

WAGE DIFFERENTIAL BY EMPLOYMENT TYPE AND CONTRACT LENGTH*

MINSEONG KIM** · SUNGHYUN RYU***

We estimate wage differentials by employment type and contract length using Oaxaca decomposition. In the Economically Active Population Survey of Korea from 2004 through 2008, we find that regular workers receive slightly higher wage rates than non-regular workers after controlling for a standard list of individual attributes. This coincides with the findings in Lee and Kim (2009) and Nam (2007) that wage discrimination explains a very small part of the observed wage differential between regular and non-regular workers. On the other hand, the wage gap between regular and non-regular workers within a subgroup of similar contract lengths can be quite significant. Among workers with longer contracts, regular workers receive significantly higher wage rates than non-regular workers. This result is in line with the findings in Kim and Park (2006) that wage discrimination between regular and non-regular workers is significant after controlling for establishment characteristics.

JEL Classification: J31, J71

Keywords: wage differential, wage discrimination, employment type, contract length, Oaxaca decomposition

I. INTRODUCTION

The observed average wage gap between the regular workers and non-

Received: May 31, 2010. Revised: June 21, 2010. Accepted: June 23, 2010..

* We thank two anonymous referees for their helpful comments.

** The first author, Sungkyunkwan University, e-mail: minseong@skku.edu

*** The second author, KDI, e-mail: shryu@skku.edu

regular workers is more than 35%. This leads to a concern regarding discrimination between the two groups of workers. It remains to be resolved how much of this gap in the observed average wage rates is indeed beyond what productivity differences can explain.

Recently, there has been a series of empirical studies to estimate wage differentials between regular and non-regular workers. Ahn (2001) found in the Korea Labor and Income Panel Study that up to 12% of wage differential between regular and non-regular workers was from wage discrimination. Some of the more recent studies report lower estimates of wage discrimination between regular and non-regular workers when either more controls for individual attributes and firm characteristics are introduced in the estimation or unobserved characteristics are methodically controlled for. For example, Lee and Kim (2009) estimated the wage discrimination coefficient to be in the range of 3.3%~7.5%, and Nam (2007) found much lower estimates of wage discrimination between regular and non-regular workers. Both of these studies used a panel estimation with fixed effects. Considering the possibility that some of the individual characteristics are omitted in the estimation, wage discrimination may have been overestimated.¹ If so, a non-regular worker may well be receiving a higher wage rate than a regular worker with the same qualification, which may be interpreted as compensating wage differentials.

Regular workers and non-regular workers are not homogeneous within groups. Wage differentials may vary across subgroups of workers. The average wage discrimination between regular and non-regular workers may be estimated to be low due to this variation across subgroups. Kim and Park (2006) reports that the wage discrimination between regular and non-regular male workers in unionized establishments with less than 300 employees is about 20% after controlling for fixed effects of establishments. Park and Kim (2007) found about 30% of wage discrimination between regular and non-regular workers in unionized large establishments with employees of 300 or more using data from the Establishment Employment Surveys. This suggest that the apparent wage

¹ See Cotton (1988) for a technical discussion of this issue. Park and Kim (2007) found more than 10% wage gap due to discrimination without controlling for job types whereas the wage gap due to discrimination reduces to 5% after controlling for job types in Nam (2007).

discrimination between regular and non-regular workers may come from varying sources such as establishment characteristics. These sources may well be systematically related to the regular versus non-regular dichotomy.

A prominent trend in the labor market since the economic crisis of 1997 is the increase in the number of temporary workers with contract lengths of one year or less. Temporary regular workers tend to become non-regular workers because of their lack of job stability. (Lee, 2001) This possibility leads us to examine the contract lengths and the ensuing wage gaps as a potential source of the apparent wage discrimination between regular and non-regular workers.

In the next couple of sections, we present the estimation model and data. In Section 4, the estimation results are discussed. Section 5 concludes.

II. ESTIMATION MODEL

Estimation of wage differentials typically uses Oaxaca decomposition. Following the lead of Becker (1957) and Oaxaca (1973), the observed wage differential between two types of workers, J and K , can be decomposed into two parts as in equation (1).

$$\ln W_J - \ln W_K = \ln W_J^o - \ln W_K^o + \ln(D + 1) \quad (1)$$

where $D \equiv \frac{W_J / W_K - W_J^o / W_K^o}{W_J^o / W_K^o}$ is what Oaxaca called the wage

discrimination coefficient, $\ln W_J - \ln W_K$ is the observed wage differential between the two types of workers, and $\ln W_J^o - \ln W_K^o$ is the wage differential between the two types of workers that would prevail without discrimination in the labor market. Thus, $\ln(D + 1)$ is the wage differential that is associated the types of workers but not explained by the observed characteristics of workers.

The wage differential that would prevail without discrimination is not directly observed. Instead, it can be estimated in Mincer-type wage equations:

$$\begin{aligned}\ln W_j &= X_j' \beta_j + \varepsilon_j, \quad j \in J \\ \ln W_k &= X_k' \beta_k + \varepsilon_k, \quad k \in K\end{aligned}$$

We can use the predicted wage of the average worker of a given type, \hat{W}_J and \hat{W}_K , to estimate the wage that he or she would receive without discrimination.

The observed average wage differential between the two types of workers can be decomposed as in the following:

$$\ln \hat{W}_J - \ln \hat{W}_K = X_J' \hat{\beta}_J - X_K' \hat{\beta}_K = (X_J' - X_K') \hat{\beta}_J + X_K' (\hat{\beta}_J - \hat{\beta}_K) \quad (2)$$

Under the assumption that type K workers would receive the same wages without discrimination as type J workers receive now, the first term in equation (2) is the estimated wage differential that would prevail without discrimination. The second term is the estimated value of the last term in equation (1). Alternatively, one could assume that type J workers would receive the same wages without discrimination as type K workers receive now. Then we have an alternative decomposition as follows:

$$\ln \hat{W}_J - \ln \hat{W}_K = X_J' \hat{\beta}_J - X_K' \hat{\beta}_K = (X_J' - X_K') \hat{\beta}_K + X_J' (\hat{\beta}_J - \hat{\beta}_K) \quad (3)$$

One can obtain a range of estimates for the wage discrimination from equations (2) and (3).

III. DATA

We use the annual addendum of The Economically Active Population Survey (EAPS) for the recent 5 year period (2004-2008) to estimate wage differentials. The annual EAPS addendum survey includes information on the employment type (regular or non-regular) and the contract length along with wages and other individual characteristics for each worker.

We divide the whole sample into four types of workers by employment type and contract length: regular workers with longer contracts (contract lengths of one year or longer), regular workers with shorter contracts

(contract lengths that are less than one year), non-regular workers with longer contracts, and non-regular workers with shorter contracts. We adopt the definition of non-regular workers used in Nam (2007) that includes three types: contingent workers, part time workers, and non-standard workers. Non-standard workers are those under alternative employment arrangements such as day laborers, temporary help agency workers, and contract company workers.

Table 1 shows the distribution of worker types. A noticeable feature is that the contract length for a majority of regular workers is one year or longer, whereas the contract length for a majority of non-regular workers is less than one year. About two thirds of regular workers have contract lengths of one year or longer. On the other hand, more than two thirds of non-regular workers have contract lengths less than one year.

The largest group is regular workers with longer contracts, accounting for about 46% of all workers in 2008. The second largest group is non-regular workers with shorter contracts, about 24% of all workers in 2008. About 20% of all workers in the whole sample are regular workers with shorter contracts. The remaining 10% of workers are non-regular workers with longer contracts. The distribution of worker types seems to be stable over the sample period, although there was a slight shift toward the subgroup of regular workers with longer contracts from all other subgroups.

[Table 1] Wage workers by employment type and contract length

(in thousands, %)

employment type contract length	Regular		Non-regular		Total
	≥ 1 year	< 1 year	≥ 1 year	< 1 year	
2004	6,088 (0.42)	3,102 (0.22)	1,612 (0.11)	3,782 (0.26)	14,584 (100.0)
2005	6,413 (0.43)	3,072 (0.21)	1,512 (0.10)	3,970 (0.27)	14,967 (100.0)
2006	6,639 (0.43)	3,255 (0.21)	1,603 (0.10)	3,854 (0.25)	15,351 (100.0)
2007	6,931 (0.44)	3,249 (0.20)	1,832 (0.12)	3,870 (0.24)	15,882 (100.0)
2008	7,498 (0.46)	3,160 (0.20)	1,608 (0.10)	3,836 (0.24)	16,102 (100.0)

Note: percentages in parentheses.

In Table 2, hourly wage rates are given by employment type and contract length. The EAPS asks workers about the average monthly earnings in the previous three months and the weekly work hours. We first divide the weekly work hours by 7 and then multiply 365/12 to convert to the monthly work hours. The hourly wage rate is defined as the ratio of the average monthly earnings to the monthly work hours.

Workers with longer contracts receive higher wage rates than workers with shorter contracts. The average hourly wage gap between workers with longer contracts and workers with shorter contracts appears to be much larger than the average hourly wage gap between employment types. For example, in 2008, normalizing the average hourly wage rate for regular workers with longer contracts to 100, non-regular workers with longer contracts receive 73.2 and regular workers with shorter contracts receive 41.4. Furthermore, among workers with shorter contracts, the average hourly wage rate is higher for non-regular workers than for regular workers.

[Table 2] Hourly wage rate by employment type and contract length

Employment type contract length	(in won, %)			
	Regular		Non-regular	
	≥ 1 year	< 1 year	≥ 1 year	< 1 year
2004	10,602 (100.0)	4,862 (45.8)	8,538 (80.5)	5,449 (51.4)
2005	11,203 (100.0)	4,914 (43.9)	8,933 (79.7)	5,515 (49.2)
2006	11,690 (100.0)	5,287 (45.2)	9,283 (79.4)	5,775 (49.4)
2007	12,474 (100.0)	5,390 (43.2)	9,961 (79.8)	5,954 (47.7)
2008	13,386 (100.0)	5,544 (41.4)	9,792 (73.2)	6,181 (46.2)

Note: Numbers in parentheses are relative wages in percentages in comparison with the average hourly wage of regular workers with contract length of 1 year or longer.

The weekly work hours are presented in Table 3 by employment type and contract length. The weekly work hours are similar between employment types for workers with contract lengths of one year or longer. Among workers with shorter contracts, on the other hand, regular workers

work longer hours and non-regular workers work less hours. Again, the gap in the weekly work hours appears to be larger between workers with longer contracts and workers with shorter contracts than between employment types.

[Table 3] Weekly work hours by employment type and contract length

Employment type contract length	Regular		Non-regular	
	≥ 1 year	< 1 year	≥ 1 year	< 1 year
2004	47.8	53.3	49.2	42.8
2005	47.2	53.2	48.2	43.3
2006	46.7	52.6	47.9	41.4
2007	45.9	52.0	46.8	40.6
2008	45.2	51.3	46.4	39.8

Tables 4-6 summarize worker characteristics such as age, job tenure, and education by employment type and contract length. The average age is higher for workers with shorter contracts than for workers with longer contracts. Among workers with longer contracts, there is no significant difference in the average age between employment types. Non-regular workers with shorter contracts are older by 4-5 years on average than regular workers with shorter contracts. The average worker age is rising overall. The average age seems to be rising faster among workers with shorter contract lengths than among workers with longer contract lengths.

[Table 4] Average worker age by employment type and contract length

Employment type contract length	Regular		Non-regular	
	≥ 1 year	< 1 year	≥ 1 year	< 1 year
2004	37.9	37.8	37.4	42.2
2005	38.3	38.0	38.0	42.4
2006	38.7	38.9	38.7	43.5
2007	39.1	40.0	38.9	44.7
2008	39.4	40.6	39.5	45.1

As one can imagine, the average job tenure varies much between workers with longer contracts and workers with shorter contracts. Among regular workers, the average job tenure gap between contract lengths is

almost 7 years. Among non-regular workers, the gap is about 3 years. The job tenure gap between employment types is about 4 years among workers with longer contract lengths. Among workers with shorter contracts, regular workers stay in the same job slightly longer than non-regular workers.

[Table 5] Average job tenure by employment type and contract length

Employment type contract length	Regular		Non-regular	
	≥ 1 year	< 1 year	≥ 1 year	< 1 year
2004	9.4	2.7	5.1	1.9
2005	9.5	2.7	5.3	2.0
2006	9.5	2.7	5.2	2.0
2007	9.6	2.7	5.3	2.1
2008	9.6	2.7	4.9	2.1

The distribution of education level also varies more between workers with longer contracts and workers with shorter contracts than it does between employment types. The distribution is bimodal for both regular and non-regular workers with longer contracts, high school diploma and college degree being the largest groups. On the other hand, the distribution has a thick tail at the lower end for workers with shorter contract lengths. The difference in the distribution of education level is much less obvious between employment types.

[Table 6] Education level by employment type and contract length (2008)

(In thousands)

Employment type contract length	Regular		Non-regular	
	≥ 1 year	< 1 year	≥ 1 year	< 1 year
Middle school	393	744	206	1,209
High school	2,230	1,410	454	1,451
2-yr college	1,323	371	296	259
4-yr college	2,648	345	456	402
postgraduate	495	19	84	44

A quick look at the data above reveals that the heterogeneity between workers with longer contracts and workers with shorter contracts appears

to be as large as that between employment types. With this observation, we are lead to examine wage gaps between workers with longer contracts and workers with shorter contracts as well as wage gaps between employment types.

IV. ESTIMATION RESULTS

4.1 Wage differential by employment type

We first examine the wage differential between employment types using OLS estimation as a benchmark. In an OLS estimation, a dummy variable for the employment type is added as an explanatory variable in a typical wage equation. Also included in our estimation as controls are a standard list of variables commonly used in the literature: age, job tenure, gender, marital status, education level as dummies, job type dummies, industry dummies, dummies for firm size, and union membership. The wage differential by employment type estimated by OLS in Table 7 is rather small ranging from 2.2% to 4.0% in the sample period. These estimates are comparable to those in Nam (2007) and Kim (2006), who found insignificant wage differential by employment type.

[Table 7] Wage differential by employment type (OLS)

	2004	2005	2006	2007	2008
discrimination	-0.039	-0.030	-0.040	-0.038	-0.022

The OLS estimate of wage differential by employment type assumes the same parameter values across groups that are being compared. Alternatively, one could allow different parameter values across groups as in Oaxaca decomposition. Table 8 presents the Oaxaca decomposition of wage differentials between regular and non-regular workers.

We first compare wages between regular workers non-regular workers in the whole sample. One could argue, however, that wages must be compared between workers with the same length of contract. Furthermore, there may exist wage differentials by employment type among workers with similar contract lengths. In consideration of this possibility, we

further divide each group of regular workers and non-regular workers into subgroups according to the length of contract terms in order to compare wages between regular and non-regular workers within each subgroup.

The Oaxaca decomposition presented in Table 8 shows the estimated wage differential by employment type under the assumption that, without discrimination, a non-regular worker would receive the same wage that a regular worker with the same characteristics is receiving now. It suggests that the wage differential by employment type for the whole sample is similar to the OLS estimates ranging from 2.8% to 4.7%. The observed wage differential ranging from 39.5% to 43.4% is mostly due to productivity difference between the two types of workers that is explained by characteristics of individual workers, firms or industries.

[Table 8] Oaxaca decomposition of wage differentials by employment type

contract length	wage differential	2004	2005	2006	2007	2008
all	observed	0.395	0.434	0.410	0.412	0.410
	productivity	0.352	0.405	0.367	0.365	0.384
	by employment type	0.042	0.028	0.043	0.047	0.026
≥ 1 yr	observed	0.288	0.294	0.308	0.315	0.327
	productivity	0.203	0.214	0.220	0.210	0.250
	by employment type	0.085	0.080	0.088	0.105	0.077
<1yr	observed	0.023	0.023	0.024	0.001	-0.033
	productivity	0.051	0.064	0.043	0.030	0.023
	by employment type	-0.028	-0.041	-0.019	-0.029	-0.056

* It is assumed that, without discrimination, a non-regular worker would receive the same wage that a regular worker with the same characteristics is receiving now.

The results are significantly different when we look at subgroups by contract length. Wage differential by employment type among workers with longer contracts ranges from 7.7% in 2008 to 10.5% in 2007, which is significantly larger than the wage differential by employment type in the whole sample. This suggests that wage differential by employment type within the subgroup of workers with shorter contracts should be much lower or even in the opposite direction. The results in Table 8 indeed shows that wage differential by employment type among workers with shorter contracts is against regular workers. This is possible

considering benefits such as insurance coverages and pension contributions provided to regular workers that are not part of their wages.

Our study suggests that the findings in the recent literature that wage differential by employment type is negligible should be modified when we compare regular and non-regular workers after we control for contract length. We find that wage differential by employment type is significant among workers with contract terms of one year or longer.

4.2 Wage differential by contract length

Findings in the previous section leads us to compare wages between workers with longer contracts and those with shorter contracts. We divide workers according to the length of their contracts and examine if wage differential by contract length exists. Considering the significant gap in the observed wages between workers with longer contracts and workers with shorter contracts and the correlation between employment type and contract length, this detailed division of workers seems warranted.

Table 9 shows Oaxaca decomposition of wage differentials by contract length under the assumption that, without discrimination, a non-regular worker would receive the same wage that a regular worker with the same characteristics is receiving now. As suggested earlier, the observed wage differential between workers with longer contracts and workers with shorter contracts is much larger than the observed wage differential between regular workers and non-regular workers, ranging from 72.4% in 2004 to 76.6% in 2007. The wage differential by contract length is also significantly larger than the wage differential by employment type, ranging from 10.1% in 2004 to 13.9% in 2007. It is also interesting that the wage differential by contract length seems to have an upward trend in the sample period whereas wage differential by employment type does not present a strong trend.

Wage differential by contract length is even larger within regular workers. It ranges from 15.5% in 2004 to 20.9% in 2007, again with an upward trend. The size of wage differential by contract length within non-regular workers is also significant, although not as much as that within regular workers. It ranges from 4.4% in 2005 to 9.4% in 2008.

[Table 9] Oaxaca decomposition of wage differentials by contract length

employment type	wage differential	2004	2005	2006	2007	2008
all	observed	0.724	0.762	0.741	0.767	0.743
	productivity	0.623	0.654	0.611	0.628	0.614
	by contract length	0.101	0.108	0.130	0.139	0.128
regular	observed	0.769	0.803	0.788	0.830	0.820
	productivity	0.615	0.627	0.592	0.620	0.634
	by contract length	0.155	0.176	0.196	0.209	0.187
non-regular	observed	0.504	0.533	0.504	0.516	0.460
	productivity	0.446	0.489	0.434	0.442	0.366
	by contract length	0.058	0.044	0.070	0.074	0.094

* It is assumed that, without discrimination, a non-regular worker would receive the same wage that a regular worker with the same characteristics is receiving now.

4.3 Wage differentials and salary type

The finding that wage differential by employment type is larger among workers with longer contracts than in the whole sample implies the importance of compositional difference between regular and non-regular worker groups. Each group of employment type is not a homogeneous group in terms of the contract length. We take one step further in this direction by considering an additional dimension of heterogeneity: salary type.

We divide the regular and non-regular worker groups according to the salary type. As Table 10 shows, most workers receive salary on a monthly basis. Daily compensation and annual salary come next, followed by incentives and hourly compensation. In 2008, for example, 62% of the workers in the whole sample received wages on monthly basis, 14% on annual basis and another 14% on daily basis. The distribution of workers across different wage types, however, varies between regular workers and non-regular workers. About 76% of regular workers received wages on monthly basis and 15% on annual basis. Only 5% of regular workers received wages on daily basis. The figures differ within the subgroup of non-regular workers. Non-regular workers who received wages on monthly basis were only 36%. In contrast, 29% of non-regular workers received wages on daily basis. The difference of distribution of

workers across different wage types between regular and non-regular workers confirms the idea that the two subgroups of regular workers and non-regular workers differ in composition of workers with different attributes, some of which may be unobserved.

[Table 10] Regular (R) and non-regular (NR) workers by salary type

whole sample	2004		2005		2006		2007		2008	
	R	NR	R	NR	R	NR	R	NR	R	NR
hourly	254	801	250	859	285	826	308	875	387	931
daily	805	3119	771	3067	852	2871	818	2753	920	2607
weekly	25	55	21	74	17	59	22	38	15	41
monthly	13393	3681	13276	3618	13396	3599	12961	3438	12619	3284
annual	1411	1043	1671	988	1867	1083	2056	1155	2471	1027
incentive	333	1181	269	1169	268	1174	272	1247	243	1136
others	31	34	19	31	11	20	17	15	16	9

[Table 11] Regular and non-regular workers with longer contracts by salary type

≥ 1 yr	2004		2005		2006		2007		2008	
	R	NR	R	NR	R	NR	R	NR	R	NR
hourly	42	14	20	6	6	4	43	34	101	32
daily	25	33	7	7	·	2	33	16	15	18
weekly	3	1	1	·	·	·	·	1	·	·
monthly	9311	1651	9589	1508	9296	1629	8988	1575	9014	1452
annual	1411	1043	1671	988	1867	1082	2055	1152	2471	1027
incentive	44	49	39	53	57	33	51	41	37	20
others	13	7	11	5	7	1	7	·	6	·

Table 11 shows the salary types for workers with contract lengths of one year or longer. In this subsample, monthly wage is the most popular, more so than in the whole sample, followed by annual salary. Other wage types are almost nonexistent. In 2008, for example, 74% of the workers in this subsample received wages on monthly basis and 25% on annual basis. The distribution of wage type is heavily concentrated in monthly wage and annual salary. This confirms that workers with longer contracts and workers with shorter contracts are indeed very heterogeneous. Furthermore, it suggests that controlling for wage type may affect the

estimate of Oaxaca's "discrimination coefficient".

Oaxaca decomposition of wage differentials within the subgroup of workers who receive wages on monthly basis is shown in Table 12. The average wage rate for regular workers with longer contracts who receive wages on monthly basis was higher by 72.9%~77.1% than the average wage rate for regular workers with shorter contracts who receive wages on monthly basis. In this case, the relative wage premium for regular workers with longer contracts ranges from 13.7% in 2004 to 18.2% in 2007. When compared to non-regular workers with longer contracts who receive wages on monthly basis, regular workers with longer contracts who receive wages on monthly basis enjoyed higher wage rates by 37.8%~47.5% on the average. In this case, the relative wage premium was estimated to range from 11.5% in 2004 to 15% in 2007.

[Table 12] Oaxaca decomposition of relative wage premiums of regular workers with longer contracts (monthly wage group)

relative to	wage differential	2004	2005	2006	2007	2008
regular, <1yr	total	0.729	0.744	0.734	0.771	0.759
	productivity	0.592	0.598	0.572	0.589	0.604
	wage premium	0.137	0.146	0.162	0.182	0.155
non-regular, ≥1yr	total	0.378	0.414	0.447	0.458	0.475
	productivity	0.263	0.294	0.319	0.308	0.359
	wage premium	0.115	0.120	0.128	0.150	0.116

Results in Table 12 confirms that wage differential by employment type within the subsample of workers on monthly wages is larger between workers with longer contracts and workers with shorter contracts than between regular workers and non-regular workers, as was in the whole sample. More importantly, the wage premium of regular workers relative to non-regular workers is quite significant when wages are compared within the subgroup of workers with longer contracts who receive wages on monthly basis. This suggests, on the one hand, that wage differential by employment type is much less prominent within the groups of workers with longer contracts who are on annual salaries. On the other hand, wage differential by employment type becomes more significant when the comparison is made within a more homogeneous subsample. To see this

more clearly, we present Table 13, where estimates of wage differentials by employment type are collected for different comparison groups.

Table 13 summarizes the wage differential by employment type within different groups. When the wage differential is estimated within the whole sample, it ranges from 2.7% to 4.8%, which may be negligible considering the possibility of omitted explanatory variables. The wage differential by employment type, however, becomes more significant when it is estimated within the subgroup of workers with contract lengths of one year or longer. It becomes even more significant when the comparison is made within a more homogeneous subgroup taking into account the wage type in addition to the contract length, ranging from 11.5% to 15.0%.

[Table 13] Wage differential by employment type

within	2004	2005	2006	2007	2008
whole sample	0.042	0.030	0.044	0.048	0.027
≥ 1 yr	0.085	0.080	0.088	0.105	0.077
≥ 1 yr & monthly	0.115	0.120	0.128	0.150	0.116

Our finding is that wage differential by employment type is quite significant within a homogeneous subgroup. In order to control the homogeneity of regular workers relative to non-regular workers, we estimated wage differential by employment type within a subgroup of workers with contract lengths of one year or longer who receive wages on monthly basis. This subgroup is the biggest and the most typical of regular and non-regular workers.

It seems that the low estimate of the wage differential by employment type for the whole sample in this paper as well as in the recent literature is an artifact of different composition of workers along other dimensions worker heterogeneity such as contract length and wage type. While wage differential by employment type does not seem to be significant on the aggregate, it becomes significant within a more homogeneous subgroup. This is because wage differential by employment type in the rest of the sample is not significant or in the opposite direction so that wage differential by employment type in the whole sample is diluted.

4.4 Robustness

In estimating the wage differentials by employment type and by contract lengths, we have assumed that, without discrimination, a non-regular worker would receive the same wage as a regular worker with the same characteristics is receiving now. We offer estimation results under the alternative assumption that, without discrimination, a regular worker would receive the same wage as a non-regular worker with the same characteristics is receiving now.

The Oaxaca decomposition presented in Table 14 shows the estimated wage differential by employment type under the alternative assumption. The estimated wage differential by employment type under this alternative assumption is also higher than what the OLS estimation suggests.

[Table 14] Oaxaca decomposition of wage differentials by employment type

contract length	wage differential	2004	2005	2006	2007	2008
all	observed	0.395	0.434	0.410	0.412	0.410
	productivity	0.336	0.392	0.362	0.364	0.368
	by employment type	0.059	0.042	0.048	0.048	0.042
≥ 1 yr	observed	0.288	0.294	0.308	0.315	0.327
	productivity	0.229	0.256	0.257	0.259	0.289
	by employment type	0.059	0.038	0.051	0.056	0.038
<1yr	observed	0.023	0.023	0.024	0.001	-0.033
	productivity	0.029	0.045	0.024	0.024	0.020
	by employment type	-0.006	-0.022	-0.000	-0.023	-0.053

* It is assumed that, without discrimination, a regular worker would receive the same wage that a non-regular worker with the same characteristics is receiving now.

In Table 15, where the wage differential by contract length is estimated under the alternative assumption. Under this alternative assumption, the wage differential by contract length seems even larger than the original estimates.

Some concerns may be raised about the endogeneity of the employment type: A (non-)regular worker's employment type may be by her own choice. One way to address this issue is to modify the estimation

[Table 15] Oaxaca decomposition of wage differentials by contract length

employment type	wage differential	2004	2005	2006	2007	2008
all	observed	0.724	0.762	0.741	0.767	0.743
	productivity	0.434	0.496	0.466	0.473	0.434
	by contract length	0.290	0.266	0.275	0.294	0.309
regular	observed	0.769	0.803	0.788	0.830	0.820
	productivity	0.386	0.430	0.401	0.423	0.402
	by contract length	0.384	0.373	0.386	0.406	0.418
non-regular	observed	0.504	0.533	0.504	0.516	0.460
	productivity	0.328	0.415	0.352	0.379	0.309
	by contract length	0.176	0.117	0.152	0.137	0.151

* It is assumed that, without discrimination, a regular worker would receive the same wage that a non-regular worker with the same characteristics is receiving now.

[Table 16] Comparison of the estimated wage equations: baseline versus switching

variable	RL		NL		RS		NS	
	I	II	I	II	I	II	I	II
female	-0.272	-0.264	-0.252	-0.250	-0.284	-0.285	-0.160	-0.143
age	0.054	0.052	0.052	0.051	0.041	0.041	0.035	0.034
age sq.	-0.001	-0.001	-0.001	-0.001	0.000	0.000	0.000	0.000
experience	0.026	0.023	0.027	0.027	0.024	0.024	0.047	0.036
experience sq.	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	-0.001
edu1	0.059	0.055	0.001	0.000	0.087	0.087	0.071	0.061
edu2	0.095	0.096	0.025	0.025	0.139	0.140	0.115	0.087
edu3	0.204	0.198	0.192	0.190	0.157	0.157	0.191	0.180
edu4	0.259	0.252	0.456	0.453	0.072	0.072	0.276	0.291

* RL, NL, RS, and NS stand for regular workers with longer contracts, non-regular workers with longer contracts, regular workers with shorter contracts, and non-regular workers with shorter contracts, respectively. I and II stand for the baseline model with no endogenous switching between employment types and the endogenous switching model, respectively.

model to include an equation for selection between regular and non-regular jobs as in Lee (1978). An application of the endogenous switching regression model to the issue of wage differentials between regular and non-regular workers can be found in Ahn (2001). He found that the estimated wage equations did not look much different and the wage

differentials by employment type were somewhat higher in the switching regression model. Table 16 compares the wage equations estimated for 2007 and confirms that the estimated wage equations show not much difference between the baseline model where the employment type is exogenous and the switching regression model where the employment type is endogenous.

V. CONCLUDING REMARKS

It is often argued that, given the dual structure of labor market in Korea, increasing flexibility of labor market would amplify the problems of regular versus non-regular workers. One of such problems is a rising wage discrimination against non-regular workers. Some of the recent studies found that there is no obvious trend in wage discrimination against non-regular workers nor significant wage discrimination can be found.

This paper conducts Oaxaca decomposition to estimate wage differential by employment type. In the whole sample, we confirm the same conclusion as has been offered in previous studies.

Our innovation in this paper is to estimate wage differential by employment type within a more homogeneous subgroup of workers that share similar contract lengths and the same wage type. Within this subgroup, we found that wage differential by employment type is significantly larger than in the whole sample. We interpret this result as suggesting the following: Some of the unobserved attributes of workers of other omitted explanatory variables that may be correlated with contract length and wage type could have increased the estimated wage differential by employment type in the whole sample if they were included in estimation.

We also found that wage differential by contract length is more significant than the wage differential by employment type. One implication of this finding is that identifying the vulnerable workers should focus more on contract lengths than on employment type.

It would be interesting to see if the heterogeneity of contract length and salary type interacts with other dimensions of heterogeneity such as gender, establishment characteristics, and union dummy. One could use the methodology of Blau and Kahn (1996) as in Cho and Cho (2010) who

decomposed the gender earnings gap along several dimensions. We leave this to those who may be interested as a topic for a further study. Recent studies show that wage differentials are more prominent within female workers than within male workers. Presumably, gender groups may not be homogeneous and one could further divide each gender group to control for other aspects such as contract length and wage type, and then estimate wage differentials between homogeneous subgroups within each gender to make comparison of wage differentials.

References

- Ahn, J. (2001), "Wage Differentials by Types of Employment Arrangements," *Korean Journal of Labor Economics*, Vol. 24, No. 1, pp. 67-96.
- Becker, G. S. (1957), *The Economics of Discrimination*, Chicago: University of Chicago Press.
- Blau, F. and L. Kahn (1996), "Wage Structure and Gender Earnings Differentials: An International Comparison," *Economica*, Vol. 63, S29-S62.
- Cho, D. and J. Cho (2010), "The Impact of Labor Unions on Gender Earning Gap: A Comparative Study of US and South Korean Labor Markets," mimeo.
- Cotton, J. (1988), "On the Decomposition of Wage Differentials," *The Review of Economics and Statistics*, Vol. 70, No. 2, pp. 236-243.
- Kim, Y. and K. Park (2006), "Wage Differentials between Standard and Non-standard Workers," *Korean Journal of Labor Economics*, Vol. 29, No. 3, pp. 25-48.
- Lee, I. and T. Kim (2009), "Wage Differentials between Standard and Non-standard Workers: Assessing the Effects of Labor Unions and Firm Size," *Korean Journal of Labor Economics*, Vol. 32, No. 3, pp. 1-26.
- Lee, L. (1978), "Unionism and Wage Rates: A Simultaneous Equations Model with Qualitative and Limited Dependent Variables," *International Economic Review*, Vol. 19, No. 2, pp. 415-433.
- Lee, S. (2001), "Economic Crisis and Mobility Patterns in the Korea Labor Market," *Korea Journal of Labor Studies*, Vol. 7, No. 2, pp. 67-96.
- Nam, J. (2007), "Wage Differentials between Non-regular and Regular Works," *Korean Journal of Labor Economics*, Vol. 30, No. 2, pp. 1-31.
- Park, K. and Y. Kim (2007), "The Analyses of the Wage Differentials between Standard and Non-standard Workers: A Comparison of 2003 and 2005," *Quarterly Journal of Labor Policy*, Vol. 7, No. 3, pp. 35-61.
- Oaxaca, R. (1973), "Male-Female Wage Differentials in Urban Labor Markets," *International Economic Review*, Vol. 14, No. 3, pp. 693-709.