

Labor Market Adjustments in the Medium Run: Female Labor Supply Five Years After the Pandemic

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Labor Market Adjustments in the Medium Run: Female Labor Supply Five Years After the Pandemic*

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March 1, 2026

Abstract

This paper examines how female labor supply in Japan evolved in the medium run following the COVID-19 pandemic. Using a retrospective individual panel survey covering 2014, 2019, and 2024, I analyze employment, working hours, and income five years after the pandemic. On average, labor outcomes follow pre-pandemic trends, but substantial heterogeneity emerges across groups. Mothers of young children increased employment but reduced working hours, indicating adjustments along extensive and intensive margins. Remote workers also worked fewer hours, and the income gap between regular and non-regular workers widened. These findings suggest persistent changes in work arrangements and inequality in the post-pandemic labor market.

Keywords— Female; Labor supply; COVID-19 pandemic; Working hours; Remote work; Employment type

JEL— J21; J22; J16

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1 Introduction

The COVID-19 pandemic caused unprecedented disruptions to labor markets. Nevertheless, the pandemic not only triggered a recession; It has also altered people's preferences and behaviors in ways that could fundamentally affect labor supply. For example, individuals may place greater value on health and safety, attach higher importance to family time, and benefit from increased flexibility in time allocation due to the widespread adoption of remote work. Much of the existing literature focuses on the immediate labor market shock during the early phase of the pandemic, when lockdowns and mobility restrictions were in place. Less is known about how labor outcomes evolved in the medium run after these restrictions were lifted and labor markets entered the post-pandemic period.

To fill this gap, I conducted a unique retrospective survey of Japanese women in 2024. The survey collects detailed information on individuals' demographic characteristics, employment status, job attributes, and labor outcomes for three reference years: 2014, 2019, and 2024. Observing the same individuals across three points in time, the survey enables us to examine how labor outcomes evolved over a decade that spans both pre-pandemic and post-pandemic periods. The survey was designed to ensure representativeness by aligning the distribution of age, employment status, and employment type with official statistics.

Using the panel data, I characterize how labor outcomes evolved following the pandemic. I adopt two complementary approaches. First, I conduct a trend-break analysis to examine whether post-pandemic outcomes deviate from the pre-pandemic trajectory and whether such deviation was specific to certain attributes. This approach captures changes in the slope of labor outcomes relative to the pre-pandemic trend and allows us to assess whether the pandemic altered the direction or speed of adjustment. Second, I conduct an event-study analysis to trace the evolution of outcome gaps across groups over time. This approach focuses on differences in levels, allowing us to detect when the between-group gaps emerged or widened. Taken together, these two approaches provide a picture of post-pandemic labor market dynamics.

As the analysis relies on observations at five-year intervals, the post-pandemic period may reflect not only the effects of the COVID-19 shock but also other structural changes in the labor market. Therefore, this paper does not attempt to isolate the causal effect of the pandemic itself. Instead, it characterizes how female labor supply evolved in the medium run following the pandemic, relative to prior trends, and examines how adjustment patterns differed across groups.

The results reveal heterogeneous post-pandemic adjustments in employment, working hours, and income. Regarding employment, both the trend-break and event-study analyses indicate greater labor attachment among those with family responsibilities after the pandemic: Married individuals are consistently less likely to have a job. Nevertheless, the gap between married and single individuals narrowed after the pandemic. Those living with preschool-aged children were less likely to have a job before the pandemic. However, they are more likely to be employed than those without preschool-aged children after the pandemic. Regarding working hours, trend-break

analysis suggests that post-pandemic shifts varied by childcare responsibilities: Those who live with preschool-aged children consistently work shorter hours than those without preschool-aged children, and this gap grew large after the pandemic. The event-study analysis suggests that remote workers worked shorter hours after the pandemic. Regarding income, the analysis suggests that regular employees consistently earned more than non-regular workers, and this regular workers' premium grew larger after the pandemic.

This paper contributes to three strands of literature. First, it provides new evidence on the labor market impacts of the COVID-19 shock. A large body of literature has examined the short-run impact of the COVID-19 pandemic on employment, working hours, and earnings during 2020-2021. Using administrative or large-scale survey data, these studies show sharp employment losses and heterogeneous effects across demographic groups and occupations, particularly in the early phase of the pandemic ([Adams-Prassl et al., 2020](#); [Cajner et al., 2020](#); [Chetty et al., 2020](#); [Coibion et al., 2020](#); [Cortes and Forsythe, 2023](#); [Alon et al., 2020](#); [Goldin, 2022](#); [Montenovo et al., 2022](#); [Fukai et al., 2023](#)). While this literature has revealed the immediate labor market shock, much less is known about how labor market outcomes evolved in the medium run, after the acute phase of the pandemic had passed. This paper contributes to the literature by providing evidence on medium-term adjustment in employment, working hours, and income using retrospective individual-level data covering the period from 2014 to 2024.

The second contribution is methodological. I combine fixed-effects trend-break specifications with an event-study analysis to distinguish changes in underlying trends from level shifts. Both approaches are well established in the literature: trend-break analysis to study labor market shifts over time and its deviations after the shock ([Blau and Kahn, 2007](#); [Aaronson et al., 2012](#); [Gordon, 2012](#); [Moffitt et al., 2012](#); [Hotchkiss and Rios-Avila, 2013](#); [Fernald, 2015](#); [Yagan, 2019](#); [Fernald and Li, 2022](#);) and event-study designs to trace responses to shocks ([Jacobson et al., 1993](#); [Stevens, 1997](#); [Couch and Placzek, 2010](#); [Davis and Von Wachter, 2011](#); [Oreopoulos et al., 2012](#); [Autor et al., 2013](#); [Angelov et al., 2016](#); [Adda et al., 2017](#); [Kleven et al., 2019](#)). Nevertheless, they are often used in isolation. By integrating them within a unified framework, I identify changes in slopes—trend breaks—and changes in levels—period-specific deviations.

The third contribution is to the broader literature on female labor supply and the mechanisms through which it is adjusted. A large body of research has shown that women's labor supply is particularly sensitive to family constraints, childcare responsibilities, and institutional settings ([Bertrand et al., 2010](#); [Goldin, 2014](#); [Kleven et al., 2019](#)). This literature emphasizes that women's labor supply responses often differ from men's not only in magnitude, but also in the margins through which adjustment takes place ([Mincer, 1962](#); [Olivetti and Petrongolo, 2008](#); [Eckstein and Lifshitz, 2011](#); [Angelov et al., 2016](#); [Adda et al., 2017](#); [Blau and Kahn, 2017](#)). Yet, little is known about how these margins adjust over medium horizons in response to COVID shocks. This paper contributes to the literature on female labor supply by jointly analyzing employment status, working hours, and income before and after five years of the pandemic.

The rest of the paper is organized as follows. Section 2 introduces how I collected the data. Section 3 describes summary statistics. Section 4 explains the models for trend-break analysis and event-study analysis. Section 5 presents the analysis for three labor outcomes: employment status, working hours, and income. Section 6 discusses policy implications based on the results. Section 7 addresses caveats in the analysis. Section 8 concludes.

2 Survey

We conducted an online survey from January 23rd to 25th in 2025. I outsourced survey implementation to Cross Marketing Inc. Our survey was approved by the Ethics Review Committee of the Tokyo Foundation (Approval No. 2025010001). I received informed consent electronically: Prior to participation, respondents were informed that the survey was anonymous and that their responses would be used exclusively for research purposes. Only those who agreed proceeded to the questionnaire. In the survey, I restricted my attention to females aged 25 or older at the time of the survey. I received responses from 7,500 individuals.

Prior to the main survey, I conducted a screening survey to ensure that the main survey sample represent the working-age female population in Japan. Specifically, I constructed target quotas based on age group, employment status, and employment type. The target number of respondents in each segment was determined so that the joint distribution of these characteristics in the main survey sample matches the corresponding distribution in the Labor Force Survey for 2024. In the screening survey, potential respondents were asked to report their age, gender, employment status, and employment type as of December 2024. Respondents were allowed to proceed to the main questionnaire only if the number of completed responses in their corresponding segment had not yet reached the predetermined quota. Once the target number for a given segment was filled, additional respondents belonging to that segment were no longer eligible to participate.

The main survey was designed as a retrospective survey covering three reference periods: December 2014, December 2019, and December 2024. For each of these periods, respondents were asked to report their socio-demographic characteristics, labor market status, and labor outcomes. Regarding socio-demographic characteristics, respondents reported their prefecture of residence, the number of children, and the age of their youngest child for each reference year. With respect to labor market characteristics, respondents were first asked about their labor force status—whether they were employed in each period. For those who reported being employed, I further asked their industry, occupation, employment type, and the availability of remote work. In addition, respondents reported their commuting time using a categorical scale with 30-minute intervals, ranging from “less than 30 minutes” to “more than six hours.” Labor outcomes included annual income and weekly working hours. Annual income was reported using eleven categorical scale with one-million-yen intervals, ranging from “less than 1 million yen” to “10 million yen or more.” Weekly working hours were reported in integers.

In addition to these period-specific questions, I also asked time-invariant individual characteristics: educational attainment and COVID-19 infection history. I asked about symptom severity, if any, including whether they and their families had experienced severe symptoms requiring ventilator or ECMO support. The questionnaire is provided in Appendix B.

3 Data

Excluding the outliers who reported weekly hours to have exceeded 120 hours, I constructed a working-age panel dataset by using the data from the participants aged between 25 and 59 in each year. This dataset includes 12,872 observations from 4,859 participants in 2014, 4,081 in 2019, and 3,932 in 2024.

Table 1 shows the summary statistics of dataset. The participants' age is distributed closely to that of the Japanese population by construction, as we described in Section 2. Educational attainment is distributed to a higher level than in official statistics: University graduates are 40.1% in 2024 in this survey, whereas they are 25.9% in the National Census in 2020. The share of married individuals is close to that reported in official statistics: 63.0% in 2024 in this survey, compared with 64.4% in the 2020 National Census. The share of living with minor children is also close to that in official statistics: 28.3% in 2024 in this survey, compared with 30.4% in the Comprehensive Survey of Living Conditions. Employment status is distributed closely to that of the Japanese population by construction: employment share is 80.4% in 2024 in our survey, which is just the same as in the 2024 Labor Force Survey. Among the employed individuals, the share of regular workers is lower in the official statistics: 39.6% in 2024 in this survey, compared with 50.0% in Labor Force Survey. Industry composition is close to that in the official statistics: The share of primary and secondary industry is 0.6% and 13.2% in 2024, respectively, whereas they are 1.4% and 14.2% in the 2024 Labor Force Survey.

I further checked whether the labor outcomes in this survey are consistent with those in the official statistics throughout the observation period. Figure 1 presents the historical changes in the employment share in Panel (a), weekly working hours in Panel (b), and annual income in Panel (c). In general, both the levels and trends in the survey data are similar to those in the official statistics. The employment share exhibits an increasing trend, with 60.9% in 2014, 70.7% in 2019, and 80.4% in 2024 in this survey. Whereas, it is 71.4%, 77.3%, and 80.4% for females aged 25-59 in each year, according to the Labor Force Survey. The weekly working hours exhibit a moderate decreasing trend, with 31.4 hours in 2014, 31.2 hours in 2019, and 29.8 hours in 2024 in this survey. Whereas, they are 29.2 hours in 2014, 28.2 hours in 2019, and 27.7 hours for female workers, according to the Monthly Labour Survey in 2023. Annual income exhibits a moderate increasing trend, with 2.7 million yen in 2014, 2.7 million yen in 2019, and 2.8 million yen in 2024 in this survey. Whereas, it is 2.5 million yen in 2014, 2.6 million yen in 2019, and 2.8 million yen in 2023 for female workers

according to the Monthly Labour Survey.¹ These data suggest that the participants in our survey reasonably represent the working-age female population.

Table 1: Summary Statistics for Working-Age Panel

	2014	Year 2019	2024
N	4,859 (37.7%)	4,081 (31.7%)	3,932 (30.5%)
<i>Age</i>			
25-39	1,646 (33.9%)	1,608 (39.4%)	1,360 (34.6%)
40-49	1,374 (28.3%)	1,317 (32.3%)	1,199 (30.5%)
50-59	1,839 (37.8%)	1,156 (28.3%)	1,373 (34.9%)
<i>Education</i>			
Junior-High/High school	1,796 (37.0%)	1,410 (34.6%)	1,297 (33.0%)
Junior College	1,470 (30.3%)	1,144 (28.0%)	1,060 (27.0%)
University/Graduate School	1,593 (32.8%)	1,527 (37.4%)	1,575 (40.1%)
<i>Family Composition</i>			
Married	3,440 (70.8%)	2,677 (65.6%)	2,479 (63.0%)
Minor Children	1,193 (24.6%)	1,127 (27.6%)	1,111 (28.3%)
<i>Employment</i>			
Employed	2,958 (60.9%)	2,887 (70.7%)	3,162 (80.4%)
(Among the Employed)			
<i>Employment Type</i>			
Regular	1,306 (26.9%)	1,377 (33.7%)	1,557 (39.6%)
Non-Regular	3,553 (73.1%)	2,704 (66.3%)	2,375 (60.4%)
<i>Industry</i>			
Primary	16 (0.3%)	14 (0.3%)	23 (0.6%)
Secondary	459 (9.4%)	496 (12.2%)	520 (13.2%)
Tertiary	4,384 (90.2%)	3,571 (87.5%)	3,389 (86.2%)
<i>Remote Work</i>			
Available	155 (5.2%)	287 (9.9%)	571 (18.1%)
<i>Hours & Income</i>			
Weekly Working Hours [hrs.]	31.4 (15.2)	31.2 (15.0)	29.8 (15.4)
Annual Income [¥mil.]	2.7 (2.0)	2.7 (2.1)	2.8 (2.2)

4 Model

This section outlines the empirical strategy used to analyze post-pandemic changes in labor outcomes and clarifies the interpretation of the estimated coefficients. I adopt two complementary approaches. First, I estimate a trend-break model that summarizes the average post-pandemic deviation from the pre-pandemic trend. Second, I estimate an event-study specification with year-specific interactions to examine the timing of these changes and assess pre-pandemic patterns. A trend-break model may detect a significant post-COVID shift even if group differences were already evolving before 2020, whereas an event-study model may yield imprecise year-specific

¹The average annual income from this survey is computed by taking the midpoint of each reported income range.

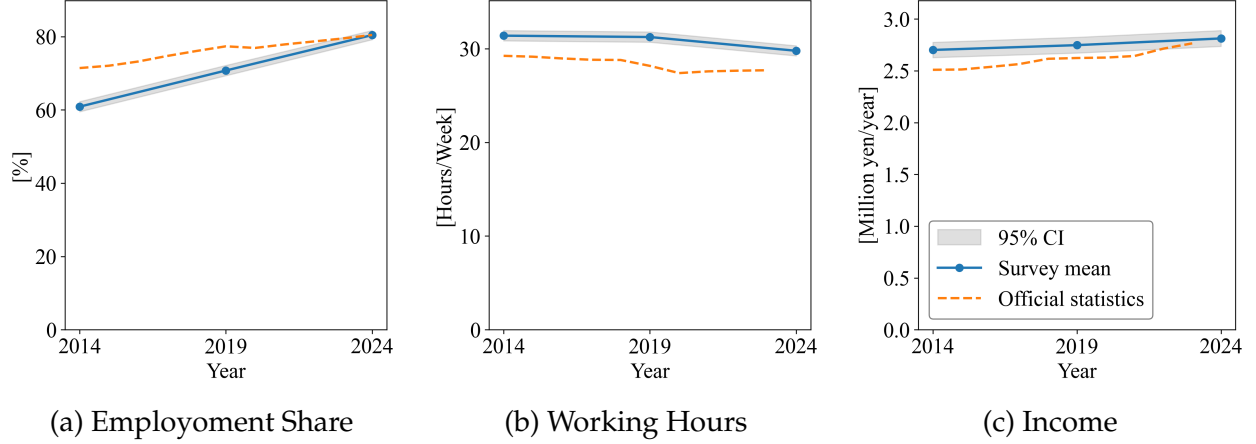


Figure 1: Labor Outcomes in the Survey and in the Official Statistics

Note: Panel (a) plots the employment share for females aged 25-59 from 2014 to 2024, drawn from the Labor Force Survey. Panel (b) plots the average working hours for female workers from 2014 to 2023, computed by average monthly working hours for females drawn from the Monthly Labour Survey (2023). Panel (c) plots the average annual labor income for female workers from 2014 to 2023, drawn from the Monthly Labour Survey (2023).

estimates even when the post-pandemic adjustment path differs from the pre-pandemic trend. By combining both approaches, I distinguish between changes in trends and changes in levels, providing a comprehensive view of medium-term labor market adjustment.

Importantly, the estimates should not be interpreted as causal effects of the COVID-19 shock in isolation. The five-year interval between survey waves implies that the post-pandemic observations may incorporate the influence of other macroeconomic developments, policy changes, and ongoing structural trends. The empirical approach instead evaluates whether labor outcomes in 2024 deviated from their prior trajectories and whether such deviations differed across groups. The results therefore capture medium-run adjustments in the post-pandemic period rather than the immediate impact of the pandemic alone.

4.1 Trend-Break Analysis

I first estimate a fixed-effects model to detect changes in outcome trends after the pandemic. The estimating equation is as follows:

$$Y_{it} = \alpha_i + \beta_1 t + \beta_2 D_{2024,t} + \beta_3' (D_{2024,t} \times Z_{it}) + \gamma' X_{it} + \varepsilon_{it}, \quad (1)$$

Y_{it} denotes the labor market outcome of individual i in year t : employment status, working hours, and income. The variable t is a linear time trend, normalized to zero in 2014. $D_{2024,t}$ is an indicator that equals 1 for the post-pandemic year 2024 and 0 otherwise. Individual fixed effects α_i control for time-invariant unobserved heterogeneity. The vector X_{it} includes time-varying de-

mographic characteristics including dummies for being married and living with preschool-aged children, and labor characteristics including dummies for regular employee and remote work availability, and categorical variables for industry and occupation. The vector Z_{it} consists of elements in X_{it} and a dummy for Jr. College/University Graduates, assumed to be time-invariant. The interaction term $D_{2024,t} \times Z_{it}$ captures changes in outcome trends after the pandemic for each characteristic.

Thus, the coefficient β_1 measures the baseline time trend. The coefficient β_2 measures the deviation of the 2024 outcome from this time trend. The interaction coefficients β_3' measure whether the post-pandemic deviation differs across groups. I interpret these interaction effects β_3' as trend effects, because they capture shifts in the slope of outcome evolution. As the time trend is estimated using all available periods, including 2024, β_3' is interpreted as a summary measure of whether post-pandemic outcomes exhibit an unpredictable change relative to earlier dynamics, rather than as a comparison against a purely pre-pandemic trend.

4.2 Event-Study Analysis

To complement the trend-break analysis, I estimate an event-study specification. The model is as follows:

$$Y_{it} = \alpha_i + \sum_{\tau \in \{2014, 2024\}} \delta_\tau (\mathbb{1}[t = \tau]) + \sum_{\tau \in \{2014, 2024\}} \theta_\tau (\mathbb{1}[t = \tau] \times G_{it}) + \gamma' X_{it} + \varepsilon_{it}, \quad (2)$$

where 2019 is the reference year. Y_{it} denotes a labor outcome for individual i at time t : employment status, working hours, and income. G_{it} denotes a key characteristic, such as marital status, childcare responsibilities, employment types, and remote-work availability. Individual fixed effects α_i denote all time-invariant characteristics. The vector X_{it} is defined in the same way as in the trend-break analysis.

Thus, the coefficients θ_τ measure the baseline outcome gap in each year relative to 2019. θ_τ measures the outcome gap between groups in each year relative to 2019. I interpret these interaction effects θ_τ as level effects, because they capture at which point in time the outcome differences between groups emerged or widened.

The event-study analysis identifies period-specific level differences rather than causal treatment effects in a strict sense. The pandemic coincided with multiple institutional and behavioral changes, including firm-level adjustments, policy responses, and shifts in household preferences. The estimated effects, therefore, reflect the combined influence of these factors rather than a single mechanism.

Unlike the trend-break model, the event-study specification does not impose any functional form on outcome trajectories. Instead, it allows us to observe whether outcome gaps exist in each year and how they evolve over time. However, the event-study alone cannot distinguish whether observed differences reflect changes in trends or discrete shifts. This limitation motivates the joint

use of both models.

5 Results

This section presents results using two complementary approaches for three labor outcomes: employment status, working hours, and income.

5.1 Employment

Table 2 summarizes trend-break analysis for employment status. I begin with the baseline specification without interaction terms (Model 1). The linear time trend is positive and statistically significant, indicating a modest increase in the probability of employment over the sample period. The post-2024 dummy is positive and statistically significant, indicating that employment in 2024 is above the level predicted by the pre-pandemic trend. Turning to individual characteristics, being married and living with preschool-aged children are significantly associated with a lower likelihood of employment. These findings are consistent with the common view that household responsibilities and childcare constrain labor participation.

I next introduce interaction terms between the post-COVID indicator and key individual characteristics (Models 2 to 4). The results suggest that post-pandemic employment adjustments varied across different family statuses. The interaction between the post-COVID indicator and the dummy for Jr. College/University graduates is positive and statistically significant. The interaction between the post-COVID period and being married is positive and statistically significant, indicating that married females are more likely to be employed after the pandemic. Likewise, the interaction between the post-COVID and living with preschool-aged children is positive and statistically significant. These results suggest that, relative to the pre-pandemic trend, the employment disadvantage associated with being married and having young children weakened in the post-pandemic period. The post-COVID dummy turns significantly negative with interaction terms, indicating that the post-COVID increase in employment shares on average is concentrated among those who are married and those who have young children.

Figure 2 presents the average marginal effects of marital status and childcare responsibilities, computed by averaging individual-level predicted differences from the event-study analysis. Panel (a) plots the employment gap between married and unmarried females. Married individuals consistently exhibit a lower probability of being employed in all years. The gap narrows over time, especially from 2019 to 2024. Thus, consistent with the trend-break estimates, the event study indicates a clear post-pandemic tightening in the employment differences between married and unmarried females.

Panel (b) presents employment differences between those who live with preschool-aged children and those who do not. In 2014, individuals with preschool-aged children were significantly

Table 2: Fixed-Effect Analysis of Employment Status

	(1)	(2)	(3)
Year	0.005*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
Married	-0.470*** (0.017)	-0.507*** (0.017)	-0.502*** (0.017)
With infants	-0.116*** (0.017)	-0.107*** (0.016)	-0.161*** (0.018)
Post-COVID (2024)	0.062*** (0.009)	-0.021* (0.011)	-0.023** (0.011)
Jr.Colledge/University # 2024		0.027** (0.011)	0.019* (0.011)
Married # 2024		0.101*** (0.009)	0.073*** (0.009)
With Children # 2024			0.202*** (0.024)
N	12872	12872	12872

Standard errors in parentheses. Estimates use individual and year fixed effects.

* < 0.1, ** < 0.05, *** < 0.01

less likely to be employed. This gap narrowed in 2019 and turned positive in 2024, indicating that females living with preschool-aged children were more likely to be employed than those without preschool-aged children. The confidence intervals indicate that this reversal is statistically significant in 2024. This result is consistent with the trend-break results, suggesting a discrete post-pandemic shift for the childcarers. As the model controls for individual fixed effects, this result may reflect unobserved time-varying factors, particularly changes in the external work environment for parents, such as increased flexibility in work arrangements.

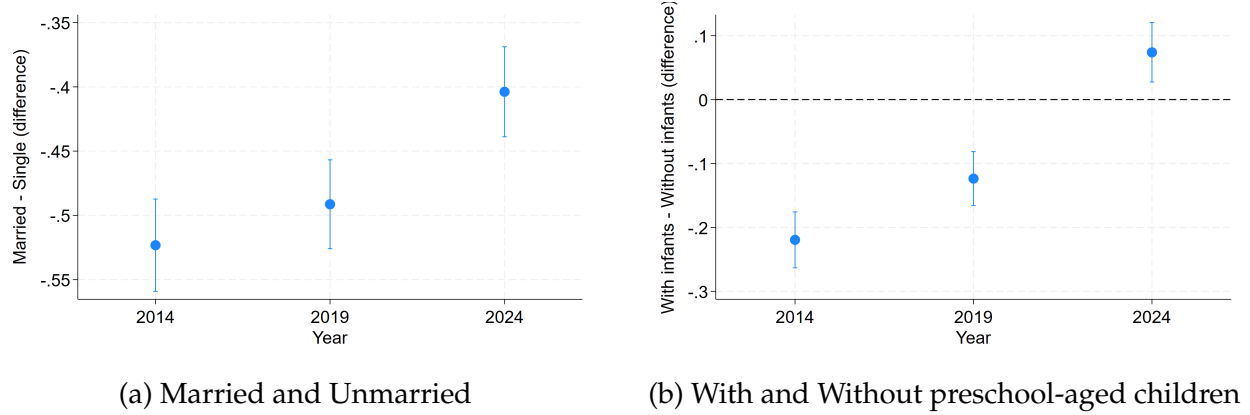


Figure 2: Event-study estimates of the employment gap

5.2 Working Hours

Table 2 summarizes trend-break analysis for weekly working hours among the employed individuals, computed by event-study analysis. In the baseline specification (Model 1), the linear time trend is negative and statistically significant, indicating a gradual decline in working hours over the sample period. Being married and living with preschool-aged children is associated with significantly shorter working hours. The results possibly reflect time constraints due to household and childcare responsibilities. Regular employment is associated with significantly longer hours, possibly reflecting greater job responsibilities and full-time contracts among regular workers. Remote-work availability is associated with shorter working hours. This result may reflect flexibility in time allocation for remote workers, allowing them to adjust their working hours in response to personal and household circumstances. The post-2024 dummy is not statistically significant, indicating that average working hours in 2024 follow the pre-pandemic trend.

In the specifications that include interaction terms between the post-COVID indicator and key labor-market characteristics (Models 2 to 5), the interaction between post-COVID and being married is not statistically significant. The interaction between post-COVID and living with preschool-aged children is significant, indicating that those with young children worked fewer hours after the pandemic than before. The interaction term between post-COVID and regular employment

is not statistically significant. The interaction term between post-COVID and remote-work availability is negative, although it is statistically insignificant. To summarize, the trend-break analysis suggests that working hours generally followed trends throughout the observation period, except that those with young children worked fewer hours after the pandemic than before.

Table 3: Fixed-Effect Analysis of Working Hours

	(1)	(2)	(3)	(4)	(5)
Year	-0.172*** (0.029)	-0.175*** (0.029)	-0.174*** (0.029)	-0.178*** (0.029)	-0.178*** (0.029)
Married	-1.487*** (0.475)	-1.428*** (0.481)	-1.422*** (0.485)	-1.436*** (0.482)	-1.448*** (0.484)
With Children	-3.057*** (0.481)	-2.612*** (0.473)	-3.066*** (0.482)	-3.079*** (0.483)	-2.643*** (0.472)
Regular Employee	7.569*** (0.732)	7.493*** (0.736)	7.562*** (0.735)	7.552*** (0.731)	7.455*** (0.736)
Remote-Work Available	-1.370** (0.557)	-1.316** (0.559)	-1.325** (0.559)	-0.842 (0.648)	-0.916 (0.649)
Post-COVID (2024)	-0.348 (0.242)	-0.032 (0.358)	-0.052 (0.391)	0.031 (0.361)	-0.004 (0.394)
Higher Education # 2024		-0.276 (0.344)	-0.320 (0.350)	-0.267 (0.340)	-0.247 (0.350)
Married # 2024		0.043 (0.332)	-0.149 (0.344)	-0.146 (0.330)	0.050 (0.345)
Children # 2024		-1.496* (0.865)			-1.440* (0.861)
Regular Employee # 2024			0.010 (0.344)		0.083 (0.339)
Remote-Work Available # 2024				-0.767 (0.620)	-0.654 (0.620)
N	9007	9007	9007	9007	9007

Standard errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure 3 presents the average marginal effects of being married, living with preschool-aged children, regular employment, and remote-work availability. Panel (a) plots the estimates for the difference in weekly working hours between married and single workers. Married workers consistently worked shorter hours than single workers. This result is in line with the trend-break

analysis.

Panel (b) plots the estimates for the difference in weekly working hours between those with and without preschool-aged children. Those with preschool-aged children consistently worked for shorter hours in a statistically significant way. The gap is widened by 1.0 hours from 2014 to 2019 and by 1.2 hours from 2019 to 2024. The result aligns with the trend-break analysis, suggesting that the working-hours penalty associated with childcare may have been more pronounced after the pandemic. Moreover, together with the analysis for employment in Section 5.1, the results highlight the post-pandemic shifts in the effect of childcare on female labor supply, both in terms of intensive and extensive margin: they are more likely to have a job, but they worked shorter hours after the pandemic than before.

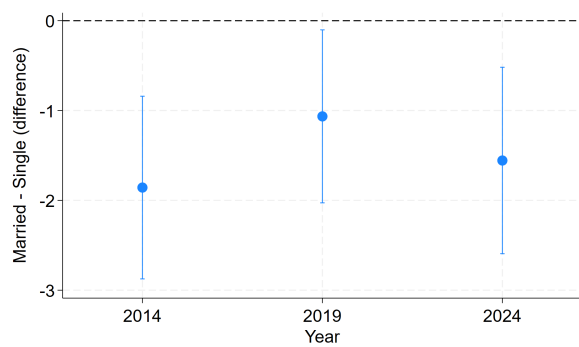
Panel (c) plots the estimates for the difference in weekly working hours between regular and non-regular workers. In 2014, regular workers worked for 7.6 hours longer per week than non-regular workers. This gap remained almost unchanged in 2019 and 2024. This result is consistent with the trend-break results, which showed no post-pandemic shift in the relative working hours of regular workers.

Panel (d) shows the difference in weekly working hours between workers with and without access to remote work. Until 2019, the estimated differences between remote and non-remote workers were not statistically significant. In contrast, in 2024, remote workers worked 1.7 fewer hours per week than non-remote workers, with the confidence intervals excluding zero. The result provides evidence that remote workers worked shorter hours than non-remote workers only after the pandemic. Thus, although the trend-break analysis did not detect significantly different shifts by remote-work availability, the event study shows that the difference in levels between remote and non-remote workers emerged after the pandemic.

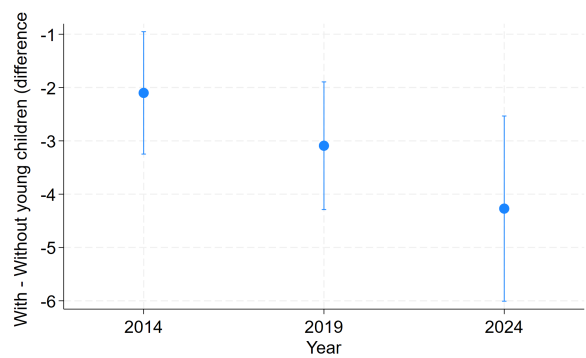
5.3 Income

Table 2 summarizes trend-break analysis for annual income among the employed individuals. In the baseline specification (Model 1), income exhibits a positive and statistically significant time trend, indicating steady income growth over the sample period. Being married and living with preschool-aged children are significantly associated with lower income. Regular employment is significantly associated with higher income: the estimates suggest a premium of 1.1 million yen per year for regular workers. Remote-work availability is also significantly associated with high income. The coefficient for the post-COVID dummy is not statistically significant, suggesting that average income in 2024 does not deviate from the level implied by the pre-pandemic trend.

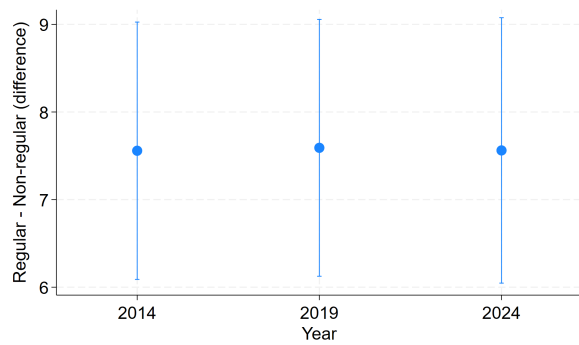
When post-COVID interaction terms are introduced (Models 2 to 5), the interaction between post-COVID and living with preschool-aged children is significantly associated with lower income in some specifications. The result suggests that the negative association between childcare responsibilities may have become stronger after the pandemic, consistently with the hours reduction of childcarers after the pandemic as presented in Section 5.2. Second, the interaction between



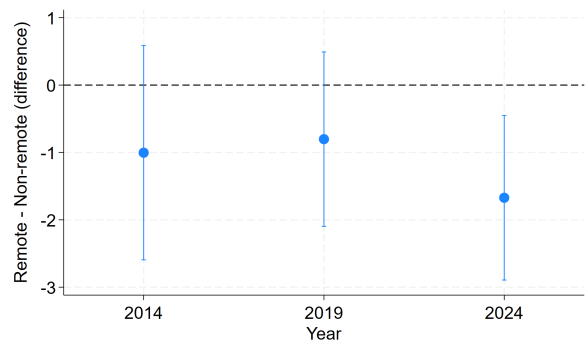
(a) Married and Single



(b) With and Without children



(c) Regular and Non-regular



(d) Remote and Non-remote

Figure 3: Event-study estimates of the hours gap

post-COVID and regular employment is significantly associated with higher income. One possible explanation is that, in addition to remote-work adoption, the post-pandemic period saw substantial improvements in workplace organization—such as the simplification and automation of administrative tasks—which may have boosted regular workers’ productivity. The interaction between post-COVID and remote work is small and statistically insignificant, implying that the association between remote work and income did not change after the pandemic.

Table 4: Fixed-Effect Analysis of Income

	(1)	(2)	(3)	(4)	(5)
Year	0.010** (0.004)	0.010*** (0.004)	0.011*** (0.004)	0.011*** (0.004)	0.011*** (0.004)
Married	-0.196*** (0.050)	-0.201*** (0.052)	-0.218*** (0.052)	-0.199*** (0.052)	-0.218*** (0.052)
With Children	-0.186*** (0.056)	-0.150** (0.061)	-0.194*** (0.056)	-0.186*** (0.056)	-0.143** (0.061)
Regular Employee	1.093*** (0.089)	1.088*** (0.090)	1.019*** (0.089)	1.095*** (0.089)	1.009*** (0.090)
Remote-Work Available	0.215*** (0.070)	0.203*** (0.070)	0.172** (0.069)	0.170** (0.080)	0.134* (0.079)
Post-COVID (2024)	0.018 (0.030)	-0.045 (0.043)	-0.144*** (0.046)	-0.052 (0.044)	-0.152*** (0.046)
Higher Education # 2024		0.093** (0.037)	0.056 (0.038)	0.086** (0.037)	0.056 (0.037)
Married # 2024		0.021 (0.041)	0.033 (0.041)	0.005 (0.040)	0.056 (0.042)
Children # 2024		-0.121 (0.090)			-0.167* (0.092)
Regular Employee # 2024			0.213*** (0.041)		0.221*** (0.041)
Remote-Work Available # 2024				0.051 (0.081)	0.061 (0.082)
N	9007	9007	9007	9007	9007

Standard errors in parentheses.

* p < 0.10, ** p < 0.05, *** p < 0.01

Figure 4 presents the average marginal effects of being married, living with preschool-aged children, regular employment, and remote-work availability, computed by event-study analysis.

Panel (a) plots the estimates for the difference in annual income between married and single individuals. Married individuals consistently earn less than single individuals, with no substantial changes throughout the observation periods. The result aligns with that from trend-break analysis.

Panel (b) plots the estimates for the difference in annual income between those who live with preschool-aged children and those who do not. Those with preschool-aged children consistently earned less than those without, with statistical significance after 2019. The result suggests the possibility that the negative association between childcare and income observed in the trend-break analysis may have already occurred before the pandemic. To summarize, the analysis does not provide a consistent evidence on particularly negative association between childcaring and post-pandemic income.

Panel (c) plots the estimated differences in annual income between regular and non-regular workers. Regular workers consistently earn more than non-regular workers, with the gap widening over time. The results align with the trend-break analysis results, suggesting an increasing regular premium.

Panel (d) shows income differences by remote-work status. Income differences between remote and non-remote workers do not exhibit substantial level shifts after the pandemic. Together with the trend-break analysis, the result suggests that remote work availability does not change much income.

Taken together with the trend-break analysis, the event study analysis suggests that post-pandemic income shifts differed substantially by regular employment. Regular workers earned more than non-regular workers, with the gap increasing after the pandemic. Childcare responsibilities do not exhibit a distinct post-pandemic association.

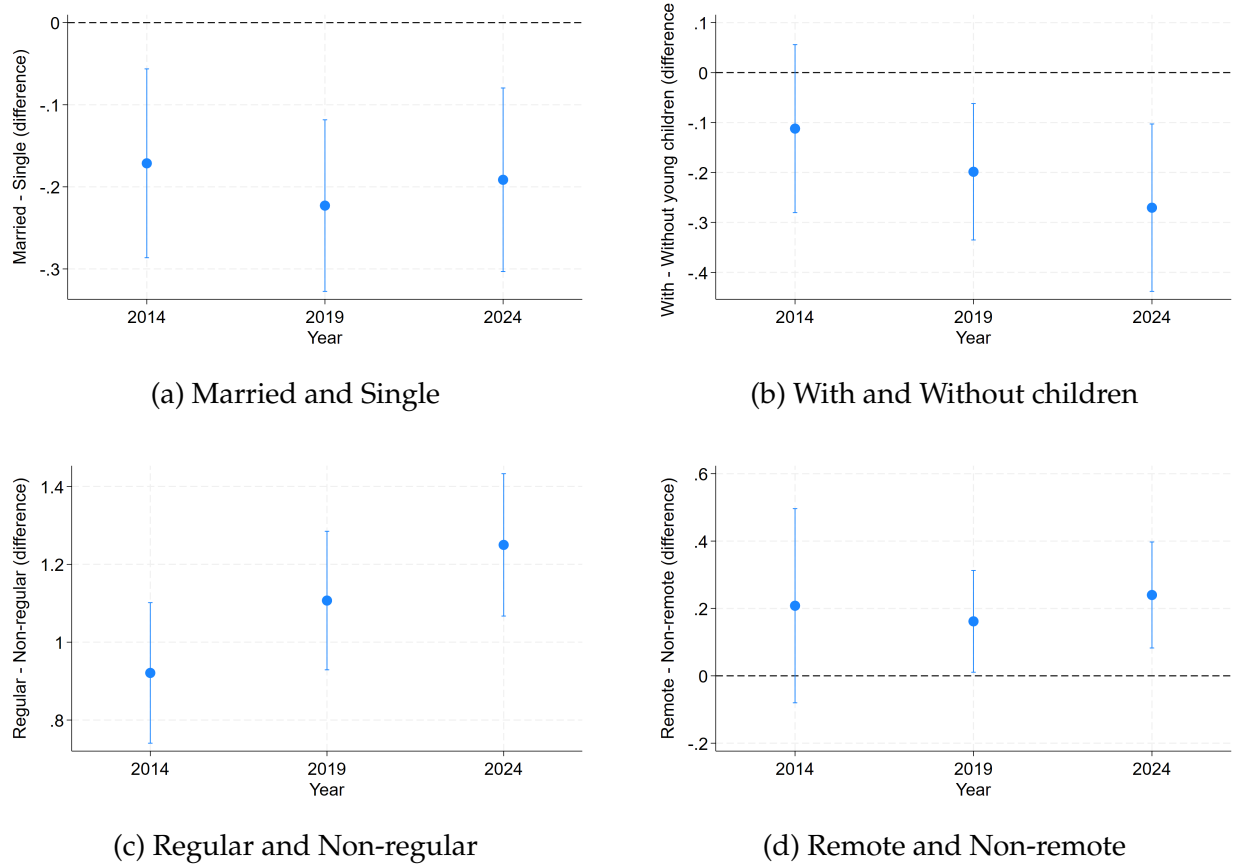


Figure 4: Event-study estimates of the income gap

6 Policy Implication

The results highlight three major factors that are associated with female labor supply in the post-COVID period: having small children, remote work availability, and regular employment. The results are robust across sampling methods as presented in Appendix A.

Having small children is widely recognized to reduce labor participation, working hours, and income in response to the COVID shock. This negative association between childcare and labor outcomes has been observed globally, including in Japan. The results of this study, however, suggest that child-caring females are more likely to be employed than other females five years after the pandemic. This reversal may be driven by multiple factors. One possible explanation is policies promoting maternal employment, such as increased childcare capacity and the expansion of free childcare services since 2019. Another possible factor is labor shortages in part-time jobs due to rapid population aging and early retirement among older workers. Increased financial needs among child-caring households, reflecting the rising cost of raising children, may also have encouraged maternal employment. Finally, reverse causality may also play a role, as females with stable employment may be more likely to afford to have children.

Child-caring females, while increasing their employment share, further reduced their working hours after the pandemic relative to females without small children. The result implies that the reduction in working hours observed during the pandemic persisted even five years later. Although daycare and school closures were the primary drivers of reduced working hours during the pandemic, working hours remained shorter even after these constraints were lifted, possibly reflecting a sustained shift in time allocation and a greater emphasis on family time. Taken together with the increase in employment share, these results suggest that labor supply adjustments among child-caring females occurred through an expansion along the extensive margin and a contraction along the intensive margin. These findings highlight the importance of policies aimed at improving productivity among workers facing time constraints. In particular, enhancing access to flexible work arrangements, investing in productivity-enhancing technologies, and promoting work practices that reward output rather than hours may help child-caring females maintain earnings and career progression despite limited working hours.

Remote work may increase or decrease working hours: Literature in post-COVID remote work suggest mixing results for the relationship between remote work and working hours around the world. The trend-break analysis in this study suggest that, overall, remote work reduces female working hours, without any post-pandemic shifts in this negative association. However, the event-study analysis suggest that remote workers worked shorter hours than non-remote workers only after the pandemic. Thus, although not robustly, this study suggests that post-pandemic remote work possibly shortened female working hours. It may have been caused by increased household chores, lack of peer-pressure, and increased efficiency.

Employment type mattered for the immediate labor market shock during the pandemic: Unsecured and part-time workers were hardest hit globally, including Japan. The trend-break analysis in this study suggests that the preexisting income gap between regular and non-regular workers increased after the pandemic. Thus, the negative shock for non-regular workers immediately after the pandemic remained evident even five years later, indicating persistent disparities in labor market outcomes by employment type. The results suggest that targeted policy interventions may be needed to prevent temporary shocks from translating into persistent inequality.

7 Caveat

This study has several limitations. The first one is the identification of COVID-19 shock. Because labor outcomes are observed at five-year intervals, the post-pandemic observations in 2024 may reflect not only the impact of the COVID-19 pandemic but also other structural changes, policy reforms, and ongoing labor market trends during this period. As a result, the analysis does not isolate the causal effect of the pandemic itself. Instead, the results should be interpreted as documenting how female labor supply evolved in the medium run following the pandemic and how adjustment patterns differed across groups.

Second, the survey is subject to recall bias, as respondents were asked report their attributes and labor outcomes for up to 10 years before. Such retrospective reporting may be subject to measurement error if participants do not accurately recall their past attributes and labor outcomes. However, the summary statistics for attributes and labor outcomes across all reference periods align closely with the official data for those years. This historical consistency supports not only the representativeness of the respondents but also the reliability of their retrospective reports.

Despite these limitations, the combined use of trend-break and event-study approaches provides a coherent and internally consistent picture of post-pandemic labor adjustment. By separating changes in trends from level shifts, the analysis offers a transparent framework for understanding how labor outcomes evolved during and after the COVID-19 period.

8 Conclusion

This study examines post-pandemic labor market adjustments in Japan using trend-break and event-study analysis of employment status, working hours, and income. The results provide no robust evidence of average deviations from long-term trends in these labor outcomes, but reveal substantial heterogeneity across groups. Females with young children experienced higher employment rates but reduced working hours, suggesting shifts in opposing directions between their intensive and extensive margins. Remote workers worked shorter hours than non-remote workers after the pandemic. Regular workers earn more than non-regular workers, especially after the pandemic. Taken together, these findings suggest that the roles of family responsibilities, remote-work availability, and employment type in shaping female labor supply have changed in the post-pandemic period. These results highlight the importance of policies that support female employment in the new era.

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Appendix

A Robustness

This part presents the results from samples aged between 25 and 64.

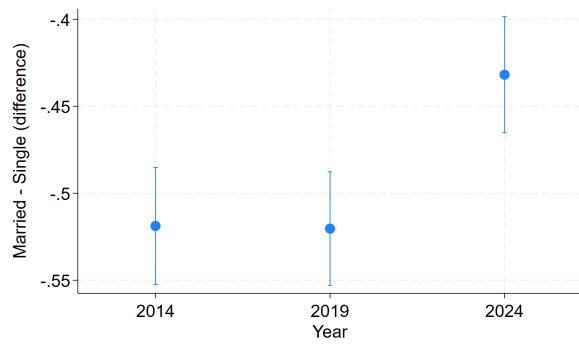
A.1 Employment

Table 5: Fixed-Effect Analysis of Employment Status (Aged 25-64)

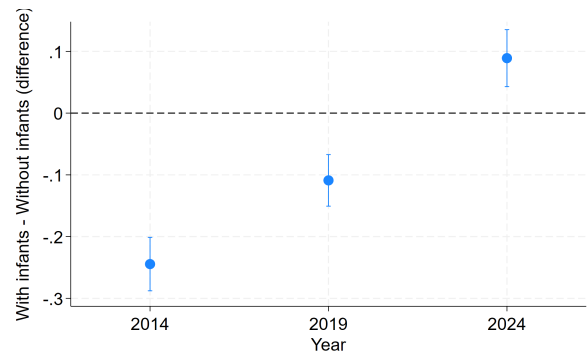
	(1)	(2)	(3)
Year	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)
Married	-0.489*** (0.016)	-0.520*** (0.017)	-0.516*** (0.016)
With infants	-0.120*** (0.017)	-0.113*** (0.017)	-0.171*** (0.018)
Post-COVID (2024)	0.094*** (0.008)	0.016 (0.010)	0.014 (0.010)
Jr.Colledge/University # 2024		0.030*** (0.011)	0.021** (0.010)
Married # 2024		0.087*** (0.008)	0.062*** (0.008)
With Children # 2024			0.222*** (0.024)
N	15673	15673	15673

Standard errors in parentheses. Estimates use individual and year fixed effects.

* < 0.1, ** < 0.05, *** < 0.01



(a) Married and Unmarried



(b) With and Without preschool-aged children

Figure 5: Event-study estimates of the employment gap (Aged 25-64)

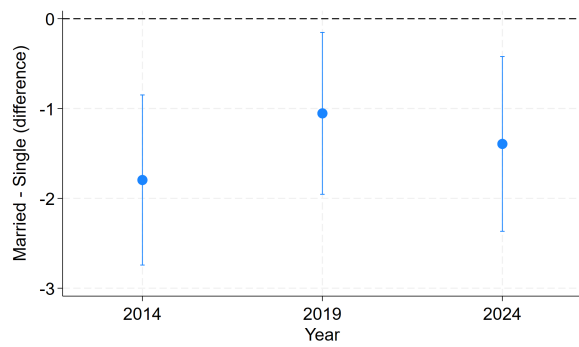
A.2 Working Hours

Table 6: Fixed-Effect Analysis of Working Hours (Aged 25-64)

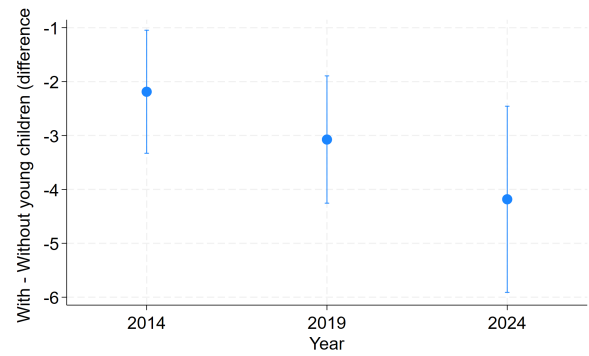
	(1)	(2)	(3)	(4)	(5)
Year	-0.195*** (0.026)	-0.197*** (0.026)	-0.196*** (0.026)	-0.200*** (0.026)	-0.200*** (0.026)
Married	-1.408*** (0.444)	-1.387*** (0.450)	-1.391*** (0.453)	-1.404*** (0.451)	-1.401*** (0.452)
With Children	-3.056*** (0.475)	-2.626*** (0.467)	-3.055*** (0.477)	-3.066*** (0.478)	-2.651*** (0.467)
Regular Employee	7.932*** (0.672)	7.881*** (0.674)	7.939*** (0.673)	7.927*** (0.671)	7.861*** (0.674)
Remote-Work Available	-1.283** (0.527)	-1.242** (0.530)	-1.248** (0.530)	-0.839 (0.610)	-0.902 (0.610)
Post-COVID (2024)	-0.222 (0.226)	-0.045 (0.345)	-0.048 (0.372)	0.006 (0.346)	-0.015 (0.373)
Higher Education # 2024		-0.184 (0.323)	-0.223 (0.329)	-0.182 (0.320)	-0.156 (0.330)
Married # 2024		0.137 (0.311)	-0.024 (0.323)	-0.017 (0.310)	0.143 (0.324)
Children # 2024		-1.438* (0.859)			-1.390 (0.853)
Regular Employee # 2024			-0.022 (0.322)		0.055 (0.317)
Remote-Work Available # 2024				-0.654 (0.583)	-0.552 (0.582)
N	10011	10011	10011	10011	10011

Standard errors in parentheses.

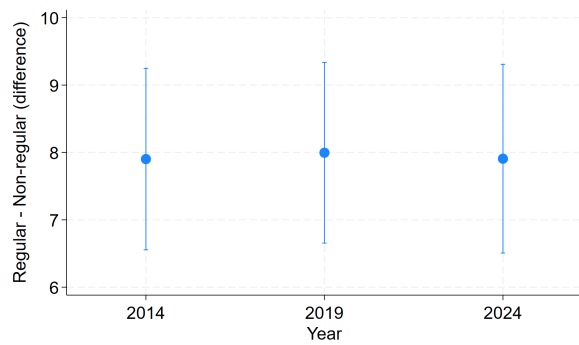
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$



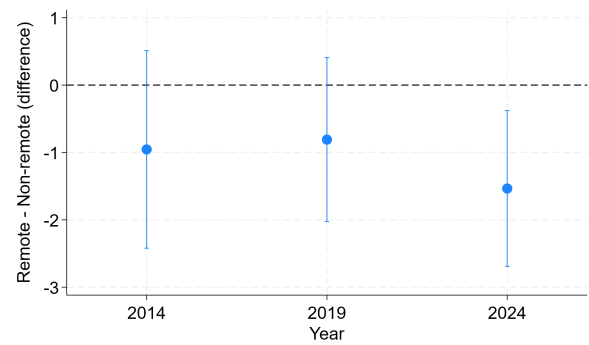
(a) Married and Single



(b) With and Without children



(c) Regular and Non-regular



(d) Remote and Non-remote

Figure 6: Event-study estimates of the hours gap (Aged 25-64)

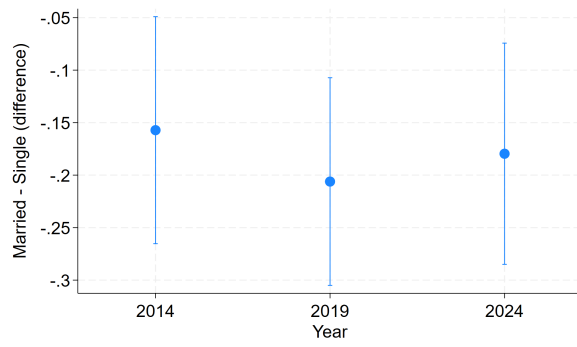
A.3 Income

Table 7: Fixed-Effect Analysis of Income (Aged 25-64)

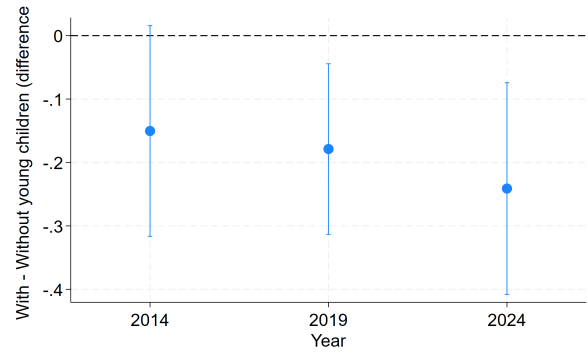
	(1)	(2)	(3)	(4)	(5)
Year	0.004 (0.004)	0.004 (0.004)	0.004 (0.004)	0.004 (0.004)	0.005 (0.004)
Married	-0.181*** (0.048)	-0.184*** (0.049)	-0.200*** (0.049)	-0.184*** (0.049)	-0.199*** (0.049)
With Children	-0.186*** (0.055)	-0.161*** (0.060)	-0.191*** (0.055)	-0.185*** (0.055)	-0.152** (0.060)
Regular Employee	1.176*** (0.084)	1.173*** (0.085)	1.120*** (0.085)	1.177*** (0.084)	1.114*** (0.085)
Remote-Work Available	0.167** (0.066)	0.158** (0.066)	0.133** (0.066)	0.119 (0.078)	0.092 (0.077)
Post-COVID (2024)	0.049* (0.029)	0.003 (0.041)	-0.074* (0.044)	-0.004 (0.041)	-0.082* (0.044)
Higher Education # 2024		0.071** (0.035)	0.041 (0.036)	0.064* (0.035)	0.039 (0.035)
Married # 2024		0.012 (0.038)	0.028 (0.039)	0.003 (0.038)	0.042 (0.039)
Children # 2024		-0.086 (0.089)			-0.130 (0.090)
Regular Employee # 2024			0.173*** (0.039)		0.179*** (0.039)
Remote-Work Available # 2024				0.061 (0.077)	0.065 (0.077)
N	10011	10011	10011	10011	10011

Standard errors in parentheses.

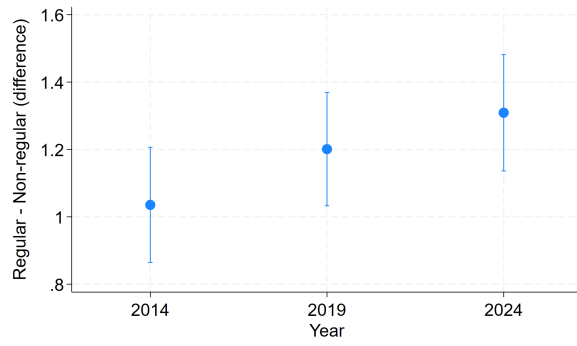
* p < 0.10, ** p < 0.05, *** p < 0.01



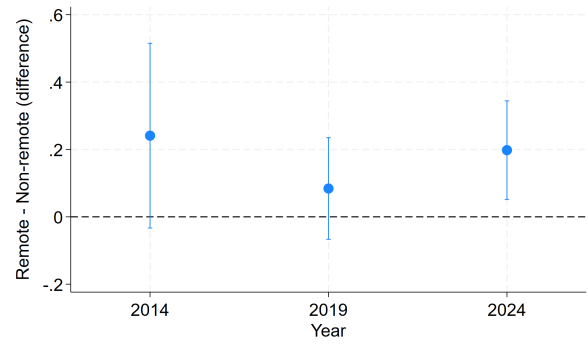
(a) Married and Single



(b) With and Without children



(c) Regular and Non-regular



(d) Remote and Non-remote

Figure 7: Event-study estimates of the income gap (Aged 25-64)

B Questionnaire

Survey on Women's Work Styles

Introduction

This survey is an academic research study conducted by the Tokyo Foundation for Policy Research and administered by Cross Marketing Inc.

The purpose of this survey is to understand changes in work styles before and after the COVID-19 pandemic among working individuals. Specifically, the survey includes questions regarding employment conditions in 2014, 2019, and 2024.

All responses will be statistically processed and handled in a way that ensures individual respondents cannot be identified. Summary statistics and raw data may be made public, but no information that could identify individuals will ever be disclosed. The data will not be used for any purpose other than this research.

The estimated time to complete the survey is 10–15 minutes.

Participation in this survey is voluntary. You may discontinue participation at any time by closing your browser. Please note that in such cases, no reward points will be granted.

If you agree to participate, please proceed by selecting “Next.”

If you do not wish to participate, please exit the survey.

Screening Survey

S1. Please indicate your age.

S2. Please indicate your gender.

S3. Please indicate the prefecture and municipality where you lived as of December 2014.

S4. Please indicate your employment status as of December 2014.

(Working)

- Self-employed
- Regular employee (open-ended contract)
- Non-regular employee (contract, part-time, temporary, dispatched, etc.)

(Not working)

- Seeking employment or preparing for work
- Not seeking employment

Main Survey

[Target population]

Female respondents aged 25–70. Samples are allocated to match official labor statistics by region, age group, and employment status.

Q1. Please state your age. (NU)

[Questions on 2024]

Q2. Please indicate the prefecture and municipality where you lived as of the end of December 2024. (PD, PD)

Q3. As of December 2024, how many minor children were living with you? (PD: 0–10)

Q4. (Shown only to respondents who answered “1 or more” to Q3)

Please state the age of your youngest child. (PD: integer from 0 to 18)

Q5. Please indicate your employment status as of January 1, 2024 and as of the end of December 2024. (SA)

- You were employed as of January 1, 2024, left the job due to employer reasons during 2024, and were not employed as of the end of December 2024.
- You were employed as of January 1, 2024, left the job for personal reasons during 2024, and were not employed as of the end of December 2024.
- You were employed as of January 1, 2024, left the job due to employer reasons during 2024, and were employed at a different workplace as of the end of December 2024.
- You were employed as of January 1, 2024, left the job for personal reasons during 2024, and were employed at a different workplace as of the end of December 2024.
- You were employed as of January 1, 2024, and continued working at the same workplace through the end of December 2024.
- You were not employed as of January 1, 2024, but were employed as of the end of December 2024.
- You were not employed as of January 1, 2024, and were not employed as of the end of December 2024.

(Q6-16 are shown only to respondents who selected options 3, 4, 5, or 6 in Q5.)

Q6. As of the end of December 2024, what was the main industry of the company or organization where you worked? (SA)

- Agriculture
- Forestry, fishery, and fisheries-related industries
- Mining
- Construction
- Manufacturing (including publishing and printing)
- Wholesale and retail trade (including department stores and supermarkets)
- Accommodation and food services
- Finance and insurance
- Real estate
- Transportation
- Information services and research services
- Telecommunications (excluding information services and research services)
- Electricity, gas, water, and heat supply
- Medical and welfare services
- Education and learning support
- Other services
- Public sector
- Other (please specify)

Q7. As of the end of December 2024, what was your main occupation? (SA)

- Managerial occupation
- Research and technical occupation
- Legal, management, or cultural professional occupation
- Medical, nursing, or health-related occupation
- Childcare or education occupation
- Clerical occupation
- Sales occupation
- Welfare and caregiving occupation
- Service occupation
- Security-related occupation
- Agriculture, forestry, and fisheries occupation

- Manufacturing, repair, painting, or drafting occupation
- Transportation, machinery operation, or delivery occupation
- Construction, civil engineering, or electrical work occupation
- Transportation, cleaning, packaging, or sorting occupation

Q8. As of the end of December 2024, what was your employment status? (SA)

- Regular employee (open-ended contract)
- Contract employee (fixed-term contract)
- Part-time or temporary worker
- Dispatched or commissioned worker
- Self-employed, freelancer, or family business worker
- Other

Q9. As of the end of December 2024, how many hours per week did you work on average? (NU)

Q10. As of the end of December 2024, what percentage of your weekly working hours was conducted remotely? (PD: 0–100, in 10% increments)

Q11. As of the end of December 2024, how long did it take you to commute between home and workplace (round trip)? (PD: 30 minutes to 6 hours, in 30-minute increments)

Q12. What was your total annual personal income in 2024 before tax, including bonuses? (PD)

- No personal income
- Less than 1 million yen
- 1–2 million yen
- 2–3 million yen
- 3–4 million yen
- 4–5 million yen
- 5–6 million yen
- 6–7 million yen
- 7–8 million yen
- 8–9 million yen

- 9–10 million yen
- 10 million yen or more

Q13. What was your spouse's total annual income in 2024 before tax, including bonuses?
Please select "No spouse" if applicable. (PD)

- No spouse
- No income
- Less than 1 million yen
- 1–2 million yen
- 2–3 million yen
- 3–4 million yen
- 4–5 million yen
- 5–6 million yen
- 6–7 million yen
- 7–8 million yen
- 8–9 million yen
- 9–10 million yen
- 10 million yen or more

(Shown only to respondents who selected "Less than 1 million yen" or "1–2 million yen" in Q12)

Q14. In 2024, did you adjust your working hours to avoid exceeding any of the following income thresholds? (SA)

- The 1 million yen threshold (the level at which resident tax becomes payable)
- The 1.03 million yen threshold (the level at which income tax becomes payable)
- The 1.06 million yen threshold (the level at which social insurance contributions become payable)
- The 1.30 million yen threshold (the level at which National Pension and National Health Insurance contributions become payable)
- The 1.50 million yen threshold (the income level at which the full spousal deduction applies)
- The 2.01 million yen threshold (the upper income limit for eligibility for the spousal deduction)
- I did not consider income thresholds.

Q15. If those income thresholds were abolished, by what percentage do you think you would increase your weekly working hours? (PD: 0–100 in 10% increments; also selectable: 150%, 200%, 300% or more)

[Questions about 2019]

Q16-28

(Structure identical to Q3-Q15, the 2024 section)

[Questions about 2014]

Q29-40

(Structure identical to Q3-Q14, the 2024 section)

Final Questions

Q41. Have you or any family members living with you been infected with COVID-19 and required a ventilator or ECMO? (SA)

- You yourself required it, and a family member did as well
- You yourself required it, but a family member did not
- You did not require it, but a family member did
- Neither you nor any family member required it
- You required it (living alone)
- You did not require it (living alone)

Q42. What is the highest level of education you have completed? (SA)

- Junior high school
- High school
- Junior college or technical college
- University
- Graduate school (Master's or Doctoral degree)

Thank you for your cooperation.