UNIVERSITAT de BARCELONA

Essays in labor and education economics in Korea

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PhD in Economics

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Chapter 1. Introduction

The Korean economy is characterized by its dramatic economic growth over the past decades. Even after the financial crises in 1997 and 2008, the recovery was relatively rapid, and Korea has been continuously growing (Grubb, Lee, and Tergeist, 2007). Education has played a crucial role in Korea's economic development (Jones, 2013). Less than 20% of students had access to secondary education in 1945; however, in 2012, 98% of Korean youths have at least secondary education, the highest among the OECD countries (OECD, 2012b). This drastic expansion of education has contributed to the development of capital-intensive and knowledge-based industries of Korea in which few natural resources are available (Jones, 2013).

However, the drastic economic growth has generated diverse social and economic problems, as there have been mismatches in the labor market, dependent on various supply (education, migration, etc.) and demand factors (technological changes, institutional settings, etc.). The development of the labor market went together with persistence of high levels of non-regular forms of employment, making the labor market highly dualized (Grubb, Lee, and Tergeist, 2007). Non-regular workers who consist of contingent, part-time, and atypical workers, are subject to adverse labor conditions such as low wages, little employment protection, and weak social safety net coverage, while regular workers enjoy high wages, high levels of employment protection, and broad social safety net coverage. According to the Economically Active Population Survey (EAPS) conducted by the Korean National Statistics Office (KNSO), around 34% of wage workers in Korea were non-regular workers in 2013 (KNSO, 2013). Looking at the share of temporary workers for purposes of international comparison, Korea had the third highest number among the OECD countries in that year (OECD, 2013).

Gaps in labor conditions between regular and non-regular workers in Korea are substantial and continuously widening. The EAPS reports that the average monthly wage of non-regular workers was only 55.8% of that of regular workers in 2014, while the corresponding figure in 2002 was 67.1%. Obviously, their lower wages are explained in part by productivity differences.[1] However, as Kim (2010) points out, the fact that most non-regular workers perform almost the same tasks as regular workers and work the same hours makes the wage differentials problematic. Moreover, non-regular workers' disadvantages in access to social insurance systems and corporate-provided fringe benefits further widen the gaps between regular and non-regular workers, fueling income inequality and relative poverty.

Furthermore, the persistence of sizable gaps in labor conditions drives Korean youth to make an unproductive effort to become regular workers, engendering inefficiency in the whole economy. The high college entrance rate, reaching almost 80%, and an excessive use of private tutoring to enter a prestigious university illustrates the current situation in Korea. Large differentials in labor conditions are one of the factors that provides younger people with incentives to adopt extreme strategies to gain an upper hand over their competitors in this fierce job market.

Investment in education is still believed by Koreans as the best way of securing their life time income as they are aware of the duality of the labor market. Given that economic and social status are closely related to the prestige of the university they attended, Korean families spend considerable sums of money on private tutoring to boost their children's academic performance, thereby increasing their chances of being admitted to one of top universities (Chang, 2009). Private tutoring in Korea is not limited to children from higher socio-economic groups, but widespread across different income groups. According to the 2009 Survey of Private Education Expenditure (SPEE) conducted by the Korean National Statistics Office (KNSO), 87.4% of elementary school students, 74.3% of middle school students and 62.8% of general high school students received private tutoring in 2009, with an average monthly private tutoring expenditure per student of 242 thousand Korean won (approximately 220 US dollars) in 2009. Total expenditure on

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[1] Previous studies such as Lee (2009) and Nam (2007) argue that the wage gap between regular and non-regular workers is less than 10% after controlling for individual and firm specific characteristics.

private tutoring in Korea amounted to 21.626 trillion won, equivalent to 2% of Korea's GDP. The OECD (2012a:24) reports that the burden of private tutoring on Korean households accounted for 10.7% of average household income per student in 2010. Obviously, the pervasiveness of private tutoring places a heavy burden on Korean households.

This thesis provides an analysis of the aforementioned labor market challenges (inequality in the dual labor market) and dissatisfaction with the education system (proliferation of private tutoring). Special attention is paid to the role of one of the main labor supply factors (education) and one of demand factors (institutional settings). Specifically, the first two chapters evaluate the effectiveness of recent educational and labor policies that aim to alleviate the excessive private tutoring consumption and labor market dualism, respectively. Policy recommendations based on these analyses should be of interest not only for Korean authorities but also for the wide set of countries with an overheated private tutoring market and a highly dualized labor market. The third chapter extends the discussion of the second chapter by focusing on the role of labor unions. In spite of declining bargaining power, labor unions continue to generate wage a premium, which contributes to polarization between unionized regular workers and non-unionized non-regular workers. By focusing on the fact that most unions in Korea limit their membership eligibility to regular workers, the third chapter provides a detailed analysis on the union wage premium and its implications.

Korea provides an interesting case study. Due to the uniqueness and seriousness of the problems associated with private tutoring and labor market duality, successive government have implemented various policy measures, so that Korea has been a testing ground for regulating private tutoring and for alleviating labor market duality. Some major education and labor reforms allow for natural or quasi-experimental research designs, which enable to circumvent endogeneity problems in evaluating policy effectiveness. Thus, it is one of the main contributions of the thesis to apply quasi-experimental research designs to the estimation of causal impacts of the policy interventions.

The thesis consists of the following three independent essays that are interconnected. In Chapter 2 I evaluate the effectiveness of an education policy in Korea that regulates operating hours of private tutoring academies,

called hagwon, to reduce private tutoring consumption. Successive Korean governments have attempted to limit private tutoring consumption for more than four decades; however, any of these policy measures has not been effective. This chapter focuses on the latest policy measure that directly regulates the supply side of the private tutoring market. Since 2009, 16 provincial education offices have placed a restriction on operating hours of hagwon in their ordinances. Since then, some regions have strengthened their initial curfew while the others have maintained the initial curfew. We take advantage of these shifts to identify the treatment effect by using an extended version of difference-in-differences estimation.

Our findings suggest that strengthening the curfew does not generate a significant reduction in the time and money spent on private tutoring. However, the results are heterogeneous by school level and socioeconomic status. High school students whose demand for private tutoring is inelastic, increased their consumption of alternative forms of private tutoring such as one to one type tutoring when their consumption on hagwon type tutoring had to be limited. This substitution was more intense among lower income high school students, suggesting that strengthening the curfew may have a negative impact on the equality of educational opportunities.

Chapter 3 deals with equal treatment legislation in the dual labor market. In this chapter, I examine whether and how labor market duality can be alleviated through legislation that prohibits discrimination based on employment type. In 2007, the Korean government undertook a labor reform banning discriminatory treatment against fixed-term, part-time, and dispatched workers. By exploiting a gradual implementation of the anti-discrimination law by firm size targeting a subset of non-regular workers, I identify the treatment effects of the anti-discrimination law, taking a difference-in-difference-in-differences approach to the 2007-2010 waves of the Economically Active Population Survey.

The results suggest that the anti-discrimination law leads to significant increases in hourly wages and the probabilities of being covered by national pension, health insurance, and employment insurance for targeted non-regular workers in small firms, relative to other workers. Anticipatory behaviors of employers and selective transitions of employees in response to the implementation of the anti-discrimination law do not underlie the

estimated effects. The presence of labor unions contributes to reducing gaps in labor conditions between regular and targeted non-regular workers. The findings suggest that policies imposing legal burdens on firms for unjustified discriminatory treatment can make a non-negligible contribution to alleviating labor market duality.

Chapter 4 extends the discussion of the second chapter paying particular attention to the role of labor unions. We study the union wage premium in Korea. Most of the literature on the union wage effect has relied on a comparison of wages between union members and non-members not fully considering the fact that non-members constitute a heterogeneous groups of workers. Using the 2007-2016 waves of the Economically Active Population Survey data that contain detailed information on individual worker's union status, we disentangle the overall union wage effect into the heterogeneous effects by taking different types of non-members groups into consideration. In addition, using quantile regression models, we examine how the union wage effects vary across the conditional wage distribution.

The results show that voluntary non-members experience a marginal wage penalty while the wage penalty for involuntary non-members is substantial. This implies that the union wage premium is likely to shrink by removing regulations limiting non-regular workers from joining labor unions. The evidence from quantile regression indicates that wage premium is the highest at the lower decile and is the lowest at the higher decile in the public sector, which suggests that labor unions operate well, with respect to reducing wage inequality, only in the public sector.

Finally, the thesis closes with Chapter 5 that provides a summary of main findings of each chapter and their policy implications.

Chapter 2. Regulating private tutoring consumption in Korea: lessons from another failure

2.1. Introduction

Private tutoring can be defined as a set of activities, supplementary to mainstream schooling, whose aim is to boost academic performance in exchange for monetary payment (Bray, 1999; Bray, 2006). Private tutoring can adopt a variety of forms: one-to-one classes, group classes or even radio or internet-based tuition. The proliferation of private tutoring seems to be a growing phenomenon in several countries across different continents (Bray and Kwo, 2014), its causes being heterogeneous (Dang, 2007; Tansel and Bircan, 2006).

Private tutoring has several beneficial effects, the main one being a student's enhanced academic performance. However, this so-called "shadow education" (Bray, 1999; Bray, 2009) can also have various detrimental effects, not least the high opportunity cost for the students and the heavy financial burden for their families. Private tutoring consumption is positively correlated with household income (OECD, 2014); therefore, if the amount of private tutoring received affect academic achievement – as some studies, including Choi, Calero, and Escardibul (2012), seem to suggest – then concerns are raised about the equity and equality of educational opportunities.

The Republic of Korea (hereinafter, Korea) has one of the largest private tutoring industries in the world. The OECD (2012a:24) reports that the burden of private tutoring on Korean households accounted for 10.7% of average household income per student in 2010 (making it also a key factor in explaining the country's low fertility rates). According to the 2009 Survey of Private Education Expenditure (SPEE) conducted by the Korean National

Statistics Office (KNSO), 87.4% of elementary school students, 74.3% of middle school students and 62.8% of general high school students received private tutoring in 2009, with an average monthly private tutoring expenditure per student of 242 thousand Korean won (approximately 220 US dollars) in 2009.[2] Total expenditure on private tutoring in Korea amounted to 21.626 trillion won, equivalent to 2% of Korea's GDP. According to this same survey, two thirds of those who receive private tutoring are taking lessons at private academic institutes, called hagwon.

Since the 1970s, Korea has been at the front line of the design of new policies for tackling the proliferation of private tutoring. In 2006, in a new attempt to curb the thriving private tutoring market and to revive public education, the Korean government decided to place a 10 p.m. curfew on the operating hours of hagwon. As a result, household spending on private tutoring has gradually decreased since reaching its highest peak in 2009. The government believes that the fall in private tutoring expenditure is an indication that the reforms have begun to take effect and that the 10 p.m. curfew has played a substantial role in this (Han 2011). However, to conclude that this reduction is attributable to the hagwon curfew may be erroneous as other factors, such as the sluggish real economy, could also have had an impact on the fall in private tutoring expenditure.

The main aim of this research is to evaluate the impact of the advancement in the implementation this new policy (i.e., the curfew on the academies' operating hours) aimed at regulating private tutoring markets. More specifically, we focus on the effect of enforcing the curfew on private education expenditure and on the time dedicated to private tutoring activities. We estimate mean and heterogeneous effects by educational level and socioeconomic status applying difference-in-differences (DD) estimators to the 2009-2012 waves of the SPEE. By doing so, we are able to overcome many of the information problems identified by Bray and Kobakhidze (2014) in previous studies of private tutoring.[3]

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[2] Bray (2013:414) reports similar information for a set of ten countries where private tutoring is prevalent. The only country where figures were close to Korea's was urban China, where 73,8%, 65,6% and 53,5% of primary, lower secondary school and high school students, respectively, consumed private tutoring.

[3] More specifically, Bray and Khobakhidze (2014) focus on the problems of international assessments such as TIMSS and PISA. The cross-sectional nature of data, imprecise

The main findings of this analysis can be summed up as follows: First, enforcing the extension of the curfew did not generate a significant reduction in the hours and resources spent on private tutoring. Second, demand for private tutoring seems to be especially inelastic for high school students, who increased their consumption of alternative forms of private tutoring. This raises equity issues concerning equality of educational opportunities, given the higher cost of these alternative forms of private tutoring. Policy recommendations based on our analysis should be of interest not only for Korean authorities but also for the wide set of countries with an overheated private tutoring market.

The rest of the Chapter proceeds as follows: Section 2.2 provides an overview of the demand for and the impact of private tutoring, and charts the struggle mounted by Korean authorities against this phenomenon, the hagwon curfew being one of their latest attempts. Section 2.3 describes the empirical methodology and the dataset employed in the analysis. In section 2.4 we present our main results concerning the impact of strengthening the curfew on expenditure and on the time spent on private tutoring activities. The section concludes with a discussion of these results and their policy implications.

2.2. Private tutoring in Korea: demand, impacts and policy evolution

Korea is one of the most frequently studied cases in the private tutoring literature, due to the magnitude of the business and the seriousness with which successive governments have sought to control it. In this section we present a brief overview of the demand for and the impact of private tutoring (2.2.1), we summarize the campaign mounted by the Korean authorities against private tutoring (2.2.2) and, finally, we explain the curfew imposed on the hagwon (2.2.3).

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questions and broad definitions of "private tutoring" are among the most relevant shortfalls of these databases.

2.2.1. Demand for and impact of private tutoring

Various factors account for the proliferation of private tutoring in Korea, a country where, as it will be seen, Bourdieu's cultural and social reproduction theory has a high explanatory capacity (Bourdieu, 1973). In this sense, Korean families regard education as one of the main channels for ensuring class reproduction and social promotion. Kim and Lee (2010) claim that parents demand private tutoring as a means of compensating for the poor quality of state schooling, especially because the former provides more individualized attention. This argument is persuasive; yet, it seems insufficient to explain the overheated demand for private tutoring in the country. The fact that Korean public education expenditure as a percentage of GDP is 4.7%, higher that is than the 2009 OECD average of 4.0%, suggests that the relative competitiveness of public education may be low not because of the level of public investment, but because of the country's more consumer-oriented, high quality private tutoring services (OECD, 2012b:4). Alternatively, Bray (2006) claims that low salaries paid to mainstream teachers may likewise yield an increase in demand for private tutoring in some developing countries. However, this is not the case in Korea, where teachers are well-paid in comparison to their counterparts in other OECD countries -only German and Luxembourger high school teachers at the top of the scale are better paid than the Korean (OECD, 2015a).

Bray and Kwok (2003), among others, observe that the cultural history of Korea is another critical reason accounting for the demand for private tutoring. Many Asian countries, including Korea, have been highly influenced by Confucianism, a system of teachings in which the importance of education is emphasized as a tool for personal development and the primary mechanism promoting mobility (Choi, 2010:24).

Finally, against this cultural backdrop, the sizeable economic and non-economic premiums of graduating from an elite university further shape a scenario in which the country is obsessed with private tutoring (Choi, Calero, and Escardíbul, 2012; Chae, Hong, and Lee, 2005). Since 1950, the Korean education system has adopted the following structure: six years of primary school; three years of lower secondary education; three years of upper secondary education; and four years of university studies. There are two types of high school: general high schools, where pupils are educated to go

on to university, and vocational high schools. The first nine years of schooling are compulsory and free, while high school education is virtually universal, with only modest tuition fees being charged (Kim, 2004:3). According to the OECD (2011), in 2009, 98% of 25 to 34-year-old Koreans had successfully finished high school education, while 63% of these had completed tertiary education: both proportions are the highest among all OECD countries. The percentage of high school graduates who begin four-year university courses or two-year technical college studies was reported to be 83.8% in 2008, which is also very high compared to other OECD countries (KEDI, 2009:66). However, as the average university degree premium fell, competition for admission to the more prestigious universities became notoriously fiercer. As Lee and Brinton (1996) and Choi, Calero, and Escardíbul (2012) highlight, the benefits of attending an elite university in Korea extend well beyond those of an individual's human capital, as school ties provide additional advantages in the labor market as a crucial source of social capital. Thus, young students face a tremendous amount of competition for the few places offered by the most prestigious universities as parents are willing to adopt any strategy to help their children gain an upper hand over their competitors (Park, Byun, and Kim, 2011).

College entrance depends primarily on academic achievement at school and on the results of the College Scholastic Achievement Test (CSAT), an objectively graded examination sat once a year. Consequently, most general high school students focus exclusively on test preparation (Byun, Schofer, and Kim, 2012) and Korean families end up spending considerable sums of money on private tutoring to support their children, a practice that is not limited solely to children from higher socio-economic groups, but one that is widespread across the income groups (Lee, Jwa, and Lim, 2014).

The intensity with which private tutoring is consumed has both advantages and disadvantages. The main advantage is that pupils enhance their learning outcomes, a result supported by several studies (see, for example, Dang and Rogers, 2008; Kang, 2007). This enhanced academic achievement may also be beneficial to the economy as a whole, since the accumulation of human capital increases labor productivity, prompting economic growth. Additionally, private tutoring has a positive effect on the

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labor market: in 2009, this sector became the largest employer of graduates in the humanities and social sciences (OECD, 2014:95).

However, various experts conclude that the proliferation of private tutoring can have a number of harmful impacts. First, in a highly competitive environment, the health of the country's pupils is put a risk. This is especially true of students receiving private tuition late into the night and on weekends (Rhie, Lee, and Chae, 2011). Second, a reliance on private tutoring inevitably has some impact on public education. As students are often already familiar with the material being taught at school (having already studied it privately), the levels of motivation of both students and teachers are negatively affected (Choi, Calero, and Escardíbul, 2012). Third, a dependence on private tutoring may impede the development of students' self-directed learning and problem-solving abilities (Kim, 2010:7). Fourth, private tutoring has an opportunity cost which may restrict the development of skills and contents beyond those taught at school.

In addition to these various effects, another serious problem identified by economists is that private tutoring gives rise to an issue of efficiency as well as one of equity. First, private tutoring activities may generate negative externalities, since students are likely to demand more private tutoring services than their optimum level so as to at least maintain their relative positions in the academic performance distribution (Kim, 2010). As a result, private tutoring may be over-consumed, compared to a socially optimum level, despite the fact that the amount of private tutoring consumed by each student is individually optimal. As such, the overheated private tutoring market in Korea can be explained in the framework of the classic prisoner's dilemma which leads to a socially inefficient equilibrium (Choi, 2010). In other words, decisions which are rational at the individual level –consuming private tutoring- can lead to a socially inefficient situation –the country may not be investing in other activities with a higher return.

As regards the equity issue, private tutoring is expensive, which means students from wealthier families are likely to consume more or higher quality services. Indeed, Korean families perceive one-to-one and group tuition – the most expensive types of private tutoring – as being the most

effective.[4] All in all, this situation can undermine the equality of educational opportunities. Thus, the Korean government has adopted different measures over recent decades in an attempt to control private tutoring for reasons of both efficiency and equity.

2.2.2. A testing ground for regulating private tutoring

In 1969, the government effectively ended selective education at the middle school level by abolishing entrance examinations. The primary aim was to control what was seen as wasteful private tutoring competition among children preparing for entrance exams to the most prestigious middle schools (Chung, 2002). For the same motive, in 1974, the high school equalization policy was implemented in Seoul and Busan, Korea's two largest cities, and subsequently expanded to several other major cities through to 1980 (Kim and Lee, 2010).[5] However, contrary to government expectations, spending on private tutoring showed no signs of abating. Rather, the equalization policy contributed significantly to raising the demand for individualized education (Kang, 2007), as households turned to private tutoring as a tool to supplement the equalized state education system (Kim and Lee, 2010).

Against this backdrop, in 1980, the Korean government took steps to prohibit all forms of private tutoring. However, parents, willing to hire private tutors at any expense, turned to the black private to meet their demand. At the same time, the suppliers of illegal private services demanded risk premiums, thus increasing further the price. Thus, paradoxically, the regulation of private tutoring seems to have exacerbated the inequality of educational opportunities by polarizing the consumption of the sector's services.

The democratization and liberalization of Korea saw the outright ban on private tutoring relaxed somewhat. However, until the Constitutional

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[4] Choi (2008), however, is unable to confirm the greater effectiveness of one-to-one tutoring. His results suggest that the effect of private, one-to-one tutoring on college entrance is positive, but statistically insignificant.

[5] The high school equalization policy introduced a lottery system whereby students were randomly allocated to the public and private schools within a province. As a result, the schools became more homogeneous as they could no longer select students and curricula, teacher salaries and tuition fees were regulated by the government.

Court ruled that the prohibition on private tutoring was indeed unconstitutional in 2000, the government had only permitted two types of operator: college students and the hagwon. In the latter case, the government imposed strict restrictions in the form of specific requirements regarding the qualifications of the instructors, the schools facilities, and fees (Kang 2007). Despite this, the number of hagwon increased dramatically from 381 in 1980 to 14,043 in 2000, while the number of students enrolled at hagwon increased in the same period from 118,000 to 1,388,000 (Kim and Lee, 2010). According to National Tax Service data, there were nearly 105,000 hagwon operating in Korea by 2013, up from 92,433 in 2008 (Korean Economic Daily, 2015).

At the same time, the government has sought to strengthen public education in the belief that the gap between the quality of mainstream education and private tutoring accounts for the willingness of households to hire private tutoring services. Thus, the government has increased inputs to public education substantially in an effort to improve school facilities, the student-teacher ratio, and the quality of school teachers. However, despite the marked increase in government spending, household spending on private tutoring has continued to rise at a remarkable pace (Kim and Lee, 2010).

Since the first decade of the new century, the government has been actively involved in providing low-cost substitutes for private tutoring so that demand for the latter could be absorbed into the public system. These reforms include the Educational Broadcasting System (EBS) lectures that specifically focus on preparing the CSAT, and "after-school" programs, introduced in 2006, that offer hagwon-like lessons in schools.[6] These measures, however, did little to cool the demand for private tutoring. As links between the EBS lectures and the CSAT intensified (with many CSAT questions being drawn from the EBS lectures), hagwon that specifically focused on the EBS lectures became very popular. The "after-school" programs enjoyed some success, especially as they provided low-income pupils with additional education opportunities. However, students from wealthier backgrounds continued to consume private tutoring services. Indeed, some were found to attend both the "after-school" programs and to receive private tutorials. According to the

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[6] These are extra lessons offered by the schools for which students pay a small tuition fee, the government meeting the extra-funding needed. Initially, schools were forbidden from signing contracts with private institutions to provide these after-school programs.

2009-2012 SPEE data, 49.8% of middle and high school students whose monthly household income was more than 4 million Korean won both received private tutoring and attended the "after-school" programs, while 27.7% of them only enrolled for private tutoring. In the case of households with a monthly income equal to or below the 4 million won threshold, these figures were 37.5 and 18.1%, respectively.

In addition, the government has reformed the university entrance system several times, seeking to reduce the importance attached to the CSAT and by introducing elements to the admissions system that cannot be acquired by simple memorization. Thus, greater importance is now attached to other selection criteria, including high school records, essay-style exams, extra-curricular activities, involvement in social services, while socio-economic disadvantages are also taken into account. However, these reforms have also failed to be effective and have actually ushered in new forms of private tutoring that specialize in the enhancement of the new selection criteria (Choi, Calero, and Escardíbul, 2012).

2.2.3. The 10 p.m. curfew on operating hours of hagwon

As the measures aimed at curbing the demand for private tutoring proved ineffective, in 2006 the government introduced a new measure, namely, the regulation of the operating hours of hagwon.[7] Before 2006, closing hours in some regions were already controlled by local ordinances; however, these curfews had no real authority in law (Kang, 2010). In September 2006, the reform of the "Act on the establishment and operation of private teaching institutes and extracurricular lessons" strengthened the powers of each of the municipal and provincial education offices with regards their regulatory authority over the hagwon. By 2009, all the offices had imposed a curfew on the operating hours of hagwon.

In April 2009, Seungjoon Kwak, chairman of the Presidential Council on Future and Vision first raised the possibility of fixing the same 10 p.m. curfew for all hagwon. He argued that this restriction would help households cut their expenditure on private tutoring and safeguard the health of their

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[7] Bray and Kwo (2014) review different types of regulation from a comparative perspective.

children. However, the plan faced strong opposition from a group of hagwon owners and parents, who claimed that the policy would result in many students going to the hagwon in the early morning and on weekends, especially as many high schools were keeping pupils at schools until 10 or even 11 p.m. (Kang, 2009). Others argued that while the policy might reduce the time students spent on private tutoring activities in the hagwon, the demand for private tutoring services would simply be substituted by private tutors. In this case, the curfew would simply widen the gap between high- and low-income earners, given that the former would be able to hire the best private tutors (Bae, 2009). Indeed, a group of hagwon operators in Seoul and Busan, with the support of both parents and students petitioned the Constitutional Court, claiming that the curfew violated children's educational rights. Despite the opposition, the curfew was declared constitutional by the court in October 2009, and the nationwide implementation of the 10 p.m. closure gained momentum. That same month, the Ministry of Education, Science, and Technology reported that the government was expected to urge the amendment of the ordinances of the education offices in all cities and provinces and to fix a 10 p.m. curfew. At the same time, the government cracked down on those hagwon that violated the curfew, even offering financial rewards to citizens who reported offenders. Daegu, Gwangju, and Gyeonggi revised their ordinances accordingly in 2011, while the rest of the regions have been pushing ahead with the reform. As a result, a total of 13 education offices have completed or partly completed the revision of their ordinances regulating the operating hours of hagwon to 10 p.m. (KEDI, 2012:15-16). Table 2.1 provides a summary, by educational level and Korean province, of recent changes in the closing times of hagwon. As can be seen, during the period 2009 to 2012 period, the provinces have either maintained or tightened the curfew.

Table 2.1. Curfew imposed on *hagwon* (closing times), 2009-2012

	Region	Middle school students (p.m.)			
		2009	2010	2011	2012
Treatment	Daegu	12	12	10	10
	Jeonnam	12	12	10	10
	Incheon	12	12	12	10
	Gyeonggi	11	11	10	10
	Jeju	12	12	12	11
Control group	Seoul	10	10	10	10
	Busan	10	10	10	10
	Gwangju	10	10	10	10
	Chungbuk	11	11	11	11
	Gyeongbuk	11	11	11	11
	Ulsan	12	12	12	12
	Gyeongnam	12	12	12	12
	Region	High school students (p.m.)			
		2009	2010	2011	2012
Treatment	Daegu	12	12	10	10
	Gwangju	12	12	10	10
	Gyeonggi	12	12	10	10
	Incheon	12	12	12	11
Control group	Seoul	10	10	10	10
	Busan	11	11	11	11
	Ulsan	12	12	12	12
	Chungbuk	12	12	12	12
	Jeonnam	12	12	12[a]	12[a]
	Gyeongbuk	12	12	12	12
	Gyeongnam	12	12	12	12
	Jeju	12	12	12	12

SOURCE: Ordinance regarding the establishment and operation of private teaching institutes and extracurricular lessons specified on the website of each city and provincial education office.
[a] The exact curfew for Jeonnam is 11:50 p.m.

However, there is little evidence of the effectiveness of the curfews in achieving their objectives (i.e., reducing expenditure and the time spent on private tutoring activities). While there are a number of authors who have analyzed previous policies -for example, Lee, Lee, and Jang (2010) or Byun (2010)-, to the best of our knowledge, only Kim (2009), Kim and Chang (2010), and Choi and Cho (2015) have attempted to evaluate the effectiveness of this regulation. Kim (2009) and Kim and Chang (2010) applied Tobit models to two different databases, and found a small negative impact of time regulations on monthly expenditure and weekly hours spent

on private tutoring. Kim (2009) did not find any evidence that the regulation significantly increased monthly spending on other types of private tutoring. Both studies specifically analyzed the effect of regulating the operating hours of hagwon on household spending on private tutoring for general high school students before the enactment of the 10 p.m. curfew. Unlike Kim (2009) and Kim and Chang (2010), our analysis, using the more robust methodological framework of difference-in-differences, measures the actual impact of the implementation of the 10 p.m. curfew on private tutoring expenditure by focusing on changes in the curfews that have been made since 2009. We also analyze heterogeneous effects by socioeconomic and educational level, namely, middle school and general high school.

Choi and Cho (2105) used a difference-in-difference framework for analyzing the impact of the curfew on spending and time spent in private tutoring. They focused on mean effects for high school students. While studying mean results is useful for describing general trends, it is insufficient for understanding the mechanisms driving the (in)effectiveness of a complex policy such as the curfew. Additionally, as it will be explained in section 2.3, their use of a linear model for treating censored data may be misleading.

While the expected impact of the curfew on expenditure and time spent on hagwon is trivial (a reduction in both), the overall effect of the measure on expenditure and time spent on private tutoring in general remains unclear. As alternative forms of private tutoring – most specifically, one-to-one and group tuition – are more expensive, the overall effect of the policy will depend on the prevalence of substitution or income effect. If admission to the top universities is the main objective driving the demand for private tutoring services, we would expect the substitution effect to prevail – i.e., families showing a greater willingness to hire additional forms of private tutoring as the date for sitting the CSAT approaches.

2.3. Methodology and data

2.3.1. Methodology: Difference-in-Differences (DD) estimation

The intuition behind the difference-in-differences (DD) method is that to investigate the effect of a specific intervention ("treatment"), the difference in outcomes after and before the intervention for groups affected by that intervention ("treatment groups") are compared with the same difference for unaffected groups ("control groups") (Bertrand, Duflo, and Mullainathan, 2004:249). Applied to the issue at stake, the DD approach compares shifts in private tutoring expenditure for students in regions that have changed their curfew on hagwon, to those in regions that have maintained their initial curfew.

Given that the curfew policy is not completely exogenous, i.e., some unobserved regional-level characteristics may affect both the regulation of the operating hours of the hagwon and private tutoring expenditure (our two dependent variables), the error term might be correlated with the independent variable. Parents' zeal for children's education can be taken as an example of such unobserved regional-level characteristics. Parents in some regions might be more eager to invest in their children's education −for example, Kang, Park, and Lee (2007) suggest the equalization policy might have led some families to move to larger cities.8 Basically, their level of enthusiasm for children's education is unobservable, but is likely to have an impact on local education offices' decision on regulating of the operating hours of hagwon as well as average private tutoring expenditure in those regions. Being concerned about the soaring private tutoring expenditure, they may support the policy of strengthening the hagwon curfew or it may be the opposite case if they want their willingness to make an investment in children's education to be unconstrained from the hagwon curfew.

The presence of the endogeneity problem thus leads an OLS estimator to be biased. If the average treatment effect of the regulation of the operating hours of the hagwon on private tutoring expenditure is measured by comparing average private tutoring expenditures across regions applying a simple OLS estimator to cross-section data, the estimate will be biased as

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[8] The so-called equalization policy, applied in Korea since the 1970 decade, consists in the assignment of students to schools based strictly on their neighbourhood of residence.

other unobservable characteristics such as parents' zeal for children's education affecting both the regulation of the operating hours of the hagwon and private tutoring expenditure may differ by region. On the other hand, if the research question is analyzed by comparing average private tutoring expenditure of the same region before and after the policy change, it will also produce bias since other characteristics affecting private tutoring expenditure may have changed over time as well. In both cases, the OLS estimator is biased, and thus does not measure a causal effect, but only a correlation.

Under certain assumptions, the DD method allows us to at least control for the unobserved regional-level characteristics that are fixed over time, thus removing a potentially large source of omitted variable bias (Angrist and Pischke, 2009). DD estimations control for time-invariant regional-level characteristics by comparing private tutoring expenditure costs and the time spent on private tutoring activities within regions over time and shared time trends by comparing differences across regions. Therefore, the use of the DD estimation enables us to measure the unbiased treatment effect of the regulation of the operating hours of hagwon.

As discussed above, by 2009 all provincial education offices around the country had fixed their own curfew on the hagwon; however, some of them changed this restriction in 2011 and 2012. This variation of hagwon curfew policy across regions makes it appropriate to exploit a DD estimator to investigate the effect of the regulation on private tutoring expenditure. The treated group comprises those regions that modified their curfew between 2009 and 2012. Thus, the treatment considered in this study is not exactly the imposition of the 10 p.m. curfew, but rather the further strengthening of existing curfews (table 2.1). The fact that the curfew time even differs within a region by school level, led us to split the analysis between middle and general high school students, the main consumers of private tutoring in Korea. Control groups are identified, for each educational level, as those regions in which the hagwon closing times remained constant during the period.

Table 2.1 provides a summary of the curfews fixed by each education office. Based on the previous discussion, seven treatment groups are identified for middle school students and four for high school students. In 2011, the Jeonnam education office changed its curfew from midnight to

11:50 p.m. for high school students. However, a ten-minute difference is not expected to have a significant effect on private tutoring expenditure, so Jeonnam is categorized as a control group for high school students.

The timing of the implementation of the reforms posed an additional challenge for the identification of the treatment. As described in subsection 2.3.2 below, the data used in this analysis were drawn from a survey completed by parents twice a year. The problem is that some regional reforms were implemented during one of these reference periods: the first being from March to May and the second from July to September. For example, in the cases of Gangwon, which introduced a change on 30 March 2012, and Daejeon, which imposed an initial curfew on 10 April 2009, including these regions in the analysis might have influenced the results and so they were dropped from the analysis. As a result, we are left with five treatment groups for middle school students (Daegu, Jeonnam, Incheon, Gyeonggi, and Jeju) and four treatment groups for high school students (Daegu, Gwangju, Gyeonggi, and Incheon). It should also be borne in mind that the enforcement of the curfews also differs across regions and school levels.

However, the credibility of this approach relies on a set of assumptions. First, the parallel trend assumption needs to hold in order for a DD estimator to yield a consistent estimate of the treatment effect; that is, in the absence of the treatment, private tutoring expenditure trends would have been the same in both treatment and control groups. This is analyzed graphically (figure 2.1). Results seem to confirm this assumption for high school students (figure 2.1B and 2.1D): the average weekly hours and yearly expenditure dedicated to private tutoring in the treatment and control groups followed a parallel evolution between 2009 and 2010 (prior to the enforcement of the hagwon curfew). This assumption does not seem to hold as strongly for middle school students (figure 2.1A and 2.1C). Thus, the results for middle school students have to be interpreted with caution and our analysis focuses primarily on the findings for high school students.

A second issue is that the DD estimator is inconsistent if an 'Ashenfelter dip' occurs. The Ashenfelter dip indicates that treated individuals might have suffered bad outcomes immediately prior to treatment assignment due either to the selection of individuals or an anticipation of their participation in the treatment. However, here, anticipation of the

implementation of the curfew did not result in parents increasing their private tutoring expenditure immediately prior to the imposition of the stricter curfew.

Figure 2.1. Parallel trend assumption
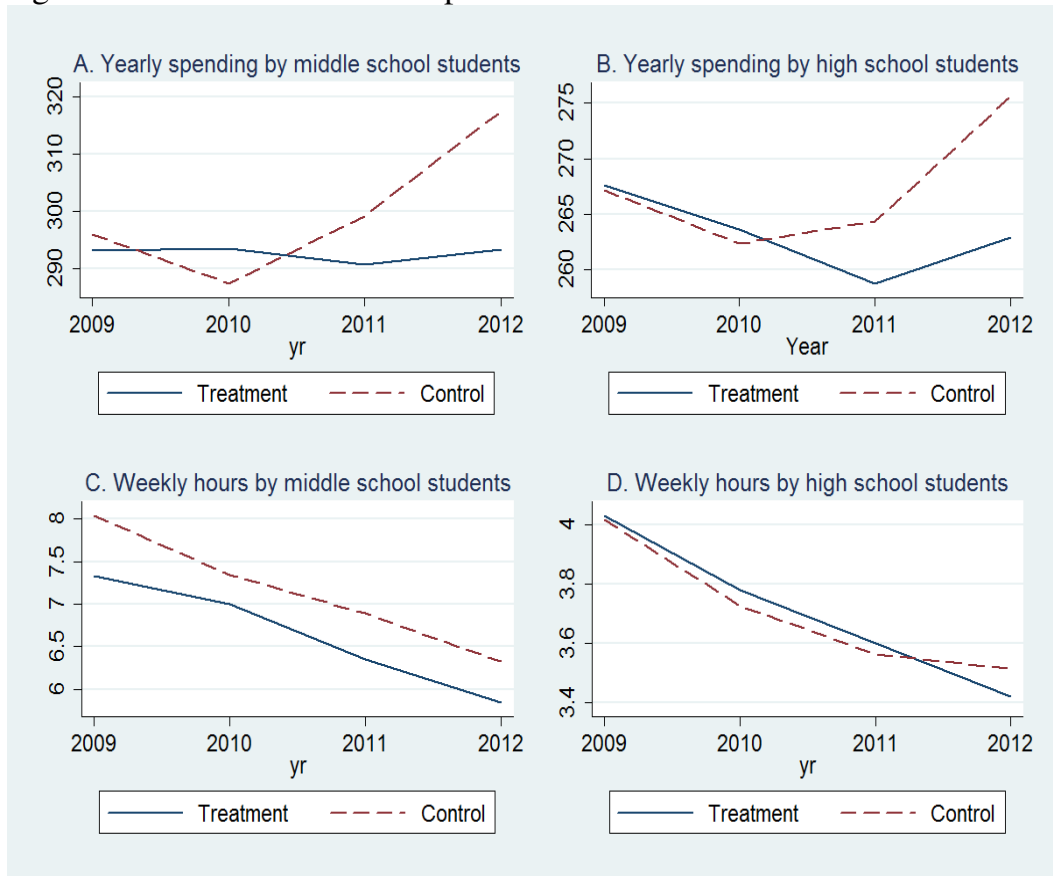
NOTE: All the variables regarding private tutoring expenditure are presented in 10 thousands Korean won.

Finally, the DD estimates would be biased if the composition of the treatment and control groups changed as a result of the treatment. This would only be a problem here if households moved between regions in search of less strict curfews on the operating hours of hagwon in order to consume more private tutoring services. However, there is no evidence of Korean families having increased their geographical mobility after 2009. Indeed, our results seem to indicate that families adopted other strategies for countering the effects of the enforcement of the curfew.

Given the existence of multiple groups and time periods, we opted to employ the general framework suggested by Bertrand, Duflo, and Mullainathan (2004) in which DD estimates and their standard errors derive from using OLS in repeated cross-sections of data on individuals –in our case, students- in both treatment and control groups for several years before and after a specific intervention. The equation at the individual level is

$$Y_{irt} = \propto_r + \delta_t + \gamma X_{irt} + \beta I_{rt} + \varepsilon_{irt} \tag{2.1}$$

where Y_{irt} is the outcome of interest for individual i in region r in year t (private tutoring expenditure –in log terms- or hours devoted to private tutoring); $\propto_r$ is a full set of region dummies; δ_t is a full set of year dummies; X_{irt} is individual-specific covariates (gender, dummies for household income, dummies for parents' educational attainment, dummies for parents' age, dummies for parents' economic activity participation, and dummies for size of the region); I_{rt} is an indicator as to whether the curfew is further strengthened in region r in year t; and ε_{irt} is an error term. The region fixed effects $\propto_r$ capture any time-invariant difference in outcomes between the treatment and control groups, while the year fixed effects δ_t capture how both groups are affected over time by any non-treatment forces (Slaughter, 2001:210). Our dependent variables take a zero value for a large number of households.[10] Following Tansel and Bircan (2006), we obtain consistent estimates using a tobit framework which controls for the censored nature of the data –the use of OLS, which assumes normally distributed data, would hence be inappropriate. Following the argument of Bertrand, Duflo, and

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[10] In our sample, 41.3% of the middle and high school students do not take any kind of private tutoring. For one-to-one private tutoring and *hagwon* private tutoring, those figures are 85.4% and 57.9%, respectively.

Mullainathan (2004), we compute robust standard errors to prevent overestimation of t-statistics and significance levels. The DD estimator β can be interpreted as the effect of the enforcement of a curfew on operating hours of hagwon on private tutoring expenditure/ hours spent on private tutoring activities.

Since curfews differ across school levels, the sample is divided into two subsamples: middle school and general high school students. The same estimation model is applied to both subsamples. Vocational high school students are excluded from the sample, as their academic profile and private tutoring consumption patterns differ significantly from students following the academic path.[11] Primary school students are excluded from the analysis too, as the consumption of private tutoring is mainly concentrated at higher educational levels.

Additionally, in the last part of our analysis, we split the high school sample into two (high- and low-income households) to check for the existence of heterogeneous effects of the enforcement of the curfew on the time and money spent on different types of tutoring. This exercise allows us to provide a clear picture of the redistributive effects of enforcing the curfew.

2.3.2. Data

The analysis in this Chapter employs the Survey on Private Education Expenditure (SPEE) conducted since 2007 by the Korean National Statistics Office (KNSO). It provides detailed information on the consumption of private education services by Korean students (time spent, expenditure, type of tutoring). The survey is answered twice a year (June and October) by 46,000 parents of students attending 1,081 elementary, middle, and high schools across the country.

Students at each school level are selected by a stratification procedure designed to be representative of the national population at that school level. More specifically, after stratifying schools into four levels (elementary, middle, general and vocational high school) and 16 cities and provinces, the schools are independently sampled by grades. For elementary school, grades

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[11] Choi, Calero, and Escardíbul (2012) discuss the different profile of vocational high school students.

are stratified into 1~3 grades and 4~6 grades, and then three classes are randomly chosen per school. For middle and high schools, one class is sampled per school (KNSO 2011).

We use data from 2009 to 2012. The rationale behind this choice is that, since 2009, KNSO provides information by administrative district -that is, by provinces and large cities-, which constitutes crucial information for performing the DD estimation, as each province and large city has its own education office and hagwon operating hours differ from one office to another. Thus, the availability of information for each province/ city facilitates the analysis of the impact of changes in the hagwon curfew on private tutoring expenses.

Several regions that implemented amendments to the ordinance during the reference periods of the survey are excluded from the sample. They include Daejeon and Jeonbuk, which enacted their initial curfews during the 2009 reference periods, and Gangwon and Chungnam, which changed their curfews during the 2012 reference periods. As a result, we work with a sample of 190,276 middle and general high school students, from an overall sample of 349,365 students.[12]

The dataset provides detailed information about the number of hours dedicated to private tutoring and the corresponding expenditure on these services. Private tutoring expenditure is reported for each subject (Korean, English, math, and science) and for each tutoring type (i.e., one-to-one tuition, group tuition, hagwon lessons, use of textbook combined with visit from a tutor, and paid internet and correspondence lecture tuition). All the variables concerning expenditure are expressed in real terms, adjusted to 2010 prices using a consumer price index.

The dataset contains information on student characteristics (gender and academic performance in class), household characteristics (monthly household income, parents' education level, age, and economic activity participation), and the size of the region in which the household resides. These variables, except for academic performance in class (due to the potential problem of endogeneity), are included in the regression model as

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[12] A student who reported that her average weekly hours spent on private tutoring for academic purpose was 80 hours was dropped from the analysis as it is clearly an abnormal value.

individual-specific covariates.[13] Treatment variables are identified as follows. A regulation dummy is assigned a value of one for regions and time periods subject to the policy strengthening the initial curfew on hagwon. Since the identification of treatment groups differs according to school level, these regulation dummies are created for each school level. Tables A2.1 and A2.2 in the appendix summarize the definitions and the main descriptive statistics, respectively, of the variables used in the empirical analysis.

Table A2.2 presents the mean values of the main variables in each sample. The first column shows the overall mean for all students, while columns two and three report the means for middle and general high school students. The fourth and fifth columns compare student characteristics according to whether they receive private tutoring or not. Compared to high school students, middle school students spend more time and more money on private tutoring. Moreover, their consumption of private tutoring seems to be heavily concentrated on hagwon tutoring, while high school students also spend a significant amount of money on private, one-to-one tuition (with high school students spending almost twice as much as middle school students).

While classes at the hagwon are the most popular form of private tutoring, the use of textbook and internet and correspondence lectures are the least frequently used methods. SPEE data show a positive correlation between household income and time spent on one-to-one tuition, suggesting that this method is considered the most effective for improving pupils' academic performance. However, to the best of our knowledge, no analyses of the heterogeneous effects of tuition methods on academic achievement have yet been performed.

More interestingly, there are systematic differences in student characteristics depending on whether or not they receive private tutoring. In general, those receiving private tutoring are likely to be female, high academic achievers, and from high socio-economic backgrounds (table A2.2). The positive correlation between students' achievement and the consumption of private tutoring indicates that the primary objective of such tuition in Korea is not to complement deficient academic achievement, but rather it constitutes a strategy for high academic performers to maintain and

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[13] Nevertheless, main results remained unchanged when introducing previous performance in the analysis.

strengthen their competitive advantage. This finding is in line with previous studies, see for example, Kim (2007) and Kim (2009).

In the case of students' socio-economic backgrounds, the fourth and fifth columns of table A2.2 indicate that the proportion of students whose parents have at least a university degree and the proportion of students whose monthly household income is more than 4 million won are substantially higher among students that receive private tutoring than those who do not. These figures imply that households with high socio-economic status may tend to provide their children with additional educational opportunities in the form of private tutoring.

2.4. Results and discussion

We present the average treatment effects of regulating the operating hours of hagwon on the time devoted to private tutoring (Subsection 2.4.1) and on expenditure dedicated to these activities (2.4.2). The section ends with a discussion of the study's main findings (2.4.3).

2.4.1. The impact of the enforcement of the hagwon curfew on the time dedicated to private tutoring activities

Table 2.2 presents the average treatment effect of the regulation of the operating hours of hagwon on the number of hours dedicated to all kinds of private tutoring activities. The non-significant coefficients clearly show that the extension of the curfew failed to reduce the time spent on private tutoring activities both for middle and high school students. There are two potential explanations for this finding: first that the policy failed to cut the time dedicated to classes offered by hagwon. This being the case, it could simply be concluded that the policy was ineffective. Second, the policy might have succeeded in reducing the amount of time spent on hagwon classes, but that this reduction was completely or partly offset by an increase in the consumption of other types of private tutoring. Although the SPEE does not provide details regarding the amount of time spent on each type of private tutoring activity, the results in subsection 2.4.2 seem to support this second scenario.

The coefficients of the control variables are consistent with results reported in most previous studies. Students from higher income households and whose parents record a higher educational attainment tend to invest more time in private tuition. It has also been shown that students in households where the father is the sole breadwinner (category of reference for the economic activity participation variable) spend more time on private tutoring than their counterparts do. This may be attributed to the fact that the fathers in such households tend to have well-paid job and stay-at-home mothers can spend more time and energy on taking care of the educational activities of their children. [14] These results suggest that educational expectations of parents vary according to their level of education and the importance of budgetary constraints on their being able to participate in private tutoring activities. This should be borne in mind when analyzing the next set of results (2.4.2).

2.4.2. The impact of the enforcement of the hagwon curfew on spending on private tutoring activities

Table 2.3 presents the average treatment effect of the enforcement of the hagwon curfew on total private tutoring expenditure (first and fourth columns). We also calculate the impact of strengthening the curfew on private, one-to-one and group tuition expenditure and on hagwon tutoring expenditure separately, in order to identify the existence of a substitution effect. The main finding reported in table 2.3 is that the extension of the curfew did not significantly reduce total expenditure on private tuition. As expected, the enforcement of the curfew was successful in decreasing expenditure on hagwon tutoring for both middle and high school students. This reduction in spending was greater for high school students, suggesting that the policy has had a greater impact on high school students, who are more likely to stay late at school.

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[14] According to the SPEE from 2009 to 2012, the average monthly household income is slightly higher for double-income families, but the average monthly household income per earner is much higher for single-income families with the father as the only breadwinner. This implies that some of the fathers in such households have a well-paid job, enough not to need an extra income earner in their households.

Table 2.2. Effects of the enforcement of the curfew on hours spent on private tutoring

VARIABLES	Middle school	High school
Regulation	0.011	-0.081
	(0.126)	(0.101)
Female	-0.353***	0.336***
	(0.065)	(0.049)
Father's education		
High school	1.988***	0.813***
	(0.235)	(0.154)
Undergraduate	2.930***	1.878***
	(0.242)	(0.160)
Graduate school	2.823***	2.085***
	(0.267)	(0.179)
Mother's education		
High school	0.938***	0.697***
	(0.228)	(0.146)
Undergraduate	1.182***	1.254***
	(0.239)	(0.155)
Graduate school	1.300***	1.612***
	(0.296)	(0.201)
Household income		
1~2 million won	2.059***	1.443***
	(0.264)	(0.217)
2~3 million won	5.016***	3.368***
	(0.257)	(0.211)
3~4 million won	6.750***	4.780***
	(0.256)	(0.211)
4~5 million won	7.451***	5.516***
	(0.260)	(0.213)
5~6 million won	7.989***	6.250***
	(0.265)	(0.218)
6~7 million won	8.569***	6.795***
	(0.279)	(0.227)
More than 7 million won	8.810***	7.059***
	(0.268)	(0.219)
Father's age		
40s	0.628***	0.694*
	(0.189)	(0.402)
50s	0.249	0.262
	(0.216)	(0.405)
Mother's age		
40s	-0.257***	0.503***
	(0.097)	(0.148)
50s	-0.150	0.753***
	(0.202)	(0.173)
Economic activity participation		
Mother only	-1.831***	-1.307***
	(0.181)	(0.138)
Both	-0.339***	-0.709***
	(0.068)	(0.0518)
None	-4.909***	-2.399***
	(0.358)	(0.303)
Size of region		
Metropolitan city	0.782**	-4.538***
	(0.354)	(0.333)
Small city	1.736***	-3.211***
	(0.195)	(0.136)
Rural area	0.289	-5.710***
	(0.213)	(0.163)
Year FE	Yes	Yes
Region FE	Yes	Yes
Observations	70,176	107,409

NOTE: * significant at 10%, ** significant at 5%, *** significant at 1%.

In the case of expenditure on private, one-to-one and group tuition (two more expensive substitutes for hagwon tutoring), the coefficients are insignificant for both school types.[15] However, a positive, albeit statistically non-significant coefficient, for high school students seems to suggest that the reduction in spending on hagwon classes might have led to an increase in consumption of other private tutoring activities (i.e., private, one-to-one and group tuition).

The coefficients presented by the father's and mother's education, along with the household income dummies (table 2.3) also indicate that yearly spending on private tutoring is significantly and positively correlated to household income and parental education. Indeed, the patterns followed by the socio-economic status variables are similar to those found when the dependent variable is the number of hours spent on private tutoring (table 2.2). Households in which the father is a single-income earner spend the most amount of money on private tutoring activities.

2.4.3. Discussion

The DD estimates reported in tables 2.2 and 2.3 indicate that the extension of the hagwon curfew did not significantly reduce the total time and expenditure dedicated to private tutoring as was intended, and that the government intervention was only successful in reducing hagwon tutoring costs. This seems to be in line with the second scenario proposed in subsection 2.4.1 in which the reduced consumption of hagwon tuition driven by the extension of the curfew is completely or partially replaced by the increase in consumption of other types of private tutoring, including private, one-to-one and group tuition.

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[15] According to KRIVET (2008a), the mean hourly cost of private tutoring provided by *hagwon* for middle and high school students was 5,902 won. This figure for one-to-one and group private tutoring was around 16,000 won per month - derived from KRIVET (2008b).

Table 2.3. Effects of the enforcement of the curfew on private tutoring expenditure

VARIABLES	Middle school			High school		
	Expenditure	1:1/Group	Hagwon	Expenditure	1:1/Group	Hagwon
Regulation	-0.037	0.002	-0.127*	-0.083	0.177	-0.197**
	(0.053)	(0.151)	(0.073)	(0.065)	(0.129)	(0.095)
Female	-0.025	0.190**	-0.170***	0.462***	1.023***	0.157***
	(0.027)	(0.078)	(0.037)	(0.032)	(0.063)	(0.046)
Father's education						
High school	1.022***	2.009***	0.953***	0.593***	0.986***	0.594***
	(0.101)	(0.305)	(0.131)	(0.103)	(0.206)	(0.149)
Undergraduate	1.578***	2.972***	1.561***	1.366***	1.807***	1.443***
	(0.104)	(0.313)	(0.135)	(0.107)	(0.213)	(0.154)
Graduate school	1.587***	3.198***	1.670***	1.563***	2.051***	1.746***
	(0.113)	(0.339)	(0.150)	(0.118)	(0.236)	(0.171)
Mother's education						
High school	0.390***	0.415	0.428***	0.488***	0.763***	0.363***
	(0.098)	(0.290)	(0.129)	(0.098)	(0.195)	(0.140)
Undergraduate	0.640***	1.514***	0.540***	0.929***	1.545***	0.864***
	(0.102)	(0.302)	(0.135)	(0.104)	(0.207)	(0.149)
Graduate school	0.803***	1.822***	0.663***	1.199***	2.145***	0.806***
	(0.122)	(0.367)	(0.169)	(0.129)	(0.257)	(0.192)
Household income						
1~2 million won	0.846***	0.853**	1.033***	1.042***	1.313***	1.227***
	(0.117)	(0.349)	(0.153)	(0.144)	(0.306)	(0.209)
2~3 million won	2.228***	2.844***	2.520***	2.416***	3.197***	2.597***
	(0.113)	(0.336)	(0.148)	(0.140)	(0.296)	(0.203)
3~4 million won	3.051***	4.361***	3.431***	3.412***	4.991***	3.417***
	(0.112)	(0.334)	(0.148)	(0.140)	(0.294)	(0.203)
4~5 million won	3.472***	5.640***	3.768***	3.946***	5.968***	3.698***
	(0.114)	(0.336)	(0.150)	(0.141)	(0.296)	(0.205)
5~6 million won	3.726***	6.442***	3.962***	4.389***	6.876***	4.062***
	(0.116)	(0.342)	(0.154)	(0.143)	(0.301)	(0.209)
6~7 million won	3.930***	6.884***	4.181***	4.787***	7.531***	4.320***
	(0.120)	(0.357)	(0.161)	(0.148)	(0.311)	(0.217)
More than 7 million won	3.992***	7.528***	4.104***	4.828***	8.165***	4.195***
	(0.117)	(0.343)	(0.156)	(0.143)	(0.300)	(0.209)
Father's age						
40s	0.276***	0.264	0.418***	0.496*	0.089	1.024**
	(0.079)	(0.228)	(0.108)	(0.270)	(0.505)	(0.402)
50s	0.087	-0.087	0.274**	0.244	-0.202	0.606
	(0.091)	(0.259)	(0.123)	(0.272)	(0.510)	(0.405)
Mother's age						
40s	-0.009	0.276**	-0.076	0.325***	0.453**	0.209
	(0.040)	(0.117)	(0.055)	(0.098)	(0.190)	(0.143)
50s	0.127	0.583**	-0.078	0.524***	0.832***	0.284*
	(0.085)	(0.242)	(0.114)	(0.114)	(0.221)	(0.165)
Economic activity						
Mother only	-0.919***	-0.938***	-0.962***	-0.860***	-0.818***	-1.180***
	(0.079)	(0.218)	(0.104)	(0.091)	(0.179)	(0.130)
Both	-0.293***	-0.919***	-0.202***	-0.472***	-0.452***	-0.697***
	(0.028)	(0.082)	(0.039)	(0.033)	(0.066)	(0.049)
None	-2.379***	-2.736***	-2.476***	-1.624***	-1.589***	-2.089***
	(0.160)	(0.433)	(0.205)	(0.201)	(0.390)	(0.292)
Size of region						
Metropolitan city	0.368**	2.435***	-0.429**	-2.008***	1.331***	-5.347***
	(0.149)	(0.460)	(0.200)	(0.223)	(0.466)	(0.308)
Small city	0.475***	0.618***	0.133	-1.279***	0.436**	-2.981***
	(0.075)	(0.223)	(0.108)	(0.091)	(0.173)	(0.137)
Rural area	-0.105	0.685***	-0.851***	-3.116***	-0.787***	-6.182***
	(0.086)	(0.246)	(0.122)	(0.109)	(0.205)	(0.168)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	70176	70176	70176	107409	107409	107409

NOTE: * significant at 10%, ** significant at 5%, *** significant at 1%.

This substitution effect seems to be stronger among high school students. The impact of the regulation on one-to-one and group tuition for middle school students is not very different from zero (table 2.3). However, the same estimate for high school students is 0.177, very similar to the decrease in expenditure on hagwon tutoring, although the value is statistically insignificant.

To obtain a clearer picture of the substitution effect across tuition types, we checked for the existence of heterogeneous effects. Table 2.4 shows the heterogeneous effects by household income of the extension of the hagwon curfew on time and money spent on private tutoring for high school students.

In the table, the whole sample of high school students is divided into two groups: low-income households and high-income household.[16] Neither group of high school students reduces the total number of hours or expenditure dedicated to private tuition. We can conjecture that these effects are not heterogeneous across different income groups. However, if we examine the way in which the enforcement of the hagwon curfew has influenced private, one-to-one and group tuition and hagwon tutoring, we see that the two groups reacted quite differently to the intervention. The first row in table 2.4 shows that high school students from low-income households significantly increased their consumption of private, one-to-one and group tuition when they had to reduce significantly their consumption of hagwon tutoring. This is clear evidence that the substitution from private hagwon tutoring to private, one-to-one and group tuition was more intense among lower income high school students. Conversely, high school students from high-income families did not seem to be as greatly affected by the intervention (given that all of the coefficients are insignificant despite showing the same signs as for the other group).

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[16] In the SPEE dataset, information on actual household income is not provided. Parents self-reported to which of the eight monthly household income groups (see table A2.1) their household belonged to. The sample was divided into two groups – low-income and high-income households-. According to the Household Income and Expenditure Survey conducted by Korean National Statistics Office, average monthly household income was 4,076,876 Korean won in 2012. We therefore took the 4 million Korean won as the threshold between both groups.

Table 2.4. Heterogeneous effects for high school students by income

VARIABLES	Hour	Expenditure	1:1/Group	Hagwon
Low-income households	-0.107	-0.077	0.347*	-0.255*
(Less than 4 million won)	(0.149)	(0.104)	(0.210)	(0.143)
High-income households	0.044	-0.016	0.257	-0.084
(More than 4 million won)	(0.172)	(0.100)	(0.198)	(0.156)

NOTE: * significant at 10%, ** significant at 5%, *** significant at 1%.

How can we explain the heterogeneous reactions of the two types of household to the policy and what are the consequences of these heterogeneous effects? Our results show that the demand of high school students for private tutoring is inelastic, given that they are likely to regard private tutoring services as indispensable for excelling on the CSAT, the critical point in their academic lives. Thus, when their consumption of hagwon tutoring was regulated by the policy intervention, a considerable number of high school students appear to have opted to increase their use of private, one-to-one and group tuition to offset the reduction in hagwon classes. More specifically, this substitution across types of tuition is driven mainly by high school students from low-income families, those traditionally more reliant on the private classes offered by hagwon (see table A2.4). In contrast, high school students from high-income families have, in addition to being consumers of hagwon tutoring, been active buyers of other types of private tuition. In other words, given that their consumption of private tutoring services had already shown an inclination for one-to-one and group tuition, regulations on the supply of hagwon did not affect their choice as much.

Finally, we checked the robustness of these results by performing a placebo test. In this test, we simulated the enforcement of the hagwon curfew as if it had been introduced between 2009 and 2010, that is, one year before actual enforcement. This analysis was replicated both for the whole sample of high school students and for the high-income and low-income households separately. Results are reported in table 2.5 and, as expected, no significant effects were found.

Table 2.5. Results of a placebo enforcement of the curfew for high school students.

VARIABLES	Hour	Expenditure	1:1/Group	Hagwon
All	-0.017	-0.113	-0.069	-0.159
	(0.115)	(0.073)	(0.146)	(0.109)
Low-income households	-0.005	-0.059	0.001	-0.201
(Less than 4 million won)	(0.167)	(0.114)	(0.234)	(0.160)
High-income households	-0.056	-0.127	-0.039	-0.131
(More than 4 million won)	(0.201)	(0.113)	(0.231)	(0.183)

NOTE: * significant at 10%, ** significant at 5%, *** significant at 1%.

2.5. Conclusions

The objective of this chapter is to evaluate the impact of the advancement in the implementation this new policy (i.e., the curfew on the academies' operating hours) aimed at regulating private tutoring markets. More specifically, we have focused on the effect of enforcing the curfew on private education expenditure and on the time dedicated to private tutoring activities.

The obtained results show that the imposition of the strengthened hagwon curfew has been more successful in changing private tutoring consumption patterns than in reducing the total time dedicated to private tutoring and the resources spent on these activities. This raises issues of both efficiency and equity. In the case of efficiency, while families managed to reduce their consumption of hagwon – a foreseeable outcome, given the nature of the regulations, their children increased the amount of time – and money – spent on other, more expensive, types of private tuition. The policy failed therefore to achieve its main objective – reducing the consumption of private tutoring – due to the inelastic demand of such tutoring, closely linked to the overheated competition for admission to the most prestigious universities. The impact of the enforcement of the curfew on efficiency therefore depends on the effectiveness of each private tuition type for transmitting skills and, ultimately, the impact of these skills on economic growth. While examining this question is beyond the scope of our analysis, it should be highlighted that if there are differences in quality between types of private tuition, the change in consumption patterns may have an impact on efficiency. Additionally, the impact of the enforcement of the curfew on efficiency is closely linked to its distributional effects.

Hence, an increase in the consumption of more expensive private tuition by low- income families may raise the overall performance of these students – that is, if the assumption of "superior quality" holds. Moreover, marginal gains in academic performance may prove to be crucial in an ultra-competitive environment. However, the substitution process generated by the extension of the curfew also has its losers, namely, the low-income families that paid for hagwon tutoring but who cannot afford other types of tuition. Therefore, as previous studies suggest that receiving private tuition has a positive impact on academic performance, the regulation has a negative impact on the equality of educational opportunities among this last subgroup of students. The analysis of the impact on academic performance of different types of private tutoring is thus a promising field for further research.

References

Angrist, J. D., & Pischke, J-S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton: Princeton University Press.

Bae, J. (2009). Will *hagwon* curfew work?. *The Korea Times*. 26th April. (http://koreatimes.co.kr/www/news/nation/2009/04/113_43860.html).

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences-in-differences estimates?. *Quarterly Journal of Economics,* 119(1), 249-275.

Bourdieu, P. (1973). Cultural reproduction and social reproduction. In *Knowledge, education, and cultural change: Papers in the sociology of education*, ed. Richard Brown. London: Tavistock.

Bray, M. (1999). *The shadow education system: Private tutoring and its implications for planners*. Paris: UNESCO.

Bray, M. (2006). Private supplementary tutoring: Comparative perspectives on patterns and implications. *Compare: A Journal of Comparative and International Education,* 36(4), 515-530.

Bray, M. (2009). *Confronting the Shadow Education System: What Government Policies for What Private Tutoring?* Paris: UNESCO International Institute for Educational Planning (IIEP).

Bray, M. (2013). Shadow Education: Comparative Perspectives on the Expansion and Implications of Private Supplementary Tutoring. *Procedia – Social and Behavioral Sciences*, 77, 412-420.

Bray, M., & Kobakhidze, M. N. (2014). Measurement issues in research on shadow education: Challenges and pitfalls encountered in TIMSS and PISA. *Comparative Education Review*, 58(4), 590-620.

Bray, M., & Kwo, O. W. Y. 2014. *Regulating Private Tutoring for Public Good: Policy Options for Supplementary Education in Asia*. Bangkok and Hong Kong: UNESCO and Comparative Education Research Centre, The University of Hong Kong.

Bray, M., & Kwok, P. (2003). Demand for private supplementary tutoring: Conceptual considerations, and socio-economic patterns in Hong Kong. *Economics of Education Review,* 22, 611-620.

Byun, S. (2010). Does policy matter in shadow education spending? Revisiting the effects of the high school equalization policy in South Korea. *Asia Pacific Education Review*, 11 (1), 83-96.

Byun, S., Schofer, E., & Kim, K. (2012). Revisiting the role of cultural capital

in East Asian educational systems: The case of South Korea. *Sociology of Education*, 85(3), 219-239.

Chae, S., Hong, J., & Lee, T. (2005). *Anatomy of the rank structure of Korean universities: Towards a design of integrated policies for education reform in Korea.* Seoul: AP EPRI/KEDI publications.

Choi, Á. (2010). Analysis of private tutoring decisions in Korea: A game theory approach. *Regional and Sectoral Economic Studies,* 10(2), 23-36.

Choi, Á., Calero, J., & Escardíbul, J-O. (2012). Private tutoring and academic achievement in Korea: An approach through PISA-2006. *KEDI Journal of Educational Policy,* 9(2), 299-322.

Choi, H. (2008). The effect of private tutoring on college entrance. *International Economic Journal,* 14(1). 73-110.

Choi, J., & Cho, R. N. (2015). Evaluating the effects of governmental regulations on South Korean private cram schools. *Asia Pacific Journal of Education.*

Chung, B. (2002). Korea's War on Private Tutoring. Paper presented at the *Second International Forum on Education Reform*, Bangkok, September 2-5.

Dang, H. (2007). The determinants and impact of private tutoring classes in Vietnam. *Economics of Education Review*, 26, 684-699.

Dang, H., & Rogers, H. (2008). How to interpret the growing phenomenon of private tutoring: Human capital deepening, inequality increasing, or waste of resources? *World Bank Policy Research Working Paper*, 4530, World Bank, Washington, DC.

Han, S. (2011). Private education costs fall for 1st time in decade. *The Korea Times*. 15th February. (http://koreatimes.co.kr/www/news/nation/2011/02/113_81456.html).

Kang, C. (2007). Does money matter? The effect of private educational expenditures on academic performance. Working Paper, 704, Department of Economics, National University of Singapore.

Kang, C., Park, C., & Lee, M-J. (2007). Effects of ability mixing in high school on adulthood earnings: quasiexperimental evidence from South Korea. *Journal of Population Economics*, 20, 269-297.

Kang, S. (2010). Hagwon curfew backsliding. *The Korea Times*. 1st April. (http://www.koreatimes.co.kr/www/news/nation/2010/04/113_63489.html).

KEDI. (2009). *Facts and figures on an analysis of educational statistics.*

Seoul: Korean Educational Development Institute. (In Korean).

KEDI. (2012). *Results and issues of hagwon management policies*. Seoul: Korean Educational Development Institute. (In Korean).

Kim, H. (2010). Analysis of the effects of private education on academic achievement and labor market performance. *KDI Reports, 2010-05*. (In Korean).

Kim, J. (2007). Shadow education around the world: Its cause and the effects. *Public Economics,* 12(2), 119-151. (In Korean).

Kim, J. (2009). The effectiveness of regulation for cram schools on demand for private tutoring. *The Journal of Educational Administration,* 27(4), 465-487. (In Korean).

Kim, J., & Chang, J. (2010). Do governmental regulations for cram schools decrease the number of hours students spend on private tutoring? *KEDI Journal of Educational Development*, 7 (1), 3-21.

Kim, S., & Lee, J. (2010). Private tutoring and demand for education in South Korea. *Economic Development and Cultural Change,* 58(2), 259-296.

Kim, T. (2004). Shadow education: school quality and demand for private tutoring in Korea. *KDI School of Pub Policy & Management Paper No. 04-21*.

KNSO. (2011). *The Survey of Private Education Expenditures*. Seoul: Korea Statistics.

KNSO. (2012). *Household Income and Expenditure Survey*. Seoul: Korea Statistics.

Korean Economic Daily. (2015). No. of Private Learning Centers Breaks 100,000 Level for First Time. *Korean Economic Daily*. 19th March. (http://english.hankyung.com/news/apps/news.view?c1=04&nkey=2015 03191203111).

KRIVET. (2008a). *A survey study on private tutoring providers 2: survey on hagwon*. Seoul: Ministry of Education, Science, and Technology.

KRIVET. (2008b). *A survey study on private tutoring providers 5: survey on private lesson*. Seoul: Ministry of Education, Science, and Technology.

Lee, B., Jwa, H., & Lim, S. (2014). The effects of private tutoring and parenting behaviors on children's academic achievement in Korea: Are there differences between low- and high-income groups?. *KEDI Journal of Educational Policy,* 11(2), 163-178.

Lee, C.J., Lee, H., & Jang, H. (2010). The history of policy responses to shadow education in South Korea: Implications for the next cycle of policy

responses. *Asia Pacific Education Review*, 11 (1), 97-108.

Lee, S., & Brinton, M.C. (1996). Elite education and social capital: The case of South Korea. *Sociology of Education,* 69(3), 177-192.

OECD. (2011). *Education at a Glance 2011: highlights*. Paris: OECD.

OECD. (2012a). *Economic surveys: Korea 2012*. Paris: OECD.

OECD. (2012b). *Korea-country note- Education at a glance: OECD indicators 2012*. Paris: OECD.

OECD. (2014). *Strong performers and successful reformers in education: Lessons from PISA for Korea.* Paris: OECD.

OECD. (2015a). *Education at a Glance 2015*. Paris: OECD.

Park, H, Byun S., & Kim, K. (2011). Parental involvement and students' cognitive outcomes in Korea: Focusing on private tutoring. *Sociology of Education*, 84(1), 3-22.

Rhie, S., Lee, S., & Chae, K. (2011). Sleep patterns and school performance of Korean adolescents assessed using a Korean version of the pediatric daytime sleepiness scale. *Korean Journal of Pediatrics*, 54(1), 29-35.

Slaughter, M. J. (2001). Trade liberalization and per capita income convergence: A difference-in-differences analysis. *Journal of International Economics,* 55: 203-228.

Tansel, A., & Bircan F. (2006). Demand for education in Turkey: A tobit analysis of private tutoring expenditures. *Economics of Education Review,* 25, 303-313.

Appendices to Chapter 2

Table A2.1. Definition of main variables

Variables	Definition
Hour	Weekly hours spent on private tutoring for academic purpose
Expenditure	Yearly spending on private tutoring for academic purpose
One-to-one tutoring	Yearly spending on 'one-to-one tutoring'
Group tutoring	Yearly spending on 'group tutoring'
Hagwon tutoring	Yearly spending on 'taking lessons at hagwon'
Workbook tutoring	Yearly spending on 'textbooks with tutor's visit' type tutoring
Internet tutoring	Yearly spending on 'paid internet and correspondence lectures'
Female	1 if female; 0 otherwise
Father's education	(The reference group is middle school degree of less)
High school	1 if father has a high school degree; 0 otherwise
University	1 if father has a university degree; 0 otherwise
Graduate school	1 if father has a graduate degree or more; 0 otherwise
Mother's education	(The reference group is middle school degree or less)
High school	1 if mother has a high school degree; 0 otherwise
University	1 if mother has a university degree; 0 otherwise
Graduate school	1 if mother has a graduate degree or more; 0 otherwise
Household income	(The reference group is less than 1 million won)
1~2 million won	1 if monthly household income is between 1~2 million won; 0
2~3 million won	1 if monthly household income is between 2~3 million won; 0
3~4 million won	1 if monthly household income is between 3~4 million won; 0
4~5 million won	1 if monthly household income is between 4~5 million won; 0
5~6 million won	1 if monthly household income is between 5~6 million won; 0
6~7 million won	1 if monthly household income is between 6~7 million won; 0
More than 7 million won	1 if monthly household income is more than 7 million won; 0
Father's age	(The reference group is father in his twenties or thirties)
40s	1 if father is in his forties; 0 otherwise
50s	1 if father is in his fifties; 0 otherwise
Mother's age	(The reference group is mother in her twenties or thirties)
40s	1 if mother is in her forties; 0 otherwise
50s	1 if mother is in her fifties; 0 otherwise
Economic activity	(The reference group is only father works)
Mother only	1 if only mother works; 0 otherwise
Both	1 if both father and mother work; 0 otherwise
None	1 if neither father nor mother works; 0 otherwise
Academic performance	(The reference group is top 10% of the class)
10~30%	1 if student is between 10~30% of the class; 0 otherwise
30~60%	1 if student is between 30~60% of the class; 0 otherwise
60~80%	1 if student is between 60~80% of the class; 0 otherwise
Bottom 20%	1 if student is below bottom 20% of the class; 0 otherwise
Size of the region	(The reference group is Seoul)
Metropolitan city	1 if metropolitan city; 0 otherwise
Small city	1 if small city; 0 otherwise
Rural area	1 if rural area; 0 otherwise
Regulation	1 if the strengthened curfew is implemented; 0 otherwise

Table A2.2. Descriptives of main variables

| Variables | Mean | | | | |
	All Students	Middle School Students	High school students	No Tutoring (Hour = 0)	Positive Tutoring (Hour > 0)
Hour	4.991	6.924	3.707	0	8.495
Expenditure	278.110	296.578	265.835	0	473.340
One-to-one tutoring	68.004	46.752	82.129	0	115.742
Group tutoring	32.118	30.488	33.201	0	54.665
Hagwon tutoring	168.35	207.095	142.656	0	286.590
Workbook tutoring	3.794	8.083	0.943	0	6.458
Internet tutoring	5.808	4.159	6.904	0	9.885
Female	0.477	0.472	0.481	0.462	0.488
Father's education					
Middle school or less	0.051	0.049	0.051	0.086	0.026
High school	0.432	0.441	0.426	0.517	0.372
University	0.441	0.441	0.441	0.350	0.507
Graduate school	0.076	0.069	0.081	0.047	0.095
Mother's education					
Middle school or less	0.054	0.050	0.058	0.087	0.032
High school	0.575	0.569	0.578	0.643	0.528
University	0.342	0.355	0.334	0.253	0.403
Graduate school	0.029	0.026	0.030	0.017	0.037
Household income					
Less than 1 million won	0.049	0.058	0.043	0.089	0.022
1~2 million won	0.138	0.143	0.134	0.211	0.086
2~3 million won	0.204	0.205	0.204	0.242	0.178
3~4 million won	0.214	0.213	0.215	0.196	0.226
4~5 million won	0.156	0.153	0.159	0.119	0.182
5~6 million won	0.098	0.094	0.100	0.064	0.122
6~7 million won	0.050	0.049	0.050	0.028	0.065
More than 7 million won	0.091	0.085	0.095	0.051	0.119
Economic activity participation					
Father only	0.359	0.372	0.351	0.328	0.381
Mother only	0.085	0.087	0.083	0.123	0.058
Both	0.538	0.518	0.552	0.519	0.552
None	0.018	0.023	0.014	0.030	0.009
Academic performance					
Top 10%	0.109	0.116	0.102	0.067	0.137
10~30%	0.208	0.215	0.204	0.148	0.250
30~60%	0.332	0.309	0.347	0.308	0.349
60~80%	0.216	0.210	0.221	0.266	0.182
Bottom 20%	0.135	0.150	0.126	0.211	0.082
Number of observations	190,276	75,973	114,303	78,480	111,796

NOTE: All the variables regarding private tutoring expenditure are annual spending presented in 10 thousands of Korean won

Table A2.3. Number of observations by region, year, and school level

	Region	Middle school students (p.m.)				
		2009	2010	2011	2012	Total
Treatment group	Daegu	1,343	1,348	1,276	1,226	5,193
	Jeonnam	878	905	910	999	3,692
	Incheon	1,904	1,882	1,810	1,722	7,318
	Gyeonggi	3,916	3,850	3,818	3,697	15,281
	Jeju	687	701	833	861	3,082
Control group	Seoul	3,291	3,243	3,196	3,013	12,743
	Busan	1,588	1,576	1,554	1,555	6,273
	Gwangju	1,527	1,481	1,424	1,503	5,935
	Chungbuk	866	847	861	746	3,320
	Gyeongbuk	828	837	810	799	3,274
	Ulsan	906	896	862	777	3,441
	Gyeongnam	1,606	1,601	1,588	1,626	6,421
	Total	19,340	19,167	18,942	18,524	75,973
	Region	High school students (p.m.)				
		2009	2010	2011	2012	Total
Treatment group	Daegu	2,273	2,263	2,218	2,302	9,056
	Gwangju	2,261	2,301	2,228	2,246	9,036
	Gyeonggi	4,367	4,303	4,260	4,037	16,967
	Incheon	1,620	1,666	1,581	1,498	6,365
Control group	Seoul	4,570	4,619	4,806	4,447	18,442
	Busan	2,244	2,207	2,351	2,164	8,966
	Ulsan	1,464	1,431	1,408	1,225	5,528
	Chungbuk	1,642	1,656	2,119	2,009	7,426
	Jeonnam	1,969	1,980	2,016	1,858	7,823
	Gyeongbuk	2,453	2,434	2,634	2,367	9,888
	Gyeongnam	2,576	2,508	2,546	2,405	10,035
	Jeju	1,073	1,082	1,315	1,301	4,771
	Total	28,512	28,450	29,482	27,859	114,303

Table A2.4. Distribution of expenditures for different forms of private tutoring by household income

Household income	Middle school students					
	One-to-one	Group	Hagwon	Workbook	Internet	Total
Less than 1 million won	6.600	5.844	57.976	4.045	1.422	75.887
	(9%)	(8%)	(76%)	(5%)	(2%)	
1~2 million won	11.730	10.559	104.474	5.835	1.821	134.419
	(9%)	(8%)	(78%)	(4%)	(1%)	
2~3 million won	22.005	20.692	162.117	8.201	3.145	216.161
	(10%)	(10%)	(75%)	(4%)	(1%)	
3~4 million won	37.008	30.100	216.726	8.969	4.482	297.286
	(12%)	(10%)	(73%)	(3%)	(2%)	
4~5 million won	58.761	39.809	255.031	9.047	5.512	368.160
	(16%)	(11%)	(69%)	(2%)	(1%)	
5~6 million won	78.803	47.842	286.087	8.596	6.103	427.430
	(18%)	(11%)	(67%)	(2%)	(1%)	
6~7 million won	95.495	51.604	315.634	9.586	6.830	479.150
	(20%)	(11%)	(66%)	(2%)	(1%)	
More than 7 million won	132.854	57.628	331.414	8.983	5.503	536.383
	(25%)	(11%)	(62%)	(2%)	(1%)	
Household income	High school students					
	One-to-one	Group	Hagwon	workbook	Internet	Total
Less than 1 million won	11.617	5.870	42.326	0.714	2.899	63.427
	(18%)	(9%)	(67%)	(1%)	(5%)	
1~2 million won	22.170	12.267	65.156	0.752	3.551	103.896
	(21%)	(12%)	(63%)	(1%)	(3%)	
2~3 million won	39.132	20.788	99.899	0.924	5.393	166.137
	(24%)	(13%)	(60%)	(1%)	(3%)	
3~4 million won	65.737	31.971	136.760	1.171	6.527	242.167
	(27%)	(13%)	(56%)	(0%)	(3%)	
4~5 million won	94.538	40.562	165.750	0.866	8.553	310.269
	(30%)	(13%)	(53%)	(0%)	(3%)	
5~6 million won	125.854	48.919	202.205	0.917	9.273	387.167
	(33%)	(13%)	(52%)	(0%)	(2%)	
6~7 million won	156.437	58.354	227.702	0.828	9.184	452.505
	(35%)	(13%)	(50%)	(0%)	(2%)	
More than 7 million won	222.274	62.478	256.622	1.063	11.102	553.540
	(40%)	(11%)	(46%)	(0%)	(2%)	

NOTE: all the expenditures are annual spending presented in 10 thousands of Korean won. The percentages of students using each type of private tutoring per income group are in parentheses.

Chapter 3. Do anti-discrimination laws alleviate labor market duality? Quasi-experimental evidence from Korea

3.1. Introduction

Labor market segmentation is a growing phenomenon in many countries across different continents (Autor, 2003; OECD, 2013), its causes having been accounted for in a wide array of theories (see, for example, Bulow and Summers, 1986; Reich, Gordon, and Edwards, 1973). An extreme form of segmentation, labor market duality is characterized by sizeable gaps in wage and non-wage benefits between workers in the primary and secondary sectors. As the large differentials in labor conditions produce various detrimental effects, the least of which are income inequality and relative poverty (Cazes and de Laiglesia, 2014), scholars and policymakers have raised concerns about the persistence of labor market duality in the economy.

The primary objective of the analysis in this chapter is to examine whether and how labor market duality can be alleviated through legislation that prohibits discrimination based on employment type. Inequalities in labor market outcomes are not only symptoms of labor market duality, but are also the main causes of the problem as they continuously provide employers with opportunities to profit from labor cost differentials between different types of workers. A regulation concerning the principle of equal pay for work of equal value has been one of the salient policy measures to reduce the gaps; however, the effectiveness of equal pay has not been rigorously studied (Cazes and de Laiglesia, 2014). Therefore, the main contribution of this Chapter is to provide empirical evidence on causal impacts of equal pay legislation on the gaps in labor conditions between different categories of workers.

The Republic of Korea (hereafter, Korea) provides a useful context to explore the contribution of equal pay legislation in two main respects. First, Korea is among the countries with a highly dualized labor market (Jones and Urasawa, 2013).[17] Non-regular workers who consist of contingent, part-time, and atypical workers, are subject to adverse labor conditions such as low wages, little employment protection, and weak social safety net coverage, while regular workers enjoy high wages, high levels of employment protection, and broad social safety net coverage.[18] Around 34% of wage workers in Korea were non-regular workers in 2013 (KNSO, 2013). Looking at the share of temporary workers for purposes of international comparison, Korea had the third highest number among the OECD countries in that year (OECD, 2013).[19]

The Korean context is also informative, because a labor reform in 2007 allows for a quasi-experiment research design to tackle the research question. Since 2007, part of the reform, the so-called "anti-discrimination law" has banned undue discriminatory treatment against fixed-term, part-time, and dispatched workers. By exploiting that the anti-discrimination law targets only a subset of non-regular workers and has been gradually implemented by firm size, I investigate whether and how the anti-discrimination law results in reducing the gaps in labor conditions between regular workers and targeted non-regular workers by applying a difference-in-difference-in-differences (DDD) estimation to the 2007-2010 waves of the Economically Active Population Survey (EAPS). More specifically, the empirical analysis estimates the changes in hourly wages and three major social insurance schemes (national pension, health insurance, and

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[17] Koske, Fournier, and Wanner (2011) point out that Korea is one of few OECD countries where income inequality stems mostly from duality in the labor market.

[18] There is no commonly accepted definition for various non-traditional employment patterns including short-term and temporary work. 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, and the labor reform in 2007 relied on this classification. Thus, the classification of non-regular workers is used in this Chapter. Table A3.1 outlines the definitions of different types of wage workers.

[19] To enable better international comparisons, the OECD maintains a database on temporary workers, which are defined as wage workers whose job has a pre-determined termination date. For Korea, temporary workers include contingent workers, dispatched workers, and daily workers. When it comes to the share of temporary workers, Poland ranked highest, followed by Spain and Korea in 2013 (OECD, 2013).

employment insurance) for targeted non-regular workers in firms that are subject to the anti-discrimination law relative to regular workers within the same firms and relative to workers in firms that are not subject to the anti-discrimination law.[20]

The main findings of this study can be summed up as follows. First, the anti-discrimination law leads to significant increases in hourly wages and the probabilities of being covered by national pension, health insurance, and employment insurance for targeted non-regular workers in small firms with 5 to 99 employees, relative to other workers. This suggests that a considerable number of targeted non-regular workers benefit from the reform, as targeted non-regular employment is highly concentrated in small firms. Second, anticipatory behaviors of employers and selective transitions of employees in response to the implementation of the anti-discrimination law do not underlie the estimated effects. Finally, the presence of labor unions contributes to reducing gaps in labor conditions between regular and targeted non-regular workers.

The Chapter proceeds as follows. Section 3.2 provides an overview of gaps in labor conditions in Korea driven by labor market duality and a description of the anti-discrimination law. The data are described in Section 3.3, and the estimation strategy is outlined in Section 3.4. Section 3.5 presents the main results, a set of robustness analysis, and a discussion on possible explanations for the heterogeneous treatment effects by firm size. Finally, Section 3.6 concludes with policy implications.

3.2. Background

3.2.1. Labor market duality in Korea

As the 1997 Asian financial crisis led to Korea's rapid integration in a globalized economy, firms began actively employing non-regular staff to reduce labor costs and to increase employment flexibility given the difficulty and cost of dismissing regular workers (Jones and Urasawa, 2013). As a result, the share of non-regular workers rose sharply —from 27.4% in 2002

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[20] The Korean Employment Insurance System is a combination of a traditional unemployment benefits program and active labor market policy to prevent unemployment; thus, is called employment insurance rather than unemployment insurance (Yoo, 1999).

to 37.0% in 2004—and it remains stable at a high level, around one-third of all wage workers (Ha and Lee, 2013). Like other OECD countries, non-regular employment in the Korean labor market is overrepresented among younger, less-educated, and female workers. In addition, due to early mandatory retirement practices in Korean firms the incidence of non-regular employment increases strikingly for older workers (Grubb, Lee, and Tergeist, 2007).

Non-regular workers in Korea receive significantly less in wage and non-wage benefits compared to their counterparts. To begin with the latter, there are significant differences in access to social insurance between regular and non-regular workers. The legal framework requires that the social insurance system cover nearly all wage workers. In practice, however, there is a sizable gap between the statutory coverage and actual coverage, with many non-regular workers excluded (Korea Labor Review, 2009). According to the EAPS, around 80% of regular workers received at least one social insurance benefit in 2010, while the corresponding figure for non-regular workers was only around 45% (KNSO, 2010).

More importantly, the wage gap between regular and non-regular workers in Korea is substantial. The EAPS indicates that non-regular workers were paid only 64.9% of the hourly wages of regular workers in 2010 (KNSO, 2010). However, unlike the other non-wage benefits, the presence of this "raw" wage gap does not necessarily mean that non-regular workers are discriminated against, since a considerable part of the differential is attributed to their productivity differences. Many studies have measured the "true" wage gap between regular and non-regular workers in Korea, endeavoring to consider all possible productivity related characteristics, but different results have been found depending on methodology and data used in the analysis (see, for example, Lee, 2009; Nam, 2007; Park and Kim, 2007). There is no conclusive evidence on the size of the "true" wage gap, but most studies point out that the estimated "true" wage gap between regular and non-regular workers is statistically non-zero; it is smaller than the "raw" wage gap, thus discrimination against non-regular workers is likely to exist.[21]

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[21] It is very difficult to measure the exact level of discrimination against non-regular workers due mainly to unobserved individual and firm characteristics that affect both wage and employment type (Lee, 2009). Similarly, estimating the effect of the anti-

Given that the incidence of non-regular workers in Korea is higher among vulnerable workers, the inferior labor conditions of non-regular workers have played a significant role in worsening income inequality (Jones and Urasawa, 2013). In addition, the persistence of sizable gaps in labor conditions drives Korean youth to make an unproductive effort to become regular workers, engendering inefficiency in the whole economy. The high college entrance rate, reaching almost 80%, and an excessive use of private tutoring to enter a prestigious university is characteristic of the current situation in Korea, where large differentials in labor conditions provide younger people with incentives to adopt extreme strategies to gain an upper hand over their competitors in this fierce job market.[22]

3.2.2. The 2007 anti-discrimination law

In 2007, the Korean government undertook a labor reform. The primary aim of the labor reform was to prevent the overuse of non-regular employment and to outlaw discrimination against non-regular workers. Although the labor reform faced strong opposition from both labor unions and business organizations, the reform bill was passed in December 2006 and became effective seven months later, beginning 1 July 2007.

One of the main changes introduced by the reform was the anti-discrimination law prohibiting undue discriminatory treatment against fixed-term, part-time, and dispatched workers. The implementation of the anti-discrimination law has been gradual by firm size. It was first applied in July 2007 to the public sector and firms with 300 employees or more. This application gradually expanded to firms with 100 employees or more in July 2008 and five employees or more in July 2009. Article 8 of Act on the

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discrimination law on the level of wage discrimination against targeted non-regular workers is complex. Given the limitations of quantifying discrimination, our analysis alternatively examines whether targeted non-regular workers experience an increase in wages and other labor market outcomes relative to other workers as a result of the implementation of the anti-discrimination law.

[22] The percentage of high school graduates who begin four-year university courses or two-year technical college studies was 83.8% in 2008 (KEDI, 2009). According to the Survey of Private Education Expenditure (SPEE), 87.4% of elementary school students, 74.3% of middle school students, and 62.8% of general high school students received private tutoring in 2009 with an average monthly private tutoring expenditure per student of 242 thousand Korean won, approximately 220 US dollars (KNSO, 2009b).

Protection, etc. of Fixed-term and Part-time Employees and Article 21(1) of Act on the Protection, etc. of Dispatched Workers state respectively that an employer shall not give discriminatory treatment against fixed-term, part-time, and dispatched workers on the ground of their employment status in comparison with workers without a fixed-term contract, full-time workers, and workers in the using firms who are engaged in the same or similar jobs in the business or workplace concerned. Workers can file a request for correction of discriminatory treatment in terms of wages and other labor conditions with the Korean Labor Relations Commission. In disputes relating to discriminatory treatment, the burden of proof is placed on employers. Penalties apply for noncompliance with a redress order confirmed by the Labor Relations Commission.[23]

Critics argued that the anti-discrimination law would produce few actual results, because the law lacks objective criteria by which discriminatory treatment could be defined (Cho, 2010). The relevant articles imply that an ideal approach to identifying discriminatory treatment is, for instance, to compare the wages of full-time and part-time workers engaged in the same job and workplace. Even in this ideal case, defining the same job or task is challenging as workers' contribution or productivity is not fully observable. Advocates such as Choi (2011), however, contend that the anti-discrimination law is designed to contribute to improving targeted non-regular workers' labor conditions, as it generates incentives for both employees and employers. On one hand, the anti-discrimination law creates a legal channel through which targeted non-regular workers can ameliorate unfavorable treatment in an active way. On the other hand, employers may also try to reduce discriminatory treatment, being afraid of punishment for noncompliance with the anti-discrimination law.

Empirically, few studies have been conducted on the effectiveness of the anti-discrimination law. To the best of my knowledge, Choi (2011) and Lee (2015) are the only two papers that empirically examine the impacts of

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[23] If an employer does not comply with a final redress order confirmed by the Labor Relations Commission without any justifiable reason, he or she is punished by a fine for negligence not exceeding 100 million Korean Won (approximately 85,000 US dollars). Furthermore, if an employer dismisses or gives other unfavorable treatment to a worker on the grounds that he or she made an application for redress to the Labor Relations Commission, the employer is punished by imprisonment of up to two years or a fine not exceeding 10 million Korean Won (approximately 8,500 US dollars).

the anti-discrimination law. Choi (2011) applies a difference-in-differences (DD) framework to establishment-level data, and finds significant positive effects for wage and training opportunities. Lee (2015) studies the impact of the anti-discrimination law on the wage structure of non-regular workers using the simplest triple difference estimation. He finds that the anti-discrimination law has a negative impact on non-regular workers' wages by lowering the probability that individual incentives will be included in wage structure. However, this research differs in at least two main respects. First, I employ an extended version of DDD estimation. This deals with the issue concerning a violation of the parallel trends assumption in the DD model and enables me to investigate the heterogeneous effects of the anti-discrimination law by firm size. Second, this research uses individual-level data instead of establishment-level data. This allows me to perform more elaborate analysis on how much each individual worker's wage and non-wage benefits change before and after the reform.

3.3. Data

This research employs the Economically Active Population Survey (EAPS), repeated cross-sectional data collected by the Korean National Statistics Office (KNSO). The Ministry of Labor uses official EAPS data to calculate the size of the non-regular employment population. The survey collects information on an individual's labor-related characteristics and other demographic characteristics. It is answered monthly by individuals who are 15 years old and over in 32,000 sample households in Korea.

I use data collected every March from 2007 to 2010. The rationale for 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 performing the DDD estimation. Specifically, the supplementary survey contains information about wage (average pretax monthly wage received for the last three months) and access to national pension, health insurance, and employment insurance, which are used as outcome variables. It also offers information with which I categorize workers by employment type. This enables me to classify regular workers, targeted non-regular workers, and non-targeted non-regular workers—the main subgroups in the analysis (figure 3.1).

Figure 3.1. Classification of wage workers by employment type
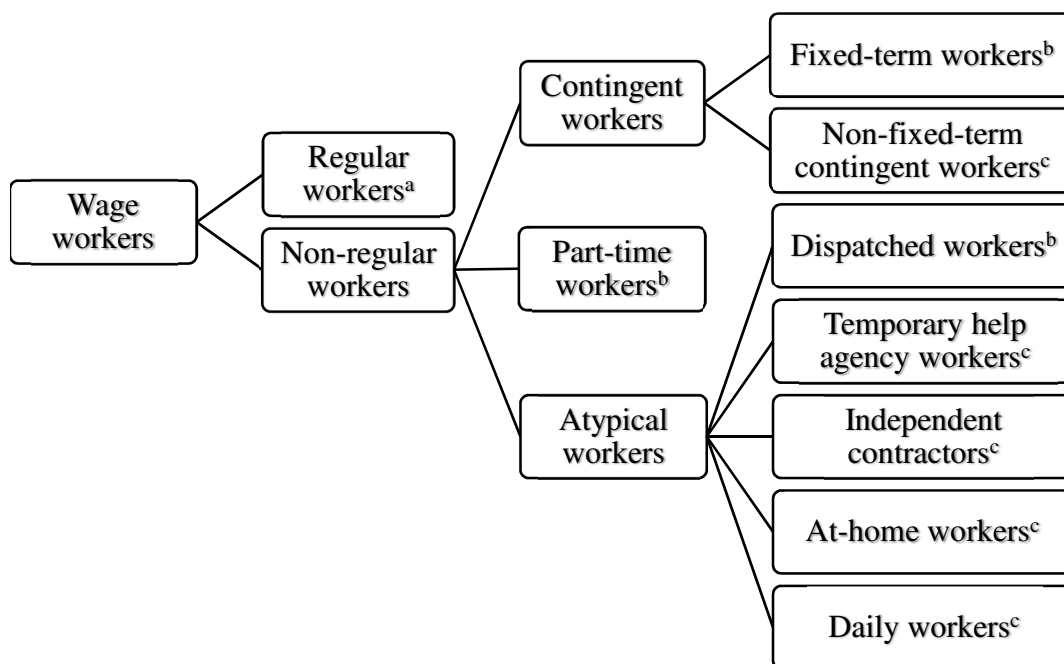
a Regular workers
b Targeted non-regular workers
c Non-targeted non-regular workers

Workers are considered "targeted" non-regular workers if they are categorized as fixed-term, part-time, or dispatched workers, while the remaining non-regular workers are considered "non-targeted" non-regular workers. I drop workers who can, in principle, belong to both targeted and non-targeted non-regular worker categories.[24] Since they can be regarded as both targeted and non-targeted non-regular workers, it is unclear in what way the anti-discrimination law affects their labor conditions. For these reasons,

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[24] Typical examples are daily workers (non-targeted non-regular workers) who work in part-time employment (targeted non-regular workers) and temporary help agency workers (non-targeted non-regular workers) on fixed-term contracts (targeted non-regular workers).

this group of workers, representing about 5% of total wage workers, is excluded from the sample.

The analysis focuses on the treatment effects of the anti-discrimination law for the three subgroups of wage workers. Thus, 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, I work with a sample of 96,246 wage workers from an overall sample of 273,471 individuals. About 18% of the sample is classified as targeted non-regular workers.

Since the dataset used in the analysis is compiled in March every year, no individual in the 2007 EAPS data was affected by the anti-discrimination law, while targeted non-regular workers who worked in the public sector or at a firm with 300 employees or more in the 2008 EAPS data were subject to the reform. In the same way, targeted non-regular workers whose workplace consisted of 100 employees or more in the 2009 EAPS data and those whose workplace consisted of five employees or more in the 2010 EAPS data were affected by the reform. Table 3.1 summarizes the gradual implementation of the anti-discrimination law by firm size.

The dataset includes detailed information on the wage and non-wage benefits 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. Hourly wage is expressed in real terms, adjusted to 2010 prices using a consumer price index. Regarding national pension and health insurance, workers are considered to receive benefits from the National Pension Service (NPS) and National Health Insurance System (NHIS) only if they are workplace-based insured persons. The dataset also contains information on individual demographic characteristics (gender, age, educational attainment, marital status, and head of household) and job-related or firm characteristics (occupation, labor union status, industry). These variables are included in the regression model as individual-specific covariates. Table A3.2 summarizes the definitions of the variables used in the empirical analysis.

Table 3.1. Gradual implementation of the anti-discrimination law by firm size

Firm size	Year			
	2007 EAPS	2008 EAPS	2009 EAPS	2010 EAPS
Large firms[a] (300 employees or more)	No	Yes	Yes	Yes
Medium-sized firms (Between 100 and 299)	No	No	Yes	Yes
Small firms (Between 5 and 99)	No	No	No	Yes
The smallest firms (Fewer than 5 employees)	No	No	No	No

NOTE.–EAPS = Economically Active Population Survey. Yes if firms are subject to the anti-discrimination law; No otherwise.

[a] Firms in the public sector belong to the group "large firms".

Table 3.2 reports the means of labor market outcome variables organized by year, firm size, and employment type. The table shows that, on average, in all firm size groups, targeted non-regular worker have lower hourly wages than regular workers and are less likely to be covered by national pension, health insurance, and employment insurance. The gaps in accessibility to social insurance tend to be larger in smaller firms. For instance, the probability that targeted non-regular workers will be covered by employment insurance in the smallest firms is about a half of that for regular workers in the same firm size group, while the corresponding difference between regular and targeted non-regular workers in large firms is marginal. It is also shown that regular workers have experienced a moderate improvement in labor conditions over time. Labor conditions of targeted non-regular workers in large firms have deteriorated during the sample period, while accessibility to social insurance for targeted non-regular workers in small and the smallest firms has drastically improved.

Table 3.2. Means of labor market outcomes

	Regular workers				Targeted non-regular workers				Non-targeted non-regular workers			
	2007	2008	2009	2010	2007	2008	2009	2010	2007	2008	2009	2010
A. Large firms (300 employees or more):												
Hourly wage	1.718	1.730	1.717	1.840	1.291	1.303	1.293	1.135	1.411	1.191	.966	1.693
National pension	.988	.985	.990	.993	.849	.816	.798	.720	.870	.745	.548	.775
Health insurance	.990	.984	.994	.993	.867	.842	.822	.764	.878	.765	.524	.775
Employment insurance	.821	.785	.784	.744	.785	.757	.771	.687	.824	.704	.524	.663
Observations	2370	2294	2415	2365	390	354	415	339	131	98	42	89
B. Medium-sized firms (between 100 and 299 employees):												
Hourly wage	1.267	1.286	1.322	1.362	1.093	.951	1.067	.968	.984	.897	.843	1.039
National pension	.958	.967	.968	.969	.808	.800	.798	.819	.628	.577	.414	.503
Health insurance	.965	.971	.973	.975	.830	.811	.846	.819	.644	.562	.434	.542
Employment insurance	.799	.777	.793	.807	.802	.784	.824	.787	.603	.592	.394	.536
Observations	1772	1778	1842	1945	459	435	421	342	239	130	99	153
C. Small firms (between 5 and 99 employees):												
Hourly wage	1.051	1.048	1.074	1.094	.784	.809	.793	.769	.804	.739	.696	.793
National pension	.801	.814	.823	.822	.526	.564	.588	.587	.328	.236	.160	.228
Health insurance	.806	.819	.835	.835	.544	.585	.608	.634	.348	.260	.192	.254
Employment insurance	.671	.675	.696	.701	.520	.554	.592	.622	.328	.243	.198	.269
Observations	9394	9257	9641	9706	2735	2390	2656	2871	2279	2212	1951	1960
D. The smallest firms (fewer than 5 employees):												
Hourly wage	.623	.633	.638	.664	.649	.625	.589	.619	.604	.540	.569	.617
National pension	.315	.314	.318	.327	.127	.164	.155	.171	.109	.077	.068	.085
Health insurance	.324	.334	.333	.335	.139	.183	.167	.191	.130	.105	.092	.109
Employment insurance	.284	.293	.309	.314	.126	.159	.163	.183	.117	.084	.078	.108
Observations	2758	2569	2655	2738	1057	900	885	934	949	1022	863	813

NOTE. – Hourly wage is presented in 10 thousands of Korean Won.

The table also reveals that there are marked differences between targeted non-regular workers and non-targeted non-regular workers. Overall, non-targeted non-regular workers are employed in jobs with poorer labor conditions. This describes a paradoxical situation wherein the anti-discrimination law does not target the workers in greatest need of improved labor conditions. In the case of workers' demographics (table A3.3), a typical targeted non-regular worker is a woman without a tertiary degree working in a small firm. Targeted non-regular workers are younger than regular workers in large firms, while those in small and the smallest firms are older.

3.4. Methodology: Difference-in-Difference-in-Differences estimation

The anti-discrimination law creates three dimensions of variation that I exploit to identify the treatment effects. First, the gradual introduction of the anti-discrimination law by firm size generates variation across firm size groups and over time. This makes it suitable to employ an extended version of the DD estimation with multiple groups and time periods. For the DD estimator to yield a consistent estimate of the treatment effect, the parallel trends assumption needs to be satisfied (Angrist and Pischke, 2008); that is, in this context, in the absence of the treatment, wage (or other outcomes) trends would have been the same in both affected and unaffected firms. However, the fulfillment of the parallel trends assumption is challenging, as different firm size groups are heterogeneous in terms of capability to provide workers with wage and non-wage benefits. Some of the time-invariant heterogeneity could be controlled for by an inclusion of firm size fixed effects in the regression, but a presence of time-variant firm size group-specific shocks is problematic. For instance, negative macroeconomic shocks might affect smaller firms more than larger firms. In this case, the parallel trends assumption does not hold; thus the use of the DD method is inappropriate (Angrist and Pischke, 2008).[25]

I address this problem by focusing on the fact that the anti-discrimination law also creates variation within a firm. The anti-

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[25] The parallel trends assumption cannot be graphically tested using years prior to the treatment, because the pretreatment period is not defined in the dataset. The supplementary survey of the EAPS in March started from 2007, and the anti-discrimination law was first applied to large firms in July 2007.

discrimination law was designed to target only fixed-term, part-time, and dispatched workers. This consequently leads the anti-discrimination law to influence workers in affected firms differently, creating "treatment" and "control" groups within the firm. I use as the treatment group targeted non-regular workers whose labor market outcomes may increase either absolutely or relatively to their counterparts, regular workers.

There are two reasons why I use only regular workers as the control group. First, discriminatory treatment against targeted non-regular workers is defined by comparing their labor market outcomes with their counterparts' labor market outcomes. For example, Articles 8(1) and 8(2) of Act on the Protection, etc. of Fixed-term and Part-time Employees indicate that the counterparts of fixed-term and part-time workers are workers under a labor contract without a fixed-term and full-time workers respectively, most of whom are regular workers. Second, as table 3.2 shows, labor conditions of non-targeted non-regular workers are poorer than those of targeted non-regular workers, and thus they cannot be the group that targeted non-regular workers want to catch up with in terms of labor conditions. For these reasons, non-targeted non-regular workers are excluded from the main analysis. Non-targeted non-regular workers are employed in placebo tests as robustness checks (Subsection 3.5.3).

The three dimensions of variation (employment type, firm size, and year) enable me to estimate the effect of the anti-discrimination law on the labor conditions of targeted non-regular workers relative to other workers using a DDD method. Take hourly wage, one of the dependent variables, as an example. The DDD method first compares the change in hourly wages of targeted non-regular workers in affected firms to the change in hourly wages of targeted non-regular workers in unaffected firms. This difference in differences is then compared to the difference between the change in hourly wages of regular workers in affected firms and the change in hourly wages of regular workers in unaffected firms. The use of the triple-differences model can difference out trends that may differ for affected and unaffected firms, addressing the concern on the parallel trends assumption in the DD estimator (Zavodny, 2000).[26]

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[26] The main advantage of the DDD estimation is that the identifying assumption is weak (Gruber, 1994). For example, even though national business cycle conditions changed over

The basic regression used to estimate the effect of the anti-discrimination law on the relative labor conditions of targeted non-regular workers includes fixed effects, interactions of the fixed effects, and individual-specific covariates. The equation at the individual level is

$$Y_{ijkt} = \alpha_j + \alpha_k + \alpha_t + \gamma_{jk} + \lambda_{jt} + \theta_{kt}$$

$$+ \delta D_{jkt} + X'_{ijkt}\beta + \varepsilon_{ijkt} \tag{3.1}$$

where i denotes individuals, j denotes employment types (regular workers or targeted non-regular workers), k denotes firm size groups (large firms (300 employees or more), medium-sized firms (between 100 and 299 employees), small firms (between 5 and 99 employees), or the smallest firms (fewer than 5 employees)), and t denotes years (2007, 2008, 2009, or 2010). Y_{ijkt} is the outcome of interest (logged hourly wage, national pension, health insurance, or employment insurance); α_j is a targeted non-regular worker dummy; α_k is a full set of firm size dummies; and α_t is a full set of year dummies. By including interactions of the fixed effects, this model provides full nonparametric control for the time-invariant firm size group-specific effects of being a targeted non-regular worker (γ_{jk}), changes over time for targeted non-regular workers common across firm size groups (λ_{jt}), and firm size group-specific time effects common across employment types (θ_{kt}). The variable of interest, D_{jkt}, indicates targeted non-regular workers in firm size groups and years that are subject to the anti-discrimination law. Hence, the DDD estimate δ is interpreted as the effect of the anti-discrimination law on the relative earnings of targeted non-regular workers.

X_{ijkt} 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 head of household, dummies for occupation (9 categories), a dummy for labor union

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the 2007-2010 period, and this affected workers in affected firms differently than workers in unaffected firms, the DDD method yields an unbiased estimate of the effect of the anti-discrimination law if the relative effects were the same for targeted non-regular workers and regular workers.

status (4 categories), and dummies for industry (21 categories). Following Bertrand, Duflo, and Mullainathan (2004), I compute heteroscedasticity-robust standard errors to prevent, as much as possible, false rejections of the null hypothesis of no effect.[27]

Given that the anti-discrimination law has been applied to different firm size groups at different points in time, firms' reactions to the policy may not be homogenous. To check for the existence of such heterogeneous effects, I estimate equation (3.2) where the treatment effect in equation (3.1) is disentangled by firm size.

$$Y_{ijkt} = \alpha_j + \alpha_k + \alpha_t + \gamma_{jk} + \lambda_{jt} + \theta_{kt} + \delta^l D^l{}_{jkt} +$$
$$+\delta^m D^m{}_{jkt} + \delta^s D^s{}_{jkt} + X'_{ijkt}\beta + \varepsilon_{ijkt} \qquad (3.2)$$

$D^l{}_{jkt}$ is an indicator variable taking the value 1 if the individual is a targeted non-regular worker in a large firm in 2008, 2009, or 2010. Similarly, $D^m{}_{jkt}$ takes the value 1 if the individual is a targeted non-regular worker in a medium-sized firm in 2009 or 2010, and $D^s{}_{jkt}$ takes the value 1 if the individual is a targeted non-regular worker in a small firm in 2010. Thus, the coefficients of interest δ^l, δ^m, and δ^s capture the effect of the anti-discrimination law on the relative wages of targeted non-regular workers in large, medium-sized, and small firms, respectively.

In principle, equations (3.1) and (3.2) are appropriate to estimate wage. However, they are applied to the rest of the dependent variables under the assumption that the controls can also have an impact on the probabilities of being covered by national pension, health insurance, and employment insurance. Workers exempt from the scope of application specified by the National Pension Act, the National Health Insurance Act, and the

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[27] According to Bertrand, Duflo, and Mullainathan (2004), our policy variable is likely to be serially correlated to some extent, which may lead to the underestimation of the true standard errors. Due to the small number of clusters (four firm size groups), clustering on firm size, employed in many DD analysis, cannot be the solution to the problem in this context. However, the serial correlation in the current DDD regression may not be as serious as believed, because the analyzed time period is relatively short (four years) and an inclusion of firm-size group specific trends might already control for much of the correlation over time with the same firm-size group (Bertrand, Duflo, and Mullainathan, 2004). For these reasons, I estimate the regression models with heteroscedasticity- robust standard errors.

Employment Insurance Act are excluded from the analysis when running each of the social insurance regressions, since they are ineligible for the social insurance benefit regardless of the imposition of the anti-discrimination law. Table A3.4 lists workers excluded when running each of the social insurance regressions. The social insurance regressions are estimated using probit models.

3.5. Results

3.5.1. Initial DDD estimates with the full sample

Table 3.3 presents the results of the DDD estimation, the impacts of the anti-discrimination law on hourly wage, national pension, health insurance, and employment insurance for targeted non-regular workers relative to other workers. Panel A shows the estimates of the overall treatment effects of the anti-discrimination law estimated by equation (3.1), while Panel B shows the estimates of the heterogeneous effects by firm size estimated by equation (3.2). Targeted non-regular workers appear to be relatively more likely to be covered by national pension, health insurance, and employment insurance after the firms are subject to the anti-discrimination law. However, the anti-discrimination law does not appear to significantly increase the relative hourly wages of targeted non-regular workers. The coefficient of hourly wage is positive, but not large enough to be statistically significant at any conventional level.

Panel B provides evidence that different firm size groups react to the imposition of the anti-discrimination law in a different manner. Targeted non-regular workers in affected small firms appear to experience significant positive changes in all labor conditions, while there are no statistically significant impacts on labor conditions for targeted non-regular workers in affected medium-sized and large firms. The results suggest that the positive overall effects on social insurance presented in Panel A are mainly driven by the positive effects in small firms. Targeted non-regular workers in affected small firms also experience an increase in hourly wages relative to other workers.

Table 3.3. Initial DDD estimates with the full sample

Variable	Log Hourly Wage	National Pension (Probit)	Health Insurance (Probit)	Employment Insurance (Probit)
A. Overall effects:				
Policy	.015	.127*	.143*	.207***
	(.016)	(.075)	(.075)	(.065)
		[.022]	[.025]	[.050]
Observations	83,082	75,668	76,291	77,953
B. Heterogeneous effects:				
Policy × Large	-.044	-.001	.113	.201
	(.032)	(.184)	(.185)	(.130)
		[-.001]	[.020]	[.049]
Policy × Medium	-.018	-.053	.012	.019
	(.026)	(.140)	(.141)	(.121)
		[-.009]	[.002]	[.005]
Policy × Small	.049**	.207**	.187**	.283***
	(.020)	(.085)	(.084)	(.081)
		[.036]	[.033]	[.068]
Observations	83,082	75,668	76,291	77,953

NOTE. – Heteroscedasticity-robust standard errors are in parentheses, and marginal effects are in brackets. The national pension, health insurance, and employment insurance regressions are estimated using probit models. The full sample is used.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

3.5.2. Main DDD estimates with the "private sector-dominated industries" sample

However, caution is needed when interpreting the results in table 3.3. The anti-discrimination law was first applied not only to large firms with 300 employees or more but also to firms in the public sector. The problem is that the EAPS dataset does not distinguish between these firm types, so that incorrect treatment assignment can generate bias, rendering the DDD estimator less convincing. To address this concern, I performed the following test. First, I calculated the share of workers in the public sector in each industry using information from the Census on Establishments conducted in 2009 by the Korean National Statistics Office (KNSO). In this database, each establishment is divided into one of four categories by the form of legal organization: individual proprietorship, incorporated company, non-business corporation, and unincorporated association. By dividing the number of employees that belong to non-business corporations by the number of all

employees in each industry, I calculated the percentage of workers in the public sector in each industry (table A3.5).[28] Second, according to the shares of workers in the public sector computed, I generated a subsample that consisted of "private sector-dominated" industries. 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. Finally, I estimated equations (3.1) and (3.2) using the chosen subsample.

The intuition behind this test is that in this chosen subsample, the incorrect treatment assignment mentioned above is likely to play a relatively minor role. I check how different these results and the initial results are. The results of the test are presented in table 3.4. In general, the estimates are similar to those obtained with the full sample. Targeted non-regular workers in affected small firms experience a significant improvement in all labor conditions relative to other workers, and the relative increases in the probabilities of being covered by the three social insurance programs in affected small firms are large enough to make the overall effects statistically significant. The results that are insensitive to the sample change suggest that the inability to distinguish workers in the public sector does not challenge the robustness of the DDD estimation.

The DDD estimates reported in table 3.4 are considered more credible than those in table 3.3 in that a potential source of bias associated with the public sector issue is relatively minimized. Thus, the results in table 3.4 are regarded as the main findings of the Chapter, and the "private sector-dominated industries" sample is used for the rest of the analysis. Panel A in table 2.4 indicates that the probabilities that targeted non-regular workers in affected firms will be covered by national pension, health insurance, and employment insurance increase respectively by about 4, 5.3, and 3.8 percentage points relative to other workers.

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[28] The public sector in Korea consists of central administration organizations, local governments, public institutions, public enterprises, and educational institutions. With few exceptions, those institutions belong to the category "non-business corporation" in the Census of Establishments.

Table 3.4. Main DDD estimates with the "private sector-dominated industries" sample

Variable	Log Hourly Wage	National Pension (Probit)	Health Insurance (Probit)	Employment Insurance (Probit)
A. Overall effects:				
Policy	.018	.208*	.280**	.189*
	(.024)	(.116)	(.124)	(.103)
		[.040]	[.053]	[.038]
Observations	40,511	37,222	36,259	39,607
B. Heterogeneous effects:				
Policy × Large	-.022	.031	.273	.378
	(.046)	(.327)	(.362)	(.291)
		[.006]	[.051]	[.076]
Policy × Medium	-.021	-.117	-.075	-.066
	(.039)	(.215)	(.225)	(.194)
		[-.022]	[-.014]	[-.013]
Policy × Small	.049*	.339***	.400***	.236**
	(.029)	(.130)	(.139)	(.115)
		[.064]	[.075]	[.047]
Observations	40,511	37,222	36,259	39,607

NOTE. – Heteroscedasticity- robust standard errors are in parentheses, and marginal effects are in brackets. The national pension, health insurance, and employment insurance regressions are estimated using probit models. The "private sector-dominated industries (manufacturing, construction, wholesale and retail sale, accommodation and food service activities)" sample is used.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

Panel B in table 3.4 reveals that the positive overall effects on social insurance are mainly attributed to the positive effects in small firms. The probabilities of being covered by national pension, health insurance, and employment insurance for targeted non-regular workers in affected small firms increase by about 6.4, 7.5, and 4.7 percentage points, respectively. Targeted non-regular workers in affected small firms also experience an almost 5% increase in hourly wages relative to other workers, and the estimate is statistically significant at the 10% level. This in turn implies that the anti-discrimination law succeeded in improving all relative labor conditions of targeted non-regular workers only in small firms. Given that about 60% of targeted non-regular employment is concentrated in small firms with 5 to 99 employees (KNSO, 2010), it can be concluded that the anti-discrimination law partly achieved its intended goal.

The insignificant overall effect on hourly wage seems to be attributed to the relatively less significant effect on hourly wage for targeted non-regular workers in small firms. In fact, it is less clear for both employees and employers to define undue discriminatory treatment in terms of wage than the other labor conditions. Wage determination depends on productivity-related factors to a larger extent; some wage discrimination might be justified under the pretext of productivity differences, lessening employers' incentives to increase the relative hourly wages for targeted non-regular workers. In contrast, social insurance eligibility and entitlement are explicitly stated in the relevant legislation. Given that many targeted non-regular workers who are eligible for social insurance programs are not actually covered by them, I suggest that employers were under greater pressure to expand social insurance coverage for targeted non-regular workers.

3.5.3. Placebo tests

The robustness of the main findings is tested by performing placebo tests. For these tests, I excluded targeted non-regular workers from the main sample and included non-targeted non-regular workers. Equations (2.1) and (2.2) were estimated to measure the effect of the anti-discrimination law on non-targeted non-regular workers in affected firms relative to regular workers within the same firms and relative to workers in unaffected firms. By construction, non-targeted non-regular workers have nothing to do with the anti-discrimination law, because they are not targeted. However, in these tests, I treated non-targeted non-regular workers as if they were the group of workers that the anti-discrimination law targets. None of the estimates of these placebo policy variables in table 3.5 are statistically different from zero at conventional levels, reaffirming that the DDD estimator yields an unbiased estimate of the treatment effect.

Table 3.5. Placebo tests

Variable	Log Hourly Wage	National Pension (Probit)	Health Insurance (Probit)	Employment Insurance (Probit)
A. Overall effects:				
Policy	.045	-.018	-.093	-.031
	(.029)	(.146)	(.157)	(.118)
		[-.003]	[-.017]	[-.006]
Observations	40,106	36,107	34,806	39,458
B. Heterogeneous effects:				
Policy × Large	.083	-.297	-.005	.098
	(.069)	(.476)	(.472)	(.408)
		[-.055]	[-.001]	[.019]
Policy × Medium	.035	.099	-.009	-.013
	(.063)	(.248)	(.255)	(.221)
		[.018]	[-.002]	[-.003]
Policy × Small	.042	-.020	-.123	-.045
	(.032)	(.159)	(.172)	(.127)
		[-.004]	[-.023]	[-.009]
Observations	40,106	36,107	34,806	39,458

NOTE. – Heteroscedasticity- robust standard errors are in parentheses, and marginal effects are in brackets. The national pension, health insurance, and employment insurance regressions are estimated using probit models. The "private sector-dominated industries (manufacturing, construction, wholesale and retail sale, accommodation and food service activities)" sample is used.
$* p < .10.$
$** p < .05.$
$*** p < .01.$

3.5.4. Anticipatory effects

The main findings may still suffer from bias if an anticipatory effect plays a role (Angrist and Pischke, 2008). For instance, the DDD estimates would be biased if firms anticipating the implementation of the anti-discrimination law raised wages for targeted non-regular workers immediately prior to its imposition, because they knew they had to do so in the near future. This would render the treatment effect underestimated. To explore the existence of the anticipatory effect, I repeated the regressions in table 3.4 adding leads of the anti-discrimination law as in Autor (2003). More specifically, I augmented equation (3.1) with an indicator for one year before the implementation of the anti-discrimination law. The lead dummy takes the value 1 if the individual is a targeted non-regular worker in a large firm in 2007, in a medium-sized firm in 2008, or in a small firm in 2009. For equation (3.2), I included the leads for medium-sized and small firms, respectively.

The lead for large firms is not included, since there is only one year prior to the implementation of the anti-discrimination law for large firms.

Four years of data might not be enough to carry out this analysis in an elaborate fashion, particularly in estimating equation (3.2). To double check the heterogeneous effects of the lead and policy variables by firm size, I also ran specifications where all individuals in large firms are dropped. The estimated coefficients of the policy variables produced by the two types of specifications are similar to the main results in table 3.4, except that the coefficient of hourly wage in small firms is not statistically significant in the first types of specifications (table 3.6), while the overall effect on employment insurance is not statistically significant in the second types of specifications (table 3.7). However, none of the coefficients of the leads in either specification are statistically different from zero, which shows little evidence of an anticipatory response about the anti-discrimination law.

Due to a lack of pre-lead years, the heterogeneous anticipatory response of large firms cannot be investigated with the current dataset. However, there is little reason to believe that large firms would preemptively raise wages for targeted non-regular workers before they were subject to the anti-discrimination law since increasing wages is costly. Moreover, given the short time interval (seven months) between the enactment and implementation of the anti-discrimination law, the anticipatory effect might be even harder to identify in the large firms to which the anti-discrimination law was first applied.

3.5.5. Composition changes

A composition change resulting from treatment needs to be considered as a possible channel to explain the main findings (Angrist and Pischike, 2008). For instance, if workers selectively move to larger (affected) firms or become targeted non-regular workers to benefit from the expected relative improvement in labor conditions arising from the anti-discrimination law, the estimated treatment effects may be confounded. Even in this case, it is still valid that the estimated effects are due to the implementation of the anti-discrimination law. However, it is unclear whether they are direct effects of the policy or effects of the selective transitions of workers across employment types or firm size groups.

Table 3.6. DDD estimates with leads

Variable	Log Hourly Wage	National Pension (Probit)	Health Insurance (Probit)	Employment Insurance (Probit)
A. Overall effects:				
Lead	.007	.179	.164	.053
	(.023)	(.112)	(.121)	(.098)
		[.034]	[.031]	[.011]
Policy	.023	.318**	.381***	.222*
	(.030)	(.131)	(.141)	(.117)
		[.060]	[.072]	[.044]
Observations	40,511	37,222	36,259	39,607
B. Heterogeneous effects:				
Lead × Medium	-.070	-.128	-.231	-.176
	(.050)	(.279)	(.285)	(.246)
		[-.024]	[-.044]	[-.035]
Lead × Small	.003	.169	.206	.091
	(.030)	(.136)	(.149)	(.118)
		[.032]	[.039]	[.018]
Policy × Large	-.026	.085	.323	.399
	(.047)	(.330)	(.365)	(.294)
		[.016]	[.061]	[.080]
Policy × Medium	-.053	-.092	-.089	-.102
	(.049)	(.266)	(.283)	(.236)
		[-.018]	[-.017]	[-.020]
Policy × Small	.050	.401***	.476***	.270**
	(.032)	(.139)	(.149)	(.123)
		[.076]	[.090]	[.054]
Observations	40,511	37,222	36,259	39,607

NOTE. – Heteroscedasticity- robust standard errors are in parentheses, and marginal effects are in brackets. The national pension, health insurance, and employment insurance regressions are estimated using probit models. The "private sector-dominated industries" sample is used.

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

Table 3.7. DDD estimates with leads (without workers in large firms)

Variable	Log Hourly Wage	National Pension (Probit)	Health Insurance (Probit)	Employment Insurance (Probit)
A. Overall effects:				
Lead	.011	.156	.151	.097
	(.025)	(.120)	(.129)	(.105)
		[.034]	[.032]	[.022]
Policy	.040	.265**	.306**	.193
	(.032)	(.135)	(.145)	(.119)
		[.057]	[.066]	[.044]
Observations	35,312	32,060	31,091	34,416
B. Heterogeneous effects:				
Lead × Medium	-.074	-.118	-.213	-.173
	(.050)	(.282)	(.288)	(.249)
		[-.026]	[-.046]	[-.039]
Lead × Small	.026	.145	.167	.121
	(.032)	(.140)	(.155)	(.123)
		[.031]	[.036]	[.027]
Policy × Medium	-.031	-.124	-.133	-.085
	(.050)	(.269)	(.287)	(.239)
		[-.027]	[-.029]	[-.019]
Policy × Small	.063*	.345**	.405***	.256**
	(.034)	(.141)	(.152)	(.124)
		[.075]	[.087]	[.058]
Observations	35,312	32,060	31,091	34,416

NOTE. – Heteroscedasticity- robust standard errors are in parentheses, and marginal effects are in brackets. The national pension, health insurance, and employment insurance regressions are estimated using probit models. The "private sector-dominated industries (manufacturing, construction, wholesale and retail sale, accommodation and food service activities)" sample is used. Workers in large firms are dropped.
* $p < .10$.
** $p < .05$.
*** $p < .01$.

Figure 3.2 shows the compositions of regular workers, targeted non-regular workers, and non-targeted non-regular workers by firm size over time. In general, no dramatic change is observed in the compositions. In 2008, the share of targeted non-regular workers decreased and the share of non-targeted non-regular workers increased in the smallest firms (figure 3.2d). However, such changes do not seem to be associated with the implementation of the anti-discrimination law, as the smallest firms have never been affected. Similarly, figure 3.3 describes the compositions of different firm size groups by employment type over time. The shares of regular and non-targeted non-

regular workers in each firm size group have been relatively constant over time (figure 3.3a and 3.3c). An increase in the share of targeted non-regular workers in small firms in 2010 might seem to be correlated with the timing of the anti-discrimination law; however, the increase is not attributed to decreases in the share of targeted non-regular workers in the smallest firms.

An ideal way of testing whether the selective transitions of workers across employment types have taken place is to run the DDD regressions using employment type dummies as dependent variables. However, the problem is that employment type and firm size are two of the three dimensions of variation exploited to identify the treatment effects in the DDD regressions. For example, when using a targeted non-regular worker dummy as a dependent variable, employment type fixed effects and the interactions cannot be included on the right-hand side in the regressions, which is in turn equivalent to running DD regressions. As noted in Section 3.4, the DD estimation produces less convincing results that are too weak to rule out the potential sources of bias concerning the composition changes.

Furthermore, the data used in this Chapter are repeated cross-sectionally and do not provide information on individuals' employment history. This makes it hard to directly control for the selective transitions of workers in the main DDD regressions. However, information on when individuals started their current jobs is available. I used this information to at least partially control for the composition changes given the data limitations. I divided the sample into two groups: (potential) "changers" who started their current jobs after the reform, July 2007 and "stayers" who started their current jobs before the reform, July 2007. The main DDD regressions were modified to include interactions of the policy and control variables (except age and age squared) with indicators for "changers" and "stayers", respectively, and were reestimated. In this practice, I checked for similar treatment effects among the "stayers" who had nothing to do with the selective transitions because they have continued in the jobs they had before the anti-discrimination law came into effect.

Figure 3.2. Shares of regular workers, targeted non-regular workers, and non-targeted non-regular workers by firm size over time
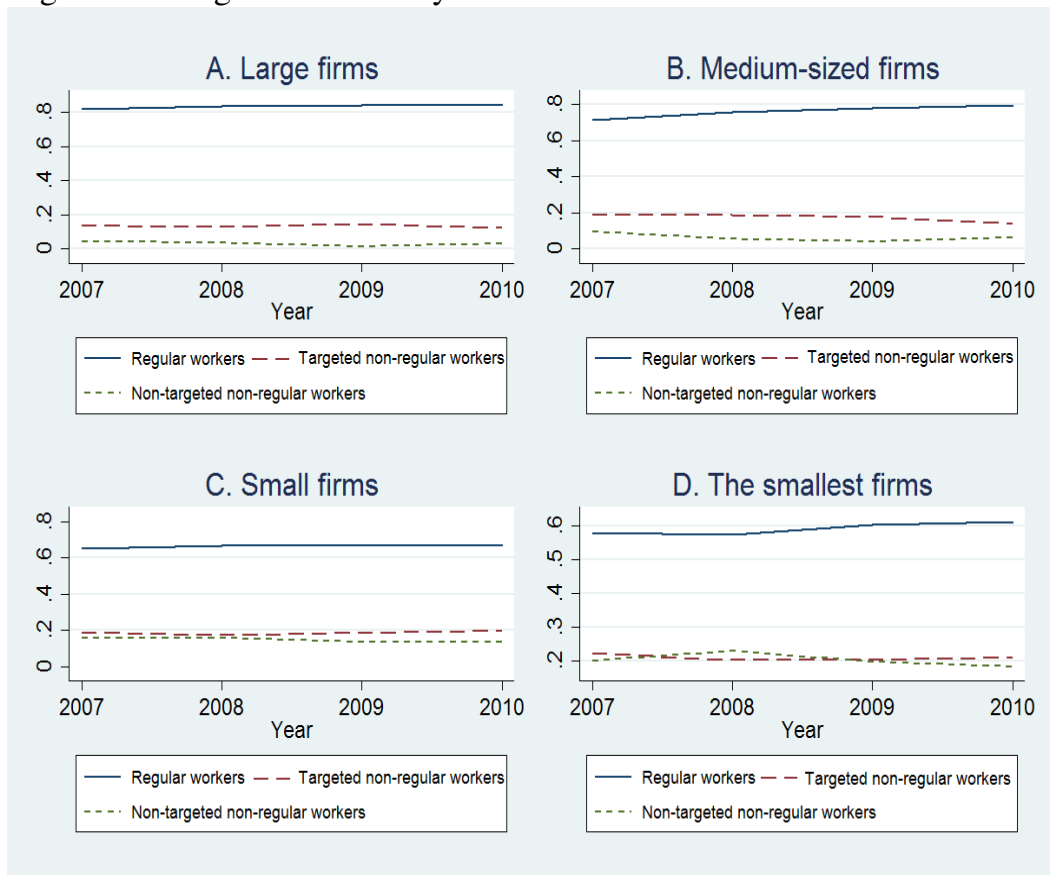
SOURCE. – Author's calculations using the 2007-2010 Economically Active Population Survey (EAPS) conducted by Korean National Statistics Office (KNSO).

Figure 3.3. Shares of firm size groups by employment type over time
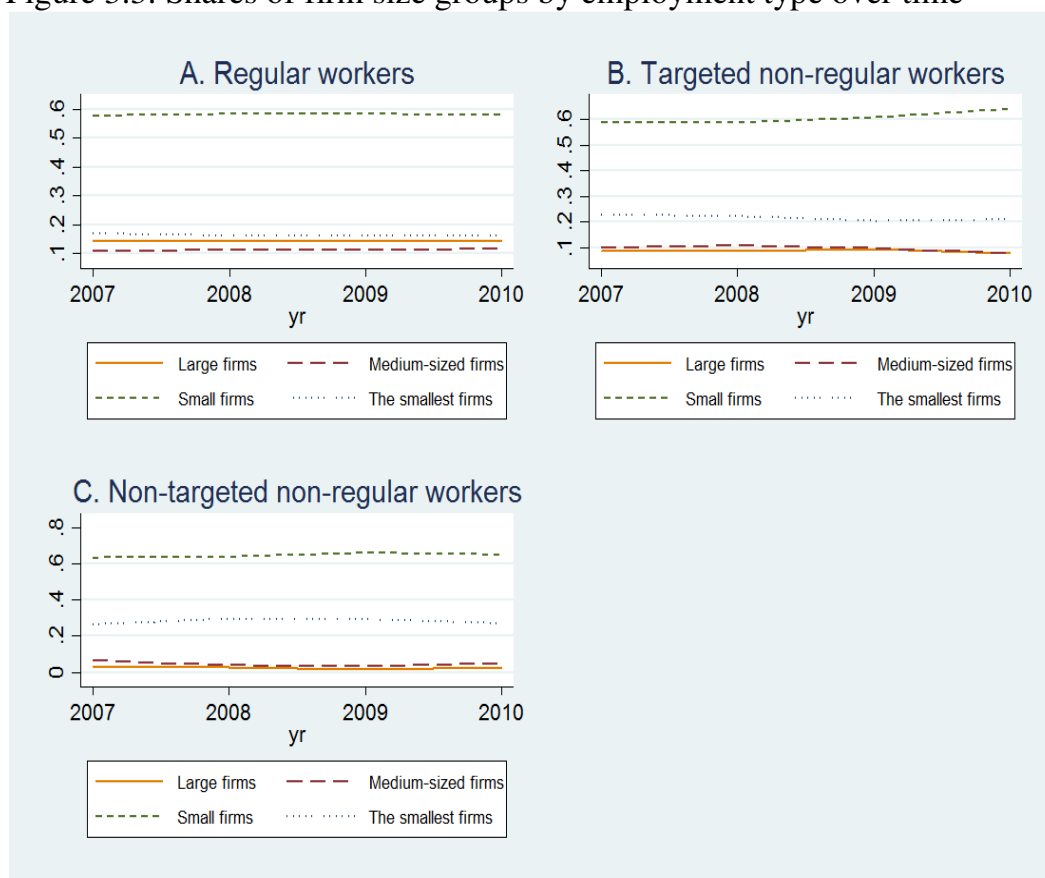
SOURCE. – Author's calculations using the 2007-2010 Economically Active Population Survey (EAPS) conducted by Korean National Statistics Office (KNSO).

Table 3.8 shows that the "stayers" experience similar treatment effects: targeted non-regular workers' relative labor conditions are improved only in affected small firms. This implies that the implementation of the anti-discrimination law indeed produces a positive outcome for targeted non-regular workers' relative labor conditions in small firms in a direct way rather than through composition changes. Given the data limitations, the results can be seen as evidence supporting that the selective transitions of workers in response to the anti-discrimination law do not underlie the observed changes in targeted non-regular workers' relative labor conditions in small firms.[29]

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[29] One may be concerned about the fact that the "stayers" are not fully comparable with workers in the "private sector-dominated industries" sample. For instance, the "stayers" group consists of fewer targeted non-regular workers, because they tend to have shorter tenure (KNSO, 2010). However, the difference in the shares of targeted non-regular workers in both groups of workers is not outstanding. The shares of targeted non-regular

Table 3.8. DDD estimates for "changers" and "stayers"

Variable	Log Hourly Wage	National Pension (Probit)	Health Insurance (Probit)	Employment Insurance (Probit)
A. Overall effects:				
Changer × Policy	.017	.173	.244*	.122
	(.027)	(.120)	(.129)	(.107)
		[.032]	[.045]	[.023]
Stayer × Policy	.040	.501***	.503***	.636***
	(.026)	(.165)	(.165)	(.152)
		[.092]	[.092]	[.123]
Observations	40,511	37,222	36,259	39,607
B. Heterogeneous effects:				
Changer × Policy × Large	.032	-.179	.188	.224
	(.058)	(.363)	(.399)	(.322)
		[-.033]	[.035]	[.043]
Changer × Policy × Medium	.017	-.174	-.186	-.144
	(.044)	(.227)	(.238)	(.207)
		[-.032]	[-.034]	[-.028]
Changer × Policy × Small	.056*	.317**	.378***	.187
	(.030)	(.133)	(.143)	(.119)
		[.058]	[.070]	[.036]
Stayer × Policy × Large	-.019	.264	.399	.459
	(.048)	(.385)	(.408)	(.337)
		[.049]	[.073]	[.089]
Stayer × Policy × Medium[a]	-.010			
	(.047)			
Stayer × Policy × Small	.060*	.501**	.508***	.666***
	(.036)	(.198)	(.195)	(.184)
		[.092]	[.094]	[.129]
Observations	40,511	37,100	36,133	39,481

NOTE. – Heteroscedasticity- robust standard errors are in parentheses, and marginal effects are in brackets. The national pension, health insurance, and employment insurance regressions are estimated using probit models. The "private sector-dominated industries" sample is used. The DDD regressions include interactions of the policy and control variables (except age and age squared) with indicators for "changers" and "stayers".

[a] Targeted non-regular workers in affected medium-sized firm among the "stayers" are dropped when social insurance regressions are estimated since all of them are covered by the social insurance. The policy variables for the "stayers" in medium-sized firms are omitted in the social insurance regressions.

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

workers in the "stayers" and "private sector-dominated industries" samples are 12.78% and 15.26%, respectively.

3.5.6. Possible explanations for the heterogeneous treatment effects by firm size

The question at hand is why the relative improvement of labor conditions for targeted non-regular workers is observed only in affected small firms. There are several possible explanations. First, it is probable that insignificant effects in large firms are not because targeted non-regular workers' labor conditions are not improved at all, but because the improvement of targeted non-regular workers' labor conditions is partly or completely offset by the improvement of regular workers' labor conditions. The rationale behind this "spillover from targeted non-regular workers to regular workers" hypothesis is that labor unions are highly concentrated in large firms, and the absolute majority of union members are regular workers.[30] Thus, the observed insignificant effects in large firms might be attributed to the influence of labor unions more interested in maximizing utility of their typical union members than in improving non-members' adverse labor conditions.

Economic theories suggest that there are two directions in which labor unions affect targeted non-regular workers' labor conditions. On one hand, bargaining theory by Ashenfelter and Johnson (1969) implies that labor unions may want to reduce gaps in labor conditions between regular and targeted non-regular workers. Given that labor unions' primary interest is to increase their bargaining power, an increase in the number of non-members can be a threat. Since the relatively low labor costs of hiring targeted non-regular workers leads to an increase in labor demand for such workers, labor unions are likely to be unhappy about large gaps in labor costs between regular and targeted non-regular workers. On the other hand, according to the theory of insiders and outsiders suggested by Solow (1985), members of labor unions tend to keep the group of insiders small and to curb outsiders' entry into the group in order to guard insiders' interests. They may hope to maintain gaps in labor conditions between regular and targeted non-regular workers, since the relatively low wages of targeted non-regular workers make

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[30] According to KNSO (2010), 72% of large firms have labor unions, while 22% of small firms have labor unions in 2010. It also reports that 92% of union members are regular workers.

outsiders attractive to hire, thus preventing the group of regular workers from growing.

The necessary condition required for spillover effects to explain the observed insignificant impacts in large firms is that the latter theory dominates, i.e., labor unions are not in favor of reducing gaps in labor conditions between regular and targeted non-regular workers. To obtain a clearer picture of labor unions' stance on the improvement of targeted non-regular workers' labor conditions, I estimated the DDD models separately for workers whose workplaces have labor unions and for workers whose workplaces do not have labor unions. As table 3.9 reports, in general, targeted non-regular workers with labor unions experience greater positive impacts in all labor conditions when the anti-discrimination law is introduced. The presence of labor unions seems to contribute to reducing the gaps in labor conditions between regular and targeted non-regular workers. Perhaps labor unions have played an active role in pushing employers to comply with the anti-discrimination law. Hence, the spillover effects hypothesis does not get empirical support.

Another and quite intuitive possible explanation for why the anti-discrimination law's impacts are concentrated in small firms is that there has been greater discrimination in small firms. Since small firms are relatively less productive, they may have less capacity and will to treat all workers equally without discrimination. If discriminatory treatment against targeted non-regular workers was more prevalent in small firms, employers in small firms would have more room for the improvement of targeted non-regular workers' labor conditions.

Table 3.9. DDD estimates by presence of labor unions

Variable	Log Hourly Wage		National Pension (Probit)		Health Insurance (Probit)		Employment Insurance (Probit)	
	Union	No Union	Union	No Union	Union	No Union	Union	No Union
A. Overall effects:								
Policy	.089*	.019	.607**	.170	.804***	.179	.523**	.049
	(.052)	(.028)	(.271)	(.126)	(.287)	(.136)	(.257)	(.111)
			[.035]	[.038]	[.046]	[.040]	[.045]	[.011]
Observations	8,044	32,467	7,902	29,320	7,893	28,366	8,399	31,598
B. Heterogeneous effects:								
Policy × Large	.070	-.054	.402	-.165	1.032**	-.489	.827**	-.180
	(.076)	(.070)	(.430)	(.464)	(.469)	(.504)	(.367)	(.400)
			[.028]	[-.037]	[.059]	[-.109]	[.059]	[-.042]
Policy × Medium	.092	-.024	-.179	.137	.193	.177	.343	-.137
	(.068)	(.050)	(.360)	(.257)	(.378)	(.281)	(.341)	(.235)
			[-.012]	[.031]	[.011]	[.040]	[.025]	[-.032]
Policy × Small	.110	.044	1.101***	.205	1.337***	.231	1.024***	.110
	(.067)	(.032)	(.369)	(.137)	(.388)	(.148)	(.362)	(.121)
			[.077]	[.046]	[.076]	[.051]	[.073]	[.025]
Observations	8,044	32,467	8,247	29,320	7,893	28,366	8,009	31,598

NOTE. – Heteroscedasticity- robust standard errors are in parentheses, and marginal effects are in brackets. The national pension, health insurance, and employment insurance regressions are estimated using probit models. The "private sector-dominated industries (manufacturing, construction, wholesale and retail sale, accommodation and food service activities)" sample is used.

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

The descriptive statistics presented in table 3.2 indicate that the gaps between regular and targeted non-regular workers in accessibility to social insurance are the largest in small firms, and the wage gap is the second largest in small firms (excluding the smallest firms). Given that, in principle, the social insurance systems cover nearly all wage workers with a few exceptions, the marked gaps in access to social insurance between regular and targeted non-regular workers reflects weak compliance, particularly among small firms (Jones and Urasawa, 2013). It might be that the larger gaps between statutory coverage and actual coverage in small firms were sufficient to be perceived as discrimination by both employers and employees, and therefore the anti-discrimination law has contributed to significantly increasing the social insurance system coverage of targeted non-regular workers, especially in small firms. On the other hand, it is relatively difficult to make a concluding comment on whether there has been greater discrimination against targeted non-regular workers in small firms in terms of wage, as wage gaps do not necessarily indicate the level of discrimination.

Finally, the heterogeneous effects could also be accounted for by the fact that employers in small firms might be more afraid of receiving requests for correction of discriminatory treatment or of punishment. Since fines are not proportional to firm size, the burden of paying fines would be heavier for employers in small firms. Thus, the anti-discrimination law worked as a credible threat, leading them to respond to the policy in a more active manner. In this case, even in the absence of greater discrimination in small firms, the relatively heavier burden could result in the concentration of the treatment effects in small firms. The Central Labor Relations Committee (2013) shows that since small firms became subject to the anti-discrimination law, about 31% of complaints filed have been initiated by workers in small firms, indicating that the possibility of filing a complaint has acted as a credible threat to employers in small firms.

It is not evident through which mechanisms the anti-discrimination law affects the relative labor conditions of targeted non-regular workers in small firms. A small number of cases filed with the Labor Relations Commission and a low relief rate during the sample period suggest that the (partial) success of the anti-discrimination law was achieved by firms' taking action to reduce unreasonable discriminatory treatment against targeted non-regular workers, rather than by the legal process for redressing discriminatory

treatment.[31] However, why small firms were the most affected still needs to be explored. While further examining this question is beyond the scope of this analysis, it should be highlighted that the implementation of the anti-discrimination law is very likely to have a negative impact on small firms' labor costs. Policies such as subsidizing small firms' contributions to social insurance systems to expand the coverage of their workers will help ease the burden on small firms, thereby enhancing equal treatment for non-regular workers and strengthening the social safety net. Firm-level empirical research—such as the effects of the anti-discrimination law on labor costs, profitability, and employment—should be conducted to fully assess the overall effect of the anti-discrimination law and to further suggest fine-tuned policy recommendations.

3.6. Conclusions

The research in this chapter shows that a labor reform prohibiting discriminatory treatment against fixed-term, part-time, and dispatched workers significantly contributes to improving their relative labor conditions. The anti-discrimination law appears to lead to significant increases in hourly wages and the probabilities of national pension, health insurance, and employment insurance coverage for targeted non-regular workers in small firms with 5 to 99 employees, relative to other workers. Anticipatory behaviors of employers and selective transitions of employees in response to the implementation of the anti-discrimination law do not seem to account for the estimated effects, leaving the anti-discrimination law as a likely cause. Labor unions seem to contribute to reducing gaps in labor conditions between regular and targeted non-regular workers. It can be safely concluded that the policy intervention partly achieved its intended goal, as around 60% of targeted non-regular employment is concentrated in small firms. The findings suggest that policies imposing legal burdens on firms for unjustified discriminatory treatment can make a non-negligible contribution to alleviating labor market duality.

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[31] From 2007 to 2010, the Korean Labor Relations Commission received around 150 charges every year (Kwon, 2015), and the relief rate was 4.7% from July 2007 to June 2009 (The Central Labor Relations Committee, 2009).

The aggregate effect of the anti-discrimination law is indeterminate, as it depends on how firms react to the increase in the relative price of targeted non-regular workers. If the demand for targeted non-regular workers is elastic, firms are likely to lower the employment level of targeted non-regular workers, especially by means of reduced new employment. In this case, although the existing targeted non-regular workers' welfare increased due to improved labor conditions resulting from the anti-discrimination law, its effect on the total welfare of all targeted non-regular workers in the long run may be ambiguous. The welfare of the people who are willing to take non-regular jobs in the future may decrease due to the reduced chance of entering the labor market.

In addition, the increase in the relative price of targeted non-regular workers may increase the use of their substitutes, generating distributional effects. The anti-discrimination law is unable to protect non-targeted non-regular workers and provides firms with incentives to replace targeted non-regular workers with non-targeted non-regular workers, not with regular workers. Obviously, this is not a scenario the government expected. Therefore, policymakers who seek to curb the proliferation of precarious employment should pay particular attention to removing this loophole from anti-discrimination laws.

References

Angrist, J. D., & Pischke, J. S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton: Princeton University Press.

Ashenfelter, O., & Johnson, G. E. (1969). Bargaining theory, trade unions, and industrial strike activity. *The American Economic Review*, *59*(1), 35-49.

Autor, D. H. (2003). Outsourcing at will: The contribution of unjust dismissal doctrine to the growth of employment outsourcing. *Journal of Labor Economics*, 21 (1), 1-42.

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences in-differences estimates?. *The Quarterly Journal of Economics*, 119 (1), 249-275.

Bulow, J. I., & Summers, L. H. (1986). A theory of dual labor markets with application to industrial policy, discrimination, and Keynesian unemployment. *Journal of Labor Economics*, 4(3, Part 1), 376-414.

Cazes, S., & de Laiglesia, J. R. (2014). Temporary contracts, labour market segmentation and wage inequality. Geneva: International Labor Organization.

Central Labor Relations Committee (2009). D*iscrimination correction decision cases*. Central Labor Relations Committee. (In Korean).

Central Labor Relations Committee (2013). *2012-2013 discrimination correction decision cases*. Central Labor Relations Committee. (In Korean).

Cho, S. G. (2010). Legal issues over the reform of the nonstandard worker protection law. *Industrial Relation Research*, 20(1), 111-134. (In Korean).

Choi, H. J. (2011). The effect in firms' effort to correct discrimination against fixed-term workers of articles regarding prohibition or correction of discriminatory treatment. *Korean Journal of Labor Economics*, 34 (3), 81-117. (In Korean).

Grubb, D. B., Lee, J. K., & Tergeist, P. (2007). Addressing labour market duality in Korea (No. 61). OECD Social, Employment, and Migration Working Papers.

Gruber, J. (1994). The incidence of mandated maternity benefits. *The American Economic Review*, 622-641.

Ha, B. J., & Lee, S. (2013). Dual dimensions of non-regular work and SMEs in the Republic of Korea: country case study on labour market segmentation. Geneva: International Labour Organization.

Jones, R. S., & Urasawa, S. (2013). Labor market policies to promote growth and social cohesion in Korea (No. 1068). OECD Economics Department Working Papers.

KEDI. (2009). *Facts and figures on an analysis of educational statistics*. Seoul: Korean Educational Development Institute. (In Korean).

Kim, Y. M. & Park, K. S. (2006). Wage differentials between standard and non-standard workers. *Korean Journal of Labor Economics*, 29 (3), 25-48. (In Korean).

KNSO. (2009a). *Census on establishments*. Korean National Statistics Office

KNSO. (2009b). *The survey of private education expenditures*. Korean National Statistics Office.

KNSO. (2010). *The economically active population survey*. Korean National Statistics Office.

KNSO. (2013). *The economically active population survey*. Korean National Statistics Office.

Korea Labor Review. (2009). International Labor Foundation, Seoul.

Koske, I., Fournier, J. M., & Wanner, I. (2012). Less income inequality and more growth–Are they compatible? Part 2. The distribution of labour income (No. 925). OECD Economics Department Working Papers.

Kwon, T. R. (2015). A comparative legal study on non-regular worker protection: focusing on discrimination correctional system. Doctoral thesis. (In Korean).

Lee, I. J. (2009). Wage gap between regular and non-regular workers and policy implications. A comprehensive research on the issue of non-regular employment. Korea Development Institute. (In Korean).

Lee, Y. K. (2015). Study on the impact of anti-discrimination procedure on the wage structure for irregular employees. *Quarterly Journal of Labor Policy*, 15 (2), 87-112. (In Korean).

Nam, J. R. (2007). A research on wage gap in regular and non-regular employment: An analysis using panel data. *Korean Journal of Labor Economics*, 30 (2), 1-31. (In Korean).

OECD. (2013). *OECD employment outlook 2013*. Paris: OECD.

Park, K. S. & Kim, Y. M. (2007). The analyses of the wage differentials between standard and non-standard workers : A comparison of 2003 and 2005. *Quarterly Journal of Labor Policy*, 7 (3). (In Korean).

Reich, M., Gordon, D. M., & Edwards, R. C. (1973). A theory of labor market segmentation. *The American Economic Review*, 63, 359-365.

Solow, R. M. (1985). Insiders and outsiders in wage determination. *The Scandinavian journal of economics*, 87 (2), 411-428.

Yoo, K. S. (1999). The Employment Insurance System in Korea. Korea Labor Institute. (In Korean).

Zavodny, M. (2000). The Effects of official English laws on limited-English-proficient workers. *Journal of Labor Economics*, 18(3), 427-452.

Appendices to Chapter 3

Table A3.1. Definitions of wage workers by the EAPS

Employment type	Definition
Regular workers	Wage workers who do not belong to the category of non-regular
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 contracts who could be dismissed
Part-time workers	Workers who work fewer than 36 hours a week
Atypical workers	Dispatched workers, temporary help agency workers, at-home workers, or daily workers
Dispatched workers	Workers who have employment contracts with sending and are supervised by using employers
Temporary help agency	Workers who have employment contracts with service companies that have service work contracts with the service (ex. workers at a security service company or a cleaning service
Independent contractors	Workers who independently provide goods or service to 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 needs warrant

Table A3.2. Definitions of variables

Variables	Definition
Hourly wage	Average pretax hourly wage received for the last three months
National pension	1 if individual benefits from the National Pension System; 0 otherwise
Health insurance	1 if individual benefits from the National Health Insurance System; 0 otherwise
Employment	1 if individual benefits from the Employment Insurance system; 0 otherwise
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
Labor union status	(The reference group is no labor union)
Cannot join union	1 if individual's workplace has labor unions, but not allowed to join; 0 otherwise
Do not join union	1 if individual's workplace has labor unions, but does not want to join; 0
Member of union	1 if individual's workplace has labor unions; 0 otherwise
Size of firm	(The reference group is fewer than five employees)
Large firms	1 if the number of employees is equal to or more than 300; 0 otherwise
Medium-sized firms	1 if the number of employees is between 100 and 299 ; 0 otherwise
Small firms	1 if the number of employees is between 5 and 99 ; 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 A3.3. Means of demographic characteristics

	Regular workers				Targeted non-regular workers				Non-targeted non-regular workers			
	2007	2008	2009	2010	2007	2008	2009	2010	2007	2008	2009	2010
A. Large firms (300 employees or more):												
Age	39.432	39.533	39.731	40.193	35.285	37.949	38.925	40.080	39.458	40.633	37.571	40.247
Female	.208	.216	.207	.223	.454	.424	.448	.552	.298	.367	.476	.416
Without tertiary degrees	.446	.395	.377	.362	.315	.333	.359	.445	.481	.541	.690	.416
Observations	2370	2294	2415	2365	390	354	415	339	131	98	42	89
B. Medium-sized firms (between 100 and 299 employees):												
Age	39.135	39.191	39.629	39.478	36.155	37.382	39.653	40.561	42.335	41.623	44.747	41.699
Female	.299	.280	.275	.278	.423	.480	.430	.494	.464	.492	.545	.477
Without tertiary degrees	.502	.443	.448	.438	.451	.531	.487	.573	.674	.700	.737	.627
Observations	1772	1778	1842	1945	459	435	421	342	239	130	99	153
C. Small firms (between 5 and 99 employees):												
Age	38.943	39.399	39.969	40.159	40.393	40.008	40.966	43.645	44.102	44.338	45.459	45.514
Female	.393	.397	.389	.389	.500	.504	.532	.605	.474	.463	.466	.460
Without tertiary degrees	.544	.515	.504	.500	.656	.626	.619	.674	.759	.798	.807	.764
Observations	9394	9257	9641	9706	2735	2390	2656	2871	2279	2212	1951	1960
D. The smallest firms (fewer than 5 employees):												
Age	39.368	40.109	40.519	40.691	42.515	42.306	43.374	43.344	47.213	46.873	48.254	47.963
Female	.560	.557	.583	.548	.610	.643	.660	.731	.521	.536	.539	.482
Without tertiary degrees	.722	.713	.703	.697	.810	.806	.781	.783	.875	.878	.913	.862
Observations	2758	2569	2655	2738	1057	900	885	934	949	1022	863	813

Table A3.4. Workers excluded when running the social insurance regressions

Dependent variable	Workers excluded	Related article
National pension	Workers aged under 18 Workers aged over 60 Daily workers who are employed for a period of less than one month Part-time workers whose prescribed working hours are fewer than 80 hours in a month	Article 8 of National Pension Act Article 2 of Enforcement Decree of the National Pension Act
Health insurance	Daily workers who are employed for a period of less than one month Part-time workers whose prescribed working hours are fewer than 80 hours in a month	Article 6 of National Health Insurance Act Article 9 of Enforcement Decree of the National Health Insurance Act
Employment insurance	Workers aged over 65 Part-time workers whose prescribed working hours are fewer than 60 hours in a month Public officials, private school teachers, workers of a special post office	Article 10 of Employment Insurance Act Article 3 of Enforcement Decree of the Employment Insurance Act

Table A3.5. Share of workers in the public sector in each industry

Industry	Share
A. Agriculture, forestry and fishing	n/a
B. Mining and quarrying	13.68%
C. Manufacturing	0.70%
D. Electricity, gas, steam and water supply	58.06%
E. Sewage & waste treatment, material recovery and restoration activities of environment	15.55%
F. Construction	0.91%
G. Wholesale and retail sale	1.61%
H. Transportation	5.44%
I. Accommodation and food service activities	0.56%
J. Publishing, video, broadcast communications and information services	15.44%
K. Financial service and insurance activities	24.21%
L. Real estate activities and renting and leasing	5.00%
M. Professional, scientific and technical activities	14.18%
N. Business facilities management and business support services	3.65%
O. Public Administration and Defense ; Compulsory Social Security	100%
P. Education	61.95%
Q. Human health and social work activities	39.18%
R. Arts, sports and recreation related services	19.05%
S. Membership organizations, repair and other personal services	8.02%
T. Private households with employed persons	n/a
U. Extra-territorial organizations and bodies	n/a
Mean	15.43%

SOURCE. – Author's calculations using the Census on establishments in 2009 conducted by Korean National Statistics Office (KNSO).

Chapter 4. The union wage premium in a segmented labor market: new evidence from Korea

4.1. Introduction and objectives

Labor unions influence wage levels of workers in various ways (see, for example, Rosen, 1969 or 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 (Card, 1996; Farber, 2005). Furthermore, the wage premium seems to be heterogeneous by firm size (Ryu, 2005) and employment type (Kim, 2013); thus more detailed researches are needed to develop a better understanding about the ways labor unions affect the determination of wage levels.

Many previous researches 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.

The main contribution of this analysis is to disentangle the overall union wage effect into the heterogeneous effects by taking different types of non-members groups into consideration. Korea provides a useful context to tackle this research question as it is 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).[32] 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).

This study contributes to the Korean literature on union wage effects 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, 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 Chapter proceeds as follows. Section 4.2 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 4.3.

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[32] 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 A3.1 outlines the definitions of different types of wage workers.

Section 4.4 presents the results, and Section 4.5 concludes suggesting policy implications.

4.2. Institutional background and literature review

4.2.1. 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).[33] 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

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

occurred at the firm level (Bae, 2006).[34] 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 7.8%, respectively, according to the only available estimate in the ICTWSS data for 2006.[35]

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 EAPS data, this gap was about 3% of non-regular workers, but 18% of regular workers were union members in 2016 (KNSO, 2016). Indeed, 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). This fragmented interest of unions has contributed to the polarization between unionized regular workers in large firms and non-regular workers in small firms (Bae, 2006). Taking this into account, in our study, 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

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[34] Industries such as cotton textiles, bus and taxi transportation are the exceptions where sub-sectoral bargaining or regional bargaining took place.
[35] http://www.uva-aias.net/en/ictwss

although there is a union operating in their firm) and those who work in firms without union organizations.

4.2.2. 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, 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. Researches 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, Arulampalam, and Smith, 2009).

4.3. Data and methodology

4.3.1. Data

As in the previous Chapter, 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. As in Chapter 3, 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 (table A3.1 – Chapter 3). 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 from an overall sample of 651,906 individuals.

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 A4.1 summarizes the definitions of the variables used in the empirical analysis.

Table 4.1 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 4.1, 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.

Table 4.1. Descriptive statistics

Variables / Mean values	Full sample	Union Members	Non-members		
			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

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

Turning to the workers' demographics, table 4.1 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.

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.

4.3.2. Methodology

The main analysis of this Chapter uses OLS and quantile regressions with different comparison groups. The basic regression at the individual level is

$$Y_{ikt} = \alpha_k + \alpha_t + \delta MEMBER_{ikt} + X'_{ikt}\beta + \varepsilon_{ikt} \qquad (4.1)$$

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.

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, four separate sets of results are provided.

4.4. Results

Table 4.2 presents the results of the OLS and quantile estimates of model (4.1) 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 A4.2). 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.

Table 4.2. Main results

Variables	OLS	Quantile regressions		
		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 unión	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

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

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 Figure 4.1.

Figure 4.1. Quantile regressions
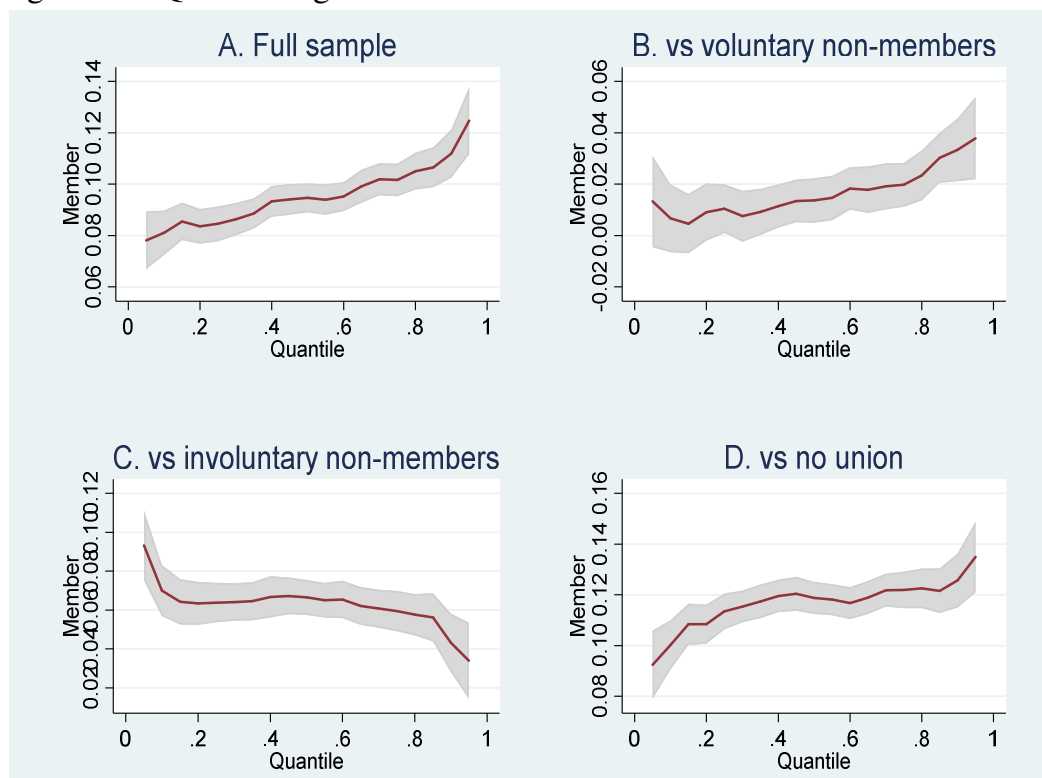
SOURCE. – Author's calculations using the 2007-2016 Economically Active Population Survey (EAPS) conducted by Korean National Statistics Office (KNSO).

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.

One 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. As mentioned in Chapter 3, 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 performed a similar analysis to the one in Chapter 3: 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 (see table A3.5).

The results of this analysis are presented in tables 4.3 and 4.4 and figures 4.2 and 4.3. 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.

Table 4.3. Main results with the private sector-dominated industries sample

Variables	OLS	Quantile regressions		
		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 unión	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

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

Table 4.4. Main results with the public sector-dominated industries sample

Variables	OLS	Quantile regressions		
		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

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

Figure 4.2. Quantile regressions with the private sector-dominated sample
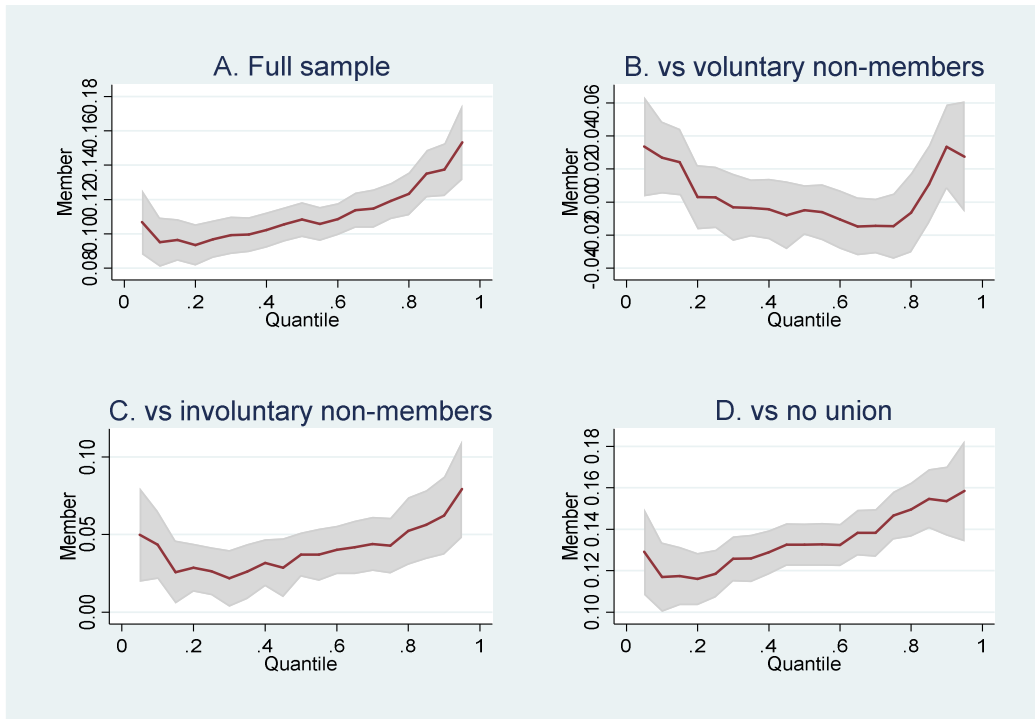
SOURCE. – Author's calculations using the 2007-2016 Economically Active Population Survey (EAPS) conducted by Korean National Statistics Office (KNSO).

Figure 4.3. Quantile regressions with the public sector-dominated sample
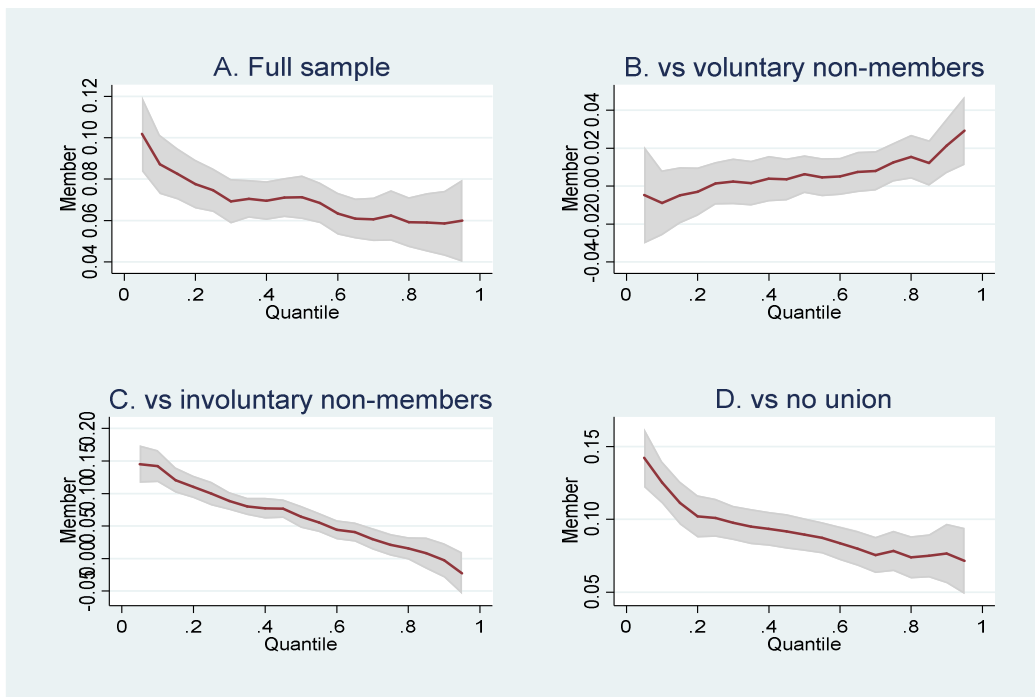
SOURCE. – Author's calculations using the 2007-2016 Economically Active Population Survey (EAPS) conducted by Korean National Statistics Office (KNSO).

In order to analyze whether the union wage premia are heterogeneous by employment type, the results of disaggregated analyses are shown in tables 4.5 and 4.6. 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 4.5 and 4.6 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 tables 4.3 and 4.4. 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.

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.

Table 4.5. Heterogeneous effects by employment type with the private sector-dominated industries sample

Variables	OLS	Quantile regressions		
		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 unión	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

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

Table 4.6. Heterogeneous effects by employment type with the public sector-dominated industries sample

Variables	OLS	Quantile regressions		
		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

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

4.5. 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).

However, caution is needed when interpreting the main findings of this chapter 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.

References

Abowd, J. M., & Farber, H. S. (1982). Job queues and the union status of workers. *ILR Review*, *35* (3), 354-367.

Arbache, J. S. (1999). Do unions always decrease wage dispersion? The case of Brazilian manufacturing. *Journal of labor Research*, *20* (3), 425-436.

Bae, K. S. (2006). Collective bargaining in Korea. Geneva: International Labour Organization.

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences in-differences estimates?. The Quarterly Journal of Economics, 119 (1), 249-275.

Blanchflower, D. G., & Bryson, A. (2010). The wage impact of trade unions in the UK public and private sectors. Economica, 77 (305), 92-109.

Bryson, A. (2014). Union wage effects. IZA World of Labor.

Cai, L. & Liu, A.Y.C. (2008). Union wage effects in Australia: Is there variation along the distribution. Economic Record, 84 (267), 496–510.

Card, D. (1996). The effect of unions on the structure of wages: A longitudinal analysis. Econometrica, 64 (4), 957-979.

Cho, D. H. (2008). A Longitudinal Analysis of the Union Effect on the Wages. Korean Journal of Labor Economics, 31 (2), 103-128. (In Korean).

Choi, S. H. (2007). Employee representation system in South Korea. 133-145.

Farber, H. (2005). Nonunion wage rates and the threat of unionization. *ILR Review*, *58* (3), 335-352.

Freeman, R. B., & Medoff, J. L. (1984). What do unions do. Indus. & Lab. Rel. Rev., 38, 244.

Grubb, D. B., Lee, J. K., & Tergeist, P. (2007). Addressing labour market duality in Korea (No. 61). OECD Social, Employment, and Migration Working Papers.

Jones, R. S., & Urasawa, S. (2013). Labor market policies to promote growth and social cohesion in Korea (No. 1068). OECD Economics Department Working Papers.

Kim, J. H. (2008). The Changes over time in union wage premium in Korea: 1998-2007. Korean Journal of Labor Economics, 31 (3), 75-105. (In Korean).

Kim, J. W. (2013). Wage differentials between non-regular and regular workers by union. Applied Economy, 15 (3), 73-98. (In Korean).

KNSO. (2016). The economically active population survey. Korean National Statistics Office.

Manquilef-Baechler, A., Arulampalam, W., & Smith, J. C. (2009). Differences in decline: quantile regression analysis of union wage differentials in the United Kingdom, 1991-2003. IZA Discussion Paper, 4138.

OECD. (2015b). OECD employment outlook 2013. Paris: OECD.

O'Leary, N.C., Murphy, P.D. & Blackaby, D.H. (2004). Quantile regression estimates of the union wage effect for Great Britain. The Manchester School, 72 (4), 497–514

Rosen, S. (1969).Trade union power, threat effects and the extent of organization. The Review of Economic Studies, 36(2), 185-196.

Ryu, J. W. (2005). The impacts of trade union on wages and employments in Korea. Korean Journal of Labor Economics, 28 (1), 105-133. (In Korean).

Ryu, J. W. (2007). Trade union and wage structure. Korean Journal of Labor Economics, 30 (1), 31-53. (In Korean).

Schmitt, J. (2008). The union wage advantage for low-wage workers. Center for Economic and Policy Research, 1.

Wang, W., & Lien, D. (2018). Union membership, union coverage and wage dispersion of rural migrants: Evidence from Suzhou industrial sector. *China Economic Review*.

Appendixes to Chapter 4

Table A4.1. 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	1 if individual works fewer than 36 hours a week; 0 otherwise
Atypical	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 A4.2. Full table 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.

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

Chapter 5. Conclusions

The Korean economy has suffered from mismatches in the labor market that depend on various supply (education, migration, etc.) and demand factors (technical changes, institutional settings, etc.). Due to the drastic expansion of education, labor force is one of the most educated in the world, but there are high levels of duality and segmentation in the labor market. These two trends have reinforced each other. As a result, agents modify their behaviors (families invest heavily in education; firms demand and treat different types of labors in a different manner; and labor unions play heterogeneous roles in the labor market), giving rise to inefficiency and inequality issues. Diverse policy measures have been implemented for decades to mitigate the problems; however, they have not been effective enough to address the challenges entirely.

This thesis has provided an analysis of the problems associated with the dual labor market structure and credentialism in Korea. Chapter 2 and Chapter 3 have evaluated the effectiveness of recent educational and labor policies aiming to alleviate the excessive private tutoring consumption and labor market duality, respectively. Chapter 4 has extended the discussion of Chapter 3 by focusing on the role of labor unions (wage compression). In particular, it has provided a detailed analysis on the union wage premium and its implications.

The main findings of each chapter can be summed up as follows. First, the results of the second chapter suggest that regulating the operating hours of educational institutions has an impact on the consumption of the services provided by those institutions. However, the policy does not significantly reduce the time and money spent on private tutoring activities, as it seems to depend on the elasticity of demand of educational services, the existence of substitute services, and the profile of the consumers of the different types of private tuition. High school students in Korea whose demand for private tutoring is inelastic, increased their consumption of alternative forms of

private tutoring such as one to one type tutoring when their consumption on hagwon type tutoring had to be limited. This substitution was more intense among lower income high school students, suggesting that strengthening the curfew may have a negative impact on the equality of educational opportunities.

The third chapter has shown that a labor reform prohibiting discriminatory treatment against fixed-term, part-time, and dispatched workers has significantly contributed to improving their relative labor conditions. The anti-discrimination law appears to lead to significant increases in hourly wages and the probabilities of national pension, health insurance, and employment insurance coverage for targeted non-regular workers in small firms with 5 to 99 employees, relative to other workers. It could be safely concluded from this analysis that the policy intervention partly achieved its intended goal, as around 60% of targeted non-regular employment is concentrated in small firms. Thus, the findings suggest that policies imposing legal burdens on firms for unjustified discriminatory treatment can make a non-negligible contribution to alleviating labor market duality, thus providing a clear incentive to families to reduce their current over-investment in education as described in Chapter 2

In the fourth chapter, we have found significant union wage effects over most of the conditional wage distribution. Compared to voluntary non-members, the wage penalty for involuntary non-members is marked, which suggests that the union wage premium is likely to shrink when regulations limiting non-regular workers from being union members. The quantile regressions estimates show that wage premium is the highest at the lower decile and is the lowest at the higher decile in the public sector. The opposite is observed in the private sector, indicating that only labor unions in the public sector contribute to reducing wage inequality. Extending the possibilities of becoming a member of the union to non-regular workers would increase their bargaining power and, as a result, the observed wage differential between members and non-members could be reduced along the wage distribution.

Based on the main findings of each chapter, useful policy implications as well as several avenues for future research can be provided. In the second chapter, the imposition of the strengthened hagwon curfew has been more

successful in changing private tutoring consumption patterns than in reducing the total time dedicated to private tutoring and the resources spent on these activities. If there are differences in quality between types of private tuition, the change in consumption patterns may have an impact on efficiency and equity. Therefore, the analysis of the impact on academic performance of different types of private tutoring is thus a promising field for further research. Additionally, the results suggest that policymakers should focus their attention on tackling the underlying causes of the overheated demand for education rather than on directly regulating the supply side of the private tutoring market, since the proliferation of private tutoring is usually the symptom of more complex issues. The overheated demand for private tutoring is generated, among other causes, by the combination of a widespread acceptance of education as the main social promotion mechanism, and the relatively scarce supply of high quality higher education institutions. While changing social perceptions would be a difficult long-term task, public authorities may help relaxing the demand for private tutoring through supply policies. Increasing the number of students admitted in high-quality public institutions and enhancing the quality of vocational studies are among the policies which could be explored.

The findings of the third chapter suggest that the implementation of the anti-discrimination law is very likely to have a negative impact on small firms' labor costs. Thus, policies such as subsidizing small firms' contributions to social insurance systems to expand the coverage of their workers will help ease the burden on small firms, thereby enhancing equal treatment for non-regular workers and strengthening the social safety net. Firm-level empirical research—such as the effects of the anti-discrimination law on labor costs, profitability, and employment—should be conducted to fully assess the overall effect of the anti-discrimination law. Moreover, further research is needed to clearly determine the channels through which the anti-discrimination law causes the positive effects observed in small firms. Panel data on individuals would help to fully control for the potential indirect effects of the anti-discrimination law. It is also important to further study the long-term effects of the anti-discrimination law. The positive impacts revealed in this analysis may only take place for a few years after the anti-discrimination law is implemented, perhaps owing to the increased social interest in the early stage of implementation. Finally, the anti-discrimination

law being unable to protect non-targeted non-regular workers provides firms with incentives to replace targeted non-regular workers with non-targeted non-regular workers, not with regular workers. Therefore, policymakers who seek to curb the proliferation of precarious employment should pay particular attention to removing this loophole from anti-discrimination laws.

In the fourth chapter, the large gaps in the union wage penalty between voluntary non-members and involuntary non-members might be partly accounted for by the fact that workers with high ability voluntarily decide not to join labor unions. Since the EAPS dataset is unable to control for selection into union status, employment, and contract type, the empirical analysis of the chapter is dependent on the assumption that union status is independent of unobservable. Therefore, future research should focus on minimizing this selection issue and to further suggest fine-tuned policy recommendations regarding the ineligibility of non-regular workers for union membership.

To conclude, policymakers should be aware of that the problems analyzed in this thesis are all interconnected and could be alleviated by reducing the relative advantages of agents' modifying their behaviors. In this regard, breaking the dual structure of the labor market could generate a domino effect, and thus should be a starting point for addressing the problem. Given that the social security system in Korea does not guarantee sufficient support and social benefits in situations of need, a successful labor market entry by getting a regular job is still believed as the best way of securing life time income. Thus, focus should be on reducing uncertainty in the society. Policies that strengthen the social safety net will help reduce the relative advantages of being a regular worker, graduating from an elite university, and taking high quality private tutoring. It is obviously a difficult long-term task. However, such effort to move toward a society with low uncertainty would allow Korea to promote sustainable growth as well as social cohesion.

References

Abowd, J. M., & Farber, H. S. (1982). Job queues and the union status of workers. *ILR Review*, *35* (3), 354-367.

Angrist, J. D., & Pischke, J. S. (2009). *Mostly harmless econometrics: An empiricist's companion*. Princeton: Princeton University Press.

Arbache, J. S. (1999). Do unions always decrease wage dispersion? The case of Brazilian manufacturing. *Journal of labor Research*, *20* (3), 425-436.

Ashenfelter, O., & Johnson, G. E. (1969). Bargaining theory, trade unions, and industrial strike activity. *The American Economic Review*, *59*(1), 35-49.

Autor, D. H. (2003). Outsourcing at will: The contribution of unjust dismissal doctrine to the growth of employment outsourcing. *Journal of Labor Economics*, 21 (1), 1-42.

Bae, J. (2009). Will *hagwon* curfew work?. *The Korea Times*. 26th April. (http://koreatimes.co.kr/www/news/nation/2009/04/113_43860.html).

Bae, K. S. (2006). Collective bargaining in Korea. Geneva: International Labour Organization.

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences in-differences estimates?. *The Quarterly Journal of Economics*, 119 (1), 249-275.

Blanchflower, D. G., & Bryson, A. (2010). The wage impact of trade unions in the UK public and private sectors. Economica, 77 (305), 92-109.

Bourdieu, P. (1973). Cultural reproduction and social reproduction. In *Knowledge, education, and cultural change: Papers in the sociology of education*, ed. Richard Brown. London: Tavistock.

Bray, M. (1999). *The shadow education system: Private tutoring and its implications for planners*. Paris: UNESCO.

Bray, M. (2006). Private supplementary tutoring: Comparative perspectives on patterns and implications. *Compare: A Journal of Comparative and International Education,* 36(4), 515-530.

Bray, M. (2009). *Confronting the Shadow Education System: What Government Policies for What Private Tutoring?* Paris: UNESCO

International Institute for Educational Planning (IIEP).

Bray, M. (2013). Shadow Education: Comparative Perspectives on the Expansion and Implications of Private Supplementary Tutoring. *Procedia – Social and Behavioral Sciences*, 77, 412-420.

Bray, M., & Kobakhidze, M. N. (2014). Measurement issues in research on shadow education: Challenges and pitfalls encountered in TIMSS and PISA. *Comparative Education Review*, 58(4), 590-620.

Bray, M., & Kwo, O. W. Y. 2014. *Regulating Private Tutoring for Public Good: Policy Options for Supplementary Education in Asia.* Bangkok and Hong Kong: UNESCO and Comparative Education Research Centre, The University of Hong Kong.

Bray, M., & Kwok, P. (2003). Demand for private supplementary tutoring: Conceptual considerations, and socio-economic patterns in Hong Kong. *Economics of Education Review,* 22, 611-620.

Bryson, A. (2014). Union wage effects. IZA World of Labor.

Bulow, J. I., & Summers, L. H. (1986). A theory of dual labor markets with application to industrial policy, discrimination, and Keynesian unemployment. *Journal of Labor Economics*, 4(3, Part 1), 376-414.

Byun, S. (2010). Does policy matter in shadow education spending? Revisiting the effects of the high school equalization policy in South Korea. *Asia Pacific Education Review*, 11 (1), 83-96.

Byun, S., Schofer, E., & Kim, K. (2012). Revisiting the role of cultural capital in East Asian educational systems: The case of South Korea. *Sociology of Education*, 85(3), 219-239.

Cai, L. & Liu, A.Y.C. (2008). Union wage effects in Australia: Is there variation along the distribution. Economic Record, 84 (267), 496–510.

Card, D. (1996). The effect of unions on the structure of wages: A longitudinal analysis. Econometrica, 64 (4), 957-979.

Cazes, S., & de Laiglesia, J. R. (2014). Temporary contracts, labour market segmentation and wage inequality. Geneva: International Labor Organization.

Central Labor Relations Committee (2009). D*iscrimination correction decision cases.* Central Labor Relations Committee. (In Korean).

Central Labor Relations Committee (2013). *2012-2013 discrimination correction decision cases.* Central Labor Relations Committee. (In Korean).

Chae, S., Hong, J., & Lee, T. (2005). *Anatomy of the rank structure of Korean*

universities: Towards a design of integrated policies for education reform in Korea. Seoul: AP EPRI/KEDI publications.

Chang (2009). A cultural and philosophical perspective on Korea's education reform: A critical way to maintain Korea's economic momentum. Academic paper series on Korea, Korea Economic Institute, Washington DC.

Cho, D. H. (2008). A Longitudinal Analysis of the Union Effect on the Wages. Korean Journal of Labor Economics, 31 (2), 103-128. (In Korean).

Cho, S. G. (2010). Legal issues over the reform of the nonstandard worker protection law. *Industrial Relation Research*, 20(1), 111-134. (In Korean).

Choi, Á. (2010). Analysis of private tutoring decisions in Korea: A game theory approach. *Regional and Sectoral Economic Studies,* 10(2), 23-36.

Choi, Á., Calero, J., & Escardíbul, J-O. (2012). Private tutoring and academic achievement in Korea: An approach through PISA-2006. *KEDI Journal of Educational Policy,* 9(2), 299-322.

Choi, H. (2008). The effect of private tutoring on college entrance. *International Economic Journal,* 14(1). 73-110.

Choi, H. J. (2011). The effect in firms' effort to correct discrimination against fixed-term workers of articles regarding prohibition or correction of discriminatory treatment. *Korean Journal of Labor Economics*, 34 (3), 81-117. (In Korean).

Choi, J., & Cho, R. N. (2015). Evaluating the effects of governmental regulations on South Korean private cram schools. *Asia Pacific Journal of Education*.

Choi, S. H. (2007). Employee representation system in South Korea. 133-145

Chung, B. (2002). Korea's War on Private Tutoring. Paper presented at the *Second International Forum on Education Reform*, Bangkok, September 2-5.

Dang, H. (2007). The determinants and impact of private tutoring classes in Vietnam. *Economics of Education Review*, 26, 684-699.

Dang, H., & Rogers, H. (2008). How to interpret the growing phenomenon of private tutoring: Human capital deepening, inequality increasing, or waste of resources? *World Bank Policy Research Working Paper*, 4530, World Bank, Washington, DC.

Farber, H. (2005). Nonunion wage rates and the threat of unionization. *ILR Review*, *58* (3), 335-352.

Freeman, R. B., & Medoff, J. L. (1984). What do unions do. Indus. & Lab. Rel. Rev., 38, 244.

Grubb, D. B., Lee, J. K., & Tergeist, P. (2007). Addressing labour market duality in Korea (No. 61). OECD Social, Employment, and Migration Working Papers.

Gruber, J. (1994). The incidence of mandated maternity benefits. *The American Economic Review*, 622-641.

Ha, B. J., & Lee, S. (2013). Dual dimensions of non-regular work and SMEs in the Republic of Korea: country case study on labour market segmentation. Geneva: International Labour Organization.

Han, S. (2011). Private education costs fall for 1st time in decade. *The Korea Times*. 15th February. (http://koreatimes.co.kr/www/news/nation/2011/02/113_81456.html).

Jones, R. S. (2013). Education reform in Korea (No. 1067). OECD Economics Department Working Papers.

Jones, R. S., & Urasawa, S. (2013). Labor market policies to promote growth and social cohesion in Korea (No. 1068). OECD Economics Department Working Papers.

Kang, C. (2007). Does money matter? The effect of private educational expenditures on academic performance. Working Paper, 704, Department of Economics, National University of Singapore.

Kang, C., Park, C., & Lee, M-J. (2007). Effects of ability mixing in high school on adulthood earnings: quasiexperimental evidence from South Korea. *Journal of Population Economics*, 20, 269-297.

Kang, S. (2010). Hagwon curfew backsliding. *The Korea Times*. 1st April. (http://www.koreatimes.co.kr/www/news/nation/2010/04/113_63489.html).

KEDI. (2009). *Facts and figures on an analysis of educational statistics*. Seoul: Korean Educational Development Institute. (In Korean).

KEDI. (2012). *Results and issues of hagwon management policies*. Seoul: Korean Educational Development Institute. (In Korean).

Kim, H. (2010). Analysis of the effects of private education on academic achievement and labor market performance. *KDI Reports, 2010-05*. (In Korean).

Kim, J. (2007). Shadow education around the world: Its cause and the effects. *Public Economics,* 12(2), 119-151. (In Korean).

Kim, J. (2009). The effectiveness of regulation for cram schools on demand

for private tutoring. *The Journal of Educational Administration,* 27(4), 465-487. (In Korean).

Kim, J., & Chang, J. (2010). Do governmental regulations for cram schools decrease the number of hours students spend on private tutoring? *KEDI Journal of Educational Development*, 7 (1), 3-21.

Kim, J. H. (2008). The Changes over time in union wage premium in Korea: 1998-2007. Korean Journal of Labor Economics, 31 (3), 75-105. (In Korean).

Kim, J. W. (2013). Wage differentials between non-regular and regular workers by union. Applied Economy, 15 (3), 73-98. (In Korean).

Kim, J. Y. (2010). A comparison of non-regular employment in Korea and Japan: Nature, difference and its possible reasons. *Evolutionary and institutional economics review*, 6(2), 299-328

Kim, S., & Lee, J. (2010). Private tutoring and demand for education in South Korea. *Economic Development and Cultural Change,* 58(2), 259-296.

Kim, T. (2004). Shadow education: school quality and demand for private tutoring in Korea. *KDI School of Pub Policy & Management Paper No. 04-21*.

Kim, Y. M. & Park, K. S. (2006). Wage differentials between standard and non-standard workers. *Korean Journal of Labor Economics*, 29 (3), 25-48. (In Korean).

KNSO. (2009a). *Census on establishments*. Korean National Statistics Office

KNSO. (2009b). *The survey of private education expenditures*. Korean National Statistics Office.

KNSO. (2010). *The economically active population survey*. Korean National Statistics Office.

KNSO. (2011). *The Survey of Private Education Expenditures*. Seoul: Korea Statistics.

KNSO. (2012). *Household Income and Expenditure Survey*. Seoul: Korea Statistics.

KNSO. (2013). *The economically active population survey*. Korean National Statistics Office.

KNSO. (2016). The economically active population survey. Korean National Statistics Office.

Korea Labor Review. (2009). International Labor Foundation, Seoul.

Korean Economic Daily. (2015). No. of Private Learning Centers Breaks 100,000 Level for First Time. *Korean Economic Daily*. 19th March.

(http://english.hankyung.com/news/apps/news.view?c1=04&nkey=2015 03191203111).

Koske, I., Fournier, J. M., & Wanner, I. (2012). Less income inequality and more growth–Are they compatible? Part 2. The distribution of labour income (No. 925). OECD Economics Department Working Papers.

KRIVET. (2008a). *A survey study on private tutoring providers 2: survey on hagwon.* Seoul: Ministry of Education, Science, and Technology.

KRIVET. (2008b). *A survey study on private tutoring providers 5: survey on private lesson.* Seoul: Ministry of Education, Science, and Technology.

Kwon, T. R. (2015). A comparative legal study on non-regular worker protection: focusing on discrimination correctional system. Doctoral thesis. (In Korean).

Lee, B., Jwa, H., & Lim, S. (2014). The effects of private tutoring and parenting behaviors on children's academic achievement in Korea: Are there differences between low- and high-income groups?. *KEDI Journal of Educational Policy,* 11(2), 163-178.

Lee, C.J., Lee, H., & Jang, H. (2010). The history of policy responses to shadow education in South Korea: Implications for the next cycle of policy responses. *Asia Pacific Education Review*, 11 (1), 97-108.

Lee, I. J. (2009). Wage gap between regular and non-regular workers and policy implications. A comprehensive research on the issue of non-regular employment. Korea Development Institute. (In Korean).

Lee, S., & Brinton, M.C. (1996). Elite education and social capital: The case of South Korea. *Sociology of Education,* 69(3), 177-192.

Lee, Y. K. (2015). Study on the impact of anti-discrimination procedure on the wage structure for irregular employees. *Quarterly Journal of Labor Policy*, 15 (2), 87-112. (In Korean).

Manquilef-Baechler, A., Arulampalam, W., & Smith, J. C. (2009). Differences in decline: quantile regression analysis of union wage differentials in the United Kingdom, 1991-2003. IZA Discussion Paper, 4138.

Nam, J. R. (2007). A research on wage gap in regular and non-regular employment: An analysis using panel data. *Korean Journal of Labor Economics*, 30 (2), 1-31. (In Korean).

OECD. (2011). *Education at a Glance 2011: highlights*. Paris: OECD.

OECD. (2012a). *Economic surveys: Korea 2012*. Paris: OECD.

OECD. (2012b). *Korea-country note- Education at a glance: OECD*

indicators 2012. Paris: OECD.

OECD. (2013). *OECD employment outlook 2013*. Paris: OECD.

OECD. (2014). *Strong performers and successful reformers in education: Lessons from PISA for Korea.* Paris: OECD.

OECD. (2015a). *Education at a Glance 2015*. Paris: OECD.

OECD (2015b). OECD employment outlook 2013. Paris: OECD.

O'Leary, N.C., Murphy, P.D. & Blackaby, D.H. (2004). Quantile regression estimates of the union wage effect for Great Britain. The Manchester School, 72 (4), 497–514

Park, H, Byun S., & Kim, K. (2011). Parental involvement and students' cognitive outcomes in Korea: Focusing on private tutoring. *Sociology of Education*, 84(1), 3-22.

Park, K. S. & Kim, Y. M. (2007). The analyses of the wage differentials between standard and non-standard workers : A comparison of 2003 and 2005. *Quarterly Journal of Labor Policy*, 7 (3). (In Korean).

Reich, M., Gordon, D. M., & Edwards, R. C. (1973). A theory of labor market segmentation. *The American Economic Review*, 63, 359-365.

Rhie, S., Lee, S., & Chae, K. (2011). Sleep patterns and school performance of Korean adolescents assessed using a Korean version of the pediatric daytime sleepiness scale. *Korean Journal of Pediatrics*, 54(1), 29-35.

Rosen, S. (1969).Trade union power, threat effects and the extent of organization. The Review of Economic Studies, 36(2), 185-196.

Ryu, J. W. (2005). The impacts of trade union on wages and employments in Korea. Korean Journal of Labor Economics, 28 (1), 105-133. (In Korean).

Ryu, J. W. (2007). Trade union and wage structure. Korean Journal of Labor Economics, 30 (1), 31-53. (In Korean).

Schmitt, J. (2008). The union wage advantage for low-wage workers. Center for Economic and Policy Research, 1.

Slaughter, M. J. (2001). Trade liberalization and per capita income convergence: A difference-in-differences analysis. *Journal of International Economics,* 55: 203-228.

Solow, R. M. (1985). Insiders and outsiders in wage determination. *The Scandinavian journal of economics*, 87 (2), 411-428.

Tansel, A., & Bircan F. (2006). Demand for education in Turkey: A tobit analysis of private tutoring expenditures. *Economics of Education Review,* 25, 303-313.

Wang, W., & Lien, D. (2018). Union membership, union coverage and wage dispersion of rural migrants: Evidence from Suzhou industrial sector. *China Economic Review*.

Yoo, K. S. (1999). The Employment Insurance System in Korea. Korea Labor Institute. (In Korean).

Zavodny, M. (2000). The Effects of official English laws on limited-English-proficient workers. *Journal of Labor Economics*, 18(3), 427-452.