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Motherhood Wage Discrimination, Evidences from Korean Labor and Income Panel Study (KLIPS) 1998-2017, South Korea

Seulki Choi^a, Mingeon Park^b

Abstract

This study uses the KLIPS data between 1998 to 2017 to examine whether wage discrimination between mothers and non-mothers exists in the South Korea labor market. We compare the amount of wage gap from OLS model to a variety of Fixed effect models which have different types of productivity measures. The results show that mothers are discriminated against in the labor market. Interestingly, the amount of discrimination is bigger for highly-educated women than less-educated women. Especially the semi-professional workers who have the educational attainment level at college degree or higher are the most serious victim of the motherhood wage discrimination.

Keywords: Gender Wage Gap, Motherhood Wage Discrimination, Motherhood Wage Penalty

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I. Introduction

The purpose of this paper is to find out whether there is motherhood wage discrimination among women in South Korea. It has specialties in two things. First, it analyzes the wage differentials between mothers and non-mothers. Secondly, it focuses on wage discrimination.

Women in the labor market have been discriminated against men. The main reason is that women are traditionally responsible for childbirth and child rearing. Fortunately, the gender wage gap looks being diminishing. At the same time, with more economic activity for women than in the past, it is no longer strange for women to have a job at least among young generation nowadays.

In South Korea, the female labor force participation rate is increasing. The proportion of women in the economically active population increased from 27.92% in 1960 to 50.8% in 2015 (World Bank, 2018). At the same time, the wage gap between men and women is decreasing though the wage gap is still the highest among OECD countries. According to the Korea Women's Development Institute's report (2018), which analyzed the supplementary survey of economically active population survey by the National Statistical Office and the survey on labor status by employment type by the Ministry of Employment and Labor, the monthly wage gap between women to men was improved from 42.1% in 2010 to 36.8% in 2017.

Does it mean that a person who is responsible for childbearing and child-rearing are less suffering from discrimination comparing to the past? To give a positive answer, it is not good enough to check the wage gap between men and women. There is a possibility that the volume of discrimination is not changed as much but it happens at the different boundary –

mothers vs. non-mothers. The gender gap approach may underestimate the difficulty of women who is suffering from the burden of child-bearing and rearing. We need to see the wage gap between mothers and non-mothers within women too. If motherhood wage discrimination occurs within women, the decreasing wage differential by gender could not mean that the discrimination is decreasing.

Not all the wage gap comes from discrimination. Discrimination happens when there is wage differential even though the productivity is the same. In other words, the wage differential which cannot be explained by productivity differential is called discrimination. Is there wage discrimination by motherhood in South Korea? If then, which group is the most vulnerable to the discrimination? They will be the research question of this paper.

II. Related Literature

Reflecting the fact that only women can give a birth, the wage gap due to motherhood among women is called motherhood wage penalty which has a negative meaning. But not all the wage penalty is discrimination. Discrimination is said to occur when the same person is disadvantaged because of a group identity that does not directly affect productivity, rather than a difference in productivity (Heckman 1998). Motherhood wage discrimination occurs when a mother earns a lower wage than a non-mothers even with the same productivity.

Motherhood wage discrimination has been reported in many countries. Waldfogel (1997) used the 1968-1988 NLSY to find that motherhood wage gap tended to increase with education levels. 1982-1993 Using NLSY, Budig and England (2001) studied the effects of skilled / unskilled workers, years of education and occupational hierarchies. They argue that

there is no clear evidence that more skilled or dedicated women experience a wider wage gap. They reported that women employed on a full-time basis have a bigger wage gap. Anderson et al. Use the 1968-1988 NLSYW data. (2002) analyzed wage gaps by education level. They reported that: 1) Less-educated workers (except high school diplomas) experience a minimum wage gap because of their low human capital, but the amount of human capital is not as important as other high-wage jobs. 2) Highly skilled workers (college graduates) are experiencing the largest wage gap. 3) High school graduates fall in the middle of these two groups. Anderson et al. (2003) found that high school dropouts suffer from wage gaps only when the child is very young and do not last as the child grows up. Choi (2011) also found that in the US National Longitudinal Survey of Youth (NLSY) data, there are motherhood wage discrimination between management professionals and office workers, but most of them can be explained by productivity differences such as career breaks. On the other hand, manual workers are the main victim of discrimination. Especially simple manual workers are suffering from the biggest size of discrimination in the United States.

Motherhood wage penalties are reported in the US as well as in many other countries. Aisenbrey, Evertsson & Grunow (2009) found that motherhood penalties were important in Germany and Sweden, and that the impact of motherhood wage penalty is important even in Sweden's "female friendly" case. Boye, Halldén & Magnusson (2017) found that the gender wage gap in Sweden narrowed in the 1970s, but stagnated since the 1980s. Cooke (2014) found that parental punishment and insurance premiums were reflected in relative socioeconomic conditions by comparing the United States, United Kingdom, and Australia. Okoshi et al (2016) found the penalties and premiums of parents of Japanese surgeons. Mu & Xie (2016) examined the causal effects of fertility on parents in China and found that motherhood penalty is not supported for one child policy. In South Korea, Ihm's study (2010)

reported that wages for women with children under 6 years were reduced by 2%, and women with children between 6 and 18 years of age experienced a drop in wages of about 8%.

Wage discrimination due to motherhood has other characteristics within women's groups. Unlike non-mothers, mothers will have difficulty achieving their full productivity potential. Even with the same amount of human capital, mothers can be less productive by preferring maternity-friendly jobs or jobs that require less work effort (Becker, 1985; Budig and England, 2001). Anderson et al. (2003) found that the wage gap narrows as the youngest child grows, and that the wage gap for women with children aged 0-2 is much larger than the wage gap for mothers with children. These results show that compensation differentials and work efforts can affect the amount of wages. Correll, Benard and Paik (2007) investigated motherhood wage discrimination through laboratory experiments and audit studies in the United States. In laboratory experiments, they kept the characteristics of potential job applicants constant, changed their motherhood only, and asked a fictitious employer to evaluate them. As a result, employers regarded mothers as less competitive and found that they offered wages that were 7.9% lower than those of general workers.

III. Data and Methodology

We used the 1998-2017 survey of the Korean Labor and Income Panel Study (KLIPS), a well-represented source of the Korean labor market at individual level. The KLIPS has been conducting an annual survey since its 1998 survey. The data used were limited to wage workers reflecting the characteristics of the current labor market, excluding military, self-employed and family businesses. The analytical sample is further limited to the birth cohort from 1960. In order to use the panel fixed-effects model that can control unobserved

heterogeneity, the respondents who surveyed at least twice were used in the analysis, and the respondents who surveyed only once were deleted. As a result, the sample of analysis used 26,849 observations from 4,637 women in the study.

$$\begin{aligned} \text{Log Monthly Wage}_{it} = & \alpha_i + \beta_1 (\text{Number of Children})_{it} \\ & + \beta_2 (\text{Demographic Variables})_{it} \\ & + \beta_3 (\text{Measures of Human Capital})_{it} \\ & + \beta_4 (\text{Measures of Work Effort})_{it} \\ & + \beta_5 (\text{Measures of Compensating Differentials})_{it} \\ & + \mu_i + \nu_t + w_{it} \end{aligned}$$

where i indexes individual women and t indexes time (1998~2017)
 μ is the individual component of error,
 ν is the timewise component of error, and
 w is the random error.

We will use a panel fixed-effects regression model in this study. Using fixed-effects has the advantage of controlling individual characteristics which cannot be observed directly but stable for its lifetime. The fixed effect could absorb the unobserved heterogeneity.

It is assumed that motherhood affects women's wages, but the causality may be spurious. External variables can affect childbirth and wages at the same time. Examples of this include physical strength, health and cognitive abilities, or personal preferences for life trajectory. If a woman's academic ability is high, she knows that the opportunity costs are relatively high, so she is more likely to pursue a career-oriented life and delay having a family. Knowing that her health is poor and her opportunity costs are relatively low, she is more likely to have a child and may spend less effort on her career. If women tend to build a family when they are young, this can increase the number of female children and reduce their income. On the contrary, if she tends to be professionally successful, she will earn more money and have fewer or no children. Previous studies solved this problem using fixed-effect

models (Waldfogel 1997, Budig and England 2001, Anderson et al. 2002, Glauber 2007). Many other heterogeneities are not observable or difficult to measure. However, if such a characteristic can be assumed to be preset or constant for at least the working period, then it can be eliminated by adding the fixed effects. So this study also prefers a fixed-effects model than the OLS model.

The effect of the number of children on wages can be identified by counting the number of children variable. Considering that the influence of the number of children may not be linear, we used a set of dummies that shows one child and two or more children comparing to having no child.

If the coefficients of child dummies are negative in the fixed effect model, it means that there is motherhood wage penalty. To capture the volume of discrimination, we need to add productivity variables in the model. If coefficients of having a child are significant even after the variables related to productivity are controlled, this can be interpreted as discrimination beyond the differences in productivity.

Productivity variables consisted of three parts. The first is the size of the human capital. Human capital is measured by the level of educational attainment and years of job experiences. The level of educational attainment is simplified into a dummy – whether the respondent has high school diploma or less / college degree or higher. Years of job experiences are measured into two different ways – tenure and total job experiences as a wage worker throughout her life. Each squared term is added, considering that the career impact on wages is not linear.

Women may have less effort at work because of parenting and household work, even if they have the same productivity potentials. As a result, it is possible to choose a workplace

with weak labor intensity. We expect to capture the effect by adding working hour. The working hour variable is constructed into three set of dummies - less than 36 hours, 36~52 hours and more than 52 hours per week.

Some women prefer a child friendly working environment and may accept the less paid job offer for the preferred environment for parenting. It is called compensating differential. The workplace environment is difficult to measure directly. Instead we add the dummy for having a child under age 5.

Monthly Wages was used as a dependent variable and adjusted based on 2017 prices. The top and bottom 1% was considered an outlier and excluded. In addition, age and marital status were considered as demographic variables. The descriptive statistics of the variables used are shown in Table 1.

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Log Monthly Wages	26,849	4.998	0.532	1.066	7.851
Categories of Number of Births					
0 Child	26,849	0.173	0.378	0	1
1 Child	26,849	0.217	0.413	0	1
More than 2 Children	26,849	0.610	0.488	0	1
Demographic Variables					
Age	26,849	35.057	9.178	15	57
Dummy of Marriage	26,849	0.578	0.494	0	1
Human Capital Variables					
Education	26,849	1.369	1.338	0	3

Years of Tenure	26,849	4.116	4.998	0	37
Years of Tenure ²	26,849	41.922	101.863	0	1369
Years of Work Experience	26,849	7.362	5.595	0	37
Years of Work Experience ²	26,849	85.501	125.777	0	1369
Categories of Working Hours					
Dummy of Under 35 Hours	26,849	0.100	0.300	0	1
Dummy of Between 36 to 52	26,849	0.709	0.454	0	1
Dummy of Over 53 Hours	26,849	0.186	0.390	0	1
Dummy for Children Under 5 Years Old	26,849	0.152	0.359	0	1

IV. Results

Model 1 is the result of the OLS model. The coefficients of child dummies mean the average wage gap between mothers and non-mothers. Comparing to women without children, women with one child receive 9% less monthly wage and women with more than two children receive 22.3% less. But this cannot all be attributed to motherhood. There may be a third factor or a reversed causality concern.

To prevent this, model 2, which uses fixed-effects, demonstrates the control of individual unobserved heterogeneity. In Model 2, women with one child earn 8.7% less and women with two or more children 13.5% less than women without children. It is the volume of motherhood wage penalty.

But these differences are not all discrimination. In Model 3, which controls education and career, women with one child earn 7.9% less monthly wage and women with two or more children are 11.1% less than women without children. For women with two or more children,

model 3 showed a smaller difference than model 2. In addition, after controlling for working hours, women with one child earned 6.9% less monthly wages and women with two or more children 9.9% less than women without children. Finally, after controlling for the presence of children under 5, women with one child earned 6.4% less monthly wages and women with two or more children paid 9.6% less than women without children. In summary, there is a significant wage difference between mothers and non-mothers (more than 20% for women with two or more children).

Table 2. Results of Panel Regression on Log of Monthly Wage

	OLS	FEM	FEM	FEM	FEM
	Model 1	Model 2	Model 3	Model 4	Model 5
Number of Births					
1 Child	-0.090*** (0.010)	-0.087*** (0.009)	-0.079*** (0.009)	-0.069*** (0.008)	-0.064*** (0.009)
More than 2 Children	-0.223*** (0.009)	-0.135*** (0.009)	-0.111*** (0.008)	-0.099*** (0.008)	-0.096*** (0.008)
Age	0.004*** (0.000)	0.040*** (0.000)	0.013*** (0.002)	0.020*** (0.002)	0.019*** (0.002)
Dummy of Marriage	0.035*** (0.008)	-0.043*** (0.008)	-0.044*** (0.008)	-0.016* (0.008)	-0.011 (0.008)
Education			0.008 (0.007)	0.013 (0.007)	0.012 (0.007)
Years of Tenure			0.010*** (0.002)	0.010*** (0.001)	0.010*** (0.001)
Years of Tenure ²			0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Years of Work Experience			0.051*** (0.003)	0.040*** (0.003)	0.040*** (0.003)
Years of Work Experience ²			-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Dummy of Under 35 Hours				-0.376*** (0.008)	-0.376*** (0.008)
Dummy of Over 53 Hours				0.075*** (0.006)	0.075*** (0.006)

Dummy for Children Under 5 Years Old					-0.011 (0.007)
Constant	5.007*** (0.015)	3.717*** (0.017)	4.333*** (0.044)	4.154*** (0.042)	4.156*** (0.042)
N	26849	26849	26849	26849	26849
R-squared	0.033	0.288	0.318	0.398	0.398

Note: standard error in parentheses. * p<0.05, ** p<0.01, *** p<0.001

How does motherhood wage penalty and motherhood wage discrimination differ by educational level? Table 3 shows the above analysis divided into three educational groups. It shows the coefficients of having a child dummy only. Each model is equivalent to the same model in table 2 except that it does not have education at the list of independent variables.

In less than high school education, comparing to women without children, women with one child earned 3.6% lower wages, and women with two or more children earned 5.7% lower wages. In colleges with two or three years, comparing to women without children, wages for women with one child were as low as 9.5%, and comparing to women with more than one child, wages were 12.9% lower. In four-year college graduates and above, comparing to women without children, wages for women with one child were about 9.1% lower, while those with more than one child were 13.6% lower. In summary, wage discrimination occurs more often between two and three-year and four-year college graduates than high school graduates.

Table 3. Results of Panel Regression on Log of Monthly Wage by Educational Attainment

		Model 1	Model 2	Model 3	Model 4	Model 5
High or Under	1 Child	-0.052*** (0.015)	-0.065*** (0.015)	-0.058*** (0.015)	-0.046*** (0.014)	-0.036* (0.014)
	More than 2 Children	-0.177*** (0.013)	-0.080*** (0.015)	-0.070*** (0.015)	-0.061*** (0.014)	-0.057*** (0.014)

2, 3 Year College	1 Child	-0.128*** (0.018)	-0.133*** (0.019)	-0.104*** (0.018)	-0.087*** (0.017)	-0.095*** (0.019)
	More than 2 Children	-0.188*** (0.015)	-0.216*** (0.017)	-0.148*** (0.017)	-0.124*** (0.016)	-0.129*** (0.017)
4 Year College or Higher	1 Child	-0.086*** (0.016)	-0.077*** (0.014)	-0.082*** (0.014)	-0.082*** (0.013)	-0.091*** (0.015)
	More than 2 Children	-0.155*** (0.014)	-0.145*** (0.014)	-0.135*** (0.014)	-0.130*** (0.013)	-0.136*** (0.014)

Note: standard error in parentheses. * p<0.05, ** p<0.01, *** p<0.001

In the following, we will look at how different jobs are different in the same education level. At this time, we combine 2, 3 year college graduates with 4 year college graduates or higher. Table 4 shows the coefficients analyzed according to occupations of women who have been educated below high school. In the manager / professional group, comparing to women without children, women with one child earned 9.7% lower wages, and women with two or more children earned 7.1% lower wages. In semi-professional group, comparing to women without children, women with one child earned 10.3% lower wages, and women with two or more children earned 19.6% lower wages. In clerical, sales or service worker, comparing to women without children, women with one child earned 2.4% lower wages, and women with two or more children earned 6.2% lower wages. In manual worker, comparing to women without children, women with one child earned 1.0% lower wages, and women with two or more children earned 3.0% lower wages. In summary, motherhood wage discrimination is the largest in the semi-professional group, followed by manager / professional group, clerical, sales or service worker, and manual worker.

Table 4. Results of Panel Regression on Log of Monthly Wage by Occupation (High School or Less Education)

	Model 1	Model 2	Model 3	Model 4	Model 5
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Manager/ Professional	1 Child	-0.139* (0.054)	-0.113 (0.064)	-0.101 (0.064)	-0.114 (0.062)	-0.097 (0.065)
	More than 2 Children	-0.05 (0.051)	-0.107 (0.066)	-0.043 (0.069)	-0.070 (0.067)	-0.071 (0.067)
Semi- Professional	1 Child	0.063 (0.050)	-0.043 (0.055)	-0.076 (0.054)	-0.083 (0.054)	-0.103 (0.054)
	More than 2 Children	-0.023 (0.042)	-0.159** (0.056)	-0.180** (0.057)	-0.190*** (0.056)	-0.196*** (0.056)
Clerical, Sales or Service Worker	1 Child	-0.067*** (0.019)	-0.034 (0.020)	-0.026 (0.019)	-0.022 (0.018)	-0.024 (0.019)
	More than 2 Children	-0.162*** (0.016)	-0.086*** (0.019)	-0.063*** (0.019)	-0.061*** (0.017)	-0.062*** (0.018)
Manual Worker	1 Child	-0.018 (0.027)	-0.037 (0.030)	-0.043 (0.030)	-0.013 (0.028)	-0.010 (0.027)
	More than 2 Children	-0.178*** (0.024)	-0.017 (0.032)	-0.060 (0.032)	-0.027 (0.030)	-0.030 (0.030)

Note: standard error in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5 shows the coefficients divided by occupation by women who have been educated over 2 years college and over 4 years college. In the manager / professional group, comparing to women without children, women with one child earned 5.8% lower wages, and women with two or more children earned 11.0% lower wages. In semi-professional group, comparing to women without children, women with one child earned 3.9% lower wages, and women with two or more children earned 17.4% lower wages. In clerical, sales or service worker, comparing to women without children, women with one child earned 11.5% lower wages, and women with two or more children earned 10.4% lower wages. In manual worker, discrimination showed the largest coefficient value, but it was not statistically significant in the overall model. In the semi-professional group, women with more than college education were more discriminated against than those who had been educated below high school. In addition, discrimination among women with more than college education was stronger in all occupations than women with less than high school education.

Table 5. Results of Panel Regression on Log of Monthly Wage by Occupation (2 Years College and Over 4 Years College)

		Model 1	Model 2	Model 3	Model 4	Model 5
Manager/ Professional	1 Child	-0.085*** (0.018)	-0.042* (0.017)	-0.046** (0.017)	-0.050** (0.017)	-0.058** (0.019)
	More than 2 Children	-0.125*** (0.016)	-0.102*** (0.017)	-0.103*** (0.016)	-0.105*** (0.016)	-0.110*** (0.017)
Semi- Professional	1 Child	-0.074** (0.029)	-0.066* (0.028)	-0.036 (0.027)	-0.031 (0.027)	-0.039 (0.029)
	More than 2 Children	-0.142*** (0.024)	-0.228*** (0.027)	-0.181*** (0.028)	-0.168*** (0.027)	-0.174*** (0.029)
Clerical, Sales or Service Worker	1 Child	-0.125*** (0.018)	-0.124*** (0.017)	-0.126*** (0.017)	-0.111*** (0.016)	-0.115*** (0.018)
	More than 2 Children	-0.199*** (0.015)	-0.157*** (0.017)	-0.127*** (0.016)	-0.101*** (0.016)	-0.104*** (0.016)
Manual Worker	1 Child	-0.182* (0.083)	-0.064 (0.093)	-0.008 (0.095)	0.028 (0.093)	0.175 (0.106)
	More than 2 Children	-0.393*** (0.073)	0.109 (0.112)	0.124 (0.111)	0.128 (0.110)	0.234* (0.115)

Note: standard error in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

V. Conclusion

This study confirmed that there is a difference in wages due to motherhood within women in South Korea. It was also confirmed that there is motherhood wage discrimination that cannot be explained by productivity differences. This difference and discrimination differed according to the level of education. Higher education is more vulnerable. Women in the semi-professional occupation group with college degree or higher were the most vulnerable. For women, wage discrimination appears to be the highest if they do not grow into management professions.

The finding is different in the United States. Choi (2011) found that there is less discrimination in the professional and semi-professional groups and more discrimination in the manual workers. In contrast, this study found that the discrimination occurs more seriously in professional occupations and less in manual workers. Especially among highly

educated women who have semi-professional job are suffering from the biggest discrimination.

It implies that being a mother is penalized seriously in the labor market of in South Korea. Many women have experienced career interruption for childbearing and rearing. It generates negative effects beyond the loss of job experiences. Especially women who have college degree but fail to promote managerial jobs or to build their career to professional jobs and remain at semi-professional jobs are the most serious victim of motherhood wage discrimination.

Note that the accuracy of discrimination studies depends on how well the productivity is measured. Insufficient productivity measures may overestimate the volume of discrimination. In addition, if this productivity measures include the influence of discrimination, there is risk of underestimation of the discrimination.

In this study, it may not be good enough to fully capture the volume of human capital by education dummy and two types of job experience. Working hours and having a child under age 5 may be incomplete to measure work effort and compensating differentials. If then, there is a risk of that the estimated discrimination could be bigger than the actual discrimination. The opposite is also possible. If a variable which is expected to capture the productivity, but it is also related with the discrimination, the estimated discrimination could be smaller than the actual discrimination. For example, if a mother has a part-time job with no preference because she is allowed to have only part-time job, the estimated discrimination will be smaller than the actual discrimination. In addition, if a mother who has a child under age 5 are being discriminated in the labor market more, the last model will fail to capture that amount of discrimination.

We admit that there is a risk of overestimation or underestimation of discrimination at this study. But the comparison of models which have productivity measures can tell the difficulty of being mother in South Korea. They are suffering from sizable wage gap which cannot be explained by productivity differentials. It can be regarded that there is motherhood wage discrimination in South Korea. It implies that the difficulty of being mother in the labor market still exists or is not much changed even though the gender wage gap is shrinking. To fully understand their difficulties, it is needed to see the gender gap as well as motherhood gap within women.

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