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Overtime Premium and Working Hours:
An Evaluation of the Labour Standards Act Reform
in Japan

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**Overtime Premium and Working Hours: An Evaluation of the Labour Standards
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Preliminary Draft

Abstract

This study assesses how the increase in the overtime premium paid to workers that carry out excessive overtime influences working hours and the incidence of overtime. In April 2010, the Japanese government reformed the Labour Standards Act, which increased the overtime premium that companies have to pay their employees from 25% to 50%. This reform, which only applied to overtime of more than 60 hours per month and workers in large firms, generated an exogenous variation in the marginal cost to employers of assigning extra overtime. Based on data derived from the Japanese Life Course Panel Survey conducted by the University of Tokyo from 2007 to 2013, the presented findings suggest that despite the overtime premium doubling, there has been no change in working hours or in the incidence of overtime since the introduction of the reform, suggesting the prevalence of unpaid overtime in Japan.

Keywords: Working hours, Labour Standard, Labour Supply

JEL Classification Codes: J010, J220, J880

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1. Introduction

Based on a standard 40-hour working week, almost one in 10 Japanese workers works more than 20 hours of overtime every week (Labour Force Survey, 2009). This proportion rises to 18% for men in their thirties. In order to reduce working hours and thus promote work/life balance as well as reduce cases of death from overwork (*Karoshi*), the Japanese government reformed the Labour Standards Act in April 2010.¹ This reform required that large firms double the overtime premium paid to workers that work more than 60 hours of overtime per month (i.e. an average of 15 hours every week) from 25% to 50%. Note, however, that small and medium-sized enterprises (SMEs) remained uncovered this by Act. In Japan, companies in different industries are classified as SMEs according to their number of employees as follows: (i) retail industry: under 50; (ii) services industry: under 100; (iii) wholesale industry: under 100; and (iv) other industries: under 300. The government is classified as a large company.

This study examines how the reform has affected average overtime hours worked and the incidence of overtime in Japan. In this regard, the presented findings contribute to the literature in two ways. First, the study assesses the Japanese government's decision to regulate excessive overtime in order to provide evidence on how such a regulation affects overtime hours. Second, I investigate whether strong governmental regulation is able to lower the incidence of overtime in a country where the culture of long working hours is deeply rooted, which is the intended effect of the reform.

The studies that have focused on how regulations on overtime pay affect working

¹ The details of the reform can be found on the Ministry of Health, Labour, and Welfare website at www.mhlw.go.jp/stf/seisakunitsuite/bunya/koyou_roudou/roudoukijun/roukikaitei/index.html.

hours and the incidence of overtime have presented inconsistent results. Trejo (2003) examines the impact of an increase in the coverage of the overtime premium during 1970–1989 in the United States and finds no impact on overtime incidence or overtime hours. He explains this result by stating that the overtime premium could have been offset by changes in standard hourly wage rates. On the contrary, Hamermesh and Trejo (2000) investigate the extension of the time-and-a-half pay for working hours above eight hours per day and find that the overtime penalty substantially reduced the amount of daily overtime worked compared with other states; this finding is consistent with the labour demand model presented in Section 2.1.

A number of studies have also focused on reductions in standard working hours, which have been shown to increase the marginal cost of an additional worker and thereby decrease employment at the firm level (Hunt, 1999; Crepón and Kramarz, 2002). In this vein, Kawaguchi, Naito, and Yokoyama (2008) investigate how a reduction in legal working hours influences actual hours worked by using Japanese data and find that that a one-hour reduction in weekly legal working hours reduced actual working hours by 0.14 hours, while it did not decrease monthly compensation to workers.

The remainder of this paper is organised as follows. Section 2 presents the theoretical framework and data sources, section 3 provides an overview of overtime in Japan, section 4 shows the descriptive analysis, section 5 presents the estimation models, section 6 discusses the results, and section 7 concludes.

2. Theoretical Framework and Data Sources

2-1. Labour Demand Model

Trejo (2003) uses a labour demand model to show that the regulation of overtime

pay would reduce the proportion of workers that regularly work more than the standard 40-hour working week. In this study, I extend Trejo's (2003) model to explain the distinction between working either fewer or more than 60 hours of overtime per month following the 2010 reform. A firm's production function is $F=f(E,H_t)$, where F is output, E is the number of employees, and H_t is monthly working hours. The total labour cost is written as follows:

$$C_1 = wEH_t + bE, \text{ if } H_t \leq H_s \quad (1)$$

$$C_2 = wEH_s + pwE(H_t - H_s) + bE, \text{ if } H_x \geq H_t > H_s \quad (2)$$

$$C_3 = wEH_s + pwE(H_x - H_s) + xwE(H_t - H_x) + bE, \text{ if } H_t > H_x \quad (3)$$

where w is the hourly wage rate, p denotes the overtime premium paid to workers that work up to 60 hours of overtime per month (overtime workers hereafter), and x denotes the overtime premium paid to workers that work more than 60 hours of overtime per month (extra overtime workers hereafter). Further, H_s is the threshold at which the overtime premium applies and H_x is the threshold at which the extra overtime premium applies, while b represents fixed labour costs² such as training costs and employee benefits. w, l, p, x, H_s , and H_x are exogenous and the firm chooses E and H_t . The profit maximisation problem including this extra overtime premium is thus

$$Y_1(w, b) = \max_{E, H_t} f(E, H_t) - wEH_t - bE \quad (4)$$

² See Hart (1984) for a detailed discussion of these costs.

$$Y_2(w, b, p, H_s) = \max_{E, H_t} f(E, H_t) - wEH_s - pwE(H_x - H_s) - bE \quad (5)$$

$$Y_3(w, b, p, x, H_s, H_x) = \max_{E, H_t} f(E, H_t) - wEH_s - pwE(H_x - H_s) - xwE(H_t - H_x) - bE \quad (6)$$

If the firm profit when assigning extra overtime, Y_3 , is higher than that without assigning overtime or with assigning some overtime, Y_1 and Y_2 , respectively, the firm assigns extra overtime to employees; otherwise, the firm lets employees work less than H_x . The rise in the overtime premium above H_x (i.e. from 25% to 50%) increases the marginal cost to employers of assigning overtime; therefore, firms respond by reducing employees' extra overtime hours. The increase in the extra overtime premium should thus reduce the proportion of employees that work more than 60 hours of overtime per month (i.e. the government's intended effect of the reform).

2-2. Labour Supply Model

Individuals choose their working hours based on the hourly wage rate as well as on their preferences for leisure and consumption. In other words, they work until the marginal value of non-market hours meets the wage rate. Therefore, taking into account the counterbalance between demand and supply effects, the new labour market equilibrium is unknown.

When a firm wants to increase an employee's working hours, it must pay an overtime premium. If employees have control over their working hours, the reform incentivises employees to increase the number of overtime hours they work because this

increases their marginal wage (even though it reduces their leisure time; Trejo, 2003; Hart, 2004; Boeri and van Ours, 2013).³

Trejo (2003) predicts that without the regulation on the straight-time wage, standard hourly wage rates are flexible; therefore, changes in the overtime premium could be offset by changes in standard hourly wages, leaving working hours and earnings unchanged.⁴ The labour supply model thus predicts that a rise in the overtime premium might either (i) increase overtime hours or (ii) have no effect on overtime hours.

In this study, I investigate whether the supply effects dominate the demand effects. I also explore the reform effects by examining workers' preferences. In Japan, some workers are forced to work overtime, whereas others do so voluntarily because their base salaries are low and/or they have a strong preference for work (i.e. workaholics).⁵ The Labour Standard Law states that when an employee's activities are under employer supervision (including implicit and indirect supervision), the employer must pay for these hours. However, there is a grey area in this law. For example, when an employee voluntarily chooses to work overtime but nobody stops him or her from doing so, this is considered to be under supervision. Therefore, in a firm without strict time management (of which there are many in Japan), employees can work as many extra hours as they want. By contrast, some employees are forced to work overtime because of staff shortages or because employers value workers who work long hours and thus favour them for

³ So-called 'service overtime' in Japan is unpaid overtime that employees typically perform voluntarily. In this study, because I cannot identify which overtime is paid and which is not, I assume that all overtime is paid. This point is discussed in the Conclusion.

⁴ Trejo (2003) considers that workers and firms can negotiate their own compensation packages of working hours and earnings.

⁵ Hamermesh and Slemrod (2008) argue that for workaholics, current work increases the marginal utility for future work, lowers the utility from a given amount of working, and imposes future costs in terms of health and other problems.

promotion. Compared with temporary and non-regular workers, regular workers in Japan enjoy lifelong employment protection and generous benefits. Hence, firms tend to consider regular workers to be obliged to work as often as they demand. Some firms even cut the fixed cost of labour by reducing their numbers of regular employees, causing chronic staff shortages. To capture the degree to which employees' overtime choices are autonomous, workers' preferences are therefore used in this study.

For those workers that voluntarily choose to work overtime, the labour supply model is considered to provide a better prediction of the reform effect, namely employees increase their overtime hours or the reform has no effect on overtime hours, unless firms have strictly tried to reduce overtime work. On the contrary, for employees that want to reduce their overtime hours, the labour demand model predicts that the reform would allow them to do so; however, any change also depends on the degree to which the firm has tried to reduce extra overtime.

2-3. Data Sources

The data used in this study are derived from the Japanese Life Course Panel Survey (JLPS) conducted by the Institute of Social Science at the University of Tokyo from 2007 to 2013.⁶ The first wave of this survey was conducted on 4800 individuals aged 20–40, whereas the seventh wave included 3076 respondents.⁷ The survey is conducted every January.

In this study, I limit my focus to regular workers that did not change their jobs during the study period of 2009–2012. I also exclude workers who are discretionary

⁶ The response rate in the first wave is discussed by Miwa (2008).

⁷ A new cohort was added in 2011; however, I did not include this in this analysis.

workers (e.g. executives), because they are not paid an hourly rate and thus they do not qualify for the overtime premium. The total sample size in this analysis is therefore 1027. The working hours and workdays are recorded as ‘working hours per day (including overtime)’ and ‘the number of workdays in a month’ in the questionnaire. Therefore, monthly working hours are calculated as ‘working hours per day (including overtime)’ multiplied by ‘the number of workdays in a month’.

3. Overview of Overtime Work in Japan

Excessive overtime work causes physical and psychological fatigue and creates negative impacts on the family and private lives of workers (Eurofound, 2012). A number of governmental and private-sector projects have tried to tackle this phenomenon, which is a major social problem in Japanese society. As shown in Table 1(a), according to JLPS data, female working hours decreased slightly in 2013; however, there was no substantial change in working hours between 2009 and 2013. Table 1(b) illustrates that the proportion of extra overtime workers⁸ did not change substantially over the same five-year period, showing that approximately 32% of men and 13% of women work more than 60 hours of overtime every month on average.⁹ Although the proportions of male extra overtime workers decreased slightly between 2010 and 2011, it is unclear whether this decline was the effect of the reform or a macroeconomic shock.

⁸ The 220 hours is calculated as four workweeks of 40 standard hours, plus 60 hours of overtime per month.

⁹ The proportion is slightly higher than that presented in the Labour Force Survey because the age distribution is skewed to younger people in the JLPS.

	Men		Women	
	(a)	(b)	(a)	(b)
Jan. 2009	211.2	31.9%	188.2	12.8%
Jan. 2010	213.4	32.5%	190.3	14.2%
Jan. 2011	213.6	32.7%	191.1	12.8%
Jan. 2012	212.5	32.2%	191.8	14.8%
Sample size	661		366	

Table 1 (a) Average monthly working hours and (b) proportion of extra overtime workers by sex

Given that some workers have a strong preference to overwork and others are rather forced to overwork, I categorise workers' preferences as follows: (1) those that want to reduce the number of hours worked, (2) those that want to work the same number of hours, and (3) those that want to increase the number of hours. These preferences are defined according to worker status in January 2009.¹⁰ Table 2 shows the changes in working hour preferences from 2009 to 2013 for extra overtime workers (left) and others (right). This table shows that almost 65% of extra overtime workers want to reduce their hours compared with only 40% of those employees that do not work extra overtime (standard worker hereafter). Nevertheless, approximately 35% of extra overtime workers are happy to continue working at the same rate (i.e. workaholics). In the following, I separately analyse (i) those who wish to reduce their hours (those who prefer leisure to overworking) and (ii) those who wish to increase their hours or work the same hours (those who prefer overworking to leisure). In the next section, I run separate regressions for these two groups to investigate whether the reform impact varies by working hour preferences.

¹⁰ The 2008 questionnaire did not ask such a question.

	Extra overtime worker			Standard worker		
	Wish to Increase Hours	Wish to work the same Hours	Wish to reduce hours	Wish to Increase Hours	Wish to work the same Hours	Wish to reduce hours
2009	0.4%	27.2%	72.4%	3.1%	61.3%	35.6%
2010	1.2%	30.0%	68.9%	3.0%	58.4%	38.6%
2011	1.6%	31.9%	66.5%	1.6%	59.1%	39.4%
2012	1.2%	34.2%	64.6%	1.6%	55.8%	42.7%
Sample size	257			762		

Table 2 Distribution of workers' preferences towards working hours according to whether a respondent worked extra overtime in January 2009

Note: Respondents who did not answer the question are excluded from the analysis.

4. Descriptive Analysis

First, I examine changes in working hours based on respondents' working hours before the reform and the size of firm for which they work. The treatment group of this study is extra overtime workers that worked in large firms in January 2009 (the reform was amended in December 2008 and enforced in April 2010).¹¹

Figure 1 shows average monthly working hours by firm size (solid line) and worker status (dashed line). This figure shows only slight changes in working hours between 2009 and 2012 by firm size, with an approximately 2.9-hour increase in large firms and a 2.1-hour decrease in SMEs between 2010 and 2011. On the contrary, the average working hours of extra overtime workers decreased by 6.1 hours, whereas they increased by 2.7 hours for standard workers between 2010 and 2011.¹²

¹¹ The definition of large firms and SMEs is in footnote 2. Results are similar when the treatment group is defined as extra overtime workers that worked in large firms in January 2008.

¹² Working hours significantly reduced from 2008 to 2009, possibly because of the ramifications of the collapse of Lehman Brothers and the ensuing global financial crisis. Because of this reason, I did not define the treatment group status based on 2008

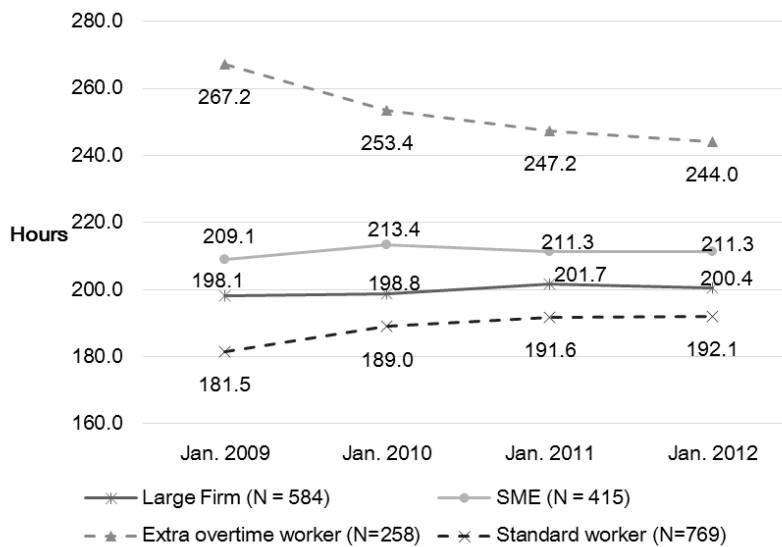


Figure 1 Average monthly working hours by firm size (solid line) and worker status (dashed line)

Figure 2 shows the average monthly working hours for four groups of respondents divided by firm size and worker status in January 2009. Of these four, the extra overtime workers in a large firm group is the treatment group. There was an approximately 0.6-hour decrease in working hours for the treatment group from 2010 to 2011, but a 10.5-hour decrease for extra overtime workers in SMEs, suggesting that the decrease in the working hours of overtime workers shown in Figure 1 was mainly driven by a reduction in working hours in SMEs.

Figure 3 shows average monthly working hours by workers' preferences. It shows that there was a 1.8-hour increase in working hours for the treatment group who want to work more compared with a 1.4-hour decrease for the treatment group who want to reduce their hours in 2011, suggesting that the reform might have had a heterogeneous effect on working hours according to different workers' preferences.¹³ However, the

working hours. Note that the results were similar when the treatment group was defined based on 2008 working hours.

¹³ In addition, the graph for weekly overtime hours is calculated from the monthly

reduction in working hours mainly derived from workers in SMEs. Indeed, there was a 9.9-hour decrease in working hours for extra overtime workers in SMEs who want to work more compared with a 10.8-hour decrease for extra overtime workers in SMEs who want to reduce their hours.

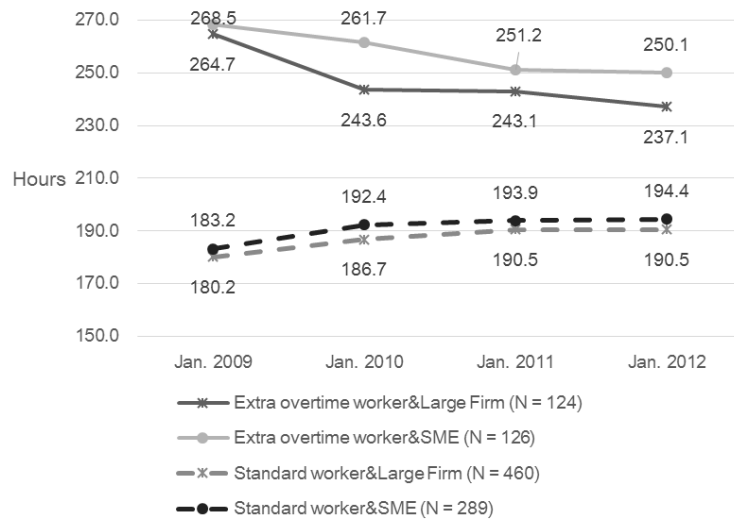
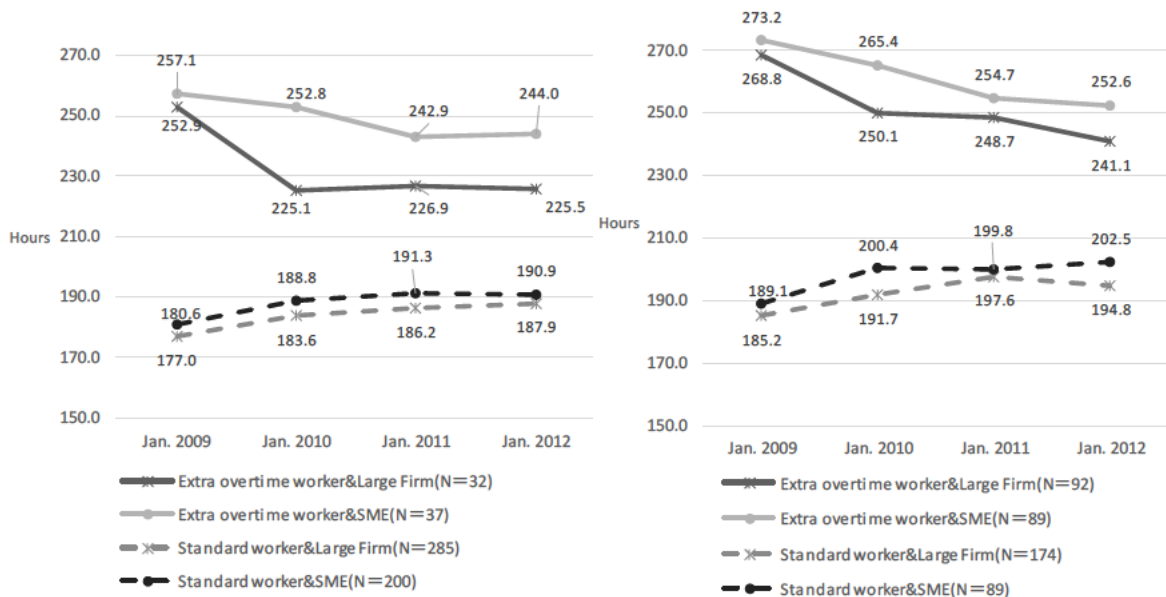


Figure 2 Average monthly working hours for four groups of respondents (defined by worker status and firm size)

working hours minus the standard working hour category. I recode the standard hours category from the JLPS with the median of each category and exclude workers in a firm with no standard hours or with varying standard hours by seasons. The sample size decreases because of non-responses or no-fixed standard hours. The results are similar to those for monthly working hours.



(Left) Workers who want to work more (Right) Workers who want to reduce their hours

Figure 3 Average monthly working hours by workers' preferences

Figure 4 shows the incidence of overtime working by group. The incidence of overtime decreased by 1.6 percentage points in the treatment group, while there was an 8.7 percentage point increase in the proportion for extra overtime workers in SMEs. Again, the difference in this average level shows that the reduction in the incidence of extra overtime was mainly from extra overtime workers in SMEs.

Figure 5 shows the incidence of overtime working by group and workers' preferences. For workers who want to work more (left panel), there was a 3.1 percentage point increase in the incidence of excessive overtime for the treatment group. On the contrary, for workers who want to reduce their hours (right panel), there was only a 3.3 percentage point decrease in incidence immediately after the reform (i.e. in 2011). However, the incidence decreased by 6.5 percentage points in 2012 compared with 2010. Note that the left panel shows that there was a 5.4 percentage point increase in the incidence of extra overtime workers in SMEs in 2011 and a 10.1 percentage point decrease for extra overtime workers in SMEs who want to reduce hours, suggesting the existence of a business trend.

The above figures suggest that firms may not have realised the cost of the increased overtime premium in 2011, right after the reform; however, they did so slightly a year later, when then they might have tried to reduce working hours. The reduction of working hours mainly comes from extra overtime workers in SMEs. In the following section, I thus examine the reform effects on working hours and the incidence of overworking by using a regression framework.

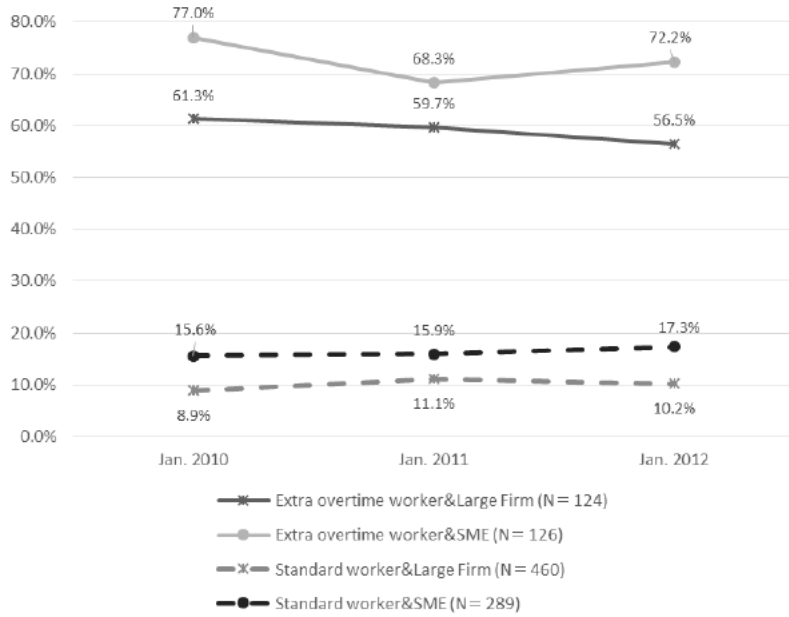
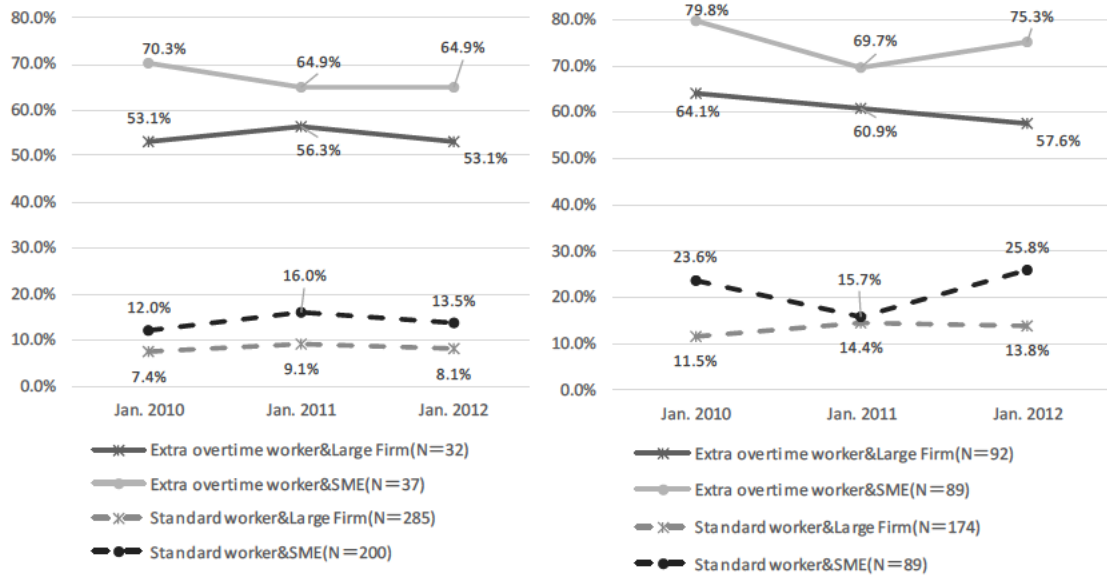


Figure 4 Incidence of extra overtime by worker status and firm size



(Left) Workers who want to work more (Right) Workers who want to reduce their hours

Figure 5 Extra overtime work by workers' preferences

5. Estimation Models

The effects of the reform on changes in monthly working hours and the incidence of overtime work are investigated in this section by adopting a policy evaluation framework (see Card and Krueger, 1994; Gruber, 1994; Angrist and Krueger, 1999; Angrist and Pischke, 2008). Here, I compare the relative outcomes of workers that worked extra overtime hours in large firms with those that did not work extra overtime hours or with those in SMEs, before and after the reform.

The outcome is changes in monthly working hours/the incidence of extra overtime. Since the reform was only enforced in large firms, the outcomes of workers in large firms are compared with those in SMEs before and after the reform (recall that the reform does not apply to workers in SMEs). Moreover, I include a dummy variable for whether an individual worked more than 60 hours of overtime in the pre-reform period. Then, the outcomes of workers who work extra hours are compared with those of workers who did not by using a difference-in-difference (DID) model¹⁴. In addition, the interaction of these two effects (extra overtime hours and firm size) is included in a triple difference (TD) model. The effect of the reform is then measured as coefficients of the treatment dummy in the interaction term in a TD model – average treatment effects on the treated. The DID estimation equation is as follows:

$$\Delta y_{ib} = \rho R_b + X_{ib}\tau + \varepsilon_{ib} \quad (7)$$

¹⁴ Difference between before and after, and between an individual worked more than 60 hours of overtime and those of workers who did not.

where Δy_{ib} represents changes in the outcomes of individual i in group b . I estimate two outcomes: monthly working hours in the logarithmic form and the incidence of excessive overtime work (taking the value of 1 if a worker is deemed to be an extra overtime worker and 0 otherwise). X_{ib} is a vector of observed characteristics before the reform (sex, age, job title, industry). R_b is either an overwork dummy (when a worker was an extra overtime worker in January 2008) or a firm size dummy. The estimator in equation (7) assumes that if there were no reform, the outcome changes for workers in SMEs would have been similar across all worker types.

The TD model is stated in equation (8):

$$\Delta y_{ibw} = \rho \text{Firm}_b + \beta \text{Over}_w + \gamma \text{Firm}_b * \text{Over}_w + X_{ibw} \tau + \varepsilon_{ibw} \quad (8)$$

where $Over$ is the indicator variable that identifies extra overtime workers before the reform and $Firm$ is the indicator variable of large firms. γ is thus the average treatment effects on the treated. Further, I estimate (8) according to workers' preferences, namely those who want to work more hours and those who want to reduce their hours. Models by workers' preferences were investigated in order to examine how the reform effects vary by the autonomous nature of working hours. All models are estimated by using a linear probability model.

6. Results and Discussion

The descriptive statistics of workers by worker status and firm size in January 2009 are shown in Table 3. Although the four groups show a similar age, their other characteristics differ. For example, extra overtime workers are more likely to be men and

have a job title above the section leader. The industry classification also varies according to groups; however, the majority of workers work in either the manufacturing or the other services industries. The models estimated below include these covariates to control for the pre-reform difference in characteristics.

The estimated coefficients on changes in monthly working hours or the incidence of overtime work from models (7) and (8) are shown in Table 4. The DID model in rows 1 and 2 shows a 4.4% decrease in working hours for overtime workers and a 3.3% increase for workers in large firms. By contrast, the TD model shows no difference in working hours for extra overtime workers in treatment firms. No significant treatment effects were thus found for total working hours. In order to check the robustness of the results, an alternative model (i.e., outcome is changes in monthly working hours from 2010 to 2012) was run to investigate the mid-term treatment effects. Rows 1 and 2 shows similar results to the main model; again, the TD model estimates show no significant effect of the reform. The incidence of extra overtime models shows similar effects. There is no significant effect of the reform on the changes in incidence of extra overtime.

	Extra overtime worker &Large Firm	Extra overtime worker &SME	Standard worker &Large Firm	Standard worker &SME
Female (=1)	10.6%	24.4%	39.1%	44.1%
Age	34.1	34.1	34.0	33.5
Job Title				
No Title	44.7%	69.1%	69.5%	78.3%
Team Leader	8.9%	7.3%	7.0%	8.9%
Section Leader	26.0%	6.5%	13.6%	6.8%
Department Chief	17.9%	8.1%	6.6%	3.2%
Department manager	1.6%	5.7%	0.9%	2.1%
Non-respondent	0.0%	0.8%	0.0%	0.4%
Industry				
Agricultural	0.0%	0.0%	0.0%	0.4%
Construction/mining	4.9%	22.0%	0.7%	6.8%
Manufacturing	24.4%	21.1%	28.6%	29.9%
Electricity/water	0.0%	0.0%	1.3%	0.7%
Transportation/operator	5.7%	8.9%	2.4%	6.8%
Wholesale	4.1%	8.1%	4.6%	5.3%
Retailing/Food Service	10.6%	5.7%	5.5%	4.6%
Insurance/Banking/Real Estate	7.3%	2.4%	5.7%	4.6%
Other services	38.2%	31.7%	38.9%	38.4%
Government	4.9%	0.0%	12.3%	2.5%
Sample Size	123	123	455	281

Table 3 Descriptive statistics of workers by worker status and firm size (characteristics are at the time of January 2009)

	Working hour 2011-2010			Working hour 2012-2010			Incidence of extra overtime 2011-2010			Incidence of extra overtime 2012-2010		
	DID extra overtime	DID firm size	TD	DID extra overtime	DID firm size	TD	DID extra overtime	DID firm size	TD	DID extra overtime	DID firm size	TD
	Extra overtime worker(=1)	-0.0444*** (0.0155)		-0.0569*** (0.0192)	-0.0547*** (0.0162)		-0.0613*** (0.0207)	-0.0722* (0.0391)		-0.0794 (0.0532)	-0.0687** (0.0353)	
Large firm(=1)		0.0327** (0.0146)	0.0227 (0.0160)		0.0266* (0.0151)	0.0188 (0.0166)		0.0266 (0.0280)	0.0174 (0.0288)		-0.00398 (0.0264)	-0.00651 (0.0279)
Extra overtime worker*Large firm			0.0290 (0.0284)		0.0165 (0.0298)	0.0174 (0.0298)		0.0174 (0.0717)				-0.0101 (0.0669)
Female (=1)	-0.0193 (0.0146)	-0.00996 (0.0137)	-0.0163 (0.0144)	-0.00960 (0.0152)	0.00100 (0.0146)	-0.00736 (0.0150)	-0.0255 (0.0268)	-0.0121 (0.0263)	-0.0234 (0.0269)	-0.00442 (0.0262)	0.00632 (0.0261)	-0.00536 (0.0261)
Age	0.00286 (0.0160)	0.00180 (0.0159)	0.00224 (0.0160)	-0.0157 (0.0163)	-0.0169 (0.0162)	-0.0160 (0.0164)	0.0451 (0.0278)	0.0435 (0.0278)	0.0447 (0.0278)	0.0214 (0.0279)	0.0201 (0.0278)	0.0216 (0.0280)
Age square	-0.00710 (0.0235)	-0.00506 (0.0234)	-0.00600 (0.0235)	0.0241 (0.0240)	0.0264 (0.0237)	0.0248 (0.0241)	-0.0728* (0.0420)	-0.0698* (0.0420)	-0.0721* (0.0421)	-0.0307 (0.0422)	-0.0280 (0.0420)	-0.0310 (0.0424)
Job title												
Team Leader (ref. no title)	-0.0294 (0.0232)	-0.0308 (0.0231)	-0.0317 (0.0232)	-0.0433* (0.0222)	-0.0446** (0.0223)	-0.0448** (0.0223)	0.0145 (0.0502)	0.0131 (0.0500)	0.0131 (0.0501)	-0.0734 (0.0456)	-0.0738 (0.0457)	-0.0726 (0.0458)
Section Leader	-0.00912 (0.0167)	-0.0205 (0.0181)	-0.0169 (0.0176)	-0.00598 (0.0187)	-0.0175 (0.0197)	-0.0116 (0.0194)	-0.00386 (0.0421)	-0.0174 (0.0420)	-0.00928 (0.0426)	0.0152 (0.0443)	0.00769 (0.0440)	0.0176 (0.0450)
Department Chief	-0.00532 (0.0250)	-0.0206 (0.0257)	-0.0131 (0.0258)	-0.0138 (0.0235)	-0.0301 (0.0243)	-0.0194 (0.0244)	0.113* (0.0666)	0.0932 (0.0661)	0.108 (0.0674)	0.0473 (0.0574)	0.0336 (0.0583)	0.0497 (0.0590)
Department manager	-0.0462 (0.0362)	-0.0467 (0.0349)	-0.0392 (0.0341)	-0.0431 (0.0326)	-0.0465 (0.0329)	-0.0380 (0.0317)	-0.0736 (0.0762)	-0.0797 (0.0745)	-0.0687 (0.0757)	-0.0421 (0.0905)	-0.0538 (0.0929)	-0.0443 (0.0903)
Non-respondent	-0.181 (0.112)	-0.174 (0.125)	-0.161 (0.107)	-0.119 (0.0888)	-0.118 (0.106)	-0.104 (0.0862)	-0.00470 (0.0364)	-0.00792 (0.0308)	0.00940 (0.0439)	0.00747 (0.0387)	-0.0128 (0.0284)	0.00129 (0.0415)
Industry												
Agricultural (ref. Manufacturing)	0.208*** (0.0208)	0.237*** (0.0194)	0.221*** (0.0197)	0.322*** (0.0212)	0.350*** (0.0200)	0.333*** (0.0204)	-0.0726** (0.0338)	-0.0411 (0.0387)	-0.0624 (0.0381)	-0.0347 (0.0295)	-0.0215 (0.0327)	-0.0385 (0.0328)
Construction/mining	0.00766 (0.0239)	0.00417 (0.0234)	0.0220 (0.0241)	0.0116 (0.0236)	0.00154 (0.0233)	0.0220 (0.0238)	-0.0489 (0.0664)	-0.0657 (0.0648)	-0.0389 (0.0684)	0.0395 (0.0581)	0.0113 (0.0556)	0.0350 (0.0590)
Electricity/water	0.171 (0.140)	0.171 (0.139)	0.166 (0.139)	0.137 (0.114)	0.140 (0.114)	0.133 (0.114)	-0.166 (0.109)	-0.160 (0.112)	-0.169 (0.110)	-0.139 (0.121)	-0.128 (0.122)	-0.138 (0.120)
Transportation/operator	0.0361 (0.0456)	0.0346 (0.0457)	0.0410 (0.0451)	0.0338 (0.0471)	0.0293 (0.0469)	0.0377 (0.0467)	-0.0555 (0.0667)	-0.0631 (0.0655)	-0.0519 (0.0668)	-0.0593 (0.0605)	-0.0722 (0.0597)	-0.0608 (0.0609)
Wholesale	0.0233 (0.0587)	0.0209 (0.0587)	0.0256 (0.0586)	0.0311 (0.0569)	0.0274 (0.0570)	0.0326 (0.0570)	-0.103* (0.0610)	-0.108* (0.0603)	-0.101* (0.0611)	-0.0400 (0.0733)	-0.0467 (0.0726)	-0.0407 (0.0738)
Retailing/Food Service	-0.0112 (0.0217)	-0.0201 (0.0219)	-0.0148 (0.0221)	-0.0331 (0.0244)	-0.0429* (0.0251)	-0.0356 (0.0248)	0.00856 (0.0566)	-0.00381 (0.0554)	0.00609 (0.0569)	0.0335 (0.0561)	0.0240 (0.0556)	0.0346 (0.0560)
Insurance/Banking/Real Estate	-0.0297 (0.0229)	-0.0358 (0.0237)	-0.0341 (0.0232)	-0.0215 (0.0236)	-0.0275 (0.0242)	-0.0247 (0.0240)	-0.0514 (0.0706)	-0.0584 (0.0722)	-0.0545 (0.0708)	-0.0121 (0.0605)	-0.0156 (0.0606)	-0.0108 (0.0600)
Other services	0.00568 (0.0154)	0.00166 (0.0156)	0.00417 (0.0155)	-0.0198 (0.0164)	-0.0242 (0.0166)	-0.0209 (0.0165)	-0.0305 (0.0330)	-0.0360 (0.0329)	-0.0315 (0.0329)	-0.0117 (0.0320)	-0.0159 (0.0320)	-0.0113 (0.0321)
Government	-0.0341 (0.0304)	-0.0406 (0.0312)	-0.0424 (0.0312)	-0.0145 (0.0312)	-0.0181 (0.0319)	-0.0211 (0.0320)	-0.0494 (0.0425)	-0.0515 (0.0430)	-0.0556 (0.0432)	-0.00350 (0.0412)	0.00386 (0.0415)	-0.00102 (0.0419)
Constant	0.0203 (0.263)	0.00444 (0.261)	0.0154 (0.263)	0.287 (0.270)	0.274 (0.267)	0.281 (0.272)	-0.622 (0.450)	-0.635 (0.449)	-0.627 (0.449)	-0.339 (0.455)	-0.337 (0.454)	-0.338 (0.456)
Observations	982	982	982	982	982	982	982	982	982	982	982	982
R-squared	0.025	0.023	0.030	0.029	0.022	0.031	0.021	0.016	0.021	0.013	0.008	0.014

Robust standard errors in parentheses

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

Table 4 Estimated coefficients on changes in working hours and the incidence of extra overtime

Note: Covariates are from the time of January 2009. Robust standard errors are in parentheses.

Clustered standard errors were smaller than the robust standard errors (Donald and Lang, 2007; Angrist and Pischke, 2008).

To assess whether the effect of the reform varies by workers' preferences, I run models (7) and (8) separately for workers who want to work more and those who want to reduce their hours. The results show no significant effect of the reform (Table 5). The coefficients shown are the treatment effect terms ρ in model (7) and γ in model (8). As

shown in row 2, there was a 6.6% decrease in working hours for extra overtime workers and a 6.5% increase in working hours for workers in large firms after the reform. However, the TD model results show no significant treatment effect, while the models of the incidence of overtime show no significant effect of the reform either.

	Working hour 2011-2010			Working hour 2012-2010			Incidence of extra overtime 2011-2010			Incidence of extra overtime 2012-2010		
	DID extra overtime	DID firm size	TD	DID extra overtime	DID firm size	TD	DID extra overtime	DID firm size	TD	DID extra overtime	DID firm size	TD
Workers who want to work more (n=545)	-0.0209 (0.0312)	0.0147 (0.0138)	0.0603 (0.0670)	-0.0133 (0.0329)	0.0180 (0.0153)	0.0422 (0.0695)	-0.0315 (0.0667)	-0.0120 (0.0344)	0.0797 (0.124)	-0.000488 (0.0674)	-0.00593 (0.0333)	0.0427 (0.126)
Workers who want to reduce their hours (n=436)	-0.0663** (0.0263)	0.0650** (0.0292)	0.00162 (0.0424)	-0.0800*** (0.0265)	0.0452 (0.0289)	0.00837 (0.0428)	-0.0656 (0.0535)	0.0950** (0.0470)	-0.0872 (0.100)	-0.0968** (0.0470)	0.00689 (0.0426)	-0.0508 (0.0914)

Table 5 Estimated coefficients of working hours and worker status

The presented results are consistent with those of Trejo (2003). Because the 2010 reform did not restrict standard wages, changes in the overtime premium might have been offset by changes in standard hourly wages, leaving working hours and total earnings unchanged.¹⁵ The other possible explanation of the presented result is the existence of unpaid overtime. So-called ‘service overtime’ is prevalent in Japan, where workers do not report their actual working hours. According to the Ministry of Health, Labour, and Welfare, 1312 firms in fiscal year 2011 received a penalty for using service overtime, with these unpaid overtime hours eventually paid to 117,002 employees.¹⁶ The findings of this study thus confirm the importance of the government considering stronger regulations towards unpaid work, while regulating the standard wage might also be an

¹⁵ The coefficients from the changes in wages regressions show no significant effect of the reform either. The results are shown in Table A1.

¹⁶ The details can be obtained from the Ministry of Health, Labour, and Welfare website: <http://www.mhlw.go.jp/stf/houdou/2r9852000002lrsc.html>.

effective strategy considering that some workers overwork because their wages are so low. Because long working hours are deeply rooted in Japanese culture, a drastic reform is thus necessary to improve working conditions considerably.

7. Conclusion

In this study, I evaluated the reform of the Labour Standards Act enacted in April 2010, which tried to reduce excessive overtime and thus promote better work/life balance for employees by doubling the overtime premium for extra overtime workers, as they are described herein, that work in large firms. The reform generated an exogenous variation in the marginal cost of assigning extra overtime, which I exploit in order to examine how the reform affected working hours and the incidence of excessive overtime.

The estimation results from the DID and TD models showed that there were no changes in working hours or in the incidence of overworking following the introduction of the reform for the treatment group. This finding also applied to workers that wanted to either increase or reduce their total number of hours worked. The findings presented herein suggest the prevalence of unpaid overtime in Japan. For example, workers might choose to work longer hours in order to gain recognition from their bosses and/or earn future promotions. This study thus highlights the importance of the Japanese government considering regulation on unpaid overtime.

For further research, it is important to investigate how standard wages have changed after the reform, because as Trejo (2003) suggested, the examined changes in the overtime premium might have been offset by changes in standard hourly wages, leaving working hours and earnings unchanged. It is also important to document changes in unpaid work. Unfortunately, this study fails to capture how many overtime hours are paid

and unpaid. Further investigation on the possibility that the reform might have reduced paid extra overtime hours is needed.

Appendix

	Hourly wage 2011-2010			Hourly wage 2012-2010		
	DID extra overtime	DID firm size	TD	DID extra overtime	DID firm size	TD
Extra overtime worker(=1)		-0.0865 (0.193)	-0.230 (0.213)		-0.0169 (0.235)	-0.158 (0.253)
Large firm(=1)	-0.0131 (0.250)		-0.331 (0.359)	-0.361 (0.281)		-0.621 (0.418)
Extra overtime worker*Large firm			0.584 (0.476)			0.481 (0.545)
Female (=1)	-0.139 (0.217)	-0.144 (0.209)	-0.137 (0.216)	-0.160 (0.245)	-0.105 (0.233)	-0.154 (0.242)
Age	-0.177 (0.196)	-0.177 (0.195)	-0.186 (0.197)	0.0992 (0.247)	0.0909 (0.246)	0.0931 (0.246)
Age square	0.293 (0.306)	0.292 (0.305)	0.307 (0.307)	-0.197 (0.383)	-0.181 (0.382)	-0.187 (0.382)
Job title						
Team Leader (ref: no title)	0.698* (0.410)	0.699* (0.410)	0.673 (0.410)	0.443 (0.549)	0.440 (0.552)	0.425 (0.550)
Section Leader	0.363 (0.313)	0.377 (0.320)	0.341 (0.317)	0.296 (0.401)	0.248 (0.421)	0.271 (0.409)
Department Chief	-0.399 (0.444)	-0.386 (0.452)	-0.417 (0.448)	-0.276 (0.398)	-0.355 (0.401)	-0.295 (0.413)
Department manager	0.897 (0.895)	0.879 (0.895)	0.904 (0.899)	0.228 (1.214)	0.177 (1.220)	0.239 (1.228)
Non-respondent	0.101 (0.226)	0.0468 (0.238)	0.118 (0.313)	0.505** (0.213)	0.398* (0.226)	0.538* (0.280)
Industry						
Agricultural (ref: Manufacturing)	0.0663 (0.257)	0.0190 (0.268)	-0.0712 (0.283)	0.160 (0.277)	0.229 (0.278)	0.0652 (0.272)
Construction/mining	0.386 (0.546)	0.344 (0.523)	0.415 (0.533)	0.893 (0.585)	0.740 (0.567)	0.931 (0.588)
Electricity/water	1.146 (2.128)	1.166 (2.126)	1.179 (2.134)	3.264 (2.713)	3.320 (2.715)	3.284 (2.719)
Transportation/operator	0.606 (0.420)	0.588 (0.405)	0.577 (0.416)	0.545** (0.259)	0.485* (0.249)	0.526** (0.264)
Wholesale	0.134 (0.214)	0.127 (0.205)	0.150 (0.214)	0.950** (0.435)	0.911** (0.431)	0.964** (0.440)
Retailing/Food Service	-0.0812 (0.573)	-0.0776 (0.566)	-0.0906 (0.573)	-0.705 (0.626)	-0.749 (0.613)	-0.707 (0.625)
Insurance/Banking/Real Estate	0.629 (0.382)	0.637* (0.377)	0.618 (0.387)	0.714 (0.688)	0.695 (0.684)	0.703 (0.686)
Other services	0.0344 (0.246)	0.0362 (0.242)	0.0353 (0.248)	0.322 (0.296)	0.298 (0.291)	0.320 (0.297)
Government	0.157 (0.377)	0.185 (0.384)	0.203 (0.380)	0.669** (0.292)	0.709** (0.300)	0.699** (0.298)
Constant	2.352 (3.001)	2.398 (3.013)	2.618 (3.029)	-1.408 (3.870)	-1.380 (3.900)	-1.225 (3.913)
Observations	964	964	964	956	956	956
R-squared	0.016	0.017	0.018	0.026	0.024	0.026

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A1. Estimated coefficients on changes in hourly wage

Note: Covariates are from the time of January 2009. Robust standard errors are in parentheses.

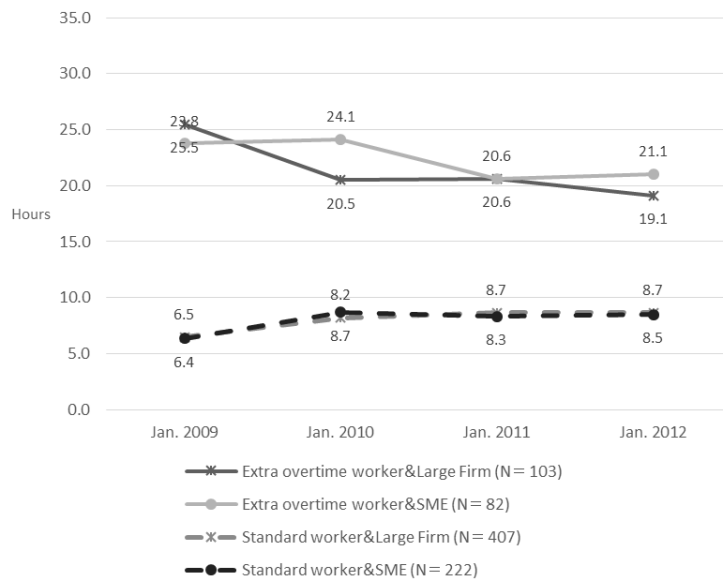


Figure A1 Weekly overtime hours by work status and firm size

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東京大学社会科学研究所パネル調査プロジェクトについて

労働市場の構造変動、急激な少子高齢化、グローバル化の進展などにもない、日本社会における就業、結婚、家族、教育、意識、ライフスタイルのあり方は大きく変化を遂げようとしている。これからの日本社会がどのような方向に進むのかを考える上で、現在生じている変化がどのような原因によるものなのか、あるいはどこが変化してどこが変化していないのかを明確にすることはきわめて重要である。

本プロジェクトは、こうした問題をパネル調査の手法を用いることによって、実証的に解明することを研究課題とするものである。このため社会科学研究所では、若年パネル調査、壮年パネル調査、高卒パネル調査の3つのパネル調査を実施している。

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東京大学社会科学研究所パネル調査プロジェクトディスカッションペーパーシリーズは、東京大学社会科学研究所におけるパネル調査プロジェクト関連の研究成果を、速報性を重視し暫定的にまとめたものである。