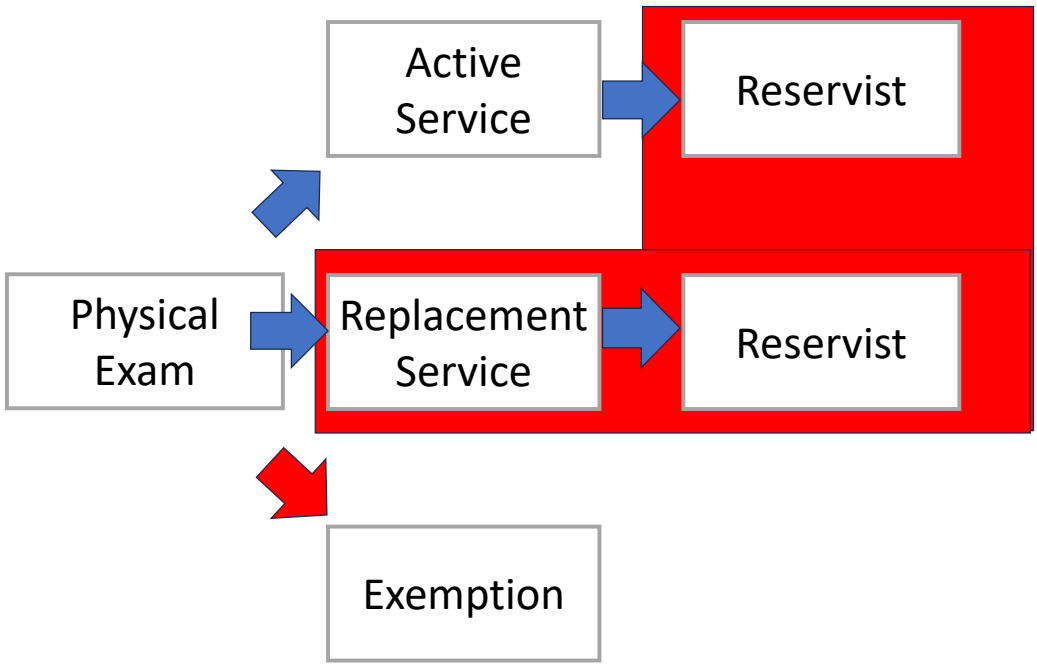
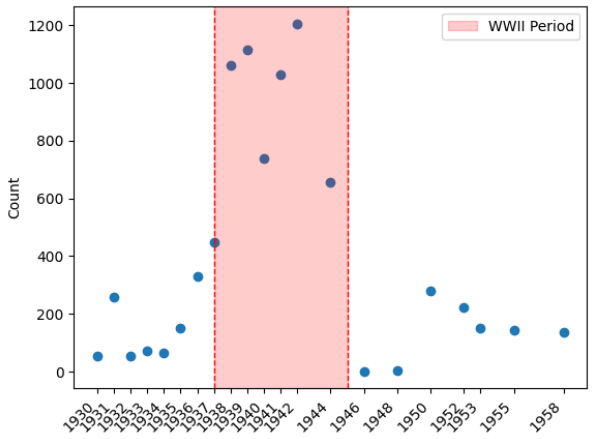
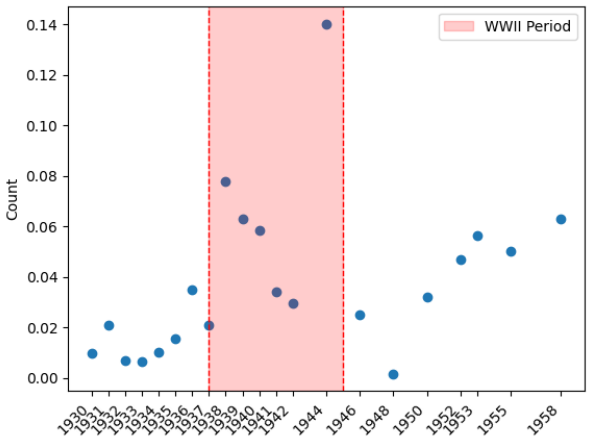


Figure 6: Impact of the War on Female Employment

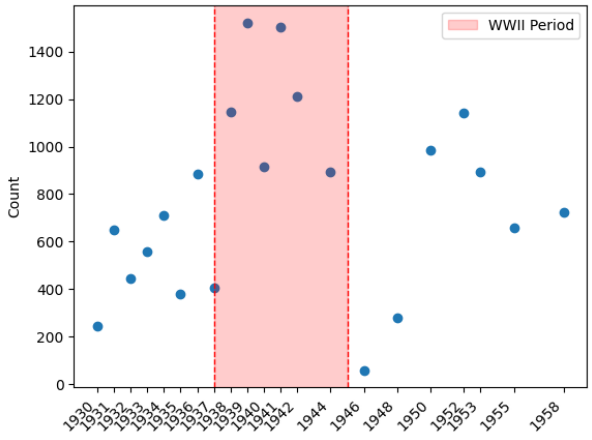


(a) Population of Female Public Civil Servants

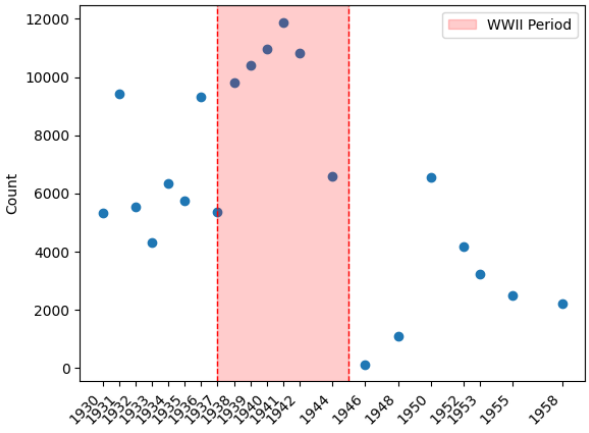


(b) Share of Female Public Civil Servants

Figure 7: Organizational Dynamics



(a) Number of Unique Offices



(b) Number of Unique Employees

Table 1: Balance Table by drafted status of office employees for 1931 and 1936

Year 1931	Not Drafted	Drafted	Difference	t statistic	p value	
Female workers share	0.02	0.02	0.00	-0.33	0.74	
New hire share	0.77	0.74	-0.03	0.50	0.62	
Share of higher class employees	0.09	0.06	-0.03	1.01	0.32	
Total workers	35.25	108.67	73.42	-3.76	0.00	***

Year 1936	Not Drafted	Drafted	Difference	t statistic	p value	
Female workers share	0.04	0.02	-0.03	3.07	0.00	**
New hire share	0.49	0.53	0.04	-1.09	0.28	
Share of higher class employees	0.06	0.09	0.03	-1.41	0.16	
Total workers	18.02	56.48	38.46	-4.96	0.00	***

Note: The two tables test the differences in office characteristics of employees that was drafted during the war period (1937-1944). Samples are conditional on employees working in the Tokyo Civil service during the war period. New hire share is the share of employees not appearing in previous year records. Higher class employees are civil servants in positions reserved for employees entering through the national exam. Total worker is defined at the office level. p-values test the null hypothesis that the difference is zero. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 2: Balance Table by drafted status of office employees for 1938

	Not Drafted	Drafted	estimate	t statistic	p value	
Female Workers Share	0.09	0.07	-0.03	10.06	0.00	***
Male Workers Share	0.91	0.93	0.03	-10.06	0.00	***
New Hire Share	0.46	0.72	0.26	-53.51	0.00	***
Higher ranked employee Share	0.05	0.03	-0.02	11.79	0.00	***
Total Workers	115.06	53.06	-62.00	37.41	0.00	***

Note: p-values test the null hypothesis that the difference is zero. Significance stars: *** p ¡ 0.001, ** p ¡ 0.01, * p ¡ 0.05. Military drafting started in 1937 in Japan.

Table 3: Logistic regression of Drafted Status on employee position

	Estimate	Std. Error	t value	Pr($>\|t\|$)
(Intercept)	-5.61	0.31	-18.31	0.00
Higher ranked employee	0.09	0.58	0.16	0.87
Engineer	1.03	0.37	2.77	0.01
Assistant to higher ranked employee	-25.59	27397079.00	-0.00	1.00
Assistant Engineers	-26.62	38745320.70	-0.00	1.00
Clerk	0.93	0.35	2.65	0.01
Part_time	1.34	0.45	3.00	0.00
Outsource	0.24	0.65	0.37	0.71

Note: Samples are employees from Tokyo-Fu in 1936. p-values test the null hypothesis that the difference is zero. Significance stars: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 4: Draft-Induced Hiring: Immediate and Spillover Effects

	(1) New hires	(2) Female	(3) Female OLS	(4) New kakari across	(5) Female kakari across	(6) New ka within	(7) New × Eng.
Own drafts	0.043***	0.059***	0.009				0.054***
	(0.005)	(0.018)	(0.006)				(0.007)
Adj. (kakari, across)				0.008***	0.008**		
				(0.002)	(0.004)		
Adj. (ka, within)						0.009***	
						(0.002)	
log(M+1)	0.464***	0.434***	0.126***	0.464***	0.435***	0.468***	0.463***
	(0.027)	(0.065)	(0.026)	(0.028)	(0.067)	(0.028)	(0.027)
Own × Eng.							−0.018**
							(0.008)
Fixed effects							
year_num	Yes	Yes	Yes	Yes	Yes	Yes	Yes
kyoku	Yes	Yes	Yes	Yes	Yes	Yes	Yes
pos_norm	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	11,701	10,178	11,775	11,701	10,178	11,701	11,701

Notes: Columns 1–2 and 4–7 estimate $\mathbb{E}[Y_{j,p,t} \mid X] = \exp(\beta_1 D_{j,p,t} + \beta_2 \log(M_{j,p,t}+1) + \gamma_j + \delta_p + \lambda_t)$ by Poisson pseudo-maximum likelihood; column 3 estimates the same specification by OLS. The unit of observation is position × office × year (wartime, 1938–1945). Y is the count of new hires or new female hires. D is the number of males drafted from the own position (cols. 1–3, 7), from neighboring positions within the same kakari across occupations (cols. 4–5), or from the same occupation within the ka (col. 6). M is the cumulative male stock. Poisson coefficients are semi-elasticities. Standard errors clustered by office in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variable: Number of New Female Hires			
	(1)	(2)	(3)
#Drafted	0.139***	0.195***	0.093*
	(0.040)	(0.041)	(0.037)
#Eligible	0.032***	0.028**	0.035***
	(0.008)	(0.009)	(0.008)
Num. Observations	5011	5012	5062
Marginal effect	15%	21%	9%
Mean of Control	0.21	0.21	0.21
R^2	0.405	0.186	0.339
Standard Errors	by Office-Year	by Office-Year	by Office-Year
Fixed Effects: Year	✓	✓	✓
Fixed Effects: Position	✓		✓
Fixed Effects: Division	✓	✓	

Notes: + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Dependent Variable: Number of New Hires			
	(1)	(2)	(3)
#Drafted	0.118***	0.149***	0.112***
	(0.030)	(0.031)	(0.028)
#Eligible	0.057***	0.047***	0.057***
	(0.007)	(0.007)	(0.007)
Num. Observations	5011	5012	5062
Marginal effect	13%	16%	12%
Mean of Control	3.64	3.64	3.64
R^2	0.565	0.465	0.527
Standard Errors	by Office-Year	by Office-Year	by Office-Year
Fixed Effects: Year	✓	✓	✓
Fixed Effects: Position	✓		✓
Fixed Effects: Division	✓	✓	

Notes: + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001.

Table 5: Effect of Drafting on Hiring

Dependent Variable: Share of new hires				
	(1)	(2)	(3)	(4)
Eligible_Workers	0.039***	0.038***	0.044***	0.046***
	(0.006)	(0.006)	(0.005)	(0.004)
Drafted_Workers_Share × War	0.714***		0.802***	0.895***
	(0.141)		(0.153)	(0.126)
Drafted_Workers_Share_Male × War		0.634***		
		(0.126)		
Model	OLS	OLS	OLS	OLS
Num. Observations	1129	991	1150	1325
R^2	0.502	0.497	0.446	0.419
Standard Errors	by Office-Year	by Office-Year	by Office-Year	by Office-Year
Fixed Effects: Year	✓	✓	✓	✓
Fixed Effects: Division	✓	✓		✓
Fixed Effects: Position	✓	✓	✓	

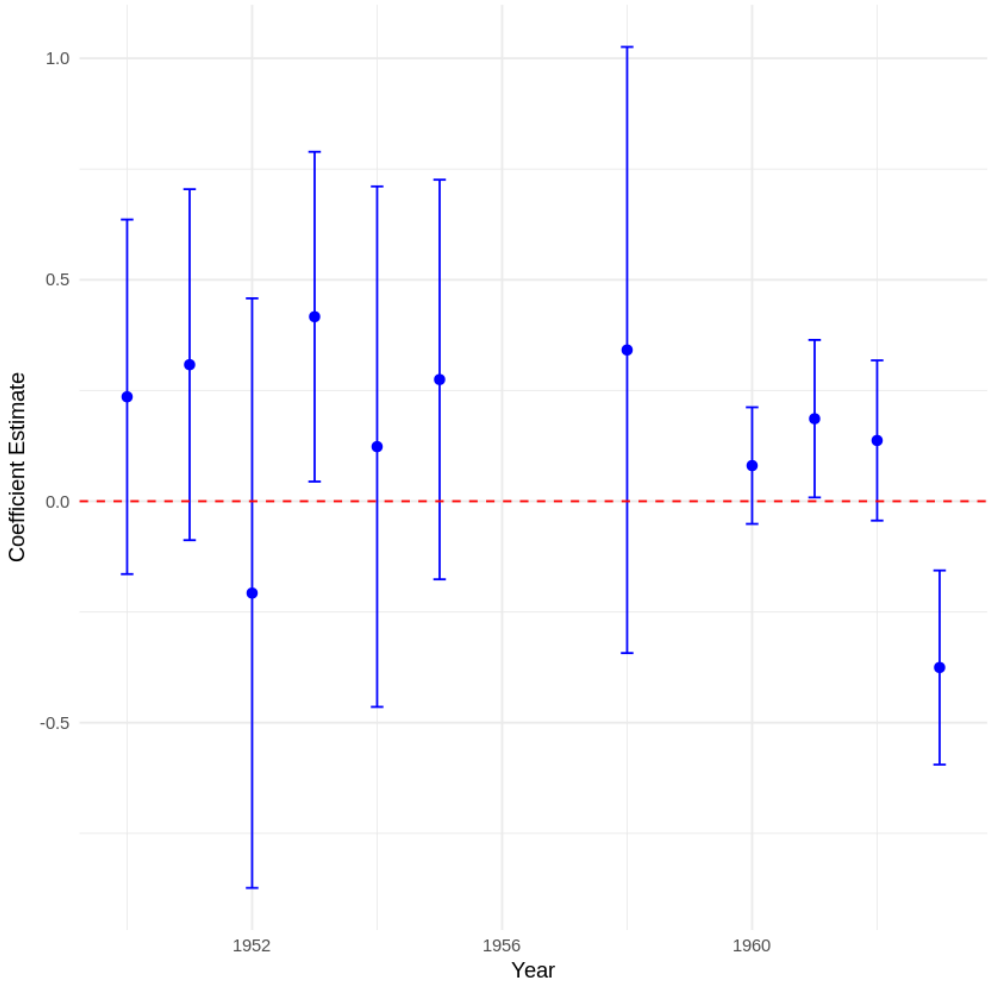
Notes: Standard errors are clustered by Office-Year. + p $<$ 0.1, * p $<$ 0.05, ** p $<$ 0.01, *** p $<$ 0.001.

Table 6: Effect of Drafting on Hiring Women

Dependent Variable: Share of female workers among new hires				
	(1)	(2)	(3)	(4)
Eligible_Workers	-0.007*	-0.006+	-0.008***	-0.008***
	(0.003)	(0.003)	(0.002)	(0.002)
Drafted_Workers_Share × War	-0.176*		-0.197***	-0.159***
	(0.073)		(0.048)	(0.037)
Drafted_Workers_Share_Male × War		-0.170*		
		(0.066)		
Model	OLS	OLS	OLS	OLS
Mean of Control	0.06	0.06	0.06	0.06
Num. Observations	267	231	269	267
R^2	0.759	0.777	0.590	0.636
Standard Errors	by Office-Year	by Office-Year	by Office-Year	by Office-Year
Fixed Effects: Year	✓	✓	✓	✓
Fixed Effects: Division	✓	✓		✓
Fixed Effects: Position	✓	✓	✓	

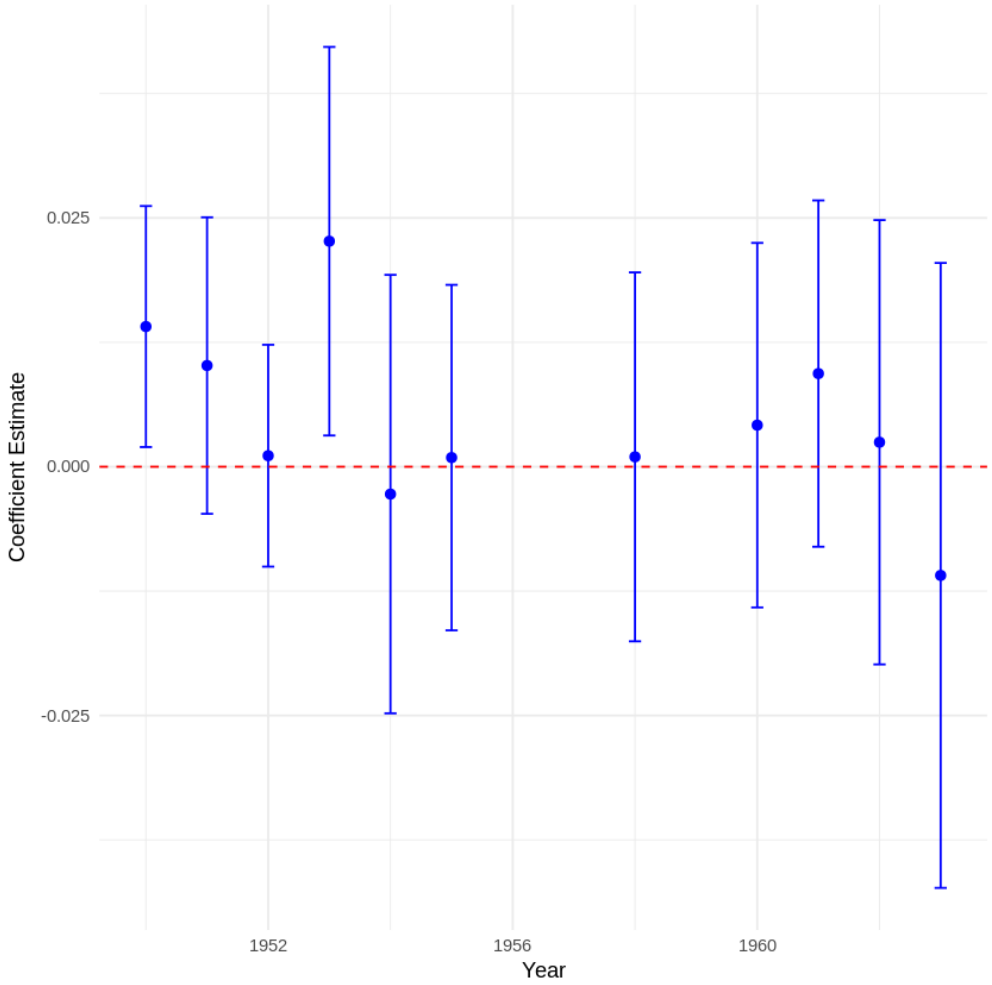
Notes: Standard errors are clustered by Office-Year. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 8: Effect on Number of Females in Office



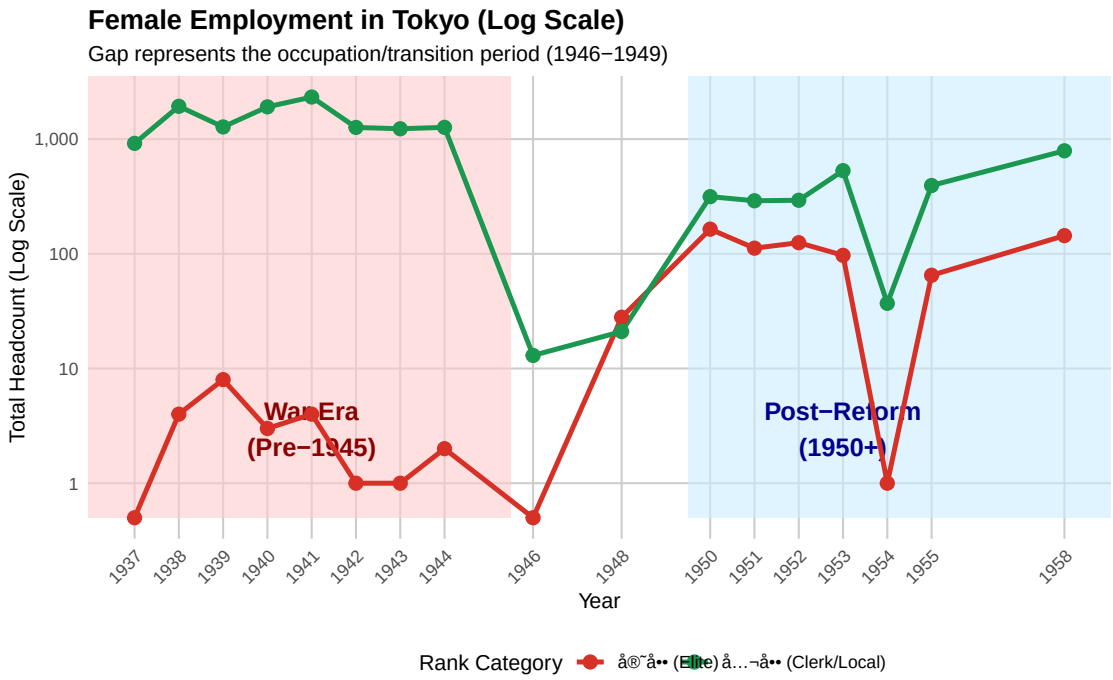
Note: This figure shows the coefficient estimates from the Poisson regression model. Standard errors are clustered at the office-position-year level.

Figure 9: Effect on Share of Females in Office



Note: This figure shows the coefficient estimates from OLS. Standard errors are clustered at the office-position-year level.

Figure 10: Female Employment in Tokyo by Rank Category



Note: Headcounts are shown on a log scale; the gap reflects the 1946-1949 transition period.

Panel A: Second Stage (Dep. var.: Number of Females)

Table 7: Direct Draft Shock: OLS vs. IV

	OLS (Cond) (1)	OLS (Uncond) (2)	IV (Cond) (3)	IV (Uncond) (4)
Exposure (cond)	1.266***		3.846	
	(0.241)		(16.56)	
Exposure (uncond)		1.730***		5.033*
		(0.133)		(2.771)
Engineer share	−0.043	0.047**	0.025	0.029
	(0.075)	(0.019)	(0.447)	(0.026)
No. Kakari-cho	0.006	−0.001	0.003	−0.005
	(0.009)	(0.009)	(0.022)	(0.009)
Kakari size	0.027***	0.030***	0.028***	0.031***
	(0.006)	(0.005)	(0.008)	(0.004)
Year FE	Yes	Yes	Yes	Yes
Kyoku FE	Yes	Yes	Yes	Yes
Observations	2,324	6,662	2,324	6,662
R^2	0.341	0.275	0.298	0.207
F-test (1st stage)			0.074	3.187

Panel B: First Stage (Dep. var.: Exposure)

	Cond (1)	Uncond (2)
Draft shock (cond)	−0.005	
	(0.019)	
Draft shock (uncond)		−0.029***
		(0.010)
Engineer share	−0.021	0.003
	(0.013)	(0.008)
No. Kakari-cho	0.001*	0.001***
	(0.001)	(0.000)
Kakari size	−0.000	−0.000***
	(0.000)	(0.000)
Year FE	Yes	Yes
Kyoku FE	Yes	Yes
Position FE	Yes	Yes
Observations	2,324	6,661
R^2	0.064	0.079

Notes: Panel A reports estimates of $Y_{j,t} = \beta\,\text{Exposure}_j + X'_{j,t}\gamma + \iota_k + \lambda_t + \varepsilon_{j,t}$, where Y is the number of females in kakari j in postwar year t (1947–) and Exposure is the mean share of females in the position × kakari × year cell during wartime (1937–1945). Columns 1–2 estimate by OLS; columns 3–4 instrument Exposure with the wartime draft shock (share of males drafted). Panel B reports the corresponding first stage. "Cond" conditions on kakaricho (subsection chief) wartime offices; "Uncond" uses all wartime survivors. Controls include engineer share, number of kakaricho, and kakari size. Standard errors clustered at the office level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Wartime Female Exposure and Postwar Female Inclusion in Kakari

	Has Female (Binary)			Number of Females		
	(1) Kakaricho (Max)	(2) Kakaricho (Mean)	(3) Kacho (Max)	(4) Kakaricho (Max)	(5) Kakaricho (Mean)	(6) Kacho (Max)
Kakaricho Exposure (Max)	0.418***			1.165**		
	(0.092)			(0.374)		
Kakaricho Exposure (Mean)		0.715***			1.810**	
		(0.141)			(0.563)	
Kacho Exposure (Max)			0.242			−0.485
			(0.200)			(0.743)
Engineer Share (Ka)	0.015	0.019	0.309***	−0.381**	−0.374**	−0.449
	(0.040)	(0.040)	(0.091)	(0.136)	(0.137)	(0.637)
No. Kakaricho (Ka)	0.018***	0.018***	0.016***	−0.036	−0.036	−0.096*
	(0.003)	(0.003)	(0.004)	(0.027)	(0.027)	(0.045)
Kakari Size	0.006***	0.006***	0.005***	0.061***	0.061***	0.076***
	(0.001)	(0.001)	(0.001)	(0.014)	(0.014)	(0.014)
Kyoku FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	Office	Office	Office	Office	Office	Office
Observations	2,324	2,324	613	2,324	2,324	613
R^2 (within)	0.174	0.177	0.247	0.502	0.502	0.562

Notes: Columns 1–3 estimate a linear probability model $\mathbf{1}[\text{Female}_{j,t} > 0] = \beta\,\text{Exposure}_{m(j)} + X'_{j,t}\gamma + \iota_k + \varepsilon_{j,t}$; columns 4–6 estimate $N^f_{j,t} = \beta\,\text{Exposure}_{m(j)} + X'_{j,t}\gamma + \iota_k + \varepsilon_{j,t}$ by OLS. The unit of observation is kakari × year (postwar, 1947–). Exposure is the share of females in the manager $m(j)$'s wartime (1937–1945) position × kakari × year cell, aggregated as maximum (cols. 1, 3, 4, 6) or mean (cols. 2, 5) across wartime years. Kakaricho = subsection chief; Kacho = section chief. Controls include engineer share, number of kakaricho, and kakari size. Standard errors clustered at office level in parentheses. $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$.

Table 9: Long-run effect of exposure to female workers during the war

	OLS	IV
# Female New Hire	0.013**	0.010
	(0.007)	(0.036)
First Stage		
# Drafted Workers		0.128***
		(0.009)
Num.Obs.	11 405	10 600
R2	0.276	0.272
F-stat		69.24
FE: year	✓	✓
FE: Position	✓	✓
FE: Division	✓	✓

Notes: + p $<$ 0.1, * p $<$ 0.05, ** p $<$ 0.01, *** p $<$ 0.001.
Standard Errors are clustered at the Office $\times$ Occupation $\times$ Year level.

Table 10: Regression Results for Retention

	OLS	IV
Female_Workers_Share_New_Hire	−0.038*	−0.063
	(0.016)	(0.125)
First Stage		
duringwar_Drafted_Workers_Share_Pre		−0.040***
		(0.005)
Num.Obs.	13 655	12 686
R^2	0.056	0.055
R^2 Adj.	0.030	0.030
RMSE	0.12	0.12
Std.Errors	Office_Position_Year	Office_Position_Year
F-stat		69.24
FE: Year	✓	✓
FE: duringwar_Position	✓	✓
FE: duringwar_Division	✓	✓

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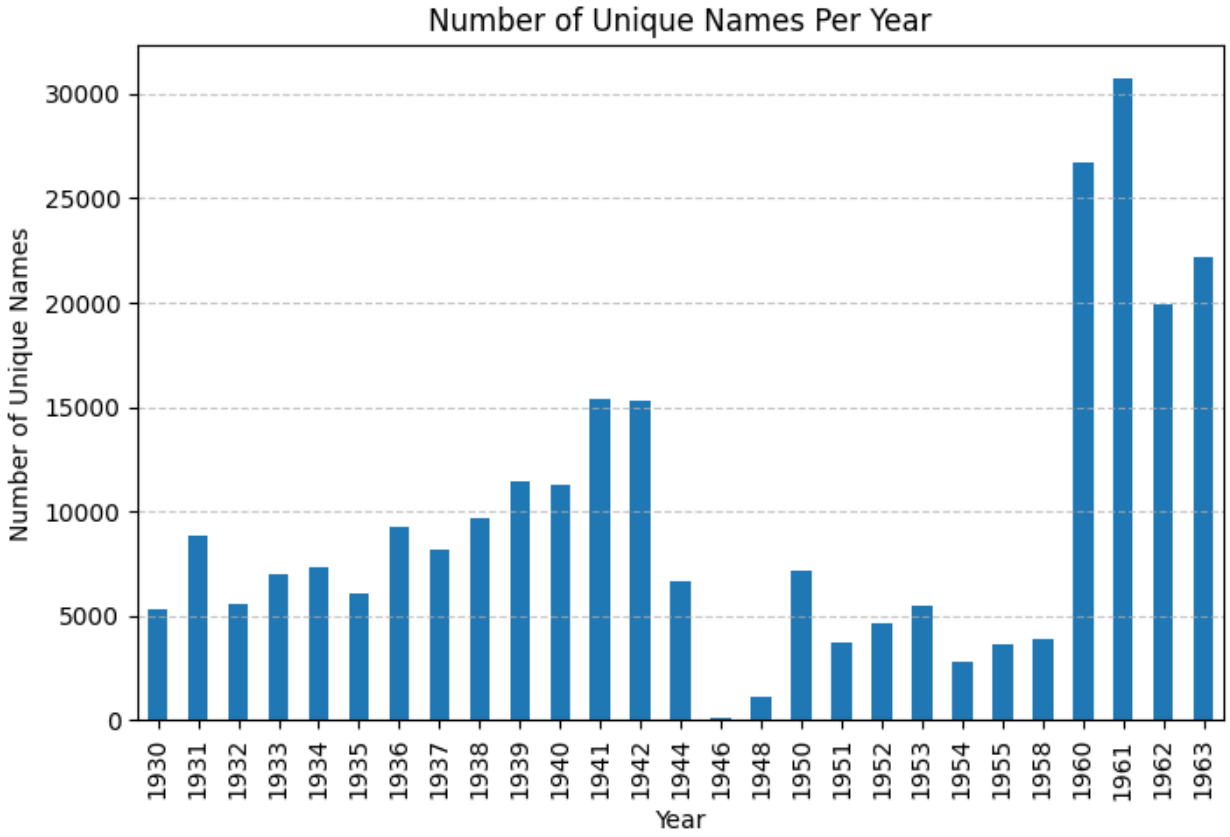
Figure 11: Number of unique names by year



A Appendix