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Can Capping Overtime Improve Worker Welfare? Evidence from Japan's 2019 Labor Reform*

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Abstract

This study investigates the effects of the overtime cap introduced in Japan in 2019—set at 360 hours annually (approximately 47 total work hours per week)—on working hours, wages, task allocation, skill investment, side-job engagement, and multiple dimensions of worker well-being. Drawing on panel data from 2015 to 2023, we find that the cap significantly reduced long working hours without adversely affecting wages or skill investment. Additional analysis indicates that firms adjusted primarily through task reorganization rather than by increasing work intensity, while some workers offset reduced working hours by taking on side jobs. Overall, the reform improved self-reported health and work–life balance, though these gains did not translate into higher overall subjective well-being. These results suggest that in labor markets characterized by persistently long working hours, statutory overtime caps can enhance worker welfare without producing adverse labor market consequences.

Keywords: Overtime cap, Worker welfare, Working hours
JEL classification: J22, J28, K31

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1 Introduction

Extended work hours is thought to be the root of evils such as bad health, low productivity, and gender gaps in the career progression.[1] Based on a presumption that work hours can be excessively long due to reasons such as workaholism or the rat race among peers, the government often sets an upper limit on the hours worked to curtail long work hours.[2] For example, the European Working Time Directive (EWTD) in 1993 set the upper limit to 48 working hours per week,[3] Korea decreased the weekly upper limit from 68 to 52 hours in 2018, Japan introduced the upper limit of 360 hours per year in 2019 that is roughly equivalent to 47 hours per week.

A cap on annual overtime hours, if effectively enforced, can reduce working hours with certainty. However, critics argue that such stringent regulation may limit workers' ability to earn additional income or accumulate skill. To avoid such criticisms, governments have often preferred "softer" interventions, such as lowering statutory working hours or increasing overtime premium rates. These measures work indirectly by altering the relationship between hours worked and total earnings, thereby discouraging excessive labor supply without imposing an absolute limit. As a result, they have been widely implemented and extensively evaluated in the empirical literature, in contrast to the relatively limited evidence on the effects of direct caps.

This study assesses the effects of Japan's 2019 labor reform, which introduced a legal cap of 47 working hours per week. Prior to the reform, the Labor Standards Act allowed employers to impose unlimited overtime, provided that employees received appropriate compensation and consent was obtained from their representatives. The introduction of this upper limit was expected to have a substantial impact, as approximately 7.7% of workers worked more than 47 hours per week in 2018.

We use data from the Japanese Panel Study of Employment Dynamics (JPSED), covering the years 2015 to 2023, to implement an event-study design. The treatment group consists of workers who averaged more than 47 hours of work per week during the pre-reform period from 2015 to 2018. Our outcome variables include hours worked, annual earnings, assessments on task allocation and skill development opportunities, side job engagement, subjective health status, and subjective well-being measures including job satisfaction and life satisfaction.

[1] Previous studies have shown that long working hours are associated with various health risk factors, including high BMI, smoking prevalence, short sleep duration, poor self-rated health, and mental illness (Cygan-Rehm and Wunder, 2018; Berniell and Bietenbeck, 2020; Sato et al., 2020). In addition, long hours have been linked to reduced organizational performance (Piasna, 2018) and are known to hinder women's career advancement (Goldin, 2014; Wasserman, 2023).

[2] Hamermesh and Slemrod (2008) sets up a theoretical model of workaholism. Collewet et al. (2017) provides empirical evidence of peer effects in hours worked. Landers et al. (1996) and Rosenthal and Strange (2008) present findings consistent with the idea that young workers signal their preference for hard work by working longer hours.

[3] The upper limit should be attained as the average over a 17 week reference period. In addition, the EWTD established (a) 11 hours of continuous rest in 24 hours, (b) a 20-minute break for work periods of more than 6 hours, (c) 24 hours of continuous rest in 7 days (or 48 hours in 14 days), (d) 4 weeks of annual leave, and (e) an average of no more than 8 hours work in 24 hours over the reference period, for night workers. Each member state is obliged to implement the content of EWTD as a minimum standard by enacting national legislation.

The event-study analysis yields a coherent set of findings that shed light on how the 2019 overtime regulation affected Japanese workers. First, we confirm that the treatment and control groups exhibited parallel trends in outcome variables prior to the reform. Second, the regulation substantially reduced the hours worked among workers who worked more than the new legal limit. Third, it only marginally reduced annual earnings, and when combined with shorter work hours, this led to an increase in hourly wages among affected workers. Fourth, the reduction in hours appears to have been achieved through a decline in task volume rather than through an intensification of workload. Consequently, affected workers reported lower levels of fatigue, tension, depression, and work-life balance stress. Despite these positive effects on health outcomes, we find no evidence of a decline in job satisfaction or opportunities for skill development. However, improvements in overall life satisfaction and happiness are limited, possibly because workers require time to adjust their time-use patterns and derive utility from newly available non-work hours. Taken together, these results suggest that the imposition of an upper limit on working hours successfully achieved its policy objective without generating unintended consequences over the five-year period following its implementation.

This study contributes to two strands of literature. The first is the literature on the impact evaluation of work-hour regulations. Numerous studies have assessed the effects of reducing statutory working hours and increasing overtime premium rates—typical policy tools aimed at curbing long working hours.[4] Despite the widespread adoption of these policies, their effects on actual working hours remain theoretically and empirically ambiguous. Calmfors and Hoel (1988) theoretically demonstrate that reducing statutory hours may not shorten actual working hours, as such policies do not affect the marginal wage for those already working beyond the threshold. Empirical evidence reflects this ambiguity: some studies report reductions in hours, while others find negligible or even adverse effects.[5] In contrast, relatively few studies have examined the effects of directly limiting overtime hours. Bae and Yoon (2014) show that overtime restrictions on nurses in the U.S. reduced their working hours, and Dolton et al. (2015) report similar effects among senior doctors in the U.K. Studies on Korea's 52-hour workweek limit by Carcillo et al. (2023) and Choi and Kang (2025) consistently demonstrate that the reduction in working hours for regular workers was offset by an increase in labor from non-regular workers—either through increased hours or higher employment—signaling a substitution from long-hour regular jobs to non-regular employment as firms adapted to the regulation. Toda (2023) and Lee (2023) analyze the same Japanese policy examined in this paper and document significant reductions in working hours.

[4] e.g., France: Crépon and Kramarz (2002); Estevão and Sá (2008); Sánchez (2017); Costa-Font and de Miera Juarez (2018); Lepinteur (2019); Germany: Cygan-Rehm and Wunder (2018); Portugal: Sánchez (2017); Lepinteur (2019); Asai et al. (2023); Japan: Kawaguchi et al. (2017); Hamermesh et al. (2017); Korea: Ahn (2016); Hamermesh et al. (2017)

[5] Kalwij and Gregory (2005) found that a reduction in the statutory workweek increased overtime incidence and hours using 17 years of UK panel data. Kawaguchi et al. (2017) report heterogeneous effects depending on pre-reform hours, consistent with Calmfors and Hoel (1988). Hamermesh and Trejo (2000) found that introducing overtime premiums for Californian men in 1980 reduced hours worked, but the effect was modest. Asai (2014) report that the 2010 increase in Japan's overtime premium had no significant effect on hours worked.

Burdin et al. (2025) further find that, although the regulation reduced overtime and slightly lowered earnings, it did not lead to statistically significant improvements in life satisfaction. Our study builds on this by using panel data on individual workers and a wider range of outcome variables to analyze the effects of the subsequent 2019 statutory overtime cap. We extend the analysis to include workplace task allocation, skill investment, engagement in side-job, self-reported health, and subjective well-being, thereby contributing to a more comprehensive understanding of how overtime limits affect worker welfare.

The second strand of literature to which this study contributes examines the impact of working hours on overall well-being, using overtime regulations as a natural experiment. Previous studies that exploit changes in statutory working hours or overtime premium rates yield mixed results. Hamermesh et al. (2017) and Lepinteur (2019) demonstrate that reductions in the statutory workweek increase worker satisfaction. In contrast, Estevão and Sá (2008) report smaller or even negative effects for individuals who worked extensively prior to the regulation, particularly men and managers. Moreover, Holly and Mohnen (2012) find that increased working hours and overtime are positively associated with life and job satisfaction, except among workers who desire shorter hours. These mixed results may reflect true heterogeneity in the effects of working hours on well-being outcomes. However, they may also reflect heterogeneity in how changes in statutory hours or overtime premiums affect actual hours worked, potentially violating the monotonicity assumption required for a Local Average Treatment Effect (LATE) interpretation of the instrumental variable estimand. Our findings, which exploit an exogenous and monotonic reduction in working hours among long-hour workers, indicate that shorter working hours improve self-reported health without compromising job and life satisfaction. Furthermore, our analysis of workers' job perceptions suggests that firms absorbed the effects of the regulation primarily through workplace task reorganization. From a policy perspective, we argue that the regulation effectively achieved its intended objectives—namely, eliminating excessively long working hours, promoting worker health, and improving work-family balance.

The remainder of this paper is structured as follows. Section 2 provides institutional background on the overtime regulation. Section 3 describes the data and presents aggregate descriptive evidence. Section 3.3 reports the estimation results for hours worked. Section 4 reports the estimation results for other outcomes. Section 5 assesses the robustness of the findings. Section 6 concludes.

2 Institutional background

This section introduces the structure of Japan's working hour regulations and the 2019 reforms of the overtime regulation.

Japan's Labor Standards Act have set the statutory working hours at 8 hours per day and 40 hours per week since 1994. If an employer requests employees to work beyond the statutory working hours,

the employer must establish a labor-management agreement with a labor union or employee representative in accordance with Article 36 of the Labor Standards Act, which needs to be approved by the Employment Standards Inspection Office.[6] The employer has to pay a wage premium of at least 25% for hours above the statutory hours.[7] Overtime hours specified within the agreement must conform to the limit standards notified by the Minister of Health, Labor and Welfare.[8] However, on a special occasion when an employer has to have workers work longer than the limit standard notification, the firms may be permitted to do so by inserting Special Article into the 36 Agreement.[9] The typical agreement includes the clause so that the overtime ceiling is virtually not a strict limit (Hamaguchi, 2018).

Japan's 2019 amendment to the Labor Standards Act introduced, for the first time, a legally enforceable cap on overtime work, limiting it to no more than 45 hours per month and 360 hours per year under ordinary conditions. However, in cases of temporary and exceptional business demands, employers may invoke a special provision in the labor-management agreement (the so-called Article 36 Agreement) to temporarily exceed these limits. Even in such cases, strict ceilings apply: annual overtime must not exceed 720 hours, total overtime and holiday work must remain below 100 hours in any single month, and the average over any two to six consecutive months must stay within 80 hours. Additionally, the standard monthly cap of 45 hours may only be exceeded in up to six months per year. Violations of these regulations may be subject to criminal penalties, including imprisonment for up to six months or a fine of up to 300,000 yen.

While the new overtime regulation consists of multiple criteria, this study focuses on the annual upper limit of 360 hours, as compliance with this threshold ensures adherence to all other conditions. These multiple thresholds are designed to account for seasonal variation in overtime demand, but implementing month-by-month scheduling adjustments can be administratively burdensome for human resource managers. The annual limit of 360 hours translates to approximately 7 hours of overtime per week, assuming a 52-week year (360 hours $\div$ 52 weeks $\approx$ 7 hours/week). Given that the statutory weekly working time is 40 hours, we define 47 hours per week as the effective upper bound on total working hours under the regulation.[10]

The regulation took effect on April 1, 2019. Small and medium-sized enterprises (SMEs) were

[6]The agreement must contain the following five points: (a) reason for overtime work or work on rest days, (b) duty and numbers of applicable workers, (c) extended hours per day, per month, and per year, (d) days when a worker works on rest days and the opening and closing times, and (e) valid term.

[7]Starting in 2010, the overtime premium rate for employees who work more than 60 hours of overtime per month has been raised to 50% for large firms. Its application to SMEs has been postponed, but the 2018 amendment makes it effective in 2023.

[8]The Labor Standards Law was revised so that the Minister of Labor (now the Minister of Health, Labor and Welfare) would set standards (limit standard notification) to control overtime work over long periods in 1998.

[9]The Examples of a special occasion include "for the settlement of the budget and/or accounts," "for bonus sales," "to avoid missing deadlines," "to react to many complaints," "to deal with unexpected machinery trouble"

[10]Fukahori and Hagiwara (2014) uses the 45-hour monthly threshold as the criterion. Toda (2023) also defines the treatment group as workers whose average monthly hours exceed 45, based on the Monthly Labor Survey and the Basic Survey on Wage Structure.

granted a one-year moratorium; however, many reportedly did not take advantage of this grace period, likely due to its short duration.[11] Certain occupations were granted longer exemptions: medical doctors, drivers, construction workers, and sugar manufacturing industry workers in Kagoshima and Okinawa prefectures received a five-year moratorium. In addition, workers engaged in research and development related to new technologies and products are entirely exempt from the overtime regulations. The new regulation applies to Article 36 Agreements concluded on or after the enforcement date and, because such agreements are typically valid for one year, the period from April 2019 to March 2020 is generally regarded as a transition period. However, since these agreements are often renewed in April—the beginning of Japan's fiscal year—the practical impact of this transition period is considered limited.

3 Data and descriptive statistics

3.1 Data and Sample Construction

We use the Japanese Panel Study of Employment Dynamics (JPSED). The JPSED encompasses approximately 50,000 individuals aged 15 and older, employing an Internet monitor survey method where qualifying respondents are chosen from monitors owned by INTAGE Inc.[12] The survey is conducted annually in January, and it focuses primarily on employment and living conditions in the previous year. This study uses data from 2016 to 2024, allowing us to observe individual situations from 2015 to 2023. Nine years of panel data enable us to follow individuals over time including the period before the regulation change and allows us to define those who worked longer than the newly implemented upper limit. The survey includes standard labor force survey items such as demographic backgrounds and labor market outcomes, as well as subjective responses that capture individual perceptions about life and work. This unique feature of the dataset allows us to explore the overall impact of the overtime regulation.

Our initial sample consists of 492,799 observations from 128,829 individuals observed over a nine-year period. We first restrict the sample to individuals who worked at least once between 2015 and 2018, yielding 351,596 observations from 76,397 individuals. We then further restrict the sample to individuals whose average weekly working hours during 2015–2018 are more than 27 hours, ensuring that the control group comprises workers with strong labor-market attachment; this restriction reduces the sample to 248,334 observations from 53,519 individuals. We additionally exclude company managers and executives, who were not subject to the regulation, resulting in 209,588 observations from 48,459 individuals. Finally, we drop workers in occupations for which the regulation was postponed until April 2024—such as medical doctors, drivers, and construction workers—leaving a final analysis sample of

[11] Firm size is defined based on capital and the number of employees. See Table A.1.

[12] The sample design is based on "Labour Force Survey" conducted by the Statistics Bureau of the Ministry of Internal Affairs and Communications. The allocation includes considerations for gender, age group, employment status, regional block, and educational background.

190,909 observations from 45,207 individuals.

We note that this analysis sample includes civil servants. National civil servants are not subject to the Labor Standards Acts and civil servants for local governments differ in whether they are required to conclude labor-management agreements depending on their occupation. However, they are all required to comply with the regulation on overtime work in principle from April 2019.

Workers engaged in research and development in new technologies and products, as well as those in the sugar manufacturing industry in Kagoshima and Okinawa Prefectures, are exempt from the regulation. However, both groups are included in the sample because the occupation and industry codes in the data are not granular enough to identify them separately.[13]

3.2 Variable Construction and Descriptive statistics

We use hours worked, annual earnings, workers' perceptions on the various aspects of their work, job satisfaction, subjective health status, and life satisfaction as outcome variables. This subsection provides details of each variable. All variables ask about the situation during the year prior to the survey. To avoid confusion, we label the year so that it indicates the timing of the observation, not the timing of the survey.

As explained in Section 2, the revised law implemented in 2019 prohibits employers from requiring or permitting employees to work 47 hours or more per week on a regular basis. Accordingly, we define the treatment group as individuals whose average weekly working hours during the pre-treatment period (2015–2018) are 47 hours or more, and the control group as individuals whose average weekly working hours during the same period are more than 27 but less than 47 hours.

Table 1 reports the descriptive statistics during the baseline period by the treatment status. The mean age of the control group is 42 years old, and 42% is female, average years of education is 14 years, 47% has a child or more, 52% is married. Individuals in the treatment group are younger, less likely to be female, more educated, and more likely to be married than those in the control group.

The work-related variables capture the outcomes of the main job including weekly working hours and annual earnings for all workers. Weekly working hours are based on the question that inquires about the average hours worked per week in December of the year prior to the survey. Hourly wage was calculated using annual earnings divided by weekly hours worked $\times$ 52 weeks for workers who are not paid based on hourly wages. Among the control group, the mean working hours per week is 39 hours, annual income is 3.8 million yen, and imputed hourly wage is 2,017 yen. By construction, the treatment group works longer hours, but they also earn higher annual income.

The workers' perception of their tasks consists of two questions: the amount of tasks (*I was over-*

[13]The number of workers in the sugar manufacturing industry is very small: the Annual Business Survey (Ministry of Internal Affairs and Communications, 2022) reports 920 employees (316 in Kagoshima and 604 in Okinawa) in the relevant category.

whelmed with more work than I could handle.) and the variety of tasks (*I was responsible for a variety of tasks and my job was not monotonous.*). The questions ask about the situation during the year before the survey, and the answers have a five-point Likert scale with the options of "agree", "somewhat agree," "neither agree nor disagree," "somewhat disagree," and "disagree." We transform the responses into a binary variable, indicating an individual chooses the top two categories of a five-point scale. Individuals in the treatment group are more likely to feel overwhelmed by their workload and to engage in a wider range of tasks than those in the control group.

To capture human capital investment, we define several dummy variables based on the respondents' experiences during the previous year. First, the OJT variable takes a value of 1 if the respondent had opportunities to acquire new knowledge or skills through practical work experience, with a sample mean of 0.27 among the control group. Regarding education and training away from regular duties, we distinguish between availability and participation: the Off-JT Opportunity variable equals 1 if such opportunities were made available, while the Off-JT variable equals 1 only if the respondent actually participated. The mean for Off-JT Opportunity is 0.34 among the control group, whereas the mean for actual Off-JT participation is lower at 0.27, suggesting a gap between the availability of and participation in formal training. Finally, we define the Self-Development variable as a dummy assigned a value of 1 if the respondent voluntarily engaged in work-related learning—such as self-study or attending external courses—independently of firm-led programs, which shows the mean among the control group at 0.34. The comparison of the control and treatment groups reveals that those in the treatment group are slightly more likely to engage in skill investment.

Two variables captures the engagement in side jobs. The dummy variable indicating the engagement in side job captures the extensive margin and the hours in the side job captures the intensive margin. Reflecting the longer working hours in the main job, the workers in the treatment group is less likely to engage in the control group in the baseline period.

The health-related variables are constructed from the responses to three questions regarding health conditions: feel extreme fatigue, feel mental tension, and feel depressed. The available responses for these questions are "Always", "Often", "Sometimes", "Rarely", or "Never". We transform the 5-point Lickert scale variable into a binary variable that takes one if the response is either "Always" or "Often." The variable Work-family Balance Stress is constructed from a 5-point Likert scale response to the question of whether the respondent feels stress in balancing work and family life variable with the choices "feel the stress strongly," "feel the stress," "feel the stress a little," "did not feel the stress," and "did not feel the stress at all." The variable Work-Life Balance Stress takes the value one if the respondent chooses "feel strongly," "feel," or "feel little." The comparison of the control group and treatment group indicates that those in the treatment group are less healthy, indicating the negative correlation between

work hours and health status.

To evaluate the reform's impact on worker well-being, we utilize variables capturing both job and life satisfaction. Job satisfaction is assessed through two distinct aspects: the feeling of personal growth ("I felt I was growing through my work") and overall job satisfaction ("I was satisfied with my job"). Regarding life-related well-being, we include measures for self-reported life satisfaction and happiness, based on five-point Likert scales ranging from "satisfied" to "dissatisfied" and "very happy" to "very unhappy," respectively. For all of these measures, we transform the original responses into binary variables. Specifically, each dummy variable takes a value of one if an individual chooses the top two categories (e.g., "agree" and "somewhat agree," or "satisfied" and "fairly satisfied") and zero otherwise. A preliminary comparison of the groups reveals that those in the treatment group (working 47 hours or more per week) generally report lower levels of both job and life satisfaction compared to the control group (working less than 47 hours).

The observed baseline differences between the treatment and control groups necessitate an individual fixed-effects specification to account for time-invariant unobserved heterogeneity. While individual fixed effects are perfectly collinear with the treatment indicator, this does not preclude their use; our analysis identifies the policy impact by examining the relative changes in outcomes over time, rather than their levels.

3.3 Changes in hours worked

As a first step to assess the impact of the overtime regulation on hours worked, we first describe the changes in hours worked before and after the implementation of the new regulation.

We first examine how the distribution of weekly work hours has changed after the implementation of the 47-hour limit in 2019. Figure 1 illustrates the histogram of the weekly work hours in 2018 and before, and in 2019 and after. The figure shows that those who work 48 hours, 50 hours, and 60 hours have decreased, and those who work 35 hours, 40 hours, and 45 hours have increased after the implementation of the 47-hour limit. This shift in the distributions suggests that those who used to work more than 47 hours reduced the hours worked to comply with the newly implemented overtime limit.

To compare changes in working hours between workers directly subject to the 2019 reform and those who were not, we examine individuals who averaged 47 hours or more per week during 2016–2018 (the treatment group) and those who worked fewer hours (the control group). Figure 2 shows that the two groups followed similar pre-2019 trends in working hours, which is consistent with the parallel-trends assumption and suggests that no major reforms or shocks differentially affected the two groups prior to the policy change. After 2019, working hours converged markedly: the treatment group reduced weekly working hours by approximately 8 hours from 54 hours to 46 hours, whereas the control group

experienced a decline of less than one hour from 39 hours to 38 hours.

In the analysis above, we neglected the one-year moratorium period given to SMEs because the analysis by firm size renders similar results as reported in Appendix A. This evidence suggests that workers working for large firms and SMEs reduced their working hours after 2019, despite the fact that a one-year moratorium period was given to SMEs. Appendix A provides an argument why large firms and SMEs reduced hours worked from 2019.

4 Event study of the policy impact

4.1 Empirical strategy

We next conduct the two-way fixed effects event study extending the outcomes beyond hours worked, such as annual earnings, the respondents' perception on tasks, the respondents' perception on skill development opportunities, engagement in side jobs, subjective health status, and subjective well-being. The event study allows us to check if the common trend assumption is a plausible assumption by examining both treatment and control groups share the similar trends of outcome variables in the periods before the implementation of the policy in 2019.

Instead of comparing those who worked 47 hours or more (the treatment group) and those who worked less than 47 hours (the control group), we exploit the heterogeneity in the treatment intensity within the treatment group by measuring the gap between the average weekly hours worked before 2019 and the threshold – 47 hours. The larger the gap, the more the intensity of the treatment. More concretely, we define a variable "overtime gap" as follows:

$$Gap_i = \max\{\frac{1}{4}\sum_{t=2015}^{2018} WH_{it} - 47, 0\}.$$

The estimation equation of the event study is following:

$$Y_{i,t} = \sum_{j \neq 2018} \gamma_j \mathbb{1}[t = j] Gap_i + \delta X_{i,t}^{'} + c_i + d_t + u_{i,t} \tag{1}$$

where $Y_{i,t}$ includes weekly working hour, annual earnings, hourly wage, respondent's perception on task assignments, self-reported health status, the respondents' perception on skill development opportunities, job satisfaction, and life satisfaction. The vector $X_{i,t}$ includes Age, age square, dummy variable for having a child, dummy variable for being married. Individual fixed effects c_i, and year fixed effects d_t are allowed for. We allow for the correlation of $u_{i,t}$ within the same individual over time by adopting the cluster robust standard errors. The key parameters of interest are γ_j, which signify the effect of the overtime regulation on the outcome variables for each year.

4.2 Results

4.2.1 Working hour

Figure 3a shows the impact of the overtime regulation on weekly working hours for the entire sample. More concretely, it depicts the coefficients of the interaction term between the year dummy and the variable "overtime gap" in Equation (1) and the associated 95% confidence intervals. It shows a significant reduction in weekly working hours due to the overtime regulation. A one-hour increase in pre-policy working hours from the threshold results in a 0.75 hour decrease in working hours right after the implementation of new regulation. The estimated impact grows as time passes and in 2023 the one hour gap results in an one hour reduction of hours worked. All these results are precisely estimated and statistically significant at the 1% significance level.

To incorporate the one-year moratorium given to SMEs, we conduct subsample analysis based on firm size, as shown in Figure 3b and 3c. The estimated impacts are slightly smaller for SMEs than those of large firms, but the differences are not statistically significant. This finding reassures that the one-year moratorium period given to SMEs plays a negligible role.

In sum, our findings reveal that long-hour worker decrease their working hours after the implementation of the new regulation. The shift of long-hour workers below the threshold corresponds to the findings of Carcillo et al. (2023), where working hours are concentrated within the legal limit of the new regulation.

4.2.2 Earnings

Imposing the upper limit on hours may reduce earnings by reducing the overtime premium. To examine this, we implement the event study using the natural logarithm of annual earnings, including the base salary, overtime pay, and bonuses, as the outcome variable. Estimation result reported in left panel of Figure 4 shows that the implementation of the regulation did not reduce the annual earnings in statistically significant ways, except for 2022 when the magnitudes were limited to -0.005 log points. This constancy of annual earnings implies the increase in hourly wage rate. To ease the interpretation of the impacts on the hourly wage, we calculate it by dividing the annual earnings by the weekly hours worked in December times 50 (weeks). We then use the natural logarithm of hourly wage as the outcome variable and repeat the event study estimation. The estimation results reported in Panel B of Figure 4 show increases in hourly wage by about 0.015 log points. In other words, those who used to work one hour more than the newly implemented hours limit enjoyed about 1.5 percent increase in hourly wages.

These results align with previous studies on the reduction of the statutory workweek that tend to report that reduction in working hours does not affect monthly wages or annual bonuses (Estevão and

Sá, 2008; Kawaguchi et al., 2017).[14]

4.2.3 Task amount and variety

The reduction of work hours due to the implementation of work hour regulations may be compensated by increased employment or efficiency of work. Indeed, Carcillo et al. (2023) pointed out that the regulation of maximum weekly working hours in Korea has redistributed working hours within firms, suggesting the reallocation of tasks among workers. While our dataset does not allow us to directly observe the firm's reaction regarding task reallocation, our dataset records how workers perceive their jobs in terms of task amount and task variety. Thus, to shed light on the mechanism through which the reduction in work hours was absorbed, we next examine how the implementation of work hour regulation changed workers' perceptions of their task amount and variety.

Figure 5 Panel (a) illustrates the evolution of the treatment effects on the probability to answer either "applicable' or "rather applicable" to the question "I was overwhelmed with more work than I could handle." The figure shows that the work hour regulation decreased the probability by about 0.01 whereas the mean of the outcome variable in 2018 was 0.276. These results imply that those who used to work one hour longer than the upper limit became less likely to feel that they are overwhelmed by about 4 percent. Reducing working hours while maintaining the same workload may increase the burden on workers, but this result implies that firms have reduced the task amount. This speculation is bolstered by the results reported in Panel (b), showing the probability to agree with the statement "My job was not monotonous engaging in a variety of tasks" decreases by about 0.4 percentage points whereas the mean of the variable in 2018 was 0.114. In sum, the analysis of the workers' perception on task amount and variety suggests that the reduction of work hour was partially attained through the reorganization of tasks at work places.

4.2.4 Skill investment

Whether skill accumulation takes the form of on-the-job training or participation in dedicated vocational programs separate from regular work hours, it is inherently a time-intensive activity. This notion is consistent with the finding that hours worked is positively correlated with engagement in skill investment as reported in the descriptive statistics. Consequently, during the policy-making process, concerns were raised that imposing a cap on working hours might deprive workers—particularly the younger generation—of opportunities for skill development. Conversely, overtime regulations may stimulate

[14]Estevão and Sá (2008) looked the change in income in the reduction of the statutory workweek in France, from 39 to 35. Because the law mandated that the monthly earnings of workers receiving the minimum wage should stay constant, they analyze separate samples for workers receiving near minimum wage and workers receiving more than minimum wage. Workers receiving near minimum wage enjoyed the increase in hourly wage by 3.4%, while workers receiving more than minimum wage also benefited from the wage increase by 2.3%.

skill investment by necessitating improvements in hourly labor productivity. For instance, the adoption of new online systems to enhance efficiency might be accompanied by training programs to facilitate their use. Given these competing views, an overtime cap could either decrease or increase skill investment. The ultimate impact of such regulations on future labor productivity and worker welfare depends on which of these effects prevails. Therefore, it is crucial to empirically examine which of these two possibilities holds true.

Figure 6, Panels (a), (b), and (c), illustrate the evolution of the treatment effects on the probability of engaging in On-the-Job Training (OJT), the opportunity to participate in Off-the-Job Training (Off-JT), and actual engagement in Off-JT activities, respectively. Panel (a) reveals that the imposition of the overtime cap significantly increased the probability of participating in OJT. Specifically, the estimates suggest that a one-hour reduction in working hours (relative to the pre-reform level of 47 hours or more per week) is associated with a 0.3 percentage point increase in the probability of OJT participation. This effect is economically meaningful; given that the reform reduced the working hours of the treatment group by an average of eight hours, the cumulative impact on OJT participation is about 2.4 percentage points, which is approximately 9% of the control group mean. The growth in OJT participation likely stems from adaptation to reorganized task structures or the introduction of new machinery to offset reduced working hours. The growth in OJT participation likely stems from adaptation to reorganized task structures or the introduction of new machinery to offset reduced working hours. In contrast, we find no statistically significant changes in either the opportunity for or actual participation in Off-JT (Table B.4). Similarly, the overtime cap had no detectable impact on engagement in self-development activities.

In sum, contrary to the concerns raised by some policymakers, we find no systematic evidence suggesting that the overtime cap leads to a reduction in skill investment opportunities.

4.2.5 Side-job

If the capping overtime forces workers to work fewer than their optional hours, they may hold a secondary job other than their main job. Indeed, concerns have been raised among some policymakers that the overtime cap may not effectively reduce total labor supply, as it could unintentionally incentivize workers to engage in side jobs. For instance, in a November 2025 budget committee session, Prime Minister Sanae Takaichi noted that strict overtime regulations might lead to a reduction in overtime pay, forcing some workers to seek additional income through side jobs to cover living expenses. This perspective suggests that the regulation might merely shift labor from the primary employer to other venues, potentially undermining the original intent of the reform and compromising worker health.

To address these concerns, we empirically examine whether the policy change led to a substantive

increase in side-job engagement. Figure 7 presents these impacts at both the extensive margin (Panel a) and the intensive margin (Panel b). Panel (a) reveals that the imposition of the cap significantly increased the probability of taking up side jobs. Specifically, each hour beyond the threshold is associated with a 0.2 percentage point increase in side-job participation. Given that the reform reduced the working hours of the treatment group by eight hours on average, the cumulative impact is approximately a 1.6 percentage point increase, representing 16% of the control group mean. However, the impact on the intensive margin is quite limited; Panel (b) shows that working one hour beyond the threshold increases side-job duration by only about 0.015 hours. Thus, an eight-hour reduction in overtime hours translates to 0.12 hours, or roughly 7 minutes. Overall, while some workers attempted to mitigate the reduction in hours by taking up side jobs, this offsetting effect on total labor supply is negligible.

In sum, our findings suggest that the overtime cap has achieved its primary goal without triggering the adverse side effects feared by policymakers. We find no evidence of a meaningful spillover into side-job labor hours that would offset the reduction in main-job hours.

4.2.6 Health

We next study how curtailing long working hours affects workers' health status. Existing studies point to the harm of long working hours on health status and improvement of health status is one of the major policy goals (Cygan-Rehm and Wunder, 2018; Berniell and Bietenbeck, 2020; Sato et al., 2020).

Figure 8 presents the estimated effects for workers whose working hours exceeded the newly introduced cap prior to the regulation's implementation. Panel (a) shows the impact on the probability of responding "Always" or "Often" to the question regarding extreme fatigue. Although the point estimate of -0.005 may appear modest, it implies a 4 percentage point reduction in the probability of extreme fatigue, given that working hours in the treatment group declined by approximately eight hours. This cumulative impact is substantial relative to the control group mean of 31.8 percent.

Panel (b) presents similar estimates for whether the respondent feels tension, with an effect size of around -0.002. An eight-hour reduction among the treatment group thus translates to a 1.6 percentage point reduction, which is notable compared to the control group mean of 29.9 percent. Panel (c) examines the likelihood of reporting feelings of depression; the results suggest that the regulation reduced depressive symptoms among long-hour workers, although the estimates are somewhat imprecise. The magnitude is comparable to the effect size estimated for tension. Panel (d) reports the impact on stress related to balancing work and family responsibilities, again indicating a reduction among long-hour workers despite some imprecision. The estimates imply that an eight-hour reduction in working hours reduces work-family balance stress by approximately 1.6 percentage points, relative to a control group mean of 73 percent.

In sum, imposing an upper limit on working hours significantly improves the physical and mental health of workers who previously worked long hours. The policy also appears to modestly reduce the level of work-family balance stress.

4.2.7 Subjective well-being

In a perfectly competitive market where working hours are optimally chosen by both employees and employers, government intervention in the form of work-hour regulations would necessarily reduce worker welfare. However, various labor market imperfections—such as labor market monopsony, negative externalities arising from "rat-race" equilibria, or workaholism—create scope for such regulations to be welfare-enhancing. This subsection investigates this possibility by examining changes in subjective satisfaction measures.

One major concern surrounding the introduction of an overtime cap was that it might restrict workers' opportunities for skill investment. Although this possibility was not supported by the analysis in the previous section, we further assess whether the regulation decreased perceived opportunities for personal growth.

Figure 9 Panel (a) reports the impacts on the sense of personal growth. The results show the absence of the impacts. Thus, the result implies that the criticism against placing the upper limit on overtime is not supported by the evidence to the extent this variable can capture.

Beyond specific issues on skill development, broader critiques pointed to the risk that limiting individuals' discretion over their working hours could undermine overall job satisfaction. These concerns rest on the premise that, in the absence of regulation, workers are capable of choosing their optimal work hours based on individual preferences. Therefore, the cap on overtime risks deteriorating job satisfaction. Figure 9 Panel (b) reports the impacts on subjective job satisfaction. The results show the absence of the impacts.

Building on this analysis of job-related outcomes, we next turn to broader measures of subjective well-being to examine whether the regulation affected workers' overall life satisfaction and happiness. Life satisfaction (Figure 9c), measured as the proportion of respondents reporting they were "satisfied," increased by about 0.2 percentage points for each additional hour worked beyond the threshold prior to the regulation. However, this increase is imprecisely estimated and statistically significant only in 2022. Figure 9d, which reports the estimated effects on happiness, similarly shows no discernible impact of the overtime limit on self-reported happiness.

In summary, the overtime regulation did not decrease job satisfaction among workers with longer pre-regulation working hours, despite concerns that government intervention might restrict the mutually beneficial arrangements between employers and employees. On the other hand, while the policy

contributed to better health outcomes, these improvements did not translate into statistically significant gains in broader subjective well-being—as measured by mitigated work-family balance stress, life satisfaction, or happiness. This lack of evidence is arguably due to the fact that subjective well-being is multifaceted, with working hours being only one of many determinants.

5 Robustness: The Effect of COVID-19

In this section, we assess the robustness of our analysis results, taking into account the possibility that the COVID-19 pandemic may have acted as a confounding factor in the main results.

The COVID-19 pandemic, which began in 2020, had a profound impact on individuals' lives and work environments. Its effects may have differed substantially between those who previously worked long hours and those who did not. To examine whether our main results are biased due to omitted variables related to the pandemic, we conduct robustness checks by incorporating two variables intended to capture the direct and indirect effects of COVID-19.

The first variable is a dummy indicating engagement in remote work, a phenomenon that expanded significantly during the pandemic. The surge in remote work may have altered working conditions in ways that confound our analysis of labor market outcomes. Crucially, the impact of remote work is likely heterogeneous across the distribution of working hours; for instance, workers who previously faced the longest hours may have experienced a more pronounced shift in their lifestyle through the elimination of commuting and improved time flexibility. If the positive effects of remote work—such as reduced overwork—are more substantial for long-hour workers, omitting this factor could bias our estimates of the regulation's impact on labor and income variables. This variable is constructed using responses to a survey question introduced in 2016, which necessitates dropping observations from 2015.

The second variable is the logarithm of the cumulative number of COVID-19 infections per 100,000 people at the prefecture level, referring to the 47 regional administrative units in Japan. The infection rate likely influenced stress levels, work content, and work arrangements, and may vary systematically across regions. Importantly, such regional variation may be correlated with the fraction of workers subject to the overtime regulation, thereby potentially confounding our treatment estimates. We use the "Number of Positive Cases (Cumulative)" from the Ministry of Health, Labour and Welfare's COVID-19 portal to calculate these values for 2020, 2021, and 2022.[15] Population estimates as of October 1st for each year are drawn from the Statistics Bureau's Population Estimates to compute incidence rates per 100,000 residents by prefecture.[16] We then merge this prefecture-level data with our main data set using individuals' prefecture of residence. For years prior to 2020 and 2023, the number of infections is

[15] https://covid19.mhlw.go.jp/extensions/public/index.html

[16] Population Estimates, Statistics Bureau, Ministry of Internal Affairs and Communications

set to zero, and for the period between 2020 and 2022, we use the logarithm of the incidence rate as the covariate.

Tables C.1, C.2, and C.3 show the results for working hours, log annual income, log hourly wage, variables capturing worker perceptions of their job, variables capturing health, job satisfaction, life satisfaction, and happiness, respectively. The results reported in these tables reassure the robustness of the results presented before.

6 Conclusion

We examine the impact of Japan's 2019 overtime regulation on a range of labor market and well-being outcomes—including working hours, earnings, task volume, skill investment, engagement in side jobs, self-reported health, and subjective well-being—using a nine-year panel dataset covering 2015 to 2023. We employ an event study design, where the treatment group is defined as workers who averaged 47 hours or more per week prior to the implementation of the regulation. Our results show that the policy significantly reduced labor supply: for every hour worked beyond the threshold, weekly working hours decreased by approximately 0.9 hours. Interestingly, despite this reduction, annual earnings declined only slightly, resulting in a statistically significant increase in implied hourly wages of about 1.3

The regulation successfully achieved its primary health-related objectives, as evidenced by improved self-reported health. Furthermore, our findings alleviate ex ante concerns regarding adverse side effects, as we find no evidence that the policy diminished skill development opportunities or lowered job satisfaction. However, the improvements in health conditions did not translate into broader gains in subjective well-being, such as life satisfaction or happiness, highlighting the multifaceted nature of these well-being measures.

Our findings are consistent with previous studies and provide strong evidence that setting a cap on working hours can be effective in alleviating excessively long work hours.[17] However, few prior studies have examined how such regulations affect workers' well-being through reductions in working hours. By explicitly evaluating these impacts, our study contributes novel evidence on the broader implications of capping overtime for workers' welfare, moving beyond traditional work hour metrics.

While our findings offer important insights, several questions remain open and point to promising directions for future research. One important direction for future research is to investigate how firms adjusted their production inputs and production scale in response to the regulation. Since our analysis relies on worker-reported data, information on firm behavior remains limited. A key question is whether firms responded to the overtime limit by increasing employment, investing in capital, or adjusting their

[17] Overtime regulation: Bae and Yoon (2014) on U.S. nurses; Toda (2023) on Japan. Maximum workweek limits: Dolton et al. (2015) on the UK; Carcillo et al. (2023) on Korea.

production scale. Alternatively, firms may have modified their management practices to reduce reliance on long working hours. For example, Tanaka et al. (2024) finds that HR interventions such as production monitoring and target setting are associated with lower incidences of overtime work beyond 45 hours per month. Building on this insight, it is plausible that the overtime regulation may have accelerated the adoption of such efficiency-enhancing practices by firms. These adjustments may, in turn, affect productivity and profitability. Future research should explore these channels in more detail.

Another important area for future research is the regulation's impact on gender inequality in the workplace. Existing studies have noted that, given the unequal division of household and childcare responsibilities, the long working hour norms often expected in high-paying positions can hinder women's entry and advancement in such roles (Goldin, 2014; Wasserman, 2023). From this perspective, it is important to examine whether the imposition of an upper limit on working hours has facilitated greater advancement of women into managerial positions or high-wage occupations.

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Table 1: Descriptive Statistics, base line period: 2015-2018

Group	Control	Treatment	Diff
Mean hours 2015-2018	< 47	≥ 47	
Demographic characteristics			
Age	42.09	39.47	−2.62
	(12.28)	(10.31)	(0.09)
Female	0.42	0.19	−0.22
	(0.49)	(0.40)	(0.00)
Years of education	13.83	14.08	0.25
	(1.92)	(1.95)	(0.02)
Child (1 = yes)	0.47	0.47	0.00
	(0.50)	(0.50)	(0.00)
Marriage (1 = yes)	0.52	0.57	0.04
	(0.50)	(0.50)	(0.00)
Outcome variable			
Weekly working hour	39.29	53.88	14.59
	(7.24)	(10.88)	(0.08)
Annual income (ten thousands yen)	382.45	474.71	92.26
	(239.71)	(242.18)	(1.94)
Hourly wage (Yen)	2017.14	1761.71	−255.42
	(2848.79)	(1099.46)	(13.10)
Worker's perception of their work			
I was overwhelmed more tasks than I could handle (Task amount)			
{applicable, rather applicable} = 1	0.23	0.43	0.20
	(0.42)	(0.49)	(0.00)
My job was not monotonous engaging in a variety of tasks (Variety of task)			
{applicable } = 1	0.39	0.49	0.11
	(0.49)	(0.50)	(0.00)
Training			
OJT (1 = yes)	0.27	0.28	0.01
	(0.45)	(0.45)	(0.00)
OffJT opportunity (1 = yes)	0.36	0.39	0.03
	(0.48)	(0.49)	(0.00)
OffJT (1 = yes)	0.27	0.29	0.03
	(0.44)	(0.46)	(0.00)
Self-development (1 = yes)	0.34	0.40	0.06

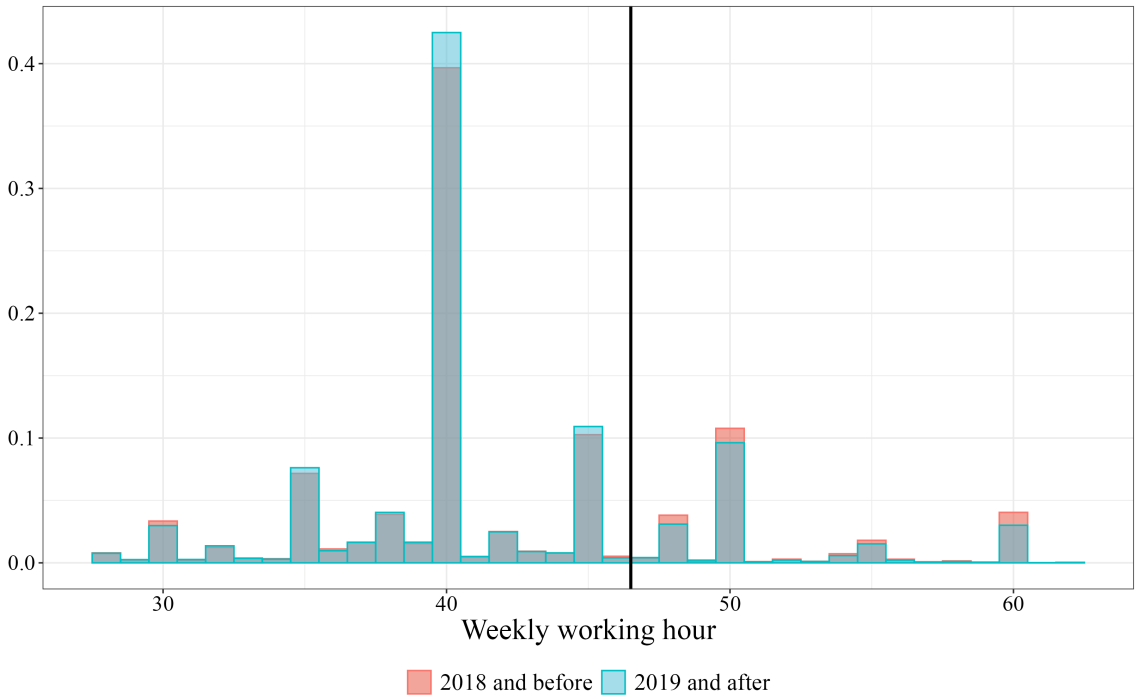
Continued on next page

Table 1 – continued from previous page

Variable	Control group	Treatment group	Diff
	(0.47)	(0.49)	(0.00)
Side job			
Side job (1 = yes)	0.10	0.07	−0.02
	(0.29)	(0.26)	(0.00)
Side job hour (weekly)	0.36	0.17	−0.18
	(2.17)	(1.57)	(0.01)
Health			
Extreme fatigue	0.30	0.39	0.09
{Always, often} = 1	(0.46)	(0.49)	(0.00)
Mental tension	0.29	0.37	0.08
{Always, often} = 1	(0.45)	(0.48)	(0.00)
Depressive mood	0.28	0.33	0.05
{Always, often} = 1	(0.45)	(0.47)	(0.00)
Work family balance stress	0.71	0.78	0.07
{Feel strongly, feel, feel little} = 1	(0.45)	(0.41)	(0.00)
Job and life satisfaction			
Perceived personal growth	0.28	0.31	0.03
{Satisfied, rather satisfied} = 1	(0.45)	(0.46)	(0.00)
Job satisfaction	0.35	0.33	−0.02
{Satisfied, rather satisfied} = 1	(0.48)	(0.47)	(0.00)
Life satisfaction	0.46	0.41	−0.05
{Satisfied, rather satisfied} = 1	(0.50)	(0.49)	(0.00)
Happiness	0.40	0.35	−0.05
{Very happy, happy} = 1	(0.49)	(0.48)	(0.00)
Num.Obs	75,364	20,055	
Individual	34,067	10,107	

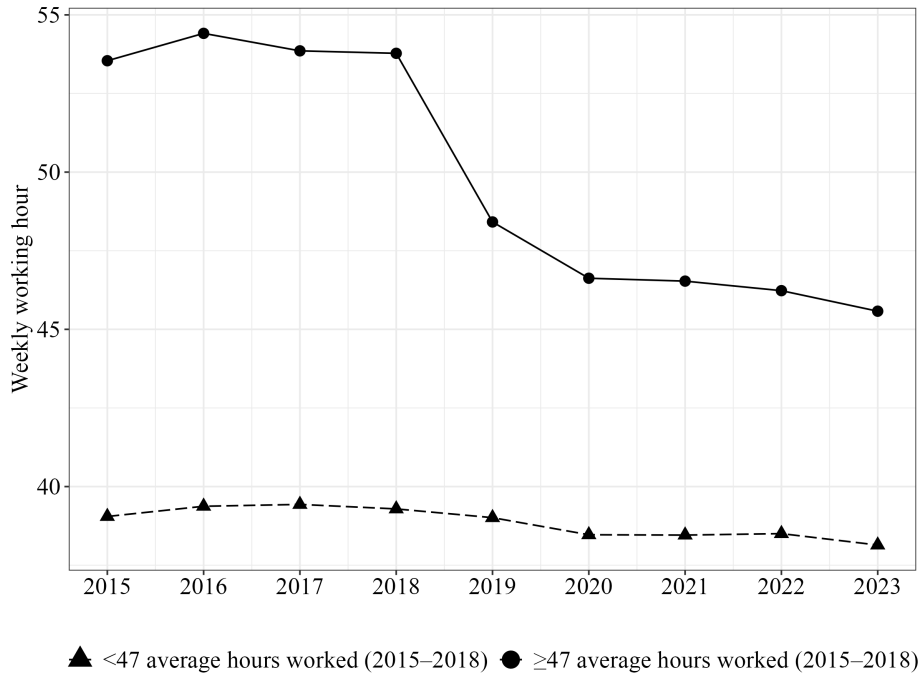
Notes: This table shows mean values before the restriction. Diff denotes the difference between the Treatment and Control groups. Parentheses in the Treatment group and Control group columns indicate standard deviations, whereas those in the Diff column indicate standard errors.

Figure 1: Distribution of average weekly working hours



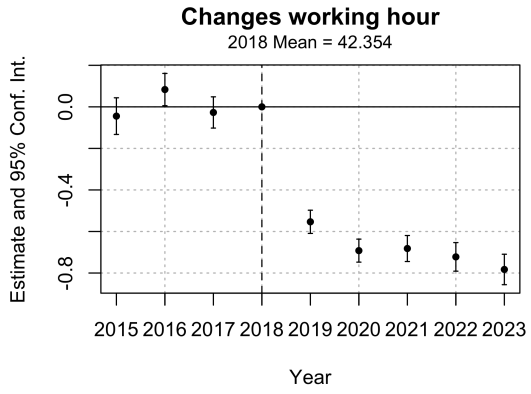
Only samples with weekly working hours between 28 and 62 hours are plotted. The mean of hours worked in 2018 and before is 42.35 (SD 10.08), and in 2019 and after is 40.40 (SD 10.51).

Figure 2: Evolution of average weekly working hours in the treatment and control group

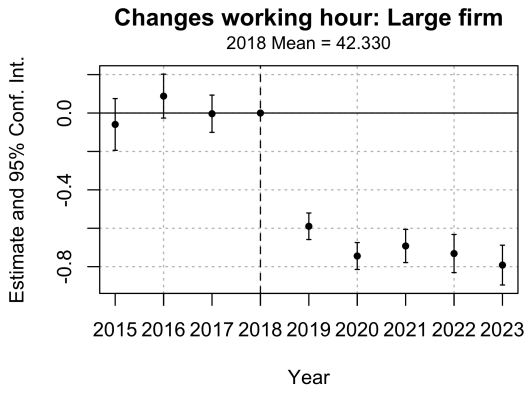


Notes: This figure plots the mean of weekly working hours for control group and treatment group for each year. The sample include regular and non-regular worker, large firm and SME. The treatment group is defined as workers who worked an average of over 47 hours per week between 2015 and 2018.

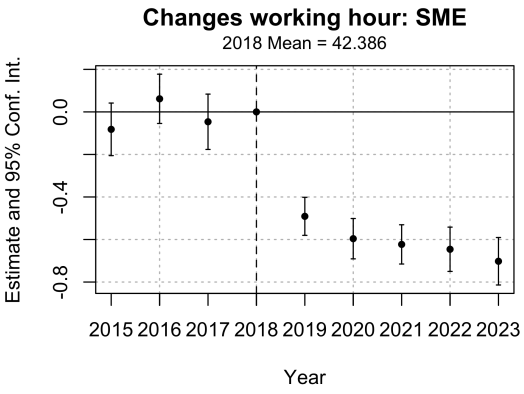
Figure 3: Changes in working hour: Event Study



(a)



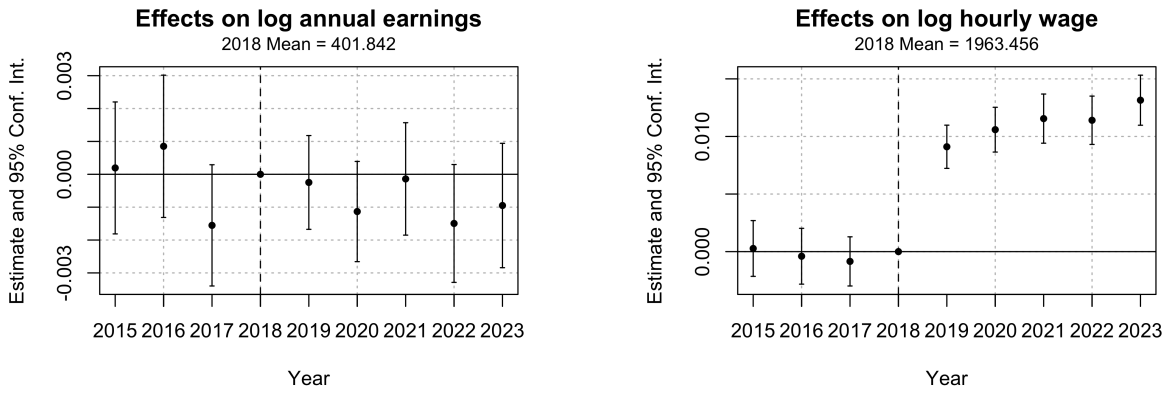
(b)



(c)

Notes: These figures illustrate the coefficients γ_j, derived from equation (1), with the dependent variable being weekly working hours. The base year is 2018, the year before the regulation was initiated for large firms. The model controls for demographic characteristics, year fixed effects, and individual fixed effects. Subsamples (b) and (c) corresponds to analysis specific to workers engaged in large firms, and workers engaged in SMEs respectively. Detailed analysis results can be found in Table B.1.

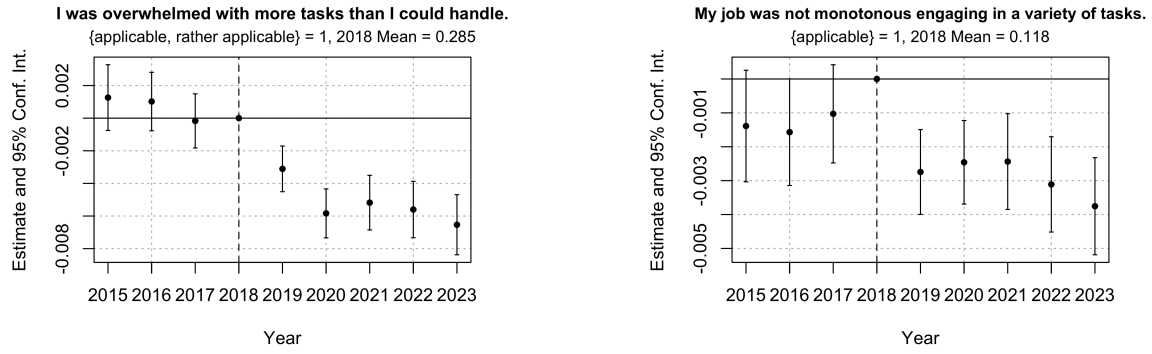
Figure 4: Effects on log annual earnings and hourly wage



(a) (b)

Notes: These figures present the impact of the overtime regulation on the natural logarithm of annual earnings and hourly wages, plotting the coefficients γ_j, derived from equation (1). The dependent variables are the logarithm of annual earnings (a) and hourly wages (b). The base year is 2018, the year before the enactment of the revised act. The model controls for age, its square, years of education, a dummy variable for being married, a dummy variable for having a child, year fixed effects, and individual fixed effects. Detailed analysis results can be found in Table B.2

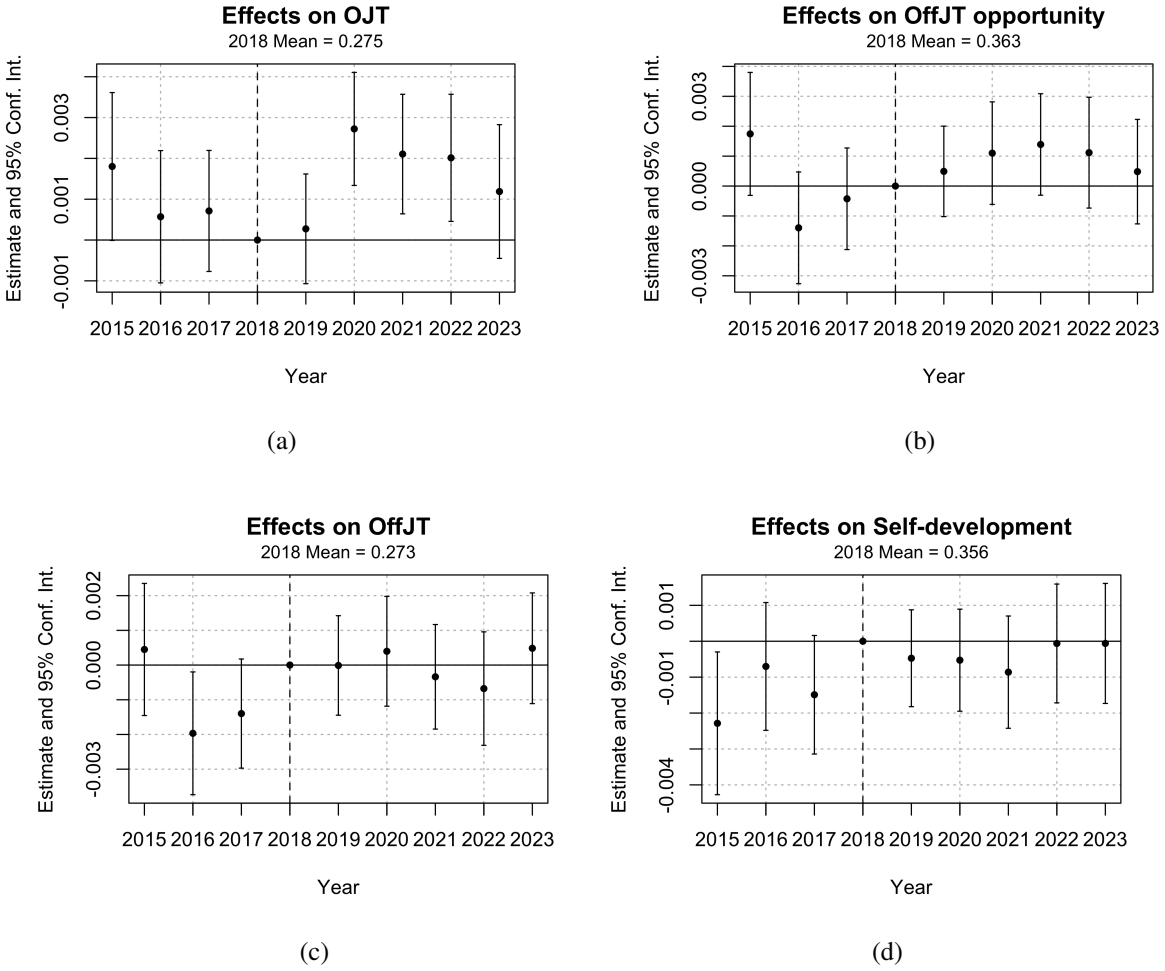
Figure 5: Impacts on workers' perception of their tasks



(a) (b)

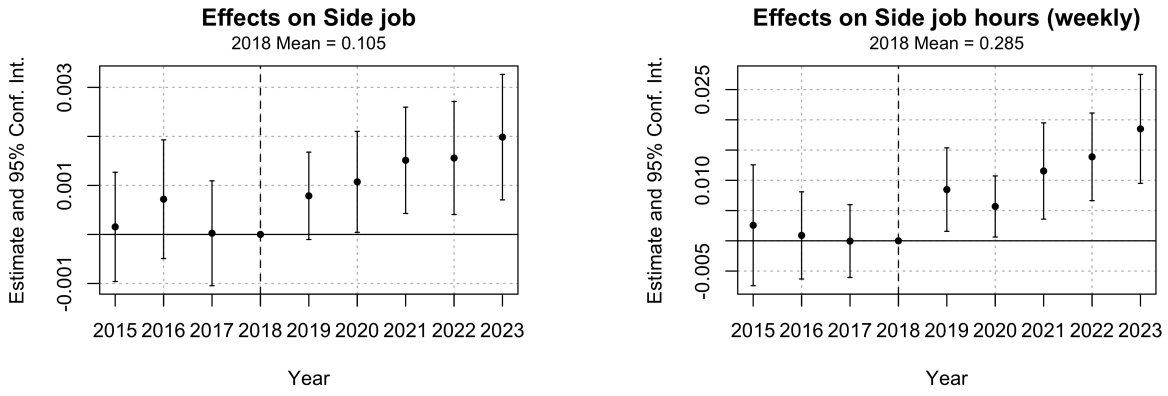
Notes: These figures illustrate the the coefficients γ_j, derived from equation (1), with the dependent variable being workers' perception for their work: "Task amount" (a) and "Task variety" (b). All questions are answered with an integer between 1 and 5, with options ranging from "disagree" to "agree". The dependent variable is a binary variable that takes 1 if answered in the top two of a five-point scale for "Task amount." For "Task variety" we define it as a binary variable the highest point on the five-point scale set to 1. The base year is 2018, the year before the enactment of the revised act. The model controls for age, its square, years of education, a dummy variable for being married, a dummy variable for having a child, year fixed effects, and individual fixed effects. Detailed analysis results are in Table B.3.

Figure 6: Effects on Training



Notes: These figures illustrate the coefficients γ_j, derived from equation (1), with the dependent variable being training variables. The base year is 2018, the year before the regulation was initiated for large firms. The model controls for demographic characteristics, year fixed effects, and individual fixed effects. In (a) and (b), we use as dependent variables dummy variables indicating whether workers received on-the-job training or off-the-job training, respectively. (c) use a dummy variable whether workers have an opportunity to receive off-the-job training. In (d), the dependent variable is a dummy variable that takes 1 if worker engage in self-development activities. Detailed analysis results can be found in Table B.4.

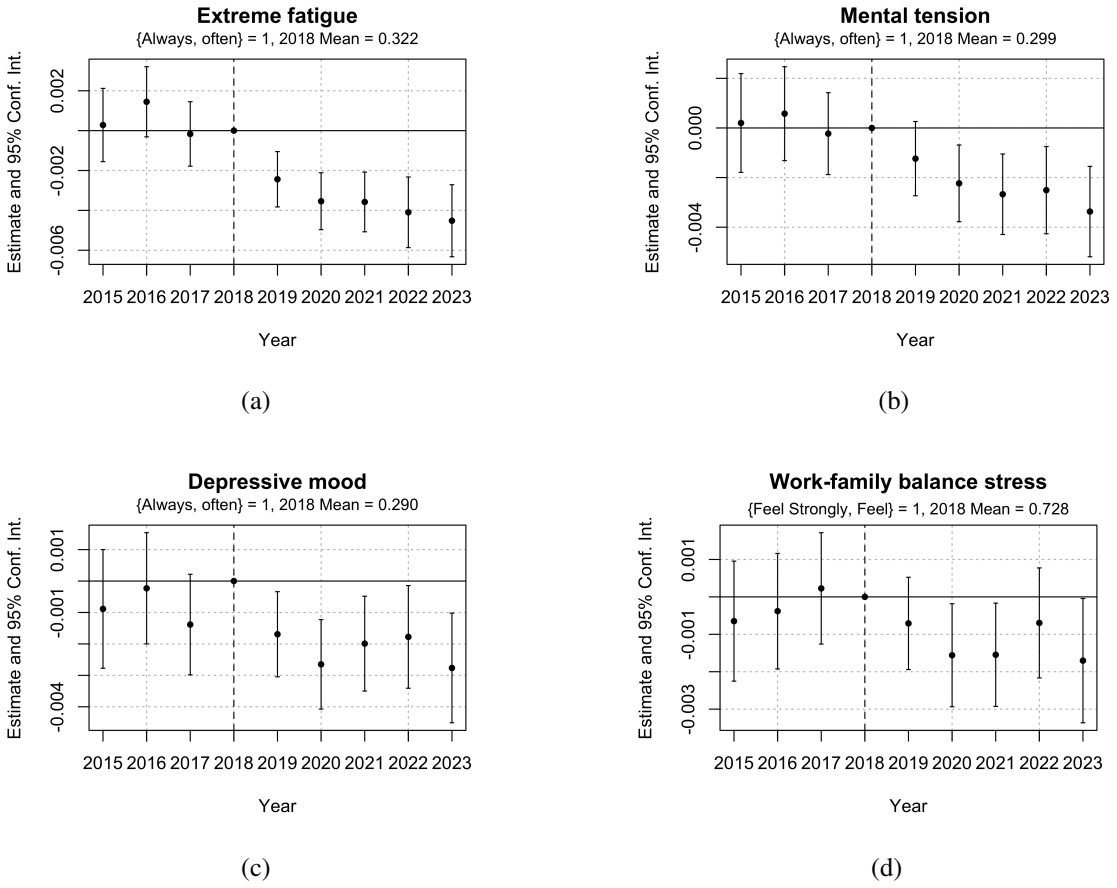
Figure 7: Effects on Side Job



(a) (b)

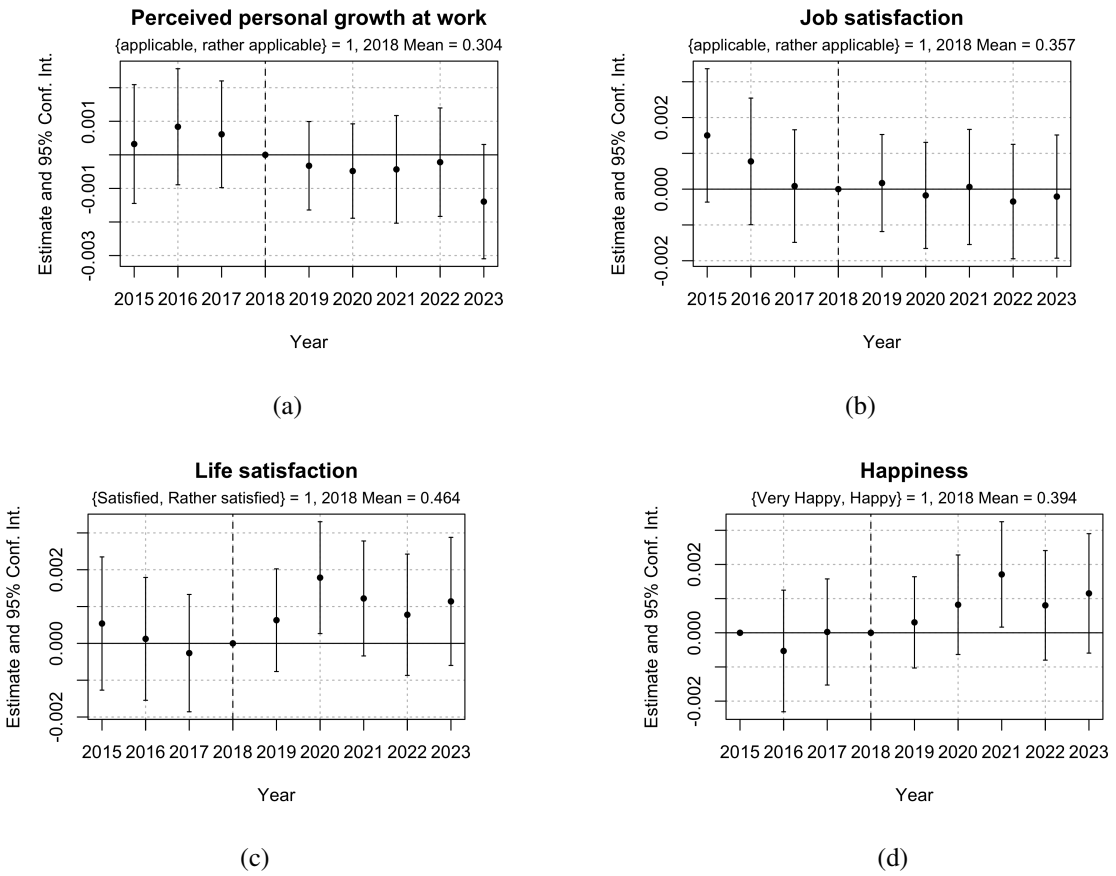
Notes: These figures illustrate the coefficients γ_j, derived from equation (1), with the dependent variable being side job variables. The base year is 2018, the year before the regulation was initiated for large firms. The model controls for demographic characteristics, year fixed effects, and individual fixed effects. In (a), the dependent variable is a dummy that takes the value 1 if the worker has a side job. In (b), the dependent variable is the number of weekly hours worked in a side job. Detailed analysis results can be found in Table B.5.

Figure 8: Impacts on Health



Notes: These figures illustrate the coefficients γ_j, derived from equation (1), with the dependent variable being job satisfaction variables. All questions are answered with an integer between 0 and 4, with options ranging from "Never" to "Always". And we set the dependent variable is a binary that takes 1 if the respondent answers "Often" or "Always". The base year is 2018, the year before the regulation was initiated for large firms. The model controls for demographic characteristics, year fixed effects, and individual fixed effects. Detailed analysis results can be found in Table B.6.

Figure 9: Impacts on job and life satisfaction



Notes: These figures illustrate the coefficients γ_j, derived from equation (1), with the dependent variable being job satisfaction variables. All questions are answered with an integer between 0 and 4, with options ranging from ”disagree” to ”agree”. The dependent variable is defined as a binary indicator equal to 1 if the respondent answers ”agree” or ”somewhat agree”. The base year is 2018, the year before the regulation was initiated for large firms. The model controls for demographic characteristics, year fixed effects, and individual fixed effects. The *Happiness* question was not administered in the first year of the panel. Detailed analysis results can be found in Tables B.7 and B.8.

A Moratorium given for SMEs

We neglected the one-year moratorium period given to SMEs throughout the analysis. This appendix provides an argument for this treatment.

We first introduce the one-year moratorium period given to the small and medium sized enterprise (SMEs) and examine if the moratorium induced the different timing of work hour reduction by the firm size.

The criteria to be recognized as SMEs in Japan are the capital amount and the number of permanent employees, which differ by industry as listed in Table A.1. Our data does not record the capital amount of the employer, we use only the number of employees to define SMEs.

Table A.1: Definition of small and medium-sized enterprises

Industry	amount of capital or total amount of investments	Number of workers employed on a regular basis
Retailing	$\leq$ 50 million yen	$\leq$ 50 employees
Services	$\leq$ 50 million yen	$\leq$ 100 employees
Wholesale trade	$\leq$ 100 million yen	$\leq$ 100 employees
Others	$\leq$ 300 million yen	$\leq$ 300 employees

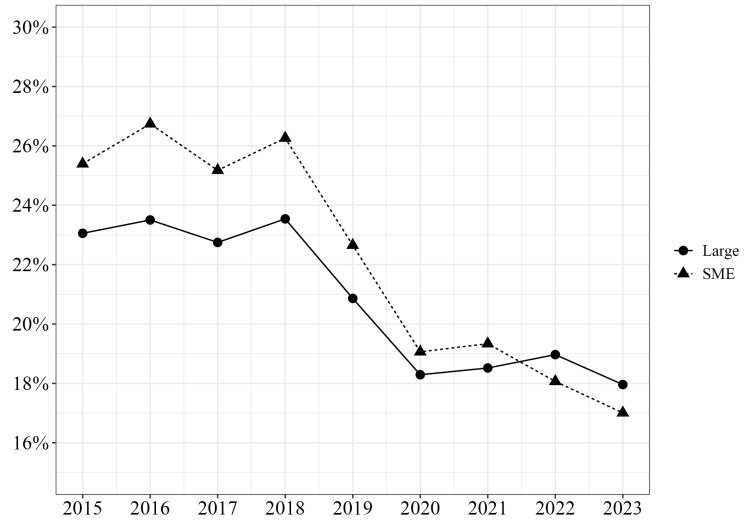
Notes: Small and medium-sized enterprises are those whose "amount of capital or total investment" or "number of workers employed on a regular basis" meet the criteria shown in the table above. Otherwise, they are defined as a large firm. "Others" in the industry column are industries such as manufacturing, construction, transportation, etc. that do not fit in the top three rows.
Source: The Small and Medium Enterprise Agency

Figure A.1 shows the proportion of workers who workers more than 47 hours per week by firm size.

The time series for large firms shows a decrease in the proportion of long-hour workers beginning in 2019. Similarly the time series for SMEs indicates a reduction in the share of long-hour workers starting in the same year. This suggests that SMEs did not utilize the one-year moratorium period.

The anticipation for the implementation of the new overtime regulation long before its 2019 enactment can well be a reason why SMEs did not use the moratorium period because the amendment had been under discussion since the inception of the Council for the Realization of Work Style Reform in 2016. Indeed, a survey on the readiness of the overtime regulation conducted by the Japan Chamber of Commerce and Industry (JCCI) for SMEs reported that more than 60% of SMEs answered that they "already addressed it or have a plan" as of April, 2019 (Figure A.2) ensuring that SMEs were ready for the expected implementation of the new limit in 2019.

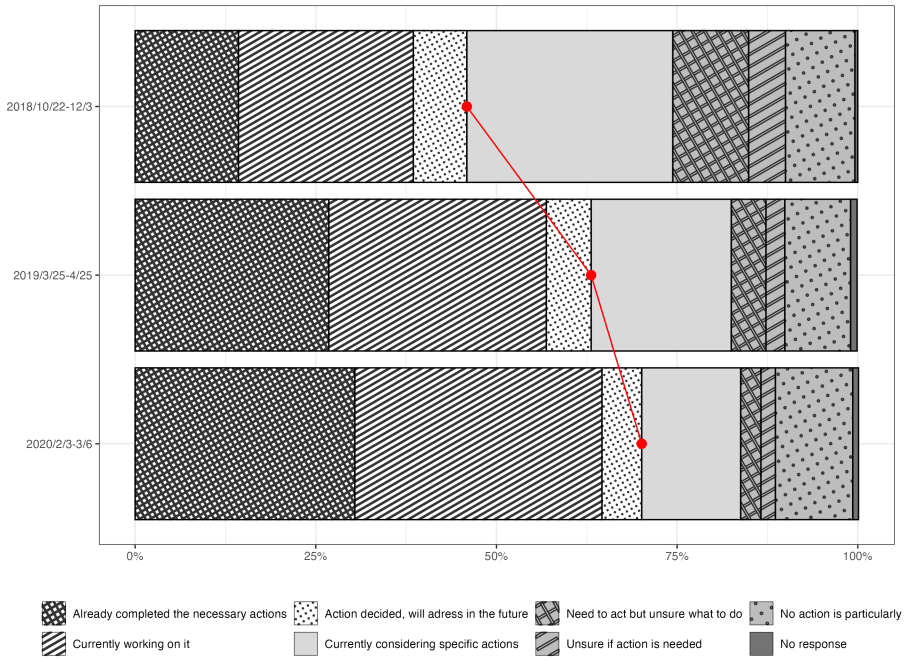
Figure A.1: Evolution of share of workers working over 47 hours per week by firm size



Notes: This figure shows the share of workers whose weekly working hours exceeding 47 hours, the approximate maximum number of hours.

Therefore, this study does not use differences in the start date of the regulation by firm size and defines the treatment year as 2019 regardless of the firm size.

Figure A.2: The preparation status of the overtime regulation



Notes: The survey conducted by the Japan Chamber of Commerce and Industry (JCCI) for SMEs. This figure plots the share of responses to a question about readiness regarding the overtime regulation. The responses of "have already taken necessary action", "we are in the process of taking action," or "have decided on specific action and plan to take action in the future" are counted as "Already addressed it or have a plan". The responses of "in the process of considering specific action", "need to take action but don't know what to do" or "don't know if action is needed" are counted as "do not have a clear plan" Other responses are, "No special action is needed." The regulation for large firm began in April 2019 and for SMEs in April 2020. Details about this survey are provided in the Table A.2 in the Appendix
Source: 'Survey on Awareness of and Readiness for Work System Reform Laws'

Table A.2: Survey on Awareness of and Readiness for Work System Reform Laws

Survey Period	2018/10/22-12/3	2019/3/25-4/25	2020/2/3-3/6
Participating local CCI	413	407	417
Subject of survey	2881	4125	4125
Responding firm (rate)	2045 (71%)	2775 (67.3%)	2838 (68.8%)

Notes: Survey area is 47 prefecture. Method by on-site survey by staff of local chambers of commerce and industry (local CCI).
Source: https://archive.jcci.or.jp/20190109%20for%20press.pdf
https://archive.jcci.or.jp/hitodebusoku.pdf
https://archive.jcci.or.jp/download/2020_hitodebusoku.pdf

B OLS regression coefficients behind the figures

Table B.1: Changes in working hours for deviation from threshold

	All	Large	SME	Diff
2015 × Overtime gap	−0.045	−0.059	−0.082	−0.012
	(0.045)	(0.069)	(0.063)	(0.089)
2016 × Overtime gap	0.083**	0.088	0.062	0.006
	(0.040)	(0.058)	(0.059)	(0.080)
2017 × Overtime gap	−0.027	−0.004	−0.046	0.024
	(0.038)	(0.049)	(0.066)	(0.079)
2019 × Overtime gap	−0.553***	−0.590***	−0.491***	−0.095*
	(0.029)	(0.035)	(0.046)	(0.057)
2020 × Overtime gap	−0.692***	−0.745***	−0.596***	−0.156**
	(0.028)	(0.036)	(0.048)	(0.060)
2021 × Overtime gap	−0.682***	−0.692***	−0.623***	−0.078
	(0.032)	(0.044)	(0.047)	(0.064)
2022 × Overtime gap	−0.722***	−0.732***	−0.646***	−0.100
	(0.035)	(0.051)	(0.053)	(0.072)
2023 × Overtime gap	−0.783***	−0.792***	−0.702***	−0.091
	(0.037)	(0.053)	(0.057)	(0.076)
Num.Obs.	190,909	113,574	77,335	190,909
Individual	45,207	30,540	23,825	45,207
Mean.dep	42.555	42.561	42.544	

Notes: Dependent variable is weekly working hour. "overtime gap" is a continuous variable that indicates the deviation between the average weekly working hours before the regulation and the threshold, 47hours. We regress on the interaction term of "overtime gap" and each year. The base year is 2018, the year before the regulation was initiated for large firms. In column (1), we estimate for all samples. Column (2) and (3) are subsample analysis for large firm and SMEs respectively. Column (4) (Diff) reports additional results for All - Large differences (or provided estimates). All regressions control for demographic characteristics, individual fixed effects ,and year fixed effects. Standard errors in parenthesis.
* p $<$ 0.1, ** p $<$ 0.05, *** p $<$ 0.01

Table B.2: Effect on Income

	Annual income	Hourly wage
2015 × Overtime gap	0.000	0.000
	(0.001)	(0.001)
2016 × Overtime gap	0.001	0.000
	(0.001)	(0.001)
2017 × Overtime gap	−0.002*	−0.001
	(0.001)	(0.001)
2019 × Overtime gap	0.000	0.009***
	(0.001)	(0.001)
2020 × Overtime gap	−0.001	0.011***
	(0.001)	(0.001)
2021 × Overtime gap	0.000	0.012***
	(0.001)	(0.001)
2022 × Overtime gap	−0.001	0.011***
	(0.001)	(0.001)
2023 × Overtime gap	−0.001	0.013***
	(0.001)	(0.001)
Num.Obs.	187,669	187,669
Individual	44,810	44,810
Mean.dep	415.371	1988.184

Notes: The dependent variables are the logarithm of annual income and hourly wage. The hourly wage calculated as $annual\ income \div (weekly\ working\ hour \times 52)$. "overtime gap" is a continuous variable that indicates the deviation between the average weekly working hours before the regulation and the threshold, 47hours. We regress on the interaction term of "overtime gap" and each year. The base year is 2018, the year before the regulation was initiated for large firms. All regression controls for demographic characteristics, individual fixed effects, and year fixed effects. Standard errors in parenthesis.
* p $<$ 0.1, ** p $<$ 0.05, *** p $<$ 0.01

Table B.3: Workers' perception of their work

	(1) Task amount	(2) Task variety	(3) Business understanding	(4) Fair evaluation
2015 × Overtime gap	0.00126	−0.00139*	0.00031	0.00146
	(0.00103)	(0.00084)	(0.00097)	(0.00092)
2016 × Overtime gap	0.00102	−0.00157*	−0.00023	0.00074
	(0.00091)	(0.00080)	(0.00091)	(0.00082)
2017 × Overtime gap	−0.00017	−0.00103	−0.00039	0.00121*
	(0.00085)	(0.00074)	(0.00084)	(0.00071)
2019 × Overtime gap	−0.00311***	−0.00274***	0.00087	0.00106
	(0.00071)	(0.00064)	(0.00073)	(0.00067)
2020 × Overtime gap	−0.00584***	−0.00246***	−0.00029	0.00084
	(0.00077)	(0.00063)	(0.00074)	(0.00069)
2021 × Overtime gap	−0.00518***	−0.00244***	−0.00052	0.00188**
	(0.00085)	(0.00072)	(0.00081)	(0.00077)
2022 × Overtime gap	−0.00560***	−0.00311***	−0.00123	0.00058
	(0.00088)	(0.00072)	(0.00086)	(0.00084)
2023 × Overtime gap	−0.00653***	−0.00375***	−0.00239***	0.00048
	(0.00094)	(0.00073)	(0.00089)	(0.00087)
Num.Obs.	190,909	190,909	190,909	190,909
Individual	45,207	45,207	45,207	45,207
Mean.dep	0.285	0.118	0.604	0.307

Notes: The dependent variables are the answer of following responses: (1) I was overwhelmed with more work than I could handle, (2) I was responsible for a variety of tasks, not monotonous, (3) I understood the whole business and did my job, and (4) I was getting due credit for my work. All questions are answered with an integer between 0 and 4, with options ranging from "disagree" to "agree". And we set the dependent variable to a binary that takes 1 if answered in the top two of a five-point scale except for (2). For (2), we set it as a binary variable that takes 1 only if the highest point on the five-point scale is selected. "overtime gap" is a continuous variable that indicates the deviation between the average weekly working hours before the regulation and the threshold, 47 hours. We regress on the interaction term of "overtime gap" and each year. The base year is 2018, the year before the regulation was initiated. All regressions control for demographic characteristics, individual fixed effects, and year fixed effects. Standard errors in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B.4: Effects on Training

	(1)	(2)	(3)	(4)
	OJT	OffJT	OffJT opportunity	Self-development
2015 × Overtime gap	0.002*	0.000	0.002*	−0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
2016 × Overtime gap	0.001	−0.002**	−0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
2017 × Overtime gap	0.001	−0.001*	0.000	−0.001*
	(0.001)	(0.001)	(0.001)	(0.001)
2019 × Overtime gap	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
2020 × Overtime gap	0.003***	0.000	0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
2021 × Overtime gap	0.002***	0.000	0.001	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)
2022 × Overtime gap	0.002**	−0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
2023 × Overtime gap	0.001	0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Num.Obs.	190,909	190,909	190,909	190,909
Individual	45,207	45,207	45,207	45,207
Mean.dep	0.294	0.289	0.384	0.416

Notes: In columns (1) and (2), we use as dependent variables dummy variables indicating whether workers received on-the-job training or off-the-job training, respectively. In column (3), we use a dummy variable whether workers have an opportunity to receive off-the-job training. And in column (4), the dependent variable is a dummy variable that takes 1 if worker engage in self-development activities. All regressions control for demographic characteristics, individual fixed effects, and year fixed effects. Standard errors in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B.5: Effects on Side Job

	(1)	(2)
	Side job	Side job hours (weekly)
2015 × Overtime gap	0.000	0.003
	(0.001)	(0.005)
2016 × Overtime gap	0.001	0.001
	(0.001)	(0.004)
2017 × Overtime gap	0.000	0.000
	(0.001)	(0.003)
2019 × Overtime gap	0.001*	0.008**
	(0.000)	(0.004)
2020 × Overtime gap	0.001**	0.006**
	(0.001)	(0.003)
2021 × Overtime gap	0.002***	0.012***
	(0.001)	(0.004)
2022 × Overtime gap	0.002***	0.014***
	(0.001)	(0.004)
2023 × Overtime gap	0.002***	0.019***
	(0.001)	(0.005)
Num.Obs.	190,909	190,909
Individual	45,207	45,207
Mean.dep	0.104	0.284

Notes: In column (1), the dependent variable is a dummy that takes the value 1 if the worker has a side job. In column (2), the dependent variable is the number of weekly hours worked in a side job. All regressions control for demographic characteristics, individual fixed effects, and year fixed effects. Standard errors in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B.6: Health

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2015 × Overtime gap	−0.00065	0.00131	0.00026	0.00069	0.00028	0.00020	−0.00089	−0.00048	0.00188**
	(0.00082)	(0.00084)	(0.00098)	(0.00068)	(0.00094)	(0.00102)	(0.00096)	(0.00065)	(0.00085)
2016 × Overtime gap	−0.00038	0.00119	−0.00010	0.00045	0.00145	0.00058	−0.00023	0.00028	0.00039
	(0.00079)	(0.00079)	(0.00095)	(0.00066)	(0.00090)	(0.00097)	(0.00090)	(0.00061)	(0.00079)
2017 × Overtime gap	0.00023	0.00049	−0.00139*	0.00107*	−0.00017	−0.00023	−0.00138*	−0.00051	−0.00044
	(0.00076)	(0.00075)	(0.00081)	(0.00060)	(0.00082)	(0.00084)	(0.00082)	(0.00054)	(0.00071)
2019 × Overtime gap	−0.00071	−0.00031	−0.00137*	−0.00038	−0.00244***	−0.00124	−0.00169**	−0.00090*	−0.00062
	(0.00063)	(0.00063)	(0.00073)	(0.00050)	(0.00071)	(0.00076)	(0.00069)	(0.00047)	(0.00062)
2020 × Overtime gap	−0.00156**	−0.00065	−0.00194**	−0.00036	−0.00354***	−0.00223***	−0.00265***	−0.00062	0.00019
	(0.00070)	(0.00067)	(0.00076)	(0.00054)	(0.00073)	(0.00079)	(0.00073)	(0.00045)	(0.00063)
2021 × Overtime gap	−0.00155**	−0.00000	−0.00233***	−0.00016	−0.00358***	−0.00267***	−0.00199***	−0.00057	−0.00043
	(0.00070)	(0.00067)	(0.00077)	(0.00059)	(0.00076)	(0.00083)	(0.00077)	(0.00053)	(0.00066)
2022 × Overtime gap	−0.00070	−0.00044	−0.00233***	0.00010	−0.00410***	−0.00251***	−0.00178**	−0.00054	−0.00087
	(0.00075)	(0.00075)	(0.00087)	(0.00061)	(0.00090)	(0.00090)	(0.00083)	(0.00051)	(0.00074)
2023 × Overtime gap	−0.00170**	0.00022	−0.00190**	−0.00019	−0.00452***	−0.00337***	−0.00277***	−0.00066	−0.00053
	(0.00085)	(0.00077)	(0.00091)	(0.00065)	(0.00092)	(0.00093)	(0.00089)	(0.00056)	(0.00077)
Num.Obs.	190,909	190,909	190,909	190,909	190,909	190,909	190,909	190,909	190,909
Individual	45,207	45,207	45,207	45,207	45,207	45,207	45,207	45,207	45,207
Mean.dep	0.728	0.211	0.416	0.091	0.322	0.299	0.290	0.058	0.188

Notes: (1):Work-life balance stress, (2):Headache or dizziness, (3):Pain in the back, waist, or shoulders, (4):Palpitations or shortness of breath, (5):Extreme fatigue, (6):To feel tense, (7):Depression, (8):No appetite, (9):Cannot sleep well All questions are answered with an integer between 0 and 4, with options ranging from "Never" to "Always". And we set the dependent variable to a binary that takes 1 if answered in the top two of a five-point scale. "overtime gap" is a continuous variable that indicates the deviation between the average weekly working hours before the regulation and the threshold, 47 hours. We regress on the interaction term of "overtime gap" and each year. The base year is 2018, the year before the regulation was initiated. All regressions control for demographic characteristics, individual fixed effects ,and year fixed effects. Standard errors in parenthesis.
p < 0.1, ** p < 0.05, *** p < 0.01

Table B.7: Job satisfaction variable

	(1) Work itself	(2) Relationship	(3) Personal growth	(4) Career	(5) Experience	(6) Enthusiasm
2015 × Overtime gap	0.00150	−0.00013	0.00032	0.00221***	0.00016	0.00098
	(0.00095)	(0.00096)	(0.00090)	(0.00085)	(0.00086)	(0.00085)
2016 × Overtime gap	0.00077	−0.00096	0.00084	0.00124	−0.00108	−0.00006
	(0.00090)	(0.00090)	(0.00088)	(0.00078)	(0.00083)	(0.00078)
2017 × Overtime gap	0.00009	−0.00025	0.00061	0.00061	−0.00005	0.00062
	(0.00080)	(0.00079)	(0.00081)	(0.00068)	(0.00074)	(0.00073)
2019 × Overtime gap	0.00017	−0.00015	−0.00033	0.00066	−0.00014	0.00034
	(0.00069)	(0.00069)	(0.00067)	(0.00062)	(0.00066)	(0.00065)
2020 × Overtime gap	−0.00018	0.00037	−0.00048	0.00000	−0.00050	−0.00020
	(0.00076)	(0.00075)	(0.00072)	(0.00065)	(0.00069)	(0.00072)
2021 × Overtime gap	0.00006	0.00065	−0.00043	0.00121*	0.00064	0.00084
	(0.00082)	(0.00085)	(0.00082)	(0.00068)	(0.00075)	(0.00076)
2022 × Overtime gap	−0.00035	−0.00014	−0.00022	0.00081	0.00012	0.00066
	(0.00082)	(0.00093)	(0.00082)	(0.00072)	(0.00076)	(0.00076)
2023 × Overtime gap	−0.00021	0.00084	−0.00139	0.00022	−0.00074	0.00071
	(0.00088)	(0.00100)	(0.00087)	(0.00077)	(0.00084)	(0.00083)
Num.Obs.	190,909	190,909	190,909	190,909	190,909	190,909
Individual	45,207	45,207	45,207	45,207	45,207	45,207
Mean.dep	0.357	0.392	0.304	0.155	0.238	0.280

Notes: The dependent variables are the answer of following responses: (1) I was satisfied with the work itself, (2) I was satisfied with my working relationship, (3) I felt I was 'growing' through my work, (4) I was open to the prospect of my future career, (5) I was satisfied with my work history to date, and (6) I was able to work with enthusiasm. All questions are answered with an integer between 0 and 4, with options ranging from "disagree" to "agree". And we set the dependent variable to a binary that takes 1 if answered in the top two of a five-point scale. "overtime gap" is a continuous variable that indicates the deviation between the average weekly working hours before the regulation and the threshold, 47hours. We regress on the interaction term of "overtime gap" and each year. The base year is 2018, the year before the regulation was initiated. All regressions control for demographic characteristics, individual fixed effects ,and year fixed effects. Standard errors in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table B.8: Quality of Life

	(1) Life satisfaction	(2) Happiness
2015 × Overtime gap	0.00054	
	(0.00092)	
2016 × Overtime gap	0.00012	−0.00053
	(0.00085)	(0.00091)
2017 × Overtime gap	−0.00026	0.00002
	(0.00081)	(0.00079)
2019 × Overtime gap	0.00063	0.00031
	(0.00071)	(0.00068)
2020 × Overtime gap	0.00178**	0.00082
	(0.00078)	(0.00074)
2021 × Overtime gap	0.00122	0.00171**
	(0.00080)	(0.00079)
2022 × Overtime gap	0.00078	0.00080
	(0.00084)	(0.00082)
2023 × Overtime gap	0.00114	0.00115
	(0.00089)	(0.00089)
Num.Obs.	190,909	168,820
Individual	45,207	41,021
Mean.dep	0.464	0.394

Notes: The dependent variables are the answer of following responses: (1)Life satisfaction, (2) Happiness, and All questions are answered with an integer between 0 and 4, with options ranging from "disagree" to "agree". And we set the dependent variable to a binary that takes 1 if answered in the top two of a five-point scale. Only the *Happiness* question was not administered in the first year of the panel. "overtime gap" is a continuous variable that indicates the deviation between the average weekly working hours before the regulation and the threshold, 47 hours. We regress on the interaction term of "overtime gap" and each year. The base year is 2018, the year before the regulation was initiated. All regressions control for demographic characteristics, individual fixed effects ,and year fixed effects. Standard errors in parenthesis. * p $<$ 0.1, ** p $<$ 0.05, *** p $<$ 0.01

C Robustness check controlling for remote work and regional COVID-19 infection rate

Table C.1: Robustness check: Hours worked, income, and task amount and variety

	(1)	(2)	(3)	(4)	(5)
2016 × Overtime gap	0.08717**	0.00116	−0.00023	0.00090	−0.00148*
	(0.03956)	(0.00116)	(0.00127)	(0.00093)	(0.00082)
2017 × Overtime gap	−0.03104	−0.00164*	−0.00094	−0.00026	−0.00111
	(0.03873)	(0.00095)	(0.00110)	(0.00085)	(0.00074)
2019 × Overtime gap	−0.55175***	−0.00015	0.00916***	−0.00308***	−0.00278***
	(0.02859)	(0.00072)	(0.00096)	(0.00072)	(0.00064)
2020 × Overtime gap	−0.68592***	−0.00116	0.01041***	−0.00578***	−0.00247***
	(0.02823)	(0.00078)	(0.00099)	(0.00077)	(0.00063)
2021 × Overtime gap	−0.67690***	−0.00023	0.01140***	−0.00515***	−0.00239***
	(0.03173)	(0.00088)	(0.00109)	(0.00086)	(0.00072)
2022 × Overtime gap	−0.71591***	−0.00147	0.01130***	−0.00551***	−0.00304***
	(0.03486)	(0.00091)	(0.00107)	(0.00089)	(0.00072)
2023 × Overtime gap	−0.77581***	−0.00102	0.01293***	−0.00649***	−0.00372***
	(0.03725)	(0.00096)	(0.00111)	(0.00094)	(0.00072)
Remote work	0.02439***	0.00060***	−0.00012	0.00029	
	(0.00454)	(0.00022)	(0.00026)	(0.00018)	
Infection	−0.26123***	0.00305	0.01542***	0.00389	
	(0.06584)	(0.00360)	(0.00431)	(0.00304)	
Num.Obs.	168,761	165,852	165,852	168,761	168,761
Individual	41,017	40,635	40,635	41,017	41,017
Mean.dep	42.555	415.371	1988.184	0.285	0.118

Notes: (1): Weekly working hour, (2): Logarithm of annual earnings, (3): Logarithm of hourly wage, (4): Task amount, (5): Task variety.
This estimation adds "Remote" and "Infection" as control variables. And we use the data from 2016 due to data availability. "Remote" is the dummy variable that takes 1 if a worker is working remotely. "Infection" is the logarithm of the cumulative number of COVID-19 infections per 100,000 people for each prefecture. Before 2020, it had a value of 0. Also, it took 0 in 2023 because the Japanese government downgraded the legal status of COVID-19 on May 2023, and there is no data after June 2023. All regressions control for demographic characteristics, individual fixed effects, and year fixed effects. Standard errors in parentheses.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table C.2: Robustness check: Health

	(1)	(2)	(3)	(4)
2016 × Overtime gap	0.00166*	0.00070	−0.00016	−0.00037
	(0.00092)	(0.00099)	(0.00092)	(0.00082)
2017 × Overtime gap	−0.00020	−0.00017	−0.00139*	0.00021
	(0.00083)	(0.00085)	(0.00082)	(0.00077)
2019 × Overtime gap	−0.00245***	−0.00134*	−0.00168**	−0.00062
	(0.00071)	(0.00077)	(0.00070)	(0.00063)
2020 × Overtime gap	−0.00358***	−0.00223***	−0.00265***	−0.00155**
	(0.00073)	(0.00079)	(0.00073)	(0.00071)
2021 × Overtime gap	−0.00362***	−0.00275***	−0.00194**	−0.00153**
	(0.00077)	(0.00083)	(0.00077)	(0.00071)
2022 × Overtime gap	−0.00411***	−0.00257***	−0.00181**	−0.00059
	(0.00091)	(0.00090)	(0.00084)	(0.00075)
2023 × Overtime gap	−0.00457***	−0.00345***	−0.00289***	−0.00169**
	(0.00093)	(0.00093)	(0.00089)	(0.00085)
Remote work	−0.00054***	−0.00014	−0.00023	−0.00012
	(0.00016)	(0.00016)	(0.00016)	(0.00016)
Infection	−0.00658**	−0.00036	−0.00037	0.00183
	(0.00280)	(0.00296)	(0.00287)	(0.00301)
Num.Obs.	168,761	168,761	168,761	168,761
Individual	41,017	41,017	41,017	41,017
Mean.dep	0.322	0.299	0.290	0.728

Notes: (1):Extreme fatigue (2):Mental tension, (3):Depressive mood, and (4):work-family balance stress This estimation adds "Remote" and "Infection" as control variables. And we use the data from 2016 due to data availability. "Remote" is the dummy variable that takes 1 if workers is working remotely. "Infection" is the logarithm of the cumulative number of COVID-19 infections per 100,000 people for each prefecture. Before 2019, it had a value of 0. Also, it took 0 in 2023 because the Japanese government downgraded the legal status of COVID-19 on May 2023, there is no data after June 2023. All regressions control for demographic characteristics, individual fixed effects, and year fixed effects. Standard errors in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table C.3: Robustness check: Job and life satisfaction

	(1)	(2)	(3)	(4)
2016 × Overtime gap	0.00103	0.00087	0.00025	−0.00050
	(0.00090)	(0.00092)	(0.00087)	(0.00091)
2017 × Overtime gap	0.00058	0.00015	−0.00018	0.00002
	(0.00082)	(0.00081)	(0.00082)	(0.00079)
2019 × Overtime gap	−0.00036	0.00017	0.00050	0.00031
	(0.00067)	(0.00069)	(0.00072)	(0.00068)
2020 × Overtime gap	−0.00052	−0.00013	0.00172**	0.00086
	(0.00072)	(0.00076)	(0.00078)	(0.00074)
2021 × Overtime gap	−0.00037	0.00013	0.00104	0.00172**
	(0.00082)	(0.00082)	(0.00080)	(0.00079)
2022 × Overtime gap	−0.00016	−0.00029	0.00073	0.00084
	(0.00082)	(0.00081)	(0.00084)	(0.00082)
2023 × Overtime gap	−0.00134	−0.00023	0.00103	0.00119
	(0.00087)	(0.00088)	(0.00089)	(0.00089)
Remote work	0.00014	0.00041**	0.00059***	0.00050***
	(0.00016)	(0.00017)	(0.00018)	(0.00017)
Infection	−0.00100	0.00035	−0.00573*	−0.00160
	(0.00296)	(0.00311)	(0.00327)	(0.00316)
Num.Obs.	168,761	168,761	168,761	168,761
Individual	41,017	41,017	41,017	41,017
Mean.dep	0.304	0.357	0.464	0.394

Notes: (1):Perceived personal growth at work (2):Job satisfaction, (3):Life satisfaction, and (4):Happiness. This estimation adds "Remote" and "Infection" as control variables. And we use the data from 2016 due to data availability. "Remote" is the dummy variable that takes 1 if workers is working remotely. "Infection" is the logarithm of the cumulative number of COVID-19 infections per 100,000 people for each prefecture. Before 2019, it had a value of 0. Also, it took 0 in 2023 because the Japanese government downgraded the legal status of COVID-19 on May 2023, there is no data after June 2023. All regressions control for demographic characteristics, individual fixed effects, and year fixed effects. Standard errors in parenthesis.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$