Research Paper

Wage Inequality in South Korea:

Trends and Sources, 2006 to 2016

December 2018

Moon Jung Kim
Hansoo Choi

KOREA INSTITUTE OF PUBLIC FINANCE

Korea Institute of Public Finance
336, Sicheong-daero, Sejong-si, Korea
Tel: 82-44-414-2114 Fax: 82-44-414-2179
URL: www.kipf.re.kr

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Introduction

Wage inequality is one of the most pressing issues in Korean society today. In reality, however, we have yet to establish a consensus on the severity and its major contributing factors. Researchers seek to analyze the problem using existing income data, yet the patterns of inequality continue to change, and contributors to the wage gap can vary over time. It is therefore important for researchers and policymakers to identify the current status of income inequality patterns and the main factors behind them at any given time.

We seek to identify the dynamic trends of wage inequality and their possible causes over the 11-year period from 2006 through 2016, during which relatively few related studies were conducted. Personal and household income is often divided between labor income and non-labor income. There are far more accumulated statistics on the former, extensive in time frame, than on the latter. If, however, non-labor income exerts a decisive influence on wage inequality, the gap in labor income may not have much meaning. We can begin to understand income polarization only when we identify the patterns and causes of disparity in non-labor income, and how earned and non-labor incomes are related. Therefore, this study represents an early-stage effort to understand the true nature of income polarization in Korea.

In order to identify the current status of wage inequality and the factors thereof, we utilize our analysis on the Labor Conditions by Employment Type Surveys (LCETS), which provide data on regular and irregular workers. Each of the surveys from the 11-year span, from 2006 to 2016, provides data on approximately 850,000 worker observations. Our study is therefore based on

data concerning at least 8.6 million workers. The LCETS, moreover, carries a relatively lower risk of arbitrariness associated with self-reporting over other studies. It is also one of the few surveys that provide information on both employers and employees simultaneously.

For our analysis, we define hourly wage as the amount of labor income divided by total work hours, and use that definition to divide workers into wage deciles. Throughout the period of time subjected to our analysis, i.e., 2006 through 2016, the gap between the 10th decile and the first decile decreased. This is surprising, as the general perception is that income inequality has been on rise. However, our finding overlaps with those of other recent studies, such as Jeong et al. (2017) and Jeong (2017), as well as analyses on the information provided by the Economically Active Population Surveys (EAPSs) on different types of employment.

What would explain the decreasing gap in the hourly wage between the 10th decile and the first decile? Could this mean that the primary distribution of wealth on the job market is improving? The first and foremost reason for the reduced gap is found in the heterogeneous patterns in the work hours and labor income of workers from the two deciles on the extremes. The number of work hours for workers in the first decile took a large drop, while their labor income grew, relative to the case for workers in other deciles between 2006 and 2016. In the 10th decile, however, the number of work hours and the labor income did not change significantly.

When we begin to examine the rates at which the hourly wage for each decile changed over our years of study, we see that the wage gap between the two extreme deciles decreased as a result of polarization in the hourly wage. Whereas the hourly wages for the lowest and highest deciles increased, the hourly wages for the deciles in between either dropped somewhat or remained unchanged, thus making the hourly wage graph by decile resemble a slowly curving U-shape.

What implications can we draw from this polarization of the rates of increase in hourly wage? The news of the reduced wage gap between the 10th and first deciles gives us the impression that the overall wage gap on the job market is on a decline. However, the wage of the first decile will unlikely reach the average wage of the middle fifth or sixth decile even if it were raised

dramatically. The wage gap between workers in the lower eight deciles may decrease and seem to converge on a similar wage level if we exclude the wages earned by the top one percent and the ninth decile. The gap between the average wage of the lower eight deciles and the top one percent, however, will ultimately widen over time.

This study is structured as follows. Chapter II provides an overview of the data analyzed. Chapter III examines patterns of change in hourly wages. Chapter IV provides a more detailed analysis of those patterns. Chapter V explores how the factors implying potential wage gaps have changed over the same period of time. Chapter VI summarizes the conclusion and policy implications of our analysis.

Ⅱ

Data

Our empirical analysis is based on data provided by the Labor Conditions by Employment Type Surveys (LCETS) spanning the years 2006 through 2016. Conducted by the Ministry of Employment and Labor (MOEL) regarding all establishments that hire at least one worker, these surveys provide statistical information on the characteristics of those workers by employment type, gender, and education level. These surveys are important as they provide helpful glimpses into the status of employment for irregular workers, in line with the government's emphasis on protecting the rights of such workers. The Work Status Survey on Irregular Workers, first introduced in 2002, underwent a name-change to the Labor Force at Establishments Survey the following year, and again to the Labor Conditions at Small Establishments Survey in 2006, before it finally merged with the LCETS in 2008.[1] It was also this year that the Wage Structure Surveys were merged with the LCETS. The LCETS, in other words, has been providing information on irregular workers and regular workers since 2008. In order to ascertain the wage gap associated with different types of employment, this study also draws upon data provided by the old Labor Force at Establishments Surveys for the applicable years.

The LCETS of the years subject to our analysis offer 8.67 million samples in total. Samples with missing data on age, business size, employment type, gender, education level, unionization status, subscription to unemployment

1) See the website on employment and labor statistics, at http://laborstat.molab.go.kr/newOut/renewal/menu05/menu05_intro.jsp (accessed October 15, 2017).

insurance, work hours, or wage were excluded, reducing the number of usable samples by 2.82 percent to 8.42 million. For ease of analysis, 10 percent of the gross number of samples provided by the surveys, selected at random, is used. Again, of the 867,000 such samples, only 843,000 remained for analysis after samples with missing data were eliminated.[2] Limiting samples to workers aged 15 to 65 reduced the total number of usable samples in the final analysis to 8,280,772.

The majority of variables used in the LCETS were used in our analysis as well. "whour," standing for work hours, combines the number of real fixed work hours and overtime work hours. "minc," representing labor income, is defined as the total amount of monthly wage, which is obtained by first dividing the previous year's "special wage" by 12 months and adding it up with regular and overtime wages. "female" is the dummy variable, which equals one if the worker is female and zero if the worker is male. "union" is the dummy variable for whether workers are unionized, equaling one for workers in labor unions, and zero for non-unionized workers. "col" is a dummy variable for workers' education, which equals one if workers' final education consists of two-year college, and zero for lower educational backgrounds. "uni" is another dummy variable for education, which equals one if workers' final education consists of four-year university or postgraduate studies, and zero if not. "age" is self-explanatory. "A20," "a30," "a40," "a50," "a60," and "a70" equal one for workers in their 20s, 30s, 40s, 50s, 60s, and 70s, respectively, and zero with respect to workers that are outside the given age groups. "size" refers to the size of establishment in terms of the number of full-time workers employed. The data lacks the actual numbers of firm-size (measured by the number of hired workers); instead, the data provides the four size categories each establishment falls, i.e., fewer than five workers, five to 29 workers, 30 to 299 workers, and 300 workers or more.

"emptype" stands for the employment status of workers, which could be one of five: (i) special employment, (ii) home-based work or dispatched service,

2) The 10–percent samples were selected by giving each year a random number following the pattern of normal distribution between zero and one, and collecting samples from the years with random numbers of less than 0.1.

(iii) day or part-time work, (iv) temporary work, and (v) regular (full-time) work.[3] "workexp" stands for the number of years a worker has worked in his or her current line of work. The original surveys provide seven subcategories: less than one year, less than two years, less than three years, less than four years, less than five years, less than 10 years, and 10 years or more. "worktype" refers to the type of work arrangement. The five subcategories here include no-shift, double-shift, triple-shift, bi-day, and part-time work.

<Table II-1> presents descriptive statistics of the LCETS data from 2006, 2011, and 2016 that were subjected to our analysis. The real hourly wage rose by 3.06 percent from KRW 13,650 in 2006 to KRW 14,060 in 2011, and further by 12.24 percent to KRW 15,790 in 2016. Positing the hourly wage as w, labor income as TW, and the number of work hours per month as TH, $w = TW/TH$ or $\dot{w} = \dot{TW} - \dot{TH}$. In other words, the fewer hours one works or the higher one's labor income, the higher one's real wage would be. Compare the changes in real monthly wage and the real number of hours worked, presented in Columns 2 and 3 in <Table III-1>, and we can see that, whereas the real monthly wage dropped by 2.57 percent between 2006 and 2011, the number of work hours per month dropped even further by 6.17 percent, ultimately raising the real hourly wage. From 2011 to 2016, the real monthly wage grew by 8.44 percent while the number of work hours per month decreased by 4.86 percent, thereby effectively raising the real hourly wage by 12.24 percent.

The proportion of female workers increased 9.94 percent from 2006 to 2016. The average age of workers was also on the rise, from 37.17 years in 2006 to 39.32 years in 2011, and to 41.23 years old in 2016, suggesting aging of the working population in Korea. This trend is all the more manifest in the changing composition of working population by age, with the share of workers in their 20s dropping from 26.73 percent in 2006 to 17.83 percent in 2016 (by 33.32 percent), while the shares of workers in their 50s and 60s almost doubled from 11.39 percent to 21.34 percent (by 87.40 percent) and from 2.60 percent to 5.83 percent, respectively. In the meantime, the percentage of unionized

3) The original LCETS provide a more refined scheme of employment types, consisting of nine categories: independent contracting, home-based work, dispatched work, hired service, day labor, part-time work, temporary work for fixed periods of time, temporary work without fixed timelines, and regular employment.

workers dropped by 33.42 percent from 13.51 percent in 2006 to nine percent in 2016. The percentages of workers with two-year college and university education increased, from 45.06 percent and 28.59 percent in 2006 to 51.61 percent and 35.85 percent, respectively, in 2016, or by 14.54 percent and 25.39 percent, respectively. The total proportion of workers with higher education thus grew from 73.65 percent in 2006 to 87.46 percent in 2016, suggesting that higher education has become almost universal in Korea.

As for the distribution of workers by employment type, the proportion of regular workers dropped by 6.60 percent from 2006 to 2016, leading to a commensurate increase in workers of other employment types, all of whom shall be referred to as "irregular workers" in the remainder of this study. Our analysis divides irregular workers into five types: independent contractors, home-based workers, dispatched or hired service workers, day laborers or part-time workers, and temporary workers. The most prevalent of these types of irregular work is temporary work, accounting for 52 percent of all irregular workers as of 2006. This was followed by day and part-time workers (24.7 percent), dispatched or hired service workers (8.44 percent), independent contractors (14.13 percent), and home-based workers (0.36 percent).

By 2016, the proportion of temporary workers decreased drastically by 35.74 percent compared to 2006, while workers of other types of irregular employment increased dramatically. In particular, the proportion of day and part-time workers increased by an astounding 136.08 percent. Although independent contractors and dispatched/hired service workers also increased significantly by 39.53 percent and 31.96 percent, respectively, they still made up less than five percent of all workers in 2016. The significant decrease in work hours likely owes to the dramatic increase in day and part-time work. If the hourly wage continues to rise over time due to changes in the minimum policy change, the number of part-time workers would increase and the gross amount of labor income would remain more or less the same, while the number of work hours would decrease significantly, thereby increasing the real wage in effect.

The proportion of workers without shifts increased slightly from 81.87 percent in 2006 to 83.20 percent in 2016, while the number of workers working on double and triple shifts decreased from 10.64 percent to 8.15 percent over the same years. At present, it is difficult to identify the probable causes for

these changes.

The proportion of workers with four years or more of work experience grew from 49.16 percent to 50.18 percent, while workers with less work experience decreased from 50.86 percent to 46.86 percent over 2006 through 2016. In light of the varying age-composition of Korea's working population, these changes suggest that young people faced increasing challenges to finding their first job and begin to acquire work experience, while more and more older workers remained in the workforce.

As for the distribution of workers by business size, the proportion of those working at businesses employing 300 or more full-time workers decreased by 18.90 percent from 14.45 percent in 2006 to 11.72 percent in 2011. On the other hand, the proportion of workers working at businesses employing 30 to 299 workers, five to 29 workers, and fewer than five workers each increased by 5.80 percent, 2.93 percent, and 0.79 percent, respectively, over the same years.

〈Table II-1〉 **Descriptive Statistics**

(Units: KRW 1,000, number of hours, percentage, years old)

	2006	2011	2016	2006–2011	2011–2016	2006–2016
Real hourly wage	13.65	14.06	15.79	3.06	12.24	15.68
Real monthly wage	2,521	2,457	2,664	−2.57	8.44	5.66
Work hours per month	191.46	179.65	170.92	−6.17	−4.86	−10.73
Female	38.40	40.65	42.22	5.87	3.85	9.94
Age	37.17	39.32	41.23	5.78	4.87	10.94
20s	26.73	20.70	17.83	−22.55	−13.90	−33.32
30s	32.94	30.02	26.15	−8.86	−12.91	−20.63
40s	25.05	27.21	27.64	8.65	1.56	10.34
50s	11.39	16.97	21.34	48.98	25.80	87.40
60s	2.60	3.73	5.83	43.25	56.39	124.03
Unionized	13.51	10.08	9.00	−25.38	−10.78	−33.42
Education level						
Two-year college	45.06	48.04	51.61	6.62	7.43	14.54
Four-year university or higher	28.59	31.72	35.85	10.95	13.01	25.39
Employment type						
Independent contracting	3.13	4.97	4.37	58.74	−12.10	39.53
Home-based	0.08	0.06	0.05	−29.27	−16.17	−40.71
Dispatched/hired service	1.87	2.20	2.47	17.83	11.99	31.96
Day/part-time	5.49	13.58	12.96	147.20	−4.50	136.08
Temporary	11.57	8.48	7.44	−26.75	−12.27	−35.74
Regular	77.85	70.71	72.71	−9.17	2.83	−6.60
Work experience						
Less than 1 year	20.73	20.10	19.09	−3.01	−5.03	−7.89
Between 1 and 2 years	12.33	12.69	11.20	2.95	−11.73	−9.13
Between 2 and 3 years	9.75	9.18	8.82	−5.79	−3.95	−9.5
Between 3 and 4 years	8.05	7.84	7.75	−2.58	−1.09	−3.64
Between 4 and 5 years	6.79	6.74	7.17	−0.77	6.41	5.60
Between 5 and 10 years	16.55	17.81	16.94	7.66	−4.89	2.39
10 years or more	25.82	25.63	29.02	−0.71	13.22	12.42
Work type						
No shift	81.87	83.00	83.20	1.38	0.24	1.62
Double shift	7.18	5.24	4.89	−27.04	−6.73	−31.94
Triple shift	3.46	3.65	3.26	5.43	−10.85	−6.01
Bi-daily	1.48	1.07	0.83	−27.99	−22.31	−44.06
Part-time	6.00	7.04	7.83	17.34	11.15	30.43
Business size						
Fewer than 5 workers	26.75	28.34	26.96	5.93	−4.85	0.79
5 to 29 workers	31.08	30.96	31.99	−0.39	3.33	2.93
30 to 299 workers	27.72	27.75	29.33	0.13	5.67	5.80
300 workers or more	14.45	12.95	11.72	−10.38	−9.50	−18.90

Note: The working population is limited to workers aged 15 to 65.
Source: Micro data for the LCETS (each year).

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Changes in Hourly Wages

1 Hourly Wages by Decile

<Table III-1> lists the (real) hourly wages by decile. We divide workers into 10 quantiles according to the distribution of their hourly wages and estimated the average hourly wage for each decile. The hourly wage for the first decile was KRW 4,630 in 2006, but rose by 32.27 percent to KRW 6,350 by 2016. The hourly wages for the second and third deciles similarly grew over the same years, but not as dramatically as for the first decile. In contrast, the hourly wage for the 10th decile rose only slightly, by 5.38 percent, from KRW 44,930 to KRW 47,340, over the 10 years. The rate of increase in the hourly wage for the ninth decile was an even paler 0.18 percent. The hourly wages for the seventh and eighth deciles dropped between 2006 and 2016.

In sum, hourly wages increased for all deciles except for the seventh and eighth, and at greater rates toward both extremes, demonstrating the rise of income polarization in the job market from 2006 to 2016. As a result, the wage gap between the 10th and first deciles decreased.

[Figure III-1] (1) and (2) are graphs of the patterns of change in the hourly wage by decile. The average wages for the upper-middle deciles moved in a similar fashion. For example, the hourly wages for the fifth through 10th deciles either increased somewhat or remained constant in 2006 and 2007. In the aftermath of the global financial crisis, the wages for these deciles continued to drop until 2009 or so, before returning to an upward pattern that continued

until 2013. The wages for these deciles again took a drop in 2014 and 2015 and remained more or less unchanged from 2015 to 2016. The hourly wages for the first two deciles, on the other hand, rose steadily from 2006 to 2016.

〈Table III-1〉 **Hourly Wages by Decile**

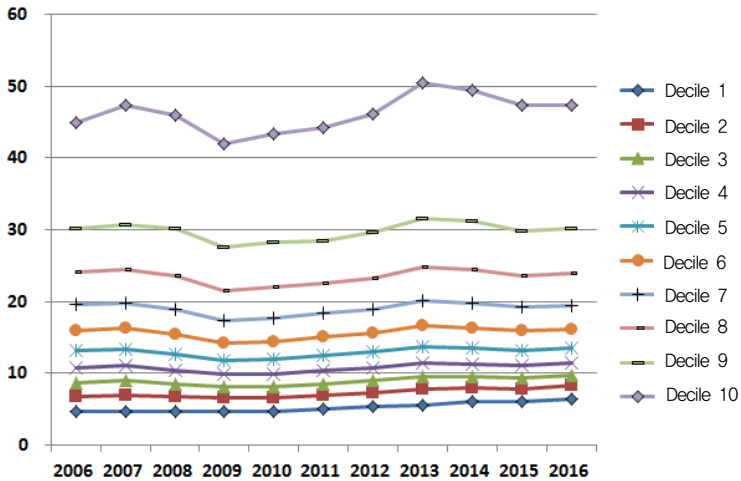
(Units: percentage, proportion)

Hourly wage												
Decile	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Change, 2006–2016 (%)
1	4.63	4.75	4.69	4.61	4.69	4.99	5.39	5.63	6.00	6.00	6.35	37.27
2	6.85	6.97	6.73	6.54	6.65	6.99	7.35	7.77	7.97	7.89	8.27	20.78
3	8.74	8.96	8.50	8.09	8.19	8.57	8.96	9.53	9.58	9.44	9.74	11.45
4	10.75	11.14	10.49	9.82	9.91	10.34	10.79	11.49	11.37	11.19	11.53	7.21
5	13.10	13.42	12.67	11.88	11.96	12.50	12.95	13.76	13.53	13.23	13.58	3.62
6	16.00	16.25	15.43	14.27	14.48	15.06	15.54	16.59	16.35	15.95	16.21	1.36
7	19.55	19.83	18.97	17.37	17.69	18.33	18.87	20.12	19.80	19.29	19.51	–0.17
8	24.03	24.43	23.59	21.56	22.01	22.51	23.29	24.79	24.44	23.60	23.89	–0.60
9	30.10	30.63	30.09	27.49	28.27	28.47	29.64	31.54	31.25	29.86	30.16	0.18
10	44.93	47.40	45.88	41.97	43.43	44.27	46.08	50.50	49.50	47.29	47.34	5.38
Hourly Wages in Comparison to First Decile												
Decile	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2016/2006 (Ratio)
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	1.48	1.47	1.43	1.42	1.42	1.40	1.36	1.38	1.33	1.32	1.30	0.88
3	1.89	1.89	1.81	1.76	1.75	1.72	1.66	1.69	1.60	1.58	1.53	0.81
4	2.32	2.35	2.24	2.13	2.11	2.07	2.00	2.04	1.90	1.87	1.82	0.78
5	2.83	2.83	2.70	2.58	2.55	2.51	2.40	2.44	2.26	2.21	2.14	0.75
6	3.46	3.42	3.29	3.10	3.09	3.02	2.88	2.94	2.73	2.66	2.55	0.74
7	4.23	4.18	4.04	3.77	3.77	3.67	3.50	3.57	3.30	3.22	3.07	0.73
8	5.19	5.15	5.02	4.68	4.69	4.51	4.32	4.40	4.08	3.94	3.76	0.72
9	6.51	6.45	6.41	5.96	6.03	5.70	5.50	5.60	5.21	4.98	4.75	0.73
10	9.71	9.99	9.77	9.11	9.26	8.87	8.55	8.96	8.25	7.89	7.45	0.77

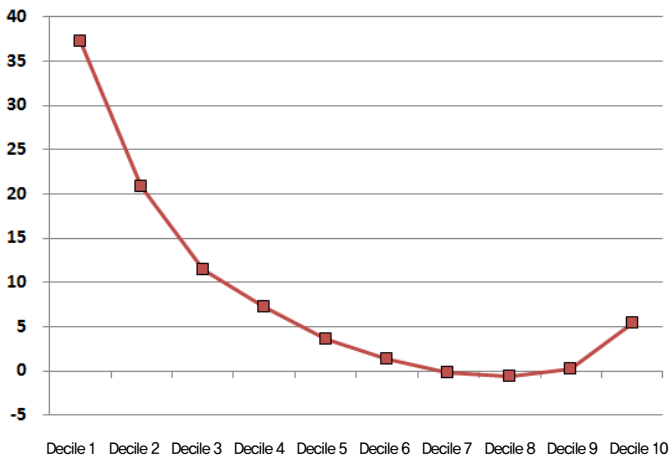
Source: Raw data of the LCETS (each year), processed by the authors.

[Figure III-1] **Hourly Wages by Decile**

(1) Hourly wage level per decile



(2) Rates of increase in hourly wages by decile



Note: Samples are limited to the working population aged 15 to 65. Samples with missing data on work hours and labor income were eliminated. To determine the deciles, the samples of each year were divided into 10 groups according to the hourly wage rates that year.
Source: Raw data of the LCETS (each year), processed by the authors.

2 Testing the Robustness of Analysis Results

By analyzing the LCETS data, we were able to confirm that the hourly wage gap between the 10th and first deciles decreased over the years 2006 through 2016. This contrasts with the prevailing perception in Korea that the wage gap has widened amid the rise of income inequality in recent years. Perhaps the 8.2 million samples provided by the LCETS of a little over a decade may not be a sufficiently reliable source of data. We proceed to test the robustness of our analysis results in two ways in an effort to improve the validity of our findings on hourly wage gap trends.

To this end, we first redefine the concept of the wage gap or the scope of the data analyzed to identify the specific patterns of change in the wage gap. Second, we draw upon other statistics to track the trends in the wage gap over the years 2006 through 2016. The definition of the wage gap analyzed according to this other data is the same as the one that we applied to our analysis of the LCETS data.

A. Changing the Scope of Analysis and Data Processing Method

First, we sought to determine whether the rates of increase in the hourly wages for different deciles would hold constant after the scope of analysis and the data processing method were changed. <Table IV-2> lists the results of the three tasks we performed to this end. First, we re-divided workers into the 10 deciles not according to hourly wage, but according to labor income, and estimated the hourly wages of all other deciles in comparison to the hourly wage of the first. The first three columns of the table indicate the ratios of other deciles' hourly wages to that of the first decile. For example, the ratio for Decile 3 as of 2006 is 1.60, which means that the third decile's hourly wage was 1.6 times that of the first decile that year. The final three columns of the table indicate the changes in these hourly wage ratios. The third decile's wage ratio as of 2011 amounts to 0.81 or 81 percent of the same decile's wage ratio as of 2006. In other words, values in the final three columns of <Table IV-2> that are greater than one indicate that the given deciles' hourly wage

ratios as compared to the hourly wage of the first decile increased in comparison to the given reference years. Values equaling one indicate that the given deciles' hourly wage ratios remained the same. Values less than one indicate that the given deciles' hourly wage ratios compared to the first decile decreased over time. The fact that all values listed in the final column are smaller than one therefore means that the hourly wage gap between all other deciles, on the one hand, and the first decile, on the other, decreased over the years 2006 through 2016. The wage gap between the first and 10^{th} deciles thus remains reduced even after the deciles are redefined in terms of labor income.

The second and third panels of <Table III-2a> indicate the estimated hourly wages of different deciles after either independent contractors were removed or regular workers were considered only. These estimates were obtained in the same way as the one used to obtain the estimates for the first panel of the table. The fact that the extent of change over time (as indicated in the final three columns of the table) remains smaller than one indicates that the wage gap between the 10^{th} and first deciles decreased over time.

<Table III-2b> traces change in the labor income gap as opposed to the wage gap. When we defined deciles in terms of hourly wage, the wage gap decreased over the years 2006 through 2016. When the deciles were redefined in terms of labor income, however, the income gap widened over time, with all the ratios (C/A) emerging as greater than one.

What could explain this contrast? On the surface, it primarily implies that the decile with the lowest hourly wage may not be the decile with the least labor income. Workers who belong to the second or third decile in terms of hourly wage may, in fact, end up working less and thereby earning less than workers in the first decile. These workers with second- and third-decile hourly wages could thus end up in the first decile when workers are divided according to labor income. This is most likely the reason for the opposite directions in which the labor income gap and the hourly wage gap appeared to move.

〈Table III-2a〉 **Robustness Test I: Substitute Variables Defined & Analyzed Samples**

(Unit: ratio)

Hourly wage analysis after deciles are defined in terms of labor income						
Decile	2006 (A)	2011 (B)	2016 (C)	2006–2011 (B/A)	2011–2016 (C/B)	2006–2016 (C/A)
1	1.00	1.00	1.00	1.00	1.00	1.00
2	1.30	1.12	0.94	0.86	0.84	0.72
3	1.60	1.31	1.07	0.81	0.82	0.67
4	1.96	1.54	1.25	0.78	0.81	0.64
5	2.38	1.83	1.47	0.77	0.80	0.62
6	2.87	2.18	1.74	0.76	0.80	0.61
7	3.52	2.62	2.07	0.74	0.79	0.59
8	4.31	3.23	2.55	0.75	0.79	0.59
9	5.24	4.07	3.22	0.78	0.79	0.61
10	7.72	6.13	4.92	0.79	0.80	0.64
Hourly wage analysis after independent contractors are excluded: Rates of change						
Decile	2006 (A)	2011 (B)	2016 (C)	2006–2011 (B/A)	2011–2016 (C/B)	2006–2016 (C/A)
1	1.00	1.00	1.00	1.00	1.00	1.00
2	1.46	1.37	1.27	0.94	0.93	0.87
3	1.87	1.68	1.50	0.90	0.89	0.80
4	2.30	2.02	1.77	0.88	0.88	0.77
5	2.80	2.44	2.08	0.87	0.85	0.74
6	3.42	2.93	2.48	0.86	0.85	0.72
7	4.19	3.58	2.98	0.85	0.83	0.71
8	5.14	4.40	3.66	0.85	0.83	0.71
9	6.44	5.56	4.62	0.86	0.83	0.72
10	9.57	8.40	7.16	0.88	0.85	0.75
Hourly wage analysis when regular workers are considered only: Rates of change						
Decile	2006 (A)	2011 (B)	2016 (C)	2006–2011 (B/A)	2011–2016 (C/B)	2006–2016 (C/A)
1	1.00	1.00	1.00	1.00	1.00	1.00
2	1.48	1.38	1.32	0.93	0.96	0.89
3	1.90	1.72	1.60	0.90	0.93	0.84
4	2.35	2.09	1.90	0.89	0.91	0.81
5	2.84	2.49	2.24	0.87	0.90	0.79
6	3.42	2.95	2.64	0.86	0.89	0.77
7	4.08	3.51	3.12	0.86	0.89	0.76
8	4.89	4.20	3.73	0.86	0.89	0.76
9	6.00	5.14	4.56	0.86	0.89	0.76
10	8.79	7.55	6.80	0.86	0.90	0.77

Source: Raw data for the LCETS (each year).

〈Table III-2b〉 **Robustness Test II: Labor Income Gap**

Earned income by decile when deciles are determined by hourly wage						
Decile	2006 (A)	2011 (B)	2016 (C)	2006–2011 (B/A)	2011–2016 (C/B)	2006–2016 (C/A)
1	1.00	1.00	1.00	1.00	1.00	1.00
2	1.47	1.49	1.42	1.02	0.96	0.97
3	1.85	1.81	1.70	0.98	0.94	0.92
4	2.22	2.13	1.96	0.96	0.92	0.88
5	2.66	2.53	2.38	0.95	0.94	0.89
6	3.20	3.02	2.78	0.94	0.92	0.87
7	3.92	3.61	3.23	0.92	0.89	0.82
8	4.81	4.44	3.91	0.92	0.88	0.81
9	5.71	5.41	4.96	0.95	0.92	0.87
10	8.01	7.70	7.23	0.96	0.94	0.90
Earned income by decile when deciles are determined by labor income						
Decile	2006 (A)	2011 (B)	2016 (C)	2006–2011 (B/A)	2011–2016 (C/B)	2006–2016 (C/A)
1	1.00	1.00	1.00	1.00	1.00	1.00
2	1.65	1.69	1.83	1.02	1.08	1.11
3	2.12	2.13	2.26	1.00	1.06	1.06
4	2.59	2.57	2.69	0.99	1.04	1.04
5	3.13	3.07	3.19	0.98	1.04	1.02
6	3.75	3.69	3.80	0.98	1.03	1.01
7	4.48	4.43	4.53	0.99	1.02	1.01
8	5.43	5.38	5.50	0.99	1.02	1.01
9	6.66	6.69	6.86	1.00	1.03	1.03
10	9.46	9.89	10.31	1.05	1.04	1.09

Source: Raw data for the LCETS (each year).

B. Comparison with Statistics from Other Sources

Perhaps the finding that the wage gap is waning is specific to analyses based on the LCETS only. To determine whether this is true, we extend our analysis to income statistics provided by the Economically Active Population Surveys (EAPSs), the Household Income and Expenditure Surveys (HIESs) and the Wage Structure Surveys (WSSs) from 2006, 2010, 2014, and 2016.

Concerning the annexes to the EAPSs, we confine our samples to workers aged 15 to 65 and defined "wage earners" as those who reported themselves as employed and currently working at the time the surveys took place. Because the EAPSs measure work hours by week, we multiply the weekly work hours by 4.34 to arrive at the number of work hours per month. We then divide the number of work hours per month by "the average labor income for recent three months" to estimate hourly wages.[4)]

With respect to the HIESs, the ordinary and non-ordinary household income is estimated, with households defined as those with male heads cohabitating with spouses and (married or unmarried) children.[5)] Households are then divided into income deciles on the basis of the sums of ordinary and non-current income. Finally, as for the WSSs, the labor income of workers aged 15 to 65 is measured, with workers divided into deciles according to labor income. Then decile-by-decile wage gaps are measured.

In processing this data, we eliminate the top and bottom one percent of wage earners in an effort to control for the outlier effect. The average income for each income decile is then estimated, applying the weights (multipliers) provided by the original surveys to all cases.

<Table III-3> lists changes in the hourly wage gaps between 2006 and 2016 as measured on the basis of the EAPS, HIES, and WSS data. In all these cases, the wage gaps in comparison to the first decile decreased.[6)] Between

4) Here employers, too, are included. The pool of samples in this case therefore does not perfectly correspond to the pool of wage-earning employees observed by the LCETS.

5) Non-current income is defined as irregularly occurring income that does not accompany changes in assets. Examples include congratulation and condolence income (i.e., money gifts Koreans typically exchange on occasions of personal importance, such as weddings and funerals) and money prizes for lottery wins.

2006 and 2016, the hourly wage gap between the first and fifth deciles, for example, decreased by 7.58 percent according to the EAPS data, by 10.85 percent according to the HIES data, and by 24.68 percent according to the WSS data. The hourly wage gap between the first and seventh deciles, during the same period, decreased by 9.97 percent according to the EAPS data, by 12.15 percent according to the HIES data, and by 22.49 percent according to the WSS data.

Our analysis based on the LCETS shows that, the higher the decile compared to the first decile, the greater the margin of drop in the hourly wage gap between 2006 and 2016. Analyses based on the EAPSs and the HIESs show similar patterns. Our analysis based on the WSSs, however, illustrate that the extents of decrease in the wage gaps were greater among the lower deciles and smaller among the higher deciles. Whereas the LCETS consider the wages and income of irregular and regular workers alike, the WSSs consider regular workers only, resulting in the inevitable difference in the patterns of change in labor income and work hours. Because the WSSs exclude part-time and other irregular workers from their scope, the pattern of change in work hours that WSSs show would differ quite dramatically from the pattern observed with respect to the LCETS.

6) The indicators for income deciles marked the critical levels for the given deciles in the LCETS. Here, however, the indicators used are the average hourly wages of different deciles. If the wage gap decreased over a given period of time, the same pattern must be observed irrespective of the techniques used. We therefore judged that this would not compromise the robustness test.

〈Table III-3〉 **Robustness Test: Comparison with Other Statistics**

(Unit: percentage)

Annexes to EAPSs				
Decile	2006–2010	2010–2014	2014–2016	2006–2016
1	0.00	0.00	0.00	0.00
2	−2.67	2.06	−0.75	−1.42
3	−3.59	3.20	−1.13	−1.62
4	−5.52	3.65	−3.42	−5.42
5	−8.38	4.38	−3.36	−7.58
6	−9.59	5.43	−3.51	−8.03
7	−8.28	3.42	−5.08	−9.97
8	−8.29	2.19	−6.29	−12.18
9	−12.93	3.14	−2.69	−12.62
10	−16.93	3.63	0.16	−13.79
HIESs				
Decile	2006–2010	2010–2014	2014–2016	2006–2016
1	0.00	0.00	0.00	0.0
2	2.95	−5.40	1.65	−1.00
3	−1.20	−4.55	−0.52	−6.18
4	−3.61	−4.42	−1.27	−9.04
5	−4.08	−6.21	−0.90	−10.85
6	−4.30	−6.69	−1.62	−12.15
7	−5.16	−5.29	−2.20	−12.15
8	−4.19	−6.51	−2.29	−12.47
9	−5.39	−6.68	−3.20	−14.54
10	−4.30	−7.76	−2.26	−13.72
WSSs				
Decile	2006–2010	2010–2014	2014–2016	2006–2016
1	0.00	0.00	0.00	0.00
2	−6.84	−4.51	−1.69	−12.54
3	−10.09	−6.76	−3.41	−19.02
4	−12.25	−8.08	−3.89	−22.47
5	−12.98	−8.80	−5.10	−24.68
6	−12.11	−9.38	−5.00	−24.34
7	−9.50	−10.08	−4.75	−22.49
8	−5.89	−10.55	−4.76	−19.83
9	−2.12	−10.68	−4.67	−16.66
10	3.19	−9.88	−4.28	−10.99

Note: Values listed in the table represent the rates of change in wage gap between the first and each of the other deciles over the given period of time. The deciles with respect to the HIESs were determined in terms of the sums of household ordinary and non-current income.

Sources: Raw data for the annexes to the EAPSs, the HIESs, and the WSSs (each year), processed by the authors.

Ⅳ

Analysis of the Patterns of Change in Wage Gap

This chapter provides a more in-depth analysis of why the hourly wage gap is growing increasingly polarized. Before we proceed, let us reiterate our findings.

Finding A: Upon examining changes in hourly wage gaps among the first through nine wage deciles and within the 10th decile (91 to 95% vs. 96 to 99% vs. top one percent) over the years 2006 and 2016, we discovered the following:

A1. The wage gap between the seventh and eighth deciles, on the one hand, and the ninth decile, on the other, increased, but only slightly, while the wage gaps between the rest of the first nine deciles decreased.

A2. The wage gap between the subtypes of the 10th decile, on the one hand, and all other deciles, on the other (with the exception of the first and second deciles), rose steadily. However, the hourly wage gaps between the third through ninth deciles, on the one hand, and the top one percent, on the other; between the fifth through ninth deciles, on the one hand, and workers in the 96th to 99th percentiles, on the other; and between the seventh through ninth deciles, on the one hand, and workers in the 91st to 95th percentiles, on the other, decreased.

A3. The wage gaps between the three subtypes of the 10th decile, on the one hand, and the eighth decile, on the other, widened most dramatically.

In general, studies present the income gap between the top and bottom deciles as one of the main indicators of wealth distribution in a given economy in conformity to the popular perception that this income gap would be the severest of all inequalities that can be observed. People commonly assume that, insofar as the top-bottom income gap decreases, the income gaps between the middle and bottom and between the top and middle would also decrease. Our analysis contradicts these perceptions by revealing that the top-bottom gap, at least when measured in terms of hourly wages, has decreased over time. Does the same pattern hold with respect to other deciles, too?

To answer this question, we estimate indicators of changes in the wage gaps between the first nine deciles and within the 10^{th} decile, divided into three subtypes, i.e., workers in the 91^{st} to 95^{th} percentiles, workers in the 96^{th} to 99^{th} percentiles, and workers in the top one percent, over the years 2006 through 2016. In <Table IV-1>, the rows indicate the reference deciles of workers divided by hourly wage while the columns indicate the compared deciles. When the reference and compared deciles overlap, the value is 1.00. In order to ensure consistency of comparisons as representing the ratio of the hourly wages in the higher deciles to those in the lower deciles, the ratios were estimated only when either the compared and reference deciles overlapped (crossing diagonally) or when the compared deciles were higher than the reference deciles (displayed on the upper right-hand corner of the diagonal lines). The shaded boxes indicate the cases in which the hourly wage ratios exceed 1.000. Boxes without shading indicate the cases in which the hourly wage ratios fall short of 1.000.

〈Table IV-1〉 **Hourly Wage Gaps by Decile: 2006 vs. 2016**

(Unit: Ratio)

Decile	1	2	3	4	5	6	7	8	9	91 to 95 %iles	96 to 99 %iles	Top 1%
1	1.000	0.880	0.812	0.781	0.755	0.738	0.727	0.724	0.729	0.735	0.757	0.815
2		1.000	0.923	0.888	0.858	0.839	0.826	0.823	0.829	0.835	0.860	0.927
3			1.000	0.962	0.930	0.909	0.896	0.892	0.898	0.905	0.932	1.004
4				1.000	0.967	0.945	0.931	0.927	0.933	0.941	0.969	1.044
5					1.000	0.978	0.963	0.959	0.966	0.974	1.003	1.080
6						1.000	0.985	0.981	0.987	0.996	1.025	1.104
7							1.000	0.996	1.002	1.011	1.041	1.121
8								1.000	1.007	1.015	1.045	1.126
9									1.000	1.008	1.038	1.119
91 to 95 %iles										1.000	1.030	1.109
96 to 99 %iles											1.000	1.077
Top 1%												1.000

Note: Samples with missing data on labor income and work hours were eliminated. Samples were confined to workers aged 15 to 65. The A and B values for Deciles 1 and 10 and the top one percent indicate the average hourly wages of workers in the given groups. The rows indicate the reference deciles or percentiles, while the columns indicate the compared deciles or percentiles. The numbers in boxes are the hourly wage ratios that serve as indicators of wage gaps. The hourly wage ratio of 0.815 between the first decile and the top one percent, for example, is 0.815, which means that the hourly wage ratio between the two groups in 2016 was 81.5 percent of what the hourly wage ratio between the same two groups had been in 2006.

Source: Raw data for the LCETS (each year).

Let us first examine the hourly wage ratios of the first through ninth deciles. The hourly wage ratios among the third through ninth deciles are smaller than one, indicating that the hourly wage gaps between these deciles decreased over the 11 years from 2006 to 2016. The hourly wage gaps between the third and fourth deciles, on the one hand, and all other deciles (except the top one percent), on the other, decreased. The hourly wage gaps between the fifth and sixth deciles, on the one hand, and all other deciles (except the 96th to 100th percentiles), on the other, also decreased. Positing the fifth and sixth deciles as "the middle group," all the sub-middle deciles saw their hourly wage gaps with all the above-middle deciles except for the 10th decrease. In other words, the hourly

wages of the first six deciles grew all the closer to the hourly wage of the ninth decile over the 11-year period. However, the fact that the hourly wage ratios of the seventh and eighth deciles as compared to the ninth decile are larger than one (1.002 and 1.007, respectively) indicates that the wage gaps widened between these high deciles.

Now, let us turn our attention to the hourly wage gaps between the first nine deciles and the three subtypes of the 10th decile. The hourly wage ratios of the top one percent of wage earners exceeded 1.000 in comparison to all other variables except for the first two, implying that the hourly wage gap between the top one percent and all but the first two deciles expanded over the years 2006 through 2016. In particular, the wage gaps between the top one percent, on the one hand, and the third through eighth deciles, on the other, widened dramatically, and at lesser extents in relation to the ninth decile and 91st through 99th percentiles. The hourly wage ratios of workers in the 96th through 99th percentiles, on the one hand, and the fifth through ninth deciles and the 91st through 95th percentiles, on the other, increased as well from 2006 to 2016. The extent of the wage gaps was especially steep in relation to the fifth through eighth deciles, but less so in relation to the ninth decile to the 91st through 95th percentiles. Finally, workers in the 91st through 95th percentiles saw their hourly wage ratios grow larger, between 2006 and 2016, in relation to the hourly wages of the seventh through ninth deciles, particularly in comparison to the eighth decile.

There are thus two main patterns we can observe here. First, the hourly wage gaps between the third through ninth deciles, on the one hand, and the subtypes of the 10th decile, on the other, widened over the years 2006 through 2016. Second, of the third through ninth deciles that saw their wage gaps with the 10th decile widen, the most dramatic growth of the gap occurred between the eighth and 10th decile. This also means that the eighth decile saw its hourly wage gaps with the lower deciles decrease over the same years.

Main Finding B: Rates of change in hourly wages from 2006 to 2016 reveal the following three patterns when workers are divided into deciles according to hourly wage:

B1. The hourly wage ratios are mostly greater than zero, and move in a U-shaped pattern.

B2. The rate at which the bottom decile's hourly wage grew was higher than the rate at which the top decile's hourly wage grew.

B3. The eighth decile marks the inflection point on the U-shaped curve.

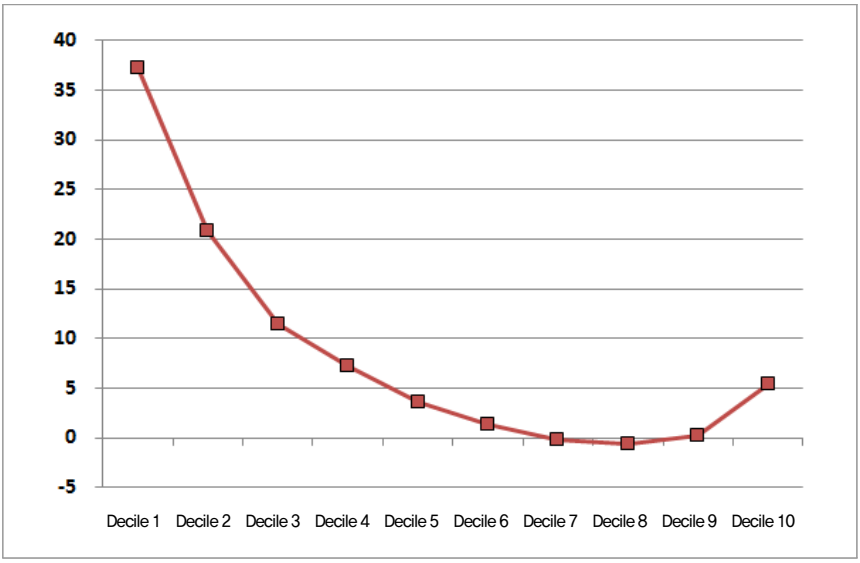
<Table IV-1> provides information on whether the hourly wage differentials between any two given deciles either decreased or increased between 2006 and 2016, but does not tell from which of the two groups of deciles—A or B—those decreases or increases originate. In order to identify this, we graphed the rates of increase in hourly wages by decile, as shown in [Figure VII-1]. The x-axis lists the deciles, while the y-axis indicates the rates of change (%) in hourly wages from 2006 to 2016.[7)]

As [Figure IV-1] shows, almost all deciles maintained wage growth rates greater than zero. Nevertheless, the rates vary quite widely from decile to decile between 2006 and 2016. The eighth decile, in particular, appears to have had almost no growth or even minus growth rates. The rates of wage growth begin to rise back up before and after the eighth decile, making the overall graph resemble a U-shaped curve. In other words, there has been a polarization of the hourly wage growth gap. Considering the fact that the right-side extreme remains lower than the left-side extreme, we can conclude that the deciles below the eighth experienced steeper growth in their hourly wages than the eighth and higher deciles during the period from 2006 to 2016.

7) Positing $x(r)$ as the hourly wage of decile r in 2006, and $y(r)$ as the hourly wage of the same decile in 2016, the rate of change can be estimated by dividing $[y(r)-x(r)]*100$ by $x(r)$.

[Figure IV-1] **Rates of change (%) in hourly wages from 2006 to 2016**

(Unit: %)



Note: Samples with missing data on labor income and work hours were eliminated. Samples were also confined to workers aged 15 to 65. The x-axis indicates deciles based on hourly wages. The y-axis indicates rates of change (%) in hourly wages from 2006 to 2016. Positing $x(r)$ as the hourly wage of decile r in 2006, and $y(r)$ as the hourly wage of the same decile in 2016, the rate of change can be estimated by dividing $[y(r)-x(r)]*100$ by $x(r)$.

Source: Raw data for the LCETS (each year).

[Figure IV-1] helps us understand a little better the patterns of change in the wage gap represented by <Table IV-1>. Whereas the hourly wages of the seventh through ninth deciles remained almost constant, recording nearly zero rates of growth, the hourly wages of the lower six deciles grew dramatically over the years. It is this steep pace of hourly wage rises in the lower deciles that has contributed to reducing the wage gap among the lower nine deciles. Much of the change observed in A1, in other words, owes to changes that have affected the lower reference deciles rather than changes in the higher compared deciles.

The graph, however, does not illustrate patterns of wage rises among the subtypes of the 10^{th} decile and therefore is silent on the causes of change in

A2. Nevertheless, the dramatic increases in hourly wages for the first two deciles and the relatively small change in the wage for the 10th decile are enough to convince us of the fact that the wage gap between the first two deciles and the 10th decile decreased between 2006 and 2016. As [Figure IV-1] shows us, however, because the rates of growth in the hourly wages of the fifth through ninth deciles remain lower than the rate of growth in the 10th decile's hourly wage, we can see that the wage gap between the fifth through ninth deciles, on the one hand, and the 10th decile, on the other hand, grew wider over the same years. The hourly wage gap between the middle (fifth and sixth) deciles and the 10th decile grew wider because the hourly wage for the latter grew at a steeper rate than for the middle deciles'.

Finally, Finding A3, that the wage gap between the eighth decile and the lower seven deciles grew narrower, while the gap between the eighth decile and the higher two deciles widened, is clearly illustrated in [Figure IV-1], with the eighth decile marking the inflection point of the graph. The eighth decile's hourly wage recorded almost a zero rate of growth from 2006 to 2016, while all other deciles saw their hourly wages rise at much greater rates.

Finding C. The rates of change in labor income and work hours vary widely among the deciles of workers, determined on the basis of hourly wages, during the 2006-2016 period.

[Figure IV-2] illustrates the rates of change, from 2006 to 2016, in the labor income of the lower nine deciles and the three subtypes of the 10th decile. [Figure IV-3] illustrates the rates of change in the work hours of the same groups over the same period of time. In both cases, the deciles are based on hourly wages. The rates of change from 2006 and 2016 with respect to both variables were estimated by applying the same formula as the one applied to the rates of change in hourly wages.

Let us examine [Figure IV-2] first. Whereas the labor income of the first two deciles increased, the labor income of the sixth through eighth deciles decreased. Labor income generally declined over time for all deciles except for the third. The top one percent also saw its labor income fall more dramatically than was the case for the other two subtypes of the 10th decile. Whereas the

rates of increase in labor income slow down as we move up from the first decile to the eighth, the pattern is quite different in the last two deciles.

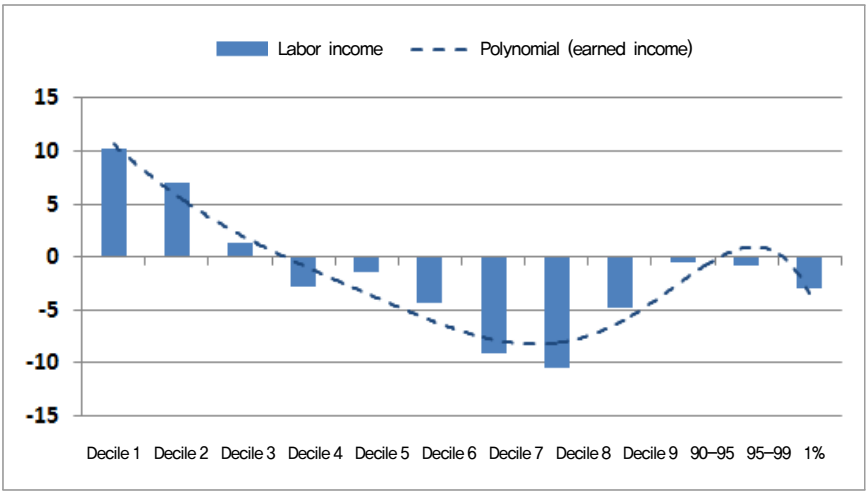
Consider [Figure IV-3] now. Whereas the rates of change in labor income were positive in some deciles and negative in others, the number of work hours decreased across the board from 2006 to 2016. This is particularly true for the first decile. The deciles that experienced the lowest decrease in work hours were the fifth and sixth deciles and workers in the 91-to-95 percentile subtype of the 10^{th} decile. The rate of decrease in the work hours of the top one percent was greater than the rate of decrease in the work hours of the second decile.

As we define hourly wage by dividing labor income by work hours, the rates of change in hourly wages therefore equal the rates of change in labor income after subtracting the rates of change in work hours. By examining the rates of change in labor income and work hours, we may therefore better understand why the rates of change in hourly wage resemble a U-shape. The positive rates of change in labor income are higher and the negative rates of change in work hours are lower among the first three deciles. This explains why hourly wages grew so dramatically for these three deciles, and particularly for the first decile.

The rates of change in both work hours and labor income are negative for the seventh through ninth deciles. As a result, the rates of change in their hourly wages almost approximate zero. Regarding the fourth through sixth deciles, no definite linear correlations between changes in work hours and changes in labor income were visible, but the rates of change in both variables remained negative. However, the lower the decile, the greater the rate of decrease in work hours than the rate of decrease in labor income. Accordingly, the rate of change in hourly wages is the highest in the fourth decile and the lowest in the sixth. Finally, with respect to the 10^{th} decile, the rate of change in labor income is negative, but the rate of decrease in work hours is significantly higher than the rate of decrease in labor income, thereby raising the decile's hourly wage in effect.

[Figure IV-2] **Rates of Change in labor income by Decile, 2006-2016**

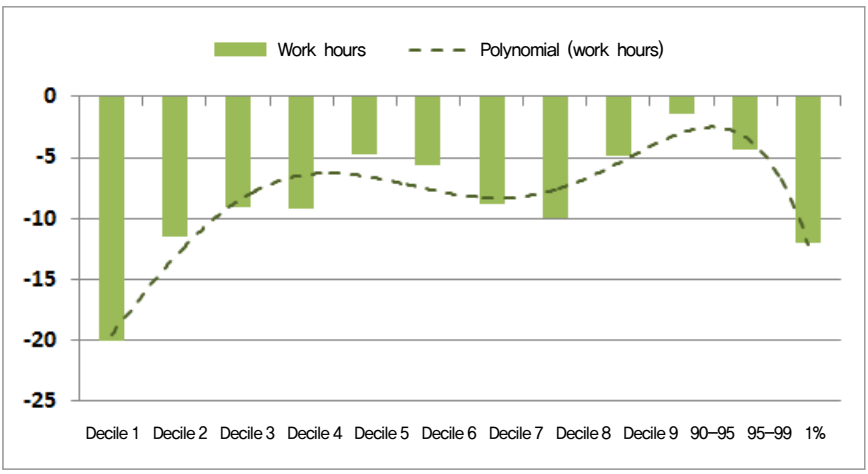
(Unit: %)



Source: Raw data for the LCETS (each year).

[Figure IV-3] **Rates of Change in Work hours by Decile, 2006-2016**

(Unit: %)



Note: Samples with missing data on labor income and work hours were eliminated. Samples were also confined to workers aged 15 to 65. Source: Raw data for the LCETS (each year).

V

Wage Gap Factor Decomposition Analysis

1 Regression Analysis on Hourly Wages: Identifying Potential Factors

A. Overall Data

1) Regression Model

The foregoing analysis on simple statistics does not control for the effects of multiple potential factors, and we should therefore not use it exclusively to reach final conclusions. We need regression analysis to determine which of the potential factors of the wage gap can explain differences in real hourly wages and their rates of increase when all other independent variables have been controlled. We thus perform a general regression analysis on log(real hourly wage) of the Mincerian type using the following equation:

$$\log w_{it} = X_{it}\beta + \epsilon_{it} \qquad (4)$$

Here the explanatory variable, X_{it}, is designed to control for the fixed effects of industries, occupations, and time. We pooled the data of all the years for this regression analysis. In the place of the logarithm of the real labor income, we use the logarithm of the real hourly wage and the logarithm of monthly work hours as dependent variables, while retaining the same explanatory variables.

In light of the dramatic increase in the number of part-time workers from

2006 to 2016, we insert interaction terms relating to the status of workers (whether part-time or not), the sizes of businesses, the gender of workers (female) and the education levels of workers to see whether and how that increase in the number of part-time workers would change the results of analysis.

With the effect of the part-time worker status thus better controlled, we may assume that explanatory variables whose estimation coefficients change significantly when such cross-terms are injected bear close correlation to the part-time worker status.

All explanatory variables are dummy variables except for constants. When dummy variables are inserted into a regression model, the base groups must be identified so that dummy variables pertaining to those base groups can be removed and appropriate interpretations can be reached. For example, if we posit workers with high school education or less as the base group, and having a two-year college diploma makes a positive difference according to the regression formula on real hourly wage, we can conclude that college-educated workers have relatively higher hourly wages than those who finished their education at high school.

2) Results

<Table V-1> presents the results of the regression analysis. The dependent variables are log(real hourly wage) for the first two columns; log(real labor income) for Columns 3 and 4; and log(work hours) for Columns 5 and 6. Columns 1, 3, and 5 present results when the part-time worker status cross-term was not injected. Columns 2, 4, and 6 present results when the cross-terms are included. Specifically, the cross-terms of the part-time worker status, gender, age, and education are used.

To identify the effects of worker gender, the base gender is male and a dummy variable is used to denote female workers. In the absence of the part-time worker status cross-term, women are shown to earn 25 percent more in real labor income, work 2.1 percent less, and earn 23.3 percent less in hourly wage than men. If women earn more in labor income than men, working almost the same hours as men would make women's hourly wage higher. Yet the analysis shows that women's hourly wage is lower than men's. With the part-time worker

status cross-term inserted, however, women's hourly wage is still lower by 23 percent than men's, but the gap in work hours between the two sexes broadens from 2.1 percent to 2.4 percent, thus reversing the discovery about women's labor income, which now emerges as 25.8 percent lower than men's. The finding obtained by inserting the part-time worker status cross-term therefore appears more realistic. It also suggests that women earn less because they are more likely than men to work as part-time workers.

Now, let us compare the hourly wages, labor income, and work hours of different age groups, with workers in their 40s posited as the base group. Compared to workers in their 40s, workers of all other age groups appear to earn less in real hourly wages. The gap is widest with respect to workers aged 15 to 19 (-24.9 percent), followed by workers in their 60s (-16.1 percent), workers in their 20s (14.4 percent), and workers in their 30s (3.8 percent). When the part-time worker status cross-term is added as an explanatory variable, the coefficient for the monthly work hours of workers aged 15 to 19 decreases, while the same coefficient for workers in their 30s changes from a significant positive number to an insignificant negative number. The same coefficient for workers in their 60s changes from a significant negative number to a significant positive number. In the meantime, no age-dependent differences emerge in terms of real labor income. The part-time worker status therefore appears to influence work hours rather than labor income.

As for education, the base group is workers with high school education or less. In the absence of the part-time worker status cross-term, workers with two-year college education and workers with four-year university education are shown to earn 8.3 percent and 16.0 percent more in hourly wages than the base group, respectively. These two relatively highly educated groups also emerge as earning 6.7 percent and 12.8 percent more in labor income than the base group, respectively. On the other hand, the two groups also appear to work 1.6 percent and 3.2 percent less than the base group, respectively. In other words, workers with high school education or less appear to work longer hours for lower hourly wages and labor income. Even after the part-time worker status cross-term is injected, these coefficients do not change significantly.

Union membership increases both work hours (0.7 percent) and wage level (10.8 percent). As the wage level increases more steeply than work hours when

workers are unionized, union membership also increases the hourly wage (10.1 percent).

We also sought to test whether different types of employment affected workers' work hours and income, positing regular workers as the base group. Compared to the base group, independent contractors earn 12.3 percent less in real labor income, but work 21.0 percent more per month. As a result, independent contractors' labor income rate is higher by 8.6 percent than regular workers'. For similar reasons, the hourly wage of part-time workers is also 10.5 percent higher than that of regular workers. Home-based workers show negative coefficients in terms of labor income and work hours. Yet the coefficient of their labor income is so high that home-based workers' hourly wage appears relatively low. The same pattern is observed with respect to dispatched and temporary workers as well. When the part-time worker status cross-term is injected, the coefficient for the part-time dummy variable changes dramatically, as expected.

In order to determine the correlation between work experience and the dependent variables, we set workers with 10 years or more work experience as the base group. The real hourly wages for workers with less experience are lower, but the hourly wage gaps diminish as workers gain more experience. While work experience makes no significant difference to work hours, the labor income gap, too, decreases as workers gain more experience.

As for the size of business, workers working at small businesses (with up to four workers each) are shown to work longer hours and make less labor income than workers working at large businesses (with 300 or more workers each), with the hourly wage gap amounting to 61.5 percent. While similar patterns are observed with respect to workers in businesses of other sizes, the hourly wage and labor income gaps generally decrease as businesses grow larger. When the part-time worker status cross-term is inserted, the work hour gap among businesses of varying sizes decreases significantly.

〈Table V-1〉 **Regression Analysis**

Dependent variable	Real hourly wage		Real labor income		Work hours per month	
Cross-term	Not included	Included	Not included	Included	Not included	Included
Female	-0.233***	-0.234***	0.254***	-0.258***	-0.021***	-0.024***
Age						
- 15~19	-0.249***	-0.171***	-0.478***	-0.365***	-0.229***	-0.194***
- 20~29	-0.144***	-0.138***	-0.134***	-0.132***	0.009***	0.006***
- 30~39	-0.038***	-0.041***	-0.035***	-0.043***	0.004***	-0.001
- 50~59	-0.022***	-0.030***	-0.023***	-0.025***	0.000	0.005***
- 60~65	-0.161***	-0.193***	-0.172***	-0.181***	-0.010***	0.012***
Education						
- Two-year college	0.083***	0.081***	0.067***	0.066***	-0.016***	-0.015***
- University or higher	0.160***	0.158***	0.128***	0.126***	-0.032***	-0.032***
Union membership	0.101***	0.106***	0.109***	0.109***	0.007***	0.003***
Employment Types						
- Independent contracting	0.086***	0.076***	-0.123***	-0.143***	-0.210***	-0.219***
- Home-based	-0.350***	-0.346***	-0.725***	-0.711***	-0.374***	-0.364***
- Dispatched/hired service	-0.175***	-0.165***	-0.243***	-0.234***	-0.068***	-0.069***
- Part-time	0.105***	0.046***	-0.557***	-1.124***	-0.662***	-1.169***
- Temporary	-0.073***	-0.081***	-0.158***	-0.172***	-0.085***	-0.092***
Work Experiences						
- Less than 1 year	-0.436***	-0.429***	-0.476***	-0.462***	-0.040***	-0.033***
- 1 yr to less than 2 yrs	-0.376***	-0.372***	-0.380***	-0.367***	-0.004***	0.005***
- 2 yrs to less than 3 yrs	-0.322***	-0.322***	-0.320***	-0.311***	0.002	0.010***
3 yrs to less than 4 yrs	-0.286***	-0.287***	-0.290***	-0.282***	-0.004**	0.005***
4 rs to less than 5 yrs	-0.247***	-0.249***	-0.252***	-0.247***	-0.004***	0.002
5 to 10 yrs	-0.178***	-0.178***	-0.180***	-0.173***	-0.002**	0.005***
Firm Size						
- Fewer than 5	-0.615***	-0.608***	-0.576***	-0.605***	0.039***	0.003**
- 5 to 29	-0.417***	-0.411***	-0.387***	-0.404***	0.030***	0.008***
- 30 to 299	-0.291***	-0.283***	-0.251***	-0.259***	0.040***	0.024***

〈Table V-1〉 **Continued**

Dependent variable	Real hourly wage		Real labor income		Work hours per month	
Cross-term	Not included	Included	Not included	Included	Not included	Included
Industries						
– Utilities	0.239***	0.233***	0.188***	0.183***	–0.051***	–0.050***
– Construction	0.048***	–0.081***	0.025***	–0.137***	–0.023***	–0.056***
– Wholesale/retail	–0.015***	–0.005**	–0.035***	–0.025***	–0.020***	–0.021***
– Transportation	–0.157***	–0.161***	–0.206***	–0.204***	–0.049***	–0.043***
– Lodging/restaurants	–0.099***	–0.079***	–0.049***	–0.018***	0.050***	0.062***
– Finance/insurance	0.277***	0.262***	0.229***	0.223***	–0.047***	–0.039***
– Real estate/property leasing	–0.160***	–0.149***	–0.108***	–0.091***	0.053***	0.058***
– Education services	0.046***	0.015***	–0.167***	–0.101***	–0.213***	–0.116***
– Health/welfare	–0.145***	–0.157***	–0.157***	–0.163***	–0.012***	–0.006***
– Publishing/information	0.053***	0.054***	–0.007**	–0.009***	–0.060***	–0.063***
– Business services	0.006***	–0.002	–0.044***	–0.050***	–0.050***	–0.048***
– Entertainment/sports	–0.106***	–0.057***	–0.144***	–0.090***	–0.038***	–0.034***
– Personal services	–0.121***	–0.135***	–0.166***	–0.148***	–0.045***	–0.013***
Occupations						
– Office workers	–0.063***	–0.060***	–0.046***	–0.054***	0.018***	0.007***
– Service/sales workers	–0.204***	–0.190***	–0.130***	–0.118***	0.074***	0.072***
– Skilled/machine operators	–0.240***	–0.265***	–0.143***	–0.188***	0.097***	0.077***
– Unskilled labor	–0.315***	–0.351***	–0.229***	–0.295***	0.086***	0.056***
Industry fixed effect	O	O	O	O	O	O
Occupation fixed effect	O	O	O	O	O	O
Year fixed effect	O	O	O	O	O	O
Unskilled worker interaction	×	O	×	O	×	O

Note: Dependent variables are logarithms of the hourly wage, labor income, and work hours per month.
Source: MOEL, LCETS (2006–2016).

B. Regression Analysis by Year

By performing regression analysis of the aforementioned model with respect to each year, we seek to determine how the explanatory power of the independent variables on hourly wages changed over time. Factors that seemed to contribute to lessening or maintaining the wage gap in simple statistical analysis appear to widen the wage gap in regression analysis. This means that other explanatory factors are at play in causing changes to hourly wages and the wage gap. We thus compare the coefficients of the labor income rates, labor income, and work hours year by year, and also additionally identify the explanatory powers of the explanatory variables and residual terms. Interestingly, the influence of the explanatory variables on labor income and work hours increased, whereas the influence of these variables on the labor income rates decreased significantly over time.

[Figure V-1] illustrates changes in the coefficients of real hourly wages over time. It illustrates the results of regression analysis without the part-time worker status cross-term included. The zero represents the base group, and the curves represent the coefficients. The closer a coefficient is to zero, the narrower the gap between the base and compared groups.

From 2006 to 2016, the hourly wage gap between women and men continued to decrease until 2014, after which it began to widen again. The hourly wage gaps between high school-educated (base), college-educated, and university-educated workers continued to decrease. Union membership did not make much difference in hourly wages until 2014 or so, but began to increase income in 2014 and afterward. The wage gap between teenage workers (aged 15 to 19) and workers in their 40s (the base group) continued widening over time, while the wage gaps between workers in their 30s or 60s and the base group continued to narrow until 2014 or so. The wage gaps between the base group and other age groups, however, began to widen in 2014 and afterward. However, the wage gap between workers in their 40s and workers in their 50s narrowed significantly over time.

[Figure V-1(2)] compares the wage levels of workers with 10 years or more work experience (the base group) with workers with less work experience. There

were significant wage gaps in the early years, ranging between 25 percent and 65 percent, but these gaps decreased drastically over time, ranging between 20 percent and 40 percent by 2016. [Figure V-1(3)] illustrates hourly wage gaps by employment type, with regular workers posited as the base group. While no definite patterns emerged in terms of the wage gap between regular workers and home-based ones, the hourly wage levels for independent contractors fluctuated dramatically according to business cycles, as in the case of home-based workers, until 2012 or so. Independent contractors' hourly wages, however, remained relatively more stable after 2012, and tended to be higher than that of regular workers, with the wage gap remaining constant from 2012 to 2016.

Part-time workers were paid almost the same hourly wages as regular workers in 2006. Then the former's hourly wages dropped compared to the latter's until 2009, before rising back up to be on par with the latter's in 2010. Part-time workers' hourly wages have been growing steadily since then, almost 15 percent higher than regular workers'.

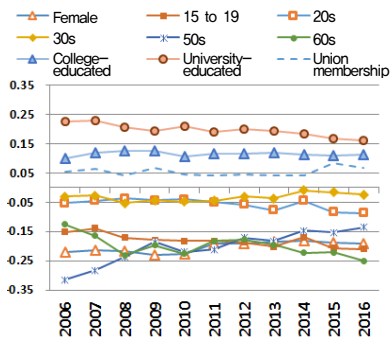
[Figure V-1(4)] illustrates the coefficients of the dummy variables for businesses of varying sizes, from those hiring fewer than five workers to those hiring five to 29 workers and finally to those hiring 30 to 299 workers, compared to the base group (businesses hiring 300 workers or more). The hourly wage gap between the base group and businesses hiring 30 to 299 workers remained almost unchanged, while the hourly wage gap between the base group and businesses hiring five to 29 workers dropped by three to four percentage points between 2006 and 2016. In contrast, the hourly wage gap between the base group and businesses hiring fewer than five workers widened by almost 10 percentage points, from 50 percent to 60 percent.

Finally, [Figure V-1(5)] visualizes the explanatory powers of the explanatory variables and residual terms on a dependent variable, i.e., log (real hourly wage). Whereas the explanatory powers of the explanatory variables have been waning, the explanatory powers of other factors have been rising since 2006. One possible explanation for this may be found in the unmeasured differences of individual worker competency.

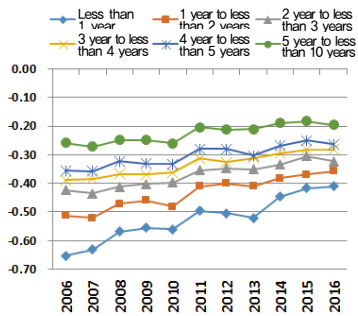
[Figure V-1] **Decomposition of the Coefficients & Variability of Explanatory Variables: Real Hourly Wages as Dependent Variable**

(Units: coefficient, percentage)

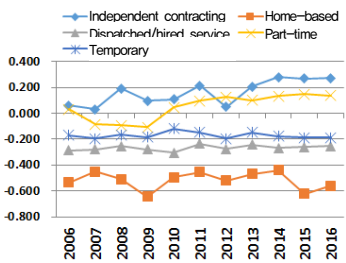
(1) Gender, age, education, union membership



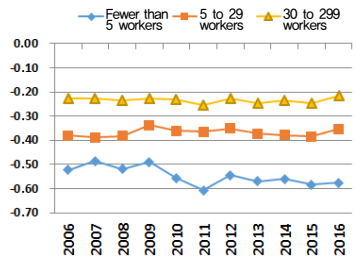
(2) Work experience



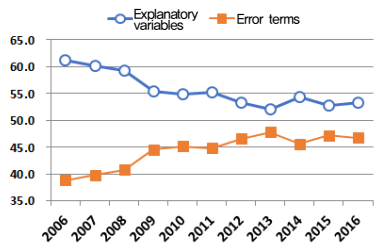
(3) Employment type



(4) Business size



(5) Variability decomposition



Note: Variability decomposition represents the parts of hourly wages of different years explained, respectively, by the explanatory variables and residual terms under the regression formula, after the wage equation for each year is determined.

Source: MOEL, LCETS (2006-2016).

2 Wage Gaps by Industry & Occupation

Generalized entropy index (GEI) was used to identify wage gaps within each industry.[8] See the following equation:

$$GE(\alpha) = \frac{1}{\alpha(\alpha-1)}\left[\frac{1}{N}\sum_{i=1}^{N}\left(\frac{y_i}{y_m}\right)^{\alpha}-1\right] \quad (5)$$

Here, there are *N*-number of lower groups, while the average of the income variables is indicated as y_m, and group i's average as y_i. GE can range anywhere between zero and infinity. GE(α) converges onto zero, meaning it represents the perfect equality of income. As it grows larger, it indicates growing income inequality. In Equation (5), the smaller the α, the more sensitive it is to lower levels of income observed; the larger the α, the more sensitive it is to higher levels of income observed. In most cases, α ranges between zero and one. When $\alpha = 1$, it may be called the Theil T index. When $\alpha = 0$, it may be called the Theil L index.

In measuring income gaps using the Theil T and L indices, we can measure income gaps both within and between groups. If, for example, the population under our analysis is divided by gender, the between-group gap would mean the income gap between men and women, and the in-group gap would mean the weighted average income gap based on the income gaps observed between male workers on the one hand, and female workers on the other. The Theil T and L indices could therefore be expressed as the sum of the in-group and between-group income gaps.[9]

The Theil T index can be written as follows:

8) See World Bank (2014).

9) The Gini coefficients, in contrast, cannot be expressed as sums of in-group and between-group Gini coefficients. Pyatt (1976), however, equated the total wage gap with the sum of in-group, between-group, and overlapping income gaps. For the purpose of our analysis, we use the Theil indices in order to keep the in-group and between-group income inequalities distinct.

$$T=\sum_{i=1}^{N}\frac{y_i}{N\bar{y}}ln\left(\frac{y_iN}{\bar{y}N}\right)=\sum_{j}\left(\frac{Y_j}{Y}\right)T_j+\sum\left(\frac{Y_j}{Y}\right)\ln\left(\frac{Y_j/Y}{N_j/N}\right) \quad (6)$$

In Equation (6), T stands for the Theil T index, and T_j for the Theil T index of group j. Y_j represents the total income of group j, and Y, the total income of the overall economy. N_j represents the number of members belonging to group j, and N, the total population of the given economy. The first term on the right-hand side in Equation (6) represents the wage gap within the group, and the second term, the wage gap between groups.

GE(0), i.e., Theil L index, can be expressed as follows:

$$L=\sum_{i=1}^{N}\frac{1}{N}\ln\left(\frac{Y}{Y_iN}\right)=\sum_{j}\left(\frac{N_j}{N}\right)L_j+\sum_{j}\frac{N_j}{N}\ln\left(\frac{N_j/N}{Y_j/Y}\right) \quad (7)$$

<Table V-2> presents the results of our analysis on wage gaps within and between industries as well as the levels of employment and hourly wages by industry. First, wage gaps within industries tend to overwhelm wage gaps between industries. When a, the Theil index could explain 84.32 percent of the wage gap observed in 2006 as originating from within industries, and the remaining 15.68 percent as originating from between industries. The portion of the wage gap resulting from within industries declined somewhat from 2006 to 2011, but began to rise in the ensuing six years, thus rising by two percent over the years from 2006 to 2016 in total. The portion of the wage gap resulting from between industries, on the other hand, dropped by over nine percent between 2006 and 2016. If s, the final conclusion would remain the same, but the margin of decrease in the portion of the wage gap resulting from between industries would grow even further to 17 percent.

From 2006 to 2016, the wage gap at the level of industries decreased, in line with the wage gap between deciles as analyzed earlier.

〈Table V-2〉 **Wage Gaps, Employment & Hourly Wage Levels by Industry**

(Units: Theil index, percentage, KRW 1,000)

Wage gaps within & between industries						
	2006	2011	2016	2006–2011	2011–2016	2006–2016
W/in industries (%)	84.32	83.48	85.80	−1.01	2.79	1.76
B/n industries (%)	15.68	16.52	14.20	5.41	−14.09	−9.44
Overall	0.21	0.23	0.18	10.20	−21.90	−13.93
				a		
W/in industries (%)	85.41	84.92	87.48	−0.57	3.01	3.01
B/n industries (%)	14.59	15.07	12.52	3.31	−16.90	−16.90
Overall	0.22	0.24	0.19	6.63	−17.42	−17.42
Share of employment, by industry						
	2006	2011	2016	2006–2011	2011–2016	2006–2016
Manufacturing	33.46	22.96	22.32	−31.38	−2.78	−2.78
Utilities	2.96	1.79	1.46	−39.43	−18.44	−18.44
Construction	2.72	3.01	4.91	10.75	62.99	62.99
Wholesale/retail	6.93	9.39	7.65	35.47	−18.53	−18.53
Transportation	7.56	9.72	8.63	28.51	−11.19	−11.19
Lodging/restaurants	3.36	5.58	6.12	66.22	9.67	9.67
Finance/insurance	5.23	5.13	5.84	−1.88	13.78	13.78
Real estate/property leasing	2.71	3.46	2.69	27.68	−22.10	−22.10
Educational services	7.76	7.66	6.67	−1.35	−12.87	−12.87
Health/welfare services	10.61	10.69	10.80	0.78	1.06	1.06
Publishing/video/information services	2.21	4.78	6.51	116.14	36.07	36.07
Business service	8.69	9.26	8.82	6.61	−4.82	−4.82
Entertainment/sports	3.79	3.67	3.68	−3.14	0.29	0.29
Organizational/personal services	2.01	2.89	3.89	43.94	34.65	34.65
Total	100	100	100			
Hourly wage level, by industry						
	2006	2011	2016	2006–2011	2011–2016	2006–2016
Manufacturing	16.83	16.56	19.35	−1.56	16.78	16.78
Utilities	25.43	25.83	27.05	1.57	4.73	4.73
Construction	18.47	19.01	20.50	2.93	7.83	7.83
Wholesale/retail	17.11	15.57	16.69	−9.01	7.21	7.21
Transportation	13.71	13.77	16.85	0.48	22.33	22.33
Lodging/restaurants	11.82	9.89	11.39	−16.34	15.20	15.20
Finance/insurance	24.39	22.93	24.49	−6.00	6.80	6.80
Real estate/property leasing	11.95	12.36	14.82	3.44	19.98	19.98
Educational services	25.95	26.99	24.96	3.98	−7.53	−7.53
Health/welfare services	15.24	15.34	15.24	0.67	−0.67	−0.67
Publishing/video/information services	23.11	21.28	21.55	−7.89	1.26	1.26
Business services	19.61	19.01	20.36	−3.09	7.12	7.12
Entertainment/sports	17.51	13.90	15.63	−20.60	12.46	12.46
Organizational/personal services	16.21	13.19	14.96	−18.62	13.39	13.39

Source: MOEL, LCETS (2006, 2011, 2016) (raw data processed by the authors).

<Table V-2> also presents changes in employment and hourly wage levels from 2006 to 2011 and to 2016 by industry. As of 2006, the industries with high hourly wages were utilities (KRW 25,000), finance/insurance (KRW 24,000), publishing/video/information services (KRW 23,000), and business services (KRW 19,000). On the other hand, lodging/restaurants (KRW 11,800), real estate and property leasing (KRW 11,950), and transportation (KRW 13,710) were industries with low hourly wages. From 2006 to 2016, the better-paying industries saw their hourly wages grow by 1.26 to 7.12 percent, while the lower-paying industries saw their hourly wages grow by 15.20 to 22.33 percent. This coincides with the earlier analysis at the personal level that hourly wages for the top 20 percent of wage earners grew rather slowly, while the hourly wages for the bottom 20 percent grew rapidly during the same period of time.

How, then, did employment levels change in these industries? The rates of increase in employment by the higher-paying industries, i.e., utilities, finance/insurance, publishing/video/information services, and business services, were -18.44 percent, 13.78 percent, 36.07 percent, and -4.82 percent from 2006 to 2016, respectively. The rates of increase in employment by the lower-paying industries, i.e., lodging/restaurants, real estate and property leasing, and transportation, were 9.67 percent, -22.10 percent, and -11.19 percent, respectively. In other words, there were no definitive patterns according to which the levels of employment changed in these industries irrespective of how well or poorly they paid workers as of 2006. The rates of change in the employment shares of industries may strike us as rather dramatic. We need to keep in mind, however, that each industry does not have a share of total employment that is greater than nine percent, except in the cases of manufacturing, health and welfare services, and business services.

<Table V-3> presents the results of breakdowns on wage gaps, employment, and hourly wage levels by occupation type. As with industry-level analysis, wage gaps within occupation types are greater than wage gaps between them. When e, wage gaps within occupation types were 79.51 percent and 85.67 percent in 2006 and 2016, respectively. On the other hand, wage gaps between occupation types were 20.49 percent and 14.33 percent in 2006 and 2016, respectively. Contrary to the decomposition of wage gaps at the industry level, the margin

of decrease in wage gaps between occupation types was greater when the Theil index was e than when it was t. However, wage gaps decreased in both cases, implying that the overall wage gap decreased from 2006 to 2016 irrespective of occupation type.

In 2006, the occupation type with the highest hourly wage was that of managers and professionals (KRW 23,000), followed by office workers (KRW 18,000), skilled workers and machine operators (KRW 14,000), service and sales workers (KRW 11,000), and unskilled workers (KRW 8,000). The rates of growth in hourly wages varied widely among occupation types over the following 11 years. The hourly wages for relatively well-paid managers/professionals and office workers, for example, grew by -0.01 percent and 10.64 percent, while the hourly wages for relatively poorly paid skilled workers/machine operators, unskilled workers, and service/sales workers increased by 15.40 percent, 19.42 percent, and 21.89 percent, respectively. In other words, the rates of growth in hourly wages were far higher for relatively poorly paid occupation types than for well-paid ones.

In 2006, over 70 percent of employment was concentrated in managers/ professionals (32.97 percent), office workers (26.61 percent), and skilled workers/machine operators (26.00 percent). Unskilled workers and service/sales workers made up significantly smaller portions of employment, at 7.52 percent and 6.91 percent, respectively. By 2016, however, the portion of service/sales workers nearly doubled, while the portion of unskilled workers also increased by 33 percent. The other categories saw decreases in their shares of employment.

In sum, occupation types with relatively low hourly wages in 2006 saw their wages and shares of employment grow dramatically over the following 11 years.

〈Table V-3〉 **Wage Gaps, Employment & Hourly Wage Levels by Occupation Type**

(Units: Theil index, percentage, KRW 1,000)

Wage gaps within & between occupation types						
	2006	2011	2016	2006–2011	2011–2016	2006–2016
	c					
W/in occupation types (%)	79.51	84.35	85.67	6.08	1.57	7.74
B/n occupation types (%)	20.49	15.65	14.33	–23.59	–8.43	–30.03
Overall	0.23	0.21	0.18	–9.26	–13.93	–21.90
	o					
W/in occupation types (%)	81.07	85.77	87.17	5.80	1.62	1.62
B/n occupation types (%)	18.93	14.23	12.83	–24.85	–9.79	–9.79
Overall	0.24	0.22	0.19	–6.22	–11.94	–11.94
Employment share by occupation type						
	2006	2011	2016	2006–2011	2011–2016	2006–2016
Managers/professionals	32.97	28.38	28.50	–13.91	0.42	–13.55
Office workers	26.61	24.06	26.10	–9.59	8.50	–1.90
Service/sales workers	6.91	13.11	13.41	89.76	2.28	94.09
Skilled/machine operators	26.00	24.75	21.96	–4.79	–11.27	–15.52
Unskilled workers	7.52	9.70	10.02	28.99	3.35	33.31
	100	100	100			
Hourly wage levels by occupation type						
	2006	2011	2016	2006–2011	2011–2016	2006–2016
Managers/professionals	23.85	23.38	23.85	–2.00	2.03	–0.01
Office workers	18.37	18.34	20.32	–0.12	10.77	10.64
Service/sales workers	11.22	13.10	13.68	16.76	4.40	21.89
Skilled/machine operators	14.45	14.42	16.68	–0.23	15.66	15.40
Unskilled workers	8.71	8.61	10.41	–1.15	20.81	19.42

Source: Raw data of the LCETS (each year).

3 Factor Decomposition

One way to understand the wage gap is by trying the factor decomposition, as proposed by Oaxaca (1973) and Blinder (1973).[10)]

<Table V-4> presents the results of factor decomposition. Prediction j represents the value of the dependent variable explained by the explanatory variables of group j. If, in other words, the explanatory variables of group j are defined as X_j, and the related coefficients, as $\hat{\beta}_j$, Prediction j would equal $\hat{\beta}_j X_j$. The average differential is obtained by subtracting Prediction 2 from Prediction 1. "Obs" represents the differences in hourly wages originating from observable factors, i.e., the explanatory variables. "Unobs" represents the differences in hourly wages resulting from unobservable factors, i.e., coefficients. "Inter" stands for factors that influence both Groups 1 and 2. The sum of "Obs," "Unobs," and "Inter" amounts to the average differential.

In <Table V-4>, the first panel posits the first decile as Group 2, and all other deciles as Group 1. The second panel posits the 10^{th} decile as Group 2, and all other deciles as Group 1.

Let us turn our attention to the first panel. The average differential in the hourly wages between the first decile and the rest was KRW 1,303. Of this, KRW 77 owed to the explanatory variables, and KRW 712 to the explanatory coefficients. In other words, if the first decile had the same explanatory variables as the rest of the deciles, its hourly wage would increase KRW 77. If the first decile had the same explanatory coefficients as those of the rest of the deciles, its hourly wage would increase KRW 712. Over time, the average difference between the two groups subsided so that the portion of the wage gap resulting from differences in the explanatory variables decreased from KRW 77 to KRW 18, and the portion of the gap resulting from differences in the explanatory coefficients decreased KRW 712 to KRW 542 by 2016. Moreover, the difference originating from observable factors decreased from 5.9 percent to 1.8 percent, while the difference owing to unobservable factors changed only slightly from

10) For the method of factor decomposition, see Jann (2008).

54.6 percent to 54.2 percent from 2006 to 2016. The portion of the wage gap owing to common factors, in contrast, increased from 39 percent to 43 percent over the same years.

Let us now turn to the second panel, with the 10^{th} decile assigned to Group 2 and all the rest to Group 1. The hourly wage gap between the two groups was -1.238 in 2006. The negative value reflects the fact that the 10^{th} decile's hourly wage is higher than those of all the other deciles. If the 10^{th} decile had the same explanatory variables as the rest of the deciles, its hourly wage would decrease by KRW 53. If the 10^{th} decile had the same coefficients as the rest of the deciles, its hourly wage would drop by KRW 647. The average wage gap decreased over time, from KRW 1,238 in 2006 to KRW 1,182 in 2016. The portion of this wage gap owing to the explanatory variables decreased from KRW 53 to KRW 23, while the portion of the wage gap attributed to the coefficients increased from KRW 647 to KRW 724 over the same years. In other words, the contribution of coefficients to the overall wage gap grew significantly from 52.26 percent in 2006 to 61.25 percent in 2016.

Both panels reveal that the average wage gaps decreased over time. In both situations, the portions of the wage gaps owing to the explanatory variables decreased over time. However, whereas the portion of the wage gap owing to the coefficients remained more or less unchanged when the first decile was posited as the reference group, the portion of the wage gap owing to the coefficients grew significantly by 8.99 percentage points when the 10^{th} decile was posited as the reference group.

〈Table V-4〉 **Factor Decomposition Results**

	Group 2 = Decile 1 / Group 1 = All other deciles					
	Prediction 1	Prediction 2	Med. Diff.	Obs.	Unobs.	Inter.
2006	2.796	1.493	1.303	0.077	0.712	0.515
2007	2.820	1.521	1.299	0.080	0.737	0.482
2008	2.780	1.535	1.245	0.051	0.695	0.499
2009	2.703	1.496	1.207	0.077	0.723	0.406
2010	2.717	1.498	1.219	0.056	0.723	0.441
2011	2.749	1.609	1.141	0.039	0.650	0.452
2012	2.791	1.664	1.127	0.045	0.652	0.431
2013	2.858	1.713	1.145	0.027	0.682	0.436
2014	2.850	1.780	1.069	0.032	0.593	0.444
2015	2.818	1.783	1.035	0.001	0.581	0.452
2016	2.843	1.844	0.999	0.018	0.542	0.439
	Group 2 = Decile 10 / Group 1 = All other deciles					
	Prediction 1	Prediction 2	Med. Diff.	Obs.	Unobs.	Inter.
2006	2.542	3.780	−1.238	−0.053	−0.647	−0.537
2007	2.565	3.817	−1.252	−0.073	−0.664	−0.515
2008	2.528	3.803	−1.275	−0.087	−0.663	−0.524
2009	2.456	3.718	−1.262	−0.116	−0.702	−0.444
2010	2.467	3.743	−1.276	−0.064	−0.720	−0.492
2011	2.512	3.750	−1.239	−0.034	−0.697	−0.508
2012	2.556	3.784	−1.229	−0.060	−0.730	−0.438
2013	2.618	3.871	−1.252	−0.045	−0.762	−0.446
2014	2.619	3.853	−1.234	−0.041	−0.737	−0.456
2015	2.594	3.799	−1.205	−0.016	−0.730	−0.459
2016	2.625	3.807	−1.182	−0.023	−0.724	−0.435

VI

Conclusion & Policy Implications

In this study, we analyze the income and wage disparities between deciles of workers in the job market. Income inequality is a critical issue with far-reaching social, economic, and political ramifications. The prevailing perception that income inequality is growing worse has fueled interest in an increasing number of studies on the topic. As income inequality involves both earned and non-earned income, we need analyses of both in order to understand income inequality in depth. As a first effort at reaching such understanding, however, this study focuses on decile-by-decile gaps in labor income. While Gini coefficients are commonly used as indicators of inequality, we decide instead to focus upon changes in decile-by-decile gaps in labor income over time in an effort to understand the changing distribution of labor income.

There is a multiplicity of factors that contribute to wage gaps. Policy measures addressing inequality will differ depending on which factors policymakers focus on. Literature on wage inequality considers factors relating to labor supply, demand, and the institutions, and seeks to explain wage gaps according to the results of decomposing these diverse factors. There have also been attempts to identify structural causes, such as demographic changes. However, efforts to understand how wage gaps have changed over time should precede attempts to identify the factors behind wage gaps. Recent studies have pointed out the decreasing wage gap between the first and 10^{th} deciles in Korea, but have simply concluded that this is reflective of the recent drop in the Gini coefficient of the Korean economy, indicative of an overall drop in inequality. We should ask, though, whether the reduced wage gap between the highest and

lowest deciles necessarily entails a reduced wage gap between other deciles. If labor income makes up a vast proportion of overall income, couldn't the drop in overall inequality also imply a drop in overall income? The conclusion that the inequality of overall income has decreased runs counterintuitive to the growing worries over the apparent rise in income inequality. In such a situation, we need additional research and analysis rather than simply finding satisfaction in the reduced wage gap between the first and 10^{th} deciles.

This study is not without limitations. We could not provide analysis of the causes behind the patterns of change in wage gaps we observed from 2006 to 2016, and how those patterns are related to those observed prior to 2006.[11] Moreover, the errors of measurement inherent to work hours should be checked. Although existing studies have pointed out the possibility of wage gaps being explained by errors of measurement rather than factors of job market institutions, demand and supply, little research has been done on how errors of measurement may have affected wage gap analyses in Korea.

As our analysis is tailored to workers who were employed at the time the surveys took place, our discussion is limited to *ex post* wage gaps only, without providing implications on *ex ante* wage gaps in light of the probabilities of unemployment and future employment. As the probability of higher unemployment increases, jobseekers are denied the opportunity to learn through actual work and the quality of human capital that has been accumulated so far can also degenerate, exerting downward pressure on entry-level wages. The pervasive risk of unemployment would disincentivize people from seeking education, career experience, and other such factors normally associated with higher wages, and ultimately lead to reduced wage gaps.[12]

11) If we placed our study in the tradition of research on the factors of wage gaps, it could be seen as continuing the discussions attempted in studies like Kim (2008) that analyze wage gaps between workers attributable to such factors as education, drawing upon the WSS Wage Structure Surveys from 1980 to 2007.

12) Jeon (2017) mentions the likelihood that inequality could increase or decrease depending on the economic activities of household members. To obtain a true measure of the correlation between economic activity and inequality, therefore, we need household data above and beyond individual data.

Policy implications

1) Policies are needed to expand opportunities to work.

The labor income gap has widened, while the hourly wage gap has decreased. Workers may be better paid, but are still struggling to make ends meet. Further research is needed on how this contrast between income and wage gaps is affecting households and on finding appropriate policy measures.

2) Further research is needed to determine the causes behind the relatively smaller drops in the middle deciles' work hours. If the middle deciles are not being paid fairly due to so-called "comprehensive wage" schemes, policy measures are needed to address this problem. It is especially important to consider the upper-middle deciles, who are the main targets of Korean policy programs on raising birth rates and other such issues. Further research and policy efforts are needed to determine why wages for the middle deciles are especially slow to recover to pre-global financial crisis levels.

3) Policy efforts may be needed to stop involuntary transitions of workers to part-time status.

The number of part-time workers is on a rise, while the number of temporary workers is on a decline. Considering that the former faces greater job insecurity due to the lack of labor contracts guaranteeing the periods of time for which they may work, we may conclude that the job market is worsening from the perspective of irregular workers. We also need further research to determine whether part-time workers become part-time workers because they want it or because there is no other option. Remember that workers with the lowest hourly wages were included in the first decile. Temporary workers previously under fixed-term contracts may have been forced to take on part-time status without fixed-term contracts. The increasing number of part-time workers therefore implies growing inequality in the job market, and may also negatively affect the future job prospects of young people.

Bibliography

Blinder, A. S., "Wage discrimination: reduced form and structural estimates," Journal of Human resources, 1973, pp. 436-455.

Jeong, J., Jeon, B., and Jang, J., "Factor Decomposition on Changes in Income Inequality: 2006-2015," *Journal of Industries and Labor*, 23(2), 2017, pp. 47-77.

Jeong, H., "Empirical Understanding of the Structure of Income Inequality in Korea and an Inclusive Growth Strategy," *Income Distribution and Economic Growth*, NRC, 2017.

Oaxaca, R., "Male-female wage differentials in urban labor markets," International economic review, 1973, pp. 693-709.

Pyatt, G. (1976). On the interpretation and disaggregation of Gini coefficients. The Economic Journal, 86(342), pp. 243-255.

[WEB SOURCES]

MOEL, LCETS, 2006-2016 (raw data),
http://laborstat.molab.go.kr/newOut/renewal/statreport/onlinepublist.jsp?cd=8&koen=ko&select=4&P_ID=3&rptId=4 (accessed April 20, 2017).

Statistics Korea, Annexes to the EAPS by Employment Type (raw data available via the MDIS) https://mdis.kostat.go.kr/index.do (accessed November 15, 2017).

Statistics Korea, Income Statistics http://kostat.go.kr/incomeNcpi/income/income_cp/2/5/index.static (accessed December 7, 2017).

World Bank. 2014. Introduction to poverty analysis (English). Washington, DC: World Bank Group. http://documents.worldbank.org/curated/en/775871468331250546/Introduction-to-poverty-analysis (accessed November 15, 2017).