

2022

Summary of Research Papers-11



# Changing Industrial Structure and Employment of Women

Jongsoog Kim, Sung-mi Jung, Woo-ri Noh



Korean Women's Development Institute

## **Changing Industrial Structure and Employment of Women**

---

©2022

**Korean Women's Development Institute**  
225 Jinheung-ro Eunpyeong-gu  
Seoul, 03367, Republic of Korea  
[www.kwdi.re.kr](http://www.kwdi.re.kr)

# Contents

I . Introduction .....	1
II . Description of the Data .....	3
III . Changes in the Women's Labor Market, and Factors Affecting Them .....	14
1. The Various Factors Driving the Share of Women's Employment by Industry .....	14
2. Changes in the Relative Demand for Women Workers .....	16
3. Qualitative Changes in Women's Labor Markets by Industry: Gender Wage Gaps .....	20
IV . Conclusion and Implications .....	31
Reference .....	44

# Tables

〈Table 1〉 Industrial Distribution of Workers: Total and Women (2004~2020) .....	5
〈Table 2〉 Women's Concentration Index, by Industry (2004~2020) .....	7
〈Table 3〉 CI of Married Women, by Industry .....	8
〈Table 4〉 Changes in Relative Labor Demand, From 2004 to 2020 .....	18
〈Table 5〉 Effects of Women's CI on Wages, by Industry / Occupation .....	25
〈Table 6〉 Effects of Women's CI on Wages, by Industry / Occupation (Period Effects) .....	25
〈Table 7〉 Effects of Women's CI on Wages, by Industry / Occupation (Men & Women) .....	26
〈Table 8〉 Effects of Women's CI on Wages, by Industry (Period Effects) .....	27
〈Table 9〉 Decomposition of the Gender Wage Gap .....	30
〈Table 10〉 Comparison of Changes in Real Share of V.A. and Changes in Employment .....	32

〈Table 11〉 Changes in Women's Employment and Women's CI, by Industry .....	34
〈Appendix 1〉 Descriptive Statistics, Analysis of Women's Share of Employment .....	38
〈Appendix 2〉 Estimation Results, Women's Share of Employment within each Industry .....	41

# Figures

[Figure 1]	Changes in Gender Wage Gap, by Industry .....	23
[Figure 2]	Changes in Employment and Changes in the Gender Wage Gap .....	35

# Changing Industrial Structure and Employment of Women<sup>1)</sup>

Jongsoog Kim

Sung-mi Jung

Woo-ri Noh

## I . Introduction

- The changes to Korea's industrial structure have given rise to continual shifts in the composition of workers across industries. Employment shifts that are observed across numerous industries may be regarded as attributable not only to cyclical factors, but also to rapid changes in the modes of production, consumption, service delivery, and trade. The rise of online shopping has reduced employment in wholesale and retail trade, while the ICT-enabled spread of contactless services is taking root in the finance industry as well as the overall service sector.
- Because the aforementioned sectors traditionally tended to employ more women, these industries may be the focus of negative employment outcomes for women. At the firm level, workforce utilization can be affected by industrial structure as well as the workforce utilization practices of each firm.

---

1) This study builds on the report by Kim, J., Jung, S.M., and Noh, W. (2021). Please refer to said report for further details and references.

- 
- In view of the ongoing digitization of all industries, as well as changes being observed across all sectors, policies for supporting women's employment must shift from a jobseeker-centric model to a service model based on the labor market and labor demand.
  - Founded upon the basis of active labor market policies that saw rapid expansion since 2000, conventional employment services were based on workforce demand at the firm level (such as identifying open positions within local communities). As such, they have not progressed much beyond conventional training / matching methods.
  - Greater variability within the labor market has given rise to new policy target groups with novel characteristics. Meanwhile, the expansion of government employment services – e.g., programs such as Employment Success Package, 'Saeil (Work Again)' Centers, and the National Employment Support System – has led to calls for employment support services that can enhance the performance of said programs.
  - Via conventional industrial / occupational gender segregation, industrial changes have affected each gender differently. Therefore, it would be timely to perform mid-to-long term analyses, as well as comparisons between time periods, regarding whether environmental shifts in the labor market were advantageous for women, and whether reductions in women's employment in manufacturing and more women's employment in the service sector expanded work opportunities and improved labor market conditions for women.



- The purpose of this study is to examine, over the mid-to-long term, changes in the worker composition by industry attributable to industrial changes and to ascertain how such changes affected women's labor markets.
  - We analyze changes in the labor market through mid-to-long term analysis of changes in the gender composition of workers by industry, looking at changes in occupations or forms of employment along with changes in industrial structure.
- The research method employed in this study is the analysis of statistical raw data.
  - Raw data sources used in this study include: each year's Economically Active Population Survey (EAPS), Census on Establishments both collected by National Statistics Office, Wage Structure Survey , and Survey Report on Labor Conditions by Employment Type both collected by Ministry of Employment and Labor. Some additional data from the Bank of Korea was also utilized.

## II . Description of the Data

- Looking at the evolution of changes in total and women's employment by industry, manufacturing had the highest number of employment. Although there was a downward trend in manufacturing employment, the trend was not consistent throughout the time periods. Meanwhile, wholesale and retail trade, another industry with a large employment share, saw continual reductions in employment throughout the periods analyzed.

- Industries that saw employment growth during the periods analyzed include human health and social work activities, business facilities management and business support services, professional, scientific and technical activities, and information and communication.
  - Such changes were influenced by changing modes of production in industries, changing modes of consumption in markets, in addition to policy effects.
- In addition to the changes in employment by industry, changes in women's employment were also observed. Women's share of employment has fallen in many industries that were traditionally female-dominated. Meanwhile, industries that were not traditionally female-dominated – such as health and social work, public administration & defense, professional, scientific and technical activities, and business facilities management and business support services – have seen a growing share of women's employment over the years. In these industries, growth in overall employment share was accompanied by growth in women's employment share.

〈Table 1〉 Industrial Distribution of Workers: Total and Women (2004~2020)

(Units: %, %p):

Industry	Total				Women			
	Employment Share			Change	Employment Share			Change
	2004	2020	Period Avg.		2004	2020	Period Avg.	
A	8.40	5.37	6.26	-3.03	9.51	4.94	6.52	-4.57
B	0.07	0.05	0.07	-0.02	0.01	0.02	0.02	0.01
C	18.48	16.26	17.11	-2.22	15.44	10.75	12.48	-4.69
D	0.32	0.27	0.31	-0.05	0.14	0.11	0.12	-0.03
E	0.22	0.57	0.35	0.35	0.06	0.20	0.13	0.14
F	8.07	7.49	7.46	-0.58	1.73	1.80	1.61	0.07
G	16.77	13.02	14.90	-3.75	19.10	13.92	16.26	-5.18
H	5.00	5.51	5.34	0.51	0.95	1.64	1.19	0.69
I	9.09	7.97	8.37	-1.12	15.13	11.48	13.04	-3.65
J	2.69	3.15	2.87	0.46	2.00	1.96	1.91	-0.04
K	3.27	2.89	3.26	-0.38	4.00	3.65	4.00	-0.35
L	1.99	1.92	1.98	-0.07	1.48	1.71	1.68	0.23
M	2.68	4.33	3.70	1.65	1.85	3.56	2.84	1.71
N	3.00	5.01	4.41	2.01	2.73	4.99	4.50	2.26
O	3.41	4.13	3.81	0.72	2.27	4.14	3.22	1.87
P	6.79	6.68	7.13	-0.11	10.67	10.39	11.35	-0.28
Q	2.61	8.68	5.50	6.07	4.45	16.59	10.42	12.14
R	1.53	1.84	1.65	0.31	1.44	2.07	1.65	0.63
S	4.96	4.42	4.96	-0.54	5.69	5.18	5.88	-0.51
T	0.55	0.37	0.49	-0.18	1.28	0.82	1.14	-0.46
U	0.11	0.06	0.06	-0.05	0.07	0.05	0.04	-0.02

Note: A: Agriculture, forestry, and fishing, B: Mining and quarrying, C: Manufacturing, D: Electricity, gas, steam, and air conditioning supply, E: Water supply, sewage, waste management, materials recovery, F: Construction, G: Wholesale and retail trade, H: Transportation and storage, I: Accommodation and food services, J: Information and communication, K: Financial and insurance activities, L: Real estate activities, M: Professional, scientific and technical activities, N: Business facilities management and business support services; rental and leasing activities, O: Public administration and defense; compulsory social security, P: Education, Q: Human health and social work activities, R: Arts, sports, and recreation related services, S: Membership organizations, repair, and other personal services, T: Activities of households as employers, undifferentiated goods and services-producing activities of households for own use, U: Activities of extraterritorial organizations and bodies

Source: Statistics Korea, Economically Active Population Survey 2004, 2020

- We focused on the concentration index (CI), which gauges how concentrated women are in some given industry.
  - In contrast to the employment share by industry, which shows the industrial distribution of overall workers or workers belong to some group, the women's CI for some industry is calculated by dividing the share of women workers within that industry (out of all women workers) by the share of all workers within that industry (out of all workers). A CI greater than 1 indicates that an industry employs women to a greater degree, relative to workers in general. The CI is examined along with the employment share by industry because doing so provides further insight into changes in worker composition for each group (Lee, C.H. et al., 2020; 12).
  - Women's CI increased in the following industries: arts, sports, and recreation, manufacturing, real estate, professional, scientific and technical activities, and public administration and defense. These are industries where growth of women's employment has been prominent.
  - Meanwhile, the manufacturing sector has seen an increase in women's CI even amid a fall in overall employment. This may be explained via the size of the fall in the denominator (share of all workers within manufacturing, out of all workers), or women's hires in manufacturing being driven by a specific occupation.

〈Table 2〉 Women's Concentration Index, by Industry (2004~2020)

(Units: %, %p)

Industry	2004	2020	Period Avg. (2004~2020)	Change
A	1.13	0.92	1.03	-0.21
B	1.15	0.39	0.26	-0.76
C	0.01	0.66	0.73	0.65
D	0.44	0.41	0.39	-0.03
E	0.27	0.36	0.37	0.09
F	0.21	0.24	0.22	0.03
G	1.14	1.07	1.09	-0.07
H	0.19	0.30	0.22	0.11
I	1.66	1.44	1.56	-0.22
J	0.74	0.62	0.67	-0.12
K	1.22	1.26	1.23	0.04
L	0.75	0.89	0.85	0.14
M	0.69	0.82	0.76	0.13
N	0.91	1.00	1.02	0.09
O	0.67	1.00	0.84	0.33
P	1.57	1.56	1.59	-0.01
Q	1.71	1.91	1.87	0.2
R	0.94	1.12	1.00	0.18
S	1.15	1.17	1.19	0.02
T	2.35	2.26	2.32	-0.09
U	0.65	0.75	0.61	0.1

Note: A: Agriculture, forestry, and fishing, B: Mining and quarrying, C: Manufacturing, D: Electricity, gas, steam, and air conditioning supply, E: Water supply, sewage, waste management, materials recovery, F: Construction, G: Wholesale and retail trade, H: Transportation and storage, I: Accommodation and food services, J: Information and communication, K: Financial and insurance activities, L: Real estate activities, M: Professional, scientific and technical activities, N: Business facilities management and business support services; rental and leasing activities, O: Public administration and defense; compulsory social security, P: Education, Q: Human health and social work activities, R: Arts, sports, and recreation related services, S: Membership organizations, repair, and other personal services, T: Activities of households as employers, undifferentiated goods and services-producing activities of households for own use, U: Activities of extraterritorial organizations and bodies

Source: Statistics Korea, Economically Active Population Survey 2004, 2020

○ Looking at marital status, we can see that employment growth was driven mainly by married women and unmarried men.

- Industries that previously had larger shares of women's employment saw falls in the CI of married women. In contrast, married women's CI rose in the following industries: water supply, sewage, waste management, construction, transportation and storage, finance and insurance, real estate, professional, scientific and technical activities, business facilities management and business support services, public administration and defense, education, human health and social work, and arts, sports, and recreation. Of these, public administration and defense and human health and social work saw the steepest rise in the CI of married women.

〈Table 3〉 CI of Married Women, by Industry

Industry	2004	2020
A	1.49	1.21
B	0.18	0.06
C	0.89	0.72
D	0.47	0.45
E	0.27	0.47
F	0.18	0.26
G	1.15	1.05
H	0.16	0.26
I	1.90	1.40
J	0.40	0.36
K	1.10	1.26
L	0.80	0.99
M	0.38	0.51
N	0.96	1.09
O	0.64	1.06
P	1.14	1.41
Q	1.12	1.95

Industry	2004	2020
R	0.77	0.96
S	1.20	1.21
T	3.05	2.93
U	0.57	0.56

Note: A: Agriculture, forestry, and fishing, B: Mining and quarrying, C: Manufacturing, D: Electricity, gas, steam, and air conditioning supply, E: Water supply, sewage, waste management, materials recovery, F: Construction, G: Wholesale and retail trade, H: Transportation and storage, I: Accommodation and food services, J: Information and communication, K: Financial and insurance activities, L: Real estate activities, M: Professional, scientific and technical activities, N: Business facilities management and business support services; rental and leasing activities, O: Public administration and defense; compulsory social security, P: Education, Q: Human health and social work activities, R: Arts, sports, and recreation related services, S: Membership organizations, repair, and other personal services, T: Activities of households as employers, undifferentiated goods and services-producing activities of households for own use, U: Activities of extraterritorial organizations and bodies

Source: Statistics Korea, Economically Active Population Survey 2004, 2020

- Looking at the industrial distribution of workers by level of education, we found that there were no industries that had new influxes of low-educated workers (aside from human health and social work). Overall, the share of high-educated workers rose across most industries for both genders.
- The steep rise of the share of high-educated workers in manufacturing is noteworthy. This stems from fewer assembly workers and more professionals and clerks.
- Professional, scientific and technical activities is an industry that traditionally had a high concentration of high-educated men. The fall in the CI of high-educated men in this industry is attributable to an inflow of high-educated women. Finance and insurance services, which employed many high-educated women, retained a high CI of high-educated women. The CI fell across all other

industries. Although the share of employment among high-educated women rose in education, their CI fell. This indicates that high-educated women are entering more diverse industries.

- Looking at industries that traditionally employed many low-educated women, in terms of concentration the influx and utilization of low-education women does not appear to have changed much in the case of wholesale and retail trade. In contrast, the CI of low-educated women fell in accommodation and food services. This is due to the rise in the influx of younger workers, with young men and women of various education levels entering said industry. The CI of low-educated women rose in human health and social work.
- Looking at the industrial distribution of workers by age group, industries that mainly employed middle-aged men – such as agriculture, forestry, and fishing, mining, construction, and transportation and storage – saw rising CI among prime-aged men. These industries are seeing a fall in the influx of new workers, as they become more driven by aged workers.
- No shifts by age group were observed in manufacturing, with an even distribution of youth, prime-aged, and middle-aged workers being retained.
- While the share of young workers of both genders fell in wholesale and retail trade, accommodation and food services saw a rise in both the employment share and CI of young workers. Although both industries traditionally employed more women, the former has exhibited aging while the latter has not.
- In 2004, young women workers had an employment share of



roughly 50% in human health and social work. However, by 2020 the majority of the workers in this industry became prime / middle-aged women.

- Industries such as information and communication and professional, scientific and technical activities have high employment shares of young workers, with a rising share of middle-aged workers as well. The CI of young workers remained high in information and communication. The CI of young women rose in professional, scientific and technical activities while that of young men fell.
  - Finance and insurance and education also so a falling share of young workers and a rising share of prime / middle-aged workers. Education, where both young and middle-aged women previously dominated, is now dominated solely by the latter. These shifts may reflect changing preferences for industries among young workers, or may indicate industries that are less friendly toward employing young workers.
- Looking at changes by employment type, recent years have seen a relative rise in the CI of women among wage earners rather than non-wage workers.
- In wholesale and retail trade, which was traditionally reliant on non-wage workers, the CI of women fell among wage earners while rising among non-wage workers. In accommodation and food services as well, the CI fell among wage earners while staying level among non-wage workers. Thus, these two industries remain key destinations for women seeking employment as non-wage workers.

- Looking at changes by occupation, the employment share of managers has fallen overall. Some industries exhibit a slight upward trend of women managers and a falling share of male managers. The overall occupational structure is shifting from one based on managers and elementary workers to one based on professionals.
  - Manufacturing, construction, and accommodation and food services saw a growing share of professionals, while the share of professionals (both genders) fell in transportation and storage, business facilities management, and human health and social work.
  - With the exception of human health and social work, the share of clerks has grown. Even in industries that saw reductions in workers, such as manufacturing and construction, the number of clerks increased while that of operators decreased.
- We also looked at changes in the number of workplaces by workplace size and age, thus examining shifts in employment and the share of women workers. In traditionally women-dominated industries, there was a gradual fall or stall in the share of women, regardless of workplace size or age.
  - On the other hand, human health and social work saw a continual increase in both the share and level of women's employment.
- Recently, industries such as information and communication and professional, scientific and technical activities have shown robust entrepreneurship and a rise in the number of workplaces, making them conducive to both overall employment and the share of women's employment. In step with the 'digital transformation', these industries are changing the face of workplaces as well as the labor

market.

- In particular, there has been a rise in the number of younger (i.e. newer) workplaces where both overall employment and the share of women have risen. This is a positive trend for women's employment.
- In several industries, shifts in the number of workplaces and employment were driven by government policy. We found that the share of women has steadily risen among such industries.
- Traditionally male-dominated industries such as construction and transportation and storage have seen steady increases in the number of workplaces. While the degree of employment changes varies depending on workplace age, the share of women's employment is steadily rising in such industries.
- Traditionally female-dominated industries such as accommodation and food services and education exhibit little changes in the number of workplaces depending on workplace age. Likewise, the utilization of women has overall fallen or remained stagnant, regardless of workplace age.
- In industries that have seen growth in the share of women workers, such growth was not closely dependent on workplace age.
- Looking at workplace size, industries such as electricity, gas, steam, and air conditioning supply, information and communication, real estate, professional, scientific and technical activities, business facilities management, and arts, sports, and recreation services have seen a recent increase in the number of workplaces of 4 or less workers.

- Generally, the share of women's employment tends to rise among smaller workplaces. While this did not hold across every industry, at the least, the growth in the number of new workplaces had no negative effect on women's employment.

### III. Changes in the Women's Labor Market, and Factors Affecting Them

#### 1. The Various Factors Driving the Share of Women's Employment by Industry

- For each industry, the major factors that can influence the share of women's employment include demographic factors, workplace characteristics, time factors, and occupational factors. The analysis in this section draws on EAPS data.
- For the analysis of the probability of women's employment, the dependent variable is binary, taking the values of either 'employed' (=1) or 'non-employed' (=0). For the analysis of the probability of women's employment as a temporary or daily worker, the dependent variable takes the value 1 if the worker is a temporary or daily female worker, and 0 otherwise.
- The independent variables included in the model are as follows. Final education (edu1) was graded into 6 levels – elementary school diploma, middle school diploma, high school diploma, associate degree, bachelor's degree, and master's or doctoral degree. Marital status (married), including both present and non-present spouses, age (age), and age squared (age2) were also

included. Based on the time periods where major employment fluctuations were observed, time dummies were assigned for years up to 2008 (period1), 2009 to 2016 (period2), and 2017 and later (period3). We also included average weekly work hours (hour), the 9 standard occupations (job1~job9), workplace size defined depending on the number of workers, with ‘4 or less’ (size1), ‘5~9’ (size2), ‘10~29’ (size3), ‘30~99’ (size4), ‘100~299’ (size5), and ‘300 or more’ (size6).

- As the dependent variable is binary, a logit model was used. The model is as follows.

$$y_i = \beta_1 + \beta X_i + e_i$$

The dependent variable  $y_i$  takes values of 1 or 0, with the probabilities specified below.

$$\Pr(Y_i = y_i) = \begin{cases} p_i & \text{if } y_i = 1 \\ 1 - p_i & \text{if } y_i = 0 \end{cases}$$

- Estimation results <Appendix 2> indicate that level of education raises the likelihood of employment across all industries, with this effect being most marked in education, professional, scientific and technical activities, and information and communication.
- The share of married women was higher among accommodation and food services and arts, sports, and recreation activities.
- The share of women’s employment higher for older women in accommodation and food services and higher for younger women in information and communication and professional, scientific and

technical activities.

- Looking at the effect of workplace size, within the same industry larger workplaces were associated with lower shares of women's employment. However, this effect was not monotone across all industries. In the case of wholesale and retail trade, finance and insurance, business facilities management, and arts, sports, and recreation services, larger workplaces (but with less than 300 workers) were associated with higher likelihoods of female employment.
- Looking at the time effects, the relative share of women's employment was higher in accommodation and food services before 2008 compared to the 2009~2016 period. Industries that saw the share of women rise included professional, scientific and technical activities, finance and insurance, and public administration and defense. This indicates that industrial gender segregation is weakening.
- Using managers as the baseline to look at the effects of occupation, industries with a higher share of women professionals and related workers included accommodation and food services and manufacturing, while industries with a higher share of women clerks included business facilities management and manufacturing.

## 2. Changes in the Relative Demand for Women Workers

- Drawing on Katz & Murphy (1992)'s method of gauging relative demand for workers by education level, we looked at how relative demand can change within a given industry. Using EAPS data, we compare the states at the beginning and end points of some time

period.

- As the unit of analysis here is some given industry, we look at changes in relative demand within that industry to then derive changes in total demand.

$$\frac{\Delta D_j^w}{E^w} = \sum_j \left( \frac{E_j^w}{E^w} \right) \left( \frac{\Delta E_j}{E_j} \right) = \frac{\sum_j \alpha_j^w \Delta E_j}{E^w}$$

- The above equation was used to estimate changes in relative demand for women workers in each industry. The w denotes women, j denotes the industry, D denotes demand, and E denotes total employment. For a given year, change in demand for women's labor in some industry, as a share of total women's employment, is calculated as the sum of each industry's female employment as a share of total female employment, adjusted by each industry's relative change in employment. This indicates that changes at the industrial level may be expressed as the sum of each industry's share of women's employment. Here,  $\alpha_j^w$  denotes the share of women's employment out of total employment in industry j.
- We partitioned the total time period analyzed into four intervals: 2004 to 2008, 2009 to 2012, 2013 to 2016, and 2017 to 2020. Thus, we considered the Global Financial Crisis as a break point, while looking at the subsequent years in three even four-year intervals. The following result is based on comparisons between the first and last years of each interval, using raw EAPS data from each year.

〈Table 4〉 Changes in Relative Labor Demand, From 2004 to 2020

Industry	2004-2020		
	Total	Men	Women
A	-0.0303	-0.0321	-0.0278
B	-0.0002	-0.0003	-0.0001
C	-0.0222	-0.0278	-0.0146
D	-0.0005	-0.0007	-0.0002
E	0.0035	0.0052	0.0013
F	-0.0057	-0.0090	-0.0014
G	-0.0375	-0.0356	-0.0401
H	0.0051	0.0077	0.0015
I	-0.0112	-0.0075	-0.0161
J	0.0046	0.0059	0.0029
K	-0.0037	-0.0030	-0.0047
L	-0.0007	-0.0007	-0.0006
M	0.0164	0.0186	0.0135
N	0.0200	0.0201	0.0200
O	0.0072	0.0072	0.0072
P	-0.0011	-0.0007	-0.0018
Q	0.0608	0.0193	0.1161
R	0.0032	0.0029	0.0036
S	-0.0054	-0.0047	-0.0064
T	-0.0018	-0.0001	-0.0041
U	-0.0004	-0.0005	-0.0003

Note: A: Agriculture, forestry, and fishing, B: Mining and quarrying, C: Manufacturing, D: Electricity, gas, steam, and air conditioning supply, E: Water supply, sewage, waste management, materials recovery, F: Construction, G: Wholesale and retail trade, H: Transportation and storage, I: Accommodation and food services, J: Information and communication, K: Financial and insurance activities, L: Real estate activities, M: Professional, scientific and technical activities, N: Business facilities management and business support services; rental and leasing activities, O: Public administration and defense; compulsory social security, P: Education, Q: Human health and social work activities, R: Arts, sports, and recreation related services, S: Membership organizations, repair, and other personal services, T: Activities of households as employers, undifferentiated goods and services-producing activities of households for own use, U: Activities of extraterritorial organizations and bodies

Source: Statistics Korea, Economically Active Population Survey 2004, 2020



- Looking at changes in relative demand for workers by industry over the full period observed (2004 to 2020), industries that exhibited positive relative demand included water supply, sewage, waste management, materials recovery, transportation and storage, information and communication, professional, scientific, and technical activities, business facilities management, public administration and defense, human health and social work, and arts, sports, and recreation. The industry with the highest relative demand was human health and social work, followed by professional, scientific, and technical activities.
- The largest fall in relative demand was observed in wholesale and retail trade. Due to changes in sales practices (e.g., online shopping), relative demand for workers fell sharply in this industry. Another industry with a notable fall in relative demand was manufacturing.
- Even within industries where relative demand rose, gender differences were apparent. Relative demand for men as opposed to women was higher in industries such as water supply, sewage, waste management, materials recovery, transportation and storage, information and communication, and professional, scientific, and technical activities.
- Industries where the relative demands for men and women were roughly even included business facilities management and public administration and defense. Meanwhile, relative demand for women was higher in human health and social work and arts, sports, and recreation services, the former being particularly pronounced.

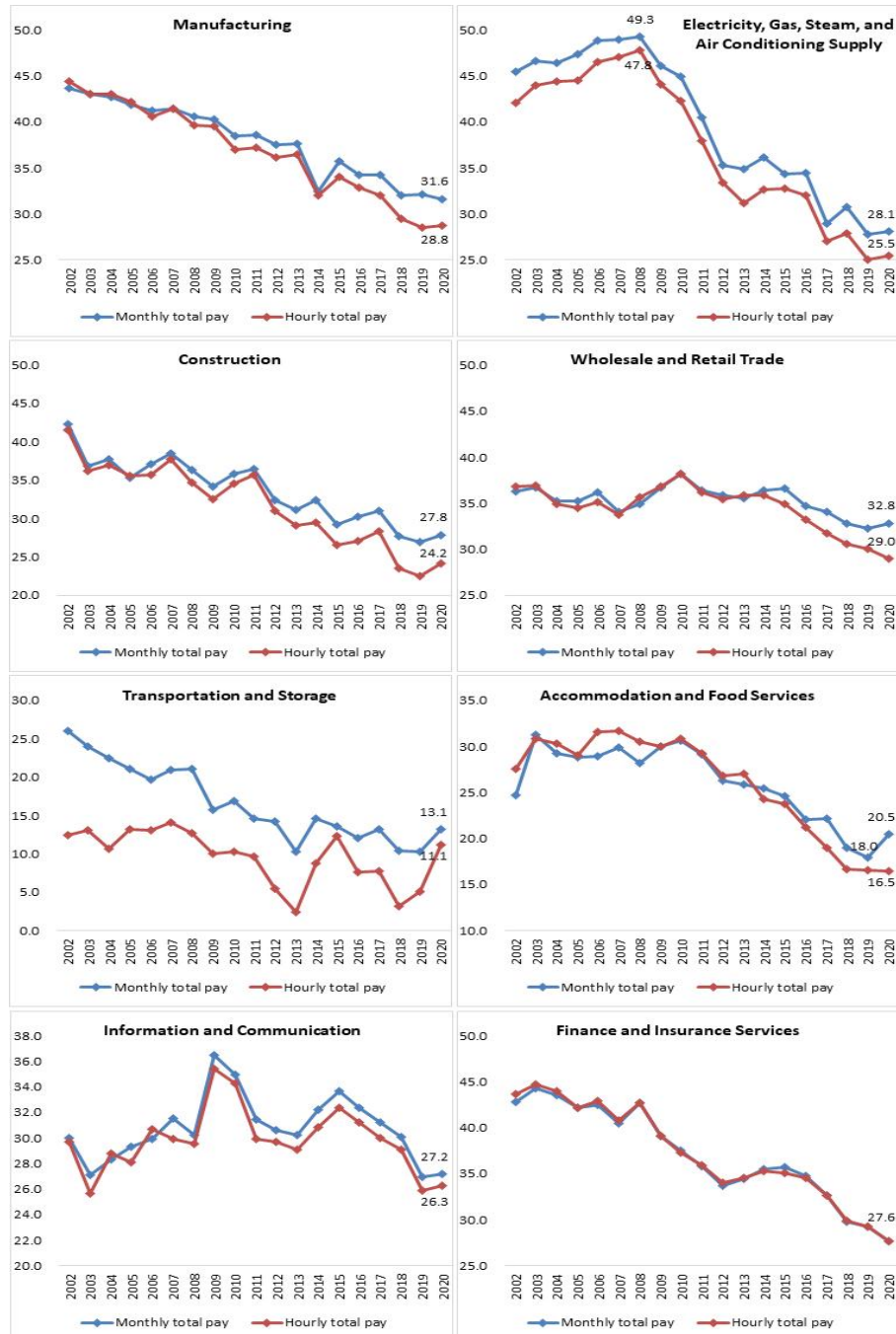
- Changes in relative labor demand show us the direction in which industrial structures are shifting. Even within such overall shifts, there exist gender differences. While the overall direction of changes in relative demand are the same for both genders, gender gaps remain relatively large in the absolute scale of change.
  - Across each industry, changes in relative demand by age group and level of education were also observed.
  - Over the more recent years, shifts in relative demand by age group and level of education have exhibited smaller differences between genders. However, pre-existing gender segregation in the labor market continues to affect relative demand in certain industries. Thus, further research by industry will be needed regarding this topic.

### 3. Qualitative Changes in Women's Labor Markets by Industry: Gender Wage Gaps

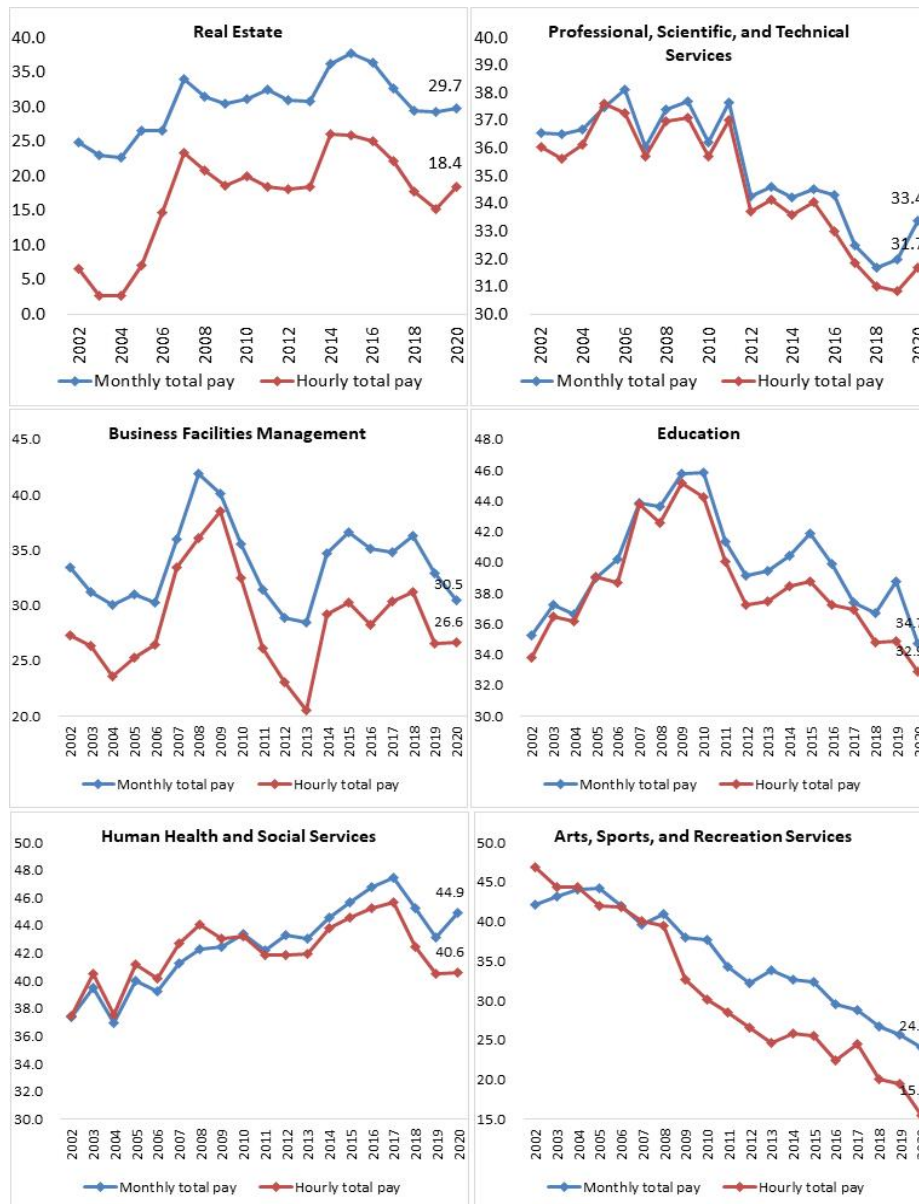
- By looking at wages and the gender gap therein, we examined the qualitative changes observed in the women's labor market of each industry. The long-term trend shows that the gender wage gap has been closing across all industries, with the process accelerating particularly since 2017.
  - In terms of average monthly pay, industries that still had above-average gender wage gaps in 2020 included education and human health and social work. In terms of hourly wage, industries that had above-average gender wage gaps included professional, scientific, and technical activities, education, and human health and social work.

- Looking at trends over time, industries where the wage gap widened are real estate and human health and social work. Industries where the wage gap decreased include manufacturing, electricity, gas, steam, and air conditioning supply, construction, wholesale and retail trade, transportation and storage, accommodation and food services, finance and insurance services, and arts, sports, and recreation services.

(Unit : %)



(Unit : %)



Source: Ministry of Employment and Labor, Wage Structure Survey, Survey Report on Labor Conditions by Employment Type (raw data, by year). Calculations by author.

[Figure 1] Changes in Gender Wage Gap, by Industry

- A wage regression was estimated. Here, we focused on how the aforementioned concentration index (CI) affected wages.
- Using a Mincer type wage equation, we looked at how women's CI affected wages within certain industry / occupation-level cells. At the industry / occupation level, women's CI is calculated as follows.

$$conct_t = \frac{\frac{f(ind_t \times occ_t)}{f(emp_t)}}{\frac{ind_t \times occ_t}{emp_t}}$$

- The wage equation is specified as follows.

$$\ln w_{it} = \beta_0 + \beta_1 conct_{it} + \alpha X_{it} + u_{it}$$

- Estimation results indicated that higher women's CI at the industry / occupation level negatively affected wages. Thus, having higher concentrations of women workers within a certain industry / occupation tended to lead to lower wages.
- Looking at gender effects over different time periods, higher women's CI had a negative effect on wages during 2002 to 2008. The absolute value of the coefficient decreased for a while, before increasing again thereafter.

〈Table 5〉 Effects of Women's CI on Wages, by Industry / Occupation

		Regression Coeff.	Robust S.E	P-val
Women's CI by Ind / Occ		-0.047	(0.002)	0.000
Age	Age	0.039	(0.000)	0.00
	Age Sq.	0.000	(0.000)	0.000
Education	High school	0.121	(0.001)	0.000
	Associate	0.222	(0.001)	0.000
	Bachelor's	0.388	(0.001)	0.000
	Graduate	0.610	(0.001)	0.000
Tenure	Tenure	0.004	(0.000)	0.000
	Tenure Sq.	0.000	(0.000)	0.000
Workplace Size	10-29	0.082	(0.001)	0.000
	30-99	0.127	(0.001)	0.000
	100-299	0.188	(0.001)	0.000
	300-499	0.262	(0.001)	0.000
	500 or above	0.417	(0.001)	0.000
Constant term		1.402	0.015	0.000
Ind / Occ		Controlled		
Year		Controlled		
$R^2$		0.5930		
No. of Obs.		12,055,979		

Note: Industry x Occupation and year (2002~2020) were controlled for, but omitted from this table.

Source: Wage Structure Survey, Survey Report on Labor Conditions by Employment Type

〈Table 6〉 Effects of Women's CI on Wages, by Industry / Occupation (Period Effects)

	Regression Coeff.	Robust S.E	P-val
2002~2008	-0.085	0.004	0.000
2009~2016	-0.017	0.004	0.000
2017~2020	-0.150	0.007	0.000

Note: Control variables were identical to those in <Table 5>, but were omitted from report.

Source: Wage Structure Survey, Survey Report on Labor Conditions by Employment Type

- Repeating this analysis separately for women and men to examine how each group was affected differently, we found that while higher CI (for some industry / occupation) had a negative effect on wages in the case of women, this effect was not present in the case of men. The fact that only women are affected negatively wage-wise from women's CI alludes to the effects of gender segregating in labor markets.

〈Table 7〉 Effects of Women's CI on Wages, by Industry / Occupation (Men & Women)

		Men			Women		
		Regression Coeff.	Robust S.E	P-val	Regression Coeff.	Robust S.E	P-val
Women's CI by Ind / Occ		0.020	0.002	0.000	-0.024	0.003	0.000
Age	Age	0.056	0.000	0.000	0.014	0.000	0.000
	Age Sq.	-0.001	0.000	0.000	0.000	0.000	0.000
Education	High school	0.096	0.001	0.000	0.092	0.001	0.000
	Associate	0.174	0.001	0.000	0.172	0.002	0.000
	Bachelor's	0.322	0.001	0.000	0.311	0.002	0.000
	Graduate	0.510	0.002	0.000	0.588	0.002	0.000
Tenure	Tenure	0.003	0.000	0.000	0.004	0.000	0.000
	Tenure Sq.	0.000	0.000	0.000	0.000	0.000	0.000
Workplace Size	10-29	0.088	0.001	0.000	0.064	0.001	0.000
	30-99	0.134	0.001	0.000	0.118	0.001	0.000
	100-299	0.206	0.001	0.000	0.166	0.001	0.000
	300-499	0.281	0.001	0.000	0.234	0.001	0.000
	500 or above	0.424	0.001	0.000	0.393	0.001	0.000
Constant term		1.092	0.016	0.000	1.963	0.074	0.000
Ind / Occ		Controlled					
Year Dummy		Controlled					
$R^2$		0.604			0.568		
No. of Obs.		7,980,425			4,075,554		

Note: Ind x Occ and years (2002~2020) were controlled for, but omitted from report.

Source: Wage Structure Survey, Survey Report on Labor Conditions by Employment Type



- Repeating the same analysis over different time periods yields interesting results. During the 2002~2008 period, higher women's CI had a negative effect on women's wages, this effect was not present in the male labor market. However, during the 2009~2016 period following the Global Financial Crisis, neither men nor women were found to be negatively affected by higher women's CI. During this period, even a rapid rise in the concentration of women within some industry / occupation was not associated with a fall in wages. However, since 2017, both women and men were found to be negatively affected by higher women's CI.

〈Table 8〉 Effects of Women's CI on Wages, by Industry (Period Effects)

	Men			Women		
	Regression Coeff.	Robust S.E	P-val	Regression Coeff.	Robust S.E	P-val
2002~2008	0.000	0.005	0.996	-0.079	0.006	0.000
2009~2016	0.027	0.005	0.000	0.062	0.006	0.000
2017~2020	-0.080	0.010	0.000	-0.088	0.009	0.000

Note: Control variables were identical to those in <Table 7>, but were omitted from report.

Source: Calculations by author, based on Wage Structure Survey, Survey Report on Labor Conditions by Employment Type

- Using the method presented by Juhn, Murphy and Pierce, we performed a decomposition of the gender wage gap to analyze the bridging of the gap observed during the 2002~2020 period. By breaking down this differential into factors such as time effects, changes in compositional effects due to explanatory variables, and changes in price structures, we aim to see which factor was the dominant driver of the changes observed.

- We summarize the analysis method employed. We define the wage

equation for men and women as follows.

$$Y_{it} = X_{it}B_t + \sigma_t\theta_{it}$$

- Here,  $i$  takes the values 1=female, 0=male, and  $t$  denotes the period analyzed.  $Y_{it}$  denotes log real hourly wage,  $X_{it}$  denotes the vector of explanatory variables which include age, age squared, dummy variables for level of education (middle school diploma or lower, high school diploma, associate diploma, bachelor's diploma, master's diploma or above), years of tenure, years of tenure squared, dummy variables for workplace size (5~9 persons, 10~29 persons, 30~99 persons, 100~299 persons, 300~499 persons, 500 persons or more), dummy variables for industry / occupation pairs, and dummy variables for the year. Weights were applied during analysis. For each period, the log gender wage is defined as follows.

$$\begin{aligned} D_t = Y_{mt} - Y_{ft} &= (X_{mt} - X_{ft})\beta_{mt} + \sigma_{mt}(\theta_{mt} - \theta_{ft}) \\ &= \Delta X_t B_t + \sigma_t \Delta \theta_t \end{aligned}$$

- $m$  and  $f$  each denote male and female. Thus, the above expression defines how the equations for each gender differ for a given time period. It tells us that at some time  $t$ , the log gender wage gap is made up of the differential effect of explanatory variables and residual differentials. The differential effect of explanatory variables is equal to gender differences in observable explanatory variables ( $\Delta X_t$ ), which is then multiplied by the market valuation of said differences ( $\beta_{mt}$ ). The residual differential may be regarded as the unobserved component that remains after gender differences

in the explanatory variables have been controlled for. The above equation decomposes the wage gap for a single time period. As our goal is to decompose the the wage gaps during 2002, 2008, 2016, and 2020 and to decompose the changes of the wage gap over time, we further rearrange the above equation as follows to decompose the changes in the wage gap between two different time periods.

$$D_j - D_k = (\Delta X_j - \Delta X_k)B_k + \Delta X_j(B_j - B_k) + (\Delta \theta_j - \Delta \theta_k)\sigma_k + \Delta \theta_j(\sigma_j - \sigma_k)$$

- Estimation results indicate that factors conducive to higher wages for women – such as more women entering high-wage industries and occupations – accounted for 65% of the total gender wage gap. We also found that there was a wage price structure in place that paid men higher wages than women, when holding years of tenure and industry constant.
- Looking at the decomposition of the wage gap across different periods, we found the compositional effect of the observed explanatory variables to be weakening over the 2002~2008, 2009~2016, and 2017~2020 periods. In fact, the effect was reversed during 2017~2020, thus acting to widen the gender wage gap.
- Meanwhile, the effects of unobserved residual effects have progressively strengthened. Looking at the long-term time series, this indicates that the factors that had traditionally determined wages are exerting less and less influence on the gender wage gap. To explain this phenomenon – the retention or expansion of the

influence of unobserved factors amid a bridging of the absolute size of the wage gap – there will need to be further industry-specific studies looking at more detailed occupational classifications (as mentioned in the key descriptive features of the data) and the growing diversification of forms of employment with regards to wages.

〈Table 9〉 Decomposition of the Gender Wage Gap

		2002	2008	2016	2020
Gender Wage Gap		0.415	0.384	0.356	0.306

	Wage Gap diff.	Comp. diff. of explanatory vars.	Price diff. of explanatory var.	Comp. diff. of unobserved factors	Price diff. of unobserved factors	Total Comp. Effect	Total Price Effect
2002 ~2020	-0.110	-0.071 (65.0)	0.021 -(19.3)	-0.084 (76.9)	0.025 -(22.6)	-0.156 (141.9)	0.046 -(41.9)
2002 ~2008	-0.031	-0.047 (151.6)	0.009 -(29.9)	-0.006 (18.2)	0.012 -(39.9)	-0.053 (169.8)	0.022 -(69.8)
2009 ~2016	-0.034	-0.007 (20.0)	0.021 -(61.4)	-0.068 (197.9)	0.019 -(56.4)	-0.075 (217.9)	0.041 -(117.9)
2017 ~2020	-0.044	0.001 -(3.3)	0.001 -(3.2)	-0.070 (160.7)	0.024 -(54.2)	-0.069 (157.4)	0.025 -(57.4)

Note: The figures in ( ) report the share contributed to the gender wage gap. The effects of age, education level, years of tenure, industry / occupation pairs, and year were omitted from this table.

Source: Wage Structure Survey, Survey Report on Labor Conditions by Employment Type

## IV. Conclusion and Implications

- As analyzed above, industries that have seen falling real shares of value added include manufacturing, wholesale and retail trade, accommodation and food services, real estate, and education. Those that have seen rising real shares of value added include finance and insurance, information and communication, professional, scientific, and technical activities, business facilities management, and human health and social services.
- As per the findings of Chapter4, industries that have seen a fall in total employment are manufacturing and wholesale and retail trade, while key industries where total employment grew include human health and social services, business facilities management, professional, scientific, and technical activities, and information and communication. With the exception of finance and real estate, falling real share of value added was associated with falling employment, and vice versa.
  - Women's employment was also matched the direction of change in real share of value added, with the exception of real estate activities, information and communication.
  - In information and communication and finance and insurance, the real share of value added increased while women's employment decreased. This may be due to the fact that in information and communication, elementary tasks tended to be handled by women. In the case of finance and insurance, the emergence of new business practices – e.g., the spread of contactless services – geared toward staffing fewer personnel may be the cause. In the

real estate industry, the real share of value added fell while women's employment rose.

- Employment fluctuations tended to be more pronounced among women. The fall in women's employment was relatively greater in manufacturing, wholesale and retail trade, accommodation and food services, and education. On the other hand, the growth in women's employment was relatively greater in professional, scientific, and technical activities and business facilities management. Thus, relative to the overall figures, the variability of employment was greater during the periods analyzed.

〈Table 10〉 Comparison of Changes in Real Share of V.A. and Changes in Employment

(unit: %p)

Industry	Real Share of V.A.	Total Employment Change	Women's Employment Change
Manufacturing	-	-2.22	-4.69
Wholesale and retail trade	-	-3.75	-5.18
Accommodation and Food services	-	-1.12	-3.65
<b>Information &amp; communication</b>	<b>+</b>	<b>0.46</b>	<b>-0.04</b>
Finance and insurance	-	-0.38	-0.35
<b>Real Estate</b>	<b>-</b>	<b>-0.07</b>	<b>0.23</b>
Professional, scientific, and technical serv.	+	1.65	1.71
Business facilities management	+	2.01	2.26
Education	-	-0.11	-0.28
Human health and social services	+	6.07	12.14

- In addition to changes in employment by industry, looking at changes in the CI provides additional information regarding the concentration of employment within some industry (relative to all industries).
- Manufacturing saw a fall in both the share of value added and women's employment, which was however accompanied by an increase in women's CI. This indicates that, during the periods analyzed, there was a disproportionate shift in women's employment from other industries to manufacturing. The fall in women's employment and rise in women's CI was also observed in finance and insurance services.
- Wholesale and retail trade and accommodation and food services are two industries that are regarded as being similar in that they tend to employ more women. However, they differed in terms of employment growth and change in CI. While the former saw a greater fall in employment, the fall in CI was not as pronounced. Thus, relatively speaking, the concentration of women in accommodation and food services has particularly weakened further. Compared to other industries, the rise in women's CI was pronounced in real estate services and professional, scientific, and technical services.

〈Table 11〉 Changes in Women's Employment and Women's CI, by Industry

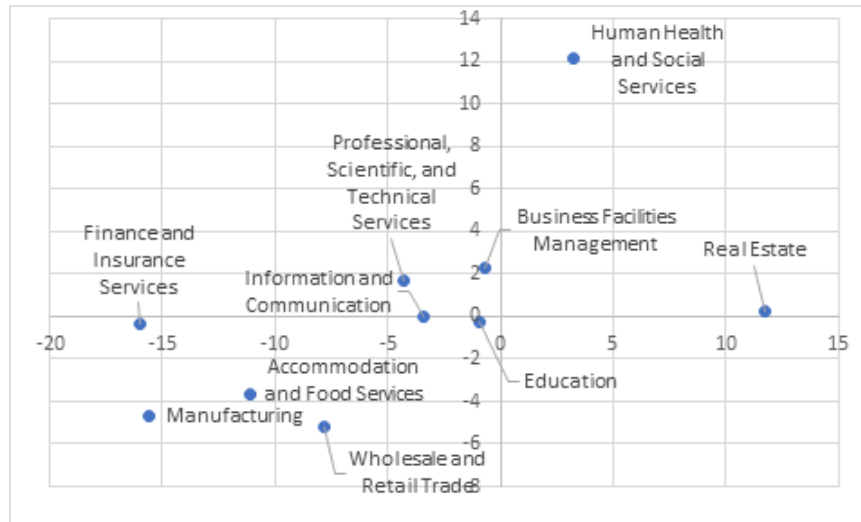
(unit: %p)

Industry	Real Share of V.A.	Women's employment change	Women's CI change
Manufacturing	-	-4.69	0.65
Wholesale and retail trade	-	-5.18	-0.07
Accommodation and Food services	-	-3.65	-0.22
Information & communication	+	-0.04	-0.12
Finance and insurance	-	-0.35	0.04
Real Estate	-	0.23	0.14
Professional, scientific, and technical serv.	+	1.71	0.13
Business facilities management	+	2.26	0.09
Education	-	-0.28	-0.01
Human health and social services	+	12.14	0.2

- The horizontal axis of [Figure 2] denotes the gender wage gap and the vertical axis denotes change in employment. In human health and social services, women's employment grew while the gender wage gap widened.
- In finance and insurance and information and communication, the gap has been bridged with little change in employment. Meanwhile, the gap was bridged, along with a fall in women's employment, in industries such as manufacturing, wholesale and retail trade, and accommodation and food services.
  - Industries that saw relative employment growth while the wage gap closed include business facilities management and professional, scientific, and technical services.



(unit : %p)



[Figure 2] Changes in Employment and Changes in the Gender Wage Gap

- These results illustrate both the qualitative and quantitative aspects of the mid-to-long term evolution of women's employment. The fact that the wage gap has widened in human health and social services, which has seen rapid growth in women's employment, indicates that women are joining said industry into low-wage positions and occupations.
- Over the mid-to-long term, there has been a shift of low-wage positions from wholesale and retail trade / accommodation and food services in the past to human health and social services. As a result, the latter sector has exhibited growth in scale without an improvement in the quality of women's jobs.
- The findings of this study may be utilized to inform policies regarding training and employment services. Amid the rapid ongoing changes in the labor market and the evolution of the workforce, it

will be important for employment service policies to take an industry-by-industry approach.

- In employment service policies, it is crucial to link training program to accommodate each industry's needs as identified by the Industrial Skills Council (ISC). The findings of this study can serve as the basis for multifaceted improvements to employment service policies, in that they point out the direction of industrial change and provide insight into occupations and job quality for each gender.
  - Industries that provide particularly favorable conditions for female labor – e.g., professional, scientific, and technical services or information and communication – currently suffer from a lack of skilled workers. In view of this, training programs and employment services for women must not be centered around providing just low or mid-skill training.
  - The finance and insurance industry has seen a reduction in workers. As this industry is both highly preferred among women and is a key employer of women, providing re-employment support for women leaving said industry must be considered.
- Aside from changes in employment levels, an industry-by-industry approach will be crucial for improving job quality. While the relative quality of women's jobs, as represented by the gender wage gap, has seen gradual improvement over time, important disparities across industries remain.
- Looking at how CI by industry / occupation affects wages, we can observe the effects of the ongoing changes to traditional gender segmentation. Focusing on the growing importance of

unexplained factors, research efforts must identify linkages between the competences required by industry / occupation and how they tie in with productivity.

- Actual measures for addressing wage disparity will only be feasible after analyses are conducted on the nature of production activities within workplaces, for each industry.
  - It is important to uphold an equitable labor market order that prevents discrimination. To prevent discrimination in all HR processes – from recruitment to task placement, promotion, and evaluation – institutional improvements must be drawn up and implemented to suit the production activities of each industry and workplace.
- In industries directly affected by government policy, such as public administration and defense and human health and social services, recent policies enacted by the government have led to significant job growth.
- Although job growth in the public sector also has a positive effect on women's employment, we have seen that in industries such as human health and social services, such job growth is taking place without improvements in job quality. Thus, prior consideration for improving both the quality and quantity of employment must be exercised when designing government policies.

〈Appendix 1〉 Descriptive Statistics, Analysis of Women's Share of Employment

(unit: %)

Variable	C		G		I		J		K		M	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
edu1	3.25	1.15	3.21	1.19	2.79	1.06	4.30	1.00	4.00	1.06	4.53	1.05
married	0.80	0.40	0.78	0.42	0.76	0.43	0.61	0.49	0.78	0.41	0.67	0.47
age	44.14	11.60	45.48	14.01	44.77	13.81	38.43	9.95	42.07	10.54	40.20	11.32
age2	2083.04	1067.98	2264.73	1358.66	2194.67	1216.26	1576.08	831.18	1881.40	942.65	1744.56	1018.02
period1	0.28	0.45	0.30	0.46	0.30	0.46	0.27	0.44	0.27	0.45	0.22	0.41
period3	0.19	0.40	0.17	0.38	0.18	0.39	0.21	0.41	0.19	0.39	0.24	0.43
hour	46.37	12.13	47.91	15.96	51.13	18.79	43.86	11.21	42.00	10.49	43.07	11.20
job2	0.08	0.27	0.04	0.20	0.01	0.07	0.47	0.50	0.07	0.26	0.54	0.50
job3	0.17	0.37	0.11	0.31	0.01	0.11	0.26	0.44	0.47	0.50	0.30	0.46
job4	0.00	0.07	0.00	0.06	0.63	0.48	0.00	0.06	0.00	0.06	0.01	0.09
job5	0.02	0.13	0.60	0.49	0.05	0.21	0.04	0.20	0.33	0.47	0.02	0.13
job6	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.05
job7	0.18	0.39	0.02	0.14	0.01	0.10	0.06	0.24	0.00	0.05	0.02	0.12
job8	0.33	0.47	0.02	0.13	0.00	0.05	0.01	0.10	0.00	0.06	0.02	0.13
job9	0.12	0.33	0.10	0.30	0.13	0.34	0.06	0.24	0.02	0.13	0.02	0.13
size2	0.10	0.30	0.12	0.32	0.17	0.38	0.10	0.30	0.08	0.28	0.17	0.38
size3	0.18	0.38	0.10	0.30	0.06	0.24	0.19	0.40	0.37	0.48	0.17	0.37

Variable	C		G		I		J		K		M	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
size4	0.19	0.39	0.05	0.22	0.02	0.15	0.23	0.42	0.30	0.46	0.13	0.34
size5	0.12	0.33	0.03	0.16	0.01	0.10	0.16	0.36	0.06	0.25	0.09	0.29
size6	0.17	0.38	0.01	0.12	0.01	0.09	0.14	0.34	0.07	0.26	0.16	0.36
Obs	1,379,137		1,236,098		782,926		179,122		243,755		236,169	
Variable	N		O		P		Q		R			
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.		
edu1	2.88	1.26	3.60	1.52	4.54	1.13	3.63	1.33	3.51	1.17		
married	0.81	0.40	0.86	0.35	0.70	0.46	0.74	0.44	0.59	0.49		
age	50.21	14.42	49.35	14.23	40.97	11.51	45.00	15.43	40.06	13.82		
age2	2729.51	1416.53	2637.37	1512.96	1810.70	1001.92	2263.41	1549.57	1796.02	1200.89		
period1	0.21	0.41	0.28	0.45	0.27	0.45	0.14	0.34	0.28	0.45		
period3	0.22	0.42	0.22	0.42	0.19	0.39	0.31	0.46	0.19	0.39		
hour	45.40	15.11	38.65	15.68	34.78	15.67	38.78	14.87	45.53	18.55		
job2	0.03	0.18	0.09	0.28	0.67	0.47	0.53	0.50	0.22	0.41		
job3	0.14	0.35	0.43	0.49	0.11	0.31	0.09	0.28	0.09	0.29		
job4	0.07	0.25	0.16	0.37	0.06	0.23	0.18	0.39	0.39	0.49		
job5	0.04	0.21	0.00	0.04	0.00	0.04	0.00	0.04	0.04	0.19		
job6	0.01	0.09	0.00	0.04	0.00	0.02	0.00	0.02	0.01	0.10		

Variable	N		O		P		Q		R	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
job7	0.06	0.24	0.01	0.10	0.00	0.06	0.01	0.07	0.01	0.12
job8	0.08	0.26	0.02	0.12	0.02	0.13	0.01	0.12	0.01	0.09
job9	0.46	0.50	0.19	0.39	0.04	0.18	0.11	0.31	0.07	0.25
size2	0.18	0.38	0.05	0.22	0.10	0.30	0.21	0.41	0.08	0.27
size3	0.25	0.43	0.19	0.39	0.15	0.36	0.22	0.42	0.11	0.32
size4	0.17	0.38	0.15	0.35	0.33	0.47	0.17	0.38	0.11	0.31
size5	0.07	0.25	0.14	0.35	0.05	0.22	0.08	0.27	0.04	0.21
size6	0.03	0.18	0.32	0.47	0.07	0.25	0.10	0.30	0.03	0.16
Obs	368,100		360,642		588,165		463,258		144,266	

Note: A: Agriculture, forestry, and fishing, B: Mining and quarrying, C: Manufacturing, D: Electricity, gas, steam, and air conditioning supply, E: Water supply, sewage, waste management, materials recovery, F: Construction, G: Wholesale and retail trade, H: Transportation and storage, I: Accommodation and food services, J: Information and communication, K: Financial and insurance activities, L: Real estate activities, M: Professional, scientific and technical activities, N: Business facilities management and business support services; rental and leasing activities, O: Public administration and defense; compulsory social security, P: Education, Q: Human health and social work activities, R: Arts, sports, and recreation related services, S: Membership organizations, repair, and other personal services, T: Activities of households as employers, undifferentiated goods and services-producing activities of households for own use, U: Activities of extraterritorial organizations and bodies

Source: Statistics Korea, Economically Active Population Survey, 2004~2020

〈Appendix 2〉 Estimation Results, Women's Share of Employment within each Industry

		edu1	married	age	age2	period1	period3	hour	job2	job3	job4
C	Odds Ratio	0.537***	1.655***	0.986***	1***	1.063***	1.11***	0.975***	7.962***	13.268***	128.992***
	Std. Err.	(0.001)	(0.012)	(0.001)	(0)	(0.005)	(0.006)	(0)	(0.255)	(0.415)	(6.781)
G	Odds Ratio	0.585***	1.497***	1.01***	1***	0.982***	1.093***	0.976***	3.237***	10.59***	24.108***
	Std. Err.	(0.001)	(0.011)	(0.001)	(0)	(0.005)	(0.006)	(0)	(0.097)	(0.303)	(1.186)
I	Odds Ratio	0.585***	2.404***	1.132***	0.999***	1.109***	0.975***	0.973***	10.853***	4.25***	5.607***
	Std. Err.	(0.002)	(0.027)	(0.002)	(0)	(0.008)	(0.007)	(0)	(0.518)	(0.162)	(0.177)
J	Odds Ratio	0.789***	0.747***	0.855***	1.001***	1.07***	1.15***	0.963***	1.183***	5.035***	2.409***
	Std. Err.	(0.006)	(0.013)	(0.004)	(0)	(0.016)	(0.018)	(0.001)	(0.065)	(0.275)	(0.246)
K	Odds Ratio	0.505***	0.921***	0.918***	1***	0.815***	1.39***	0.964***	1.784***	5.749***	3.011***
	Std. Err.	(0.003)	(0.014)	(0.003)	(0)	(0.009)	(0.018)	(0.001)	(0.069)	(0.19)	(0.231)
M	Odds Ratio	0.797***	0.815***	0.871***	1.001***	0.781***	1.406***	0.966***	2.183***	8.91***	32.176***
	Std. Err.	(0.005)	(0.012)	(0.003)	(0)	(0.011)	(0.018)	(0)	(0.17)	(0.696)	(3.394)
N	Odds Ratio	0.52***	2.182***	1.086***	0.999***	0.851***	0.988	0.952***	5.291***	14.608***	6.847***
	Std. Err.	(0.002)	(0.034)	(0.003)	(0)	(0.009)	(0.01)	(0)	(0.326)	(0.86)	(0.41)
O	Odds Ratio	0.658***	1.193***	0.882***	1.001***	0.665***	1.374***	0.952***	5.613***	6.678***	1.635***
	Std. Err.	(0.003)	(0.017)	(0.002)	(0)	(0.007)	(0.014)	(0)	(0.483)	(0.57)	(0.141)
P	Odds Ratio	0.828***	0.917***	1.083***	0.999***	0.84***	1.229***	0.973***	1.765***	1.435***	22.757***
	Std. Err.	(0.003)	(0.009)	(0.003)	(0)	(0.006)	(0.011)	(0)	(0.036)	(0.032)	(0.849)
Q	Odds Ratio	0.473***	1.059***	1.064***	0.999***	0.68***	1.379***	0.975***	1.192***	0.428***	2.435***
	Std. Err.	(0.002)	(0.016)	(0.002)	(0)	(0.009)	(0.014)	(0)	(0.041)	(0.016)	(0.093)
R	Odds Ratio	0.777***	1.399***	1.096***	0.999***	1.044***	1.218***	0.972***	4.085***	5.738***	5.452***
	Std. Err.	(0.005)	(0.028)	(0.004)	(0)	(0.016)	(0.019)	(0)	(0.335)	(0.475)	(0.448)

		job5	job6	job7	job8	job9	size2	size3	size4	size5	size6
C	Odds Ratio	6.669***	0.998	5.894***	5.006***	29.467***	0.841***	0.818***	0.758***	0.691***	0.34***
	Std. Err.	(0.23)	(0.252)	(0.185)	(0.156)	(0.927)	(0.007)	(0.006)	(0.005)	(0.006)	(0.003)
G	Odds Ratio	6.943***	12.477***	1.386***	0.111***	3.049***	0.899***	1.177***	1.419***	1.752***	1.505***
	Std. Err.	(0.196)	(2.054)	(0.045)	(0.006)	(0.088)	(0.006)	(0.008)	(0.013)	(0.022)	(0.025)
I	Odds Ratio	4.569***	0.16***	1.789***	0.098***	3.345***	1.082***	1.004	0.817***	0.646***	0.65***
	Std. Err.	(0.152)	(0.04)	(0.072)	(0.011)	(0.108)	(0.008)	(0.011)	(0.014)	(0.018)	(0.02)
J	Odds Ratio	4.53***	8.666***	0.046***	0.718***	0.962	1.087***	0.881***	0.752***	0.747***	0.968
	Std. Err.	(0.271)	(3.964)	(0.005)	(0.065)	(0.059)	(0.027)	(0.019)	(0.016)	(0.017)	(0.023)
K	Odds Ratio	13.244***	0.112	0.237***	1***	7.17***	1.292***	1.702***	1.813***	1.934***	1.889***
	Std. Err.	(0.437)	(0.116)	(0.04)	(omitted)	(0.338)	(0.031)	(0.033)	(0.036)	(0.05)	(0.049)
M	Odds Ratio	2.614***	8.571***	0.32***	3.32***	11.77***	0.832***	0.631***	0.544***	0.533***	0.339***
	Std. Err.	(0.227)	(1.03)	(0.035)	(0.289)	(1.013)	(0.014)	(0.011)	(0.01)	(0.011)	(0.007)
N	Odds Ratio	17.322***	0.372***	0.465***	1.336***	6.166***	1.001	1.019	1.206***	1.345***	1.119***
	Std. Err.	(1.054)	(0.034)	(0.03)	(0.081)	(0.361)	(0.013)	(0.012)	(0.016)	(0.023)	(0.026)
O	Odds Ratio	24.919***	2.354***	0.298***	0.024***	4.157***	0.952	0.925***	0.79***	0.616***	0.676***
	Std. Err.	(3.558)	(0.295)	(0.035)	(0.006)	(0.357)	(0.023)	(0.017)	(0.016)	(0.013)	(0.013)
P	Odds Ratio	2.83***	0.42***	0.02***	0.222***	2.222***	1.26***	1.02	0.936***	0.454***	0.317***
	Std. Err.	(0.238)	(0.079)	(0.003)	(0.008)	(0.062)	(0.016)	(0.011)	(0.008)	(0.007)	(0.004)
Q	Odds Ratio	0.336***	0.619	0.094***	0.014***	0.432***	1.113***	0.786***	0.698***	0.599***	0.48***
	Std. Err.	(0.03)	(0.133)	(0.005)	(0.001)	(0.017)	(0.017)	(0.011)	(0.011)	(0.011)	(0.008)
R	Odds Ratio	15.303***	0.329***	0.076***	0.209***	4.714***	1.103***	1.409***	1.453***	1.111***	0.826***
	Std. Err.	(1.338)	(0.041)	(0.015)	(0.031)	(0.398)	(0.025)	(0.029)	(0.03)	(0.033)	(0.03)



Note: C: Manufacturing, G: Wholesale and retail trade, I: Accommodation and food services, J: Information and communication, K: Financial and insurance activities, M: Professional, scientific and technical activities, N: Business facilities management and business support services; rental and leasing activities, O: Public administration and defense; compulsory social security, P: Education, Q: Human health and social work activities, R: Arts, sports, and recreation related services

Source: Statistics Korea, Economically Active Population Survey, 2004~2020

Topic classification: labor, employment

Key words: industrial structure, women's labor

## References

- Blau, F. and L. Kahn, 1996, “Wage Structure and Gender Earnings Differentials: An International Comparison”, *Economica*, Vol. 63, No. 250
- Katz, L. F., & Murphy, K. M. (1992). “Changes in relative wages, 1963–1987: supply and demand factors”. *The quarterly journal of economics*, 107(1), 35-78.
- Kim, J., Jung S., Noh, W. “Changing industrial structure and employment of women”, Korean Women’s Development Institute.
- Lee, C., Kim, H(2020). “Can Immigration Help Alleviate Labor Market Effects of Demographic Changes? Analysing Industrial Distribution of Immigrant Workers”. *A Study on Labor Policy*. 6. 1-31.

