How the 2003 Social Insurance Premium Reform Affects Firm Behavior*

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Abstract

In 2003, a total reward system was introduced for employee pension insurance and health insurance in Japan. This reform increased the insurance premiums for bonuses from 2% to 21.87%, and decreased the premiums for monthly salary from 25.96% to 21.87%. As a result, the social insurance premium burden of some companies increased, while that of others decreased. The variation, depending on the difference in the bonus/monthly salary ratio before the introduction of the total reward system, allows us to measure the influence of the increased social insurance premium burden using a natural experiment. This paper provides new evidence on the possible effect that the 2003 total reward system had on the behavior of firms, specifically its impact on labor demand and wages. Consequently, many firms reduced the number of employees, increased the average number of working hours, and maintained the total number of working hours. In terms of the costs to firms, the increase in average monthly salary associated with longer working hours was compensated for by a decrease in the amount of the average bonus. Our finding of the effects of the 2003 reform on the behavior of firms could lead to the general effects of the increasing social insurance premium burden found in many developed countries.

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1 Introduction

In 2003, a total reward system was introduced for employee pension insurance and health insurance in Japan. Due to this reform, the insurance premiums for bonuses increased from 2% to 21.87%. Prior to 2003, almost all the premiums had been calculated based on monthly salary. In response to this reform, theoretically, some firms whose bonus ratio was originally very high experienced an increase in costs, while others experienced a decrease. Thus, even though changes in the social insurance premiums and the reward system policy are uniformly applied throughout the nation, the impact those changes have on firms varies due to the previous bonus/salary ratio that companies used. Therefore, we utilized this natural experiment to explore how this reform affected various labor market outcomes, using a rich Japanese national dataset.

A number of overseas studies have also examined how recent tax reforms have affected various variables in the labor market. For example, Eissa and Liebman (1996) examined the impact of the US Tax Reform Act of 1986, which included an expansion of the earned income tax credit, by using a difference-in-difference (DID) estimation in order to compare the change in the labor supply of single women with children with that of single women without children. They found that the Tax Reform Act increased labor participation among single women with children. Furthermore, Blundell et al. (1998) examined how the UK tax reforms in the 1980s affected that country's labor supply by comparing the labor supply responses over time for different groups defined by cohort and education level. Many other studies have explored the impact of tax/welfare reform on economic behavior (Aaron 1981, Feldstein 1995, Feldstein and Feenberg 1996, Blundell et al. 1998, Meghir and Phillips 2008). Many of these studies have focused on the effect that changes in tax rates have on labor income. Among them, the new tax responsiveness literature presents a general view that people can adjust their incomes not only by work hours/labor participation, but also by their effort at work, their job choices, and their manner of earning income (e.g., salary, dividends, or capital gains). Thus, these studies have used the response of taxable income to the marginal tax rate as a summary statistic of the behavioral response to taxation (Meghir and Phillips 2008, Feldstein 1995). However, an analysis of the impact that the introduction of a total

reward system has had on firms is also meaningful in a general context. For most firms, the social insurance premiums they pay for their employees are substantial costs, along with the tax burden. Although some countries relieve the tax burden, or keep it low, in order to augment international competitiveness, as the population ages, firms shoulder a greater burden of social welfare and pension expenses in many countries.[1]

Furthermore, our finding of the effects that the 2003 reform has had on the behavior of firms could lead to increasing the social insurance premium burden found in many developed countries. In Japan, the social insurance premium has been increasing gradually over the last 20 years. Decreases in the bonus/monthly salary ratio and employment over that time period may be driven, in part, by the growing social insurance premium burden. In addition, the increasing burden could worsen business conditions, especially in firms with a high labor share (e.g., small- and medium-sized firms).

Many studies have disputed whether insurance premiums in Japan should be virtually borne by a company or by laborers rather being seen this as a verification of the effect of the 2003 reform. Empirical studies have addressed the shift of liability responsibility for insurance premiums from employers to employees based on wages (Komamura and Yamada 2004, Tachibanaki and Yokoyama 2008, Iwamoto and Hamaaki 2006, Sakai 2006, Sakai and Kazekami 2007, Iwamoto and Hamaaki 2009), and some studies have examined its influence on employment (Kim 2008, Sakai 2009, Miyazato and Ogura 2010). Except for Abe (2006), Hamaaki (2012), among others, few studies have explicitly estimated the impact of the introduction of a total reward system. This paper provides new evidence on the possible effect that the 2003 social insurance premium reform has had on the behavior of firms related to labor policy. In response to that reform, many firms have reduced the number of employees, increased the average number of working hours, and maintained the total number of working hours. An increase in the average monthly salary associated with longer working hours has been compensated for by a decrease in the amount of the average bonus. To address the challenges posed by the unexpected increase in labor costs, companies

[1] http://www.nta.go.jp/osaka/shiraberu/gakushu/kyozai/pdf/04/08.pdf

slightly decreased the amount of the bonuses they paid their employees.

Finally, applying the resolution and analysis methods of DiNardo et al. (1996), this present study found that, as a result of drawing out the bonus distribution that would have taken place if the reward system revision had not been enacted, the bonus amount distribution would have been higher overall. Moreover, when comparing the distribution of bonuses before and after the reward system reform, a shift toward reduction can clearly be seen after the changes were instituted. Additionally, it was shown that this shift in distribution can be explained not as a change in the attributes of the firms or workers, but rather as a change in the level of influence those attributes have on the explanatory variables, which strongly implies the effect of the introduction of the 2003 total reward system on the distributions. The similar things can be said to employment. The distribution for employment shifted down after the policy change, which is consistent with the decrease in employment after the 2003 reform. In contrast, the work-hour distribution shifted at the higher level after the change, which is consistent with an increase in monthly work hours.

This paper is organized as follows. Section 2 describes the social insurance premium reforms in 2003 in detail. Section 3 provides an empirical model and Section 4 offers a brief description of the data. Section 5 discusses the results from the empirical analysis. Section 6 presents the conclusion.

2 The 2003 Social Insurance Premium Reforms

In Japan, social insurance premiums, specifically the insurance premiums for private-sector employee welfare pensions, medical insurance, and the contributions to the child allowance, are paid according to a fixed wage ratio. In 2003, the fixed percentage of the total wage paid was 13.58% for the insurance premiums for the welfare pensions, 8.20% for medical insurance, and 0.09% for the child allowance contribution.[2] The premium welfare pensions and medical insurance payments are shared equally between the employee and employer, but the employer pays the entire contribution for the child allowance. Until 2002, the wage used as a basis for the social insurance premiums was

[2]There are ceiling insurance expenses for employee welfare pensions, and for medical insurance.

the monthly salary, but since April 2003 the total annual compensation, meaning the total of bonus and monthly salary, has been used instead. The 2003 reforms of the social insurance premiums were called the introduction of the total reward system.

The total reward system was introduced in order to resolve an unfair element of the old system. Previously, the amount of social insurance premiums paid could be different depending on the bonus/monthly salary ratios among workers with the same total annual compensation. Though the fixed percentage of monthly salary for the employee welfare pensions was 17.35% in 2002, the proportion for the annual wage was 13.58% in 2003. Similarly, the premium rate for medical insurance on monthly salaries was 8.50% in 2002, but on annual wages it was 8.20% in 2003. As a result, this reform increased the insurance premiums for bonuses from 2% to 21.87%, and decreased the premiums for monthly salary from 25.96% to 21.87%. Due to this change, assuming that there was no change in amount of bonus and monthly salary, workers with a high bonus/monthly salary ratio in 2002 paid more for social insurance, and just the opposite occurred in workers with a low bonus/monthly salary ratio.

Assume that the amount of bonus is x yen, the amount of monthly salary is y yen, the social insurance premium rate for bonuses is α until 2002, that for monthly salaries is β till 2002, and that for both bonus and monthly salaries is γ since 2003. The total premium amount is exactly the same if the following equality is true:

$$\frac{x}{y \times 12} = \frac{\alpha - \gamma}{\beta - \gamma} \tag{1}$$

Table 1 shows the actual premium rates in 2002 and 2003. That is, α is 0.02, β is 0.2596, and γ is 0.2187. The threshold of the ratio of bonus/monthly salary can be calculated as approximately 2.47, upon the introduction of the total reward system. The workers with a higher bonus/monthly salary ratio than 2.47 in 2002 paid higher premiums, while those with lower ratios than 2.47 paid lower premiums.

3 Empitical Model

3.1 Difference-in-Differences

To evaluate the effects of the social insurance premium reform on firms' labor-related behavior, we estimated the following standard difference-in-differences model:

$$y_{it} = \alpha + \beta\, After \times Treatment_i + X_{it} + (establishment\ fixed\ effects) + (year\ effects) + u_{it} \quad (2)$$

where y_{it} is labor demands related indices of establishment i in year t, such as the total working hours in an establishment, employment calculated on a headcount basis, average hours worked, average amount of monthly salary and bonuses at 2010 prices.[3] $After \times Treatment_i$ is the interaction term with the $After$ dummy variable (=1 if the year t is after 2003, 0 otherwise) and the (bonus/monthly salary) ratio (hereafter we call it $BSratio$) in 2002.[4] The estimated coefficient on $After \times Treatment_i$ is of prime interest, and the negative and significant coefficient indicates that the 2003 reform impacts negatively on firms with a heavier burden of social insurance premium. As we use the fixed $BSratio$ in 2002 as the treatment variable, we exclude the treatment dummy from the independent variable because the treatment variable is time-invariant and we are now using the fixed effect model.

It is plausible that the $BSratio$ is correlated with unobserved establishment characteristics that tend to be time-invariant, such as workplace culture, tradition and underlying managerial practice (e.g., committed relationships, profit sharing plans or lifetime employment practices). Furthermore, such unobserved establishment characteristics are likely to be correlated with labor-related indices. Without accounting for such unobserved firm heterogeneity, the estimated coefficients will be biased. Fortunately, our data are longitudinal, and thereby allow us to estimate establishment fixed effect models and hence account for such unobserved establishment heterogeneity.

To control for common year effects including common trends and macro shocks, we also con-

[3] CPI is used as a deflator.

[4] For robustness check, we create the alternative index of bonus/monthly salary ratio using bonus payments of the same establishments in the next survey, in order to synchronize the year of the bonus payments with monthly salary.

sider year fixed effects. Finally, we control for time-variant establishment characteristics such as female employee ratio, average tenure, average experience in years, proportion of graduates from junior high school, senior high school, 2-year-college, and 4-year-university, firm's employment (in log), and industry.

3.2 DFL Decomposition

Lastly, we visually confirm how the behavioral changes confirmed in the DID estimationby affected the overall distribution of each depedent variables utilizing the DFL decomposition (DiNardo et al. 1996). The advantage of this method is that it visually decomposes the change in the distribution into two parts: structure effects and composition effects (DiNardo et al. 1996, DiNardo and Lemieux 1997).

First, the distribution in 2002 is expressed as:

$$F_{2004} = \int f_{2002}(Y/X)h(X/t = 2002)dX \tag{3}$$

where $f_{2002}(Y/X)$ is the income determination mechanism in 2002 that maps firms' attributes to the income distribution. The density $h(X/t = 2002)$ is the p.d.f. of attributes in year 2002. Similarly, the distribution during year 2004 is expressed as:

$$F_{2004} = \int f_{2004}(Y/X)h(X/t = 2004)dX \tag{4}$$

What the distribution would be after the tax reform if the income determination mechanism were identical to its mechanism in 2002 is expressed as:

$$F_{2004}^{2002} = \int f_{2002}(Y/X)h(X/t = 2004)dX \tag{5}$$

This can be thought of as a counterfactual distribution in the period 2004 without the reform because it consists of the same firms' attributes as the real 2004 distribution of X but of β prior to

the tax reform. This counterfactual distribution is calculated by DiNardo et al. (1996) method:

$$F_{2004}^{2002} = \int f_{2002}(Y/X)h(X/t=2004)dX = \int \omega f_{2002}(Y/X)h(X/t=2002)dX \tag{6}$$

The reweighting term ω can be calculated by DiNardo et al. (1996) method:

$$\omega = \frac{h(X/t=2004)}{h(X/t=2002)} = \frac{P(t=2004/X)P(X)/P(t=2004)}{P(t=2002/X)P(X)/P(t=2002)} = \frac{P(t=2004/X)P(t=2002)}{P(t=2002/X)P(t=2004)} \tag{7}$$

where the density $h(X/t=T)$ is the p.d.f. of attributes in year T. The second equation is derived from Bayes' rule. In the actual regression of ω, $P(t=T/X)$ can be calculated using propensity scores obtained from the probit model in which $P(t=T)$ is regressed on X, and $P(t=T)$ is calculated as the proportion of the observations from year T in the pooled data.

4 Data

The Basic Survey on Wage Structures (BSWS) is the most comprehensive wage survey in Japan, conducted every year by the Ministry of Health, Labour and Welfare. The BSWS excludes agriculture, forestry, fisheries, and public services. It covers private- and public-sector firms with ten or more employees, and private-sector establishments with five to nine employees. The establishments in the sample were randomly chosen in proportion to the size of prefectures, industries, and the number of employees, using data from the Establishment and Enterprise Census (EEC), which includes all establishments in Japan. The sampling of the survey was done in two steps: in the first step, a random sample of establishments was selected, and in the second step, the establishments selected in the first step were asked to take a random sample of workers and to provide information on their payroll records.

The data contain information on individual workers' monthly salaries in June, total bonus payments in the previous year, hours worked, gender, age, length of employment, education, job title, and job type. The data include approximately 1.2 million workers for each year, from 70,000 es-

tablishments. We created the establishment-level panel data using the information from the EEC. We aggregated the total work hours in an establishment, the ratio of bonus/monthly salary, average monthly work hours, average monthly salary, and average amount of bonus by establishments, using worker-level information. The dataset we used in this analysis contains 67,671 establishment observations in 2002 and 2004. Table 2 summarizes the descriptive statistics of this study. The sample in Column (1) is the statistics of unbalanced panel which includes 2002 and 2004. To compare the descriptive statistics change between 2002 and 2004 at the same establishments, Columns (3) and (4) reports statistics before and after the reform.

When we look at the balanced panel data 2002 and 2004, monthly salary slightly increased in accordance with an increase in monthly hours worker per person, while bonus payment decreased.

5 Empirical Results

5.1 DID Results

Table 3 first presents the fixed effect estimates of Eq. (2), using the data from 2002 (before the reform) and 2004 (after the reform). The estimated coefficient on 2004 year dummy is negative and significant at the 1% level in Columns (1) and (3), and that on $After \times Treatment_i$ is insignificant in Column (1), indicating that the total labor demands in firms in 2004 are on average lower than those in 2002. In addition to that, there are little differences between the labor demands in firms burdened more heavily by the 2003 reform and those in non-burdened firms. Secondly, the estimated coefficients on $After \times Treatment_i$ in Column (2) is negative and statistically significant, even at the1% level, when we use the number of employment (in log) as the dependent variable. The size of the estimated coefficient suggests that the establishments with one month more $BSratio$ in 2002 will lead to a 0.9% decrease in employment after the reforms. The estimated coefficient on the average hours worked per person is positive and significant at the 1% level, suggesting that establishments with a heavier social insurance premium burden increased their average work hours.

Table 4 reports the results for wages. In Table 3, we have seen that monthly work hours per person increased, thus, in accordance with the change, monthly salary also increased with statistical significance. The magnitude of $After \times Treatment_i$ on the amount of monthly salary is much the same as the average working hours. We cannot identify the causality, but the increase in working hours and monthly salary occur simultaneously. In contrast, the estimated coefficient on the amount of bonus is negative and significant.

Compared to the magnitude of the coefficient of the interaction term, it turns out that bonuses responded more than monthly salary. These results are consistent with the fact that bonuses are flexible in Japan.[5]

Therefore, in sum, firms that suffered a greater burden as a result of the 2003 reform might have to decrease the level of employment or bonuses because their resources for the total payroll allocated to the employees could have decreased.

5.2 Robustness Check

There might be a possibility that *BSratio* in 2002 is something special, i.e., the firms might have experienced different shocks in that year, and thus categorizing firms based on the 2002 *BSratio* might introduce some biases. To mitigate the possibility of the abrupt shock of 2002 biasing our results, we also use the average *BSratio* of each establishment during 1999-2002 as an independent variable, instead of the 2002 *BSratio*. In Table 5, we find our key results to be robust to this alternative treatment variable, as shown in the main result, Table 3.

Furthermore, there should be a time-lag for the impact to appear, so we extended the sample period in Table 6, but achieved similar results to Table 3.

[5]The Japanese wage is known to respond flexibly to exogenous shocks, because bonus payments comprise around 25 to 33 percent of total annual compensation (Steinberg and Nakane (2011)). Firm-specific human capital resulting from labor-market friction is often identified as an important feature of the Japanese labor market (Hashimoto and Raisian (1985)). Consequently, both employers and employees have strong incentives to protect their relationship, and hence future returns on their investments in specific human capital, by adjusting wage compensation, including bonus payments (Hashimoto (1979)). Although Japanese labor law prohibits employers from cutting compensation without workers' consent unless the employers experience hardship (and courts apply strict criteria to define that hardship), many unions/workers' representatives and employers agree to contracts so that the bonus payment depends on the firm's performance.

In Table 7, we also test our results using the placebo period of data from 1999 and 2001, which could not have been affected by the 2003 reforms. The estimated coefficients on the total labor demands, the employment numbers, and the average hours worked in Table 7 are insignificant.[6]

5.3 DFL Results

Figure 1 presents the results of a DFL decomposition of the log of bonus amount and the log of monthly salary. The red line is the kernel density of the bonus amount in 2002, and the blue line is that in 2004. As we can see from the bonus distribution, after the introduction of the total reward system in 2003, the bonus distribution shifted to the left, which reconfirms the decrease in bonuses after the 2003 reform.

Furthermore, we also draw the distribution that would have been realized if the 2003 reform had not occurred. This counter-factual distribution indicates that the bonus amount would have been distributed at a higher level without the reform. Note that the difference between the two actual lines can mainly be explained by the difference between the counter-factual line and the actual 2004 line, which means that this distributional gap is caused by something other than the change in attributes of firms, since both the blue and the black line have the same attributes in 2004. This result strongly implies the effect of the introduction of the 2003 total reward system on the gap of the two distributions.

As we have confirmed, the change in monthly salary is much more modest, which is consistent with the so-called wage rigidity in basic pay.

Figure 2 reveals that firms do not change the total work hours much, but if we look at employ-

[6]Because the BSWS contains information on individual workers' monthly salaries in June, and total bonus payments in the previous year, the *BSratio* in our main results is calculated by the amount of bonus payments in the year $t-1$, and the monthly salary in year t. In contrast, because the BSWS contains not worker-level panel data but establishment-level panel data, the alternative definition of *BSratio*, which is calculated by bonus payments in year t from the survey in year $t+1$ and monthly salaries in year t from the survey in year t. We cannot identify data at the worker level, and many workers are not necessarily resampled even if the same establishments are resampled in consecutive years. Even worse, some establishments cannot be resampled in consecutive years and are dropped from the analysis. Thus, we have basically two options for calculating *BSratio*: (a) defining it as $Bonus_t/Salary_t$ using two different consecutive surveys, or (b) defining it as $Bonus_{t-1}/Salary_t$ using the same survey, in which case we are free from the problem of resampling and loss of sample size when matching firms that appear in two consecutive years. The results in Table A.1 in the Appendix do not change much even if we use Option (a), i.e., defining it as $Bonus_t/Salary_t$ using different two consecutive two surveys.

ment in Figure 3, the distribution for 2004 shifted down, which is consistent with the decrease in employment after the 2003 reform. Again, since the gap between the two actual lines can mainly be explained by the gap between the counter-factual line and the actual 2004 line, this result implies the effect of the introduction of the 2003 total reward system on the gap of the two distributions.

As we have confirmed in the difference-in-differences estimation, in Figure 4, the distribution of monthly work hours per person shifted to the right (i.e.,increased). The slight increase in workers' monthly salary confirmed in Figure 1 and other estimations should be reflected this change in work hours per person. The gap between the two actual lines are again explained by changes in β or an error term, i.e., there is a great possibility that the 2003 reform affected the distributional change.

6 Conclusion

In 2003, a total reward system was introduced for employees' pension insurance and health insurance in Japan. This reform increased the insurance premiums for bonuses from 2% to 21.87%, and decreased the premiums for monthly salary from 25.96% to 21.87% The social insurance premium burden of some companies increased, while that of others decreased as a result of the reform. The different effects depending on the difference in bonus/monthly salary ratio before the introduction of the total reward system allow us to measure the influence of the increased social insurance premium burden using natural experiment.

This paper has provided new evidence on the possible effect on the firms' behavior related to labor policy of the 2003 social insurance premium reform. As a result, many firms reduced the number of employees, increased average working hours, and kept total working hours the same. An increase in average monthly salary associated with longer working hours is compensated for with a decrease in the amount of the average bonus. To address the challenges posed by the unexpected increase in labor costs, companies increase the average working hours of regular workers and the amount of monthly salary, and decrease the amount of bonuses.

Our finding of the effects of the 2003 reform on the behavior of firms could lead to the general effects of the increasing social insurance premium burden found in many developed countries. The social insurance premium has been increasing gradually over 20 years in Japan. A decrease in the bonus/monthly salary ratio and in employment over 20 years may be driven in part by the growing social insurance premium burden. In addition, the increasing burden could worsen business conditions, especially in firms with a high labor share (e.g., small and medium-sized firms). We would like to consider in a future study how the increase in the social insurance premium can impact on capital intensity, output, and productivity.

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Table 1: The premium rates in 2002 and 2003

	Before		Aftert	
	Bonus	Salary	Bonus	Salary
Welfare Insurance Premiums	1.00%	17.35%	13.58%	13.58%
Health Insurance Premiums	1.00%	8.50%	8.20%	8.20%
Child Benefits	0.00%	0.11%	0.09%	0.09%
Total	2.00%	25.96%	21.87%	21.87%

Note: Table 1 shows the social insurance premium before and after 2003.

Table 2: Descriptive Statistics

	(1) Unbalanced Panel	(2)	(3) Balanced Panel	(4)
Sample	All	All	Before	After
Year	2002 and 2004	2002 and 2004	2002	2004
Total Work Hours	24,023.40	59,418.61	60,375.38	58,461.85
	(65,372.95)	(115,399.24)	(114,193.28)	(116,591. 84)
Establishment Size	144.34	355.55	363.49	347.62
	(390.82)	(686.80)	(689.91)	(683.62)
Monthly Hours Worked	167.68	168.46	167.86	169.06
	(25.90)	(22.75)	(22.53)	(22.96)
Monthly Salary (100 yen)	2,853.67	3,222.26	3,202.17	3,242.34
	(1,042.29)	(1,114.24)	(1,095.19)	(1,132.68)
Bonus Amount (100 yen)	7,977.33	10,690.28	11,079.67	10,300.89
	(6,712.645)	(7,328.67)	(7,359.26)	(7,277.59)
Bonus Ratio in Year *t*	2.47	3.02	3.15	2.88
	(1.54)	(1.46)	(1.45)	(1.46)
Bonus Ratio in 2002 (Fixed)	2.52	3.15	3.15	3.15
	(1.56)	(1.45)	(1.45)	(1.45)
Bonus Ratio during 1999-2002	2.60	3.23	3.23	3.23
	(1.54)	(1.40)	(1.40)	(1.40)
After	0.25	0.50	0.00	1. 00
	(0.43)	(0.50)	0.00	0.00
Fraction of Female Workers	0.35	0.31	0.31	0.30
	(0.27)	(0.24)	(0.24)	(0.24)
Potential Experience	21.70	21.12	20.88	21.35
	(7.35)	(6.15)	(6.25)	(6.04)
Tenure	11.60	13.39	13.16	13.63
	(6.07)	(5.90)	(5.87)	(5.91)
Part Ratio	0.13	0.09	0.09	0.10
	(0.23)	(0.19)	(0.19)	(0.20)
Junior-High School Graduates	0.09	0.07	0.08	0.06
	(0.16)	(0.12)	(0.13)	(0.12)
High School Graduates	0.54	0.51	0.52	0.51
	(0.29)	(0.28)	(0.28)	(0.29)
Two-year College Graduates	0.14	0.13	0.13	0.13
	(0.19)	(0.16)	(0.16)	(0.16)
University Graduates	0.23	0.29	0.28	0.30
	(0.25)	(0.26)	(0.26)	(0.27)
Firm Size	1,088.21	1,632.59	1,639.88	1,625.30
	(1,715.66)	(1,910.73)	(1,918.41)	(1,903.11)
Observations	67,671	16,392	8,196	8,196

Note: The observation units are establishments. The sample in Column (1) is used for Table 5, which is an unbalanced panel of 2002 and 2004. To compare the descriptive statistics change between 2002 and 2004 at the same establishments, Columns (3) and (4) report statistics before and after the reform.

Table 3: FE DID Estimation Results (2002 (Before) VS 2004(After))

	(1) ln(Total Work Hours Within an Establishment)	(2) ln(Employment)	(3) ln(Work Hours Per Person)
After×Treatment$_{i(02)}$	-0.002	-0.009***	0.007***
	(0.003)	(0.003)	(0.001)
Year2004	-0.031***	-0.014	-0.015***
	(0.010)	(0.010)	(0.003)
Female	0.332**	0.585***	-0.195***
	(0.152)	(0.164)	(0.027)
Experience	0.008	0.017**	-0.006***
	(0.006)	(0.007)	(0.002)
Experience$^2/100$	-0.021	-0.038***	0.008*
	(0.013)	(0.014)	(0.005)
Tenure	-0.046***	-0.059***	0.010***
	(0.007)	(0.008)	(0.002)
Tenure$^2/100$	0.116***	0.150***	-0.025***
	(0.021)	(0.022)	(0.005)
High School Graduates	-0.029	-0.058	0.016
	(0.061)	(0.061)	(0.018)
Two-year College Graduates	-0.065	-0.117	0.006
	(0.073)	(0.075)	(0.023)
University Graduates	-0.236**	-0.234**	-0.019
	(0.094)	(0.096)	(0.023)
ln(Firm Size)	0.132***	-	-0.008***
	(0.015)		(0.002)
Industry Dummies	Yes	Yes	Yes
R-squared	0.088	0.065	0.043
N	59,027	59,027	59,027

Note: * p<0.10, ** p<0.05, *** p<0.01. FE stands for the fixed effects model. Standard errors clustered at establishment level are in parentheses. Bonuses are taken from the same survey year, which means survey of year *t* uses bonuses during the previous year.

Table 4: FE-DID Wage Regression Results (2002 (Before) VS 2004(After))

	(1) ln(Annual Bonus)	(2) ln(Monthly Salary)
After×Treatment$_{i(02)}$	-0.009*	0.007***
	(0.005)	(0.001)
Year2004	-0.096***	-0.027***
	(0.020)	(0.004)
Female	-0.841***	-0.628***
	(0.165)	(0.039)
Experience	0.003	0.015***
	(0.009)	(0.003)
Experience^2/100	-0.015	-0.029***
	(0.019)	(0.005)
Tenure	0.089***	0.025***
	(0.008)	(0.002)
Tenure^2/100	-0.154***	-0.029***
	(0.021)	(0.006)
High School Graduates	0.056	0.055***
	(0.082)	(0.021)
Two-year College Graduates	0.085	0.084***
	(0.100)	(0.026)
University Graduates	0.196**	0.153***
	(0.096)	(0.029)
ln(Firm Size)	0.053***	-0.001
	(0.013)	(0.003)
Industry Dummies	Yes	Yes
R-squared	0.167	0.321
N	54,911	59,027

Note: * p<0.10, ** p<0.05, *** p<0.01. FE stands for the fixed effects model. Standard errors clustered at establishment level are in parentheses.

Table 5: FE DID Estimation Results (Treatment defined over 1999-2002)

	(1) ln(Total Work Hours Within an Establishment)	(2) ln(Employment)	(3) ln(Work Hours Per Person)
After×Treatment$_{i(99-02)}$	-0.001	-0.009***	0.007***
	(0.003)	(0.003)	(0.001)
Year2004	-0.031***	-0.014	-0.016***
	(0.010)	(0.010)	(0.004)
Female	0.332**	0.585***	-0.195***
	(0.152)	(0.164)	(0.027)
Experience	0.008	0.017**	-0.006***
	(0.006)	(0.007)	(0.002)
Experience$^2/100$	-0.021	-0.038***	0.008*
	(0.013)	(0.014)	(0.005)
Tenure	-0.046***	-0.059***	0.010***
	(0.007)	(0.008)	(0.002)
Tenure$^2/100$	0.116***	0.150***	-0.025***
	(0.021)	(0.022)	(0.005)
High School Graduates	-0.029	-0.057	0.016
	(0.061)	(0.061)	(0.018)
Two-year College Graduates	-0.065	-0.116	0.005
	(0.073)	(0.075)	(0.023)
University Graduates	-0.236**	-0.234**	-0.019
	(0.094)	(0.096)	(0.023)
ln(Firm Size)	0.132***	-	-0.008***
	(0.015)		(0.002)
Industry Dummies	Yes	Yes	Yes
R-squared	0.088	0.065	0.042
N	67,671	67,671	67,671

Note: * p<0.10, ** p<0.05, *** p<0.01. FE stands for the fixed effects model. Standard errors clustered at establishment level are in parentheses.

Table 6: FE DID Estimation Results (Period 1999-2002 (Before) VS 2004-2007 (After))

	(1) ln(Total Work Hours Within an Establishment)	(2) ln(Employment)	(3) ln(Work Hours Per Person)
After×Treatment$_{i(02)}$	-0.002	-0.010***	0.009***
	(0.002)	(0.002)	(0.001)
Year2000	0.003	-0.011***	0.014***
	(0.003)	(0.003)	(0.001)
Year2001	0.002	-0.006*	0.008***
	(0.003)	(0.003)	(0.001)
Year2002	-0.068***	-0.065***	-0.004***
	(0.004)	(0.004)	(0.001)
Year2004	-0.076***	-0.055***	-0.027***
	(0.008)	(0.009)	(0.002)
Year2005	-0.070***	-0.055***	-0.028***
	(0.008)	(0.009)	(0.002)
Year2006	-0.063***	-0.056***	-0.024***
	(0.008)	(0.009)	(0.002)
Year2007	-0.065***	-0.056***	-0.027***
	(0.009)	(0.009)	(0.003)
Female	0.231***	0.458***	-0.241***
	(0.056)	(0.059)	(0.010)
Experience	-0.001	0.007***	-0.006***
	(0.002)	(0.002)	(0.001)
Experience$^2/100$	0.003	-0.008*	0.007***
	(0.005)	(0.005)	(0.002)
Tenure	-0.039***	-0.052***	0.008***
	(0.003)	(0.003)	(0.001)
Tenure$^2/100$	0.080***	0.109***	-0.017***
	(0.008)	(0.008)	(0.002)
High School Graduates	-0.046**	-0.070***	0.006
	(0.020)	(0.021)	(0.007)
Two-year College Graduates	-0.109***	-0.132***	0.005
	(0.026)	(0.027)	(0.008)
University Graduates	-0.236***	-0.220***	-0.023***
	(0.036)	(0.037)	(0.009)
ln(Firm Size)	0.139***	-	-0.007***
	(0.006)		(0.001)
Industry Dummies	Yes	Yes	Yes
R-squared	0.097	0.064	0.053
N	119,750	119,750	119,750

Note: * p<0.10, ** p<0.05, *** p<0.01. FE stands for the fixed effects model. Standard errors clustered at establishment level are in parentheses.

Table 7: FE DID Estimation Results (Placebo: 1999 VS 2001)

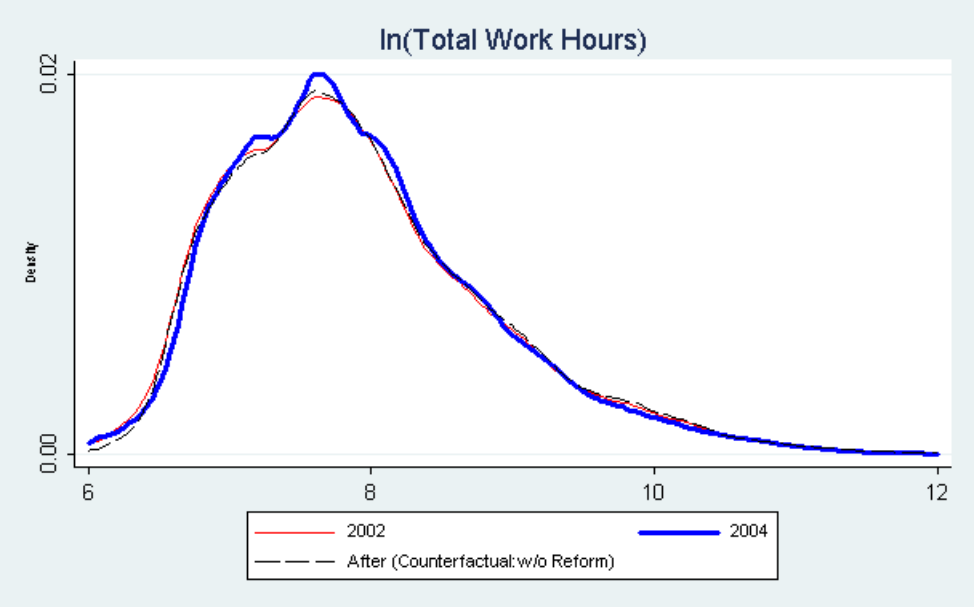
	(1) ln(Total Work Hours Within an Establishment)	(2) ln(Employment)	(3) ln(Work Hours Per Person)
After×Treatment$_{i(02)}$	0.001	0.001	-0.000
	(0.003)	(0.003)	(0.001)
Year2001	-0.033***	-0.042***	0.009**
	(0.011)	(0.011)	(0.004)
Female	0.625***	0.834***	-0.204***
	(0.155)	(0.163)	(0.022)
Experience	-0.014*	-0.007	-0.008***
	(0.007)	(0.008)	(0.002)
Experience$^2/100$	0.032**	0.022	0.009**
	(0.014)	(0.016)	(0.004)
Tenure	-0.015**	-0.030***	0.013***
	(0.007)	(0.008)	(0.002)
Tenure$^2/100$	0.016	0.052**	-0.027***
	(0.020)	(0.021)	(0.005)
High School Graduates	-0.134**	-0.156**	0.018
	(0.060)	(0.062)	(0.015)
Two-year College Graduates	-0.250***	-0.258***	0.007
	(0.073)	(0.076)	(0.018)
University Graduates	-0.425***	-0.429***	-0.015
	(0.092)	(0.095)	(0.019)
ln(Firm Size)	0.118***	-	-0.004**
	(0.010)		(0.002)
Industry Dummies	Yes	Yes	Yes
R-squared	0.083	0.073	0.046
N	64,810	64,810	64,810

Note: * p<0.10, ** p<0.05, *** p<0.01. FE stands for the fixed effects model. Standard errors clustered at establishment level are in parentheses.

Figure 1: DFL Results for ln(Bonuses) and ln(Monthly Salary)

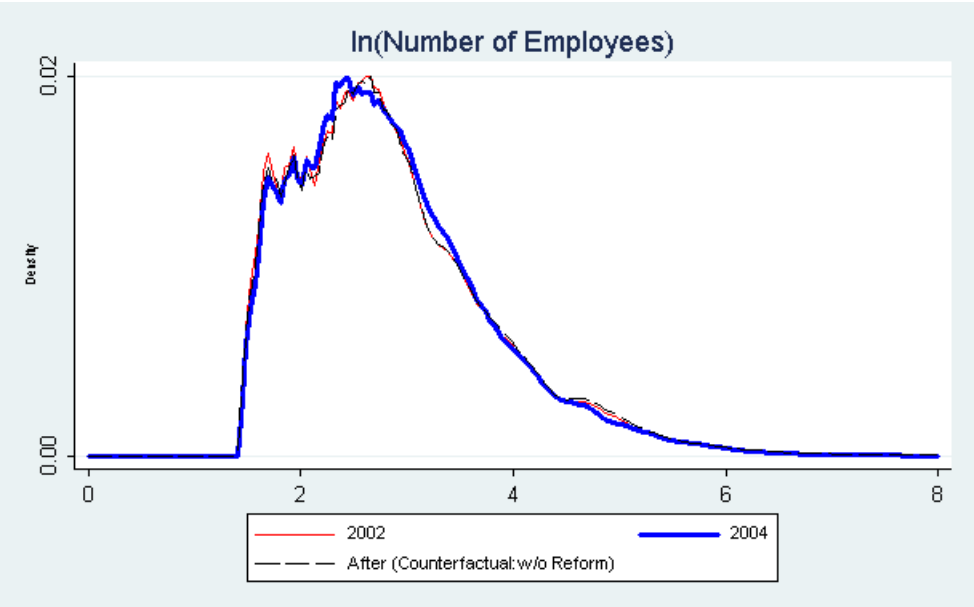
Note: The red line is the kernel density of the bonus amount in 2002, and the blue line is that in 2004. The counterfactual distribution represents a distribution that would have been realized if the 2003 reform had not occurred.

Figure 2: DFL Results for ln(Total Work Hours Within an Establishment)



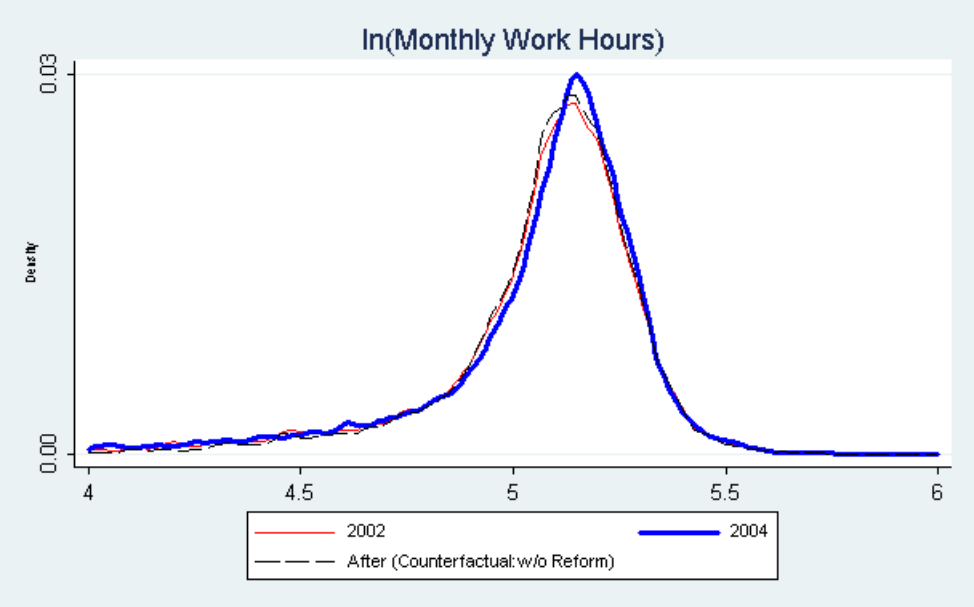
Note: The same note applies as Figure 1.

Figure 3: DFL Results for ln(Employment)



Note: The same note applies as Figure 1.

Figure 4: DFL Results for ln(Work Hours Per Person)



Note: The same note applies as Figure 1.

Appendix

Table A.1: FE DID Estimation Results (2002 (Before) VS 2004(After)): Bonuses from Different Survey Year Used

	(1) ln(Total Work Hours Within an Establishment)	(2) ln(Employment)	(3) ln(Work Hours Per Person)	(4) ln(Annual Bonus)	(5) ln(Monthly Salary)
After×Treatment$_{i(02)}$	0.005	-0.002	0.007***	0.011***	-0.044***
	(0.003)	(0.003)	(0.001)	(0.002)	(0.009)
Year2004	-0.053***	-0.036***	-0.016***	-0.038***	0.088**
	(0.012)	(0.012)	(0.004)	(0.006)	(0.034)
Female	0.397*	0.547**	-0.168***	-0.634***	-0.491**
	(0.207)	(0.216)	(0.035)	(0.051)	(0.202)
Experience	0.005	0.012	-0.007**	0.014***	-0.000
	(0.008)	(0.008)	(0.003)	(0.003)	(0.013)
Experience$^2/100$	-0.012	-0.022	0.009	-0.025***	-0.011
	(0.015)	(0.014)	(0.006)	(0.006)	(0.030)
Tenure	-0.039***	-0.049***	0.010***	0.024***	-0.016
	(0.009)	(0.009)	(0.002)	(0.003)	(0.012)
Tenure$^2/100$	0.088***	0.109***	-0.022***	-0.022***	0.084***
	(0.025)	(0.025)	(0.006)	(0.007)	(0.032)
High School Graduates	-0.155**	-0.187**	0.029	0.076***	-0.024
	(0.079)	(0.073)	(0.023)	(0.025)	(0.123)
Two-year College Graduates	-0.194**	-0.216**	0.022	0.118***	0.081
	(0.095)	(0.090)	(0.028)	(0.029)	(0.155)
University Graduates	-0.333***	-0.362***	0.024	0.211***	0.165
	(0.116)	(0.113)	(0.027)	(0.034)	(0.148)
ln(Firm Size)	0.141***	0.154***	-0.013***	-0.003	0.017
	(0.019)	(0.019)	(0.003)	(0.004)	(0.021)
R-squared	0.107	0.135	0.048	0.347	0.061
N	34,678	34,678	34,678	34,678	29,805

Note: * p<0.10, ** p<0.05, *** p<0.01. FE stands for the fixed effects model. Standard errors clustered at establishment level are in parentheses.