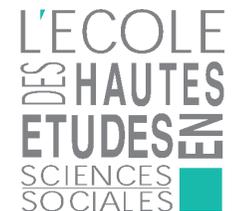


Uneven use of Non-regular Workers at the Corporate Level. Investigating the Japanese Case

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Reminder

- Presentation of this paper last year at the Waseda Workshop
- 2 types of expected improvement:
 1. Extension of the database: from 1994-2006 to 1994-2014 >> previous results are basically confirmed, with some changes to be explained (technical and substantial reasons)
 2. Trying to take into account your comments by introducing new variables and discussing them >> mixed results...

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.

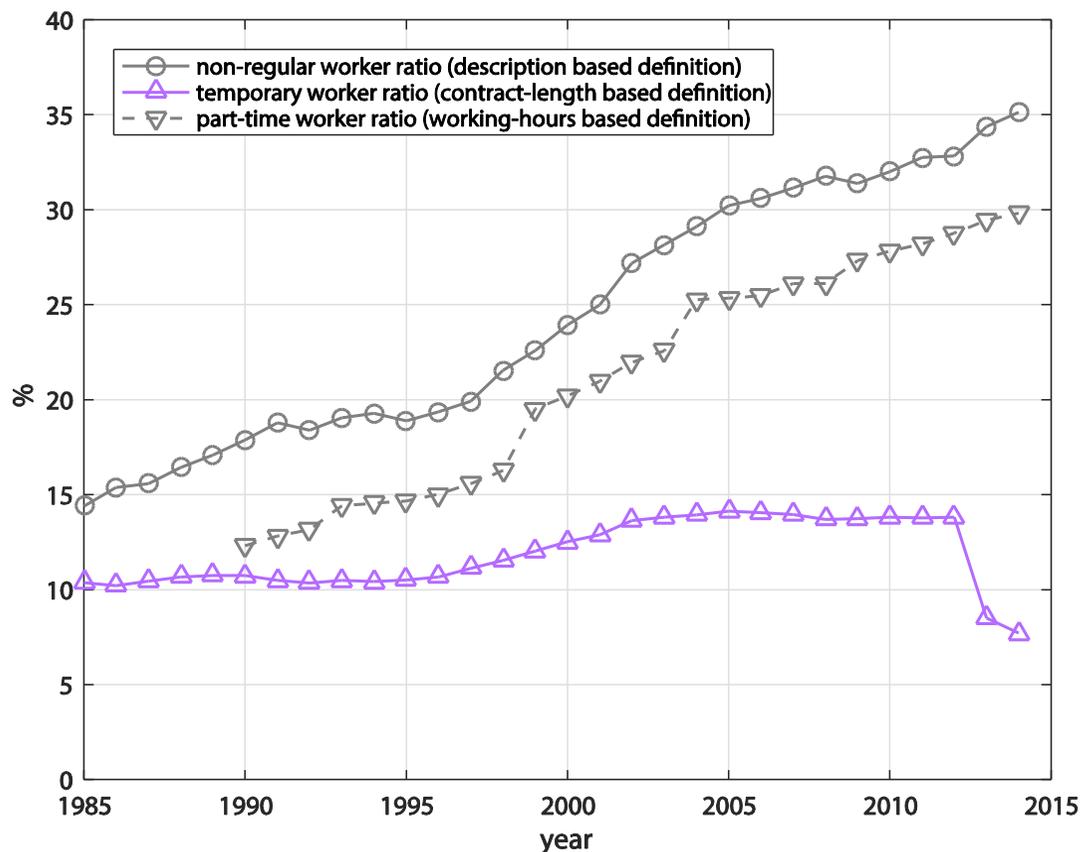
Fraction of non-regular workers, for three alternative definitions

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: 44% of the establishments do not use part-time workers in the Employment Trend Survey 2005-2009).
- **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)

	Part-time workers	Temporary workers	Dispatched workers
1994	35.74	89.20	—
1995	34.82	90.99	—
1996	34.51	90.87	—
1997	33.41	91.24	—
1998	33.16	91.40	—
1999	31.67	91.67	—
2000	22.52	90.23	63.96
2001	23.26	90.83	60.87
2002	23.07	90.98	55.96
2003	23.63	91.58	52.08
2004	24.24	91.82	47.55
2005	25.01	91.81	44.95
2006	22.95	92.49	45.09
2007	20.10	93.05	43.51
2008	18.08	93.64	48.45
2009	19.24	94.09	51.10
2010	18.65	94.13	50.50
2011	18.41	94.08	49.45
2012	18.48	94.12	49.33
2013	18.17	94.30	47.59
2014	17.62	94.69	47.50

An uneven use of NRW across Japanese firms - continued (Kernel density)

	1995	2005	2014
75%	11.50	22.89	22.86
90%	28.47	42.75	44.21
95%	44.65	58.31	63.79
99%	72.22	81.25	83.83

Descriptive percentile, data from BSBSA 1994-2014

In 1995 (2014), up to 75% of firms surveyed used less than 12% (23%) of NRW in their total workforce, and NRW represented more than 44% of the workforce of only 5% (10%) of the firms

Deregulation of labor market and increase of non regular workers (1/2)

- 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

Deregulation of labor market and increase of non regular workers (2/2)

- 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.
- A related question is to check whether deregulation did increase the diversity of corporate behavior in terms of hiring NRW, in the spirit of the findings of Jackson (2003), among others

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 within a given institutional environment (even if few studies have looked at differences by size and sectors)

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

- 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)
- Rather ambiguous effect of the size:
 - Negative - Montgomery (1998): larger firms will experience higher supervisory cost per worker, which increases fixed costs of using temporary workers.
 - Positive - Harrison and Kelley (1991): a bigger range of products/services produced by larger firms requires more frequent access to expertise and services that may be difficult to develop in-house at the same level of cost efficiency

Age of the firm: Younger firms are more likely to hire NRW

- Whilst most empirical results imply that age of the firm negatively correlates with the use of NRW, explanations for this result remain underdeveloped in the literature.
 1. Ono (2009) suggests that a young plant may reflect greater output uncertainty not captured by average output fluctuation.
 2. Kato and Zhou (2015) argue that start ups (young firms by definition), due to resource constraints and high internal transaction costs, will typically rely on temporary employees to fulfill non-core activities such as administration: start ups can only focus on conducting core activities in-house due to their limited human and capital resources

NRW as complements to regular workers in a new production process? (1/4)

- **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 employees 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 (management and monitoring functions)

NRW as complements to regular workers in a new production process? (2/4)

- The impact of **internationalisation** in the literature is ambiguous (core intuition = scale and substitution effects of offshoring):
 1. 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)
 2. Offshoring to OECD countries is generally beneficial to Korean workers but the temporary workers do not fully enjoy the benefits. As for offshoring to non-OECD countries, it actually reduces the real wages of temporary workers (Lee & Lee, 2015). In general, it may affect the demand of NRW
 3. **Effect through sales volatility:** (Higuchi et al, 2016): Whilst an exporting firm may indeed face greater volatility due to demand shocks affecting trading partners, if a firm exports to multiple markets then perhaps the firm can absorb these shocks in other markets

NRW as complements to regular workers in a new production process? (3/4)

- **Innovation:** a more ambiguous effect than expected
 1. 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. Similar effect than **capital/labor ratio**
 2. However, Numerical flexibility and resulting high worker turnover is considered to bring high skilled workers who infuse the firm with new ideas and networks that foster innovation (Malcomson 1997, Matusik Hill 1998). Innovative firms could also rely on NRW when in need for some specific expertise (e.g. fixed term contracts).

NRW as complements to regular workers in a new production process? (4/4)

- **Degree of unionisation within a sector:** no certain hypothesis- although most theory suggests higher unionisation will reduce NRW
 1. For example, Ono (2009) finds that plants in highly unionized industry seem to use temporary workers less often. Unions may be successful in resisting the use of nonmembers (same effect found in Houseman, 2001)
 2. Indirectly captured through industry dummies. Might require a deeper investigation

Explaining Variables	Empirical proxy in the data	Theoretical mechanism and expected sign
Fluctuations 1	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 2	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 **1994-2014**.
 - 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; dispatched workers are included only 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.
NRW ratio (= NRW / total workers)	(persons/ persons)	0.144	0.073	0.183	132,300
number of total workers	persons	647	190	2,621	135,196
sales	mil Yen	44,838	6,927	332,249	141,918
R&D expenditure	mil Yen	1,633	13	15,263	86,616
firm age	years	46.7	47.0	16.1	141,819

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

(firm s)

	total firm s (a+b)	reporting:		ratio of firm s reporting zero on NRW (a/(a+b)), %
		zero (a)	non-zero (b)	
1994	6,758	2,167	4,591	32.1
1995	6,758	2,130	4,628	31.5
1996	6,758	2,086	4,672	30.9
1997	6,758	2,065	4,693	30.6
1998	6,758	2,026	4,732	30.0
1999	6,758	1,949	4,809	28.8
2000	5,857	577	5,280	9.9
2001	5,891	555	5,336	9.4
2002	5,890	466	5,424	7.9
2003	5,996	469	5,527	7.8
2004	6,006	415	5,591	6.9
2005	6,005	409	5,596	6.8
2006	6,376	515	5,861	8.1
2007	6,245	343	5,902	5.5
2008	6,149	294	5,855	4.8
2009	6,211	385	5,826	6.2
2010	6,247	361	5,886	5.8
2011	6,231	331	5,900	5.3
2012	6,228	339	5,889	5.4
2013	6,224	312	5,912	5.0
2014	6,196	295	5,901	4.8

Dispatched
workers are
included ↓

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

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

$$\left\{ \begin{array}{ll} NR_{it} = NR_{it}^* & \text{if } NR_{it}^* > 0 \\ NR_{it} = 0 & \text{if } NR_{it}^* \leq 0 \end{array} \right.$$

NR_{it} : observed explained variable

NR_{it}^* : latent variable

\mathbf{X}_{it} : explanatory variables

α_i : individual effect

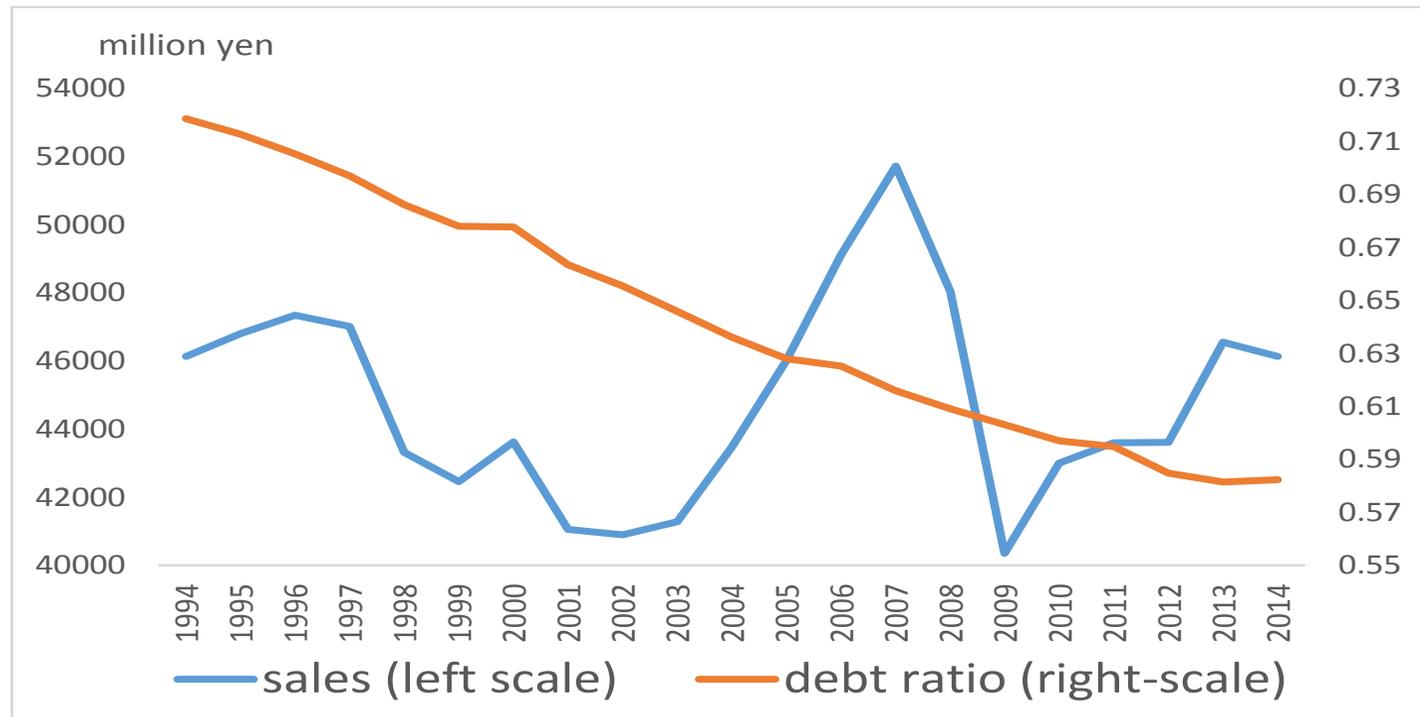
- Greene (2004, *Econometric Reviews*) argues that the incidental parameters problem for the panel tobit model has relatively a small effect

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

- Determinants of the non-regular worker ratio
- **Long-run determinants:** determining the steady-state ratio
 - Firm i's characteristics or environments that require employment flexibility
 - The average (or trend) of the factor affects the average non-regular ratio
- **Short-run determinants:** determining the ratio in each period
 - Firm i's business conditions to which the non-regular ratio should be adjusted period-to-period
 - The fluctuations of the factor (deviations from its average) affects the non-regular ratio fluctuations.

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

- “Long-run determinants”: example: debt ratio
- “Short-run determinants”: example: sales



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

- Construction of long-run and short-run determinants
- Decompose variable x_{it} into two parts
 - Long-run-factor (LF)
 - Average level over sub-period: \bar{x}_i for $t = t_1, \dots, t_2$
 - Short-run factor (SF)
 - Deviations from the sub-period average: $\hat{x}_{it} = x_{it} - \bar{x}_i$

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

- Sub-periods: 1995-2000 , 2001-2004, 2005-2009, 2010-2014
- Calculating the long-run factor (\bar{x}_i) as the sample average over each sub-period:
- $\bar{x}_i = \sum_{t=t_k}^{t_k+\tau} \frac{x_{it}}{\tau}$, t_k : the first year of each sub-period

Our method of decomposition is one among many others; results will confirm if it is appropriate or not, given the characteristics of our data

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

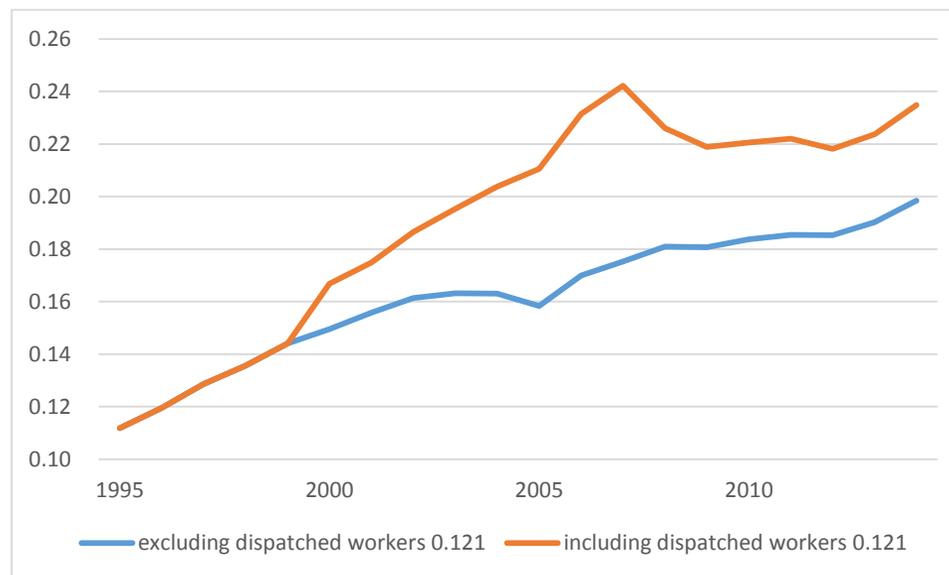
- **Decomposed series estimation:** using decomposed data (LFs and SFs)
- **Level series estimation:** using raw level data
 - Note: The BSBSA includes many sample firms with short-period time series (e.g., 2 or 3 years observation) and with many breaks (discontinuous time series). We drop such sample firms to have the sub-period averages reliable. Then we get a complete panel data set with about 6,800 firms.

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

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

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

Note that dispatched workers are not included in the BSBSA sample before 2000



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
(Comparison between these two cases is the first step to investigate the differences of the role for labor adjustment among different types of non-regular workers.)

Results

Variables used in the estimations

			Case1 (base case) : including DWs		Case2 (reference case) : excluding DWs	
[explained variables]			decomposed series estimation	level series estimation	decomposed series estimation	level series estimation
non-regular worker ratio	including dispatched workers excluding	NR_RATIO NR_B	○	○	○	○
Short-run factor						
[explanatory variables]						
sales	deviation of bg of sales from the mean	SLNDEV	○		○	
	bg of sales	SALES_LN		○		○
	standard deviation of bg of sales	SLNSD	○	○	○	○
capital/labor ratio	decomposed series level series	CAPPCLNA CAPPCLN	○	○	○	○
head quarter concentration	decomposed series level series	HQAV HQWGHT	○	○	○	○
debt/total asset ratio	decomposed series level series	DRAV DEBT_RAT	○	○	○	○
R&D/sales ratio	decomposed series level series	RDV 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*	○	○	○	○
Long-run factors						

We estimated models with the same variables except the inclusion/exclusion industry dummies and found that results almost unchanged.

Case 1 of decomposed series estimation

Variable	Coefficient	S.E.	b/S.E.	P value	Mean of X
SLNDEV	0.040	0.0015	27.1	0.0000	-0.008
SLNSD	0.017	0.0033	5.2	0.0000	0.129
CAPPCLNA	-0.030	0.0010	-29.4	0.0000	1.982
HQAV	-0.137	0.0030	-46.3	0.0000	0.507
DRAV	-0.002	0.0032	-0.7	0.4622	0.653
RDAV	-0.083	0.0325	-2.6	0.0104	0.011
EXPAV	0.013	0.0049	2.6	0.0084	0.041
AGEAV	0.002	0.0001	28.1	0.0000	44.029
O ECD	-0.055	0.0036	-15.2	0.0000	1.204
REFORM	0.012	0.0026	4.7	0.0000	0.530
industry dummy	Yes				
# of obs.	135,160				
# of groups	6,757				

Note: Since dispatched works are not include before 2000, legal reform dummy REFORM may reflect this effect mainly in Case 1.

Case1 of decomposed series estimation

- NR increases along with firm's temporary profitability (measured by short-run sales fluctuations around its trend)
- NR increases as business uncertainty increases measured by sales volatility)
- NR increases as increases in export intensity (, which is a measure of product-market competitiveness)
- 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	0.028	0.0010	28.1	0.0000	9.222
SLNSD	0.014	0.0029	4.8	0.0000	0.127
CAPPCLN	-0.044	0.0007	-59.9	0.0000	2.041
HQ_WGHT	-0.121	0.0019	-61.9	0.0000	0.496
DEBT_RATIO	0.008	0.0023	3.6	0.0003	0.644
RD_INT	-0.056	0.0176	-3.2	0.0014	0.013
EXP_RATIO	0.004	0.0016	2.5	0.0111	0.051
AGE	0.001	0.0000	23.0	0.0000	44.711
O ECD	-0.008	0.0042	-2.0	0.0489	1.211
REFORM	0.045	0.0028	16.1	0.0000	0.490
industry dummy			Yes		
# of obs.			135,160		
# of groups			6,757		

Note: results are overall close to those in Case 1 of decomposed series. Only one exception is that debt ratio has a positive significant effects (i.e., a firm with bad financial condition increase flexible workers). This suggests that our decomposition for debt ratio was not successful.

Case2 of decomposed series estimation

Variable	Coefficient	S.E.	b/S.E.	P value	Mean of X
SLNDEV	0.013	0.0015	8.6	0.0000	-0.008
SLNSD	0.000	0.0033	0.1	0.9013	0.129
CAPPCLNA	-0.020	0.0010	-20.1	0.0000	1.984
HQAV	-0.025	0.0029	-8.5	0.0000	0.507
DRAV	0.017	0.0032	5.3	0.0000	0.653
RDAV	-0.175	0.0323	-5.4	0.0000	0.011
EXPAV	-0.001	0.0040	-0.1	0.8814	0.041
AGEAV	0.000	0.0001	12.2	0.0000	44.065
O ECD	-0.026	0.0008	-30.8	0.0000	1.201
industry dummy			Yes		
# of obs.			578,448		
# of groups			6,757		

Case2 of decomposed series estimation

- Basic results are almost the same as case1
- But two of the explanatory variables, sales volatility and export intensity become insignificant

Conclusions

Summing-up our results so far (1/2) - in the short run

- (Impact of financial health is still unclear in any time horizon)
- Results: Non-regular workers tend to increase with:
 - (1) increases in firm temporary profitability fluctuations

Summing-up our results so far (2/2) - in the long run

- Results: Non-regular workers tend to increase with:
 - (2) increases in business uncertainty
 - (3) increases in internationalization but same effect for any destination of exports?
 - (4) deregulation of labor market but are all firms affected in the same way?
- Results: Non-regular workers tend to decrease with:
 - (5) investment in capital and R&D
 - (6) age of the firm

Limits and next steps

1. Estimation methods for the **long-run factors** → Instead of using step functions with rather arbitrary break points, polynomial functions (e.g., quadratic) or band-pass filters (e.g., HP filter) could be used.
2. **Causality** → (i) Careful investigation about the choice of variables, (ii) using IV with some linear specifications
3. **Which type of firms did contribute the most to the increase of NRW in Japan?** → Detailed decomposition analysis
4. **Differences in the types of non-regular workers** → Estimation on each type of NRW using the newest data
5. **Any structural break** in the evolution of corporate diversity around 2007-2008?

Thank you for your attention

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