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The long working hour and a positive utilization of part-timers

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Abstract:

The long working hour of Japanese workers has been nation widely known and it is statistically confirmed as well. By referring the official statistics we found that when the total working hours are increasing, working hours of full-timers are decreasing and increasing for part-timers. This symmetric behavior suggests part-timers is important channel for adjusting the total working hours, because the working terms for full-timers is not easily revised. By utilizing part-timers and combining them to full-timers, it becomes possible to pursue the flexible working hour management and it leads, as a consequence, the reduction of total working hours. There is no likelihood of any immediate improvement to the long working hour in local economy, however, reconsidering the method to utilize part-timers may be the first step for establishing the appropriate and efficient labor managements.

Keywords:

part-timers　full-timers　working hours

1. Introduction

The long working hour of Japanese workers is widely known. In Nagasaki prefecture, the west end of the Japanese archipelago, Monthly Labor Statistics Survey released by Ministry of Health, Labor and Welfare(MHLW) shows the total working hours were 1889hrs(2005), 1896hrs(2006),1889hrs(2007),1919hrs(2008), 1927hrs(2009), 1927hrs(2010), 1876hrs(2011). Especially in the three years since 2009, Nagasaki has recorded the longest hours among the nation.

These results have caused a huge argument among workers (unions), the Chamber of Commerce, the local authorities, prefectural and municipal assembly and the local office of MHLW. Some unions emphasized the possibility that the low wage have forced to workers to work longer to support their households, regardless of a high labor productivity. On the other hand, the managements denied it because the over 40hours per week were not allowed under the legal restriction, instead, emphasized the low productivity of workers and an overall inertia of the local economy. Further, because some members of assembly suspected the accuracy of the statistics, then the local office

of MHLW has checked it but could not find any significant errors, though there was some incompleteness in the replacement of the sample. However, prior attempts to show the causes have been inconclusive.

Fukaura (2012) focused on the relation between the employment pattern and the working hours, and confirmed the hypothesis that the business was not utilizing the diversification of the employment pattern efficiently enough to shorten the working hour. Fukaura (2013b) also estimated the labor-productivity of Nagasaki workers and found it was not as high as workers insisted. Moreover, as to the discussion saying the minimum wage of Nagasaki is unfairly low, it was found that the current procedures for setting the minimum wage were not so irrational so the local economic factors are relatively fairly considered, although not perfectly (Fukaura (2013a)(2013c)). These show the possibility that the causes of the long working hour are the local factors, then both of business and workers can improve their employment environments by themselves.

If the working hours are determined and influenced by local factors, then a correct measurement of the working hours in each region is a first step for analyzing the causes and effects of long working hour. The discussion we develop below is an attempt to examine MHLW's estimation method and results, and then we will go on to discuss the causes of long working hour in Nagasaki which is one of the typical example of the weak local economy.

2. Re-calculation of working hours

We do not know exactly how MHLW calculates the total working hours for all prefectures. However, it is possible to infer it by checking the original data used there. Table 1 presents the inferred procedures.

In the statistics of MHLW, sample firms collected are divided to two categories, the firms with 30 employees or more and the firms with 5-29 employees. Further, these are divided into full-timers and part-timers. First, annual working hours and working days are used to calculate the working hours par day (=annual working hours/ working days). For example in 2005, as to smaller firms, we have 8.15hrs for full-timers and 5.53hrs for part-timers. Similarly, for larger firms, 8.29hrs for full-timers and 5.46hrs for part-timers are derived.

In order to estimate the total working hours, we have to take into account the ratio of full-time worker and part-timers workers. Then we calculate the weighted average of working hours by using this ratio as a weight. Take 2005, full-timers, smaller firms for

instance, 2062×0.795+1217×0.205=1639.29+249.49=1888.78. Iterating the similar calculations yields the numerical values for each year (Table 1).

The total working hours by our estimations and the total working hours reported by MHLW (bottom row of Table 1) are graphed by Figure 1, from which we can derive some implications.

First of all, Figure 1 confirms that the officially reported total working hours is the estimation concerning a relatively small-scale firm (the reasons why the value of 2008 does not identical are unknown). This might be because smaller firms of 29 people or less account for around 95% of all firms, workers employed by smaller firm are around 60% of all workers.

Second, we have to note the total working hours of larger firms are longer than those of smaller firms. In larger firms, we can see from Table 1 that the working hours of full-timers (part-timers) are generally longer (shorter) than the small firms. Because the ratio of full-times is higher in the larger firms, then there is a possibility that resulted values are influenced by the larger firms' working hours.

In third, both series show the drastic decrease of the working hours from 2010 to 2012. By examining Table 1, total working hours estimated(5-29) are decreased by around 12% between 2010 and 2012 and by around 11% from 2011 to 2012 for the larger firms(see Figure 1). These are very impressive events and in the autumn in 2013 it was reported broadly that Nagasaki returned the disgrace of longest working hour.

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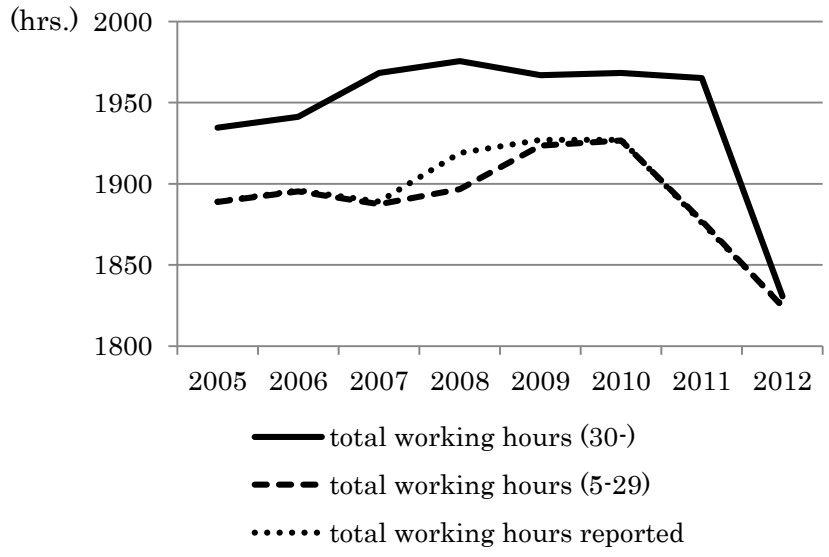

Figure 1 total working hours

However, in order to conclude the working conditions and environments are significantly improved in Nagasaki, we have to consider the background reasons from the view points of the

technical constraints in the statistical research and the characters of local labor market.

The former is related to the technical constraints which are inevitable when we sample firms from the entire. In Monthly Labor statistics Survey, the sample firms are shuffled in every 2~3 years and some are replaced to another, in order to remove the influence of the specific firm. Hence, when the large firm with short working hours is chosen by chance, it affects the results significantly. According to the Nagasaki office of Labor Bureau, the possibility that a new sampling conducted in 2012 had an influence is undeniable. Especially in Nagasaki where the number of large firms is less than that of the metropolitan area, the population of the large firms from which the sample firms are drawn is small. So this kind of sample bias has a significant influence in the calculation of larger firms' value.

If this bias would have caused similar effect in all prefectures, then the working hour in other areas in recent few years would be miscalculation, which causes the doubt that Nagasaki would not be the worst. At present, there is no way to confirm it, hence we have to rely on Table1 as the only accessible dataset. This may lead to incorrect conclusions, but we can extract some findings for working hour management.

3. Ratio of part-timers and the total working hours

As noted above, a simple and direct comparison of total working hours cannot capture the accurate findings. Therefore, we have to search the background factors which reduced the total working hours, by considering the labor market structures. Note the behaviors of each row of Table 1 after 2010. There is a considerable difference in the movement between full-time and part-timers. For example, working hours(Y) of full-timers (5-29) are decreased only 28 hrs. since 2010, but that of part-timers are decreased around 100 hrs. The working days (5-29) are decreased by 2 days and 11 days, respectively. However, for working hours(D), we cannot see such a big difference, that is, differences are only 0.04 hrs.(≒3 minutes) and 0.13 hrs.(≒8minutes) respectively. A similar trend is observed in the larger firms too.

The most striking feature is the behaviors of working hours estimated (see Figure 2 and Figure 3). At a glance, we can understand that two figures are almost symmetric vertically, which means working hours of full-timers has been decreasing during that periods, and that of part-timers has been increasing. By referring the Figure 1 too, it is the reduction of working hours of full-timers that have contributed to the reduction of total working hours. This seems to contradict the fact of the increased working hours of part-timers, however, we can explain this contradiction by noting the rapid increase of

the ratio of part-timers.

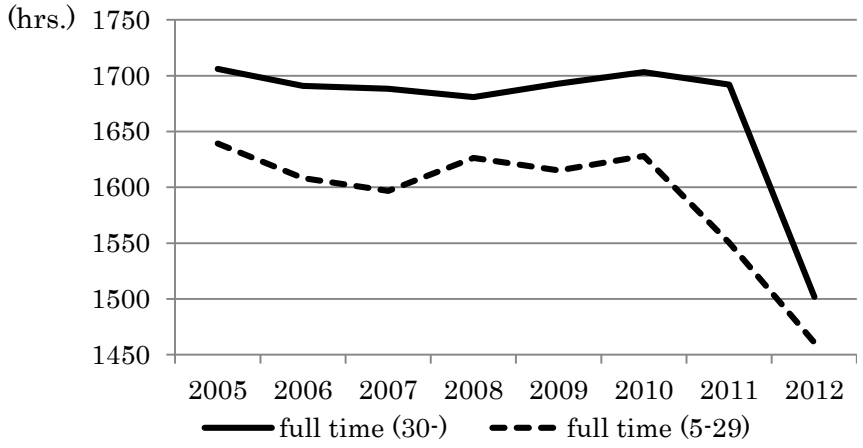

Figure 2 total working hours estimated (full-timers)

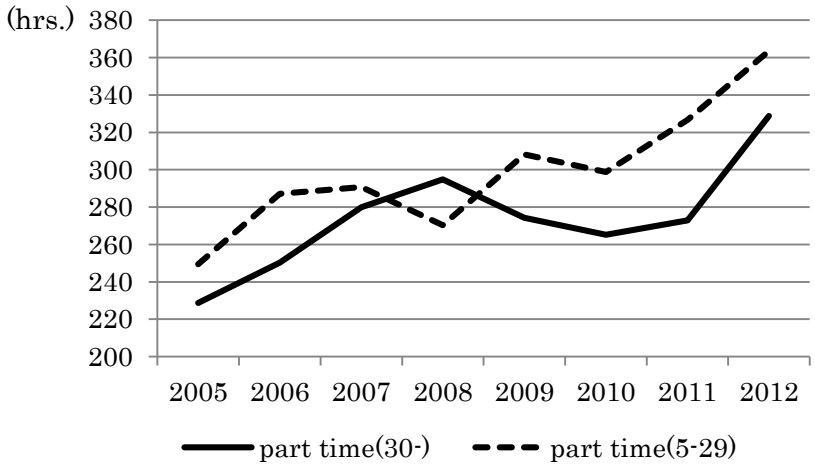

Figure 3 total working hours estimated (part-timers)

According to the data classified by industries, an increase in the ratio of part-timers in medical/welfare industry and in hotel/restaurant businesses is remarkable since 2010. Because part-timers are working normally shorter than full-timers, then it is straightforwardly understood that total working hours are decreased when the ratio of part-timer is increased.

Working hours per day are relatively constant as noted above. Because the working conditions of full-timers cannot be changed easily, then the numbers of part-timers are the almost only channel to adjust the total man-hours or personal expenses. This may result in the reduction of total working hours.

4 Graphical explanations

We found that when the total working hours are increasing, working hours of full-timers are decreasing and increasing for part-timers. This symmetric behavior suggests part-timers is important channel for adjusting the total working hours, because the working terms for full-timers is not easily revised. By utilizing part-timers and combining them to full-timers, it becomes possible to pursue the flexible working hour management and it leads, as a consequence, the reduction of total working hours.

Figure 4 presents the theoretical foundations of above discussion.

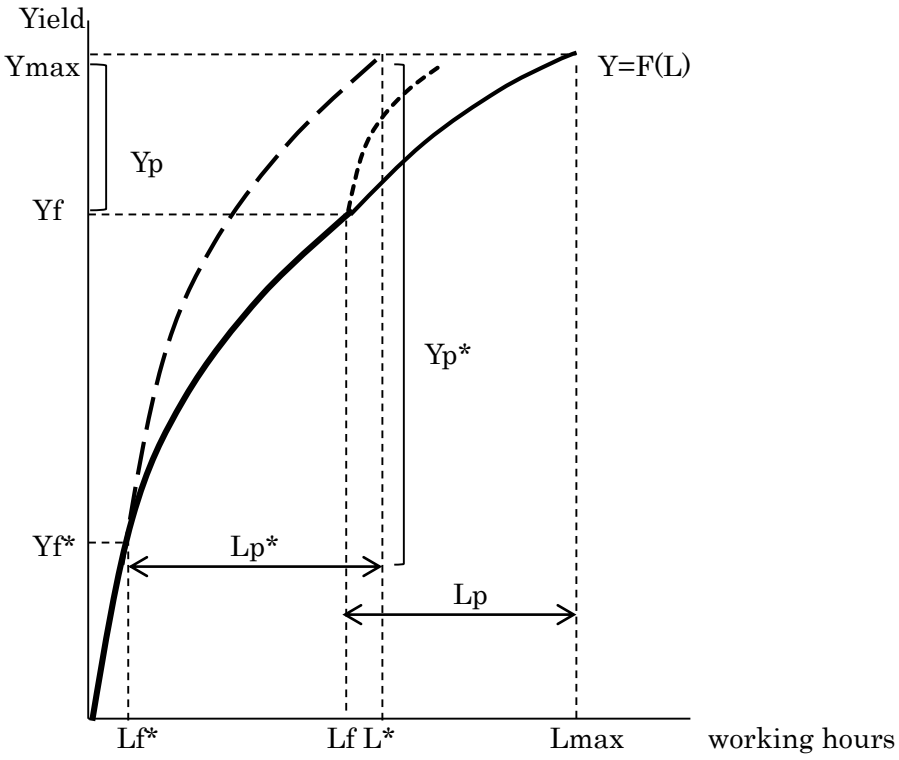

Figure 4 full timers and part timers

In Figure 4, Y=F(L) is the well behaved production function, which shows Ymax is produced if Lmax is employed. Consider the situation that the firm substitutes full-timers whose marginal productivity (MP) is relatively low to part-timers with similar low MP. In this case, firm attains Yf(<Ymax) by employing Lf of full-timers and Lp of part-timers produce (Ymax-Yf). The wage of part-timers is lower because of their low MP. However, because total working hours and total wage bills are not changed, there is no incentive for firms to take such an employment strategy. Therefore, a simple substitution of the unskilled labor (jobs with low productivity) of by full-timers to

part-timers is unattractive for the firms.

However, when the high skilled part-timers are available, Ymax can be realized with lowering the total working hours. Here the “high skilled” means that part-timers have the same production function as full-timers. Then Lf* of full-timers and Lp* of part-timers are employed and produces Yf* and Yp* respectively (Yf*+Yp*=Ymax). Total working hours are L*(<Lmax). Needless to say, the firms can employ more small number of high skilled part-timers, with keeping full-timers to Lf (shown by small dotted line).

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5 Regression analyses

Above discussions suggest that the behavior of part-timers is important channel for adjusting the total working hours. Here, "the behavior of part-timers" should be examined from three dimensions, i.e., the working days, the working hours per day and part-timers’ ratio. In what follows, we conduct the regression analysis in order to confirm if the behaviors of part-timers have a significant correlation with the total working hours.

The structures and the results of the regressions are shown in Table 2. Independent variables and dependent variables are

(independent variables)

estWH(Y)part: estimated working hours (year), part-timers

estWH(Y)full: estimated working hours (year), full-timers

est-total WH(Y): estimated total working hours estimated
= estimated working hours (year), part-timers
+ estimated working hours (year), full-timers

repo-total WH(Y): total working hours reported by MWHL

(dependent variables)

WDpart: working days (year), part-timers

WH(D)part: working hours oar day, part-timers

Partratio: ratio of part-timers

WDfull: working days (year), full-timers

WH(D)full: working hours oar day, full-timers.

dependent variables		independent variables					ad.R^2
		WDpar (5-29)	WH(D)part (5-29)	Partratio (5-29)	WDfull (5-29)	WH(D)full (5-29)	
①	estWH(Y)part (5-29)	1.0006*** (18.41)	1.0290*** (42.37)	0.9792*** (76.66)			0.99
②	estWH(Y)full (5-29)			-0.3092*** (-26.98)	1.2390*** (8.44)	1.4374*** (5.76)	0.99
③	est-total WH(Y) (5-29)	0.1377 (0.58)	0.2409* (2.23)	-0.0890 (-1.612)			0.72
④				-0.1298*** (-7.34)	0.8926** (3.94)	1.9195*** (4.98)	0.95
⑤	repo-total WH(Y) (5-29)	0.2448 (0.99)	0.1592 (1.38)	-0.0814 (-1.38)			0.69
⑥				-0.1417*** (-5.25)	0.8991* (2.60)	1.2136 (2.06)	0.88

Table 2-1 regression results (5-29)

dependent variables		independent variables					ad.R^2
		WDpar (30-)	WH(D)part (30-)	Partratio (30-)	WDfull (30-)	WH(D)full (30-)	
⑦	estWH(Y)part(30-)	1.1093*** (6.42)	1.0279*** (19.98)	0.9062*** (26.46)			0.99
⑧	estWH(Y)full (30-)			-0.2331*** (-118.39)	1.1109*** (27.30)	1.0877*** (25.80)	0.99
⑨	est-total WH(Y) (30-)	0.1752 (0.77)	0.1427 (2.09)	-0.1045* (-2.31)			0.95
⑩				-0.1228** (-3.59)	1.026 (1.45)	0.9766 (1.33)	0.92
⑪	repo-total WH(Y) (30-)	0.0686 (0.12)	0.0206 (0.11)	-0.0492 (-0.44)			0.40
⑫				-0.0872* (-2.20)	-0.6062 (-0.74)	0.7668 (0.90)	0.69

Table 2-2 regression results (30-)

(significance level of 1%:***,5%: **,10%:*)

Among these results, regression ①, ②, ⑦ and ⑧ are trivial. Because its dependent variables are calculated by the independent variables as explained in Table 1,

it is natural that all dependent variables are statistically significant. However, a negative coefficients of Partratio in ② and ⑧ are worth to note because this means the working hours of full-timers are decreased as the share of part-timers to the total workforce grows. This suggests that part-timers are the substitution to full-timers.

From these results, we can extract some implications for reducing the total working hours.

1. For smaller firms, it is effective to reduce the daily working hours of part-timers because of the negative coefficient of ③. The sign of WH(D)part(30-) is positive but the t-value is relatively large, so the same implication can be derived for the larger firms.
2. WDfull(5-29) and WH(D)full(5-29) are statistically significant and positively correlated with the independent variables of ④. Therefore, an increase of the off-day (holidays, vacations) is effective, in addition to reducing the overtime duties. This supports the conclusions of Fukaura(2012a), where the author discussed the five-day work week system has not introduced broadly in Nagasaki yet, especially at the small-size firms, and this contributes to make the total working hours longer than national average.
3. The coefficients of Partratio are statistically significant and negative in ④ and ⑩. The implication is the same as ② and ⑧.
4. Although WDfull(30-) and WH(D)full(30-) are not statistically significant in ⑩, the signs are positive. Together with the above discussions, this means the five-day work week system and overtime duties are the key factors for the improvement of long working hour.

In summary, the important findings are as follows. First, because part-timers' working hour is normally shorter than full-timers, then it is intuitively expected that a substitution between part-timers and full-timers decreases total hour worked. Second, for full-timers, the reductions of working hours and the working days are effective. Needless to say, it is impossible to do this only by a revision of full-timers' working conditions unless the load of full-timers is substituted for part-timers. Here, it is worth to notice that part-timers “substitute” full-timers, not “complement” full-timers.

In other words, part-timers are different from full-timers not because they engage in the different jobs, but because their working hours are different. Therefore, it is ideally preferable that the skill of both is equal. For this case, the firms can introduce multiple work systems based on worker's attribute, and can selectively employ the workers who prefer part time job to full time job and the workers who prefer full time

job to part time job. By utilizing part-timers and combining them to full-timers, it becomes possible to pursue the flexible working hour management and it leads, as a consequence, the reduction of total working hours.

Here we have to remember, because these regressions do not include any variables representing the productivity, we cannot confirm the theoretical predictions depicted in Figure 4. However, from above results that an increase of part-timers' ratio brings the reduction of total working hours, we can infer that part-timers are playing the important role as the complement working force, in the sense that their productivities are almost same as full-timers, especially at the small firm.

5 Concluding remarks

Throughout the course of this essay, we can extract the conclusions that promoting the five day work system and an effective combination of full-timers and part-timers (as a result part-timers' ratio is increased) are expected to reduce the total working hours and improve the overall working environments.

Needless to say, the reduction of working hours/day deteriorates the performance of the firms if the improvement of labor productivity does not occur. Though the labor productivity of Nagasaki is nearly the bottom in Japan, this means the room for improvement is large.

Nowadays, part-timers and dispatched workers are classified into temporary workers. If we focus only the difference of daily working hours, part-timers are temporary. However, if we focus on the similarities of the jobs both workers engage in, it will be necessary to think part-timers as the key factor of the various employment system. It is effective in the reduction in total working hours to establish the effective substitution between part-timers and full-timers.

This requires a high elasticity of substitution between part-timers and full-timers. This is not difficult in industries where the high skilled professions are needed. For example, in Japan, doctors or nurses are engaging in the long hour job. However, some female doctors and nurses often retire in the early stage of their careers because of marriages and child caring. But after their children grow up, as the part-timers, they can spare their time to substitute the incumbent doctors. Or they can engage in the supplemental medical jobs, for example, the medical consulting or Health Supervisor for the locals, because they are officially qualified as a profession. It is beneficial for them and the incumbents, because they can utilize their free time and the incumbents can reduce their job load.

Of course, this may be a special and lucky example and cannot be directly applied in other industries. However, in order to reduce the total working hours without loss of productivity, it is effective to regard part-timers as the pivotal work force, not as the fringe workers, and improve their skills enough to substitute perfectly to full-timers.

There is no likelihood of any immediate improvement to the long working hour in local economy, however, reconsidering the method to utilize part-timers may be the first step for establishing the appropriate and efficient labor managements.

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		2005	2006	2007	2008	2009	2010	2011	2012
working hours(Y)	full-time workers(5-29)	2062	2105	2090	2077	2095	2106	2098	2078
	part-time workers(5-29)	1217	1217	1232	1246	1346	1316	1252	1224
	total working hours(5-29)	1889	1896	1889	1919	1927	1927	1876	1825
	full-time workers(30-)	2088	2111	2113	2101	2108	2100	2102	2066
	part-time workers(30-)	1250	1258	1393	1474	1392	1403	1400	1204
	total working hours(30-))	3338	3369	3506	3575	3500	3503	3502	3270
working days	full-time workers(5-29)	253	257	254	253	253	254	253	252
	part-time workers(5-29)	220	218	225	234	229	226	218	215
	full-time workers(30-)	252	253	252	250	248	248	250	246
	part-time workers(30-)	229	228	228	232	226	228	228	209
working hours(D)	full-time workers(5-29)	8.15	8.19	8.23	8.21	8.28	8.29	8.29	8.25
	part-time workers(5-29)	5.53	5.58	5.48	5.32	5.88	5.82	5.74	5.69
	full-time workers(30-)	8.29	8.34	8.38	8.40	8.50	8.47	8.41	8.40
	part-time workers(30-)	5.46	5.52	6.11	6.35	6.16	6.15	6.14	5.76
full/part ratio	full-time workers(5-29)	79.5	76.4	76.4	78.3	77.1	77.3	73.9	70.3
	part-time workers(5-29)	20.5	23.6	23.6	21.7	22.9	22.7	26.1	29.7
	full-time workers(30-)	81.7	80.1	79.9	80	80.3	81.1	80.5	72.7
	part-time workers(30-)	18.3	19.9	20.1	20	19.7	18.9	19.5	27.3
working hours estimated	full-time workers(5-29)	1639.29	1608.22	1596.76	1626.29	1615.25	1627.94	1550.42	1460.83
	part-time workers(5-29)	249.49	287.21	290.75	270.38	308.23	298.73	326.77	363.53
	total working hours estimated(5-29)	1888.78	1895.43	1887.51	1896.67	1923.48	1926.67	1877.19	1824.36
	full-time workers(30-)	1705.90	1690.91	1688.29	1680.80	1692.72	1703.10	1692.11	1501.98
	part-time workers(30-)	228.75	250.34	279.99	294.80	274.22	265.17	273.00	328.69
	total working hours estimated(30-)	1705.90	1690.91	1688.29	1680.80	1692.72	1703.10	1692.11	1501.98
total working hours reported		1889	1896	1889	1919	1927	1927	1876	1825

Table 1　total working hours (estimated and reported)