Do Overtime Regulations Reduce Overtime Work in Japan?

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Abstract

■ Research question

- **Does the 2019 overtime limit introduced in Japan reduce long working hours?**

■ Conclusion

Estimation Results

- **Estimation results suggest that this policy intervention had only a limited effect.**

Policy Implication

- **The policy should simultaneously provide technical and financial support in improving labor productivity and reducing overtime by gradually tightening the requirements for regulatory exceptions.**

Contents

1 Introduction

- **Background**
  - Among the Organisation for Economic Co-operation and Development (OECD) countries, Japan has a higher proportion of full-time workers working long hours, although labour productivity is considered low
  - If long working hours become the labour norm, achieving a work-life balance will be difficult.
  - In addition, talented people may be discouraged from working in Japan.
  - Many cases of physical and mental health problems have been reported because of long working hours.

- **Research question**

⇒ **Does the 2019 overtime limit introduced in Japan reduce long working hours?**

1 Introduction

- **Literature review**

A large strand of literature analyses the impact of labour time restriction policies in various countries.

a. Studies on the effects of reductions in standard labour hours on total labour hours

Cahuc and Carcillo (2014) for France; Chen and Wang (2011) for Taiwan; Kawaguchi et al. (2013) for Korea; Kawaguchi et al. (2017) for Japan; Raposo and Van Ours (2010) for Portugal; Sánchez (2013) for Chile; Skans (2004) for Sweden; Skuterud (2007) for Quebec, Canada; Bhattacharya et al. (2000) for California, US

b. Studies on the effects of rising overtime premium on overtime and total labour hours

Those are often examined together with the labour demand model hypothesis or the compensating wage model hypothesis

Trejo (2003) for US; Hamermesh and Trejo (2000) for California, US; Bell and Hart (2003) for UK; Kalwij and Gregory (2005) for UK; Fukahori and Hagiwara (2014) for Japan

1 Introduction

- **Work hours regulations in Japan :**
  - **Regulation of work hours in Japan before 2019**

· The **legal working hours** were reduced from **48** hours to **40** hours per week in 1987.

· The **premium wage rate** for **overtime work** is set at **25%** and the **premium wage rate** for **holiday work** is set at **35%** in 1996.

· The standards (the Notice on Limit Standards) were established regarding the limits of extension of working hours to be set in labor-management agreements regarding overtime work. The labor-management agreement must conform to these standards in 1998.

· The **overtime premium rate** was increased to at least **50%** of hourly wage in 2008 for those working more than **60 hours** per month.

⇒However, **these legislative changes did not reduce the long working hours of workers** .

The reason for this is that Japan retains the Notification of Agreement on Overtime and Work on Days off based on Article 36 of the Labour Standards Law, known as the **agreement reached via Article 36** (**Subu-Roku Kyoutei**, in Japanese).

1 Introduction

- **The agreement reached via Article 36:**

  · The legislation mandates that even if only one worker in an establishment works overtime or on a legal holiday, the entire establishment must sign the 36 Agreement and notify the Labour Standards Inspection Office.

  · The 36 Agreement informs the public that workers' overtime work hours should be limited to a maximum of 45 hours per month and 360 hours per year.

  · However, this does not have a legally enforceable effect.

  · Although companies are required to assume responsibility for safety that does not endanger the health of employees, they can set unlimited overtime hours for workers six times (or months) a year in some special situations through special provisions.

⇒The 36 Agreement is considered one of the main reasons for Japanese workers' unlimited long working hours.

Cf.: 43.0% had agreements for over 600 hours and under 800 hours, 7.4% for over 800 hours and under 1,000 hours, and 0.3% for over 1,000 hours.

1 Introduction

- **2019 legislation reform on overtime restriction in Japan :**
  - The Japanese Labour Standards Law, as amended in April 2019, clearly stipulates the **maximum overtime hours** for **workers in large companies**.
    - · **In principle**, the **limit of overtime work is 45 hours per month and 360 hours per year**.
  - However, the law also provides for **exceptions**.
    - · The **total number of overtime hours per year does not exceed 720 hours**.
    - · The **total number of overtime and holiday work hours** is **less than 100 hours per month**.
    - · The **total number of overtime and holiday work hours** for a worker from **'two months' to 'six months' is less than 80 hours per month on average**.
  - Some occupations and industries in some regions are exempt from this Act.

1 Introduction

- **Contribution**

Analysing a highly distinctive international system reform

- Internationally, total working hours are generally regulated, whereas Japan has **directly set an upper limit on overtime hours** as a countermeasure to the high level of overtime work in Japan.

Data

- By **using statistics from multiple government agencies**, not only the content of regulations in principle but also the policy effects of regulatory exceptions can be analysed, thereby **enabling a multifaceted policy evaluation** of the current system reform.

Using causal inference

- This study uses **causal inference** as an analytical method to examine policy effects in terms of causal relationships.

2 Methodology

- **Theoretical model and hypothesis :**

This study is based on the theoretical models of Boeri and Ours (2021) and Yamamoto (2019), which extend Hunt's (1999) model.

Yamamoto (2019) suggests that a maximum limit on work hours (overtime) leads to a shift from work hours to employment as a reduction in work hours does not lead to an increase in labour costs (the marginal cost of employment) in response to a reduction in overtime pay.

$$\frac{F_N}{F_H} = \frac{w\bar{H}+(1+x)w(H-\bar{H})+f}{(1+x)wN} \quad if\ H > \bar{H} \qquad (3)$$

Therefore, we propose the **hypothesis that large firms are subjected earlier to restrictions on overtime hours to reduce the workers' overtime work compared to small and medium-sized firms not subject to the limit**.

2 Methodology

- **Data and Method**

Method: DID, RD design.

$$Y_{i(t)} = \alpha + \beta \cdot Largesized\ firm_{i(t)} + \gamma \cdot Year_{i(t)} + \boldsymbol{\delta} \cdot \left(Largesized\ firm_{i(t)} \cdot Year_{i(t)} \right) + \theta \cdot X_{i(t)} + \mu_i + \varepsilon_{it} \quad (1)$$

$$Y_i = \alpha + \boldsymbol{\beta}\, I(Size_i \geq 301) + \gamma\,(Size_i - 301) + (\delta - \gamma)\, I(Size_i \geq 301)(Size_i - 301) + \mu_i \quad (2)$$

Data

- Employee-Employer matching data from the 2018 to 2019 Basic Survey of wage Structute (BSWS).
- Monthly Labour Survey (MLS) from January 2018 to December 2019.
- Matched data from the 2019 Basic Survey of Japanese Business Structure and Activities (BSJBSA) and the 2019 BSWS.

2 Methodology

- **Empirical model（DID）: baseline model**

$$Y_{i(t)} = \alpha + \beta \cdot Largesized\ firm_{i(t)} + \gamma \cdot Year_{i(t)} + \boldsymbol{\delta} \cdot \left(Largesized\ firm_{i(t)} \cdot Year_{i(t)} \right) + \theta \cdot X_{i(t)} + \mu_i + \varepsilon_{it} \quad (1)$$

$Y_{i(t)}$: Outcome variables that measure the overtime hours and working hours of all employees for establishment i in year t, such as the average monthly overtime hours of all employees, the ratio of employees working overtime, and the ratio of employees working more than 45, 60, and 80 hours of overtime per month, the average monthly working hours of all employees, and the ratio of employees working more than 240 hours per month in the establishment.

$Largesized\ firm_{i(t)}$: a dummy variable indicating whether establishment i belongs to the treatment group (i.e. large-sized firm group).

$Year_{i(t)}$: a dummy variable indicating whether it is in the year after the legislation became effective (i.e. 2019)

$X_{i(t)}$: a vector of several variables, including the ratio of male employees, the average age of employees and its square, the ratio of employees with various education levels, the ratio of employees with various employment statuses, the ratio of employees at various positions, the average number of working days, and standard working hours.

μ_i: establishment-=fixed effects, controlling for any unobserved time-invariant heterogeneity across the establishment.

ε_{it}: the error term

2 Methodology

- Definition of large-sized firm
  - Manufacturing firms and other industries: More than 300 employees.
  - Wholesale and service firms: More than 100 employees.
  - Retail firms: More than 50 employees.

2 Methodology

- **Empirical model: RD design**

$$Y_i = \alpha + \boldsymbol{\beta}\, I(Size_i \geq 301) + \gamma\,(Size_i - 301) + (\delta - \gamma)\, I(Size_i \geq 301)(Size_i - 301) + \mu_i \quad (2)$$

where $301 - b \leq Size_i \leq 301 + b$

$Y_{i(t)}$: Outcome variables that measure for individual *i*, including overtime and working hours.

$Size_i$: The firm size to which individual *i* belongs

β: The policy effect

μ_i: the error term

2 Methodology

- Choice of bandwidth of RD design
  - The CER (Coverage error rate) bandwidth selector proposed by Calonico et al. (2018) is used to calculate the optimal bandwidth.
- Choice of kernel weights of RD design
  - A triangular kernel function is used to construct the estimators.
- Choice of degree of polynomial in local regression of RD design
  - A first-order equation: a local linear regression model.

2 Methodology

- **Data(1)**
- **Employee-Employer matching data from the 2018 to 2019 Basic Survey of wage Structute (BSWS)**
  - The employee questionnaire includes the official working hours and overtime hours of the workers of interest in this study.
  - Individual demographic variables such as age, gender, education, employment status, and employment position are also included.
  - The establishment questionnaire includes variables such as the industry of the establishment and its size.
  - We match the employee questionnaire with the employer questionnaire and then construct the establishment-level unbalanced yearly panel data using common establishment numbers.
  - We use a sample of employees aged 16 to 60 with workdays and standard work hours greater than zero.
  - Final sample includes 107,859 establishments.

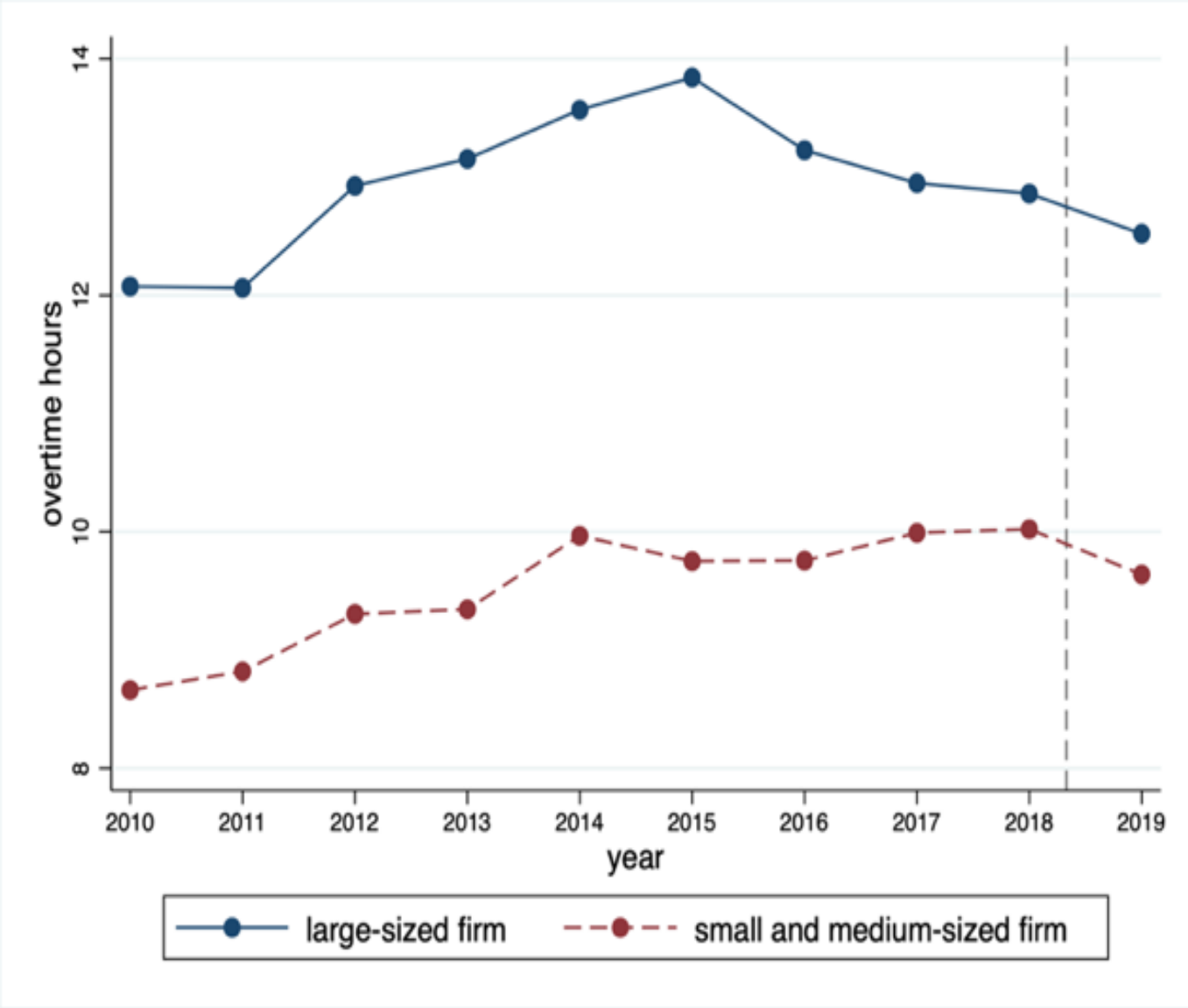
2 Methodology

- Descriptive statistics for DID for a month analysis

	(1)	(2)	(3)	(4)	(5)	(6)
	All firms		Large-sized firm		Small and medium-sized firm	
	Mean	Std.dev	Mean	Std.dev	Mean	Std.dev
Outcomes						
Overtime hours (in hours)	11.24	12.29	12.69	11.85	9.837	12.55
Overtime hours>0 (%)	0.546	0.352	0.614	0.318	0.479	0.371
Overtime hours>45 (%)	0.0512	0.142	0.0533	0.140	0.0493	0.144
Overtime hours>60 (%)	0.0200	0.0857	0.0187	0.0807	0.0212	0.0902
Overtime hours>80 (%)	0.00395	0.0347	0.00307	0.0283	0.00479	0.0399
Work hours (in hours)	175.2	20.56	172.5	18.96	177.7	21.68
Work hours>240 (%)	0.0183	0.0866	0.0133	0.0723	0.0231	0.0981
Employee characteristics						
Average age (in years)	41.04	5.939	40.11	5.742	41.92	5.990
Ratio of males (%)	0.635	0.288	0.626	0.276	0.644	0.299
Ratio of employees with junior high school education (%)	0.0270	0.0877	0.0153	0.0598	0.0381	0.107
Ratio of employees with senior high school education (%)	0.471	0.332	0.400	0.317	0.539	0.332
Ratio of employees with junior college education (%)	0.176	0.220	0.170	0.201	0.182	0.237
Ratio of employees with university or graduate school education (%)	0.326	0.310	0.414	0.321	0.242	0.273
Ratio of regular employees without fixed term (%)	0.853	0.243	0.824	0.248	0.881	0.235
Ratio of regular employees with fixed term (%)	0.0221	0.113	0.0166	0.0868	0.0273	0.133
Ratio of non-regular employees without fixed term (%)	0.0419	0.143	0.0390	0.132	0.0446	0.153
Ratio of non-regular employees with fixed term (%)	0.0832	0.180	0.121	0.208	0.0471	0.139
Ratio of managers (%)	0.0455	0.127	0.0621	0.146	0.0206	0.0867
Ratio of section heads (%)	0.126	0.232	0.176	0.261	0.0498	0.151
Ratio of team leaders (%)	0.0991	0.208	0.137	0.236	0.0428	0.140
Ratio of superintendents (%)	0.0157	0.0849	0.0159	0.0870	0.0152	0.0817
Ratio of other official positions (%)	0.136	0.272	0.202	0.315	0.0367	0.144
Ratio of person in charge (%)	0.579	0.445	0.407	0.421	0.835	0.346
Standard hours (in hours)	163.9	15.95	159.8	13.96	167.9	16.73
Work days (in days)	21.52	1.857	20.91	1.597	22.10	1.902
Firm characteristics						
Large-sized firm	0.490	0.500	1	0	0	0

2 Methodology

- Average overtime hours in large and small and medium-sized firms from 2010 to 2019



3 Results

- Results (1) policy impact based on one month

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Overtime hours	Overtime hours>0	Overtime hours>80	Overtime hours>60	Overtime hours>45	Work hours	Work hours>240
2019*Large-sized firms	0.317	0.00246	0.000766	0.00347	0.00159	0.317	0.00654***
	(0.211)	(0.00613)	(0.000862)	(0.00220)	(0.00327)	(0.211)	(0.00221)
Work days	YES	YES	YES	YES	YES	YES	YES
Standard hours	YES	YES	YES	YES	YES	YES	YES
Position	YES	YES	YES	YES	YES	YES	YES
Demographic variables	YES	YES	YES	YES	YES	YES	YES
Establishment fixed effects	YES	YES	YES	YES	YES	YES	YES
Observations	82,038	82,038	82,038	82,038	82,038	82,038	82,038
R-squared	0.105	0.161	0.004	0.016	0.024	0.702	0.042

- Using panel data from the 2018 and 2019 Basic Wage Structure Surveys, **DID estimation results** show that **policy interventions did not significantly reduce overtime hours**, the **percentage of workers who work overtime**, the **percentage of workers who work over 80 overtime hours**, the **percentage of workers who work over 60 overtime hours**, the **percentage of workers who work over 45 overtime hours**, and **total hours worked**.

- The percentage of workers with total hours worked exceeding 240 hours is, in fact, significantly higher

3 Results

- **Data(2)**
- **Monthly Labour Survey (MLS) from January 2018 to December 2019**

· This survey is conducted monthly, we can obtain information about the dynamics of employees' overtime hours and calculate the cumulative number of overtime hours over several months.

· Panel data of several months are required to analyse the impact of the policy on the sum of cumulative hours over several months.

· However, as the survey comprises cross-sectional data, constructing panel data at the establishment level or calculating the cumulative overtime hours of establishment over the past few months is impossible.

· Therefore, we assign the identification value to each industry, region, and enterprise-scale and calculate the average overtime hours accumulated in the previous few months based on the assigned identification value.

3 Results

- Descriptive statistics for DID for several months analysis

	(1)	(2)	(3)	(4)	(5)	(6)
	All firms		Large-sized firms		Small and medium-sized firms	
	Mean	Std.dev	Mean	Std.dev	Mean	Std.dev
One Month						
Overtime hours (in hours)	16.17	16.03	23.12	18.42	12.45	13.18
Ratio of males (%)	0.502	0.176	0.490	0.194	0.508	0.166
Observations	804		280		524	
Two months						
Total overtime hours (in hours)	33.50	32.60	48.20	38.96	24.88	24.44
Ratio of males (%)	0.506	0.179	0.495	0.200	0.513	0.165
Observations	774		286		488	
Three months						
Total overtime hours (in hours)	51.44	49.65	74.15	59.81	37.42	35.63
Ratio of males (%)	0.508	0.180	0.497	0.201	0.515	0.165
Observations	705		269		436	
Four months						
Total overtime hours (in hours)	69.24	65.93	99.36	79.93	50.08	45.98
Ratio of males (%)	0.511	0.182	0.500	0.203	0.517	0.167
Observations	625		286		382	
Five months						
Total overtime hours (in hours)	87.50	82.49	125.3	100.9	62.93	55.68
Ratio of males (%)	0.514	0.183	0.505	0.203	0.519	0.168
Observations	536		211		325	
Six months						
Total overtime hours (in hours)	105.7	99.24	152.8	121.6	75.26	65.85
Ratio of males (%)	0.514	0.183	0.507	0.203	0.518	0.169
Observations	436		171		265	

3 Results

- Results (2) Policy impact based on several months

	(1) Total overtime hours (Two months)		(2) Total overtime hours (Three months)		(3) Total overtime hours (Four months)		(4) Total overtime hours (Five months)		(5) Total overtime hours (Six months)	
Month4~5*		Month4~6*		Month4~7*		Month4~8*		Month4~9*		
Large-sized firms	12.69	Large-sized firms	25.57*	Large-sized firms	34.54**	Large-sized firms	30.36	Large-sized firms	29.40	
	(9.666)		(14.08)		(17.51)		(21.30)		(26.23)	
Month5~6*		Month5~7*		Month5~8*		Month5~9*		Month5~10*		
Large-sized firms	15.10*	Large-sized firms	21.07*	Large-sized firms	18.67	Large-sized firms	20.23	Large-sized firms	32.48	
	(9.021)		(12.73)		(16.59)		(21.00)		(27.10)	
Month6~7*		Month6~8*		Month6~9*		Month6~10*		Month6~11*		
Large-sized firms	13.66	Large-sized firms	12.31	Large-sized firms	12.86	Large-sized firms	26.48	Large-sized firms	36.81	
	(9.239)		(13.03)		(17.25)		(23.10)		(29.78)	
Month7~8*		Month7~9*		Month7~10*		Month7~11*		Month7~12*		
Large-sized firms	3.804	Large-sized firms	1.580	Large-sized firms	9.914	Large-sized firms	19.22	Large-sized firms	26.62	
	(9.028)		(13.47)		(19.02)		(25.21)		(29.19)	
Month8~9*		Month8~10*		Month8~11*		Month8~12*				
Large-sized firms	−0.665	Large-sized firms	2.998	Large-sized firms	9.775	Large-sized firms	18.80			
	(9.068)		(14.52)		(20.37)		(24.28)			
Month9~10*		Month9~11*		Month9~12*						
Large-sized firms	−1.538	Large-sized firms	0.628	Large-sized firms	8.666					
	(9.986)		(16.14)		(20.04)					
Month10~11*		Month10~12*								
Large-sized firms	5.046	Large-sized firms	10.19							
	(10.48)		(15.24)							
Month11~12*										
Large-sized firms	2.160									
	(9.801)									
Demographic variable	YES	Demographic variable	YES	Demographic variable	YES	Demographic variable	YES	Demographic variable	YES	
Industry dummies	YES	Industry dummies	YES	Industry dummies	YES	Industry dummies	YES	Industry dummies	YES	
Region dummies	YES	Region dummies	YES	Region dummies	YES	Region dummies	YES	Region dummies	YES	
Observations	774	Observations	705	Observations	625	Observations	536	Observations	436	
R-squared	0.275	R-squared	0.292	R-squared	0.307	R-squared	0.320	R-squared	0.342	

- Using panel data from the 2018 and 2019 monthly Labour Survey from 2018 to 2019, **DID estimation results** show that **policy interventions with multi-month requirements** also **do not significantly reduce overtime hours**, other explained variables.

3 Results

- **Data(3)**

- **Matched data from the 2019 Basic Survey of Japanese Business Structure and Activities (BSJBSA) and the 2019 BSWS**

· The BSWS has data on employee overtime hours and work hours, although data on firm size are only available for categories.

· The BSJBSA data include specific variables on the number of employees.

· We matched BSJBSA with BSWS by unique firm codes.

· We retain the sample of employees aged 16 to 60 years and remove the sample with zero work days and official working hours.

· We divide the sample into two parts, establishment size 251 to 300 and establishment size 301 to 350.

3 Results

- Descriptive statistics for RD design for manufacturing industries

	Establishment size 251–300		Establishment size 301–350	
	Mean	Std.dev	Mean	Std.dev
Overtime hours (in hours)	16.24	18.44	17.19	18.39
Overtime hours>0 (%)	0.699	0.459	0.721	0.449
Overtime hours>45 (%)	0.0775	0.267	0.0767	0.266
Overtime hours>60 (%)	0.0291	0.168	0.0254	0.157
Overtime hours>80 (%)	0.00228	0.0477	0.00393	0.0626
Observations	6,144		5,088	

3 Results

· Validity of RD design implementation

- Satisfy the continuity assumption

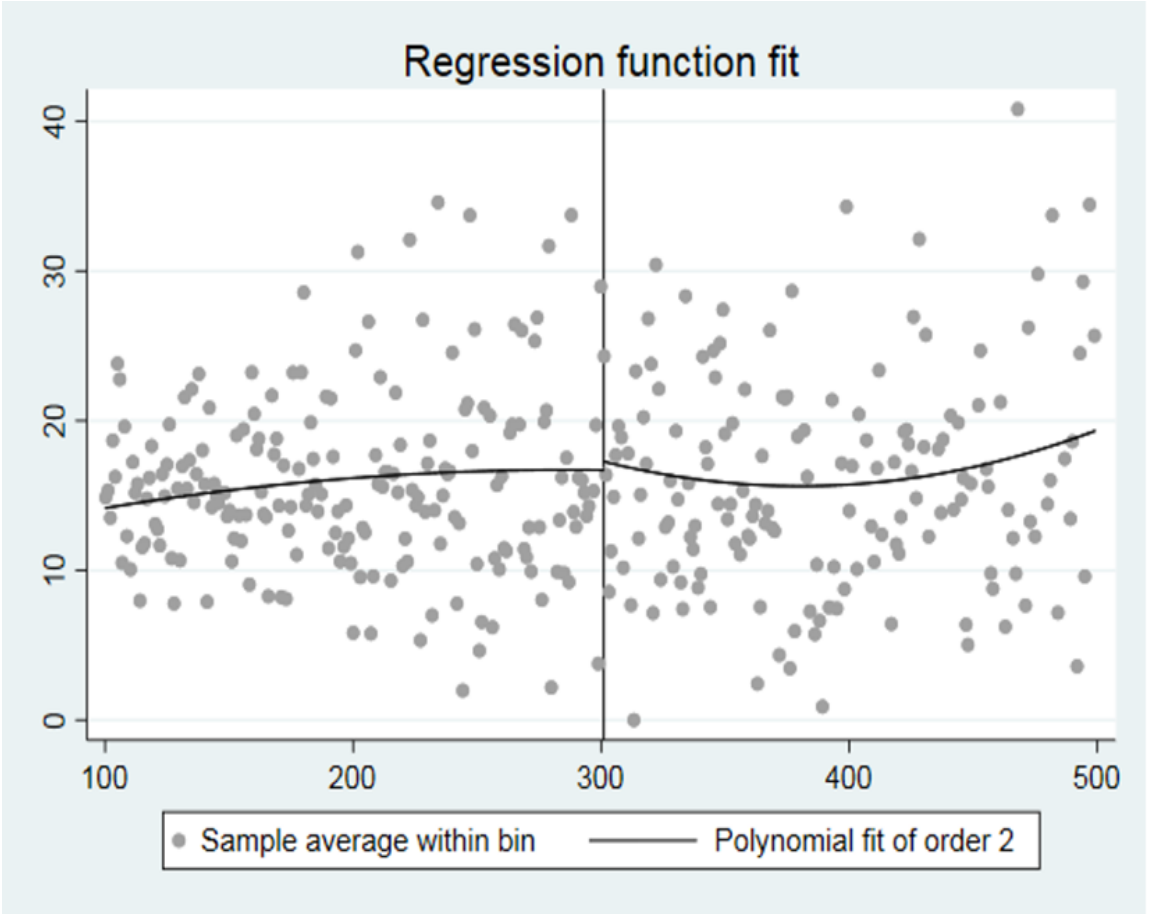
T	P>|T|
1.4889	0.1365

- Other covariates continuity ate the cut-off point

	(1) Age	(2) Sales	(3) Capital
Conventional	−0.632	3,926	912.7
	(1.342)	(3,494)	(665.6)
Bias-corrected	−0.685	4,043	939.3
	(1.342)	(3,494)	(665.6)
Robust	−0.685	4,043	939.3
	(1.396)	(3,625)	(692.7)
Bandwidth selection	CER	CER	CER
Observations	12,188	9,158	11,037

3 Results

- Relationships between employees 'overtime hours and the frim sizes for manufacturing industries



3 Results

- Results (3) Evaluation of policy effects in the manufacturing industries using RD design

	(1) Overtime	(2) Overtime>0	(3) Overtime>45	(4) Overtime>60	(5) Overtime>80
Conventional	−3.476	−0.0990	−0.0465	−0.0281	−0.0128**
	(4.931)	(0.0948)	(0.0567)	(0.0276)	(0.00575)
Bias-corrected	−3.667	−0.101	−0.0482	−0.0293	−0.0132**
	(4.931)	(0.0948)	(0.0567)	(0.0276)	(0.00575)
Robust	−3.667	−0.101	−0.0482	−0.0293	−0.0132**
	(5.115)	(0.0978)	(0.0595)	(0.0286)	(0.00585)
Bandwidth selection	CER	CER	CER	CER	CER
Observations	11,037	10,271	11,164	11,268	7,270

- **The RD design estimation results for the manufacturing industry** using matched data from the Basic Survey on Wage Structure and the Basic Survey on Business Activities indicate that **the policy intervention significantly reduced the proportion of overtime hours exceeding 80 hours.**

- It also shows that other explained variables are not significantly reduced.

3 Results

- Policy evaluation (1)

- The primary objective of the policy intervention was to improve labour productivity by dispensing with the tendency to work long hours, it was also to prevent the physical and mental illnesses associated with extremely long working hours and maintain the health of workers.
- The above estimates show that **the policy intervention** implemented in 2019 was **effective in curbing long working hours, which are at the level of the overwork death line**, in some industries, namely **manufacturing**, but the average overtime hours and the percentage of employees working overtime did not significantly decrease after the policy intervention.
- It indicates that **the policy effects were very limited**.

3 Results

- Policy evaluation (2)

- **The reason for this is presumably related to the fact that there are exceptions to the policy that are more lenient than the principle regulatory requirements** and the types of industries in which the policy is postponed.

- In other words, **the program only encourages these very few workers to reduce their overtime hours, and is not considered to be an incentive or pressure for companies to reduce overtime for the majority of their workers**.

4 Conclusion

- Policy implication

- **Policies that simultaneously increase labour productivity and reduce overtime are needed**.

- In future, it will be necessary to reduce overtime to the average level of other OECD countries by implementing a package of policies that provide technical and financial assistance to companies in improving labor productivity and gradually tightening the requirements for exceptions.

4 Conclusion

・Limitations of this research

- Future studies should consider analyses based on monthly panel data with detailed information about individual attributes and firm characteristics.

- It needs to conduct analyses using data on employee responses, which reflect the actual conditions of unpaid overtime work.

Appendix 1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	overtime>80	overtime>80	overtime>80	overtime>80	overtime>80	overtime>80	overtime>80	overtime>80
Bandwidth:	10	20	30	40	50	60	MSE	CER
Conventional	−0.0154	−0.00830	−0.0131**	−0.00958*	−0.00482	−0.00248	−0.00511	−0.0128**
	(0.0155)	(0.00825)	(0.00597)	(0.00507)	(0.00417)	(0.00355)	(0.00422)	(0.00575)
Bias-corrected	−0.0179	−0.0136*	−0.00747	−0.0150***	−0.0138***	−0.0101***	−0.00656	−0.0132**
	(0.0155)	(0.00825)	(0.00597)	(0.00507)	(0.00417)	(0.00355)	(0.00422)	(0.00575)
Robust	−0.0179	−0.0136	−0.00747	−0.0150**	−0.0138**	−0.0101*	−0.00656	−0.0132**
	(0.0220)	(0.0131)	(0.00942)	(0.00720)	(0.00639)	(0.00562)	(0.00466)	(0.00585)
Observations	1,960	4,898	6,708	8,824	11,164	13,296	11,164	7,270

Appendix 2

- RD estimates for the placebo analysis using 2018 data

	(1)	(2)
	overtime>80	overtime>80
Bandwidth:	MSE	CER
Conventional	−0.00295	5.06e−05
	(0.00482)	(0.00583)
Bias-corrected	−0.00374	−0.000163
	(0.00482)	(0.00583)
Robust	−0.00374	−0.000163
	(0.00533)	(0.00601)
Bandwidth selection	MSE	CER
Observations	17,964	12,178

Appendix 3

- OLS estimation for determinants of long working hours (1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Overtime hours	Overtime hours>0	Overtime hours>80	Overtime hours>60	Overtime hours>45	Work hours	Work hours>240
Age21-30	−0.0561	0.0426***	−0.00169***	−0.00518***	−0.0101***	−0.0561	−0.00559***
	(0.0873)	(0.00238)	(0.000352)	(0.000827)	(0.00128)	(0.0873)	(0.000683)
Male	7.865***	0.130***	0.00562***	0.0281***	0.0625***	7.865***	0.0160***
	(0.0596)	(0.00186)	(0.000214)	(0.000492)	(0.000790)	(0.0596)	(0.000404)
Junior high school	3.351***	0.0143***	0.00741***	0.0239***	0.0404***	3.351***	0.0205***
	(0.221)	(0.00515)	(0.00127)	(0.00247)	(0.00339)	(0.221)	(0.00222)
Senior high school	1.504***	0.0110***	0.00275***	0.00866***	0.0147***	1.504***	0.00838***
	(0.0720)	(0.00217)	(0.000273)	(0.000649)	(0.00101)	(0.0720)	(0.000568)
University or graduate school	−2.034***	−0.110***	−0.000810***	−0.00534***	−0.0121***	−2.034***	−0.00317***
	(0.0725)	(0.00223)	(0.000242)	(0.000612)	(0.000977)	(0.0725)	(0.000506)
Regular without fixed term	2.989***	0.0765***	0.00274***	0.00546***	0.0138***	2.989***	−0.000514
	(0.152)	(0.00495)	(0.000580)	(0.00143)	(0.00204)	(0.152)	(0.00124)
Regular with fixed term	2.068***	−0.0241***	0.00316***	0.00772***	0.0162***	2.068***	0.00200
	(0.244)	(0.00739)	(0.00102)	(0.00232)	(0.00338)	(0.244)	(0.00202)
Section head	1.950***	0.0868***	0.000190	0.00135**	0.00726***	1.950***	0.00110*
	(0.0837)	(0.00267)	(0.000238)	(0.000582)	(0.000985)	(0.0837)	(0.000570)
Team leader	14.08***	0.593***	0.00233***	0.0182***	0.0526***	14.08***	0.00930***
	(0.110)	(0.00314)	(0.000338)	(0.000882)	(0.00144)	(0.110)	(0.000709)
Firmsize over15000	8.735***	0.212***	−0.000651	0.0223***	0.0728***	8.735***	0.0194***
	(0.184)	(0.00556)	(0.000824)	(0.00165)	(0.00251)	(0.184)	(0.00165)
Firmsize 5000-14999	9.126***	0.257***	0.00165**	0.0285***	0.0657***	9.126***	0.0205***
	(0.185)	(0.00556)	(0.000834)	(0.00167)	(0.00247)	(0.185)	(0.00165)
Standard hours	−0.0617***	−0.000332***	−0.000183***	−0.000606***	−0.000884***	0.938***	0.00153***
	(0.00238)	(5.95e−05)	(1.29e−05)	(2.57e−05)	(3.56e−05)	(0.00238)	(3.71e−05)
Work days	1.771***	0.0141***	0.00356***	0.0136***	0.0235***	1.771***	0.00246***
	(0.0218)	(0.000493)	(0.000137)	(0.000258)	(0.000338)	(0.0218)	(0.000256)
Prefecture dummies	YES	YES	YES	YES	YES	YES	YES
Observations	391,434	391,434	391,434	391,434	391,434	391,434	391,434
R-squared	0.178	0.193	0.017	0.047	0.074	0.653	0.077

Other variables are dummy of industries.

Robust standard errors in parentheses

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

Appendix 3

- The number of males is significantly higher than females at the 1% level for all overtime and total hours worked indicators.
- Almost all workers in their 30s work the longest hours, with some estimates showing that workers in their 20s work the same long hours as those in their 30s.
- The lower the level of education, the longer the working hours.
- Regular employees with no fixed term of employment tend to work the longest hours, while regular employees with a fixed term of employment tend to work the next longest hours.
- Team leader and section chiefs tend to work longer hours.
- The larger is the size of the company, the more likely are the employees to work long hours, with peaks in the 1,000–4,999 and 5,000–14,999 employee groups.
- The construction and other industries are found to have long working hours, when the explained variable is evaluated based on overtime hours exceeding 80 hours and total hours worked of 240 hours.

Appendix 3

- OLS estimation for determinants of long working hours (3)

- In terms of individual attributes, men in the age group, mainly in their 30s, who are just entering the lower management positions within a company while at home raising children tend to work longer hours.
- We can infer that achieving a work-life balance is difficult in Japan, which has traditionally had a relatively strong gender role division of labour among OECD countries.
- Although the challenge is to change this situation, the fixed social norm is maintained, rendering the maintenance of a work-life balance difficult for men.
- In addition, women in the process of marriage, childbirth, and child-rearing also face strong barriers to social advancement.