

The guideline system of the Japanese minimum wage law and the regional economy
– Does it have a statistical validity? –

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Abstract: The Japanese minimum wage system adopts the guidelines system. Under this system all prefectures are classified into several groups, with considering the regional social and economic conditions. A standard of the rise of minimum wage width is also shown for each group, and the minimum wage of the prefecture is determined by referring the standard. Therefore, in which group each prefecture is ranked has an important economic and political implication, because it determines the regional minimum wage indirectly. In this paper, by adapting the more analytical and statistical technique than the method the current guideline depends on, we examine the validity of the current ranking system. It was shown that, under the guideline system, some prefectures are ranked more higher or lower than the real economic condition suggests. Furthermore, its influence on regional economy depends strongly on a skewness of the wage-income distribution.

JEL classification: J31, J81, J82, R10

Keywords: minimum wage, guideline system, wage income distribution

The guideline system of the Japanese minimum wage law and regional economy – Does it have a statistical validity? –

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1. Introduction

This paper is intended to examine the rationality of the guidelines system used in minimum wage system in Japan. According to the Minimum Wage Law, two kinds of minimum wages are introduced. One is the “regional minimum wage” which must be determined for all prefectures compulsorily and applied principally all workers in the region. The other is the “special minimum wage” applied to workers in the particular industry. It is set occasionally when the regional minimum wage is too low to induce workers into that industry. For example, in Nagasaki, the special minimum wages are applied to the workers in shipbuilding, electronic device and general-purpose machine respectively.

If we understand the wage as the reward of the labor supply, the wage must basically be determined through the labor market equilibrium. Then in the setting the minimum wage, many social aspects that affects the demand for and supply of labor must be reflected. Therefore it seems to be natural that wage of the booming industry or of the high skilled worker is higher than the declining industry and low-skilled workers. In other words, the difference among workers, industries and prefectures is natural and simple consequences of the labor market equilibrium.

On the other hand, in Japan, work is the one of the constitutional obligation of the citizen, and the citizen has the constitutional right to enjoy “the minimum standards of wholesome and cultured living”. From this point of view, the minimum wage must be enough to keep the minimum standard of the modernized society.

Because the two minimum wages are practically determined through the negotiation between workers and the management, it is not easy to keep the consistency between the contradicting interests of both parties. Then to avoid the long-lasting negotiation, in Japan, prior to the determination of the regional minimum wage, the desirable and attainable level of the minimum wage are shown by the central committee, then the regional minimum wage is negotiated by referring this guideline, together with considering the local regional economic situation. In this sense the guideline works as the kind of anchor around which the wages are directed to eliminate the extreme difference between the local wage levels. We call this series of

¹ This paper is the revised version of Fukaura(2013). I am particularly grateful for the useful comments and suggestions by the anonymous referee. The statistical data for this study were provided by the Nagasaki Labor Bureau. I would like to express my gratitude to the Bureau too.

procedure as the guideline-system (Meyasu-system in Japanese).

Under the guideline-system, all prefectures are divided into several groups (ranks) according to the economic environment, and the possible rise width of minimum wage is given for each rank, for example, 5 yen for a top rank, 4 yen for a second rank etc. The prefectural minimum wage is affected by a possible rise width. Then if ranking cannot reflect the economic situation, it is impossible to set the rational prefectural minimum wage.

If ranking is just a reference information (like a reputation of the restaurant), this may not be important. However, sometimes the difference of the possible rise varies over dozens of yen. Because the regional minimum wage is strongly influenced by this value, it is extremely important to which rank each prefecture belongs. In addition, workers and the management sometimes are inclined to agree at the very close level to the guidelines, and then the actual economic situation is often misevaluated.

Based on such a consideration, we attempt to establish a method to examine the validity of the guideline system. Our main concern is whether the guideline reflects exactly the economic disparity of areas and the local situation. As the results of our analysis, we found that a technique now used for ranking does not lead an extreme deflection. However, as for the middle ranked prefecture, a room for improvement was revealed. Furthermore, in such a middle ranked prefectures, it was clarified that the change of minimum wage would cause an opposite effect.

The remainder of this article is organized in the following way. In the next section, we briefly outline the current guidelines system. Then, two multivariate analyses are employed to rank the prefectures and the resulting ranking is compared with the current ranking of the guideline system. Finally, we consider about the effect that the change of minimum wage brings. Some concluding remarks are given in the last section.

II. Guideline System²

Under the Japanese Minimum Wage Law, three different factors are included in the determination of the minimum wage, such as, ability to pay of the normal business firm, cost of living, actual wage level³.

On one side, these factors must be based on a consideration that the wage are substantial “to maintain the minimum standards of wholesome and cultured living”, because the

² For the understanding of the minimum wage system in Japan, see Ohashi (2009).

³ Article 1 of Labor Standard Act states “working conditions shall be those which should meet the needs of workers who lives worthy of human beings, “and “the standards for working conditions fixed by this Act are minimum standards”. On the other hand, wage in the American federal law completely different from Japanese official regulations. First, Fourteen amendment to the United States Constitution protects the “freedom of contract”, where an employer and an employee can determine a wage without the interference of the state. Although some precedents invalidated the Minimum Wage Law, in 1928, a minimum wage was introduced by Wage Hour Law. However, there are many exemptions then it is not applied to the individual, small business where we can find many problems about wage. In this sense, in the US, wage is a pure business issue, not a social issue like Japan.

constitutional right is superior to the minimum wage law. This means we must consider both of the economical rationality (ability to pay) and social characters of the prefectures (cost of living) simultaneously. The latter is deeply related to the national and local minimum of standard of life. If so, we have to take into account the living environment, a lifestyle and consumption custom. For example, it is conceivable that the life in the prefectures equipped with highly modernized public transport is more convenient and that lower cost of living very much. In such a prefecture, the wage level may be higher than it looks.

Moreover, an average wage level of the prefectures depends significantly on industrial structure of the region. For instance, a wage of the prefectures specializing service industry relates mainly to the domestic demand, so its economic structure and average wage differs from prefectures depending on export-centered manufacturing industry. If the economy tracks the Petty–Clark growth pass, the wage of the former may be higher than the latter. These, in turn, affect the ability to pay of the business firm in the area. It can be said that classifying the prefectures into the groups is a practical way in order to reflect such circumstances, from the view point of the whole national economy.

The guideline system was introduced in 1978. Looking back, the economic disparity between the areas was outstanding during the mid of 1970's. In addition, two oil crises in 1970's have drastically changed Japanese economic structure and terminated the high growth era. People began to recognize the policy aim was not only to achieve a national uniformity (so-called “balanced-development strategy”), but also to consider the local peculiar characters⁴. Then, the government established the principle that wage level should reflect the regional economic situation and contribute the improvement of the national income. Under such a background, a simultaneous consideration of national minimum and regional peculiar characters has gradually spread out⁵. In order to concrete this principle and achieve the “nationwide consistency of the minimum wage” (Ministry of Health, Labor and Welfare (2012a, 2012c), the guideline system was introduced.

The guidelines system is carried out as follows. To begin with, the central committee for minimum wage (*cyuo-saitei-tingin-shingikai*, Tokyo) announces the possible rise width of minimum wage. This functions as a kind of aim of prefectural minimum wage, and is named as “*meyasu*” (referenced standard). This standard is set for each ranking (A, B, C, and D in 2012). Although “*meyasu* shows the standard as reference of the deliberation of the council for local minimum wage” (MHLW (2012a, 2012c)), the prefectural committee (*Chihou-saitei-tingin-shingikai*) is not banned to determine the different minimum wage from the *meyasu*⁶.

For the decades, the guideline divides 47 prefectures into several ranks (A, B, C, D in 2012),

⁴ In many universities, new subjects or courses for analyzing the regional economy were introduced in 1980's.

⁵ Of course, the difference in minimum wage between the prefectures existed from the past. In this sense, the guidelines system (or its ranking system) is sometimes criticized because it made a wage-gap among the prefectures fixed.

⁶ *Cyuo-saitei-tingin-shingikai* and *Chihou-saitei-tingin-shingikai* are formed by the representatives of workers, the management and the public interests.

by using 20 variables, including a scheduled monthly earnings, the total value of a shipment per capita, and so on. The calculation is a series of a rudimentary arithmetical computation. Take three prefectures (1,2,3) and two variables(X, Y) for instance. At first, the mean of X,Y from 2005 through 2010 are derived for the 2012 grouping,

$$X^1_M = 1/6 (X^1_{2005} + X^1_{2006} + X^1_{2007} + X^1_{2008} + X^1_{2009} + X^1_{2010})$$

$$X^2_M = 1/6 (X^2_{2005} + X^2_{2006} + X^2_{2007} + X^2_{2008} + X^2_{2009} + X^2_{2010})$$

$$X^3_M = 1/6 (X^3_{2005} + X^3_{2006} + X^3_{2007} + X^3_{2008} + X^3_{2009} + X^3_{2010})$$

$$Y^1_M = 1/6 (Y^1_{2005} + Y^1_{2006} + Y^1_{2007} + Y^1_{2008} + Y^1_{2009} + Y^1_{2010})$$

$$Y^2_M = 1/6 (Y^2_{2005} + Y^2_{2006} + Y^2_{2007} + Y^2_{2008} + Y^2_{2009} + Y^2_{2010})$$

$$Y^3_M = 1/6 (Y^3_{2005} + Y^3_{2006} + Y^3_{2007} + Y^3_{2008} + Y^3_{2009} + Y^3_{2010})$$

then, each mean was indexed by setting maximum mean as 100. If $X^1_M > X^2_M > X^3_M$, we set X^1_M as 100. X^2_M , X^3_M are indexed according to the value of X^2_M / X^1_M and X^3_M / X^1_M , which show the relative value of X of each prefecture. Same indexation is given about Y. As the results we have,

$$X^1_{index} = (X^1_M / X^1_M) \times 100, X^2_{index} = (X^2_M / X^1_M) \times 100, X^3_{index} = (X^3_M / X^1_M) \times 100,$$

$$Y^1_{index} = (Y^1_M / Y^1_M) \times 100, Y^2_{index} = (Y^2_M / Y^1_M) \times 100, Y^3_{index} = (Y^3_M / Y^1_M) \times 100,$$

Finally, the simple average of these indexes was calculated to give the particular value of each prefecture as follows.

$$V^1 = 1/2(X^1_{index} + Y^1_{index}), V^2 = 1/2(X^2_{index} + Y^2_{index}), V^3 = 1/2(X^3_{index} + Y^3_{index}),$$

These values are again indexed by setting the maximum as 100. If V^1 is the maximum,

$$V^1_{index} = (V^1_M / V^1_M) \times 100, V^2_{index} = (V^2_M / V^1_M) \times 100, V^3_{index} = (V^3_M / V^1_M) \times 100,$$

are derived. Normally, Tokyo's index value is the largest, and then this procedure teaches us the relative position of each prefecture's economy to Tokyo.

The results for 2012 are presented in Table 1. All prefectures are indexed by a single value from 0 to 100 and divided into 4 ranks, where the possible rise widths of minimum wage in 2012 are also given⁷. If we apply the method like this, we can expect that the prefectures with highly active economic performance are classified in the higher rank (A and B), and it is natural that the prefectures which are not so are included in C, D rank. At a glance, actually, highest rank includes Tokyo, Kanagawa, Osaka, and Aichi, all of which are the leading area. On the other hand, the economic performance of the prefectures in D rank is not so active.

⁷ The criteria to divide the prefectures is unknown, however, from Table 1, we can infer that around 85, around 80, around 75 seems to be the boarders.

prefectures	index	rank	possible rise width(2012)	prefectures	index	rank	possible rise width(2012)				
Tokyo	100	A	5	Miyagi	77.3	C	4				
Kanagawa	87.7			Gifu	77.3						
Aichi	86.4			Niigata	77.1						
Osaka	86.1			Hokkaido	77.1						
Chiba	84.6			Fukui	76.9						
Saitama	83.0	B	4	Wakayama	76.6	D	4				
Shizuoka	82.6			Tokushima	76.0						
Mie	81.8			Oita	75.6						
Shiga	81.6			Shimane	75.4						
Tochigi	81.0			Fukushima	74.9						
Hiroshima	80.4			Ehime	74.3						
Toyama	80.4			Tottori	73.9						
Hyogo	80.3			Saga	73.4						
Kyoto	80.2			Yamagata	73.1						
Ibaraki	80.1			Iwate	72.4						
Nagano	80.0			Kochi	72.2						
Okayama	79.6			C	4			Kumamoto	72.2		
Gunma	79.3							Kagoshima	71.8		
Yamaguchi	79.3	Akita	71.1								
Yamanashi	79.2	Aomori	70.5								
Ishikawa	78.8	Miyazaki	69.7								
Kagawa	78.8	Nagasaki	69.6								
Nara	78.6	Okinawa	65.5								
Fukuoka	78.4										

Table 1 prefectures ranking and possible rise width (2012)

In 2012, the possible rise width of A was 5 yen, and 4 yen for B, C, and D. However, if the different values are given to B, C, D, it brings very serious influence among prefectures. In addition, a careful examination is also necessary when a ranking is changed. Needless to say, the move to upper (lower) rank leads the rise (fall) of minimum wage standard, generally. If the ranking method is unreliable, it causes the unnecessary (or irrational) conflict of interest between labor and management. From this, it can be emphasized that we have to apply the rational ranking method, in order to avoid the unfairness of the wage.

Since 1978, prefectures in A and B have been increased, and prefectures of C and D have been decreased. And the most frequent changes were the transfer from C to B. On the other hand, almost all prefectures in D have kept their position since the start of the guideline, and only Miyagi and Kagawa moved to C in last decade of the Showa era. Top rank has included only

three prefectures of Tokyo, Kanagawa, and Osaka for a long time, but Aichi, Chiba were added in the early Heisei era. Nowadays, five prefectures belong to A rank. From these observations, we can state that the high and low rank layers are relatively fixed, and the middle layer fluctuates often. This confirms the Japanese economy reveals the bipolar structure from the point of view of the wage-structure.

The question we are facing now is: does the ranking-method mentioned above correctly reflect the character of regional economy which is described by the 20 variables?

III. Statistical examination of the ranking

As the first part of this paper has stated, our purpose is to examine the rationality of current ranking, by applying the more scientific method onto the same data set. In order to reflect the character of data more precisely, we employ two kinds of multivariate analysis, i.e., principal component analysis and discriminant analysis.

The central council for minimum wage uses the 20 indexes as mentioned before. However, some of them are the mean value of similar kind of indexes. For example, as the data of amount of sale per employee, a wholesale-trade industry and retail-trade industry are referred individually and, in addition, the mean value of both indexes is included again as an another index. Needless to say, the mean value has the high correlation with the original indexes, so such added indexes have to be excluded from the analysis, in order to remove analytical bias. We can find three more composite indexes to be excluded by the same reason.

Extracting 4 composite variables leaves us only 16 ones, there are (1)prefecture income per capita, (2)wage earnings per capita,(3)the monthly expense per household, (4)consumer prices difference index, (5)cost of living per household(single family), (6)cost of living (four-member family), (7)scheduled monthly earnings per full-time worker, (8)scheduled monthly earnings per part-time worker, (9)the amount of salary of 5 percentile worker, (10)high-school graduate initial salary, (11)medium and small-sized business annual spring wage increase, (12)total value of a shipment (manufacturing industry), (13)total value of a shipment (construction industry), (14)the amount of sales (dealership),(15)the amount of sales (the restaurant) and (16)the amount of sales (other service industries).

The analysis is conducted as follows. We start from applying a principal component analysis in order to derive the principal components. This enables us to understand the character of each prefecture by referring fewer dimensions. With that in mind, the principal component scores for all prefectures are derived, which teaches us some distinguishing features of prefectures. Next, a discriminant analysis is applied to the principal component scores. A discriminant analysis yields the theoretical grouping based on the statistical features of the data directly. We can conclude that the ranking shown in Table 3 (current ranking in 2012) works as the rational reference if our ranking (theoretical discrimination) consistent with the grouping in Table 3. This also means the ranking of Table 3 reflects the economic situation definitely, in the

sense of the statistical accuracy.

III-3 Results of principal component analysis

The principal component loading (PCL) is given in Table 2⁸. The first principal component has a positive correlation with all variables and it particularly highly correlates with (7) scheduled monthly earnings per full-time worker, (1) prefecture income per capita, (2) wage earnings per capita income. They are the variables which relate to the general conditions of wage and employment of the region. On the other hand, the variables indicating the industrial performance ((12) ~ (16)) are related to the business conditions and the payment ability of the industry/firms. From these considerations, we can name the first principal component as "the general employment environment".

The second principal component has a weak positive correlation with (11) medium and small-sized business annual spring wage increase and the business environment ((12) ~ (16)). In contrast, it correlates negatively with costs of living ((5), (6)) and (3) the monthly expense. Therefore, it can be said that the second principal component reflects the ability for wage payment. It will be natural to think that the bigger the ability for wage payment and the bigger the annual wage increase, the better life the worker can enjoy. Therefore, we assume the second principal component "the ability to pay".

The positive correlation exists between the third principal component and (12) total value of a shipment, and the former negatively correlates with the performance of the tertiary industries ((14)~(16)). Then, it is thought that PLC (3) reflects "the industrial structure" of the prefectures. In other words, it is expected the value of the third principal component becomes large when the tertiary industry becomes more dominant.

variables	PCL(1)	PCL(2)	PCL(3)
	employment environment	ability to pay	industrial structure
(1) Income	0.8882	0.0536	0.0643
(2) Wage	0.8840	0.1563	-0.0006
(3) Expend	0.5033	-0.7548	0.0175
(4) Prices	0.7875	0.1304	-0.1108
(5) LivingC3	0.6900	-0.6747	-0.0519
(6) LivingC4	0.6860	-0.6863	-0.0166
(7) WageHJKN	0.9656	0.1546	0.0752
(8) WageHPART	0.8303	-0.0220	0.0863

⁸ The sum of the eigenvalue to the third principal component is 75.33%.

(9) 5%	0.8826	0.0444	0.1353
(10) InitialWage	0.8831	0.0094	0.3287
(11) Wincrease	0.7733	0.3686	0.1572
(12) Manufct	0.3747	0.2528	0.7217
(13) Build	0.4445	0.1852	-0.1906
(14) Dealer	0.7633	0.2091	-0.3142
(15) Rstrn	0.5813	0.1446	-0.3245
(16) Servise	0.6253	0.2293	-0.5817

Table 2 principal component loading (PCL)

Based on the above considerations, we can state (1) the wage situation is favorable when the first principal component is large, (2) the firm can afford to pay more if the second principal component is large (in other words, cost of living is high), and (3) the prefecture that depends on the manufacturing industry more than the tertiary has the large third principal component.

The principal component scores (PCSs) are reported by table 3. The economic/social structure of the prefectures is described by three principal components and PSCs express their relative importance. If the first PCS is the biggest among three, it means the employment environment has the strongest influence as a factor to characterize the economic structure of the region.

prefectures	rank	employment environment	ability to pay	industrial structure	prefectures	rank	employment environment	ability to pay	industrial structure
Tokyo	A	11.556	1.661	3.946	Miyagi	C	-0.472	-0.843	1.279
Kanagawa		5.602	-0.662	-0.541	Gifu		-0.146	-2.233	-0.594
Aichi		4.299	1.788	-1.880	Niigata		-0.750	0.804	1.069
Osaka		3.923	2.912	0.737	Hokkaido		-0.510	0.928	1.686
Chiba		2.783	0.320	-1.653	Fukui		-0.215	0.366	0.069
Saitama	B	3.369	-2.823	-0.327	Wakayama	D	-1.563	2.465	-1.985
Shizuoka		2.153	0.957	-0.135	Tokushima		-0.805	-1.278	-0.412
Mie		0.699	0.450	-1.455	Oita		-1.932	0.416	-0.461
Shiga		2.171	-0.587	-0.178	Shimane		-1.028	-1.100	1.100
Tochigi		1.971	-0.110	-0.544	Fukushima		-0.822	-1.050	0.043
Hiroshima		1.393	-0.199	-0.248	Ehime		-1.738	0.720	-1.315
Toyama		1.093	-0.911	-0.036	Tottori		-2.027	0.256	1.043
Hyogo		1.153	1.931	-0.782	Saga		-3.009	-0.841	-0.143
Kyoto		1.424	0.907	-0.678	Yamagata		-1.751	-1.673	0.233
Ibaraki		0.920	-0.321	-0.927	Iwate		-2.658	-0.103	1.213
Nagano		0.900	-0.151	0.343	Kochi		-2.225	-1.046	0.338
Okayama		0.574	0.666	-0.844	Kumamoto		-2.747	0.405	0.954
Gunma		0.172	1.370	-0.878	Kagoshima		-2.697	-0.636	1.146
Yamaguchi		-0.213	-0.257	-2.335	Akita		-3.763	-1.588	1.418
Yamanashi	1.171	-1.015	-0.769	Aomori	-3.439	1.110	1.099		
Ishikawa	1.156	-3.490	0.376	Miyazaki	-4.451	1.112	0.889		
Kagawa	0.383	-0.852	-0.216	Nagasaki	-4.030	1.230	0.730		
Nara	0.776	-1.901	-0.953	Okinawa	-6.651	2.918	0.024		
Fukuoka	0.004	-0.025	0.555						

Table 3 Principal Component Scores(PCS)

Some distinguishing examples are as follows. Tokyo is strongly characterized by the employment environment and its industry structure. In other words, wage level is clearly higher in Tokyo than all other prefectures, and the tertiary industry, not the manufacturing industry, is the center of the regional economy. This is generally consistent with the common view about Tokyo. Tokyo is often regarded as the "center of the consumption and the fashion", and the most attractive region for job seekers, in the sense that its employment condition is favorable for workers.

In contrast, Aichi has the completely opposite type of the economic structure, where the third principal component score is the negative and this reflects that Aichi's economy is structured mainly on the manufacturing industry.

All Saga's scores are negative, that means the ability to pay is not enough to keep high wage. Furthermore, the weight of the manufacturing industry is small. From this, we can say that most of all regional problems are actualized in Saga. Okinawa suffers the worst wage situation. Generally, the higher (lower) the prefectures are ranked, the more positive (negative) principal component scores are detected. On the other hand, in the middle-class prefectures, positive and negative scores coexist.

When an absolute value is large, features of the prefecture are determined by such a principal component, and it can be said that such a prefecture is more distinguishing than other prefectures. Actually, seeing the sum of the absolute values from the top, Tokyo (17.164) is the top and followed by Okinawa (9.593), Aichi (7.967), Osaka (7.573), and these prefectures reveal the character mentioned above. In addition, we could understand that Okinawa has a peculiar economic structure, although we cannot show the reason.

It is Fukuoka that the sum is lowest (0.584), which means Fukuoka is a prefecture without any remarkable features. Frequently, Fukuoka is named as the branch economy prefecture, in other words, as to Fukuoka, our statistical analysis cannot find any peculiar factors which contribute to its economic structure.

III-2 Results of discriminant analysis

As the results mentioned above, the general characteristic of the prefecture can be expressed by three principal component scores, just like the academic ability of the student can be expressed by the examination scores of three subjects. Then, we extend our analysis to yield the statistically-rational grouping by applying the discriminant analysis.

The discriminant analysis is the statistical technique in order to estimate in which group the samples are included. For example, it can be used to distinguish the applicants who pass from those who fail in the multifaceted entrance examination, including a written examination, an interview, GPA and so on. By referring three PCSs, we can apply the discriminant analysis to classify 47 prefectures into 4 groups. The resulted grouping is purely based on the statistical ground. If the ranking (grouping) shown in Table 3 is consistent with the results of the

discrimination analysis, we can confirm that the ranking used as the guideline is rational and provides the firm foundation that the guideline reflects the characters of prefectures properly.

In order to derive four groupings, three discriminant functions (D.F.) must be estimated. Standardized coefficients of each function are indicated by Table 4. D.F.1 gives the boundary line between A and B rank, and D.F.2 between B and C, and D.F.3 between C and D. According to Table 4, the high ranked prefectures (A rank) are characterized mainly by the employment environment and the lower ranked ones by the industrial structure.

Variables	D.F.1	D.F.2	D.F.3
employment environment	1.1751	0.0100	0.1526
ability to pay	0.5600	0.6374	-0.7079
industrial structure	-0.4994	0.7862	0.5543

Table 4 standardized coefficients of discrimination functions

Table 5 provides the resulted ranking for each prefecture (the column of Rank (D.A)). 14 prefectures out of 47 are ranked differently from the referenced ranking (the column of Rank (Table3)), then total hitting ratio is $33/47=70.22\%$. But as far as we focus on C, the hitting ratio is rather low (50.0%). This indicates that the middle-class ranking is not so reliable.

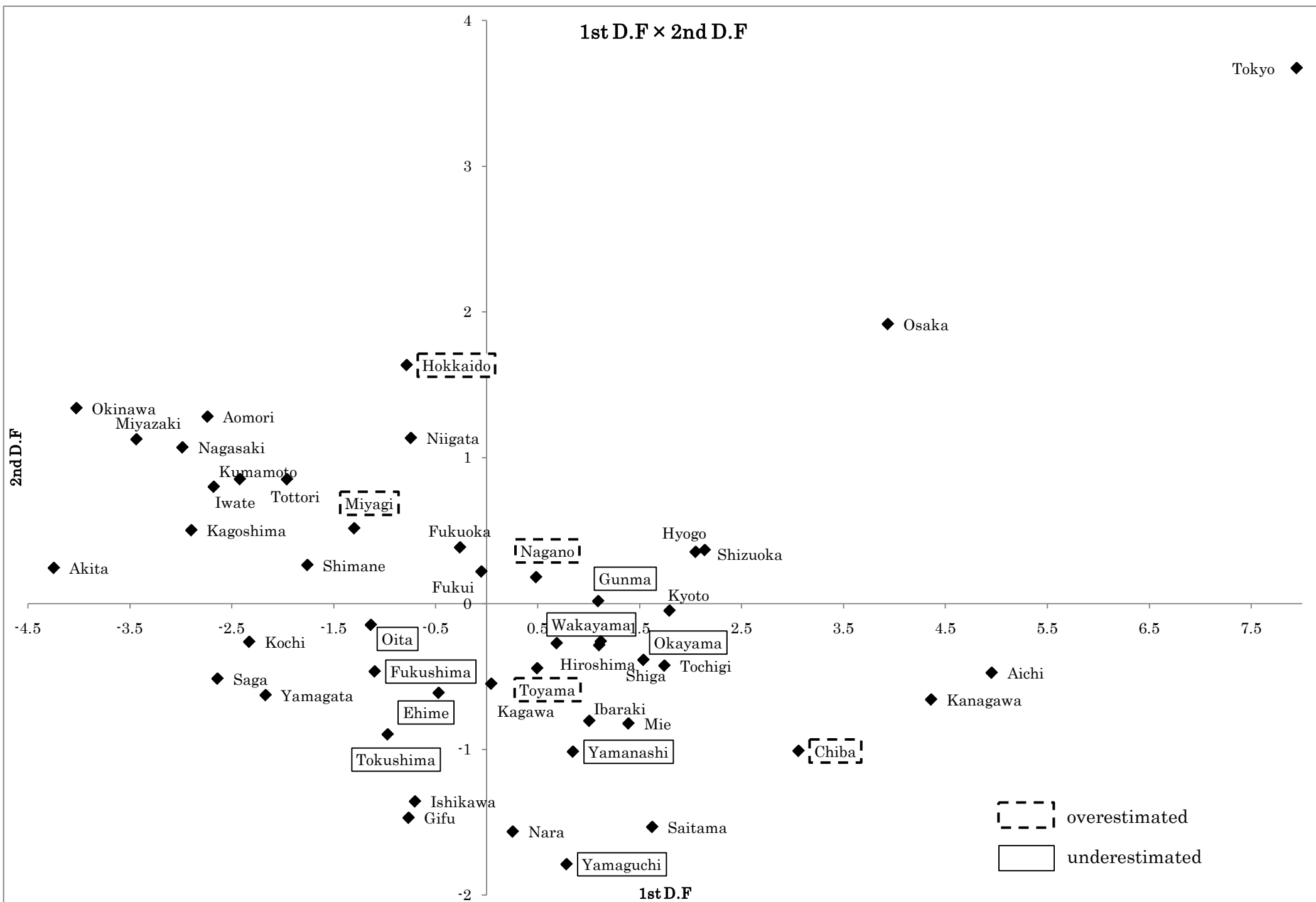
In order to understand the results more easily, Table 5 can be translated into Figure 1. Figure 1 is the scatter diagram of the discrimination scores provided from the first and second discriminant function. In Figure 1, five prefectures circled by dotted line are ranked lower than the guideline ranking. For example, Hokkaido is ranked in C by the guideline system, but in d by our analysis. On the contrary, the prefectures circled by solid line are ranked higher by our analysis like Tokushima (D and c). Hereafter, we call the formers “the overestimated prefectures” in the sense the guideline is overestimating, the latter “the underestimated prefectures”. Some findings are given as follows.

Prefecture	Rank (Table3)	Rank(D.A)	prefecture	Rank (Table3)	Rank(D.A)
Tokyo	A	a	Miyagi*	C	d
Kanagawa	A	a	Gifu	C	c
Aichi	A	a	Niigata	C	c
Osaka	A	a	Hokkaido*	C	d
Chiba*	A	b	Fukui	C	c
Saitama	B	b	Wakayama**	C	b
Shizuoka	B	b	Tokushima**	D	c
Mie	B	b	Oita**	D	c
Shiga	B	b	Shimane	D	d
Tochigi	B	b	Fukushima**	D	c
Hiroshima	B	b	Ehime**	D	c
Toyama*	B	c	Tottori	D	d
Hyogo	B	b	Saga	D	d
Kyoto	B	b	Yamagata	D	d
Ibaraki	B	b	Iwate	D	d
Nagano*	B	c	Kochi	D	d
Okayama**	C	b	Kumamoto	D	d
Gunma**	C	b	Kagoshima	D	d
Yamaguchi**	C	b	Akita	D	d
Yamanashi**	C	b	Aomori	D	d
Ishikawa	C	c	Miyazaki	D	d
Kagawa	C	c	Nagasaki	D	d
Nara	C	c	Okinawa	D	d
Fukuoka	C	c			

Table 5 resulted ranking (D.A.)

*) overestimated prefecture **) underestimated prefecture

1st D.F × 2nd D.F



 overestimated
 underestimated

First, the most underestimated prefectures (the circled prefectures) are located in the third and fourth quadrant (lower half of the diagram). It is because the second discriminant scores are negative. Conversely, the prefectures with positive second discriminant score are spotted in the 1st and 2nd quadrant, the upper half area. If cost of living is considered more significantly in the guideline system, such prefecture may be located in the upper half area, not a lower half, which reduces the underestimated prefectures.

From this, we cannot exclude the possibility that, in the current guideline system, cost of living, which is a mirror image of the ability to pay of the firm, is less considered to determine the ranking. This means that the guideline system attaches the great importance to general employment environment more than cost of living. Although we cannot show the reason definitely, it may be difficult to take cost of living into account, because it reflects deeply the regional factors. Therefore, the guideline system is inclined to consider “a national minimum” to be more important factor than the local peculiar characters⁹.

However, we have to remember the minimum wage was originally set for individual prefecture each by each (we do not have the single national minimum wage). In principle, it is desirable to give priority to local circumstances over the nationwide economic conditions. If the ranking is set lower by considering living expenses lesser, the minimum wage of such prefectures is also determined lower than the actual economic structure suggests.

In the negotiation of each prefecture, if the guideline is set lower than the actual economic condition implies, the local minimum wage has a tendency to fall to a low level. In that case, workers cannot enjoy the wages that corresponds to the local economic potentiality. Accordingly, when this reasons for the wage-rising, it is favorable for workers. However, from the view point of the management, the higher wage disturbs their effort to maintain the employment or invest the technology development. On the contrary, in the overestimated prefectures where wage standard is set more highly than the actual situation, one ground of the reduction of minimum wage will be provided^{10,11}.

Very often, in the negotiation of local minimum wage, we face the serious conflict of interest between two sides, but above discussion suggests that the guideline itself may cause such a conflict.

⁹ This is reflected in the fact that minimum wages are still set lower than the public assistance levels in some prefectures.

¹⁰ Such a kind of the conflict can be described as the conflict between the long-term consideration and the short-term one. Generally speaking, workers are more myopic than the management. Very often workers emphasize the high wage is necessary to boost up the consumer demand from the view point of the short run, which brings the more profits in the long run. But the management insists that the internal reserves are important for the long lasting growth of the firm and the growth is origin of the high wage.

¹¹ According to the standard model of the market, the minimum wage does not contribute to raise the economic welfare. If the minimum wage is set lower than the equilibrium, equilibrium wage is realized without any interference of the law (= wage does not rise) . If the minimum wage is higher than the equilibrium, the involuntarily unemployment remains. See Gramlich (1976). Kawaguchi, Mori (2009). Famous counter arguments are given by Card, Krueger (1994)

IV Effect of wage distribution and minimum wage

Here, another problem arises. The minimum wage do not determine a local *average* wage level, but the *lowest* wage level, in the sense that more lower wage under the minimum is not allowed legally. Therefore, the shape of the wage distribution bears some important relation to the effect of the change of minimum wage¹².

See Figure 2. If skewness of the wage distribution is small (=cumulative distribution less than average wage is large, and minimum wage is far from the average), the change of minimum wage have a profound effect on the local wage, because there are very few numbers of workers employed under the minimum wage. On the contrary, a minimum wage change brings huge influence on the overall wage situation, if skewness is large (the difference between average and minimum wage is small)¹³.

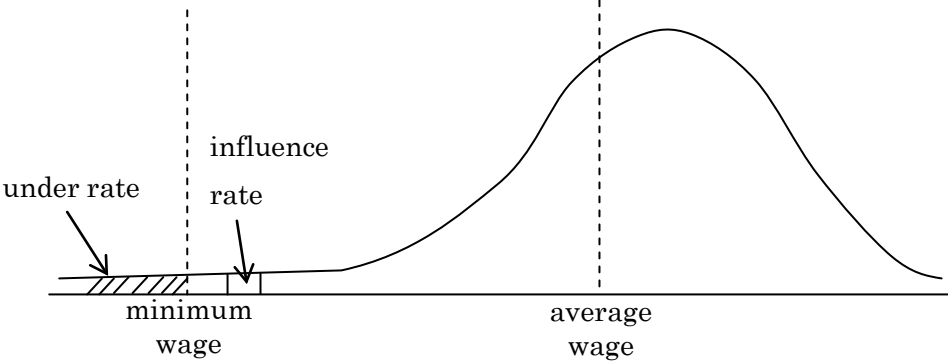


Figure 2-1 under rate and influence rate (small skewness)

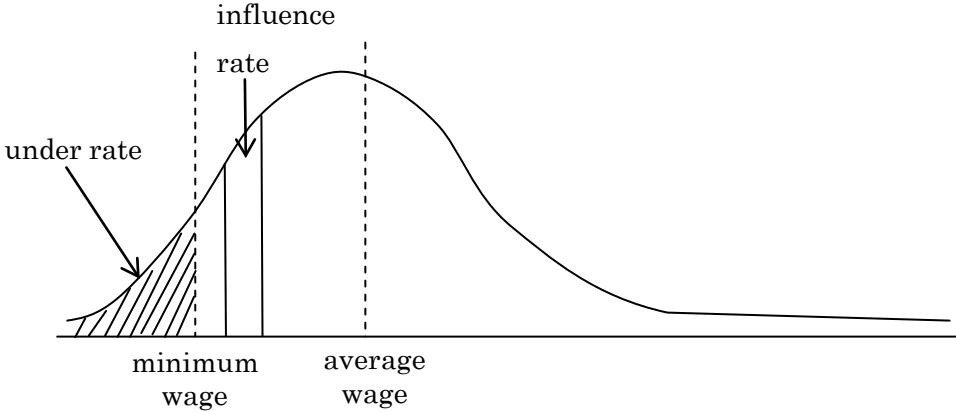


Figure 2-2 under rate and influence rate (large skewness)

¹² MHLW (2012b) states “if wages below the minimum wage is formulated under the condition of agreement with employees, it is invalidated by the law and is regarded to have formulated the same wages with the minimum wage. In case the minimum wages are not paid to employees, employers are fined 500,000 yen” .

¹³ The effect that minimum wage gives to quantity of employment depends on many factors, i.e., the labor market structure, the employment policy etc. We cannot know the precious effect unless we control these factors. See Neumark & Wascher (2004).

Conventionally, in the negotiation of the minimum wage, two ratios are often focused, i.e., “under rate” (ratio of workers who are employed by the wage under the minimum) and “influence rate” (the ratio of workers who are affected by 1 yen rise of minimum wage). If these ratios are large, the more workers are affected by the rise of minimum wage. This implies if the minimum wage is revised, the more “miserable” workers are rescued, but it also means the increase of the wage payment burden for the management. At all events, these ratios are the key in the minimum wage negotiation. It is easy to know the “influence rate” is bigger if the skewness is bigger, even if “under rate” is equal. This means that the minimum wage revision does not bring the identical effect on the economy, and this leads us to examine the skewness of the wage distribution.

By using the data from the household survey 2010, we calculated the skewness of the income distribution for all prefectures. Clearly, income is not identical to wage revenue, but it is natural to assume the both are highly correlated then we can use the income distribution as the surrogate variable for wages. Table 6 displays the results¹⁴.

prefecture	skewness	prefecture	skewness	prefecture	skewness
Okinawa	0.842920199	Akita	0.320307544	Nagano*	0.071357744
Kochi	0.744385256	Yamaguchi**	0.304046933	Kanagawa	0.034816122
Kagoshima	0.63515246	Hiroshima	0.298303363	Nara	0.019952422
Hokkaido*	0.629413931	Kagawa	0.288408	Tochigi	0.018224969
Miyazaki	0.545889175	Kyoto	0.288168973	Saitama	0.001113401
Oita**	0.533423449	Aichi	0.260981477	Chiba*	-0.00839861
Tokushima**	0.498268316	Hyogo	0.253763572	Yamanashi**	-0.01708625
Ehime**	0.475149325	Okayama**	0.191721077	Shiga	-0.05233874
Nagasaki	0.469430714	Gunma**	0.160024085	Gifu	-0.05535793
Kumamoto	0.464178258	Shizuoka	0.146093235	Yamagata	-0.10499545
Aomori	0.463605792	Fukushima**	0.142249027	Ibaraki	-0.11631169
Fukuoka	0.442207817	Saga	0.131389128	Ishikawa	-0.12046184
Wakayama**	0.434193575	Miyagi*	0.12820014	Toyama*	-0.17453781
Iwate	0.398368623	Shimane	0.092913253	Niigata	-0.19449091
Osaka	0.393771438	Tottori	0.081094561	Fukui	-0.36919255
Tokyo	0.381753721	Mie	0.081058817		

Table 6 Skewness of Income Distribution

*) overestimated prefecture **) underestimated prefecture

¹⁴ Business income and asset income are included here. As a general tendency, the salaried employees are often distributed over the lower area of the income distribution in comparison with an asset income earner. Therefore, it is necessary to note that skewness of table 6 has the upward bias than we pay attention to only wage income.

Generally speaking, the prefectures where economic activities suffer show the high skewness, which means the income distribution is unbalanced downwardly. This is partly because the active economy increases the upper-income earners.

The notable fact we can find is that skewness is relatively small in the underestimated prefectures. Nine underestimated prefectures out of ten have a positive skewness. In these prefectures, if the minimum wage is increased, there are many workers taking a benefit by it, although it depends on the “influence ratio”. On the other hand, it increases the total wage bill that is not favorable to the management. Therefore, the conflict of interest between workers and the management is easy to break out here¹⁵.

Chiba is an overestimated prefecture and an opposite example. Therefore, there is a room to lower the minimum wage. Because its skewness is negative, there are few workers suffer from the wage reduction, and the increase of the total wage bill is not so significant. This may moderate the conflict of interest between two parties¹⁶.

We should consider the possibility that the regional labor market is segmented. In Japan, fortunately, most workers who work at the minimum wage are not the main household-income earner. They are very liquid work force and can survive even if they quit their working place. Especially in Tokyo or the metropolis area, such workers can find another working opportunity very easily, because they accept the minimum wage. Instead, they are not protected by the official safety net (for example, the social security service is not provided by the employer). In this sense, they are segmented from the regular hired workers¹⁷.

Because the more workers are distributed around the minimum wage if the minimum wage is severely applied, the skewness becomes large. However, we have not considered it, it is impossible to state that the minimum wage law is conducted most strictly in Okinawa.

V Concluding remarks

Throughout the course of this paper, we have attempted to examine the rationality of the minimum wage guidelines system of Minimum Wage Law. Under the current guideline (ranking)

¹⁵ Even if both rates are equal, influence on society varies by the difference in attribute of the worker included there. If principal income earners of the family are included the influence is significant. But if housewives or students who work as the part-time worker only for their pocket money, the increase of minimum wage may not lead to improvement of the standard of life.

¹⁶ Whether the rise of minimum wages brings a rise in standard of living of the worker depends on the structure of labor market. When the labor market is competitive, the quantity of employment does not change if an equilibrium wage is higher than minimum wages. When an equilibrium wage is low, demand for labor is decreased. In any case the minimum wages do not increase the employment in the competitive market. If the labor market is monopsony and the minimum wage is lower than equilibrium wage, firm's profit is decreased if it maintains quantity of employment (Richard, Machin, Manning (1999)). But, firms can increase its profit by increasing its labor demand. This is because the point at which the marginal expenditure curve crosses the demand curve moves to the top right corner and this increases the revenue.

¹⁷ David & Washer (2000)

system, all prefectures are ranked in four classes and are given the possible rise width of the minimum wage, based on the simple arithmetical calculations. This is an easy and practical method. Although the guideline does not determine the minimum wage directly, it has a significant influence on a regional minimum wage because it works as a kind of standard around which the regional minimum wage should be determined. Therefore, it is necessary for the guidelines system to be managed on the persuasive ground, that is, it needs to adapt a method with statistical soundness, not a simple arithmetical means. In this report, we tried to apply the multivariate analysis on the same data set the current guidelines system used.

By comparing our results with the current guideline, we extracted the following contributions. At first, we found that the calculation now in use sometimes yields the underestimated or overestimated prefectures. On the other hand, for the prefecture performing the strong regional economy or the prefecture where regional economy is weakened, it was confirmed that current guideline expressed the economic actual situation approximately fair. In this sense, there are not extremely many prefectures where our ranking does not harmonize with current ranking.

Second finding is about the middle ranked prefectures. Most prefectures where we ranked differently from the guideline were detected from the middle ranked prefectures. This is mainly caused by the evaluation of cost of living. This is fairly important implication because, in the overestimated prefectures, the minimum wage is tend to be set higher than the actual economic condition implies. This may disturb the market mechanisms and cause the misallocation of resource.

Third implication is about the possible conflict between workers and management. Our analysis shows that, in the underestimated prefectures, if the minimum wage is revised up, there are many workers taking a benefit by it, but, on the other hand, it increases the total wage bill that is not favorable to the management. Therefore, the conflict of interest between workers and the management is prone to occur here.

As the traditional microeconomics teaches, wage should be determined at the point where the demand and supply are equalized in the labor market, in order to avoid the resource misallocation. However, practically, the minimum wage is strongly influenced by the occasional political situation or the historical events. When such a non-economical factor comes out to the front, the minimum wage system loses its economic rationality.

If it is rationally constructed and properly operated, the guidelines system is an effective way because it shows the direction the minimum wage aims and helpful to remove an unnecessary political factor. In this sense, the guideline system is a realistic and practical policy tool, although it is necessary to make a continuous effort to improve the system reliability.

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