

# Diversity in the use of non-regular workers at the corporate level. The Japanese case

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# Japanese labor institutions and practices in transition : Absolute and relative increase of non regular employment

- Although it depends on the definition one considers (contract length, working hours, title used by the workplace), there is no doubt that non-regular employment in Japan experienced an overall increase since the mid-1980s (Kambayashi, 2013; Teruyama & Toda, 2015).
- For example, if one considers the definition based on the title used by the workplace, the % of non regular workers has increased from 15% in the mid-1980s to 35% recently.

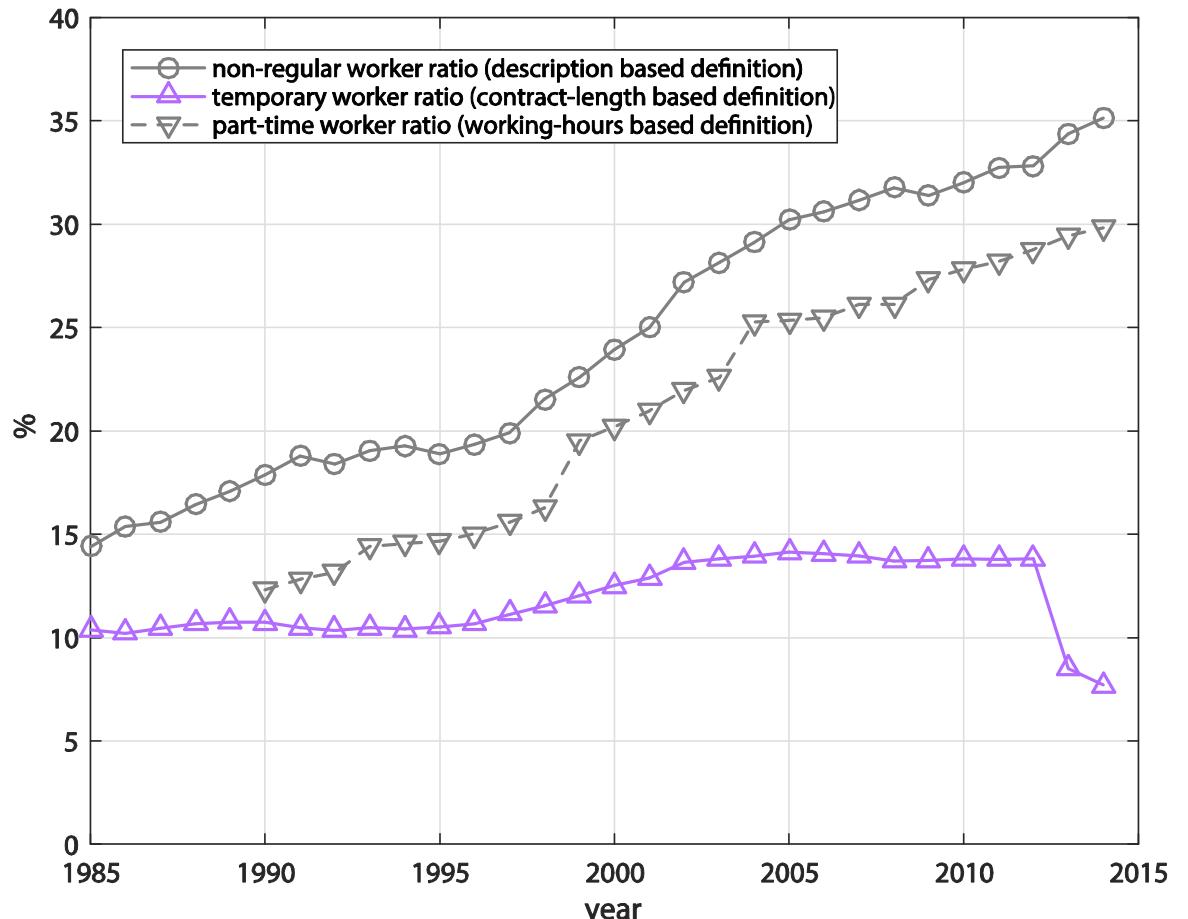
# Fraction of non-regular workers, for three alternative definitions

Source: Teruyama & Toda (2016); Labor force survey

**Description based definition:** non-regular employees are classified according to how workers are referred to in their workplaces.

**Contract-length based definition:** Temporary employees are defined as persons who work on a contract of a month or more but not more than a year.

**Working-hours based definition:** Part-time workers are defined by those who have shorter scheduled working hours per day/working hours per week than full-time workers

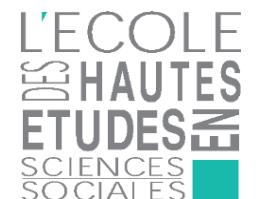


# Definitions of non regular workers (NRW)

- The definition of NRW is more ambiguous than often assumed
- In the labor force survey (LFS), NRW are classified according to how workers are called in their workplaces. 6 categories of NRW are distinguished: part-time worker', 'temporary worker', 'dispatched worker from temporary labour agency', 'contract employee', 'entrusted employee', and 'other' (Teruyama, 2016)
- In this paper, based on another survey (the BSBSA), we will focus on 3 categories due to data restriction: part-time, temporary and dispatched
- (Moreover, the type of definition is different for each type of NRW...)

# Diversity in the use of NRW at the corporate level in Japan

- What is less known is that this overall increase in the use of non-regular workers does not concern all firms or establishments. Non-regular workers are concentrated in some specific firms or establishments (see for example, Kalantzis et al., 2012).
- **Our contribution:** not using employees survey (LFS, ESS) but to mobilize an administrative firm survey (BSBSA) to focus on this dimension (corporate characteristics explaining the diverse use of NRW)



# An uneven use of NRW across firms: Share of firms in the sample answering they use none of the following types of workers (BSBSA)

	“Other workers” (= Part-time + Temporary workers)	Dispatched workers
1994	33,25	-
1995	32,30	-
1996	31,50	-
1997	30,26	-
1998	29,88	-
1999	28,50	-
2000	18,84	57,54
2001	19,87	56,47
2002	19,28	52,82
2003	20,31	49,71
2004	21,13	46,71
2005	21,90	43,62
2006	17,65	44,61

# An uneven use of NRW across Japanese firms - continued (BSBSA)

	1995	2005
75%	14.16	29.17
90%	36.17	55.48
95%	53.05	71.68
99%	75.61	86.77

Kernel density estimation, data from BSBSA 1994-2006

In 1995, up to 75% of firms surveyed used less than 15% of NRW in their total workforce, and NRW represented more than 50% of the workforce of only 5% of firms, when they represent more than 10% of firms surveyed in 2005

# Deregulation of labor market and increase of non regular workers

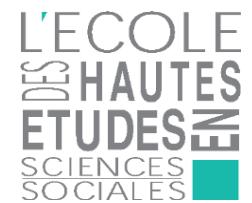
- Legal changes have been emphasized as a driving force of the overall increase of NRW (Watanabe, 2012)
- However, the relationship with the increase of non-regular has not been well established yet
- Indeed:
  1. Deregulation occurred in the late 1990s and early 2000s but the increase of NRW started much before (in the 1980s)
  2. The overall increase of NRW is mainly explained by the increase of part-time workers, who are not concerned by the deregulation
- The deregulation, however, which translates into the OECD Employment Protection Index for temporary workers also concerns dispatched workers from temporary agencies, the number of which, though still very low compared to part-time workers, has been multiplied by three in about 6 years

# Diversity in the use of NRW at the corporate level : size, sector and beyond

- To be fair, it has been shown that the use of non-regular workers differs by industries and by size of the firm or establishment. For example, part-time workers seemed to be concentrated in large firms and in the service industries (Ogura, 2002).
- However, these findings have been contradicted by other empirical studies on various countries (Houseman, 2001)
- Moreover, there is no consensus on the theoretical reasons of the impact of the size and industry on the use of non-regular workers (compare Houseman, 2001 with Kalleberg & Schmidt, 1996 for example).

# Question(s)

- Q1 : Which Japanese firms do resort more than others to NRW? What are their characteristics?
- Q2: Which type of firms did contribute the most to the increase of NRW in Japan?
- Q3: Is it possible to derive some conclusions about the driving forces of the rise in NRW?



# Content of today's presentation

- Diversity and determinants of corporate hiring of non-regular workers: some theoretical insights
- Dataset and estimation issues
- Results

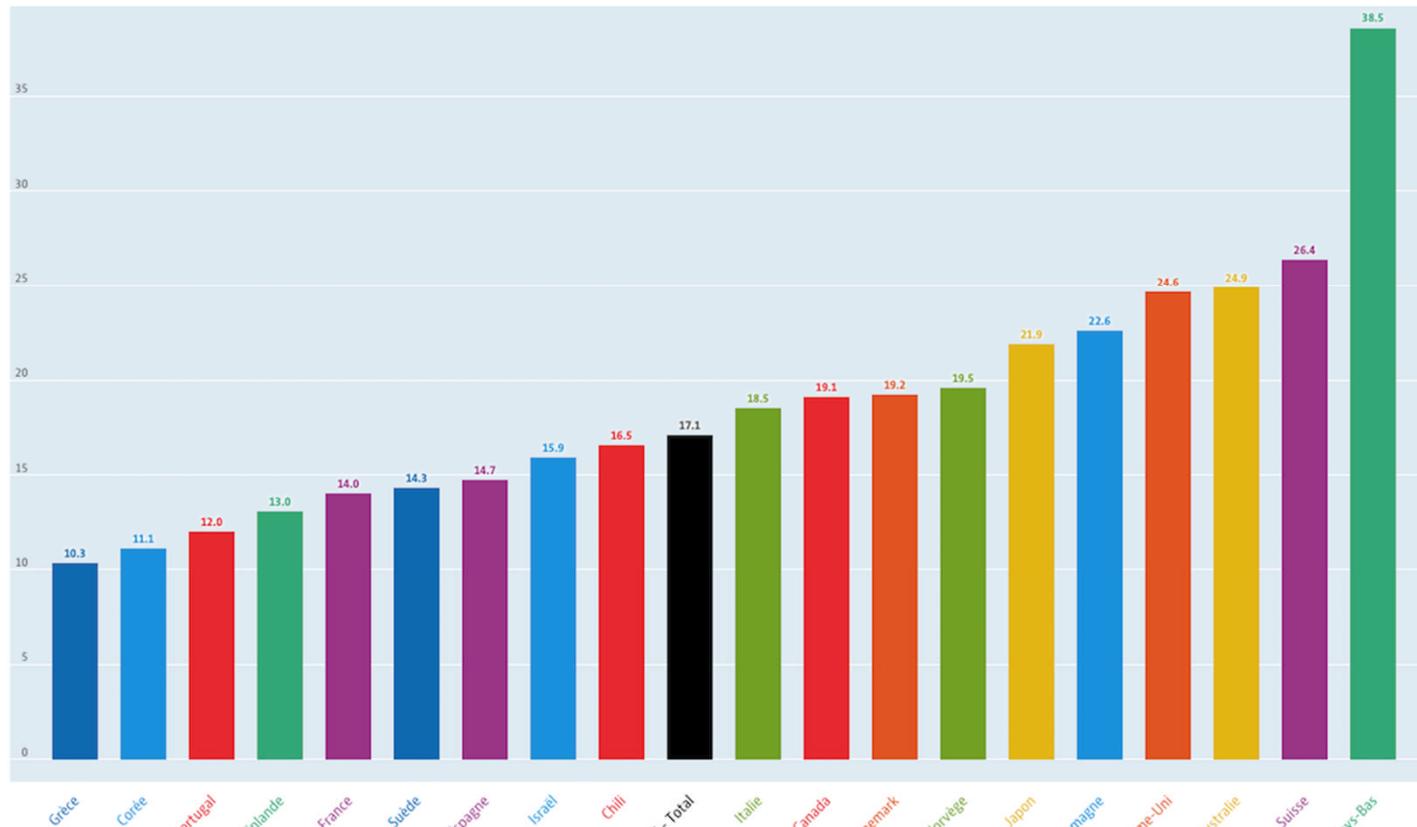
# Diversity and determinants of corporate hiring of non-regular workers: some theoretical insights



# Cross-country differences and drivers of the increasing use of NRW

- Cross-country differences in the use of NRW have been well-documented (OECD Employment Outlook 2014, Anxo, Hussain and Shukur, 2008) and linked to specific legal and institutional settings (degree of employment protection, tax incentives, etc.)
- BUT: still poor understanding of the differences across firms (even if few studies have looked at differences by size and sectors)

# Part-Time Employment ratio across OECD countries (2015 data)

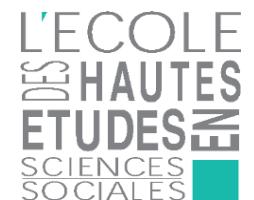


# Size and sector: two key factors of the corporate diversity in NRW demand

- Larger firms are likely to require workers that would deal with a greater variety of tasks and thus to potentially hire NRW (especially temporary workers). This would correspond to some sort of functional flexibility (Abraham 1990, Christensen 1995, Harrison and Kelley 1993)
- Different sectors not only lead to different degrees to which firms require NRW, but also defines partly which type of non-regular work they use:
  - Service industry : need for “scheduling flexibility” in some service firms that lead to the use of part-time workers (Roux 2007, Keizer 2008)
  - Manufacturing firms are more likely, on the other hand, to hire a greater fraction of dispatched workers from temporary agencies, especially as a “buffer” (Booth & al. 2002, Houseman 2001)

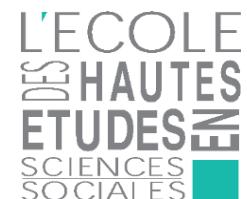
# Beyond the trends towards more « flexibility », a long-term organizational choice

- NRW are traditionally thought of as a means to gain more “flexibility”, especially regarding the costs incurred in hiring and firing regular workers (Saint-Paul 1991, Bentolila & Bertola 1990)
- BUT: the notion of flexibility hides a variety of drivers of the use of NRW, that have longer-term impacts, are partly the result of strategic choices, and may complement each other
- The ever increasing trend observed in the use of NRW suggests they are not solely used as buffers, but rather that the “flexible staffing arrangements” are probably part of a production process (eg Dhyne & Mahy 2009)



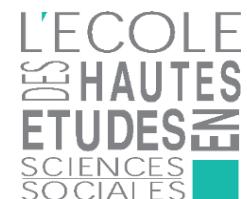
# NRW as complements to regular workers in a new production process? Potential driving features (1)

- **Performance and corporate finance:** we expect “structural uncertainty” in sales to translate to labour demand. Increasing the share of employees being hired under NR contracts thus counterbalances advantageously this uncertainty. The firm distinguishes between two “pools” of workers, the optimal share of which is determined by the degree of uncertainty (Pinker and Larsson, 2003)
- **Organizational characteristics:** the fraction of workers working in the headquarters gives an idea of the degree of concentration, and thus suggests that the more decentralized a firm is, the more it needs to rely on regular workers



# NRW as complements to regular workers in a new production process? Potential driving features (2)

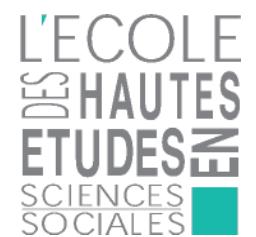
- The impact of **internationalisation** in the literature: a higher share of exports as well as increasing FDI are found to increase the need for regular workers as they are those who can benefit from in-work training and acquire firm-specific capital (Laffineur & Mouhoud, 2015)
- **Innovation:** given the traditionally important role played by firm-specific human capital in Japanese firms' HRM strategy, it is to be expected that a higher R&D intensity results in a less intensive use of NRW



Explaining Variables	Empirical proxy in the data	Theoretical mechanism and expected sign
Fluctuations	Deviation from the mean log of sales (SLNDEV)	Uncertainty should increase the number of NRW hired, but that does not mean the ratio increases, give they might only be used as a temporary "buffer", and not as substitutes to regular workers
Fluctuations	Standard deviation of the log of sales (SLNSD)	"Structural uncertainty" regarding the sales might lead to an increase in the fraction of NRW used for purposes of functional or numerical flexibility
Accumulation of capital	Capital / Labour ratio (CAPPCLNA)	High capital / labor ratio should increase the marginal productivity of labor and may thus be an incentive to hire regular workers, instead of non-regular
Degree of concentration (organizational structure)	Headquarter concentration (HQAV)	It is expected that more decentralization leads to a need for further reliability from workers outside of the headquarters and therefore a lower NRW ratio
Financial health	Debt/ total asset ratio (DRAV)	It is expected that firms with a higher debt/asset ratio use a greater fraction of NRW

Explaining Variables	Empirical proxy in the data	Theoretical mechanism and expected sign
R&D intensity	R&D /sales ratio (RDAV)	A greater R&D intensity, in the Japanese context, should call for highly qualified workers that may acquire firm-specific human capital, and therefore decrease the share of non-regular workers.
Internationalization	Exports / total assets (EXPAV)	The effect from internationalization (embodied by exports) is ambiguous. The scale effect might result in hiring more regulars workers, but the greater exposure to volatility on different markets could result in using a greater fraction of NRW.
Age of the firm	Firm age (AGEAV)	We expect younger firms to use more NRW. However, only firms with over 50 employees are included in our sample, and we use only 12 years of data, which makes it doubtful we will get meaningful results for that variable.
Degree of regulation	OECD non-regular employment protection index (OECD)	The higher the degree of protection, the more difficult and costly it is for firms to hire NRW,
Degree of regulation	Dispatched worker regulation dummy (REFORM)	The higher the degree of protection, the more difficult and costly it is for firms to hire NRW,
Sector	Industry dummy (IND_DUM*)	It is expected to find, on a broad level, a greater use of NRW in the service sector. Details are ambiguous

# Dataset and estimation issues



# Dataset

- *Basic Survey of Japanese Business Structure and Activities*
- A unique firm level panel administrative survey allowing us to follow about 37,000 firms with over 50 employees during the period 1994-2006.
  - It is conducted annually by the Ministry of Economy, Trade and Industry (METI). It covers firms with at least 50 employees and 30 million yen of paid-in capital in manufacturing, mining, commerce, and most service sectors.
- It includes information on different types of non-regular workers (part-time, temporary, dispatched workers from 2000)

# Descriptive Statistics

- Most variables such as workers and sales are right-skewed → We use their log in the estimation

	unit	mean	median	S.D.	# of obs.	Total # of firms
NRW ratio ( = NRW/total workers)	(persons/persons)	0.160	0.073	0.205	322,003	
number of total workers	persons	424	148	1,757	327,438	48,204
sales	mil. Yen	22,768	4,771	192,967	350,359	
R&D expenditure	mil. Yen	530	0	7,568	217,690	
firm age	years	36.3	37.0	16.7	373,071	

# Features of the data (1): many zero values in the explained variable

	total firms (a+b+c)	(firms)			
		reporting:		ratio of firms reporting zero on NRW (a/(a+b)) (%)	firms not reporting the number of NRW (c)
		zero (a)	non-zero (b)		
1994	25,255	8,397	16,858	33.2	0
1995	26,469	8,542	17,902	32.3	25
1996	26,399	8,306	18,061	31.5	32
1997	26,321	7,958	18,338	30.3	25
1998	26,307	7,853	18,433	29.9	21
1999	25,873	7,367	18,485	28.5	21
2000	24,459	1,954	21,411	8.4	1,094
2001	24,618	1,969	21,653	8.3	996
2002	24,099	1,513	21,642	6.5	944
2003	23,546	1,430	21,334	6.3	782
2004	24,913	1,330	22,809	5.5	774
2005	24,257	1,179	22,357	5.0	721
2006	24,922	1,018	23,904	4.1	0

# Method used (1): tobit model

- The numerous zero values for the use of NRW can be regarded as a sort of truncation
- We use a panel fixed effect (FE) tobit model

$$NR_{it}^* = \mathbf{X}_{it}\beta + \alpha_i + \varepsilon_{it} \quad \varepsilon_{it} \sim iid N(0, \sigma_\varepsilon^2)$$

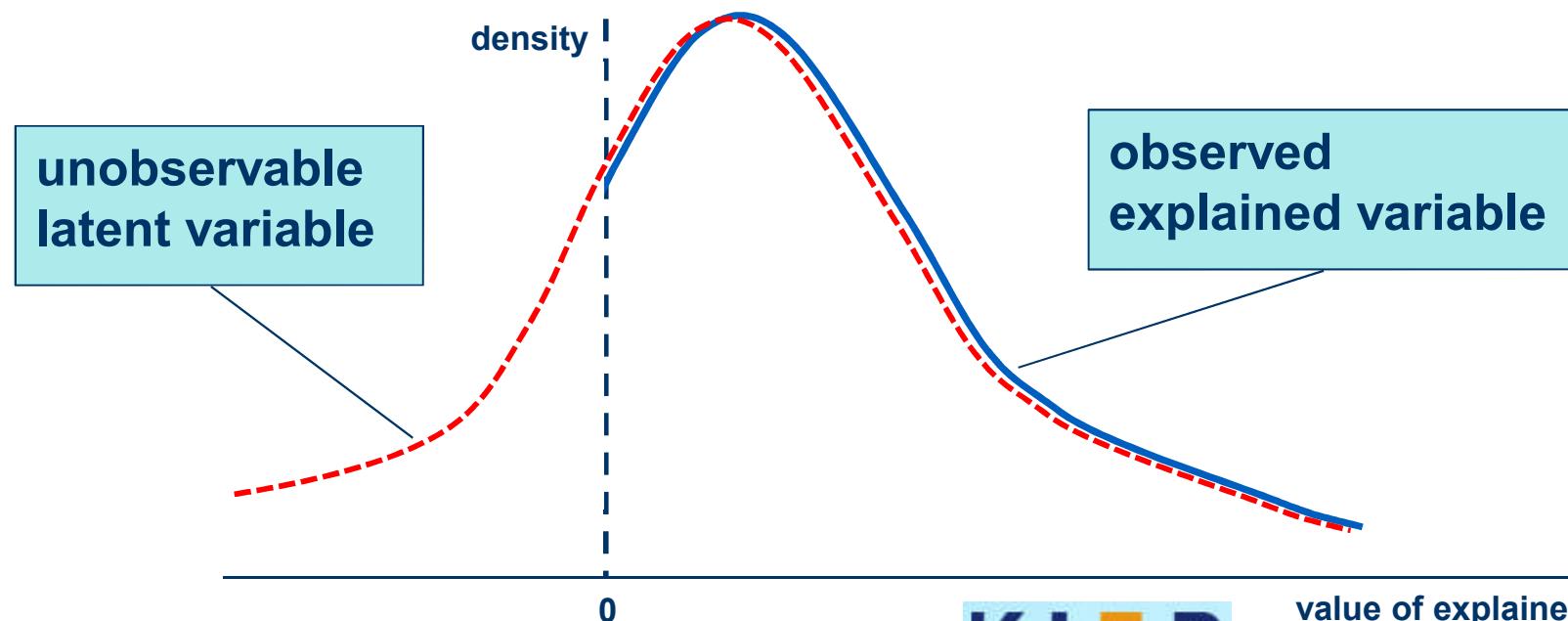
$$\begin{cases} NR_{it} = NR_{it}^* & \text{if } NR_{it}^* > 0 \\ NR_{it} = 0 & \text{if } NR_{it}^* \leq 0 \end{cases}$$

$NR_{it}$ : observed explained variable  
 $NR_{it}^*$ : latent variable

- Greene (2004, Econometric Reviews ) argues that the incidental parameters problem for the panel tobit model has relatively a small effect

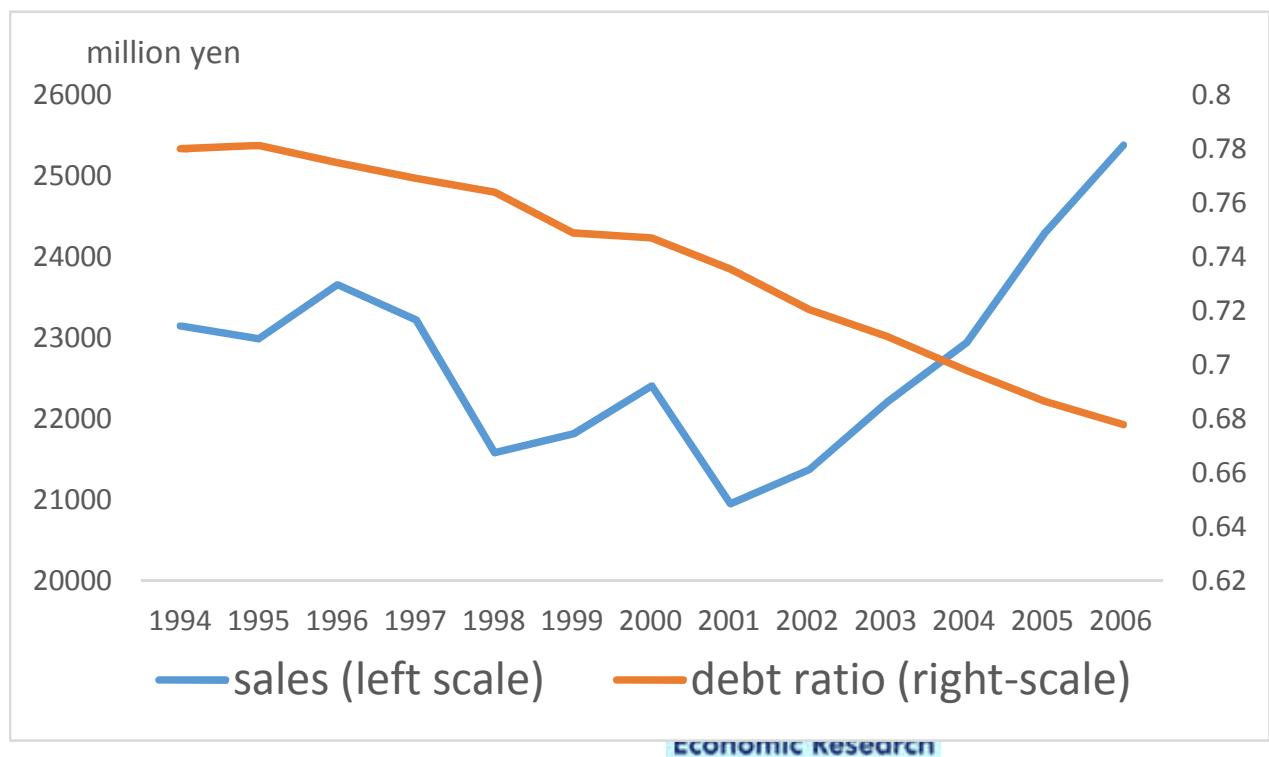
# Method used (1): an image

- An image of explanatory variable in tobit model:



# Features of the data (2): two types of exploratory variables

- Comparatively stable “determining factor (DF)”
- Comparatively volatile “adjusting factor (AF)”



# Method used (2): estimation of two types of models using DFs or not

- Dividing the entire period into two halves: from 1994 to 2000 and from 2001 to 2006
- Calculating DF as average of each period and AF as deviation from the average

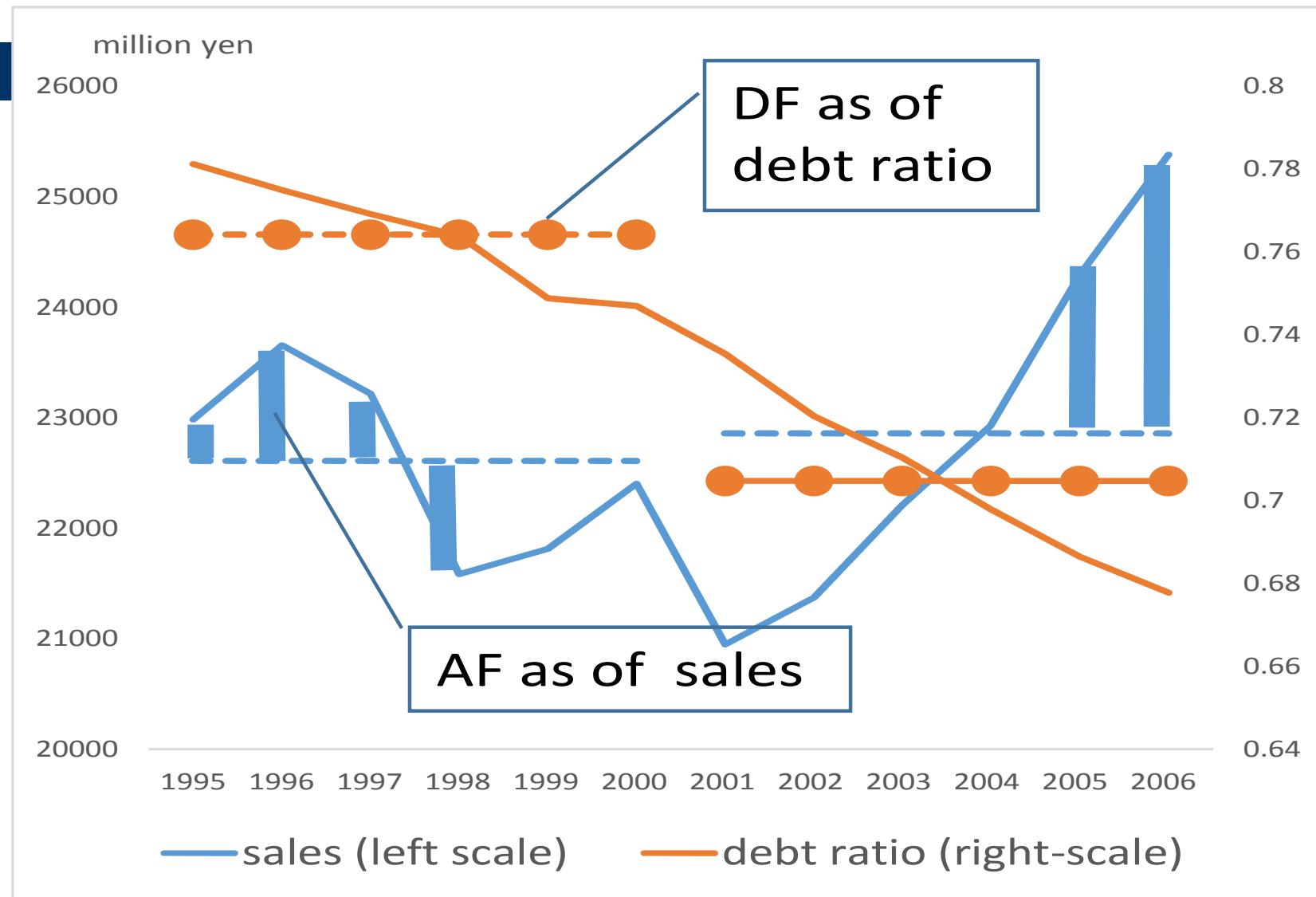
$$\overline{d}_{j,i}^f = \sum_{s=1995}^{2000} \frac{d_{j,is}}{6} \quad \text{for } t = 1995, \dots, 2000$$

$$\overline{d}_{j,i}^l = \sum_{s=2001}^{2006} \frac{d_{j,is}}{6} \quad \text{for } t = 2001, \dots, 2006$$

$$\widetilde{a}_{k,it}^f = a_{k,it} - \sum_{s=1995}^{2000} \frac{a_{k,is}}{6} \quad \text{for } t = 1995, \dots, 2000, k = 1, 2, \dots, K$$

$$\widetilde{a}_{k,it}^l = a_{k,it} - \sum_{s=2001}^{2006} \frac{d_{k,is}}{6} \quad \text{for } t = 2001, \dots, 2006, k = 1, 2, \dots, K$$

## Method used (2): images of DF and AF



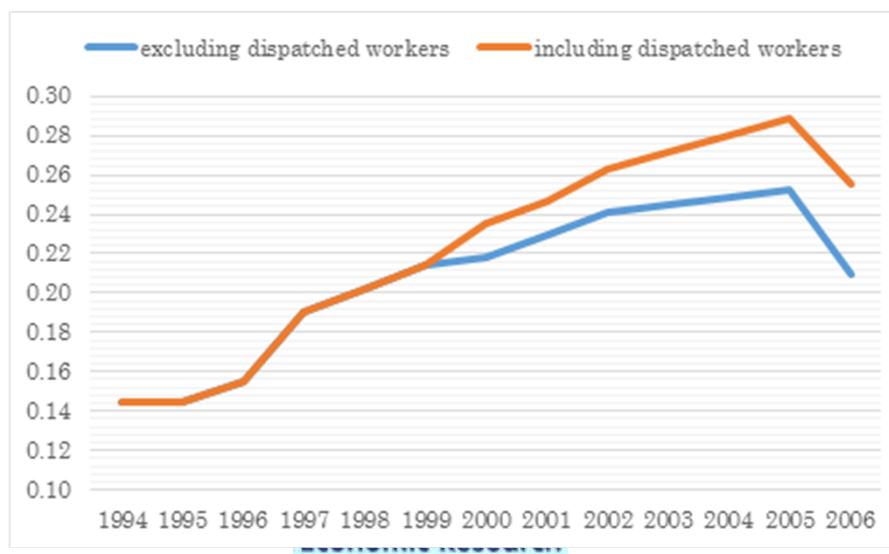
# Method used (2): estimation of two types of models using DFs or not

- Decomposed series estimation: using decomposed data (DFs and AFs)
- Level series estimation: using raw level data

# Features of the data (3): amendment to dispatched workers

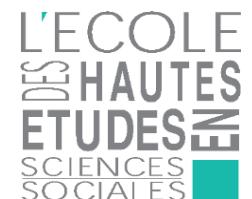
- We define non-regular workers (NRW) as:  
$$\text{NRW} = \text{part-time} + \text{temporary} + \text{dispatched}$$
- Comprehensive amendment in 2000 to dispatched workers

non-regular worker ratio at the aggregate level, with and without dispatched workers

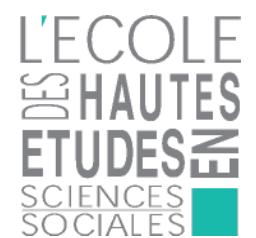


# Method used (3): estimation of two types of models including DWs or not

- Case1 (base case): including dispatched workers (DWs)
- Case2 (reference case): excluding DWs
  - → If we find difference between two cases, it suggests the differences among different types of non-regular workers



# Results



# Variables used in the estimations

[explained variables]			Case1 (base case) : including DWs		Case2 (reference case) : excluding DWs	
			decomposed series estimation	level series estimation	decomposed series estimation	level series estimation
non-regular worker ratio	including dispatched workers excluding	NR_RATIO NR_B	○	○	○	○
[explanatory variables]						
sales	deviation of log of sales from the mean log of sales standard deviation of log of sales	SLNDEV SALES_LN SLNSD	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ○
capital/labor ratio	decomposed series level series	CAPPCLNA CAPPCLN	○	○	○	○
head quarter concentration	decomposed series level series	HQAV HQ_WGHT	○	○	○	○
debt/total asset ratio	decomposed series level series	DRAV DEBT_RAT	○	○	○	○
R&D/sales ratio	decomposed series level series	RDAV RD_INT	○	○	○	○
exports/total assets	decomposed series level series	EXPAV EXPRATI	○	○	○	○
firm age	decomposed series level series	AGEAV AGE	○	○	○	○
OECD protection index	(which measures the degree of protection about labor market of each country)	OECD	○	○	○	○
dispatched worker dummy	("before 2000"=0, "since 2000"=1)	REFORM	○	○		
industrial dummy		IND_DUM*	○	○	○	○

Industry characteristics might correlate with disturbance terms(i.e, industry dummies might be endogenous). However, we estimated models with the same variables except to exclude industry dummies and found that results almost unchanged.

# Case1 of decomposed series estimation

Variable	Coefficient	S.E.	b/S.E.	P value	Mean of X
SLNDEV	0.023	0.0009	25.8	0.0000	-0.013
SLNDEVA		0.0028	5.0	0.0000	0.148
SLNDEVB		0.0009	-27.5	0.0000	1.623
SLNDEVC		0.0027	-48.3	0.0000	0.530
SLNDEVD		0.0030	4.6	0.0000	0.728
SLNDEVE		0.0250	-2.9	0.0033	0.008
SLNDEVF		0.0042	7.5	0.0000	0.034
SLNDEVG		0.0001	18.5	0.0000	36.859
SLNDEVH		0.0024	-27.7	0.0000	1.286
SLNDEVI		0.0017	4.3	0.0000	0.411
industry dummy			Yes		
# of obs.			578,448		
# of groups			34,275		

# Case1 of decomposed series estimation

- NR increases along with firm's growth measured by its size (sales amount) and age
- NR increases as the circumstance becomes more severe: sales volatility and export intensity
- NR decreases as more specialized skill or knowledge is needed: capital intensity, head-quarter's weight and R&D intensity
- NR increases as institutional factors are eased: amendment dummy and OECD index

# Case1 of level series estimation

Variable	Coefficient	S.E.	b/S.E.	P value	Mean of X
SALES_LN	0.013	0.0008	16.5	0.0000	-0.006
SLNSD	0.016	0.0023	6.9	0.0000	0.146
CAPPCLN	-0.035	0.0005	-73.0	0.0000	1.745
HQ_WGHT	-0.111	0.0013	-85.2	0.0000	0.519
DEBT_RAT	0.007	0.0015	4.3	0.0000	0.710
RD_INT	-0.065	0.0110	-5.9	0.0000	0.010
EXP_RATI	0.007	0.0014	4.9	0.0000	0.043
AGE	0.001	0.0000	18.6	0.0000	38.773
OECD	-0.026	0.0030	-8.6	0.0000	1.281
REFORM	0.033	0.0020	16.3	0.0000	0.380
industry dummy			Yes		
# of obs.			578,448		
# of groups			31,808		

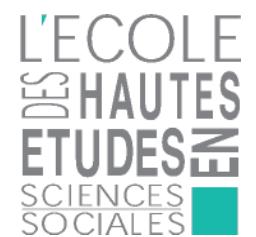
## Case2 of decomposed series estimation

Varialble	Coefficient	S.E.	b/S.E.	P value	Mean of X
SLNDEV	0.006	0.0009	6.0	0.0000	-0.013
SLNSD	-0.008	0.0029	-2.7	0.0078	0.148
CAPPCLNA	-0.019	0.0009	-20.7	0.0000	1.618
HQAV	-0.027	0.0028	-9.5	0.0000	0.530
DRAV	0.034	0.0031	11.0	0.0000	0.729
RDAV	-0.156	0.0263	-5.9	0.0000	0.008
EXPAV	-0.001	0.0037	-0.2	0.8150	0.033
AGEAV	0.000	0.0001	-1.1	0.2632	36.816
OECD	-0.031	0.0007	-47.9	0.0000	1.289
industry dummy			Yes		
# of obs.			578,448		
# of groups			34,167		

# Case2 of decomposed series estimation

- Basic results are almost the same as case1
- But some of the explanatory variable such as export intensity and firm age become less significant

# Conclusions



# Summing-up

- Results: Non-regular workers tend to increase with:
  - (1) firm growth
  - (2) severity of business circumstance
  - (3) decline in specialty
  - (4) deregulation of labor market

# Summing-up

- Limits and next steps:
  - Data period are limited until 2006 → Inclusion of the data for later years
  - Causality → (i) Careful investigation about the choice of variables, (ii) using IV
  - Which type of firms did contribute the most to the increase of NRW in Japan? → Detailed decomposition analysis
  - Differences in the types of non-regular workers → Estimation on each type of NRW using the newest data

# Thank you for your attention

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