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Uncertainty over Working Schedules and Compensating Wage Differentials: From the Viewpoint of Labor Management

April 18, 2018

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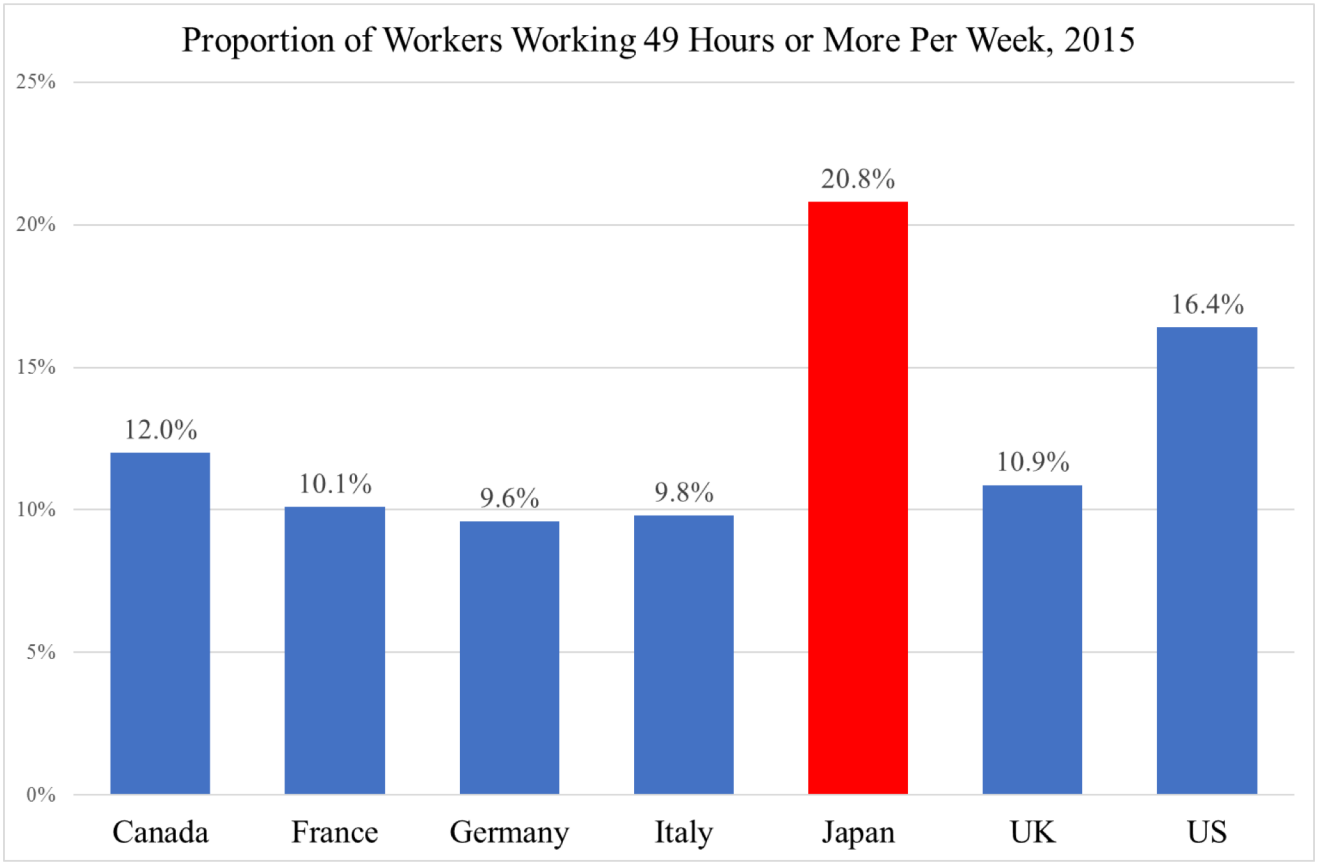
Motivation of this study (1)

- Given the prevalence of long working hours compared to other advanced countries, their reduction is currently an important policy issue in Japan.
- Recent policy developments aim to prevent death from overwork (*karoshi*), improve workers' health, attain better WLB, and enhance labor productivity.



"The Action Plan for the Realization of Work Style Reform" (Abe Cabinet, March 2017)

① Improvement in the working conditions of non-regular workers ⇒Equal pay for equal work

② Increase in wages and improvement in productivity

③ Improvement in long working hours including introduction of a regulatory limit on overtime work ⇒Upper limit of overtime: 750 hours/year, 100 hours/month

- However, for political reasons, whether the revision of the Labor Standard Act will pass the Diet or not is unclear. ⇒Policy uncertainty

Motivation of this study (2)

- However, workers' life is also significantly affected by the uncertainty/unpredictability of working schedules such as sudden unexpected overtime work or difficulty in taking annual leave.
- Such an uncertainty may arise from bad management practice.
- However, in order to preserve profitability or even survival, firms have often to quickly react to sudden claims from their customers and unexpected accidents. Thus, some schedule changes are unavoidable even for well-managed firms.
- However, different from long working hours (or overtime work), studies explicitly taking into account uncertain working schedules have been scarce.

Related literature

- Long working hours
  - Impacts on productivity of workers/firms: Pencavel (2015); Collewet and Sauermann (2017); Lee and Lim (2017).
  - Impacts on wages: Kato *et al*. (2013); Cortes and Pan (forthcoming).
  - Relationships with subjective well-being/job satisfaction: Pouwels *et al*. (2008); Estevão and Sá (2008); Wooden *et al*. (2009); Rätzel (2012); Tsurumi and Managi (2017).
- Shift work (nights, weekends)
  - Positive compensating wages: Kostiuk (1990); Lanfranchi *et al*. (2002).
- Flexible working arrangements
  - WTP for flexible working hours: Eriksson and Kristensen (2014); Mas and Pallais (2017); Wiswall and Zafar (2018).
  - Negative compensating wages for flexible working arrangements: Heywood *et al*. (2007); Kuroda and Yamamoto (2014); Mas and Pallais (2017), Hasebe *et al*. (2018).
- WLB, management practices, and productivity
  - Bloom and Van Reenen (2006); Bloom *et al*. (2011).

Is this study related to international trade?

- The title of this workshop is "uncertainty, trade and firms."
- Bøler *et al*. (2018:JIE) indicate the association between exporting and the gender wage gap.

  "A firm's entry into exporting increases the gender wage gap by about 3% points."

  "Working for an exporting firm may require working particular hours and taking late night phone calls to communicate with customers in different time zones and may involve international travel arranged at short notice."

⇒International trade may cause uncertain working schedules. This study is related to the theme of the workshop.

Outline

1. Survey design
2. Unpredictable overtime hours and uncertainty over taking holidays
3. WTA for uncertain working schedules
4. Uncertain working schedule and job satisfaction
5. Compensating wage differential in the actual labor market
6. Conclusion and implications

An original survey for Japanese individuals

- "Survey of Life and Consumption under the Changing Economic Structure" (November 2017)
  - Designed by the author and conducted by the Rakuten Research, Inc., contracted out by the RIETI.
  - Internet survey. The number of respondents: 10,041
  - The number of observations used in this study (those who are currently working) is 6,856.
- Survey items used in this study
  1. Frequency of unexpected overtime work and sudden cancellation of planned holidays
  2. Workers' distaste for uncertain working schedules (or preference for predictable working schedules)
  3. Subjective job satisfaction (5 point scale)
  4. Annual earnings, working hours, gender, age, education, tenure, etc.

Question: Unpredictable overtime hours, uncertainty over taking holidays

- *"How often do you incur unexpected overtime?"*
  - 1) frequently
  - 2) occasionally
  - 3) rarely
  - 4) not at all.
- *"How often do you have to cancel your planned holidays because of work?"*
  - 1) frequently
  - 2) occasionally
  - 3) rarely
  - 4) not at all

Who faces uncertain working schedule?

- Male, younger (aged 20 to 40) workers, those who working longer tend to experience unpredicted overtime work frequently. The frequency is higher among company executives and standard full-time employees.
- Females, older (aged 60 or more) workers, and non-standard employees are less likely to be forced to cancel planned holidays. Those who work long hours are more likely to experience uncertainty over taking holidays.

	(1) Unpredictable overtime		(2) Unpredictable cancellation of holidays	
	Frequently	Occasionally	Frequently	Occasionally
All	14.0%	38.3%	5.2%	23.4%
Male	16.3%	41.3%	6.6%	27.8%
Female	10.8%	34.2%	3.2%	17.3%
Age 20-29	18.2%	43.0%	5.6%	23.7%
30-39	19.4%	45.3%	7.2%	26.8%
40-49	17.4%	42.6%	6.1%	26.8%
50-59	11.9%	40.3%	4.7%	24.3%
60-69	5.2%	24.4%	2.5%	16.6%
70-	5.0%	19.5%	4.4%	13.2%
Company executive	24.7%	33.2%	11.6%	27.8%
Self-employed	10.4%	31.9%	7.0%	28.5%
Standard employee	18.4%	47.2%	6.3%	28.5%
Non-standard employee	7.1%	27.9%	1.9%	13.7%
Less than 35 hours	7.3%	26.8%	2.5%	14.9%
35-42 hours	5.8%	39.0%	1.8%	20.7%
43-45 hours	14.6%	51.5%	5.0%	27.7%
46-48 hours	20.3%	54.0%	5.2%	35.1%
49-59 hours	31.3%	46.3%	10.4%	33.1%
60-64 hours	32.0%	44.0%	13.9%	37.6%
65-74 hours	40.9%	41.7%	22.8%	40.9%
75 hours or more	49.7%	34.3%	30.2%	37.9%

Individual characteristics and unpredictable overtime: Ordered-probit estimation results

- The coefficient for female is negative but statistically insignificant. The observed gender gap in the working schedule uncertainty is the result of other attributes such as employment type and weekly working hours.
- Non-standard employees are less likely to face uncertain overtime work.

	(1) All	(2) Male	(3) Female
Female	-0.0317		
	(0.0332)		
Company executive	0.2071 ***	0.2359 ***	0.1681
	(0.0703)	(0.0814)	(0.1472)
Self-employed	-0.1152 **	-0.1268 *	-0.0785
	(0.0540)	(0.0649)	(0.1012)
Family worker	-0.4955 ***	-0.5728 ***	-0.4647 ***
	(0.1152)	(0.1845)	(0.1437)
Part-time worker	-0.2570 ***	-0.3395 ***	-0.2413 ***
	(0.0519)	(0.1174)	(0.0640)
Hourly paid worker	-0.3190 ***	-0.3642 ***	-0.2646 **
	(0.0748)	(0.1041)	(0.1076)
Dispatched employee	-0.2218 **	-0.1280	-0.2236 **
	(0.0907)	(0.1507)	(0.1125)
Contract employee	-0.2344 ***	-0.3068 ***	-0.1219
	(0.0677)	(0.0995)	(0.0934)
Fixed-term employee	-0.6544 ***	-0.9162 ***	-0.3707 **
	(0.1283)	(0.1964)	(0.1725)
Union	0.1839 ***	0.1800 ***	0.1904 ***
	(0.0349)	(0.0447)	(0.0571)
lnhours	0.5854 ***	0.6471 ***	0.5110 ***
	(0.0380)	(0.0506)	(0.0592)
Age dummies	yes	yes	yes
Marital status	yes	yes	yes
Children	yes	yes	yes
Observations	6,856	3,975	2,881
Pseudo R^2	0.0939	0.1008	0.0718

$$Pr\,(uncertainty=j) = P\,(\alpha + \Sigma\,\beta X + \gamma\,lnhours) + \varepsilon \qquad j=1,\,2,\,3$$

1: "Rarely" and "Not at all"
2: "Occasionally"
3: "Frequently"

Individual characteristics and uncertainty over taking holidays: Ordered-probit estimation results

- Females and non-standard employees are less likely to be forced to cancel planned holidays.
- Those who work long hours are more likely to experience uncertainty over taking holidays.

	(1) All	(2) Male	(3) Female
Female	-0.1782 ***		
	(0.0374)		
Company executive	0.3119 ***	0.3145 ***	0.2924 *
	(0.0709)	(0.0811)	(0.1530)
Self-employed	0.3023 ***	0.2311 ***	0.4720 ***
	(0.0559)	(0.0657)	(0.1090)
Family worker	-0.1064	-0.2670	0.0002
	(0.1363)	(0.2356)	(0.1677)
Part-time worker	-0.1961 ***	-0.4373 ***	-0.1111
	(0.0601)	(0.1361)	(0.0776)
Hourly paid worker	-0.2042 **	-0.2574 **	-0.1196
	(0.0870)	(0.1169)	(0.1311)
Dispatched employee	-0.4870 ***	-0.1781	-0.6782 ***
	(0.1139)	(0.1716)	(0.1599)
Contract employee	-0.1545 **	-0.2713 ***	0.0290
	(0.0752)	(0.1024)	(0.1128)
Fixed-term employee	-0.2941 **	-0.5549 ***	0.0415
	(0.1457)	(0.2099)	(0.2040)
Union	0.1035 ***	0.0692	0.1717 **
	(0.0394)	(0.0488)	(0.0672)
lnhours	0.4917 ***	0.5282 ***	0.4532 ***
	(0.0443)	(0.0581)	(0.0720)
Age dummies	yes	yes	yes
Marital status	yes	yes	yes
Children	yes	yes	yes
Observations	6,856	3,975	2,881
Pseudo R^2	0.0655	0.0536	0.0522

$$Pr\ (uncertainty=j) = P\ (\alpha + \Sigma\, \beta X + \gamma\, lnhours) + \varepsilon \qquad j=1,\ 2,\ 3$$

1:"Rarely" and "Not at all"
2: "Occasionally"
3: "Frequently"

Hypothetical question: Preference for predictable overtime work

- Q. The predictable overtime hours equivalent to the unpredictable sudden two hours' overtime.

  "Suppose that you are asked, all of a sudden, to put in two overtime hours. Moreover, suppose an alternative situation in which you knew in advance that you would have had to put in overtime on certain days. How much would you dislike the former situation compared to the latter? How many overtime hours would you be willing to put in if you could avoid the former? In other words, if you could avoid a situation in which you are suddenly asked to put in two hours of overtime under the condition that you agree in advance that you would accept overtime at a later date, how many extra hours would you be willing to put in?"

➢ Subjective costs of unpredictable overtime work are 50-75% greater than the same amount of hours of predictable overtime.

	Mean	P10	P50	P90
All	3.47	2	3	5
Male	3.51	2	3	5
Female	3.40	2	3	5

Hypothetical question: Preference for predictable holidays

- Q. The number of unpredictable holidays equivalent to the predictable two holidays.

  "Suppose that you can definitely take two holidays and plan them in advance. How do you value those two days if you could alternatively request more holidays on condition that you are willing to accept a forced cancellation of your holidays? In other words, in order for you to take these two holidays, how many more holidays—days that you are not certain you can take until you actually take them—would you be willing to sacrifice?"

➢ Subjective benefit from predictable holidays is 50-75% larger than that from the same number of uncertain holidays.

	Mean	P10	P50	P90
All	3.45	2	3	5
Male	3.42	2	3	5
Female	3.49	2	3	5

Hypothetical question: WTA for uncertain working schedules

- Q. Wage premium necessary to accept uncertain working schedules

  "Compare two types of jobs—those that require unexpected overtime assignments or sudden changes in your holiday plans with those that do not. Which salary increase would you expect if you were to take the former? This question assumes that overall number of working hours and the difficulty of assignments are similar for both."

- The mean and the median (p50) of the wage premium necessary to accept uncertain working schedules (WTA) are 27.4% and 20%, respectively. However, there is a large heterogeneity across individuals.

	Mean	P10	P50	P90
All	27%	5%	20%	50%
Male	27%	5%	20%	50%
Female	28%	10%	20%	50%

Uncertain schedules and job satisfaction: Ordered-probit estimation results

- Those who frequently face uncertain overtime work tend to be unsatisfied with their jobs. The estimation results indicate an additional negative impact of schedule uncertainty after controlling for the length of overtime work.
- Frequent forced cancellation of planned holidays has a large negative impact on workers' job satisfaction.
- Compared with the coefficients of working hours or wages, the magnitude of the coefficients of schedule uncertainty is very large.

	(1) Male	(2) Female	(3) Male	(4) Female
lnwage	0.2149 ***	0.1685 ***	0.2179 ***	0.1581 ***
	(0.0288)	(0.0325)	(0.0289)	(0.0325)
lnhours	-0.1800 ***	-0.2937 ***	-0.1697 ***	-0.2918 ***
	(0.0434)	(0.0537)	(0.0433)	(0.0532)
Occasional unpredictable overtime	0.0313	-0.0724		
	(0.0385)	(0.0446)		
Frequent unpredictable overtime	-0.2786 ***	-0.3666 ***		
	(0.0570)	(0.0742)		
Occasional cancellation of holidays			-0.1463 ***	-0.1178 **
			(0.0380)	(0.0531)
Frequent cancellation of holidays			-0.5339 ***	-0.5448 ***
			(0.0827)	(0.1266)
Age	yes	yes	yes	yes
Type of employment	yes	yes	yes	yes
Observations	3,975	2,881	3,975	2,881
Pseudo R^2	0.0301	0.0237	0.0321	0.0233

Pr (job satisfaction=j)
= P (α + β lnwage + γ lnhours + δ uncertainty + ΣθX) + ε
j=1, 2, 3, 4, 5

1: "Dissatisfied"
2: "Somewhat dissatisfied"
3: "Difficult to say"
4: "Somewhat satisfied"
5: "Satisfied"

Compensating wage differentials for uncertainty: OLS

- In the actual labor market in Japan, some wage premium compensation for uncertain working schedules is observed.
- The size of the coefficients is larger for female than for male workers, corresponding to wage premiums of 11-14% and 5-6%, respectively.
- Significant wage premiums compensating for uncertainty over taking holidays are not detected.

	(1) Male	(2) Male	(3) Female	(4) Female
Occasional unpredictable overtime	0.0560 **		0.1088 ***	
	(0.0231)		(0.0255)	
Frequent unpredictable overtime	0.0531 *		0.1266 ***	
	(0.0287)		(0.0441)	
Occasional cancellation of holidays		0.0042		0.0427
		(0.0224)		(0.0304)
Frequent cancellation of holidays		0.0293		-0.0442
		(0.0419)		(0.0764)
lnhours	yes	yes	yes	yes
Age	yes	yes	yes	yes
Tenure	yes	yes	yes	yes
Education	yes	yes	yes	yes
Occupation	yes	yes	yes	yes
Type of employment	yes	yes	yes	yes
Industry	yes	yes	yes	yes
Union	yes	yes	yes	yes
Observations	3,975	3,975	2,881	2,881
Adj. R^2	0.4905	0.6152	0.6228	0.6248

$$lnearnings = \alpha + \beta\ lnhours + \gamma\ uncertainty + \Sigma\delta X + \varepsilon$$

Conclusion

- About 50% of workers have experienced unpredictable overtime work, while about 30% are occasionally forced to cancel scheduled holidays due to sudden work issues.
- The uncertainty over working schedules is prevalent among full-time regular employees and those working long hours.
- The subjective cost of such an uncertainty is large. As for the subjective cost of unpredictable overtime work, it is more than 150% of predicted overtime hours. The same holds for the subjective value of secured holidays compared to uncertain holidays.
- The negative effect of uncertain working schedules on job satisfaction is far greater than that of an increase in the total amount of working hours or a decrease in wages.
- Although some wage premium compensation is found, its size is small.

Implications

- From the viewpoint of workers' well-being including WLB, dealing with working schedule uncertainty is more important than simply reducing the number of total working hours or increasing wages.
- Labor management aimed to reduce such an uncertainty by correcting irrational business practices and/or to contain the negative impact of unavoidable schedule uncertainty is necessary. Particularly for firms engaged in international trade.
- When designing and executing the "equal pay for equal work" principle, the large negative costs to accept an uncertain schedule should be taken into account.

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Thank you for your attention.

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Appendix Tables

Characteristics of the respondents

	(1) All		(2) Engaged in work	
All	10,041	100.0%	6,856	100.0%
Male	4,973	49.5%	3,975	58.0%
Female	5,068	50.5%	2,881	42.0%
Age 20-29	1,329	13.2%	1,020	14.9%
30-39	1,630	16.2%	1,272	18.6%
40-49	2,013	20.0%	1,647	24.0%
50-59	1,641	16.3%	1,308	19.1%
60-69	2,796	27.8%	1,450	21.1%
70-	632	6.3%	159	2.3%
Primary school or junior high school	218	2.2%	113	1.6%
Senior high school	2,864	28.5%	1,751	25.5%
Vocational school	1,086	10.8%	790	11.5%
Junior (2-year) college	1,287	12.8%	773	11.3%
(4-year) college or university	4,060	40.4%	2,984	43.5%
Graduate school (master's course)	417	4.2%	355	5.2%
Graduate school (doctoral course)	109	1.1%	90	1.3%
Not married	3,499	34.8%	2,668	38.9%
Merried	6,542	65.2%	4,188	61.1%
Preschool children	1,076	10.7%	771	11.2%
Junior high school or elementary school children	1,049	10.4%	868	12.7%
Senior high school student or older	2,072	20.6%	1,404	20.5%

Employment type of working individuals

		Number of sample	(%)
Emplyment type	Company executive	352	5.1%
	Self-employed	673	9.8%
	Family worker	126	1.8%
	Standard full-time employee	3,464	50.5%
	Part-time worker	1,128	16.5%
	Hourly paid worker	408	6.0%
	Dispatched employee	199	2.9%
	Contract employee	378	5.5%
	Fixed-term employee (*shokutaku*)	128	1.9%
Union member		1,517	22.1%