The union wage premium in a segmented labor market: new evidence from Korea

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Abstract

Korea's labour market is highly dualized. Non-regular workers are subject to adverse labor conditions and unions, controlled by regular workers, usually restrict their entry as allowed by Korean regulations. Our objective is to analyse the union wage gap in Korea considering this institutional setting. In particular, we examine union wage effects using a more recent and richer dataset than previous studies, the Economically Active Population Survey (EAPS) data, that enables us to distinguishunion members from voluntary non-members, involuntary non-members, and workers in firms without unions. Our empirical analysis compares the wages of union members to those of different categories of non-unionised workers not only in the mean but also along the wage distribution using quantile regressions. Our results show that voluntary non-members experience a marginal wage penalty while for involuntary non-members it is much higher, a difference that could be reduced by removing regulations limiting non-regular workers from joining unions.

Keywords

Union wage premium, dual labour markets, regular and non-regular workers, quantile regression

1. Introduction and objectives

Labor unions influence wage levels of workers in various ways (Rosen, 1969; Freeman and Medoff, 1984). Although there has been a long-standing debate on the existence of union wage effects, recent empirical studies have converged to suggest that the union premium does exist at least in those countries where unions are not able to control wage outcomes in the non-union sector by extension of collectively bargained rates (Bryson, 2014). However, it is still difficult to make a concluding remark on the size of the union premium due to econometric problems in identifying a union causal impact on wages (Bryson, 2014; Card, 1996; Farber, 2005; Kulkarny and Hirsch, 2020). Furthermore, the wage premium seems to be heterogeneous by firm size (Ryu, 2005) and employment type (Gomez and Lamb, 2019; Kim, 2013); thus more detailed research is needed to develop a better understanding about the ways labor unions affect the determination of wage levels.

Many previous studies have relied on estimating earning differences between union members and non-members (Bryson, 2014). However, such studies focusing on the effect of "union membership" might not fully pay attention to the fact that non-members consist of substantially heterogeneous groups of workers. For instance, the reason why workers are not unionized could be that there is no labor union in the firm they work for, that they are not eligible for the union membership, or that they choose not to join the union. Although many previous empirical studies take into account relevant individual and workplace characteristics to satisfy *ceteris paribus* earnings condition between members and non-members, it remains skeptical whether the estimated effects of being a union member should be regarded as the true union premium.

While exploring the true union premium is an on-going task, comparing the wages of union members with those of different types of non-union members can shed light on a better interpretation of the estimated union effects and the role of labor unions. Taking this into account, the main contribution of this analysis is to disentangle the overall union wage effect into the heterogeneous effects by taking into account different types of non-members groups, in particular in terms of voluntary. Korea provides a useful context to tackle this research question as it has a highly dualized labor market in which non-regular workers are subject to adverse labor conditions such as low wages, little employment protection, and weak social safety net coverage (Jones and Urasawa,

2013).[1] Besides, most non-regular workers in the Korean labor market are not allowed to be union members, engendering that these involuntary non-members are fundamentally different from voluntary non-members in terms of individual characteristics (Choi, 2007). In fact, unions do not allow non-regular workers to become members of the union due to their different objectives: while regular workers want to improve overall labor conditions including wage increases, non-regular workers are mainly interested in employment stability.

A part of providing relevant results for the international literature regarding the need to take into account workers' heterogeneity when analyzing the union wage premium, this study also contributes to the Korean literature in two ways. First, we examine union wage effects using a more recent and richer dataset than previous studies. In particular, the Economically Active Population Survey (EAPS) data, conducted by the Korean National Statistics Office (KNSO), contain detailed information on individual worker's union status, which enables us to distinguish involuntary non-members from voluntary non-members. Specifically, as it will be explained in more detail in the next section, the EAPS data divide non-members into three categories: workers who voluntarily choose not to join unions, workers who are not eligible for the union membership, and workers whose workplace has no labor union. Our empirical analysis compares the wages of union members to those of different categories of non-members using the 2007-2016 waves of the EAPS, an issue that has not been considered in the literature before. Second, using quantile regression models, we examine how the union wage effects vary across the conditional wage distribution.

The rest of the paper proceeds as follows. Section 2 provides an overview of collective bargaining in Korea and a summary of the empirical literature. The data and the empirical strategy are described in Section 3. Section 4 presents the results, and Section 5 concludes suggesting policy implications.

[1] Non-regular workers who consist of contingent, part-time, and atypical workers. Non-regular worker is a term that has been widely used in Korea since the 1980s. The Korea Tripartite Commission of Labor, Management, and Government agreed to the classification of non-regular workers according to employment type. Table A1 outlines the definitions of different types of wage workers.

2. Institutional background and literature review

2.1. Institutional background: Collective bargaining and union density in Korea

There are two main labor union federations in Korea: the Federation of Korean Trade Unions (FKTU) and the Korean Confederation of Trade Unions (KCTU). Their legal status allows them to influence the design of social policies by participating in the Tripartite Commission as representatives for employees (Choi, 2007).[2] Up until the mid-1980s, the operations of industrial relations have been controlled by the government in Korea. The FKTU, founded in 1960, was supported by the government, and most of labor unions were organized at the firm level. Union density rate was 12.6% in 1970 and was 14.7% in 1980 (Bae, 2006). Due to low union density rate and dependence on employers and the government, labor union activities were very limited during this period (Bae, 2006).

Since 1987, political democratization in Korea has led workers to have opportunities to organize unions that are independent on their employers and the government. Newly formed unions started playing active roles in organizing collective actions to improve wages and working conditions. These new unions formed the KCTU in 1990 that tends to rely more on collective actions than negotiations. Union density hit a peak in 1989 at 19.8%, but has been declining for more than 20 years (Choi, 2007). Employers preferred to have enterprise unions to industry unions being afraid of that unions at the industry level may be more aggressive. Labor unions also wanted to strengthen their bargaining power at the firm level, establishing a Korean enterprise unionism where conflicts between unions and employers are internalized within the firm (Bae, 2006).

Collective agreements have applied solely to workers in unionized firms because most labor unions were firm-based, and collective bargaining occurred at the firm level (Bae, 2006).[3] Therefore, the bargaining coverage in Korea is very similar to union density. The union density and collective bargaining coverage in Korea have remained very low compared to other OECD countries. According to the OECD (2015b), labor union density was 10.1%, and the coverage by collective bargaining was 11.8% in 2015. Both figures were the second lowest among the OECD countries. However, union density is much higher in the public sector compared to the private one: 34.3% and

[2] Although the KCTU disaffiliated from the Tripartite Commission in 1999, it is still one of the most important mechanisms in labor relations.

[3] Industries such as cotton textiles, bus and taxi transportation are the exceptions where sub-sectoral bargaining or regional bargaining took place.

7.8%, respectively, according to the only available estimate in the ICTWSS data for 2006.[4]

Bargaining coverage in Korea is uneven depending on firm size. According to the EAPS, 73% of large firms with more than 300 employees were unionized, whereas 4% of small firms with less than five employees were unionized (KNSO, 2016). The fact that most workers in large firms are unionized and covered by collective bargaining while most workers in small firms are not has contributed to the extent of wage differentials in Korea (Grubb, Lee, and Tergeist, 2007). A common wage bargaining practice led by powerful enterprise unions in key industries such as automobile, electronics, and ship building has been criticized due to their pursuing a high wage premium through massive strikes. The wage increases often have an impact on other large firms in the same industry, boosting the union wage premium in large firms (Bae, 2006).

Bargaining coverage is also heterogeneous across different types of employment: there is a significant gap in union density between regular and non-regular workers. According to the EAPS data, union density was only 3% of non-regular workers, while 18% of regular workers were union members in 2016 (KNSO, 2016). This gap is largely attributed to the practice of restricting non-regular workers' union membership. The Korean labor law, '*Trade Union and Labor Relations Adjustment Act*' indicates that workers are free to establish a labor union or to join it; however, in practice, most of the enterprise-based unions in Korea limit their membership eligibility to regular workers in accordance with their union rule book (Choi, 2007). There are two main reasons why labor unions in Korea are reluctant to let non-regular workers join them. First, it is difficult for non-regular workers to maintain union membership due to their job insecurity. Unions believe that the expansion of union membership to non-regular workers does not help strengthen their bargaining power. Second, the interests of regular and non-regular workers conflict. The main demand of non-regular workers is employment stability, while regular workers want to improve overall labor conditions including wage increases. Since 1997 Asian financial crisis, labor market deregulation has been widely accepted, and insiders of labor unions, regular workers, actually looked at the use of non-regular workers favorably, as they regard non-regular workers as buffers that contribute to securing their employment in economic downturn (Durazzi et al., 2018). For this reason, regular worker-oriented labor unions in Korea have paid less attention to covering and protecting non-regular workers (Choi, 2007). This fragmented interest of unions in Korea has contributed to the polarization between unionized regular

[4] http://www.uva-aias.net/en/ictwss

workers and non-unionized non-regular workers, weakening the union's role of employee representation (Bae, 2006). Due to the practice of not allowing non-regular workers to join union, non-members in Korea consist of a heterogeneous group of workers. First, there are workers who voluntarily choose not to join unions (voluntary non-members). When it comes to productivity related characteristics, voluntary non-members are most likely to be similar to union members. Second, there are workers who are ineligible for the union membership although there is a union operating in their firm (involuntary non-members). A considerable number of non-regular workers belong to this group, so that on average, involuntary non-members are likely to be employed in jobs with poorer labor conditions. Third, there are workers who work in firms without union organizations. Since these three types of non-members are distinguished in terms of individual characteristics, comparing the wages of union members with those of each of the three types of non-union members in our study can provide a more detailed empirical evidence on the union wage premium.

2.2. Literature review

The empirical evidence shows that the existence and the size of union wage effects varies across countries (Bryson, 2014). While in countries such as France, Germany, Italy, the Netherlands, and Sweden, there is no statistically significant effect of unions on wages premia, in other developed countries including the US and the UK several studies have found significant wage premia ranging approximately between 10% and 20%. These diverse results across countries are mainly attributed to different institutional settings in which labor unions operate (Bryson, 2014).

The Korean evidence represents an interesting case study from this perspective. In particular, previous studies have found positive wage effects for union members. Although different results have been found depending on methodology and data used in the analysis, most studies point out that the estimated union wage effect is statistically non-zero and ranges from 2% to 8% (see, for example, Cho and Cheon, 2008; Cho, 2008; Kim, 2008; Ryu, 2007). Similar to the US and the UK, enterprise based labor unions in Korea seem to contribute to increasing the wage premium as the outcomes from union wage bargaining are not extended to non-unionized workers (Bryson, 2014). Kim (2008) investigates the changes in union wage effects from 1988 to 2007 using an OLS estimator and finds, on average, 3.4% of union wage premium for the two decades. He also shows the counter-cyclical nature of union wage premium in Korea during the analyzed period. Other studies such as Cho (2008) examine the union wage effect by applying fixed effect estimation. His results indicate that the estimated effect is 2.1%,

suggesting that the cross-sectional estimation of union wage effect is overestimated. Kim (2013) focuses on the heterogeneity of the union wage premium across employment types. The findings indicate that the union wage premium is higher among fixed-term workers than permanent workers, which suggests that fixed-term workers can benefit from union organization.

However, most of the existing literature relies on a comparison of wages between union members and non-members not fully considering the fact that non-members constitute a heterogeneous group of workers. In this respect, our analysis complements the previous research by disentangling the overall union wage effects on different groups of workers. Furthermore, our analysis does not only focus on the mean union wage effects, but also considers the whole wage distribution by using quantile regressions. The quantile regressions allow us to look at the effect of union membership on different parts of the distribution, thus examining patterns of heterogeneity in union wage premia (Manquilef-Baechler et al, 2009; Gunderson et al, 2016; Hirsch and Mueller, 2020).

3. Data and methodology

3.1. Data

Our analysis uses the Economically Active Population Survey (EAPS) repeated cross-sectional data collected by the Korean National Statistics Office (KNSO). It collects a series of information on an individual's labor related characteristics and other demographic characteristics. The survey is answered monthly by about 32,000 individuals in Korea who are 15 years old and over, and individuals in each region are selected by a stratification procedure designed to be representative of the national population in that region level.

We use data conducted every March from 2007 to 2016. The rationale behind this choice is that, since 2007, the KNSO has provided the supplementary survey of the EAPS by employment type every March, which constitutes crucial information for this analysis. More specifically, the supplementary survey contains information about wage (average gross monthly wage received for the last three months) and information with which we categorize workers by employment type. Workers are considered non-regular workers if they are categorized as contingent, part-time, or atypical workers, while the remaining workers are considered regular workers. The empirical analysis is limited to wage workers, so that non-wage workers are dropped from the sample. Among wage workers, those who were temporally not working during the reference week are not

included, as their hourly wages cannot be defined due to the zero hours worked for that period. Thus, we work with a sample of 249,177 wage workers.

The dataset has detailed information on the wage an individual worker receives. Monthly wage is transformed into hourly wage to make it easier and more informative to compare wages between full-time and part-time workers. Monthly wage is first divided by 4.3 to estimate weekly wage, and hourly wage is calculated by dividing the estimated weekly wage by the number of hours actually worked last week. Hourly wage is expressed in real terms, adjusted to 2015 prices using a consumer price index. The dataset also contains information on individual demographic characteristics (gender, age, educational attainment, marital status, rural residence, and head of household) and job-related or firm characteristics (tenure, employment type, occupation, firm size, industry). These variables are included in the regression model as individual-specific covariates. Table A2 summarizes the definitions of the variables used in the empirical analysis.

Table 1 reports the means of wages and demographics by labor union status. The first column shows the means for all workers, while the other columns report the means by labor union status. As previously mentioned, we consider four different type of workers depending on their union status: union members, voluntary non-union members, involuntary non-union members (ineligible for joining although there is a union operating in their firm) and those who work in firms without union organizations. As we can see from table 1, one eighth of the workers have union membership and union members have higher hourly wages than non-members. Among non-members, workers working in firms without labor unions account for around three fourths of the full sample and they are the ones receiving lower hourly wages. The wage gap between union members and workers without labor unions is sizable: average hourly wage of workers without unions is about 55% of that of union members. The table also reveals that there are considerable differences between voluntary non-members and involuntary non-members. In general, involuntary non-members are employed in lower paying jobs, while the wages of voluntary non-members are similar to those of union members. Turning to the workers' demographics, table 1 indicates two interesting features. First, non-regular workers are over-represented in the involuntary non-members group. This is consistent with the fact that many labor unions limit their membership eligibility to regular workers. Second, it is shown that voluntary non-members are the most educated group of workers among them. About 72% of the voluntary non-members have a tertiary degree. The proportion of more educated workers among voluntary non-members is about 16 percentage points higher than that among union-members. This implies that comparing wages of union members and those of voluntary non-members

may be underestimated owing to the selection of voluntary non-members. Last, it is important to highlight that workers in firms without unions are present across large, medium and small firms (so, the distributions of observable characteristics for union and non-union workers do overlap), although they are clearly over-represented in this last segment.

INSERT TABLE 1 HERE

One limitation of the EAPS data is that we cannot properly control for selection into union status, employment, and contract type. Taking this into account, if wages and selection into these variables are affected by some correlated unobservables, the estimates we obtain in the next section could be biased.

3.2. Methodology

The starting point of our analysis is the estimation of OLS and quantile regressions with different comparison groups. The basic regression at the individual level is

$$Y_{ikt} = \alpha_k + \alpha_t + \delta MEMBER_{ikt} + X'_{ikt}\beta + \varepsilon_{ikt} \qquad (1)$$

where *i* denotes individuals, *k* denotes firm size groups, and *t* denotes years. Y_{ikt} is logged hourly wage, the outcome of interest; α_k is a full set of firm size dummies; and α_t is a full set of year dummies. The variable of interest, $MEMBER_{ikt}$, is an indicator variable taking the value 1 if the individual is a union member and taking the value 0 otherwise. The OLS estimate δ is interpreted as the effect of union membership on earnings.

X_{ikt} controls for observable individual characteristics and includes a dummy for female, age, age squared, dummies for educational attainment (6 categories), dummies for marital status (4 categories), a dummy for rural residence, a dummy for head of household, the number of years of tenure, a dummy for contingent employment, a dummy for part-time employment, a dummy for atypical employment, dummies for occupation (9 categories), and dummies for industry (21 categories). We compute heteroscedasticity-robust standard errors to prevent, as much as possible, false rejections of the null hypothesis of no effect (Bertrand, Duflo, and Mullainathan, 2004).

Quantile regression techniques enable us to estimate the effect of union membership at different points along the whole wage distribution (Schmitt, 2008). More specifically, we estimate the union wage premium at the 10th, 50th, and 90th percentile of the wage distribution. Thus, the estimated union wage premium with quantile regressions is interpreted as the effect of being a union member for low-wage workers (at the 10th percentile), middle-wage workers (at the 50th percentile), and high-wage workers (at the 90th percentile), respectively.

Next, the empirical analysis uses three subsamples in addition to the full sample. The first subsample consists of union members and voluntary non-members who voluntarily choose not to join unions. The second subsample includes union members and involuntary non-members who are not eligible for the union membership. Finally, the third subsample constitutes union members and non-members who are unable to be members due to the absence of unions in their workplaces. Thus, a part of results for the whole sample, three additional sets of results are provided where union members are compared to each of the three subgroups of workers. This means that four different values of δ, the effect of union membership on earnings, are obtained from different estimates of equation (1): the first one represents the union wage premium when comparing union workers with all subgroups; the second captures the premium when compared to voluntary non-union workers, the third in relation to involuntary non-members and, last, the fourth is the premium compared to non-unionised workers, those in firms where no union exists.

4. Results

Panel A in Table 2 presents the results of the OLS and quantile estimates of model (1) regarding the impacts of union membership on hourly wage. The first column shows the OLS estimates, while the second, third, and fourth columns show the estimates of quantile regressions (0.10, 0.50, and 0.90, respectively). The OLS estimates indicate that union members appear to have higher wages compared to non-members after controlling for the observable characteristics described in the previous section (full results are also presented in table A3). The estimated overall effect is 8.6% and statistically significant, which is in line with the previous studies on the wage premium in Korea (see, for example, Cho, 2008; Kim, 2008; Ryu, 2007). However, the union wage premia are heterogeneous when taking into account different types of non-member groups. First, the OLS estimate obtained by comparing union members and non-members without unions in their workplaces indicates the highest union premium (10.4%). This implies that unobservable firm level characteristics might account for a considerable part of the estimated positive wage effect. Second, voluntary non-members appear to experience a marginal wage penalty. The estimated wage penalty of being a non-member is statistically significant, but lower than 2%. As later discussed, this might

underestimate the true value of the union membership because of the selection of voluntary non-members. Third, the wage penalty for involuntary non-members are about three times as large as that for voluntary non-members. This suggests that the union wage premium is likely to shrink by removing regulations limiting non-regular workers from joining labor unions.

The results of quantile regressions provide evidence that involuntary non-members are distinguished from the other non-members in terms of the distribution of the wage premium over quantiles. For involuntary non-members, the wage penalty of being a non-member at the tenth quantile is 7% and declines monotonically to 4.3% at the 90th percentile. The opposite is found among the rest non-member groups: the wage penalties of being a non-member is the lowest at the first decile and the highest at the upper decile. This is clearly illustrated in Panel A of Figure 1.

INSERT TABLE 2 and FIGURE 1 HERE

With the only exception of involuntary non-members, this is not the usual result in the literature. In fact, there is wide evidence that unions tend to compress the wage structure by increasing wages at the lower-end of the wage distribution (Bryson, 2014). However, analyzing Brazil's manufacturing sector, Arbache (1999) finds evidence that unions did not reduce wage inequality. The author argues that this situation could be explained by Abowd and Farber (1982) proposition that firms have incentives to hire better quality workers due to the union wage premium. As a result of this policy, a positive relationship could be observed between unionization and the distribution of wages. A potential explanation for why our results are different from the ones found by international studies for developed countries (see, for instance, O'Leary, Murphy, and Blackaby, 2004 for Great Britain; Cai and Liu, 2008 for Australia or Schmitt, 2008 for the United States) might involve the bargaining power of workers for different type of workers and firm sizes. In general, low wage earners have low skills and also low bargaining power. However, if low-skill workers are represented by unions, their bargaining power would be increased substantially compared with non-unionized low-skill workers. On the other hand, high wage earners have high bargaining power due to their specific skills; association with unions or not makes little difference in terms of bargained wage outcomes.

However, as we have previously mentioned, union density is much higher in the public compared to the private sector and, for this reason, it is relevant to check whether the behavior of unions is also different in the two sectors. Unfortunately, the EAPS dataset does not have information on which firm types (public or private) can be distinguished. Given the data limitation, to check whether similar union wage premium patterns are observed in the private sector, we have generated two subsamples that consisted of "private sector-dominated" industries and another one formed "public sector-dominated" industries, according to the shares of workers in the public sector in these industries. In the first case, four major industries with very low (around 1%) shares of workers in the public sector formed the subsample, which accounts for about a half of the whole sample. In the second case, the sample is formed by four sectors: electricity, gas, steam and water supply, public administration and defense; education; and human health and social work activities.

The results of this analysis are presented in panels B and C of table 2 and figure 1. The greater overall union wage premium in the private sector is not consistent with findings such as Blanchflower and Bryson (2010) pointing out that the union wage premium in the public sector is larger than that in the private sector. However, the evidence from the quantile regressions indicate that the behavior of unions in the public sector is the expected: it tends to reduce wage inequality (wage premium is the highest at the first decile and is the lowest at the last decile), with the only exception of voluntary non-members. This is not the case for the private sector.

In order to analyze whether the union wage premia are heterogeneous by employment type, the results of disaggregated analyses are shown in tables 5 and 6. We divided the sample of workers in the private and public sector into two groups: regular workers and non-regular workers. For example, we compare the wages of non-regular workers with union membership in the private sector and those of non-regular workers who are not allowed to join unions in the same sector.

The OLS estimates of tables 3 and 4 show that the overall wage premium is larger for non-regular workers in both sectors, which is in line with the findings in Kim (2013). Although the estimates for non-regular workers are relatively less accurate due to the small number of non-regular workers in the sample, the results show a similar pattern to the ones reported in panels B and C in table 2. First, the wage penalty of being a non-member is the largest for non-members without unions in their workplaces except for non-regular workers in the public sector. Second, there is a considerable amount of difference in the estimated wage penalty of being a non-member between voluntary

non-members and involuntary non-members. Lastly, the union wage premia are larger in the private sector.

INSERT TABLES 3 & 4 HERE

The results from the quantile regressions indicate that the wage premium is smaller at the lower quantile in the private sector and is smaller at the higher quantile in the public sector for both regular and non-regular workers, which implies that only unions in the public sector reduce wage inequality. This pattern seems to hold regardless of employment types (regular and non-regular workers). Except that the union wage premium is greater for non-regular workers in general, the union wage effects do not seem to be very heterogeneous by employment type.

5. Conclusions

Previous research on union wage effects in Korea has only focused on the effect at the mean of the conditional wage distribution. Using EAPS microdata from 2007 to 2016, we have employed quantile regressions in order to examine the union wage effects over the entire conditional wage distribution, considering different type of workers and firms.

We have found that voluntary non-members experience a marginal wage penalty while the wage penalty for involuntary non-members is substantial (about three times as large as that for voluntary non-members). Such a large difference may suggest that the union wage premium is likely to shrink by removing regulations limiting non-regular workers from joining labor unions. The current legislation regarding union membership does not contribute to reduce labor market segmentation between regular and non-regular workers.

In addition, the results from quantile regressions show significant union wage effects over most of the conditional wage distribution. For workers in the private sector, the union wage effects are significantly higher at the upper end than at the lower end of the conditional wage distribution. The opposite is observed among workers in the public sector, which suggests that Korean labor unions only contribute to reducing wage inequality in the public sector where union density is significantly higher than in the private sector. One hypothesis regarding the different behavior of unions in the private

sector could be related to the fact that they only represent the interests of high-qualified workers who want to keep their relative position compared to those workers in the lower part of the wage distribution. This is a potential explanation related to the fact that most of the enterprise-based unions in Korea limit their membership eligibility to regular workers, paying less attention to covering and protecting non-regular workers (Choi, 2007). In any case, and despite the very specific institutional setting in Korea, the public sector results show similarities with other countries (Gunderson et al, 2016; Blanchflower and Bryson, 2010) where workers in the right tail of the wage distribution receive lower union premiums than public sector workers in the left tail of the distribution.

However, caution is needed when interpreting the main findings of this paper due to the data limitation that we cannot fully control for selection into union status. The large differential in the wage penalty between voluntary and involuntary non-members may be partly attributed to the fact that the most able non-members voluntarily choose not to join unions (positive selection), rendering the estimates underestimated. On the other hand, part of the large wage penalty for involuntary non-members may be due to differences in observable or in unobservable characteristics such as ability between members and voluntary non-members. Quantile decomposition methods such as those applied by Wang and Lien (2018) could allow us to provide a more detailed explanation of the origins of the union wage premium. Further research is also needed to measure in an elaborate fashion the extent to which removing regulations limiting non-regular workers from being members contributes to reducing income inequality. A promising future research would be to capitalize on changes in institutional settings that affect exogenously individuals' selection into union status. In this regard, the shift from enterprise unions to industry unions may provide a useful context to deal with the selection issue.

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TABLES

Table 1. Descriptive statistics

	Full sample	Union Members	Non-members		
Variables / Mean values			Voluntary non-members	Involuntary non-members	No union
Hourly wage	1.151	1.742	1.702	1.514	0.972
Female	.442	.260	.408	.411	.479
Years of age	42.518	41.614	40.314	44.588	42.621
Less-educated (no tertiary degrees)	.574	.449	.278	.463	.629
More-educated (tertiary degrees)	.476	.561	.722	.537	.371
Years of tenure	5.532	12.361	11.188	7.534	3.751
Contingent employment	.202	.076	.113	.415	.208
Part-time employment	.107	.005	.012	.159	.126
Atypical employment	.140	.019	.022	.086	.175
Fewer than 30 employees	.591	.190	.190	.311	.717
Between 30 to 299 employees	.297	.444	.550	.419	.241
More than 300 employees	.112	.366	.260	.270	.042
Private sector-dominated industries	.471	.362	.254	.282	.525
Manufacturing	.210	.296	.172	.177	.202
Construction	.080	.019	.026	.033	.099
Wholesale and retail sale	.113	.038	.047	.059	.136
Accommodation and food service	.068	.009	.009	.013	.088
Public sector-dominated industries	.220	.292	.501	.449	.163
Electricity, gas, steam, and water	.006	.026	.008	.012	.001
Public Administration and defense	.060	.117	.125	.216	.030
Education	.081	.101	.311	.170	.052
Human health and social work	.073	.048	.057	.051	.080
Other industries	.309	.346	.245	.269	.312
Agriculture, forestry, and fishing	.013	.003	.002	.004	.016
Mining and quarrying	.001	.003	.001	.002	.001
Sewage and waste treatment	.004	.005	.002	.003	.005
Transportation	.041	.125	.061	.047	.025
Publishing, video, and broadcast	.028	.049	.034	.029	.024
Financial service and insurance	.043	.077	.055	.075	.033
Real estate activities	.019	.006	.003	.005	.024
Professional and scientific activities	.036	.028	.041	.042	.036
Business facilities management	.061	.028	.028	.040	.072
Arts, sports, and recreation	.013	.009	.010	.014	.014
Membership organizations and repair	.041	.011	.007	.008	.051
Private households	.008	.001	0	.001	.011
Extra-territorial organizations	.001	.003	.001	.001	.001
Number of observations	249,177	31,498	13,542	19,020	185,117

Hourly wage is presented in 10 thousands of Korean Won (adjusted to 2015 prices using a consumer price index).

Table 2. Main results

A. Full sample

		Quantile regressions		
Variables	OLS	q10	q50	q90
Full sample	0.086***	0.081***	0.095***	0.112***
	(0.003)	(0.004)	(0.003)	(0.005)
Observations	249,177	249,177	249,177	249,177
Voluntary	0.017***	0.007	0.014***	0.033***
non-member	(0.004)	(0.007)	(0.004)	(0.006)
Observations	45,040	45,040	45,040	45,040
Involuntary	0.059***	0.070***	0.067***	0.043***
non-member	(0.004)	(0.006)	(0.005)	(0.007)
Observations	50,518	50,518	50,518	50,518
No union	0.104***	0.100***	0.119***	0.126***
	(0.003)	(0.005)	(0.003)	(0.005)
Observations	216,615	216,615	216,615	216,615

B. Private sector-dominated industries

		Quantile regressions		
Variables	OLS	q10	q50	q90
Full sample	0.113***	0.095***	0.108***	0.137***
	(0.004)	(0.007)	(0.005)	(0.008)
Observations	117,373	117,373	117,373	117,373
Voluntary	0.009	0.027***	-0.005	0.033***
non-member	(0.007)	(0.008)	(0.008)	(0.011)
Observations	14,838	14,838	14,838	14,838
Involuntary	0.044***	0.044***	0.037***	0.062***
non-member	(0.007)	(0.011)	(0.008)	(0.012)
Observations	16,750	16,750	16,750	16,750
No union	0.136***	0.117***	0.133***	0.154***
	(0.00480)	(0.00745)	(0.00506)	(0.00846)
Observations	108,581	108,581	108,581	108,581

C. Public sector-dominated industries

		Quantile regressions		
Variables	OLS	q10	q50	q90
Full sample	0.071***	0.087***	0.071***	0.059***
	(0.004)	(0.006)	(0.005)	(0.006)
Observations	54,784	54,784	54,784	54,784
Voluntary	0.009*	-0.009	0.006	0.021***
non-member	(0.005)	(0.008)	(0.005)	(0.007)
Observations	15,986	15,986	15,986	15,986
Involuntary	0.057***	0.142***	0.064***	-0.003
non-member	(0.007)	(0.010)	(0.008)	(0.012)
Observations	17,742	17,742	17,742	17,742
No union	0.086***	0.125***	0.090***	0.077***
	(0.005)	(0.007)	(0.006)	(0.008)
Observations	39,454	39,454	39,454	39,454

Heteroscedasticity-robust standard errors are in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$

Table 3. Heterogeneous effects by employment type with the private sector-dominated industries sample

		Quantile regressions		
Variables	OLS	q10	q50	q90
		A. Regular workers		
Full sample	0.104***	0.089***	0.099***	0.134***
	(0.005)	(0.007)	(0.005)	(0.008)
Observations	81,557	81,557	81,557	81,557
Voluntary	-0.001	0.023**	-0.019**	0.026**
non-member	(0.008)	(0.009)	(0.008)	(0.011)
Observations	13,419	13,419	13,419	13,419
Involuntary	0.023***	0.028***	0.013	0.046***
non-member	(0.008)	(0.010)	(0.008)	(0.011)
Observations	14,200	14,200	14,200	14,200
No union	0.130***	0.112***	0.126***	0.151***
	(0.005)	(0.007)	(0.005)	(0.009)
Observations	74,986	74,986	74,986	74,986
		B. Non-regular workers		
Full sample	0.145***	0.127***	0.126***	0.164***
	(0.014)	(0.030)	(0.014)	(0.022)
Observations	35,816	35,816	35,816	35,816
Voluntary	0.064***	0.076***	0.033	0.093***
non-member	(0.022)	(0.025)	(0.021)	(0.025)
Observations	1,419	1,419	1,419	1,419
Involuntary	0.132***	0.100***	0.114***	0.175***
non-member	(0.018)	(0.024)	(0.016)	(0.021)
Observations	2,550	2,550	2,550	2,550
No union	0.159***	0.154***	0.143***	0.158***
	(0.015)	(0.023)	(0.014)	(0.015)
Observations	33,595	33,595	33,595	33,595

Heteroscedasticity-robust standard errors are in parentheses. The private sector-dominated industries sample is used.

* $p < .10$ ** $p < .05$ *** $p < 01$.

Table 4. Heterogeneous effects by employment type with the public sector-dominated industries sample

		Quantile regressions		
Variables	OLS	q10	q50	q90
		A. Regular workers		
Full sample	0.044***	0.057***	0.048***	0.046***
	(0.004)	(0.007)	(0.005)	(0.006)
Observations	35,944	35,944	35,944	35,944
Voluntary	0.007	-0.014*	0.006	0.018***
non-member	(0.005)	(0.008)	(0.005)	(0.006)
Observations	14,959	14,959	14,959	14,959
Involuntary	0.022***	0.093***	0.026***	-0.043***
non-member	(0.008)	(0.011)	(0.010)	(0.010)
Observations	12,049	12,049	12,049	12,049
No union	0.066***	0.088***	0.077***	0.074***
	(0.005)	(0.007)	(0.006)	(0.009)
Observations	26,418	26,418	26,418	26,418
		B. Non-regular workers		
Full sample	0.134***	0.148***	0.179***	0.122***
	(0.020)	(0.030)	(0.025)	(0.019)
Observations	18,840	18,840	18,840	18,840
Voluntary	0.040	0.006	0.051**	-0.020
non-member	(0.026)	(0.025)	(0.024)	(0.029)
Observations	1,027	1,027	1,027	1,027
Involuntary	0.142***	0.194***	0.175***	0.150***
non-member	(0.024)	(0.019)	(0.026)	(0.024)
Observations	5,693	5,693	5,693	5,693
No union	0.139***	0.153***	0.167***	0.128***
	(0.021)	(0.019)	(0.021)	(0.027)
Observations	13,036	13,036	13,036	13,036

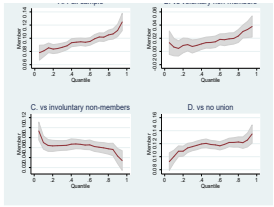
Heteroscedasticity-robust standard errors are in parentheses. The public sector-dominated industries sample is used.

* $p < .10$ ** $p < .05$ *** $p < .01$

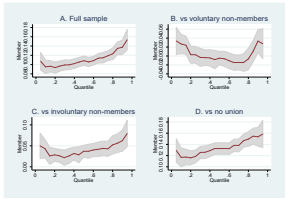
FIGURES

Figure 1. Quantile regressions

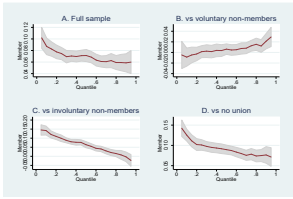
A. Full sample



B. Private sector-dominated sample



C. Public sector-dominated sample



APPENDIX

Table A1. Definitions of wage workers by the EAPS

Employment type	Definition
Regular workers	Wage workers who do not belong to the category of non-regular workers
Non-regular workers	Contingent workers, part-time workers, or atypical workers
Contingent workers	Fixed-term workers or non-fixed-term contingent workers
Fixed-term workers	Workers with prescribed contract period
Non-fixed-term contingent	Workers with open-ended t who could be dismissed against their own will
Part-time workers	Workers who work less than 36 hours a week
Atypical workers	Dispatched workers, temporary help agency workers, independent at-home workers, or daily workers
Dispatched workers	Workers who have employment contracts with sending employers but work and are supervised by using employers
Temporary help agency	Workers who have employment contracts with service companies and work companies that have service work contracts with the service companies (ex. workers at a security service company or a cleaning service company)
Independent contractors	Workers who independently provide goods or service to customers and paid freelance basis (ex. insurance planners, caddies)
At-home workers	Workers who work at home in office-type jobs
Daily workers	Workers who work during special events, peak hours, or intermittently when needs warrant

Table A2. Definitions of variables

Variables	Definition
Hourly wage	Average pretax hourly wage received for the last three months
Female	1 if individual is female; 0 otherwise
Age	Age when the survey was conducted
Education	(The reference group is elementary school degree or less)
Middle school	1 if individual has a middle school degree; 0 otherwise
High school	1 if individual has a high school degree; 0 otherwise
Junior college	1 if individual has a junior college degree; 0 otherwise
University	1 if mother has a university degree; 0 otherwise
Graduate school	1 if mother has a graduate degree; 0 otherwise
Marital status	(The reference group is single)
Married	1 if individual is married; 0 otherwise
Bereaved	1 if individual is bereaved; 0 otherwise
Divorced	1 if individual is divorced; 0 otherwise
Head of household	1 if individual is a head of household; 0 otherwise
Rural residence	1 if individual lives in a rural area; 0 otherwise
Tenure	Years of tenure when the survey was conducted
Contingent	1 if individual is a contingent worker; 0 otherwise
Part-time employment	1 if individual works fewer than 36 hours a week; 0 otherwise
Atypical employment	1 if individual is an atypical worker; 0 otherwise

NOTE. – Monthly wage is first divided by 4.3 to estimate weekly wage, and hourly wage is calculated by dividing the estimated weekly wage by the number of hours worked in the previous week.

Table A3. Full results of the main OLS regressions

Variables	Full sample	Voluntary non-member	Involuntary non-member	No union
Member	0.0859***	0.0171***	0.0591***	0.104***
	(0.00257)	(0.00382)	(0.00419)	(0.00286)
Female	-0.193***	-0.140***	-0.172***	-0.196***
	(0.00236)	(0.00504)	(0.00544)	(0.00254)
Age	0.0348***	0.0368***	0.0265***	0.0367***
	(0.000571)	(0.00166)	(0.00140)	(0.000610)
Age square	-0.000417***	-0.000464***	-0.000312***	-0.000442***
	(6.39e-06)	(1.94e-05)	(1.54e-05)	(6.86e-06)
Married	0.0626***	0.0598***	0.0798***	0.0594***
	(0.00269)	(0.00542)	(0.00589)	(0.00287)
Bereaved	0.0263***	-0.0186	0.0764***	0.0207***
	(0.00613)	(0.0188)	(0.0149)	(0.00651)
Divorced	-0.00960*	-0.0481***	-0.0387***	-0.0108**
	(0.00501)	(0.0136)	(0.0127)	(0.00527)
Household head	0.0817***	0.0648***	0.0714***	0.0831***
	(0.00230)	(0.00490)	(0.00544)	(0.00245)
Rural residence	-0.0164***	-0.0153***	-0.0122**	-0.0167***
	(0.00224)	(0.00471)	(0.00475)	(0.00240)
Middle school	0.0375***	0.0840***	0.0123	0.0427***
	(0.00447)	(0.0159)	(0.0119)	(0.00469)
High school	0.107***	0.202***	0.142***	0.105***
	(0.00417)	(0.0141)	(0.0110)	(0.00438)
Junior college	0.186***	0.291***	0.243***	0.182***
	(0.00483)	(0.0150)	(0.0123)	(0.00508)
University	0.283***	0.377***	0.351***	0.265***
	(0.00488)	(0.0150)	(0.0123)	(0.00516)
Graduate school	0.393***	0.426***	0.479***	0.363***
	(0.00673)	(0.0161)	(0.0142)	(0.00779)
Tenure	0.0223***	0.0253***	0.0242***	0.0210***
	(0.000154)	(0.000305)	(0.000291)	(0.000180)
Contingent work	-0.0363***	-0.0704***	-0.0937***	-0.0254***
	(0.00226)	(0.00690)	(0.00582)	(0.00244)
Part-time work	0.0682***	0.124***	0.0752***	0.0676***
	(0.00401)	(0.0347)	(0.0130)	(0.00422)
Atypical work	-0.0351***	-0.0683***	-0.0709***	-0.0311***
	(0.00355)	(0.0166)	(0.0123)	(0.00369)
Occupation FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Firm size FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	249,177	45,040	50,518	216,615

NOTE. – Heteroscedasticity-robust standard errors are in parentheses. The full sample is used.
* $p < .10$. ** $p < .05$. *** $p < .01$.