Analysis of the Determinants of Minimum Wages in Japan[*]

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This paper overviews Japan's minimum wage system and examines the determinants of "guideline increases (*meyasu-gaku*)," which are the increases in minimum wages recommended by the central council, and the actual minimum wage increases set by the regional councils. In Japan, minimum wages are deliberated upon mainly by advisory councils. The central council recommends the guideline increases and the regional councils set the actual increases. Our analysis found that the guideline increases are positively affected by the wage growth rates. Comments by public interest at meetings of the central council have suggested that their decisions on the guideline increases are influenced by the wage growth rate, and our estimation results also support the hypothesis that the guideline increases are positively affected by the wage growth rate. Because the council comprises workers represented by union officials, we examined the possible impact of the unionization rate on the guideline increases. We found that the guideline increase is not affected by the unionization rate. Our analysis indicated that the actual minimum wage increases are set close to the guideline increases. We also found that the actual increase is positively affected by the active job openings-to-applicants ratio. As with the guideline increases, however, our analysis showed that the actual increase is not affected by the unionization rate. In addition, we found that in 2007 and 2008, when the guideline increases were determined in light of the debates conducted by the Roundtable to Promote Strategy to Enhance Growth Potential (*seicho-ryoku sokoage senryaku suisin entaku kaigi*) which set a policy direction toward minimum wage increases, the actual increases were larger than those in other years.

I. Introduction

This paper explains Japan's minimum wage system and its public framework for setting minimum wages. Then, it empirically examines the determinants of the minimum wage increases. Minimum wage level can be determined by two methods: the council method and the collective-agreement extension method. Japan employed both and now employs the council method. Japan's minimum wage system is applied to almost all the workers, however some countries allow lower minimum wage rates for young or disabled workers.

In the United States and Canada, minimum wages are set through congressional deliberations, and numerous studies have investigated on the influence of labor unions and po-

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litical parties on minimum wages.[1] Cox and Oaxaca (1982) investigated the union's influence of minimum wages by proposing a theoretical model and conducting an empirical analysis. Their study, which examined minimum wage legislation considering three groups—unionized skilled workers, non-unionized unskilled workers, and capitalists—showed that unionized workers call for minimum wage increases when they act on the basis of their own initiative. Their empirical analysis found that an increase of the unionized workers leads to the expected higher minimum wage level. Sobel (1999) found that the minimum wage is higher when the interests of labor unions are stronger relative to business interests. Canadian studies by Blais, Cousineau and McRoberts (1989) and Dickson and Myatt (2002) indicated that state minimum wages are not affected by the union.

Among the studies analyzing political influences on minimum wages, Besley and Case (1995) and Waltman and Pittman (2002) examined state minimum wages in the United States and suggested that the setting of them is affected by political factors. Blais, Cousineau and McRoberts (1989) and Dickson and Myatt (2002) found that minimum wages in Canada tend to be set at a low level under conservative governments, while Green and Harrison (2006) indicated that minimum wages are likely to be high under liberal governments.

In countries covered by those studies, researchers can explore the possibility of political influence on minimum wages because the political processes are involved in setting them. In Japan, however, political factors are unlikely to affect the process because minimum wages are determined mainly by regional councils, rather than through parliamentary deliberations. Still, Japan's minimum wage councils include representatives of labor unions which consist of workers with relatively high wages; it is possible that those councils' decisions represent the interests of unionized labor over the low-wage workers, who generally are non-unionized.[2] This paper also analyzes the impact of the unionization rate on minimum wages.

This paper is organized as follows. Section II explains Japan's minimum wage system. Section III analyzes the determinants of the guideline increases. Section IV analyzes the determinants of the actual minimum wage increases in prefectures. Section V summarizes our conclusion.

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[1] For researches on political influences on minimum wages, see Chapter 8 of Neumark and Wascher (2008).

[2] The Cabinet Order on the Minimum Wage Council stipulates that "when the Minister of Health, Labour and Welfare and the directors-general of the prefectural labour bureaus appoint members of the Central Minimum Wage Council and Regional Minimum Wage Councils who represent workers and employers, they should ask relevant labor unions and employer associations to recommend candidates within a reasonable period of time."

II. Overview of Japan's Minimum Wage System[3]

The Minimum Wages Act constitutes the basis for the Japan's minimum wage system. The purpose of the minimum wage system is to improve the terms of employment by assuring that minimum wages are higher than the prescribed level. The system is also expected to improve the quality of labor forces and assure fair competition among companies. The minimum wage requirement is universally applied to all workers and employers, with a few exceptions that include workers hampered by physical or mental disability, workers employed on a trial basis, workers taking governmentally designated vocational training classes and meeting other conditions, workers who perform easy and simple jobs, and workers employed intermittently. Minimum wages are classified by coverage into two categories: the regional (prefectural) minimum wage and the "specified minimum wage" (specific to a region and to an industry). Our analysis focuses on the former since the number of workers to whom the latter applies is decreasing. Provisions of the revised Minimum Wages Act, enforced on July 1, 2008, permit reduced minimum wage rates in exceptional cases following a review. Although the council method and the collective-agreement extension method had been used in Japan, the collective-agreement extension method is set to be abolished two years after the entry-into-force of the revised Minimum Wages Act.

Under the council method, the Minister of Health, Labour and Welfare or the director-general of a prefectural labor bureau sets the minimum wage, when he or she deems it necessary, as dictated by the requirements of the Minimum Wage Act. The act requires that minimum wages be based on workers' costs of living, the level of wages for comparable workers, and the wage-paying capacity of ordinary businesses. A revision to the act in 2008 further required that regional minimum wages be considered in coordination with public assistance level. The respective ministers consult the relevant minimum wage council (the Central Minimum Wage Council in the case of the Minister of Health, Labour and Welfare and the Regional Minimum Wage Council in the case of the chief of the prefectural labor bureau). Councils are comprised of equal numbers of public interest and representatives of workers and employers.

Under the collective-agreement extension method, in cases where a worker-employer minimum wage agreement applies to most of the workers who are engaged in the same type of job in a specific region and their employers, and where a request for the extension of a minimum wage agreement is made based on the consensus of all unions and employers who are parties to the agreement, the Minister of Health, Labour and Welfare or the general-secretary of a prefectural labor bureau consults the relevant minimum wage council and adopts that agreement as one applicable to all non-unionized workers engaged in the same type of job and their employers as well.

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[3] For the details of the Japan's minimum wage system, see Hori and Sakaguchi (2005), Nakakubo (2009), and the Japan Institute for Labour Policy and Training (2010).

1. Regional Minimum Wages

Regional minimum wages are set separately by individual prefectures irrespective of industry category and job type. In principle, a regional minimum wage applies universally to workers and employers in the prefecture, and the employers who fail to comply are punishable by a fine of up to ¥500,000. Regional minimum wages are deliberated by the regional councils following "guideline increases (*meyasu-gaku*)," which is the amounts of minimum wage increases recommended by the central council, as well as wage levels in the relevant prefectures. The central council is responsible for recommending a guideline increase for each rank, and the regional councils set the actual minimum wage levels.

Regional councils are not bound by the guideline increases when determining regions' actual minimum wage increases. Since workers and employers seldom reach agreement during the central council's deliberation, a minimum wage increase recommended by public interest of the council is, in most case, ultimately adopted as the central council's recommendation. Regional councils set or revise the minimum wage in light of the guideline increases.

Japan's 47 prefectures are divided into four ranks—Rank A, Rank B, Rank C, and Rank D—with the guideline increases for each rank. Using the guideline increase for each rank as a benchmark, each regional council determines the minimum wage level. The classification, which is reviewed every five years, is made on the basis of index points gained by prefectures in relation to five benchmark indexes related to income and consumption, 10 indexes for salaries, and five indexes related to corporate management.[4] Prefectures are ranked according to the total index points and divided into four ranks to assure stable classification and minimize the disparity of the total points gained within the ranks. The Rank A rigion is the set of the highest index points, while the Rank D region corresponds to the lowest-index- points prefectures.

During deliberations, regional councils check the actual working conditions and the wage situation on the basis of the results of the Basic Surveys on Minimum Wages conducted by prefectural labor bureaus. They examine wage levels on the basis of the interview with the relevant unions and employers. Regional councils reach their conclusions after considering the cost of living, the starting salaries, minimum wages agreed upon between individual companies and their employees, the distribution of workers by wage class, and the number of workers whose wages fall below where a new minimum wage is likely to be set. However, it remains unclear to which factors regional councils give the biggest priority.

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[4] The specific benchmark indexes are as follows:
・ Indexes related to income and consumption: prefectural income per capita, employee earnings, per-month expenditures, the Regional Difference Index of Consumer Prices and the average cost of living
・ Indexes related to salaries: regular salaries, fixed cash payments, the first 20 percentile of fixed cash payment, the starting salaries for senior high school graduates
・ Indexes related to corporate management: shipment value of manufactured products, annual transaction amount, annual sales, annual revenue, annual business income

Moreover, the revised Minimum Wages Act requires that consistency between minimum wages and public assistance level to assure that workers may maintain the minimum standards of wholesome and cultured living.[5] In minimum wage deliberations, it is required to eliminate the gap in prefectures where the minimum wage was lower than the public assistance level when working full-time. The gap, in principle, should be eliminated in two or three years where the increase required in the fiscal year to eliminate the gap would be high.[6]
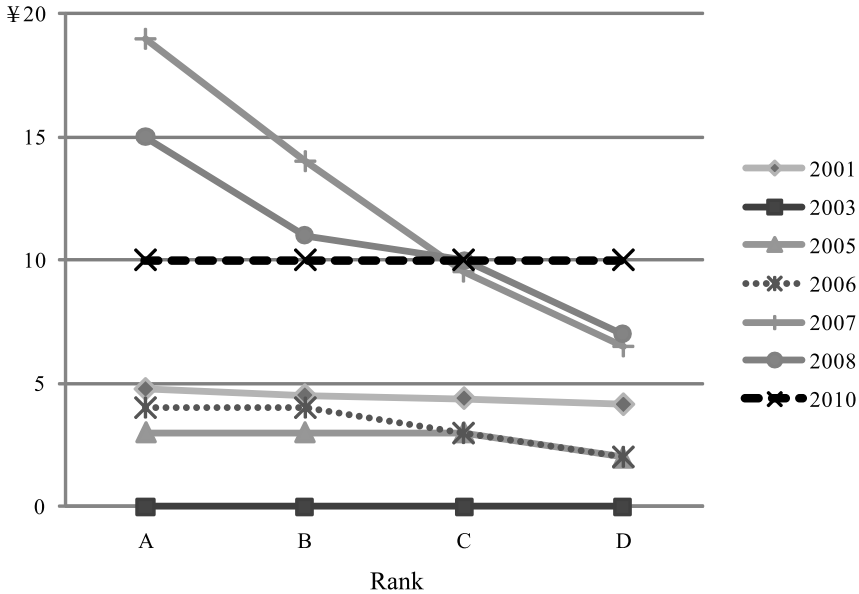
2. Specified Minimum Wages

Specified minimum wages apply to an industry-specific group and a job category-specific group. Currently, only the former group exists. In some cases, the requirement for an industry-specific minimum wage is limited to a specific industry in a specified prefecture, and in other cases, the coverage is nationwide. In both cases, it applies only to workers and employers in the relevant establishments. Specified minimum wages are also divided into "a new system for industry-specific minimum wage" and an "old system for industry-specific minimum wage" (the standard in 1986). Under the new system, an industry-specific minimum wage is set at the petition of workers and employers when it is found to be necessary to set a minimum wage for the primary workers in the relevant industry at a level higher than the regional minimum wage, in order to improve the worker-employer relationships or to enhance fairness of competition in the relevant business sector. Industry-specific minimum wages set under the old system are required to be kept at the same level after fiscal 1999, with each of them to be abolished when eventually exceeded by the regional minimum wage for the relevant prefecture. As of fiscal 2009, the new system was applicable to 247 cases while the old system was applicable to just two cases.

Petitions by workers and employers are of two types. The first type of petition is made when a minimum wage agreed upon between workers and employers covers more than half of the primary workers in the relevant industry and when all parties to the agreement agree to the petition. The other type of petition is made when a universal minimum wage for all workers in the same type of job is needed to promote fair business competition. These petitions are made by a person who represents all or a portion of workers and employers to whom the industry-specific minimum wage applies.

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[5] The public assistance level compared with the minimum wage are those provided to single persons aged 12 to 19 in accordance with the standard set by the government.

[6] The election manifesto of the Democratic Party of Japan, which is the current ruling party, sets the goal of increasing the national average minimum wage to ¥1,000 per hour. As the first step toward achieving this goal, the DPJ is aiming to raise the national average to ¥800 per hour. In a special allocation under the fiscal 2011 budget, the government plans to provide cash incentives to companies planning wage increases so as to support small and medium-sized companies (Nikkei Newspaper, December 22, 2010).

Source: On the Guideline Increase in Regional Minimum Wages (recommendation report).
Note: Figures for 2002, 2004 and 2009 are not indicated, since no specific guideline increases were proposed.

Figure 1. Changes in the Guideline Increase

III. Analysis of the Determinants of the Guideline Increases

This section analyzes the determinants of the guideline increases from 2001 to 2010. Figure 1 shows the changes in these amounts. The guideline increases for 2002, 2004 and 2009 are excluded, because no specific guideline increases were proposed in those years. A zero increase was recommended for all ranks in 2003. This figure shows that a particularly large increase was recommended for Rank A in 2007 and 2008.

1. The Determinants of the Guideline Increases

Factors considered as the determinants of the guideline increases in regional minimum wages are: the rate of increase in the average cost of living; the wage growth rate; the rate of increase in manufacturers' gross value added per employee as a substitute for the wage-paying capacity of ordinary business; the ratio of workers whose wages will be below the revised minimum wage (impact ratio); and the ratio of workers whose wages are lower than the minimum wage before its revision (shortfall ratio).[7] It may be assumed that the

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[7] It is assumed that the "wage-paying capacity of an ordinary business" as referred to in Article 9 of the Minimum Wages Act is not the paying capacity of specific companies but the paying capacity

rate of increase in the average cost of living, the wage growth rate, and the wage-paying capacity of ordinary business all positively affect the guideline increases.

The active job openings-to-applicants ratio is considered as a macroeconomic index because a higher active job openings-to-applicants ratio suggests better economic conditions, which presumably portend larger guideline increases.

Next, as with Cox and Oaxaca (1982), we examine the impact of the unionization rate on the guideline increases. At the central council, workers are represented by union officials, and in most cases, union officials elected as representatives receive wages well above the minimum wage level. This suggests the possibility that those union officials may respect the intent of their own unions in their approach to minimum wage increases, rather than the wishes of non-unionized low-wage workers. Hara and Kawaguchi (2008) found that unionized workers earn higher wages than non-unionized workers and Tachibanaki and Urakawa (2006) showed that the wages earned by unionized members are unlikely to be near the minimum wage level. In light of these findings, the unionization rate is presumed to positively affect the guideline increases.

To capture the macro shocks, we use the 2007 and 2008 year dummies. In 2007 and 2008, public interest of the central council stated that they paid special consideration to the debate on minimum wage increases conducted by the Roundtable to Promote Strategy to Enhance Growth Potential (reports by the central council's subcommittee on the guideline increases, 2007 and 2008). As shown in Figure 1, it is possible that the guideline increases in those years were determined in a manner differing from other years. That may be why the guideline increases in those years were higher than those in other years.

2. Estimation Results

We estimate the following equation:

$$guideline_{it} = \alpha_0 + \alpha_1 living\_cost_{it-1} + \alpha_2 wage\_inc_{it} + \alpha_3 \, val\_add_{it-1} + \alpha_4 \, impact_{it}$$
$$+ \alpha_5 shortfall_{it} + \alpha_6 job\_a_{it-1} + \alpha_7 union_{it-1} + yr07\_08 \, \alpha_8 + u_{it}$$

The elements of this equation are as follows:

"guideline": the guideline increase

"living_cost": the rate of increase in the average cost of living

"wage_inc": the wage growth rate

"val_add": the rate of increase in manufacturers' gross value added per employee

"impact": the impact ratio

"shortfall": the shortfall ratio

"union": the unionization rate

"job_a": the active job openings-to-applicants ratio.

"yr07_08": year dummies, with the variable for 2007 represented by "1" and those for

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that companies in general are expected to have (a research report by the Study Group on the Wage System [*Chingin-seido no arikata ni kansuru kenkyu-kai*], March 31, 2005).

other years by "0," and the variable for 2008 represented by "1" and those for other years by "0"

"u": error term

"i": rank of regions and

"t": the year when the guideline increase was set

The sample period is from 2001 to 2010 and the sample regions are those classified into Ranks A, B, C, and D. Since the rate of increase in the average cost of living, the rate of increase in manufacturers' gross value added per employee, the unionization rate, and the active job openings-to-applicants ratio are the data compiled on a prefecture-by-prefecture basis, we calculate the averages of these data for each rank and each year after weight-averaging them according to either the population size or the number of employees. The wage growth rate, the impact ratio, and the shortfall ratio in year "t" are used, since the central council refer to the data of year "t." As for other explanatory variables, the data used are those for the year "t-1," since the guideline increases are determined in light of the previous year's data for those variables.

Regarding the guideline increases, we must consider two points. First, the guideline increases in 2002, 2004 and 2009 were not proposed for all ranks, so the guideline increases in those years are set to zero. Second, for regions where the minimum wage level is below the public assistance level, the gap of the minimum wage against the public assistance level is indicated in place of the guideline increase. Since the calculation of this gap is not based on deliberations by the central council, we do not analyze the gap.

The average cost of living used in our analysis is the figure for people aged around 18 in single persons that are indicated in the reference materials. For wages, we selected the wage growth rate indicated in the Survey of Wage Revisions from among the wage data available. This is because this survey is intended for use in determining the guideline increases. In particular, the central council's subcommittee on the guideline increases stated its "willingness to respect the Survey of Wage Revisions."

The impact ratio and the shortfall ratio are indicated in the Basic Survey on Minimum Wages by year and rank. The unionization rate is calculated by dividing the number of union members by the total number of employees. Table 1 shows the descriptive statistics. For the sources of the data, refer to the Supplement.

Column (1) of Table 2 reports the results obtained through the estimation using the rate of increase in the average cost of living, the wage growth rate, the rate of increase in manufacturers' gross value added per employee, the impact ratio and the shortfall ratio as explanatory variables. The coefficient of the rate of increase in the average cost of living is negative and insignificant due to the large standard error.[8] The coefficient of the wage growth rate is positive, and significant at the 1% level, which means that the higher the

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[8] Hereinafter, we use the words "insignificant" and "significant" to denote a statistical test at the 5 percent level.

Table 1. Descriptive Statistics

	Mean	Std. dev.	Min	Max
Guideline increase	4.344	5.025	0	19
Rate of increase in the average cost of living	0.013	0.107	-0.230	0.264
Rate of wage growth (%)	0.223	0.395	-0.300	1
Rate of increase in manufactures' gross vaule added per employee	-0.001	0.069	-0.148	0.251
Impact ratio	2.108	0.711	1	3.700
Shortfall ratio	1.565	0.553	0.600	3
Active job openings-to-applicants ratio	0.640	0.252	0.325	1.226
Unionization rate	0.242	0.039	0.188	0.321

Note: The number of observations is 40.

Table 2. Determinants of the Guideline Increases

Dependent variable:the guideline increase

	OLS		
	(1)	(2)	(3)
Rate of increase in the average cost of living	-1.056	4.590	31.171 **
	(6.067)	(6.525)	(9.059)
Rate of wage growth	9.086 **	7.702 **	3.538 **
	(1.158)	(1.381)	(1.223)
Rate of increase in manufacturers' gross value added per employee	-22.048	-23.292	-9.106
	(20.448)	(18.781)	(13.391)
Impact ratio	0.811	0.263	-0.881
	(0.912)	(1.112)	(0.751)
Shortfall ratio	-1.796	-0.177	2.250 *
	(1.189)	(1.622)	(1.092)
Active job openings-to-applicants ratio		6.805	5.375
		(4.206)	(2.860)
Unionization rate		-9.109	7.330
		(11.582)	(8.202)
2007 dummy			14.187 **
			(3.491)
2008 dummy			7.346 **
			(1.378)
Constant	3.419	0.237	-5.981
	(1.922)	(6.397)	(4.958)
R-squared	0.47	0.52	0.79

Note: The number of observations is 40.   Robust standard errors are in parentheses. * and ** indicate significant at 5% and of 1%, respectively.

wage growth rate is, the larger the guideline increase will be. While the coefficient of the rate of increase in manufacturers' gross value added per employee is negative and insignificant due to the large standard error. The coefficient of the impact ratio is positive, whereas that of the shortfall ratio is negative. In both cases, the coefficients are insignificant as the standard errors are large.

Column (2) of Table 2 shows the estimation results using the active job openings-to-applicants ratio and the unionization rate as additional variables of explanatory valuables of Column (1). The coefficient of the rate of increase in the average cost of living is positive and insignificant. As for the wage growth rate, we found that a wage growth of one percentage point leads to a rise of approximately ¥8 in the guideline increase. The coefficient of the rate of increase in manufacturers' gross value added per employee is negative and insignificant, as the standard error is large. The coefficient of the impact ratio is positive and that of the shortfall ratio is negative as same in Colum (1), and is insignificant in either case. The coefficient of the active job openings-to-applicants ratio is positive and insignificant. The coefficient of the unionization rate is negative and insignificant, which means the unionization rate has no impact of the guideline increase.

Column (3) of Table 2 shows the estimation results using 2007 and 2008 dummies as additional variables of explanatory valuables of Column (2). The coefficient of the rate of increase in the average cost of living is positive and significant. The coefficient of the wage growth rate is also positive and significant, with a wage increase of one percentage point leading to an increase of approximately ¥4 in the guideline increase. The coefficient of the rate of increase in manufacturers' gross value added per employee is negative and insignificant. The coefficient of the impact ratio is also negative and insignificant, whereas that of the shortfall ratio is positive and significant. The coefficients of the active job openings-to-applicants ratio and unionization rate are positive and insignificant. The coefficients of both of the 2007 dummy and the 2008 dummy are positive and significant. This suggests that the guideline increase was set at a high level in those years compared with other years once other conditions were controlled.
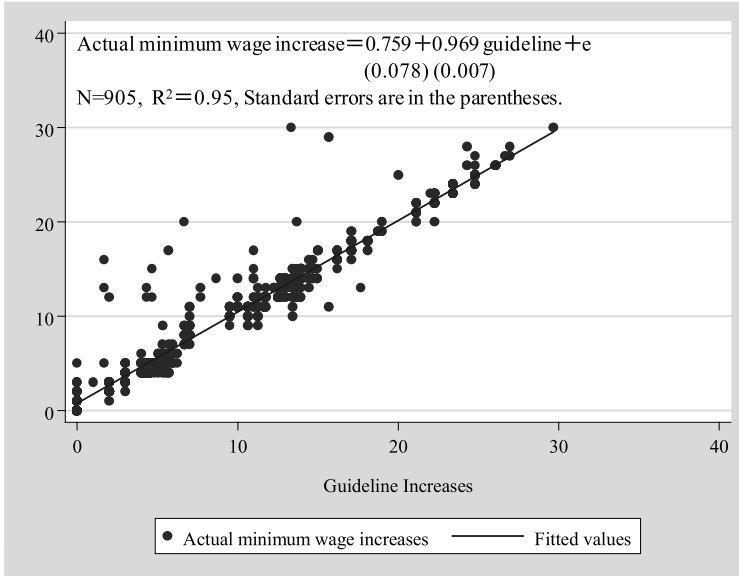
These findings indicate that the guideline increase is positively affected by the wage growth rate as suggested by comments made by the central council's subcommittee on the guideline increases and by public interest. Labor unions do not have a significant impact on the guideline increase, despite having substantial representation at the central council, presumably because the council's guideline increases primarily reflect the opinions of public interest.[9] However, the sign and significance of the coefficients are not robust in the analysis we made in this section. It is possible that multicollinearity arose due to a strong correlation between the explanatory variables, and thus, further analysis using a larger number of observations will be necessary.

IV. Analysis of the Determinants of the Actual Minimum Wage Increases

In this section, we analyze the determinants of the actual minimum wage increases. How much importance do the regional councils attach to the guideline increases? Other than

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[9] When we made our analysis using the rate of increase in the shipment value of manufactured products in order to check robustness, our finding was almost the same.

The figure shows a scatter plot with the following annotation inside:

Actual minimum wage increase＝0.759＋0.969 guideline＋e
(0.078) (0.007)
N=905, R^2＝0.95, Standard errors are in the parentheses.

Axis labels: Guideline Increases (x-axis). Legend: ● Actual minimum wage increases —— Fitted values

Source: Directory of Minimum Wage Decisions (Each year).

Figure 2. The Guideline Increases and the Actual Minimum Wage Increase

the guideline increases, to which factors do regional councils pay attention when determining the actual increases?

Figure 2 indicates the relationship between the guideline increases and the actual minimum wage increases, and it shows that the former does not exactly match the latter. When the guideline increase is regressed on the actual increase, the coefficient comes to 0.969. The null hypothesis that the coefficient is 1 is rejected. (F-value = 22.47, P-Value = 0.000).

1. The Determinants of Actual Minimum Wage Increases

Regional councils supposedly determine the actual minimum wage increases after considering to the guideline increase. This means that the coefficient of a guideline increase would be 1 in cases when regional councils comply with the guideline increase. In cases where regional councils do not pay much attention to a guideline increase, either the coefficient of the guideline increase would be a value other than 1, or insignificant.

We use as variables the rate of increase in the average cost of living, the wage growth rate and the rate of increase in the value of manufactures' gross value added per employee as a substitute benchmark for the wage-paying capacity. We may assume that the higher rate of increase in the average cost of living leads to the larger actual minimum wage increase. We use the wage growth rate for female part-time workers and the rates of increase in the starting salary for male and female senior high school graduates. We may assume that the

higher these rates are, the larger the actual minimum wage increase will be. The rate of increase in the value of manufacturers' gross value added per employee is also assumed to have a positive impact on the actual minimum wage increase.

The actual minimum wage increase is presumably affected by the economic conditions in the relevant prefecture. Therefore, we also use as explanatory variables the Regional Difference Index of Consumer Prices (Tokyo's 23 wards = 100), the results of spring wage increase negotiations (the ratio of companies that increased wages in the spring), the active job openings-to-applicants ratio, and per-capita income of the relevant prefecture. All these variables assumed to be positively affected by the economic conditions of the prefecture and, consequently, to the actual minimum wage increase.

As the central council, the regional councils also include union representatives, we may assume that, like the guideline increases, the actual increases may be positively affected by the unionization rate. To capture the macro shocks that cannot be explained by the explanatory variables above, we also use year dummies.

2. Estimation Results

We estimate the following equation:

$$actual_{jt} = \beta_0 + \beta_1 guideline_{jt} + \beta_2 living\_cost_{jt-1} + wage\_inc_{jt-1}\beta_3 + \beta_4 val\_add_{jt-1}$$
$$+ \beta_5 union_{jt-1} + economics_{jt-1}\beta_6 + year\beta_7 + c_j + e_{jt}$$

The elements of this equation are as follows:

"actual": the actual minimum wage increase

"guideline": the guideline increase

"living_cost": the rate of increase in the average cost of living

"wage_inc": the vector of the wage growth rate variables

" val_add": the rate of increase in manufacturers' gross value added per employee

"union": the unionization rate

"economics": the vector of economic variables

"year" for the vector of the year dummies

"c": the time-invariant prefectural fixed effect

"e" : the idiosyncratic error term

"j": the prefecture and

"t": the year when the actual increase is set

This section focuses on the fixed-effects model, which considers time-invariant prefectural effects.

The sample period is from 1993 to 2009 and the sample regions are Japan's 47 prefectures. The actual minimum wage increase used in the model is calculated by subtracting the minimum wage level in the year "t-1" from the minimum wage level in the year "t." For prefectures where the minimum wage level may be lower than the public assistance level,

we use the gap between the guideline increase and the public assistance level divided by 3 as a proxy variable for the guideline increases.[10]

The Osaka prefectural government ceased to disclose data on the average cost of living in 1996, but the Osaka city government began disclosing such data in 1999. Accordingly, in our analysis we used data disclosed by the Osaka prefectural government for the period up until 1996, and data disclosed by the Osaka city government from 1999 onward. Meanwhile, the Hyogo prefectural government did not disclose the average-cost-of living data in 1995, because the Hanshin-Awaji Earthquake struck the region. As a result, our analysis does not cover data for Osaka Prefecture in 1996 and 1997 or data for Hyogo Prefecture in 1995. Thus, the number of observations comes to 794.

The wage growth rate for female part-time workers is calculated on the basis of regular hourly pay for such workers at private establishment with 10 to 99 employees. The Regional Difference Index of Consumer Prices (relative regional consumer price index, hereafter) is calculated with the figure for Tokyo's 23 wards used as the base of 100. The results of spring wage negotiations are represented by those small- and medium-sized companies, namely companies with a workforce of up to 299 employees. For the sources of data, refer to the Supplement. Table 3 shows the descriptive statistics. The minimum actual minimum wage increase was zero implying that the minimum wage was not increased in some years.

Columns (1) and (2) of Table 4 report the estimation results of the pooled OLS. In Column (1), the coefficient of the guideline increase is 0.992 and significant. The null hypothesis that the coefficient of the guideline increase is 1 is not rejected (F-value = 0.13, P-value = 0.72). We found that the actual minimum wage increase is not affected by either of the rate of increase in the average cost of living, the wage-paying capacity, or the wage growth rate, all of which are supposed to be used as a reference in setting the minimum wage level. The coefficient of the rate of increase in the value of manufacturers' gross value added per employee is also positive and insignificant.

The coefficient of the rate of increase in the relative regional consumer price index is negative and insignificant. The coefficient of the status of spring wage negotiations is negative, which indicates that the higher the ratio of small- and medium-sized companies that have increased wages in spring is, the lesser the actual the minimum wage increase will be. The coefficient of the active job openings-to-applicants ratio is positive, indicating that the better the economic conditions are, the larger the actual minimum wage increase will be. The coefficient of the rate of increase in prefectural income per capita is positive and significant. The coefficient of the unionization rate is negative and significant.

Column (2) of Table 4 reports the estimation results using year dummies as additional variables in order to capture the impact of nationwide shocks. Although the coefficient of

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[10] As the guideline increase for each rank was expressed as daily wages until 2001 and has been expressed as hourly wages since 2002, we converted daily wages for 2001 and earlier into hourly wage terms on the assumption of eight regular working hours per day.

Table 3. Descriptive Statistics

	Mean	Std. dev.	Min	Max
Actual minimum wage increase	7.713	5.738	0	30
Guideline increase	7.326	5.824	0	29.667
Rate of increase in the average cost of living	0.007	0.129	-0.465	0.559
Wage growth rate for female part-time workers	0.019	0.057	-0.195	0.286
Rate of increase in starting salary for male senior high school graduates	0.009	0.028	-0.111	0.127
Rate of increase in starting salary for female senior high school graduates	0.010	0.036	-0.246	0.329
Rate of increase in manufacturers' gross value added per employee	0.017	0.060	-0.285	0.684
Rate of increase in the relative regional consumer price index (Tokyo's 23 wards = 100)	0.002	0.008	-0.025	0.037
Status of spring wage negotiations	2.140	1.070	0.740	5.300
Active job openings-to-applicants ratio	0.677	0.304	0.150	1.970
Rate of increase in the prefectural income per capita	0.008	0.044	-0.213	0.473
Unionization rate	0.263	0.048	0.140	0.417

Note: The number of observations is 794.

Table 4. Determinants of the Actual Minimum Wage Increases

Dependent variable: the actual minimum wage increase

	Pooled OLS		FE	
	(1)	(2)	(3)	(4)
Guideline increase	0.992 **	0.969 **	0.981 **	0.948 **
	(0.021)	(0.058)	(0.019)	(0.059)
Rate of increase in the average cost of living	-0.016	-0.047	0.079	-0.073
	(0.257)	(0.184)	(0.248)	(0.184)
Wage growth rate for female part-time workers (hourly wages)	0.768	0.551	0.531	0.621
	(0.699)	(0.641)	(0.671)	(0.643)
Rate of increase in starting salary for male senior high school graduates	0.970	-1.131	0.584	-0.987
	(0.793)	(0.764)	(0.775)	(0.754)
Rate of increase in starting salary for female senior high school graduates	0.354	0.458	0.098	0.676
	(0.802)	(0.801)	(0.775)	(0.746)
Rate of increase in manufacturers' in gross value added per employee	0.176	0.960	0.510	1.099
	(0.858)	(0.669)	(0.798)	(0.640)
Rate of increase in the relative regional consumer price index (Tokyo's 23 wards = 100)	-2.930	-1.755	-0.603	-1.713
	(2.835)	(4.485)	(2.699)	(4.269)
Status of spring wage negotiations	-0.210 *	0.340	-0.058	0.162
	(0.095)	(0.236)	(0.061)	(0.203)
Active job openings-to-applicants ratio	0.685 **	0.069	1.070 **	0.611 *
	(0.162)	(0.194)	(0.229)	(0.264)
Rate of increase in the prefectural income per capita	2.438 **	-0.022	0.964	-0.308
	(0.805)	(0.615)	(0.788)	(0.766)
Unionization rate	-5.030 **	-0.341	-9.552 **	0.428
	(1.189)	(1.098)	(2.128)	(2.238)
Constant	1.707 **	-0.987	2.406 **	-0.629
	(0.350)	(0.870)	(0.573)	(0.928)
Year dummies	No	Yes	No	Yes
R-squared	0.97	0.98	0.98	0.98

Note: The number of observations is 794. Robust standard errors are in parentheses. * and ** indicate significant at 5% and of 1%, respectively.

the guideline increase is statistically significant, its size, 0.969, is smaller than the coefficient of the guideline increase in Column (1). The null hypothesis that the coefficient of the guideline increase is 1 is not rejected (F-value = 0.28, P-value = 0.60). Coefficients of all variables other than the guideline increase are insignificant.

Columns (3) and (4) of Table 4 show the estimation results of the fixed-effects model to take account of time-invariant prefectural fixed effects, such as a propensity toward a relatively large minimum wage increase. In Column (3), which does not use year dummy variables, the coefficient of the guideline increase is 0.981 and significant. The null hypothesis that the coefficient of the guideline increase is 1 is not rejected (F-value = 0.97, P-value = 0.33). The coefficients of the rate of increase in the value of manufacturers' gross value added per employee and the rate of increase in the average cost of living are positive and insignificant. The coefficients of the wage growth rate for female part-time workers and the rate of increase in the starting salary for male and female senior high school graduates are positive, their sizes are smaller than the comparable coefficients in Column (1), and are insignificant in either case. The coefficient of the relative regional consumer price index is negative and insignificant. The coefficient of the status of spring wage negotiations is negative and insignificant. The coefficient of the active job openings-to-applicants ratio is positive and significant. While the coefficient of the rate of increase in per-capita income of the prefecture is positive, its size is too small so the coefficient is insignificant. The coefficient of the unionization rate is negative and significant.

Column (4) of Table 4 represents the estimation results using year dummies as additional variables. The coefficient of the guideline increase is positive, its size, 0.948, is smaller than the comparable coefficient in Column (3). The null hypothesis that the coefficient of the guideline increase is 1 is not rejected (F-value = 0.80, P-value = 0.37). Unlike the result that is not included year dummies, the coefficient of the rate of increase in the average cost of living is negative and insignificant. The coefficients of the wage growth rate for female part-time workers and the rate of increase in the starting salary for female senior high school graduates are positive and insignificant. The coefficient of the rate of increase in the starting salary for male senior high school graduates is negative and insignificant, although the size of the coefficient is larger than when year dummies are not included in the estimated model. The coefficient of the rate of increase in the value of manufacturers' gross value added per employee is positive and insignificant. As for variables related to economic conditions, only the coefficient of the active job openings-to-applicants ratio is positive, and its size is large enough to indicate significance. As for the variables of other economic conditions, the coefficient of the relative regional consumer price index is negative and insignificant, while the coefficient of the index that represents the status of spring wage negotiations is positive, but the size of the coefficients is too small to indicate statistical significance. The coefficient of the rate of increase in prefectural income per capita is negative and insignificant. The coefficient of the unionization rate is positive and insignificant.

The above analysis shows that the actual minimum wage increase is affected by the

guideline increase, with an increase of ¥1 in the guideline increase corresponding approximately to a ¥1 actual increase. It also indicates that the active job openings-to-applicants ratio positively affects the actual minimum wage increase. Other variables, notably the rate of increase in the average cost of living, the rate of increase in manufacturers' gross value added per employee, and the wage growth rate have little impact on the actual minimum wage increase. The analysis also suggests that the actual minimum wage increase is not affected by the unionization rate. This finding indicates that, as with the guideline increase, opinions of workers' representatives are not necessarily reflected in the outcome of minimum wage deliberations.[11]

V. Conclusion

This paper has overviewed the Japan's minimum wage system and analyzed the determinants of the guideline increase (*meyasu-gaku*) and actual increases in regional minimum wages. Our analysis found that the guideline increase is positively affected by the wage growth rate indicated in the Survey of Wage Revision. Comments by public interest at meetings of the Central Minimum Wage Council have suggested that importance is placed on the wage growth rate in the determination of the guideline increases, and our empirical analysis also support the hypothesis that the guideline increases are positively affected by the wage growth rate.

On the other hand, the results indicated that the guideline increases are not affected by either the rate of increase in the cost of living, the wage-paying capacity, or the active job openings-to-applicants ratio. We also examined the possible impact of unionization rate on the guideline increases and found that there is no effect in light of the possibility that deliberations by the central council reflect the will of unions, which is mostly organized by higher-wage workers, rather than those of low-wage workers.

Our analysis indicated that the actual minimum wage increases are set at a level close to the guideline increases. However, we found that the actual minimum wage increase is not affected by some of the indexes supposed to be used as a reference, such as the rates of increase in the average cost of living and in the starting salary for senior high school graduates. We found that the actual minimum wage increase is not affected by the unionization rate.

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[11] In light of the fact that zero is the threshold for the actual minimum wage increase, which is the dependent variable, we estimate Tobit model to validate our analysis. We found little change in the coefficient sign and the significance level.

Supplement

Data Sources Used in This Article

Guideline increase	*On the Guideline Increase in Regional Minimum Wages* (recommendation report)
Minimum wage level	*Regional Hourly Minimum Wages* (recommendation report)
Changes in the average cost of living in each prefecture (each prefectural capital) (for people aged around 18 in one-person households)	*Report and Recommendation on Salaries for Employees*
Wage growth rate	*Survey of Wage Revisions*
Number of unionized workers	*Basic Survey on Labor Unions*
Number of employees	*Monthly Labour Survey*
Gross value added in manufacturing industry in each prefecture	Census of Manufactures
Number of employees engaged in manufacturing industry in each prefecture	Census of Manufactures
Impact ratio	*Basic Survey on Minimum Wages*
Shortfall ratio	*Basic Survey on Minimum Wages*
Hourly regular wages for female part-time workers (at companies employing 10 to 99 workers)	*Basic Survey on Wage Structure*
Starting salary for new graduates (male senior high school graduates)	*Basic Survey on Wage Structure*
Starting salary for new graduates (female senior high school graduates)	*Basic Survey on Wage Structure*
Status of spring wage negotiations in each prefecture (at companies employing up to 299 workers)	Labour Union Division, Labour Bureau, Ministry of Labor; Office of Counsellor in charge of labor relations, Ministry of Health, Labour and Welfare
Relative regional consumer price index for each prefecture (for each prefectural capital) (Tokyo's 23 wards = 100)	*Consumer Price Index*
Active job openings-to-applicants ratio in each prefecture (excl. part-timers)	*Employment referral statistics*
Prefectural income per capita	*Prefectural Accounts*

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