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Abstract

Is there wage differential by parenthood? If then, how is it different by gender and cohort? This study is to study motherhood penalty and fatherhood premium in South Korea using the Korean Labor and Income Panel Study (KLIPS) data. In the essence of the study overall, men have gained the fatherhood premium, while women do not. In addition, the fatherhood premium is getting weaker, but the motherhood penalty is getting stronger in Korean case. It shows that young generation including young men are suffering from wage penalty due to parenthood.

Keywords: Fatherhood Premium, Motherhood Penalty, Parenthood Wage Differential, Generation, South Korea

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I. Introduction

Even in the same gender group, the wage could be different by parenthood. In general, mothers wage is lower than non-mothers among female workers. This phenomenon is called motherhood wage penalty. It may come from career interruption, compensating differentials for child-friendly working environment, less work effort to save energy for home duties, or simply discrimination (Budig & England, 2001). On the contrary, the wage of a male is relatively increased when it becomes a father, and this phenomenon is called the fatherhood premium.

The purpose of this study is to examine whether there is mother penalty or father premium in South Korea. If there is such a parenthood penalty and premium, we will analyze the size and shape by age and the changes by birth cohorts. We will use the longitudinal data from 1998 to 2016 of the Korean Labor and Income Panel Study (KLIPS) provided by the Korea Labor Institute.

II. Related Literature

Motherhood Penalty

In many countries women pay a wage penalty, but men receive a wage premium in the labor market. Parenthood penalty and premium are caused by the household specialization: married men are concentrated on wage-earning while their wives devote to household chores and childcare (Killewald & Gough, 2013). It is the result of a career break because women usually play a role in raising their children, and even if they return to the labor market, they are discriminated against. Budig & England (2001) pointed out four major determinants of motherhood penalty that are *"(1) lose job experience, (2) be less productive at work, (3) trade*

off higher wages for mother-friendly jobs, or (4) be discriminated against by employers" (p. 204). The mechanism of the motherhood penalty is that it is the key that women are less devoted to the workplace. In the labor market, mothers have been treated as less skilled and dedicated workers than other types (Anderson, Binder & Krause, 2002; Budig & England, 2001; Cooke, 2014). Recent research has been expanding to examine what aspects of the motherhood penalty are, what the causes are, and how they appear according to age and income. Budig, Misra & Boeckmann (2012) found that culture and policy were an important to motherhood penalty. Kahn, García-Manglano, & Bianchi, S. M. (2014) found that motherhood penalty was seen in younger women, but the effect disappears in their 40s and 50s. Killewald & Bearak, (2014) confirmed the opposite of Budig and Hodges's assertion that the motherhood penalty is not large for women of low incomes.

The motherhood penalty has been reported in the United States, however recent trend of motherhood penalty declined by transforming the labor market structure as to "mother-friendly" characteristics as known as "gender revolution" and "grand gender convergence" (England 2010; Goldin 2014). Recently Glauber (2018) concluded that motherhood penalty was eliminated, though fatherhood premium exists. Motherhood penalty is reported not only in the United States but also in the many other countries. Aisenbrey, Evertsson & Grunow (2009) found that motherhood penalty was a significant in Germany and Sweden and effects of motherhood penalty were a critical even in "woman-friendly" Sweden. Boye, Halldén & Magnusson (2017) found that Swedish gender wage gap had been decreased in the 1970s, but fell into a stagnation since 1980s. Cooke (2014) found that parenthood penalty and premium were reflected relative socio-economic conditions by comparing United States, United Kingdom and Australia. Okoshi et al (2016) found that parenthood penalty and premium in Japanese surgeons. Mu & Xie (2016) examined the causal effects of fertility on parents in China

and found that parenthood penalty and premium were not supported for one child policy. There is a study in South Korea. Ihm's study (2010) focus on women's case and she reported that wages of women with children under the age of 6 were reduced by 2%, and women with children between the ages of 6 and 18 underwent a wage drop of about 8% in South Korea.

Fatherhood Premium

The fatherhood premium means that men have a benefit from wages by having a child (Hodges & Budig, 2010). The reason that men earn wage gains is because responsibility for family support encourages working motivation (Ashwin & Isupova, 2014). This approach consists of a division of traditional gender roles, a sort of selection and concentration. The fatherhood premium is customarily formed within the workplace because men tend to concentrate more on work at the same time as marriage. Therefore, it can be said that the fatherhood premium is the result of reflecting all the cultural and biological characteristics. The previous researches are exploring the cause and mechanism of the fatherhood premium. Killewald (2013) found that married, residential, biological factors were crucially positive to fatherhood premium. Hodges & Budig (2010) found that fatherhood premium was explained by workplace of masculinity such as white, married, traditional gender division and physical strength (Hodges & Budig, 2010). Lundberg & Rose (2002) found that gender of a child were an important factor to determine a magnitude of fatherhood premium. Ashwin & Isupova (2014) found that marriage motivated men to work harder and to take a responsibility to the housekeeping, monitoring and childcare.

III. Data and Methodology

Data and Measurement

We use 1998-2017 KLIPS. KLIPS has advantages in the field of labor market

characteristics and it also have information on fertility at individual level. The analytical sample used in the study was limited to wage workers, excluding self-employed and unpaid employees. Of the wage workers, we exclude the lower 1 percent (22.24 million won, 941 observations) and the upper 1 percent (704.6 million won, 937 observations) from the sample as we regard them as outliers. Because we want to see the effect of parenthood at the labor market and fertility, we exclude the observations who were too young (below age 25) or too old (more than age 50). Since we adopt fixed effect model, we also exclude respondents who has observed only once during the survey years. It makes the final analytical sample size to be 61,695 observations from 10,680 persons.

The dependent variable used in this study is the natural log of monthly wages after taxes at the respondent's current job. Considering the monetary value changes by years, we adjust the amount of wage using GDP deflator based on 2017. The core independent variables were based on the number of children and respondents' responses at the time of the survey. Demographic variables included age, dummy of marriage, and education. Labor variables include years of continuous service, weekly working hours and dummy of full-time job.

The baseline statistics of the variables used in this study are shown in Tables 1 by gender. From 1998 to 2017, there are 5,985 male respondents and 4,695 female respondents, respectively. The total sample size is 38,437 for males and 23,268 for females. In the basic statistics, it is noteworthy that there is a sizable gender wage gap. The wage of men is about 2.65 million won, while the wage of women is about 1.72 million won, about 65% of men. In terms of the number of years of continuous service, males average 6.1 years and 4.5 years for females, and men have a longer service life than females for two years. Working hours per week were 50 hours for males and 46 hours for females and males were about 4 hours longer than females. The percentage of full-time workers is 98% for males and 90% for females, and

males are about 8% higher than females.

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Male (5,985 persons)					
Monthly Wages	38,437	265.358	119.961	22.865	704.6
Number of Births	38,437	1.429	0.895	0	5
Age	38,437	36.939	6.551	25	49
Dummy of Marriage	38,437	0.702	0.457	0	1
Education	38,437	1.635	1.305	0	3
Years of Continuous Service	38,437	6.098	5.984	0	34
Weekly Work Hours	38,437	49.874	10.639	20	84
Dummy of Full Time Job	38,437	0.979	0.142	0	1
Female (4,695 persons)					
Monthly Wages	23,268	172.500	94.250	22.96	704.6
Number of Births	23,268	1.570	0.929	0	5
Age	23,268	36.629	7.285	25	49
Dummy of Marriage	23,268	0.671	0.470	0	1
Education	23,268	1.449	1.269	0	3
Years of Continuous Service	23,268	4.482	5.112	0	35
Weekly Work Hours	23,268	45.578	10.591	20	84
Dummy of Full Time Job	23,268	0.895	0.306	0	1

Empirical Strategies

In order to examine what factors are related to the wage differential analyzed, we will

analyze the panel based on labor market characteristics. We conduct a regression analysis using a Fixed-Effects Model (FEM) that reflects individual characteristics. Ordinary Least Squares (OLS) estimation is not appropriate because the data used in the study is panel data that was observed repeatedly for each respondent. In addition, life paths can vary with family-oriented or career-oriented tendencies. This may affect the number of children but may cause an omitted variable issue because preferences can affect children as well as fail to control a third variable that affects wages. Failure to control this may raise endogeneity problem. In other words, a FEM and marital status is additionally controlled. Marital status is the most representative variable that reveals family-oriented or career-oriented tendency. In addition, if the preference tendency does not change easily and can be assumed to remain constant after adulthood, it can be solved through a FEM following the previous studies on motherhood penalty (Anderson, Binder, & Krause, 2002; Budig & England, 2001; Choi, 2011; Glauber, 2007). It assumes that traits that do not change from person to person during repeated observations between the ages of 25 and 49 could be controlled by individual dummies.

The estimation equation is as follows.

$$y_{it} = \beta_1 Numbere\ of\ Children_{it} + \beta_2 (Control\ Variables)_{it} + C_{it} + \delta_i + \varepsilon_{it}$$

IV. Results

As the first stage, to find out whether there is a wage differential by parenthood, We grouped the observations into three groups – having no child, having only one child, and having two or more children.

Figures 1 and 2 show the trend of monthly wage by age for each gender by applying the lowess smoothing based on the number of children. Figure 1 shows that for males, the

wages of males without children are higher than those of one child and two children from ages 25 to the early 30s, but the lowest wage is from the point beyond age 35. One child's male was lower than the male with no children from the age of 25 to the early 30s, but it increased from age 35 and later increased. For males with two or more children, the lowest level was between age 25 and 30, but later the highest wage level. It suggest that men with more children are more likely to have higher wages, which means fatherhood premiums.

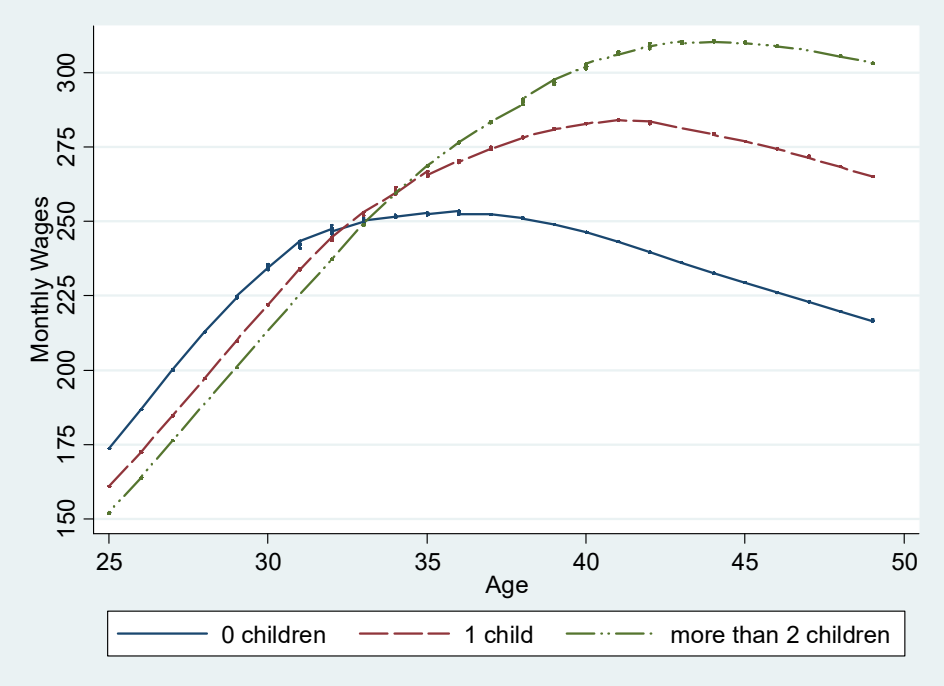

Figure 1. Lowess Graph of Monthly Wages by Number of Births in the South Korea (Male)

Figure 2 shows that for women, wages are highest in all ages for women without children. Women with one child had lower wages than women without children, but higher wages than women with two or more children. Women with two or more children showed lower wages than women without children and women with one child. Contrary to men, women are more likely to have less wage when they have more children, which implies motherhood penalty.

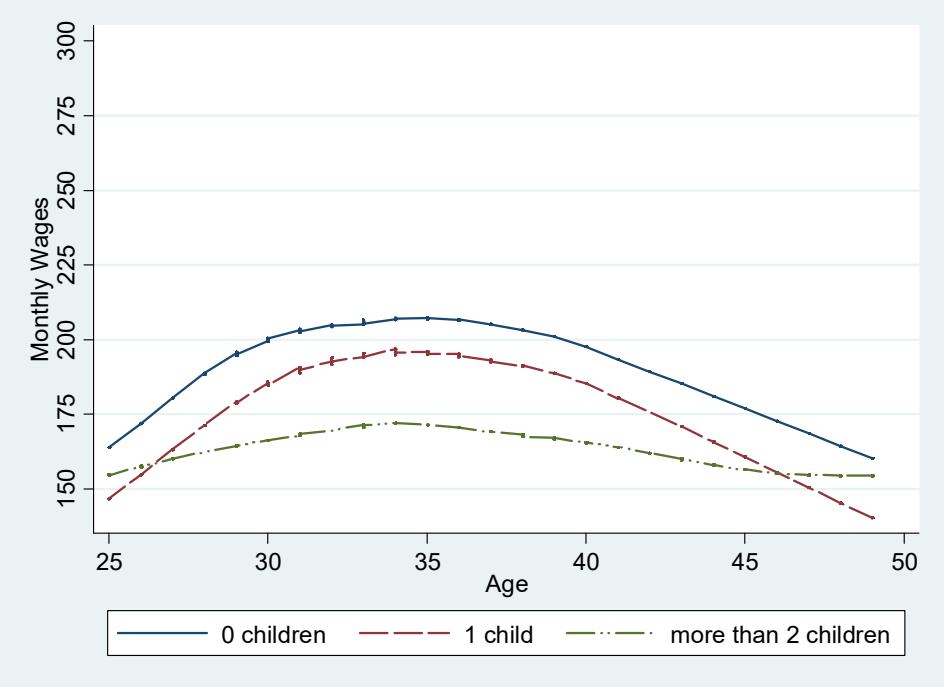

Figure 2. Lowess Graph of Monthly Wages by Number of Births in the South Korea (Female)

Are the parenthood wage differentials the same across cohorts? We divide the observations into three birth cohort groups; cohort in the 1960s, cohort in the 1970s, and cohort in the 1980s. Tables 2 shows the average monthly wages by gender and cohorts at age 30s and 40s. For men, premiums were observed for cohorts in the 1960s and 1970s, with premiums higher in their 40s than in their 30s. The cohort of the 1980s, however, showed different results. In the 1980 cohort, men without children had the lowest wages, but the gap was not large, men with one child were 1.6% higher and men with two or more children were only 3.5% higher. Since most of them are not yet in their 40s, current data cannot tell what will happen in their later lives, but unlike the previous generation, there is a possibility of premium deterioration. Females, on the other hand, showed a different trend, with cohorts tending to be less penalized in the 1970s than in the 1960s. The average wage level of women with one child in these cohorts was not significantly different from women without children. However, the penalty

appeared in the 40s, but weaker than the cohort in the 1960s. However, in the 1980s, the cohort appeared to be more penalized. In the cohort, women without children in their 30s were 7.5% higher than women with one child and 12% higher than women with two children.

Table 2. Average Monthly Wages by Gender, Cohorts, and Parenthood at age 30s and 40s

	Male			Female		
	1960s	1970s	1980s	1960s	1970s	1980s
Age 30s, no child	205.0	258.0	276.1	176.4	211.5	225.3
1 child	219.3	274.2	280.6	150.2	211.6	208.4
More than 2	236.9	300.2	285.7	133.6	190.1	198.3
Age 40s, no child	221.6	263.1		167.9	217.3	
1 child	277.9	323.9		154.7	210.3	
More than 2	323.5	366.8		156.6	197.8	
Age 30s, no child	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
1 child	107.0%	106.3%	101.6%	85.1%	100.0%	92.5%
More than 2	115.6%	116.4%	103.5%	75.7%	89.9%	88.0%
Age 40s, no child	100.0%	100.0%		100.0%	100.0%	
1 child	125.4%	123.1%		92.1%	96.8%	
More than 2	146.0%	139.4%		93.3%	91.0%	

Note: the unit of the number is 10,000.

The Results of Regression

Table 3 shows the regression results. The model 1 is OLS estimates controlling for age and marital status. The coefficient of number of births is 0.1% which means that men's wages become higher by 0.1% when they have one additional child even though it is not statistically significant. The model 4 is the same model applied to women. Women's wages become lower by 6.5% when they one additional child. The different direction and amount of changes is clear. But it may not come from parenthood directly. There is a risk of reversed causality. It is a reason

why we need to move to the next model, fixed effect model.

Table 3. Results of Panel Regression on Log of Monthly Wage

	Male			Female		
	Model 1 OLS	Model 2 FEM	Model 3 FEM	Model 4 OLS	Model 5 FEM	Model 6 FEM
Number of Births	0.001 (0.002)	0.008** (0.003)	0.006* (0.002)	-0.065*** (0.004)	-0.037*** (0.004)	-0.028*** (0.003)
Age	0.037*** (0.000)	0.043*** (0.000)	0.038*** (0.000)	0.026*** (0.000)	0.038*** (0.000)	0.034*** (0.001)
Marital Status (married=1)	0.124*** (0.005)	0.115*** (0.006)	0.102*** (0.006)	-0.118*** (0.008)	-0.068*** (0.008)	-0.032*** (0.008)
Education (ref=H.S)						
High school or lower			-0.055 (0.046)			0.002 (0.066)
2-3 year college graduates			0.011 (0.024)			-0.026 (0.023)
4 year-college graduates or higher			0.091*** (0.021)			0.084*** (0.025)
Years of Continuous Service			0.015*** (0.001)			0.018*** (0.001)
Years of Continuous Service^2			-0.000*** (0.000)			-0.000*** (0.000)
Weekly Working Hours			0.003*** (0.000)			0.008*** (0.000)
Full Time/Part Time(full=1)			0.213*** (0.012)			0.237*** (0.009)
Constant	3.978*** (0.012)	3.793*** (0.012)	3.514*** (0.022)	4.181*** (0.018)	3.728*** (0.019)	3.182*** (0.027)
R-Squared	0.067			0.038		
R-Squared, within between overall		0.487 0.234 0.813	0.413 0.075 0.170		0.612 0.256 0.852	0.351 0.000 0.035
N	38437	38437	38437	23268	23268	23268

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

In FEM models 2 and 5, where age and marital status are controlled, the size of coefficient of number of births become smaller comparing to the equivalent model 1 and model 4. Additionally, controlling for unobserved heterogeneity which is expected to be related with individual preference on the life track, men's wages become 0.8% higher when they have one more child. The premium exists, but it is close to "0". Women's wages become 3.7% lower when they have one more child even at FEM. It could be said that women is suffering from motherhood penalty.

In models 3 and 6, where the variables representing human capital, educational attainment, job experience, and other labor market characteristics were further controlled, men received a 0.6% premium, while women had a 2.8% penalty. In other words, even after controlling human capital, males were found to have a small but premium by parenthood, but females were penalized, indicating a change in gender wage.

Table 4. Coefficients of number of children at the variety of Regression models by Cohort

	Male			Female		
	1960s	1970s	1980s	1960s	1970s	1980s
OLS with age and marital status	0.049*** (0.006)	0.009*** (0.003)	-0.025*** (0.005)	-0.002 (0.010)	-0.052*** (0.005)	-0.053*** (0.006)
FEM with age and marital status	0.045*** (0.006)	0.008* (0.003)	-0.026*** (0.006)	0.024* (0.011)	-0.045*** (0.005)	-0.053*** (0.007)
FEM, full model	0.042*** (0.006)	0.008** (0.003)	-0.021*** (0.006)	0.024* (0.010)	-0.032*** (0.005)	-0.046*** (0.007)

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

Table 4 shows the results of regression analysis classified by cohort. OLS with control variables of age and marital status corresponds to models 1 and 4, FEM with age corresponds to models 2 and 5, and full model corresponds to models 3 and 6, showing only the coefficients

of number of birth in each model. For men born in the 1960s, premiums are found, and in FEMs that control human capital, a significant premium is found at 4.2% per child, but in the 1970s this influence is diminished (<0.01%), whereas in the 1980s Penalty appeared (-2.1%). The size of penalty is weaker than women of the same age.

For women born in the 1960s, motherhood effect is statistically insignificant in the OLS model, but turned to premium in the FEM. For women born in the 1960s, women's career advancement can vary considerably depending on social life and family preferences. The FEM, which controls these unchanged characteristics of individuals, appears to be a premium, implying that the characteristics of women in the 1960s, who have a workplace, may differ from those of ordinary women. In the 1970s, all three models showed penalties, and even after controlling for human capital, a 3.2% penalty was observed. Born in 1980, these traits were further strengthened, increasing the penalty to 4.6%. It is characterized by the fact that the current young generation's difficulties related to childbirth are seen by both men and women.

V. Conclusion

Is there wage differential by parenthood in South Korea? This study shows that there is fatherhood premium, but its effect is marginal. After controlling for unobserved heterogeneity within a personal life and other productivity-related variables, the premium becomes less than 1 % when a man has one more child. On the contrary, women are suffering from motherhood penalty. The wage gap by motherhood is 8.6%. More than half of them can be explained by unobserved heterogeneity. Even after controlling for human capital measured by educational attainment level and years of current job experiences and job characteristics such as working hours and full time/part time, the penalty remained.

Are there changes of wage differential by cohort and gender? We found the same direction regardless of gender – strengthen of penalty.

For women, the penalty becomes stronger for younger generation. The reason is not clear. But we may suggest several possible answers. First, for 1960 cohorts, it is not common for women to have jobs like men. For young generation, women's labor market participation becomes popular. So, in the past, discrimination happened to all female worker regardless motherhood. Nowadays, people narrow down the victims to the specific group who has the characteristics for discrimination – mothers. The diverge between mothers and non-mothers are formulated. Secondly simply discrimination may increase in recent years. The recurrent economic crisis, and intensive competition in the labor market may make the people to have more hostile mind. Thirdly, the effect of self-selection was bigger among old generation. When women's job is not much popular like old generation, the difference of life trajectory between mothers and non-mothers would be bigger. The reversal of wage gap to the premium among 1960 cohorts can be understood by the effect of unobserved heterogeneity absorbed in fixed effect.

For men, old generation who was born in 1960s enjoyed the sizable fatherhood premium. The amount of premium becomes smaller and smaller. Even to the young generation who was born in 1980s, the premium changes to penalty. It is the most interesting findings for us. It could give an answer for the question - why young men are hesitant to have more children. The intention to low fertility may come not only from young women but also from young men.

But we need to be cautious to conclude that there is a reversal of trend from premium to penalty among young men. The fatherhood premium is small or unclear at the early ages and grows at the later ages. The ages of 1980 cohorts are still 30s even at the most recent wave of KLIPS. As the point of having a first job and establishing at the labor market are postponed

further and further, 30s may be too early to find the premium. Nevertheless, the overall trend of fatherhood premium confirms that it is shrinking for younger generation.

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