

# Labor Market Responses to Legal Work Hour Reduction: Evidence from Japan<sup>1</sup>

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## **Abstract**

Japan's labor standard law defines weekly legal work hours, and employers must pay a 25-percent wage premium for overtime. The number of legal work hours was 48 in 1987 and gradually declined to 40 by 1997. During the corresponding period, the average weekly hours of work dropped from 45 to 41, suggesting the causal effect of legal regulation on the actual hours of work. Exploiting the different timing of the regulation change by industry and establishment size, this paper estimates the causal impact of legal work hour reduction on labor market outcomes. The analysis results indicate that a one-hour reduction of legal work hours led to a reduction of 0.14 actual hours worked, but it was not accompanied by a reduction in monthly cash earnings. The recruitment of new school graduates was suppressed in response to an increase in the hourly wage rate.

JEL Classification: J23 (Labor Demand); J80 (Labor Standards: General)

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# 1 Introduction

Setting legal standard work hours has long been used as a policy tool to reduce the actual hours worked, and recently it has attracted attention as a tool to attain employment creation through work sharing. With long work hours compared with other developed countries as a background (Estevao and Sa (2008)), the revision of the Labor Standard Law that sets work hour regulation is vigorously debated in Japan (Ogura (2007)).

In contrast to the interest in the effect of work hour regulation on actual work hours, theoretical works reveal that the effect of legal work hours on actual work hours depends on the parameter values of the production function and the fixed cost of employment, even in a perfectly competitive labor market where hourly wage rate is exogenously given (Calmfors and Hoel (1988) and the references therein), and even more fundamentally, the structure of the labor market, whether wage rate is exogenously determined or not ((Boeri et al., 2008, Chapter 4)). In response to the need for empirical works to gauge plausible effects, several papers have emerged to examine its actual effects.<sup>1</sup> Hunt (1999) examines the effect of the reduction of standard work hours from 40 to 35 in Germany from the mid 1980s to the mid 1990s. She finds that a one-hour reduction of standard work hours reduces the actual work hours by 0.8 to 1 hour. This reduction of actual work hours was not fully compensated for by a reduction in monthly salary, and it resulted in an employment reduction because the hourly wage rate increased. Crepon and Kramarz (2002) examines the French case of 1981 that reduced the standard hours from 40 to 39 without allowing for a reduction of weekly pay for existing workers. They found this law change reduced employment among workers who worked 40 hours before the reduction of standard hours and induced the workers' turnover

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<sup>1</sup>Several studies examine the effect of scheduled work hours on actual hours worked in the Japanese context. Brunello (1989) set up an macroeconomic model in which hours, employment, and earnings are simultaneously determined with exogenous scheduled work hours. He fits the model to a macroeconomic time-series between 1973 and 1986. From the estimated parameters, he obtains a prediction that the reduction of legal work hours will prolong actual work hours, increase earnings, and reduce employment. Niimi (1998) and Saito and Tachibanaki (2002) examine the effect of the reduction of scheduled work hours on the level of employment assuming the exogeneity of scheduled work hours. Niimi (1998) concludes that the reduction of legal work hours reduces employment, but Saito and Tachibanaki (2002) obtains the opposite prediction. These works do not explicitly discuss how legal work hours determine scheduled work hours.

that replaces workers with existing contracts with workers with new contracts. Estevao and Sa (2008) examines additional standard hour reduction from 39 hours to 35 hours in France between 2000 and 2002 and finds that standard hour reduction reduced actual hours worked and increased hourly rate of pay and job workers' turnover. Raposo and van Ours (2008) finds similar results for 1996 revision of labor standard law in Portugal that reduced workweek from 44 hours to 40 hours. Skuterud (2007) examines the case of Quebec, Canada that reduced legal work hour from 44 hours to 40 hours between 1997 and 2000 and finds effect on actual hours worked, but no effect on employment. Hamermesh and Trejo (2000) examines the effect of an introduction of an 8 hours per day limit for men in 1980 in addition to a pre-existing 40 hour per week limit in California and concluded that the work hour regulation effectively reduced hours worked per day. It is worth noting that none of these studies directly support the effectiveness of work-sharing.

Given burgeoning empirical literature on the effect of the legal work hour on actual hours worked, this paper contributes to the literature by examining the Japanese experience from 1988 to 1997, which offers a very nice natural experiment. Japan experienced intense criticism for its large current account surplus in the early 1980s, and the government responded to this criticism by reducing domestic production through work hour reduction. The government revised the labor standard act in 1987; before the revision, the number of legal work hours was set at 48 per week and 8 per day, but the weekly legal work hours were gradually reduced to 40 by 1997. The hours worked exceeding this legal limit should be compensated by at least a 25-percent premium. The timing of the legal work hour reduction differed across industries and establishment sizes.

Figure 1 indicates the time series of the weighted average of legal work hours weighted by workers' composition by industry and establishment size for mining, construction, manufacturing, and public utility industries. The figure also includes the average work hours of all workers in the industries. This figure seems to suggest the causal effect of the legal work hour on the actual hours worked, but the macroeconomic condition also changed dra-

matically during the corresponding period. The Japanese economy started contracting from 1991<sup>2</sup>, and this almost coincided with the reduction of actual work hours. To identify the effect of the legal work hours on actual work hours, we exploit the heterogeneous timing of the reduction of legal work hours by industry and establishment size.

Analysis results based on repeated cross-sectional data from the Basic Survey of Wage Structure suggest that the current legal work hours assigned to specific industries and establishment sizes had modest effects on actual hours worked. The most-preferred specification that allows for year-, industry-, and establishment size-specific effects indicates that a reduction of one legal work hour led to 0.14 fewer actual hours worked. Shortened legal work hours reduce actual hours worked, but they virtually do not affect the monthly salary. There is no sign of maneuvering the straight wage rate or bonus payments to neutralize the effect of legal work hour reduction. Anecdotes suggest that reducing the monthly wage of existing workers in accordance with the work hour reduction was extremely difficult at the time because of opposition by workers and labor unions. The reduced work hours without a monthly pay reduction resulted in an increase of the hourly wage rate. The adjustment took place at the margin of the recruitment of new school graduates. The fraction of newly recruited workers from school to existing permanent employees was reduced by 0.1 percentage point in response to the one-hour reduction of the legal work hour, while the average new recruitment rate between 1989 and 1999 was around 5 percent.

This paper is organized as follows. Section 2 reviews the legal setting of Japan's legal work hour. Section 3 lays out a theoretical discussion on the possible effects of the legal work hour on actual work hours. Section 4 discusses the econometric identification strategy. Section 5 introduces the data set. Section 6 reports the estimation results. Section 7 further discusses the effect of work hour regulation on monthly wage and the new recruitment of workers. The last section concludes.

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<sup>2</sup>see Motonishi and Yoshikawa (1999), Hayashi and Prescott (2002) and Kobayashi and Inaba (2006) for various explanations.

## 2 Legal Institution on Work Hour in Japan

Japan's labor standard law prohibits employers from employing workers exceeding the daily and weekly legal work hours. The current legal work hours are 40 per week and 8 per day (Article 32). Employers can allow employees to exceed these legal limits only under an agreement with a workers' representative that represents the majority of employees. This agreement is called the Article 36 agreement because Article 36 of Labor Standards Law defines exceptions to the legal work hour standard. Overtime work hours under this agreement should be compensated by at least a 25-percent wage premium (Article 37).<sup>3</sup>

The weekly legal work hours had been set at 48 per week until 1987 and then gradually declined to 40 by 1997. In response to diplomatic pressure to reduce the current account surplus, prior to the Tokyo summit of May 1986, the Japanese government established a clear policy goal to set a standard of 40 work hours per week. In accordance with this policy goal, the Labor Standard Law was revised in 1987 and implemented from April 1, 1988. Moratorium periods were given depending on industry and establishment size, and this transition is summarized in Appendix Table 1. The moratorium periods ended by March 1997, by which time the standard work hours had become 40 hours per week uniformly across industries and establishment sizes with a few exceptions.<sup>4</sup>

Another important legal standard was set by the Temporary Act for the Promotion of Work Hour Reduction, which is often called *Jitan Sokushin Ho*, enacted on September 1, 1992. The law was effective for five years and offered three legal provisions. First, the law promoted the formation of an establishment-level committee, which consisted of employer and employee representatives, for work hour reduction. The agreement in the committee that is submitted to local labor standard office becomes a legally binding contract as a usual

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<sup>3</sup>See (Sugeno, 2002, Chapter 3 Section 5) for an overview of the Japanese legal system on work hours.

<sup>4</sup>Exceptions apply to small establishments that usually hire less than 10 employees in commerce and service industries. In addition, the workers in managerial-supervising positions are exempted from the work hour regulation, and for those workers, overtime work hours and overtime compensation are not recorded (Article 41). The definition of the managerial-supervising position is rather vague, and there are accumulated court cases over this definition.

labor agreement (*Roushi Kyoyaku*). Second, the law provided the potential exemption from the Antitrust Law for the employers' collusion in an effort to reduce work hours. This exemption was provided because establishments may *exceedingly* compete for quick service, and this excess competition may result in long working hours. Third, the law established a subsidy scheme that provided up to 3 million yen (about 30 thousand US dollars) to promote labor-saving capital investment for establishments that hired up to 300 regular employees. This paper abstracts from the effect of *Jitan Sokushin Ho*, but the law's effect should be absorbed by year dummy variables or the interaction terms of year and establishment size dummy variables.

### 3 Theory

This section discusses the effect of legal work hours on the actual hours worked and employment based on a simple static labor demand model, as in Calmfors and Hoel (1988) and Hunt (1999). Assume the firm produces output by using labor and capital and it faces an exogenous wage rate ( $w$ ), rental rate of capital ( $r$ ). The firm chooses the hours of work per worker ( $h$ ), employment ( $N$ ), and capital ( $K$ ) given legal work hours ( $\bar{h}$ ), the overtime premium ( $p$ ), and the fixed cost of employment ( $f$ ). The firm produces output sold at a unit price using a given technology expressed as a production function  $g(h, N, K)$ . The firm solves the following profit maximization problem:

$$\max_{h, N, K} g(h, N, K) - whN - fN - pw \max(0, (h - \bar{h}))N - rK. \quad (1)$$

The reduction of legal work hours  $\bar{h}$  increases the marginal cost of labor, and this reduces employment through the scale effect. In addition, the increase of the marginal cost of labor causes a substitution to capital. The isoquant and isocost curves on the hour and employment planes are drawn in Figure 2. This figure also indicates how the isocost curve changes when the number of legal work hours is reduced.

Figure 3 illustrates the results of comparative statics for the reduction of legal work hours. Case 1 considers the case in which the optimal hours are above the legal work hours before and after the legal work hour revision (i.e.,  $h^* > \bar{h}_0 > \bar{h}_1$ ) because of high fixed costs. The first-order conditions regarding labor inputs are given as:

$$\begin{aligned} g_h(h, N, K) &= MC_h = wN + pw, \\ g_N(h, N, K) &= MC_N = wh + f + pw(h - \bar{h}). \end{aligned} \quad (2)$$

The marginal cost of employment  $MC_N$  increases, while the marginal cost of hour  $MC_h$  does not change, in response to the reduction of legal work hours  $\bar{h}$ . This induces the substitution of employment to hour. Thus the reduction of legal work hours unambiguously reduces employment because of the scale effect and the substitution to hour (and capital). The effect on hour depends on whether the sum of the scale effect and the substitution effect to capital exceeds the substitution effect from employment.

By contrast, if the initial number of legal work hours does not bind but the number of revised legal work hours does (i.e.  $\bar{h}_0 > h^* > \bar{h}_1$ , Figure 3 Case 2), the first-order conditions evaluated around the revised legal work hours becomes:

$$\begin{aligned} g_h(h, N, K) = MC_h &= wN \text{ if } h \leq \bar{h}_1, \\ &= wN(1 + p) \text{ if } h > \bar{h}_1, \\ g_N(h, N, K) = MC_N &= wh + f \text{ if } h \leq \bar{h}_1, \\ &= wh + f + pw(h - \bar{h}_1) \text{ if } h > \bar{h}_1. \end{aligned} \quad (3)$$

The discontinuities of the marginal costs of hour and employment at legal work hours create an incentive for a firm to set the actual hours at legal work hours. Thus, employment substitutes for hours of work. Because of the scale effect and substitution effect to capital, the hours of work unambiguously fall. The effect on employment depends on the relative



size of the substitution effect between hours and employment, and the sum of the scale effect and the substitution effects to capital.

The analysis of the static model reveals that the reduction of legal work hours is more likely to reduce actual hours worked when 1. the fixed cost of employment is small (i.e., the legal work hour is initially not binding), 2. the scale effect is large (i.e., the labor cost share is large and product demand is price elastic), and 3. the capital substitution is large (i.e., the elasticity of substitution between labor and capital is large and capital supply is price elastic).

The dynamic structure of the legal work hour reduction adds another complexity to our analysis. The legal work hour reduction in Japan in the late 1980s and early 1990s took place gradually with moratorium periods, and the schedule of the legal work hour reduction was known in 1988. The adjustment cost of work hours could be high because it involves a reorganization of the work schedule and a full revision of the employment contract. If the cost of the work hour adjustment is sufficiently large, the employer is likely to reduce the actual work hours only once after the first reduction of legal work hours. Suppose that an employer experiences a 2-hour reduction in the legal work hours this year and expects an additional 2-hour reduction in 2 years. If the lump-sum adjustment cost is sufficiently high, the employer reduces the work hours by 4 hours so that the employer pays the adjustment cost only once, and not twice. In this situation, the steady state legal work hour, instead of the current legal work hour, affects the actual work hours once the employer experiences the legal work hour change.

## 4 Identification Strategies

The change in the actual hours of work in response to the change of legal work hours can be examined by estimating the following regression model, which was also employed by Hunt (1999).

$$h_{ijst} = \alpha \bar{h}_{jst} + D_j + D_s + D_t + D_j D_s + D_j D_t + D_s D_t + u_{ijst}, \quad (4)$$

where  $h_{ijst}$  is actual hours worked. The subscript  $i$  is for individual,  $j$  for industry,  $s$  for establishment size, and  $t$  for year. Legal work hours is denoted as  $\bar{h}_{jst}$  defined by industry, establishment size, and year. The dummy variables are included for industry, establishment size, and year to capture industry, establishment size, and year-specific macroeconomic shocks. In the actual implementation, we gradually add the dummy variables to examine which level of aggregate shock is the crucial determinant of work hours that is correlated with legal work hours.

Additional identification information can be obtained from the heterogeneity of the initial work hour distribution across industries and establishment sizes. The theory in the previous section predicts that the reduction of legal work hours reduces actual hours worked through the substitution effect when legal work hours are initially not binding but become binding after the revision. The data set does not allow us to directly test this prediction at the establishment level because it does not have a panel structure. We instead use the industry, establishment size, year-level fraction of workers for whom the work hour regulation was initially not binding but becomes binding after the revision.

The fraction of workers whose work hours are below the current legal work hours but above the revised legal work hours in industry  $j$ , establishment size  $s$  in year  $t$  is denoted as  $fa_{jst}$ . The estimation equation becomes:

$$h_{ijst} = \alpha_1 \bar{h}_{jst} + \alpha_2 \bar{h}_{jst} \times fa_{jst-1} + \alpha_3 fa_{jst-1} + \text{dummy variables} + u_{ijst}. \quad (5)$$

The theory predicts  $\alpha_2 > 0$  through the substitution effect because the higher the fraction of affected workers, the more effective the work hour regulation is. If the reduction of work hours in response to the legal work hour reduction is mainly caused by the scale effect,  $\alpha_1 > 0$ , but  $\alpha_2 = 0$  holds.

We further consider the econometric model that takes a dynamic adjustment into consideration. The econometric model that allows for the lump-sum adjustment cost of work

hours becomes:

$$h_{ijst} = \alpha \bar{h}_{jst}^{adj} + \text{dummy variables} + u_{ijst}, \quad (6)$$

where  $\bar{h}_{jst}^{adj} = 48$  if the legal work hour is not yet revised and  $\bar{h}_{jst}^{adj} = 40$  once the legal work hour is revised. This specification embodies the theoretical prediction that the adjustment of work hours takes place at one time without a gradual adjustment.

## 5 Data

The data set used in this study is micro data from the Basic Survey on Wage Structure (BSWS), compiled annually by the Japanese government between 1989 and 1999.<sup>5</sup> This survey is conducted in June of every year and includes observations randomly chosen from almost all regions and industries in Japan except for agriculture. The annual number of observations is approximately 1.5 million workers from 60-70 thousand establishments. The sample includes all establishments with 10 or more employees in both private and public sectors and all establishments that belong to private firms with 5 to 9 employees.

The establishments in the sample are randomly chosen in proportion to the size of prefectures, industries, and number of employees from the Establishment and Enterprise Census (EEC hereafter), which lists all establishments in Japan.<sup>6</sup> The randomly selected establishments were asked to extract their workers' information from their payroll records.<sup>7</sup> The establishment and individual files were merged using an establishment identification number.

The unit of analysis is an individual worker with relevant information from the establish-

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<sup>5</sup>Having a cross-section before the initial reduction of the legal work hour before 1998 would have been ideal, but the data before 1989 were not available for this project.

<sup>6</sup>This list is revised every 2-5 years. Of the years relevant to our analysis, the lists were revised in 1986, 1991, 1994, 1996, 1999, and 2001. The BSWS 1989-1992 sample is randomly picked from the 1986 EEC list, the 1993-1995 sample is from the 1991 list, the 1996-1997 sample is from the 1994 list, the 1998-2001 sample is from the 1996 list, and the 2002-2003 sample is from the 1999 list. While the sampling is based on the same list, about half of the establishments are chosen in two consecutive years, but only about 1/10 of the establishments in the sample are picked at the time of the list revision. We should recognize the large discontinuity of the analysis sample at the times of the list revision: 1993, 1996, 1998, and 2002.

<sup>7</sup>A person in charge of personnel matters in each establishment was asked to randomly choose a number of workers from its pool of employees based on the given instructions for random sampling, including the sampling probability, which depended on the establishment's size and industry.

ment to which he/she belongs. Among the variables related to work hours, scheduled work hours and overtime work hours in June are available. Other variables include each worker's scheduled monthly payment in June, overtime payment in June, bonus payment of the previous calendar year, age, sex, educational attainment, full-time/part-time status, type of work or job, employment status (with or without permanent status), working days/hours, as well as the firm's attributes, including the number of permanent workers (*Joyo Rodo Sha*)<sup>8</sup>, firm size, industry, and location.

Table 1 reports the descriptive statistics of the analysis data. The weighted average of legal work hours declined to 40 in 1999 from 47.21 in 1989. Weekly actual hours worked also decreased from 44.67 in 1989 to 40.33 in 1999. While hours worked declined during the period, monthly scheduled cash earnings and annual bonuses increased during the corresponding period. Accordingly, the imputed hourly wage rate increased from 1,645 yen to 2,345 yen between 1989 and 1999.

Figure 4 compares the distribution of actual hours worked (=scheduled work hours + overtime work hours) in 1989 and 1999. The distribution apparently shifts to the left and becomes less dispersed.

Figure 5 examines compliance to the overtime pay premium regulation. Labor standard law requires employers to pay a wage premium of between 25 and 50 percent to compensate for overtime. To examine compliance to this regulation, the overtime wage premium is calculated by the hourly wage for overtime (= unscheduled wage in June / unscheduled work hour in June) divided by the hourly wage for scheduled work hours (= (scheduled wage in June - legal allowances) / scheduled work hours in June). In this calculation, those workers in managerial-supervising positions who are exempted from the work hour regulation are not included in the sample because overtime work hours and wage payment are not recorded. The mode of the distribution is 1.25, but many workers do not receive the

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<sup>8</sup>Those workers who satisfy one of the following three criteria are classified as permanent workers: 1. on contracts that do not clearly specify a contractual time period, 2. on contracts that last more than a month, or 3. on contracts that last less than a month, but on which the workers worked 18 or more days in the last two months. This classification includes part-time workers if one of the criteria above is satisfied.

expected overtime premium. This seemingly noncompliance to the law is partly because the work hours exceeding scheduled work hours are not necessarily work hours exceeding the legal work hours, but a portion may result from noncompliance to the law. The noncompliance to the law attenuates the effect of the legal work hour on actual work hours. By contrast, in a significant number of cases the overtime wage premium exceeds 25 percent. There are several reasons for this. First, employers must pay at least a 35-percent holiday wage premium for having workers work on holidays. Second, at least a 25-percent wage premium should be paid for the work schedule that takes place between 10 p.m. and 5 a.m. as a midnight premium. A midnight premium should be added on to the usual overtime or holiday premium if the overtime or holiday work takes place during the aforementioned period, and thus the total of the legal premium goes up to 60 percent.

## 6 Results on Hours Worked

Table 2 reports the results of the regressions of actual hours worked on legal work hours with several specifications. The estimated coefficient of 0.481 reported in Column 1 implies that a one-hour reduction of legal work hour reduces the actual work hour by about 30 minutes. This relationship is robust even after controlling for industry and establishment heterogeneity, as reported in Columns 2, 3, and 4.

However, once the year effects are allowed for, the coefficient dramatically drops to 0.140, as reported in Column 5. This implies that a one-hour reduction in the legal work hours reduces the actual hours worked by a mere 8.4 minutes ( $=60 \times 0.140$ ). This coefficient is rather stable after including year and industry interaction terms and industry and size interaction terms, as reported in Columns 6 and 7. The coefficient further drops to 0.093 after including size and year interaction dummy variables, but there is not much variation in legal work hour for this specification. If we take 0.140 as the causal effect, among 4 actual work hour reductions between 1989 and 1999, about a 1-hour reduction ( $480 \text{ minutes} \times 0.140$ ) was attained by the reduction of legal work hours.

The effect of the legal work hour reduction on actual hours worked should depend on the fraction of workers who are directly affected by the change of legal work hours, if the substitution effect is important. Table 3 reports the regression results that include the interaction terms of legal work hours and the lagged fraction of workers who are affected by the reduction of work hours. The results are mixed, but the results in Columns 5, 6, and 8 confirm the theoretical prediction that the effect is stronger in the industries and establishment sizes where the fraction of workers who are affected by the change in legal work hour is high. However, the results are of weak statistical significance and rather suggestive for the importance of the substitution effect. By contrast, the straight effect of legal work hours on actual hours worked continues to be significant in a robust way, and this is suggestive for the relative importance of the scale effect.

Table 4 reports the regression results that allow for a specific form of adjustment for hours worked with dynamic consideration. The explanatory variable is “eventual legal work hours” that takes 48 hours before the legal work hour revision and 40 hours after the revision. If establishments adjust their work hours toward 40 hours once the reduction of legal work hour applies, this explanatory variable should pick up its effect. The estimated coefficients are similar to the ones reported in Table 2, but once the year dummy variables are included, the coefficient virtually becomes zero, as reported in Columns 5 through 8. The dynamic adjustment consideration does not seem to be an important explanation for why the estimated coefficients reported in Table 2 are small.

Previous studies point out that there is nonnegotiable unrecorded hours of work in Japan (Takahashi (2005) and Ogura (2007)) and one might wonder how this unrecorded hours of work affect the previous estimates. We infer that its effect is minimal because the gap between employers’ reported hours of work and employees’ reported hours of work based on two independent government surveys had been almost stable during the period of legal change, which is 1988-1997 (Takahashi (2005)). Furthermore, to address the concern, we estimate the hour equation only using production workers as analysis sample because unrecorded hours

of work is presumably negligible among production workers. Table 5 reports the results of regression and we confirm that the coefficients are almost identical to the results reported in Table 2 while the size of coefficients get slightly larger.

## 7 Effects on Wage and Employment

### 7.1 Effects on Monthly Wage

The theoretical analysis in the previous section assumed that the firms are wage takers operating in a perfectly competitive market. In the presence of friction in the labor market, however, firms and workers could potentially negotiate a package of total compensation and work hours.

Within this negotiation framework, Trejo (1991) points out that efficient negotiations between firms and workers nullify the work hour regulation because firms and workers continue to contract on the identical package of total compensation and work hours. He finds evidence for this in the US. In contrast, Hunt (1999) finds that monthly pay had not changed when actual hours declined in the mid 1980s in Germany and, as a result, the effective hourly wage increased. Nymoen (1989) also found that, in the short run, the reduction of work hours increased hourly wage based on Norwegian time-series data. Pencavel and Holmlund (1988) finds a similar result based on Swedish data.

To examine the effect of the tighter work hour regulation on monthly total compensation, which is defined as scheduled wage and overtime wage in June plus bonus payments in the previous year/12, is regressed upon the legal work hours. The results of regressions for several specifications are reported in Table 6. The specifications without year effects render negative coefficients, but the specifications with year effects, reported in Columns 5 through 8, indicate that the tighter work hour regulation had decreased monthly total compensation, but the estimates are not statistically significant except for the specification reported in Column 7. The size of the coefficient, which is 0.004, is very small because when the legal

work hour is reduced by one hour, which is a 2.5-percent reduction from 40 hours, monthly pay is reduced by 0.4 percent. The elasticity is about 0.16. Combined with the previous findings that the tighter work hour regulation reduced the actual hours worked, the reduction of the legal work hours resulted in an increase of the hourly wage rate.

To further investigate the reasons why monthly total compensation hardly changed in response to the reduction of the legal work hours, the monthly compensation is divided into regular monthly salary and bonus parts, using the following relationship:

$$\begin{aligned}
& \ln(\text{Scheduled Wage} + \text{Overtime Wage} + \text{Annual Bonus}/12) \\
= & \ln\{(\text{Scheduled Wage} + \text{Overtime Wage}) \\
& \times (1 + \frac{\text{Annual Bonus}/12}{\text{Scheduled Wage} + \text{Overtime Wage}})\} \\
\simeq & \ln(\text{Scheduled Wage} + \text{Overtime Wage}) \\
& + \frac{\text{Annual Bonus}/12}{\text{Scheduled Wage} + \text{Overtime Wage}}.
\end{aligned}$$

The approximation  $\ln(1 + \rho) \simeq \rho$  is used to derive the third line.

The log of monthly cash earnings and the fraction of bonus to monthly wage are separately regressed on the legal work hour to decompose the legal work hour's effect on monthly total compensation.

Table 7 reports the results for the regressions of monthly wage, including overtime pay, on legal work hours. The specifications with year dummy variables report that the tighter legal hour restriction was associated with the reduction of monthly wage, but these estimates are not statistically significant, except for a specification in Column 7. Table 8 reports the results for the regressions of the fraction of bonus to monthly wage on legal work hours. All the estimated coefficients are almost zero.

Overall, neither monthly wage nor the bonus fraction responds to the change of the work hour resection in a significant way. Combined with evidence that the reduction in the legal work hour reduced the actual hours worked, the reduced legal work hour increases the hourly



wage rate, or hourly labor cost.

## 7.2 Effects on Hiring New School Graduates

Increased hourly wage induced by the reduction in legal work hours may have reduced the number of employees. The Basic Survey of Wage Structure is not designed to provide panel data and basically cannot capture change in the number of employees over time. However, it includes information on the number of workers who are newly recruited from schools by types of schools (junior high school, senior high school, junior college (*Tandai*)/technical college (*Kousen*), four year college) at each establishment. These numbers are added up to obtain the total number of newly recruited workers from schools, and this total is divided by the total number of permanent employees to obtain the fraction of newly hired workers among permanent workers as an establishment-level variable. The fraction of workers who are newly hired from schools among permanent workers may vividly capture the labor input adjustment because this is the margin where the adjustment cost is presumably minimal.

Table 9 reports the regression results of the fraction of newly hired workers among permanent workers on legal work hours. All the estimated coefficients indicate that the reduction of legal work hours reduces the fraction of newly hired workers. According to the specification that allows for straight industry, establishment size, and year effects indicates that a one-hour reduction in the legal work hour reduces the fraction of new hiring by 0.113 percentage point. The eight-hour reduction of legal work hours between 1988 and 1999 results in more than a one-percentage point reduction in the hiring of new graduates from schools. The accumulated effect is non-negligible, considering the fact that the fraction of newly hired workers among permanent workers is about 5 percent during the analysis period.

The Basic Survey of Wage Structure also records the total wage bill that went to newly hired workers from schools. Dividing this figure by the number of workers recruited from schools, the average monthly wage for newly hired workers is calculated. Average monthly wages of newly hired workers from schools by education groups are regressed on the legal

work hour. Table 10 reports the results of the regression, and the estimated coefficients for the specifications with industry, establishment size, and year dummy variables imply that the reduced legal work hours had no impact on the monthly salary of newly recruited workers from schools. This nominal rigidity may well have amplified the quantity adjustment.

## 8 Conclusion

This paper examined the effect of the weekly legal work hour reduction on actual work hours through both theoretical and empirical analysis. The theoretical analysis with exogenous wage revealed that whether the reduction of the legal work hour reduces the actual work hours critically depends on production technology, including the fixed cost of employment and the elasticity of substitution between the hours of work and the number of workers.

The empirical examination exploited a natural experiment in Japan; the number of legal work hours was reduced from 48 in 1988 to 40 in 1997. The analysis, based on micro data from the Basic Survey of Wage Structure, revealed that the reduction of legal work hours modestly reduced actual hours worked. The most preferred estimate implies that a one-hour reduction in the legal work hours reduced actual work hours by 0.14 hour, or 8.4 minutes. Thus an 8-hour reduction in the legal work hours had reduced work hours by 1 hours and 7 minutes. This is a modest effect, considering the fact that actual work hours had declined by 4 hours and 20 minutes: from 44 hours and 40 minutes in 1989 to 40 hours and 20 minutes in 1999. The effect of the legal work hour reduction on actual hours worked is not necessarily stronger in industries where a higher fraction of workers are affected. This finding suggests the relative importance of the scale effect rather than the substitution effect, contrary to policymakers' intentions.

While the reduction of the legal work hour modestly reduced the actual hours worked, it did not decrease monthly compensation to workers, even after taking bonus payment into account. As a result, the effective hourly wage increased after the legal work hour reduction. This increase in hourly wage reduced new recruitment from schools. This set of results is

similar to the German experience in the 1980s reported by Hunt (1999). Nominal monthly wage rigidity increased the hourly wage rate in response to a legal work hour reduction, even without an explicit legal provision that employers could not reduce total weekly or monthly pay in accordance with the reduced hours worked, as was the case in France (Crepon and Kramarz (2002)). This mechanism could well be one of the reasons why work-sharing policies does not seem to work well in many countries, as pointed out by Freeman (1997) and Kapteyn et al. (2004).

As for Japanese macroeconomic implications, the finding in this paper is consistent with that of Niimi (1998), indicating that the reduction of scheduled work hours does not increase the number of employees. The increased hourly labor cost may well have contributed to the increase of the labor wedge, which is the gap between the value of marginal labor product and the marginal rate of substitution between leisure and consumption. Kobayashi and Inaba (2006) pointed out the increase of labor wedge as a reason for the long-term stagnation of the Japanese economy during the 1990s and the early 2000s, based on business cycle accounting. In this sense, this paper offers additional evidence that reduced legal work hours can partly explain Japan's recession in the 1990s, as claimed by Hayashi and Prescott (2002), but through a different mechanism.

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Table 1: Descriptive Statistics of the Analysis Data, 1989-1999, 4 Industries: Mining, Construction, Manufacturing, and Electricity, Gas, Heat supply and Water.

Sample	Total	1989	1994	1999
Legal Work Hours	43.52 (2.87)	47.21 (0.98)	42.79 (1.98)	40.00 0.00
Actual Hours Worked	41.91 (7.89)	44.67 (8.41)	40.99 (7.26)	40.33 (7.34)
Scheduled Hours	38.76 (6.07)	40.73 (6.34)	38.34 (5.82)	37.58 (5.57)
Overtime	3.14 (4.44)	3.94 (5.05)	2.65 (3.82)	2.75 (4.20)
Scheduled Cash Earnings	2608.47 (1332.36)	2169.19 (1119.44)	2749.18 (1371.05)	2857.45 (1391.99)
Overtime Allowance	275.30 (407.75)	276.87 (386.92)	260.15 (393.72)	265.82 (411.13)
Annual Bonus in Previous Calendar Year	9900.17 (9060.72)	7671.55 (7438.65)	10974.75 (9564.85)	10244.21 (9282.40)
Hourly Wage Rate	21.18 (14.41)	16.45 (10.97)	22.85 (15.09)	23.45 (14.92)
Establishment Size	403.85 (1086.39)	387.53 (1116.61)	469.90 (1128.53)	348.93 (921.91)
Overtime Premium Rate	1.56 (2.18)	1.46 (1.74)	1.70 (2.54)	1.63 (2.43)
Fraction of Workers Affected by Year, Industry, Establishment Size ("FA")	4.26 (8.25)	- (-)	11.33 (8.63)	0.00 (0.00)
Fraction of Newly Hired Workers from Schools (%)	4.97 (5.06)	5.69 (5.65)	4.76 (5.12)	4.02 (4.01)
Monthly Wage of Newly Hired Workers from School	1539.11 (245.60)	1275.31 (182.42)	1610.12 (208.82)	1692.15 (223.69)
Establishment Size: 301- 101-300	0.28 0.18	0.25 0.17	0.33 0.21	0.26 0.18
31-100	0.28	0.28	0.24	0.31
10-30	0.22	0.25	0.18	0.22
1-9	0.05	0.05	0.04	0.04
Industry Distribution: Mining (4 categories)	0.02	0.02	0.01	0.02
Construction (3 categories)	0.10	0.08	0.10	0.15
Manufacturing (22 categories)	0.81	0.85	0.79	0.76
Electricity, Gas, Heat supply and Water (4 categories)	0.07	0.05	0.10	0.08
Observations	6735360	658489	527153	613359

Note: Standard deviations are in parenthesis. All the monetary compensation is denominated in 100 yen that is approximately one US dollar.

Table 2: The Effect of Legal Work Hours on Actual Hours Worked

Dependent var.	Actual Hours (= Scheduled Hours + Overtime)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Legal Work Hours	0.481	0.472	0.450	0.441	0.140	0.130	0.132	0.093
	(0.021)	(0.015)	(0.023)	(0.016)	(0.041)	(0.032)	(0.016)	(0.068)
Industry	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Establishment Size	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	No	No	No	Yes	Yes	Yes	Yes
Year×Industry	No	No	No	No	No	Yes	Yes	Yes
Industry×Size	No	No	No	No	No	No	Yes	Yes
Size×Year	No	No	No	No	No	No	No	Yes
N	6735360	6735360	6735360	6735360	6735360	6735360	6735360	6735360
R-squared	0.031	0.065	0.033	0.069	0.083	0.087	0.096	0.096

Note: Standard errors robust against the clustering within year × industry × size clusters (1772 clusters) are reported in parentheses. Actual hours worked is defined as scheduled hours plus overtime hours.

Table 3: The Effect of Legal Work Hours on Actual Hours Worked Exploiting the Variation of the Degree of Bind

Dependent var.	Actual Hours							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Legal Work Hours	0.432	0.431	0.396	0.392	0.149	0.157	0.146	0.121
	(0.028)	(0.021)	(0.030)	(0.022)	(0.047)	(0.037)	(0.020)	(0.074)
Legal Work Hours	0.008	0.004	0.008	0.005	0.006	0.004	-0.001	0.007
* Fraction Affected	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.001)	(0.003)
Fraction Affected	-0.266	-0.127	-0.296	-0.171	-0.220	-0.165	0.040	-0.282
	(0.127)	(0.091)	(0.125)	(0.085)	(0.127)	(0.128)	(0.053)	(0.113)
Industry	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Establishment Size	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	No	No	No	Yes	Yes	Yes	Yes
Year×Industry	No	No	No	No	No	Yes	Yes	Yes
Industry×Size	No	No	No	No	No	No	Yes	Yes
Size×Year	No	No	No	No	No	No	No	Yes
N	6076065	6076065	6076065	6076065	6076065	6076065	6076065	6076065
R-squared	0.025	0.058	0.027	0.062	0.073	0.077	0.086	0.086

Note: Standard errors robust against the clustering within year × industry × size clusters (1598 clusters) are reported in parentheses. “Fraction Affected” is defined by year, industry, establishment size, and this value is the fraction of workers whose work hours in the previous year are between the legal work hours in the previous year and the current legal work hours. The sample size is reduced from Table 2 because 1989 observations are dropped and “Bind” is not defined for some cells because of missing observations.

Table 4: The Effect of Legal Work Hours on Actual Hours Worked Incorporating a Dynamic Adjustment

Dependent variable	Actual Hours							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Eventual Legal Work Hours	0.462	0.441	0.425	0.406	0.019	0.035	0.038	0.014
	(0.026)	(0.015)	(0.026)	(0.013)	(0.020)	(0.019)	(0.008)	(0.023)
Industry	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Establishment Size	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	No	No	No	Yes	Yes	Yes	Yes
Year×Industry	No	No	No	No	No	Yes	Yes	Yes
Industry×Size	No	No	No	No	No	No	Yes	Yes
Size×Year	No	No	No	No	No	No	No	Yes
N	6735360	6735360	6735360	6735360	6735360	6735360	6735360	6735360
R-squared	0.023	0.057	0.026	0.062	0.083	0.087	0.095	0.096

Note: Standard errors robust against the clustering within year × industry × size clusters (1772 clusters) are reported in parentheses. “Eventual Legal Work Hours” takes 48 hours if the current legal work hours are 48 hours and takes 40 hours if the current legal work hours are below 48 hours.

Table 5: The Effect of Legal Work Hours on Actual Hours Worked among Production Workers

Dependent var.	Actual Hours Worked (= Scheduled Hours + Overtime)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Legal Work Hours	0.517	0.515	0.483	0.492	0.168	0.149	0.143	0.251
	(0.026)	(0.017)	(0.027)	(0.017)	(0.050)	(0.040)	(0.020)	(0.127)
Industry	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Establishment Size	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	No	No	No	Yes	Yes	Yes	Yes
Year×Industry	No	No	No	No	No	Yes	Yes	Yes
Industry×Size	No	No	No	No	No	No	Yes	Yes
Size×Year	No	No	No	No	No	No	No	Yes
N	3589764	3589764	3589764	3589764	3589764	3589764	3589764	3589764
R-squared	0.031	0.064	0.033	0.066	0.08	0.083	0.091	0.091

Note: Standard errors robust against the clustering within year × industry × size clusters (1249 clusters) are reported in parentheses. Actual hours worked is defined as scheduled hours plus overtime hours.

Table 6: The Effect of Legal Work Hours on Monthly Total Compensation

Dependent variable	ln (Monthly Total Compensation)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Legal Work Hours	-0.046 (0.003)	-0.042 (0.002)	-0.027 (0.003)	-0.022 (0.001)	0.004 (0.004)	0.004 (0.003)	0.004 (0.001)	0.004 (0.004)
Industry	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Establishment Size	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	No	No	No	Yes	Yes	Yes	Yes
Year×Industry	No	No	No	No	No	Yes	Yes	Yes
Industry×Size	No	No	No	No	No	No	Yes	Yes
Size×Year	No	No	No	No	No	No	No	Yes
N	6735360	6735360	6735360	6735360	6735360	6735360	6735360	6735360
R-squared	0.047	0.189	0.125	0.271	0.275	0.277	0.288	0.288

Note: Standard errors robust against the clustering within year × industry × size clusters (1772 clusters) are reported in parentheses. Monthly total compensation is defined as scheduled wage plus overtime wage plus one twelfth of the bonus amount of previous calendar year.

Table 7: The Effect of Legal Work Hours on Cash Earnings in June

Dependent variable	ln (Cash Earnings in June)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Legal Work Hours	-0.041 (0.003)	-0.037 (0.002)	-0.027 (0.002)	-0.022 (0.001)	0.003 (0.004)	0.003 (0.003)	0.004 (0.001)	0.003 (0.003)
Industry	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Establishment Size	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	No	No	No	Yes	Yes	Yes	Yes
Year×Industry	No	No	No	No	No	Yes	Yes	Yes
Industry×Size	No	No	No	No	No	No	Yes	Yes
Size×Year	No	No	No	No	No	No	No	Yes
N	6735360	6735360	6735360	6735360	6735360	6735360	6735360	6735360
R-squared	0.046	0.179	0.100	0.240	0.243	0.245	0.255	0.255

Note: Standard errors robust against the clustering within year × industry × size clusters (1772 clusters) are reported in parentheses. Cash earnings in June is defined as scheduled wage plus overtime wage in June.



Table 8: The Effect of Legal Work Hours on (annual bonus payment in previous year/12) / (cash earnings in June)

Dependent variable	(Annual Bonus Payment in Previous Year/12) / (Cash Earnings in June)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Legal Work Hours	-0.007 (0.001)	-0.005 (0.001)	0.000 (0.001)	0.000 (0.000)	0.000 (0.001)	0.000 (0.001)	0.000 (0.000)	0.001 (0.002)
Industry	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Establishment Size	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	No	No	No	Yes	Yes	Yes	Yes
Year×Industry	No	No	No	No	No	Yes	Yes	Yes
Industry×Size	No	No	No	No	No	No	Yes	Yes
Size×Year	No	No	No	No	No	No	No	Yes
N	6735360	6735360	6735360	6735360	6735360	6735360	6735360	6735360
R-squared	0.015	0.112	0.145	0.229	0.233	0.236	0.246	0.246

Note: Standard errors robust against the clustering within year × industry × size clusters (1772 clusters) are reported in parentheses. Cash earnings in June is defined as scheduled wage plus overtime wage in June.

Table 9: The Effect of Legal Work Hours on the hiring ratio of New Graduates to Permanent Employees

Dependent variable	(Number of Hiring from New Graduates) / (Number of Permanent Employees) * 100							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Legal Work Hours	0.326 (0.022)	0.322 (0.018)	0.198 (0.013)	0.203 (0.012)	0.126 (0.040)	0.113 (0.031)	0.109 (0.026)	0.259 (0.109)
Industry	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Establishment Size	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	No	No	No	Yes	Yes	Yes	Yes
Year×Industry	No	No	No	No	No	Yes	Yes	Yes
Industry×Size	No	No	No	No	No	No	Yes	Yes
Size×Year	No	No	No	No	No	No	No	Yes
N	98263	98263	98263	98263	98263	98263	98263	98263
R-squared	0.031	0.056	0.180	0.191	0.192	0.199	0.208	0.215

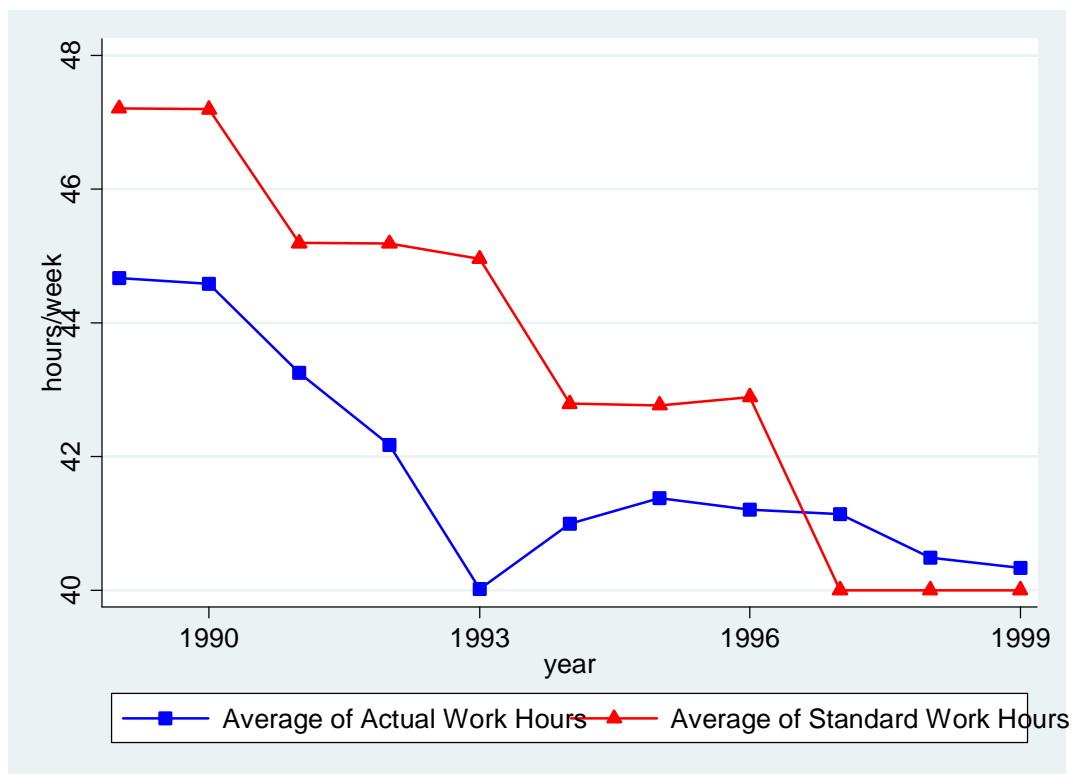
Note: Observation units are establishments. Standard errors robust against the clustering within year × industry × size clusters (1636 clusters) are reported in parentheses.

Table 10: The Effect of Legal Work Hours on Monthly Wage of New Graduates

Dependent var.	Log (Monthly Wage of New Graduates)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Legal Work Hours	-0.032 (0.001)	-0.031 (0.001)	-0.030 (0.001)	-0.029 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.003 (0.003)
Industry	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Establishment Size	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	No	No	No	Yes	Yes	Yes	Yes
Year×Industry	No	No	No	No	No	Yes	Yes	Yes
Industry×Size	No	No	No	No	No	No	Yes	Yes
Size×Year	No	No	No	No	No	No	No	Yes
N	98263	98263	98263	98263	98263	98263	98263	98263
R-squared	0.282	0.353	0.288	0.363	0.443	0.447	0.456	0.458

Note: Observation units are establishments. Standard errors robust against the clustering within year × industry × size clusters (1636 clusters) are reported in parentheses.

Figure 1: Time Series of Weighted Average of the Work Hour Standard and Actual Work Hours



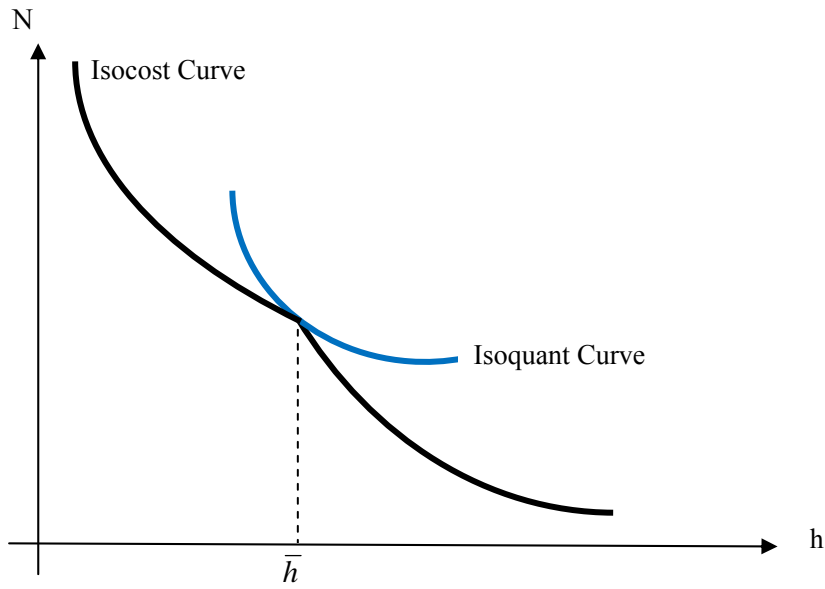
Note: Figures are based on microdata of Basic Survey of Wage Structure.

Figure 2: Isocost Curve with the Work Hour Standard

Isoquant Curve  $f = g(h, N; k, q)$

Isocost Curve

$$C = \begin{cases} whN + fN + rK & \text{if } \bar{h} > h \\ whN + fN + pw(h - \bar{h})N + rK & \text{if } \bar{h} < h \end{cases} \quad N = \begin{cases} \frac{C - rK}{wh + f} & \text{if } h < \bar{h} \\ \frac{C - rK}{wh + f + pw(h - \bar{h})} & \text{if } h \geq \bar{h} \end{cases}$$



When  $\bar{h}$  decreases from  $\bar{h}_0$  to  $\bar{h}_1$ , the Isocost curve will switch to the red line.

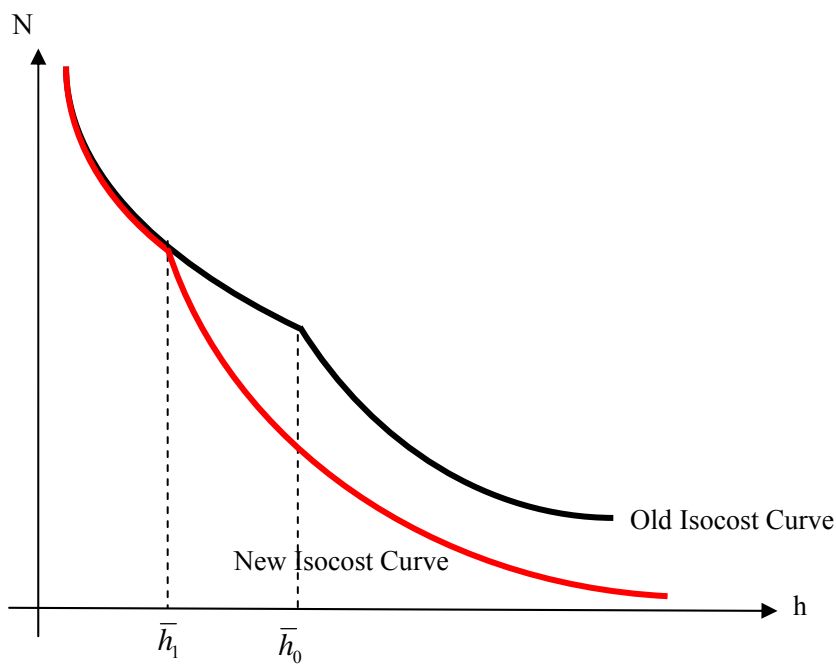


Figure 3: The Effect of the Work Hour Standard Change on Actual Work Hours and Employment

(Case 1)  $\bar{h}_1 < \bar{h}_0 < h^*$  The optimal hours are above even the original standard hours.

(Case 2)  $\bar{h}_1 < h^* < \bar{h}_0$  The initial standard hours do not bind, but the revised standard hours do.

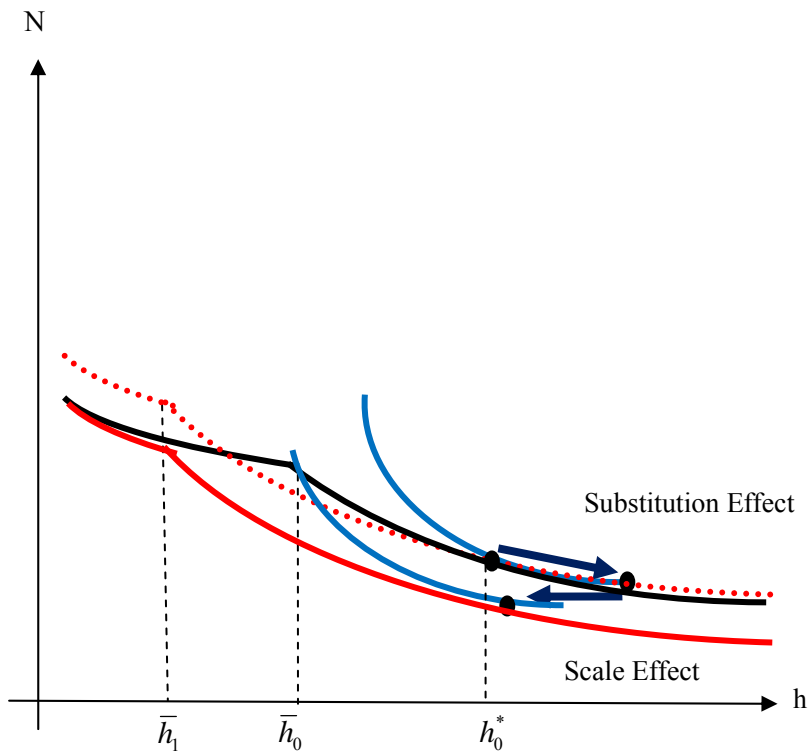
(Case 3)  $h^* < \bar{h}_1 < \bar{h}_0$  The optimal hours are below even the revised standard hours.

Case 1 is likely to occur when the fixed cost of employment  $f$  is high.

The higher  $f$  becomes, the flatter of the slope of isocost will be.

$$\square \text{ Slope} = -\frac{MC_h}{MC_N} = \begin{cases} -\left(\frac{wN}{wh + f}\right) \uparrow \text{ if } \bar{h} > h \\ -\left(\frac{wN(1+p)}{wh + f + pw(h - \bar{h})}\right) \uparrow \text{ if } \bar{h} < h \end{cases}$$

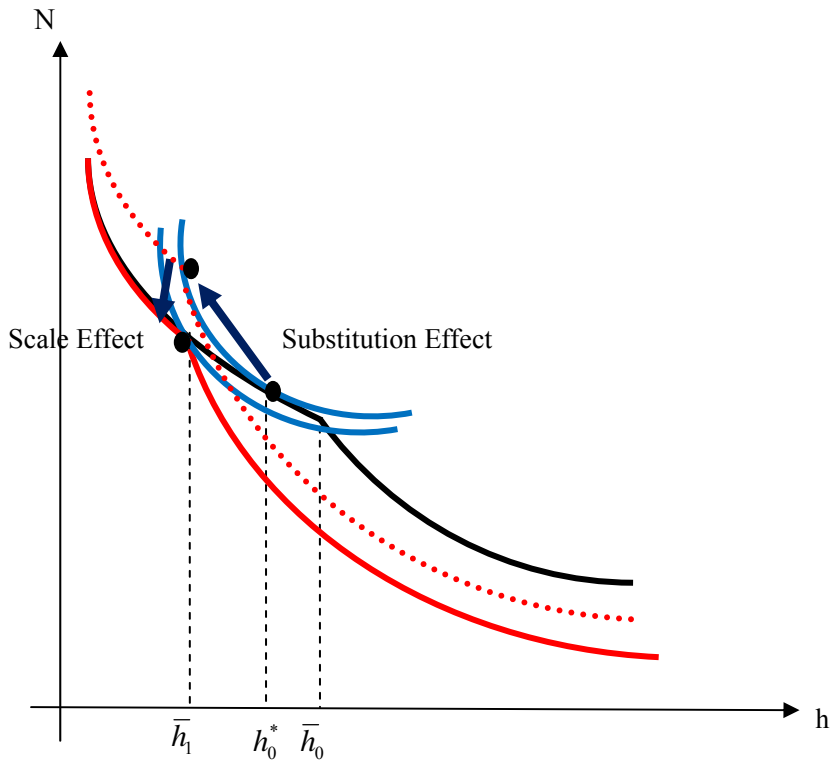
- Case 1 ( $f$  is high)  $\bar{h}_1 < \bar{h}_0 < h^*$



Substitution Effect: The slope gets flatter at the new tangency point.

$$\text{Slope} = -\frac{MC_h}{MC_N} = -\left(\frac{wN(1+p)}{(wh + f + pw(h - \bar{h} \downarrow))}\right) \uparrow$$

Case 2  $\bar{h}_1 < h^* < \bar{h}_0$



Substitution Effect: Slope gets steeper at the new tangency point.

● Case 3 (f is low)  $h^* < \bar{h}_1 < \bar{h}_0$

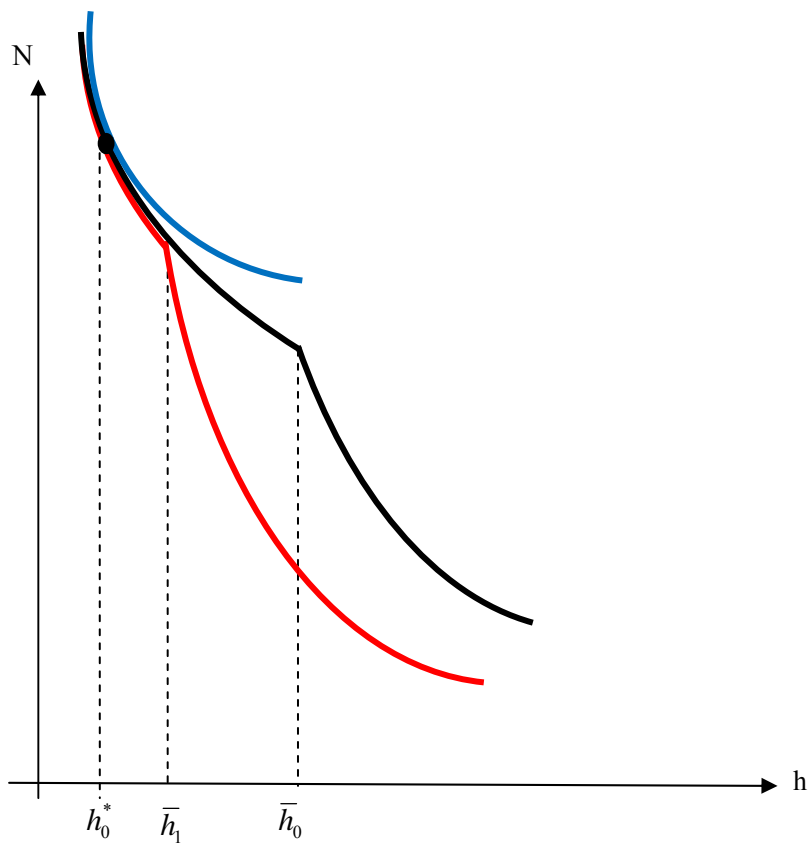


Figure 4: Distribution of Actual Work Hours, 1989 and 1999

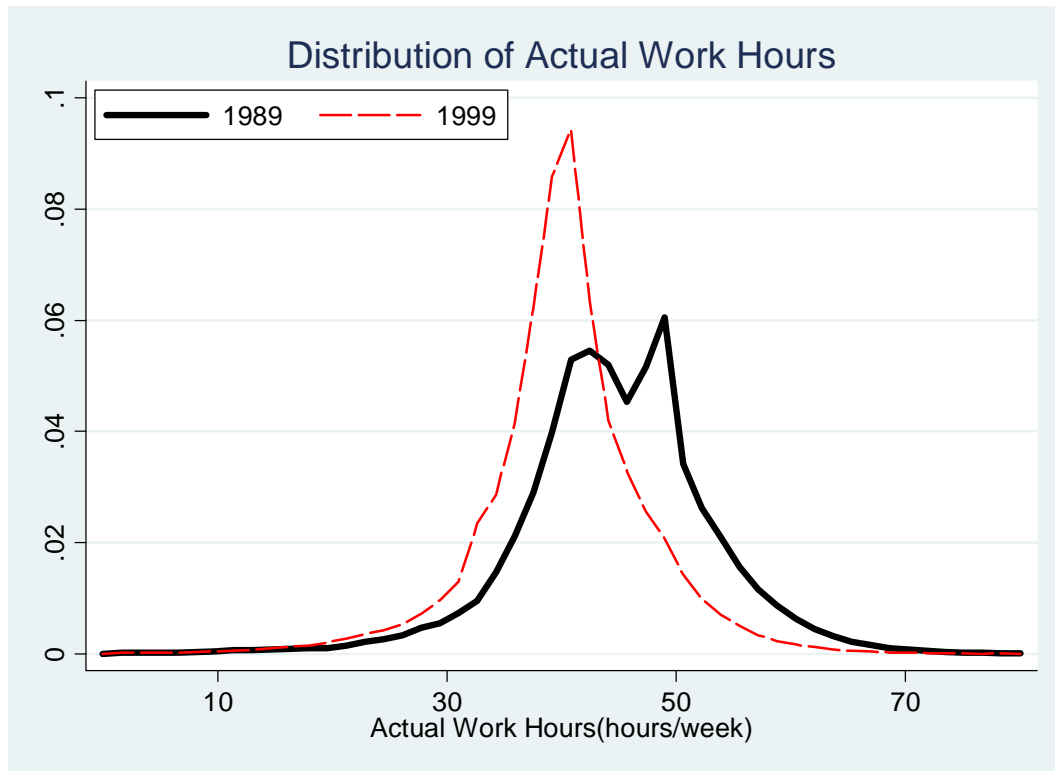
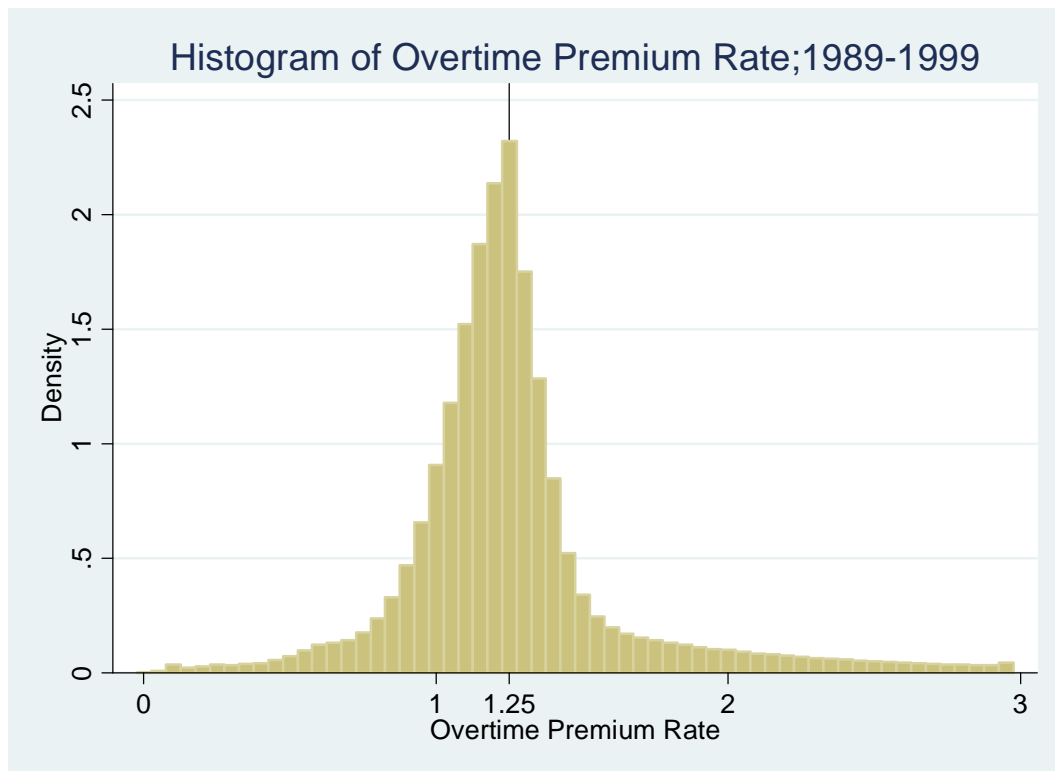


Figure 5: Compliance to overtime premium regulation



Note: 
$$\text{Overtime Premium Rate} = \frac{\text{Overtime Wage} / \text{Overtime Hours}}{(\text{Scheduled Wage} - \text{Allowances}) / \text{Scheduled Hours}}$$

Appendix Table 1: History of Standard Work Hours (Industries 1-3 are used for the analysis)

Type of Industry/Establishment Size	1988/4~1991/3					1991/4~1993/3				
	301-300	101-100	31-100	10-30	1-9	301-300	101-100	31-100	10-30	1-9
1.Manufacturing	46	46	48	48	48	44	44	46	46	46
2.Mining	48	48	48	48	48	46	46	46	46	46
3.Construction	46	48	48	48	48	44	46	46	46	46
4.Transportation	48	48	48	48	48	46	46	46	46	46
5.Handling Cargo	46	46	46	48	48	44	44	44	46	46
8.Commercial	46	46	48	48	48*	44	44	46	46	48
9.Banking/Advertising	46	46	46	46	46	44	44	44	44	44
10.Motion Picture/Theatrical Performance	46	46	46	48	48*	44	44	44	46	48
11.Communication	46	46	46	46	46	44	44	44	44	44
12.Education and Research	46	46	46	46	46	44	44	44	44	44
13.Health and Hygiene	46	46	46	48	48*	44	44	44	46	48
14.Service Trade and Reception Center	46	48	48	48	48*	44	46	46	46	48
15.Sanitation and Livestock	48	48	48	48	48	46	46	46	46	46
16.Public Agencies	46	46	46	46	46	44	44	44	44	44
17.Other***	46	48	48	48	48	44	46	46	46	46
Type of Industry/Establishment Size	1993/4~1994/3					1994/4~1995/3				
	301-300	101-100	31-100	10-30	1-9	301-300	101-100	31-100	10-30	1-9
1.Manufacturing	44	44	46	46	46	40	44	44	44	46
2.Mining	44	44	46	46	46	44	44	44	44	46
3.Construction	44	44	46	46	46	40	44	44	44	46
4.Transportation	44	44	46	46	46	44	44	44	44	46
5.Handling Cargo	44	44	44	46	46	44	44	44	44	46
8.Commercial	44	44	46	46	48	40	44	44	44	46**
9.Banking/Advertising	44	44	44	44	44	40	40	40	40	40
10.Motion Picture/Theatrical Performance	44	44	44	46	48	40	40	44	44	46
11.Communication	44	44	44	44	44	40	40	40	40	40
12.Education and Research	44	44	44	44	44	40	44	44	44	44
13.Health and Hygiene	44	44	44	46	48	40	44	44	44	46**
14.Service Trade and Reception Center	44	44	46	46	48	40	44	44	44	46
15.Sanitation and Livestock	44	44	46	46	46	44	44	44	44	46
16.Public Agencies	44	44	44	44	44	40	40	40	40	40
17.Other***	44	44	46	46	46	40	40	44	44	44

Appendix Table 1 (Continued)

Type of Industry/Establishment Size	1995/4~1997/3					1997/4~2001/3				
	301-300	101-100	31-100	10-30	1-9	301-300	101-100	31-100	10-30	1-9
1.Manufacturing	40	44	44	44	44	40	40	40	40	40
2.Mining	44	44	44	44	44	40	40	40	40	40
3.Construction	40	44	44	44	44	40	40	40	40	40
4.Transportation	44	44	44	44	44	40	40	40	40	40
5.Handling Cargo	44	44	44	44	44	40	40	40	40	40
8.Commercial	40	44	44	44	46	40	40	40	40	46
9.Banking/Advertising	40	40	40	40	40	40	40	40	40	40
10.Motion Picture/Theatrical Performance	40	40	44	44	46	40	40	40	40	46
11.Communication	40	40	40	40	40	40	40	40	40	40
12.Education and Research	40	44	44	44	44	40	40	40	40	40
13.Health and Hygiene	40	44	44	44	46	40	40	40	40	46
14.Service Trade and Reception Center	40	44	44	44	46	40	40	40	40	46
15.Sanitation and Livestock	44	44	44	44	44	40	40	40	40	40
16.Public Agencies	40	40	40	40	40	40	40	40	40	40
17.Other	40	40	44	44	44	40	40	40	40	40
2001/4~										
Type of Industry/Establishment Size	301-300	101-100	31-100	10-30	1-9					
1.Manufacturing	40	40	40	40	40					
2.Mining	40	40	40	40	40					
3.Construction	40	40	40	40	40					
4.Transportation	40	40	40	40	40					
5.Handling Cargo	40	40	40	40	40					
8.Commercial	40	40	40	40	44					
9.Banking/Advertising	40	40	40	40	40					
10.Motion Picture/Theatrical Performance	40	40	40	40	44					
11.Communication	40	40	40	40	40					
12.Education and Research	40	40	40	40	40					
13.Health and Hygiene	40	40	40	40	44					
14.Service Trade and Reception Center	40	40	40	40	44					
15.Sanitation and Livestock	40	40	40	40	40					
16.Public Agencies	40	40	40	40	40					
17.Other	40	40	40	40	40					

\*Working hours of Commercial enterprises, Motion Picture and Theatrical Performance enterprises, Health and Hygiene enterprises, and Service Trade/Reception Center enterprises with 1-4 employees shall be 54 hours per week until 3/31 in 1991.

\*\*Working hours of Commercial enterprises and Service Trade/Reception center enterprises with 1-4 employees shall



be 48 hours per week until 3/31 in 1995.

\*\*\*Other excludes agricultural and forestry, marine products, and livestock