Global Journal of human-social science: E Economics
Volume 15 Issue 7 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-460X & Print ISSN: 0975-587X

Human Capital and Glass Ceiling: Quantile Regression Decomposition of Gender Pay Gap in Korean Labor Market

By HongYe Sun & GiSeung Kim
Pusan National University, South Korea

Abstract- Conventional estimation methods on analyzing gender pay gap focus on comparing the earnings premium and gender inequality from the view of mean earnings distribution, highlighting human capital factors (e.g. education attainment, career training). However, mean distribution analysis do not reflect the whole perspective of gender earnings. Therefore, in our study, we adopt quantile regression estimation method to measure the impact of human capital (e.g. returns to education) and other social characteristics factors on wage. In addition, Melly2006 wage decomposition method is employed to reveal the pattern of gender earnings gap through overall distributions. We verified the evidence of 'glass ceiling effect' phenomenon in Korean labor market. The finds of our study also imply the female's returns to education are higher than male, and the magnitude is even higher for upper earnings distribution. Furthermore, the estimation results of conditional and unconditional quantile regression present the differential of human capital variables occupy a big part of the explanatory on gender wage gap.

Keywords: *unconditional quantile regression, glass ceiling, return to education.*

GJHSS-E Classification : *FOR Code: C21, D31, I24*

Strictly as per the compliance and regulations of:

Human Capital and Glass Ceiling: Quantile Regression Decomposition of Gender Pay Gap in Korean Labor Market

HongYe Sun [α] & GiSeung Kim [σ]

Abstract- Conventional estimation methods on analyzing gender pay gap focus on comparing the earnings premium and gender inequality from the view of mean earnings distribution, highlighting human capital factors (e.g. education attainment, career training). However, mean distribution analysis do not reflect the whole perspective of gender earnings. Therefore, in our study, we adopt quantile regression estimation method to measure the impact of human capital (e.g. returns to education) and other social characteristics factors on wage. In addition, Melly2006 wage decomposition method is employed to reveal the pattern of gender earnings gap through overall distributions. We verified the evidence of 'glass ceiling effect' phenomenon in Korean labor market. The finds of our study also imply the female's returns to education are higher than male, and the magnitude is even higher for upper earnings distribution. Furthermore, the estimation results of conditional and unconditional quantile regression present the differential of human capital variables occupy a big part of the explanatory on gender wage gap.

Keywords: unconditional quantile regression, glass ceiling, return to education.
JEL Classification: C21, D31, I24

I. Introduction

The latest OECD survey statistics indicates gender wage inequality in Korea is stuck in the worst circumstance comparing to other OECD countries. Notwithstanding, the OECD average gender wage gap shrink slightly from 2000 to 2014, gender wage inequality do not emerge remarkably improvement in Korean labor market. The tremendous gender earnings gap and low work participant rate of female are always tenderness problems for East Asia countries, especially for Korea. In addition, compare to other eastern and western countries, the working condition for female in Korea is still far behind other industrialized countries.

However, the level of upper secondary education participation rate is the closest between male and female than other OECD countries in the context of existing serious gender earnings inequality in Korea. Becker (1971) has argued that discrimination unrelated to workers' productivity is costly and may not be sustainable in a competitive market. Recent experience of developed countries in which the gender pay gap has generally declined seemingly supports this argument (Blau and Kahn, 2006).

Considering the diversity of pattern of wage gap on the analysis cross overall distributions, we need to mention two concepts on sketching the phenomenon, 'glass ceiling' and 'sticky floor'. In the case of wage gap increasing from bottom to top wage earners distribution, the situation is described by term 'glass ceiling'. On the contrary, if a large pay gap at the bottom distribution where women are "stuck" in low-wage jobs, this kind of situation is called 'sticky floor' (Lin, 2012).

The growing of literature on gender wage gap in Korea referred several aspects of research insight. Gender wage gap is rigorous in Korea, the average wage of female only take 45% of male's in 1970s-1980s, in 1999, the proportion has been raised to 63%, but still stuck in a bad situation (Liu, 2001). Kim (2013) utilized Oaxaca-Blinder decomposition technique and found 55.1% of overall gender pay gap account for discrimination by employing of 'Korea's Labor Statistics Survey 2010'. These studies via constructing counterfactual wage formula base on no discrimination wage structure, the method allow us to reveal gender pay gap in an entire outlook. In the route of analysis methods revolution across entire distribution, Melly (2006) developed an earnings counterfactual distribution decomposition method based on MM 2005. In 2009, Firpo et al. proposed another earnings decomposition method by meaning of recentered influence function (RIF). RIF need to be calculated after the establishing of counterfactual wage structure based on reweighting function. Regarding the studies of gender earnings gap on overall distribution in Korean labor market, the existent literature is not abundant until recently. Cho et al. (2014) divided the labor market into core and peripheral sectors and used Korea Labor & Income Panel Study to analyze the gender wage gap through Chernozhukov counterfactual decomposition method, thus they verified the evidence of glass ceiling effect. Ahn (2012) found the evidence of glass ceiling effect in Korea labor market and indicated the differential of human capital account for the gender earnings gap especially for top quantile. In which the interruption of job for baby care or family work occupy chief reason of the drawback of human capital.

Author α: Department of Economics, Pusan National University, 30 jangjeon-dong, geumjeong-gu, Pusan, South Korea.
e-mail: hysun@pusan.ac.kr
Author σ: Department of Economics, Pusan National University, 30 jangjeon-dong, geumjeong-gu, Pusan, South Korea. (Corresponding Author) e-mail: gsk@pusan.ac.kr

In view of the tight relationship between gender earnings gap and education attainment, this paper highlight the effective of education on gender earnings gap and earnings determination system. This study contains several contributions and improvement compared to previous literature. First we use unconditional quantile regression investigate gender wage structure, and second we illustrate the gender wage gap and do detailed exploration. Finally we employ Melly 2006 method to decompose the gender wage gap, and summarize the main findings.

The remaining sections of this paper are organized as follows: Section two discuss the analysis data and describe the summary statistics. Section three outlines the research method. Section four presents empirical findings. And finally concludes the main point and discuss policy implications.

II. Analysis Data and Summary Statistics

This study employs most recently available data from the Korean Labor & Income Panel Study (KLIPS), the 15th wave surveyed in 2012. The Korea Labor Institute began to collect detailed data for households and individuals starting in 1998. The key survey objective of KLIPS includes personal income, social population characteristics, health, mobility, social life style, social attitude, labor market and social security et al. This data collection is modeled after processing, which is similar to the Panel Study of Income Dynamics (PSID) from the University of Michigan. Among those individual observations, we selected those who are currently employed as wage earner and have proper average monthly income. Thus we exclude those who are currently self-employed or unemployed. Finally, we adjusted our sample size to 3,462 individual observations. We also excluded missing values for any of the explanatory variables that have to be used in our analysis.

Table 1: Summary statistics - average monthly wage and continued individual characteristics

Variable	Mean	Std.Dev.	Min	Max
Monthly wage	254.02	134.16	100.00	1,300.00
Log of hourly wage	0.20	0.53	-1.26	2.25
Age	39.67	9.57	19	60
Experience	6.66	7.05	0.00	41
Experience squared	93.97	185.69	0.00	1,681
Observations		3,426		

Table 1 shows summary statistics of the final selected data. The scope of age is set from 19 to 60. The final sample contains 1,100 male and 778 female age earners. KLIPS contains survey of monthly earnings and weekly working time of wage earners. Therefore, we calculate the hourly wage by applying the formula of monthly wage/4.3*weekly working time. The average monthly wage is 254.02 KRW for total sample and the average log hourly wage is 0.2 KRW. The results are in line with the government public data which report the average wage roughly close to 210 KRW in 2012.

The dummy variables of individual characteristics include gender, education attainment, health status, marital status, living region, firm size, occupation, and industry are presented in Table 2. In our final selected analysis data, the percentage of distribution of dummy variable is relatively balanced, where the ratio of full-time employees in total male observations is about 12% more than female. Meanwhile, there is more part of male who get married than female and the differential is nearly 13%. Most observations report they have above general health level no matter male or female. Furthermore, observations live in capital area are slightly more than other areas, the relatively balanced region population distribution can helps us estimate a more accurate result whereas there likely existence a nonnegligible economic gap between capital and other areas. Moreover, the portion of male employees is more than female employees in the total observations, which is consistent with the social reality in Korea labor market. In Table 2, we also summarized the frequency of labor market demand side variables. The variables include firm size, occupation and industry which represent the labor market characteristics. The firm size was divided into 3 groups, and the distribution for male and female in the 3 groups is similar, more than half of male and female were employed by middle-small size firms (300 employees & below). We combined 4-digital occupation from raw data as 5 categories based on 2008 International Standard Classification of Occupation (ISCO) [1] . In consideration of the estimation

[1] The International Standard Classification of Occupations 2008 (ISCO-08) is a four-level hierarchically structured classification that covers all jobs in the world (ILO, 2012). The original classification of occupations in ISCO-08 includes 10 categories, Managers, Professionals, Clerical support workers, Service and sales workers, Skilled agricultural, forestry and fishery workers, Craft and related trades workers, Plant and machine operators, and assemblers, Elementary occupations, Armed forces occupations.

bias may be caused by sample deficiency, we combined Manager/professionals, Skilled agricultural/fishery workers and Craft/related trade workers as one group, respectively. Industry was combined into 5 categories from agriculture to government service. Gender occupation and industry segregation has been widely proved by various studies in Korea labor market. It is not surprising we found polarization segregation phenomenon of occupation and industry for male and female. There are more female gathered as clerical or service worker, on contrary, the occupation distribution for male is more equally. Most of female can be found in less-technological occupation and the high-ranking position is more occupied by male. We verified the earnings highly associate with occupation, the results reveal notwithstanding male and female have relatively similar education attainment, even in the same occupation female earn lower wage than male. Furthermore, there are more female are employed by Educational, Recreational, Medical, Retailing, and Catering industry, meanwhile the male are more frequently found in physical labor industry such as Manufacturing, Transportation, Construction industry.

Table 2 : Frequency statistics and distribution by gender

Variable	Male			Female			
	Freq.	Share(%)	Wage wage	Freq.	Share(%)	Wage wage	F/M (%)
Part-time	360	16.68	203.63	360	28.39	144.66	71%
Full-time	1,798	83.32	312.60	908	71.61	201.32	64%
Not married	546	25.30	219.50	488	38.49	172.69	79%
Married	1,612	74.70	319.79	780	61.51	193.73	61%
Under general healthy	607	28.13	273.54	448	35.33	166.07	61%
Healthy	1,551	71.87	302.59	820	64.67	195.75	65%
Not seoul	1,018	47.17	291.01	571	45.03	175.15	60%
Seoul	1,140	52.83	297.46	697	54.97	194.38	65%
Education (%)							
Junior high & below	132	6.12	212.82	137	10.80	138.17	65%
High school	711	32.95	263.09	445	35.09	157.41	60%
Junior college	460	21.32	271.23	306	24.13	183.67	68%
University & above	855	39.62	345.55	380	29.97	236.15	68%
Firm size (%)							
1-30	708	32.81	233.53	570	44.95	154.06	66%
30-300	636	29.47	273.81	276	21.77	180.64	66%
300 and above	567	26.27	391.38	235	18.53	228.62	58%
Occuption (%)							
Managers/ Professionals	529	24.51	537.41	391	30.84	242.50	45%
Clericals	440	20.39	337.78	364	28.71	214.28	63%
Service/Sales	239	11.08	331.07	271	21.37	206.77	62%
Craft/Skilled Opera Plant/Machine Opera	792	36.70	279.46	145	11.44	151.48	54%
Elementary	158	7.32	252.95	97	7.65	154.24	61%
Indusry (%)							
Manufacturing/Mining	757	35.08	301.95	252	19.87	161.38	53%
Construction/Retail	666	30.86	268.33	328	25.87	164.54	61%
Financial/Real Estate	203	9.41	332.56	105	8.28	236.17	71%
Education/Health	169	7.83	302.49	77	6.07	178.75	59%
Tech./Other Services	359	16.63	321.01	506	39.90	205.93	64%
Total	2,158	62.99	294.42	1,268	37.01	185.26	63%

III. Research Methodology

Our investigating method aims to explore the gender wage differential from a specific wage distribution view. Different from previous research method, in our analysis, we attempt to examine the wage determination mechanism and decompose the wage gap under more accurate and detailed situation. From the summary statistics results, we have already observed the wage differential for different distribution between male and female. The results in previous section also reveal the occupation distribution and human capital differentials. Our methodology focuses to test and find out the profound and deep reason of gender earnings differentials.

The decomposition of Oaxaca-Blinder focuses on the conditional mean wage differential. However, in the real labor market, gender wage differential posses the different pattern base on the different wage distribution, e.g. the glass ceiling effects (Albrecht, et al., 2003) indicates that the wage differential is more significant in high wage distribution which is described as glass ceiling effect, in addition, sticky floor effects indicates that the wage differential is more significant in low wage distribution. Therefore, the exploration for the whole wage distribution expanded previous incomplete results. Machado and Mata (2005) proposed the counterfactual wage distribution decomposition method which employed conditional quantile regression.

Melly (2006)[2] suggested to integrate the conditional quantile over the range of covariates to estimate the counter factual distribution (Thomschke, 2015). Melly (2006) pointed that the transfer of probability integral cannot assure the estimation consistent in terms of conditional distribution function or total distribution function by MM2005 decomposition. Furthermore, along with this conception, the wage differential can be divided into three factors, which can be presented as:

$$D_\tau(\ln\overline{W}_m - \ln\overline{W}_f) = \left[(\hat{\beta}_m^n \hat{\beta}_f^s X_m) - (\hat{\beta}_f X_m)\right](\tau) + \left[(\hat{\beta}_m X_m) - (\hat{\beta}_m^n \beta_f^s X_m)\right](\tau) + \left[(\hat{\beta}_f X_m) - (\hat{\beta}_f X_f)\right](\tau)$$

Where $D_\tau(\ln\overline{W}_m - \ln\overline{W}_f)$ is the raw wage differential between male and female at quantile. $\ln W_m$ and $\ln W_f$ represent the vectors of male and female characteristics, respectively. The first term on the right side of the function represents intra-group differential, the second term means inter-group differential, while the last term reveals the altering effect of individual characteristics distribution vector.

IV. Empirical Findings

a) Impact of human capital factors on wage determination mechanism by gender and pooled data

For obtaining detailed and informative results, we recategorized the education group and estimated Mincerian wage function by gender and pooled data. We combined the university& above education level as high education group, and junior high & below, high school , junior college was merged as low education group which was used as a reference group in this regression. Table 3 show the estimation results by applying of unconditional quantile regression. Notably, gender significantly and considerably affect the wage determination mechanism in pooled data anlysis. Male wage earners are more in favor of obtaining higher wages than female workers especially in low quantile wage distributions. Education attainment is significant cross the entire wage distribution, namely, high educated workers are more apt to get higher wages. Further we can find the magnitude of returns to high education impact on wage mechinism become mild at upper quantiles. That proves the influce of education attainment on wage is relatively moderate for higher wage earners cluster in magnitude.

However, compared to bottom quantile, the magnitude of returns to high education is still very high. In other words, the results indicate well educated workers have relatively fair working circumstance than less educated ones. It is not surprsing that the wage premium is much higher for Full-time than Part-time workers. The rigorous job environment bring huge pressure to job seekers and central & local government. Full-time work symbolize high earings and high-class working condition than Part-time work. It is intractable and necessary to improve the salary and working condition for Part-time workers. Also, experience is another key factor make significant impact on wage determination mechnism, we find evidence to verify experice influence wage cross bottom to middle quantile but not include upper quantile. One of the most important reason is upper quantile distribution get more influence by ability and education attainment rather than experience. In addition, we also find marriage status, health and place of residence impact the wage system more or less. However, the effect is weak or insignificant at upper quantile.

There are some other independent variables[3] show consistent estimation results from low to high quantile distribution. The statisticis significance of firm-

[2] The variation in the gender-wage gap across the wage distribution is examined using quantile regression analysis, following the methodology proposed by Melly (2005). This allows us the search for possible sticky floor and glass ceiling effects – see Albrecht et al. (2003).

[3] Detailed regression results contact to authors.

size variable reveals whether for less educated and high educated groups be emloyed by different size of firms is an effective factor on wage earners' income, the wage premium is especially in favor of emploees who are employed by big-size firm. Apart from these, we also find evidence to confirm the importance of occupation on wage, high-ranking position bring about high wage premium from bottom to upper quantiles. Moreover, for bottom quantile distribution, there is prodigious wage premium as manager/ professionals or clerical.

Table 3 : Unconditional quantile regression by pooled sample

Independent variables	10^{th}	25^{th}	50^{th}	75^{th}	90^{th}
	Unconditional quantile treatment effects				
Male	0.293***	0.352***	0.348***	0.245***	0.160***
	(0.028)	(0.024)	(0.020)	(0.021)	(0.022)
High education	0.063***	0.155***	0.236***	0.253***	0.194***
	(0.021)	(0.023)	(0.021)	(0.025)	(0.028)
Experience	0.009**	0.029***	0.039***	0.042***	0.008
	(0.004)	(0.004)	(0.003)	(0.004)	(0.005)
$Experience^2/100$	-0.000	-0.001***	-0.001***	-0.000**	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age	-0.008***	-0.008***	-0.003***	0.004***	0.008***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Full-time	0.183***	0.228***	0.183***	0.131***	0.054***
	(0.039)	(0.033)	(0.025)	(0.021)	(0.018)
Married	0.075***	0.144***	0.201***	0.154***	0.036*
	(0.029)	(0.026)	(0.023)	(0.022)	(0.022)
Healthy	0.084***	0.073***	0.052***	0.059***	0.021
	(0.026)	(0.023)	(0.019)	(0.020)	(0.023)
Seoul	0.047**	0.046**	0.040**	0.045**	0.007
	(0.023)	(0.020)	(0.017)	(0.019)	(0.022)
30-300	0.085***	0.132***	0.095***	0.068***	0.024
	(0.027)	(0.025)	(0.022)	(0.024)	(0.023)
300 & above	0.089***	0.162***	0.180***	0.336***	0.367***
	(0.026)	(0.024)	(0.023)	(0.028)	(0.035)
Occupation	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Intercept	-1.004***	-1.059***	-0.758***	-0.670***	-0.053
	(0.114)	(0.093)	(0.070)	(0.070)	(0.073)
Number of Obs.	3,426	3,426	3,426	3,426	3,426
R-squared	0.202	0.348	0.427	0.422	0.271

*Note: *, **,* ** denote statistical significance at the level of 10%, 5% and 1%.*

Standard errors are in parentheses. Standard errors are estimated based on 100 bootstrap replications.

Table 4 reports the unconditional quantile regression estimation results by gender. As the results documented in Table 4, the returns to individual characteristics and returns to labor market characteristics present different pattern for male and female. However, the validation of explanatory variables is similarly effective and the significant variables represent the key component on wage determination is nuance. Age is not significant for female at all quantile in Korean labor market. Marginal diminishing and the early wage declining of age on the nonlinear curve account for the non-significant of age. The education attainment is similar for male and female as we discussed before, meanwhile the returns to education for female are even higher than male.

Table 4 : Unconditional quantile regression by gender

Independent variables	Male			Female		
	10th	50th	90th	10th	50th	90th
Unconditional quantile treatment effects						
High education	0.080***	0.167***	0.252***	0.059***	0.217***	0.374***
	(0.030)	(0.024)	(0.040)	(0.020)	(0.030)	(0.060)
Experience	0.018***	0.034***	0.007	-0.004	0.035***	0.043***
	(0.005)	(0.004)	(0.007)	(0.004)	(0.005)	(0.011)
Experience^2/100	-0.000*	-0.000***	0.001***	0.000	-0.001***	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Age	-0.008***	0.000	0.009***	-0.002	-0.002	0.004
	(0.003)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)
Full-time	0.281***	0.170***	0.023	0.084**	0.123***	0.138***
	(0.059)	(0.028)	(0.032)	(0.037)	(0.032)	(0.034)
Married	0.249***	0.214***	0.011	0.040	0.025	0.140***
	(0.043)	(0.026)	(0.032)	(0.029)	(0.028)	(0.044)
Healthy	0.067**	0.046**	0.055	0.042	0.043	0.067*
	(0.033)	(0.022)	(0.035)	(0.028)	(0.026)	(0.038)
Seoul	-0.039	0.024	-0.001	0.091***	0.121***	0.139***
	(0.029)	(0.020)	(0.033)	(0.025)	(0.024)	(0.039)
30-300	0.084**	0.079***	0.036	0.119***	0.105***	0.010
	(0.037)	(0.025)	(0.033)	(0.027)	(0.031)	(0.051)
300 & above	0.058*	0.240***	0.412***	0.116***	0.213***	0.233***
	(0.035)	(0.027)	(0.051)	(0.027)	(0.031)	(0.065)
Occupation	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	-1.129***	-0.505***	0.134	-0.975***	-0.734***	-0.454***
	(0.163)	(0.083)	(0.107)	(0.121)	(0.092)	(0.144)
Number of Obs.	2,158	2,158	2,158	1,268	1,268	1,268
R-squared	0.200	0.393	0.238	0.143	0.392	0.371

*Note: *, **,* ** denote statistical significance at the level of 10%, 5% and 1%.*

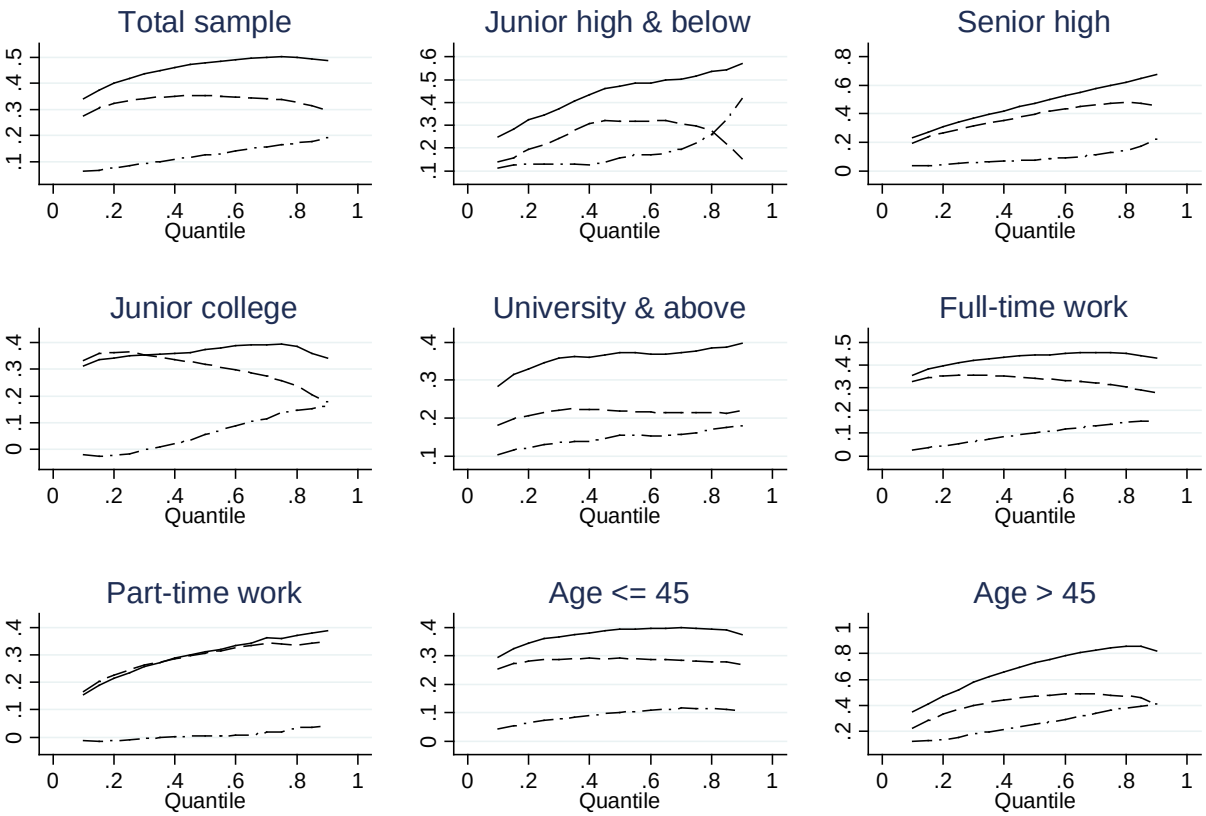
Standard errors are in parentheses. Standard errors are estimated based on 100 bootstrap replications.

The results are also consistent with our previous summary statistics analysis which was revealed in Table 2. Warunsiri (2010) find the overall rate of return to education is between 14% and 16% in Thailand. In addition, he also indicated female have higher returns to education than male. For women, if one is a Full-time worker, she may get more probability to earn more than Part-time work under the same individual characteristics. However, Full-time work only significantly impact on wage for bottom wage distribution male. Some previous studies also find the same results which suggest that the Full-time work plays a particular role in signaling ability among low earnings workers who typically lack the educational certificates more conventionally thought to signal ability. Health is a significant variable for male at bottom quantiles and the effective range is much wider for female. Notwithstanding firm-size is effective on wage system cross the entire wage distributions, the results have much difference for male and female. Female get more wage premium when they are employed by middle size firms (30-300 employees), while male get more wage premium when they are employed by big size firms (more than 300 employees). It is not surprising that the influence of occupation on wage is not resemblance for male and female. As we discussed in the previous section, that not only exists gender occupation segregation, the returns to occupation is significantly different as well. High-ranking occupations get considerable wage premium. Particularly, senior managers and professionals can get more salary across all distributions. However, the estimation coefficient have huge different, for male the pattern is reversed 'U', on contrast, for female the coefficient is nearly linear growth from lower quantile to upper quantile.

b) Glass ceiling effect on gender wage gap

By applying of Melly 2006 earnings decomposition technique, we can explore the pattern of gender wage gap on entire distribution. Melly 2006 also

reveal the quantile change on how much of wage gap can be attributed to individual characteristics (endowment), and how much of wage gap account for returns to labor market characteristics (discrimination). We not only estimated the total sample results, in order to investigate the specific gender wage gap, we also added detailed estimation in our analysis (e.g. Education attainment, Age, Employment background). Figure 1 presents the estimation results by using of Melly 2006 decomposition technique. It is not surprising the tendency of gender wage gap is slightly increasing from bottom to top quantile when we use total sample. As we discussed before, Korea has upgraded to be one of the advanced country and the supply of high educated employee is relatively sufficient. In this figure, we found the increasing extent for gender wage gap at bottom quantile to middle quantile is sharp than middle quantile to upper quantile. The total gender wag gap reflects the combine effect of endowment (characteristics differential) and discrimination (returns to characteristics differential). Furthermore, we found the effect of endowment gap gradually increase from bottom quantile to upper quantile. However, the effect of discrimination reflect reversed 'U' shape pattern, which means discrimination is more considerable at relatively middle-upper quantile but not the most top distribution. Strikingly, notwithstanding the endowment effect linearly increasing, even the highest point is much lower than discrimination effect, which means discrimination effect occupy the most proportion of total gender wage gap. We also found glass ceiling effect is more significant for low educated groups. For low educated groups, the linear increasing tendency of gender wage gap is quite steeper compared to high educated groups. On the contrary, the changing tendency of gender wage gap is steady for university & above group. However, despite the pattern of endowment effect has apparently differential, the changing direction of endowment effect for all groups is consistent. The higher quantile distribution means the more obvious characteristics difference for male and female.



Note: Solid, Dash, Dash dot represent Total gap, Unexplained gap, Explained gap, respectively.

Figure 1: Melly 2006 decomposition method on gender earnings gap

Regarding the full-time and part-time employment status is striking in Korea labor market. Following Melly (2006) method, we further disaggregated the analysis into full-time and part-time employment groups. Figure 1 also contains the specific estimation results focusing on this situation. There is no accident that discrimination is much more serious for part-time employees. The characteristics only account for a meager part on explaining the gender wage gap. Discrimination effect for full-time employees decrease at

upper quantile, however for part-time employees, the upper wage distribution female have to sustain the most serious discrimination.

V. Conclusion and Policy Implication

We find evidence of glass ceiling effects for wage earners in Korea labor market by utilizing KLIPS 2010 individual survey. Further, we adopt Melly 2006 decomposition technique to investigate the details of mechanism in gender wage gap. In our study, we highlight to explore the effective of education attainment on gender pay gap. In specific, we further find pattern of glass ceiling effect strongly exist in less-educated group, but the effects gradually decrease with the rising of education attainment. No matter in higher or less educated groups, the structure effects or discrimination gap take large portion in overall gap than composite effects or endowment gap from bottom to top earnings distribution. The endowment gap continued increasing from bottom to top quantile which means there are large human capital differential at upper pay distributions. As a result of comparison for all groups, the upward increasing curve of endowment gap for high educated workers is relative placid.

Apart from gender earnings gap, we also verified the driving force of human capital factors on wage equation. Particularly, the effective of education on wage is substantially significant. A big part of the gender wage gap cannot be explained by human capital or labor market characteristics variables and the invisible earnings inequality is usually attributed by discrimination. If government does not implement proper regulations and laws to protect female rights in labor market, the employer's preference for employing male labor will further deteriorate the female employment condition. Moreover, we divided the total sample to subcomponent groups and found the glass ceiling effect become milder from low educated groups to high educated groups. Namely, the gender wage gap is relatively flat and smooth from bottom to top quantile distribution in high educated groups. We also verified the unexplained (discrimination) is serious and take most part of gender pay gap for Part-time work. The estimation results are consistent with the real social situation, which clearly illustrate the requirement of further policy direction.

In addition, the empirical results also verified female have higher returns to education than male, which is in accordance with a variety of studies on other entities. Nonetheless, the low work participant rate and the phenomenon 'same work with different pay' limit female exert adequate capability. Becker (1971) has suggested that discrimination do not associate with workers' productivity may be costly and inefficient in a competitive market. In spite of the education attainment is fairly equivalent for male and female particularly in the recent decades in Korea, the work participant rate has not got remarkable improvement for female yet. Notwithstanding, the existence of the intrinsic culture and social background is not in favor of female, government need to foster proper regulation and laws to balance productivity through labor market and help to ameliorate the female's work participant rate and gender pay gap.

References Références Referencias

1. Ahn, T. (2012). Gender wage gap across the wage distribution in Korea. Applied Economics, 14 (1), 127-149.
2. Albrecht, J., Bjorklund, A., & Vroman, S. (2001). Is there a glass ceiling in Sweden?. Journal of Labor Economics, 21(1), 145-177.
3. Arulampalam, W., Booth, A. L., & Bryan, M. L. (2007). Is there a glass ceiling over Europe? Exploring the gender pay gap across the wage distribution. Industrial & Labor Relations Review, 60(2), 163-186.
4. Azam, M. (2012). Changes in Wage Structure in Urban India, 1983–2004: A Quantile Regression Decomposition. World Development, 40(6), 1135-1150.
5. Becker, G. (1971). The Economics of Discrimination. Chicago: University of Chicago Press.
6. Chi, W., & Li, B. (2008). Glass ceiling or sticky floor? Examining the gender earnings differential across the earnings distribution in urban China, 1987–2004. Journal of Comparative Economics, 36(2), 243-263.
7. Cho, Joonmo. (2014). Glass ceiling in a stratified labor market: Evidence from Korea. Journal of the Japanese and International Economies, 32, 56-70.
8. Christofides, L. N., Polycarpou, A., & Vrachimis, K. (2013). Gender wage gaps,'sticky floors' and 'glass ceilings' in Europe. Labour Economics, 21, 86-102.
9. De la Rica, S., Dolado, J. J., & Llorens, V. (2008). Ceilings or floors? Gender wage gaps by education in Spain. Journal of Population Economics, 21(3), 751-776.
10. DiNardo, J., Fortin, N. M., & Lemieux, T. (1995). Labor market institutions and the distribution of wages, 1973-1992: A semiparametric approach (No. w5093). National Bureau of Economic Research.
11. Firpo, S., Fortin, N., & Lemieux, T. (2007). Decomposing wage distributions using recentered influence function regressions. University of British Columbia (June).
12. Fortin, N., Lemieux, T., & Firpo, S. (2009). Unconditional quantile regression. Econometrica, 77(3), 953-973.
13. Frölich, M., & Melly, B. (2008). Unconditional quantile treatment effects under endogeneity. IZA Discussion Paper No. 3288, January.

14. Heo, S. (2003). An Empirical Analysis of Gender Wage Differentials in Industries and Occupations. Applied Economics, 5 (3), 57-74.
15. Kee, H. J. (2006). Glass ceiling or sticky floor? Exploring the Australian gender pay gap. Economic Record, 82(259), 408-427.
16. Koenker, R., & Bassett Jr, G. (1978). Regression quantiles. Econometrica: journal of the Econometric Society, 33-50.
17. Liu, G. (2001). The Gender Pay Gap in South Korea: Difference and Discrimination. Korea Development, 23(1), 193-232.
18. Lorenz, T. (2014). Changes in the distribution of rental prices in Berlin. Regional Science & Urban Economics, 51, 88-100.
19. Machado, J. A., & Mata, J. (2005). Counterfactual decomposition of changes in wage distributions using quantile regression. Journal of applied Econometrics, 20(4), 445-465.
20. Melly, B. (2006). Estimation of counterfactual distributions using quantile regression. Review of Labor Economics, 68(4), 543-572.
21. Melly, B. (2005). Decomposition of differences in distribution using quantile regression. Labour Economics, 12(4), 577-590.
22. Messinis, G. (2013). Returns to education and urban-migrant wage differentials in China: IV quantile treatment effects. China Economic Review, 26, 39-55.
23. ILO (2012). International Standard Classification of Occupations 2008 (ISCO-08): Structure, group definitions and correspondence tables. International Labor Office.
24. Sandefur, G. D., & Park, H. (2007). Educational expansion and changes in occupational returns to education in Korea. Research in Social Stratification and Mobility, 25(4), 306-322.
25. Thomschke, L. (2015). Changes in the distribution of rental prices in Berlin. Regional Science and Urban Economics, 51, 88-100.
26. Warunsiri, S., & McNown, R. (2010). The returns to education in Thailand: A pseudo-panel approach. World Development, 38(11), 1616-1625.
27. Xiu, L., & Gunderson, M. (2014). Glass ceiling or sticky floor? Quantile regression decomposition of the gender pay gap in China. International Journal of Manpower, 35(3), 306-326.
28. Zhuge, Y., Kaufman, J., Simeone, D. M., Chen, H., & Velazquez, O. C. (2011). Is there still a glass ceiling for women in academic surgery?. Annals of surgery, 253(4), 637-643.
29. Zhong, H. (2011). Returns to higher education in China: What is the role of college quality?. China Economic Review, 22(2), 260-275.

This page is intentionally left blank