Women's Wages and Fertility Hazards in South Korea

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Abstract

In an attempt to understand lowest-low fertilities in South Korea, this paper assesses the relationship between women's wages and fertility hazards. Both women's wage levels and the percentages of women's wages in household income have been considered to evaluate gender equity theory. Drawing data from the Korea Labor and Income Panel Study 1998-2008, we fit the data into the Cox proportional hazards model. We find that women whose monthly wages were more than 2 million KRW were more likely to give birth to a first child than those earning up to 1 million KRW. Women out of the labor force were more willing to bear a second child than any other women. Women whose wages were between 30% and 70% of household income were least likely to deliver a second child. These results suggest that policy formulation should focus on promoting gender equity in work and family to boost lowest-low fertility rates.

Key words

Women's wage, fertility hazards, gender equity, child parity

Introduction

For the last four decades, total fertility rates in South Korea (hereafter Korea) have dropped unprecedentedly. To illustrate, the total fertility rate was 4.530 in 1970, but decreased below the replacement level of 2.1 in 1984 (Statistics Korea, 2015). Korea plunged into the lowest-low fertility of 1.3 in 2001 (Kohler, Billari, & Ortega, 2002) and failed to get out of this category even by 2013, when the total fertility rate was 1.187. Due to concerns over economic and social consequences of the lowest-low fertilities, scholars and experts have actively investigated various factors behind the delay or postponement of childbearing behaviors

(for a brief overview, see Eun, 2003; Frejka, Jones, & Sardon, 2010). For instance, T. Kim, Lee, and D. Kim (2006) evaluated the decennial census from 1980 to 2000 to associate the emergence of low fertility with rapid urbanization and the expansion of higher education for women. Comparing differential fertility before and after the 1997 Asian economic crisis, a study reported that women from high-level socioeconomic backgrounds moved from a high to low fertility schedule (D. Kim, 2009).

Notwithstanding this strong body of literature, differential fertility according to women's wage levels and their shares in total household income has rarely been a main topic of study in the Korean context. We can locate only a couple of articles that address our first research question and none for the second. Analyzing the 2006 Survey on the National Fertility, Family Health and Welfare, Min (2008) found negative effects of women's wage on fertility hazards of first and second childbirth. In a similar vein, Kim reported that "the increase in female wage by 10 percent leads to a decrease in second birth hazard by 0.56~0.92 percentage points" (J. Kim, 2009, p. 106).

This article fills the gap by attempting to evaluate the effects of women's wage on fertility hazards. The study subject is one of the crucial issues in the current Korean society, particularly because the government keeps trying to allure women who are out of the labor force into the labor force by creating bad, temporary, and low wage jobs (Yeo, S. Kim, E. Kim, & Choi, 2013). If women with low wages are found to register low fertility hazards, it is not difficult to infer that the current policy of job creation will have directly opposite effects to its intent of boosting lowest-low fertility rates.

In addressing this controversial topic, the current study extends beyond the previous studies in several critical aspects. First and foremost, we will present theoretical formulations on the relationship between women's wages and fertility hazards grounded on economic, sociological, and demographic research. In addition, both women's wage levels and the percentage in household income have been considered to evaluate gender equity theory. Further, we use nationally representative, prospective longitudinal data, which is starkly contrasted with previous research that examined retrospective cross-sectional data. So our results presented in this article can be safely considered to provide stronger in-

ferences than ever before (Wooldridge, 2002). Throughout this paper, we apply the Cox proportional hazards model to parity specific datasets, as several previous articles have demonstrated that the same factor would affect fertility differently depending on child parity via distinct theoretical mechanisms (Kim, 2007; Stolzenberg & Waite, 1977).

Theoretical Backgrounds

Regarding the relationship between women's wages and fertility, the most basic economic theory predicts that higher wages lead to greater fertility hazards (Becker, 1960). This argument makes sense because, other things being equal, higher wages can be translated into greater purchasing power in terms of economic resources for children. Given that bearing, delivering, and rearing children costs a significant amount of material goods, women postpone or forgo childbearing when they do not have sufficient disposable income, whereas those who enjoy high wages can afford an additional child. Thus, under this economic resource framework, we envisage the positive effect of women's wages on fertility hazards (Do & Choi, 2013). Note that the economic resource argument may be applied to different levels of parity, such that women's high wages act as a benevolent factor enhancing fertility risk regardless of a parity distinction.

However, what puzzled Becker is the negative relationship between household income and fertility. Becker's economic theory (Becker, 1960; Becker & Lewis, 1973) attempted to solve this conundrum by introducing child quality versus quantity even though the theory has been widely criticized for being too simplistic and non-feminist, if not anti-feminist, in part because it failed to distinguish two cooperative but many times conflicting actors: husband and wife (e.g., Folbre, 1983). Unlike child quantity, child quality is elastic to income such that demand for child quality increases as income rises, resulting in higher costs for an additional child. Therefore, Becker predicted that the desired number of children would decrease as household income increased. According to this child quality and quantity theory, women's high wages may decrease childbirth hazards. With regard to child parity, we anticipate that high wages have greater negative effects for high parity than low wages because women who earn high wages are more likely to invest resources

in raising already born child(ren) than in bearing another child.

The third economic theory hinges on the concept of opportunity cost. Having a child not only means spending economic resources but also involves opportunity cost, which implies a difference between alternative utilities that women can purchase and utilities related to a child. Time or leisure has been widely cited as the most important mediator converting one opportunity cost to another in this respect (Becker, 1965). More specifically, an hour spent on children would cost much more for women with high wages, such that these women would maximize utilities by reducing the number of children. However, the opportunity cost increases further when we consider the careers of women in the labor market. It has been repeatedly demonstrated that women returning to the labor market after delivering a child confront low wages, precarious employment, and unfavorable working conditions (Budig & England, 2001). Thus, women with high wages who also tend to be ensconced in an agreeable working environment are likely to relinquish those benefits and fall to relatively lower-status jobs by deciding to give birth to a child. In this line of research, we find another reason for women with high wages to delay or forsake childbirth.

It is not easy to determine whether the opportunity cost would increase or decrease with an additional child. If we narrow our focus to household chores involved in childbearing and childrearing, then economies of scale and experiences with previous children would reduce the opportunity cost as women move to higher levels of parity. However, note that this reduction is based on the simple comparison between, for instance, a first child and a second child. Assuming increasing marginal costs, the price for an additional child is likely to be more prohibitive for higher levels of parity. With consideration of jobs and careers, the opportunity cost also looms larger for higher levels of parity, particularly if job opportunities are more restricted for older mothers. This statement cannot be truer than in Korea, wherein women workers are expected to work overtime with labor-intensive workloads but with low wages (Monk-Turner & Turner, 2008; Patterson & Walcutt, 2013).

Sociological theories regarding role conflict and role balance provide additional theoretical grounds for formulating the effect of high wages on fertility hazards. Role conflict theory states that there is a conflict

between the roles of mother and worker, such that working women confront difficulties in bearing and rearing children (e.g., Sung, 2003). By contrast, role balance theory posits harmless compatibility, if not beneficial substitution, between two roles as far as women "become fully engaged in the performance of every role in" work and family (Marks & MacDermid, 1996, p. 421). For instance, lively interactions with a child may refresh women who undergo frustrating events in the labor market. Clearly, jobs with high wages are demanding and exacting, particularly jobs that are occupied by women in the prime period for childbearing when they struggle at the entry level (Bianchi & Milkie, 2010). In this vein of reasoning, it seems reasonable to state that role conflict theory prevails over role balance theory leading to the negative effect of high women's wages on childbirth hazards.

Role conflict theory evolved to gender equity theory, which has been a dominant theory explaining the low and lowest-low fertility in industrialized societies for more than a decade (McDonald, 2000). Adopting a cross-national perspective, McDonald argued that the emergence of very low fertility could be attributable to unequal advances in gender equity between individual-oriented and family-oriented institutions. In his view, "when gender equity rises to high levels in individual-oriented institutions while remaining low in family-oriented institutions, fertility will fall to very low levels" (McDonald, 2000, p. 437). We can draw several different hypotheses on the effect of women's wages on fertility hazards by applying gender equity theory.

Women with high wages feel more obligated toward work because jobs affording high wages tend to be more competitive, calling for individualistic commitment. Other things being equal, women with high wages are thus more likely to postpone or relinquish the choice to bear a child. In this respect, it is of particular interest to note the phenomenon of the "marriage strike," which refers to the tendency for highly successful women to delay or even forgo marriage because they refuse to accept traditional Confucian values of family (Hwang, 2014). If this is the case, we will observe a negative relationship between wage and fertility hazards because a large portion of Korean childbirth occurs within marriage (only 2.1 percent of childbirth was out-of-wedlock in 2013 [Statistics Korea, 2015]).

However, it is doubtful to assume "other things being equal," particularly given the context of assortative mating in Korea. For instance, women with high wages are likely to partner with males with high educational attainment and high wages who are in turn more willing to assist, help, or share household work and childrearing burdens (Kravdal & Rindfuss, 2008). In the latter case, women with high wages feel more equitable, which promotes fertility hazards.

We can draw the other implication from gender equity by asking whether women's wage can be treated as a prism of gender equity. If we think of a nuclear family as a joint enterprise between a husband and a wife, then it seems inevitable that wives who contribute more to household income are more likely to command household resources, and household labor is more likely to be equally shared with their husbands. If women feel comfortable managing the work and responsibilities that are involved in childbirth, then they will be eager to give birth to a child. The more women contribute to household income, the more likely they are to enjoy gender equity, resulting in higher fertility hazards. In this regard, we will test the effect of women's wage percentage in household income in addition to women's wages per se on fertility hazards.

However, the same gender equity theory may lead to a totally different fertility behavior if we take son preference into account. Even though Korea has observed a rapid decline in son preference in recent years (Chung & Das Gupta, 2007), there still remained noticeable differences in numbers of births by gender, particularly in higher parities, throughout our study period. For instance, in 1998 the number of male births per 100 female births was 108.1, and 105.6 in 2008 for the second childbirth (Statistics Korea, 2015). In this context, it seems reasonable to predict that women with high wages will exhibit low childbirth hazards because they feel empowered to voice their own reproductive rights and are less affected by the strong son preference of other family members.

Thus far, we have discussed a number of theories relating fertility hazards to women's wages. In doing so, we acknowledged the possibility that each theoretical mechanism may operate differently depending on child parity. In addition, we attempted to elaborate on how these mechanisms may be compromised or reinforced at higher levels of parity

whenever possible. Finally, we would like to introduce a theory that directly addresses this issue: the learning hypothesis (Stolzenberg & Waite, 1977). Originally proposed to explain the strong inverse relation between women's age and the effect of labor force participation plans on fertility expectation, this hypothesis can be easily extended to explain different forces of the same theoretical mechanism based on child parity. For instance, women who have earned high wages throughout their reproductive age may hesitate to bear a second child if they realized that their husbands were not as helpful as they had expected in the first childbirth. If this hesitation was indeed a factor, then the positive effect of high women's wages would diminish second childbirth hazards.

Data and Measurement

Data

To assess our theoretical predictions empirically, we draw data from the Korea Labor and Income Panel Study (KLIPS) 1998-2008 (Nam et al., 2010). KLIPS is an ongoing panel study that has traced respondents annually beginning in 1998 with nationally representative samples of more than 13,000 respondents in 5,000 households. KLIPS registered a 74.2% retention rate of original samples in the 11th wave, which is quite comparable with the Panel Study of Income Dynamics (PSID) of the United States.

Because we focus on fertility differentials according to women's wage, we select all women aged 15 through 49. To obtain our analytical samples, we apply the listwise deletion method, which excludes observations with at least one missing value in the variables that will be described soon. We are concerned with this method because our estimates would be biased if our set of covariates were not sufficient for explaining the longitudinal attrition and survey nonresponse and because there were differential response rates based on a combination of our main causal variables and propensity to childbirth (Allison, 2002). To consider an empirical perspective, our positive estimates for women's high wages would be upwardly biased if those who received low wages and were eager to give birth to a baby were more likely to exit the surveys than

those who received low wages but were not eager to give birth. To ameliorate this problem, we use the longitudinal weight "w11_pl" in all analyses reported in this paper (Nam et al., 2010).

Measurement

The outcome variable, time to childbirth, is retrieved from individual-level records that contain information on respondents and household-level records that enclose the date of birth of every household member. Using information on average monthly wages, we classify women's wages into four categories: 1) up to 1 million Korean Won (KRW) (baseline category), 2) more than 1 to 2 million KRW, 3) more than 2 million KRW, and 4) out of the labor force. In this coding scheme, women with the values 1, 2, and 3 were in the labor force. Throughout this paper, we use Korean Won (KRW) as a unit of monetary values. In addition, monetary values are inflated to the 2008 level, such that a ten thousand KRW in 1998 is the same amount as in 2008. Ten thousand KRW in 2008 is equivalent to approximately 10 US dollars. For instance, 200 ten thousand KRW may be equivalent to 2,000 USD. To assess the effects of the percentage of women's wages in household income, we create a categorical variable with four levels: 1) up to 30% (baseline category), 2) 30% to 70%, 3) more than 70%, and 4) out of the labor force.

Some readers may wonder why monthly wage is considered instead of some other measures such as hourly wage. First and foremost, we think that levels of monthly wage are more appropriate for our theoretical formulations than hourly wage. For instance, income effect has much stronger bearing on monthly wage than hourly wage. In this respect a totally different set of theoretical perspectives should be formulated if we want to evaluate effects of hourly wage. We also think that people tend to choose a job after considering monthly wage rather than hourly wage, particularly because, in Korea, working overtime is the rule rather than the exception (Bae, 2012), and only one quarter of women workers receive extra pay for their overtime work (Shin, Y. Kim, J. Kim, Nam, & O, 2013). Finally, working hour variables in the raw data had many missing values, putting us in risk of losing a large portion of our observations if we used it.

Concerns with omitted variable bias in an observational study urge us to control for a wide array of confounding variables (e.g., Wooldridge, 2002). Using the question regarding household income for the last year (Do & Choi, 2013), we employ a monthly household income variable with four categories: 1) up to 2 million KRW (baseline category), 2) 2 to 4 million KRW, 3) 4 to 6 million KRW, and 4) more than 6 million KRW. Home ownership, a proxy for family wealth that does not fluctuate in the short term, is included as a categorical variable with four values: own home (baseline category), reclaimable down payment, monthly rent, and others (D. Kim, 2009; Kim et al., 2006). A reclaimable down payment refers to a type of rent in which renters deposit an appreciable amount of money at approximately 60% to 70% of the house price and claim this money when they vacate the house. There is no monthly rent in this arrangement. The last category may include a house provided by an institution to which a family member belongs or a house owned by a relative.

Household structure should be adjusted for because it may affect women's labor force participation and women's wages as well as childbirth decisions (e.g., H. Kim & J. Kim, 2012). In particular, percentage of wage in household income may have different implications on childbearing behaviors depending on household structure. For instance, married women who live with dependent parents may be reluctant to give birth to a child even though they earn high wages and contribute high proportion to the household income. However, those who live with high-income parents are likely to show prenatal tendencies in spite of a trivial contribution. Because we do not have fine-tuned measurements in these respects, we hope that two variables—the total number of household members and co-residence with at least one parent—capture the skeletons of highly divergent household structures. The total number of household members is categorized into four levels (1-2 [baseline category], 3, 4, and 5 or more) for the first childbirth and three levels (1-3 [baseline category], 4, and 5 or more). Co-residence with a parent is a binary variable with 0 indicating not living together and 1 otherwise.

The individual characteristics of the respondents consist of their marital status, birth cohort, and educational attainment. The most critical proximate determinant of childbearing has been shown to be marital

status (e.g., J. C. Caldwell & B. K. Caldwell, 2005). We have two categories indexing marital status: married and the others. The first category may include women who have been married more than once, and the latter category consists of several types, such as never married, divorced, separated, and widowed. One of the few established facts in the transition of fertility in Korea is a fertility decline in recent cohorts; thus, we consider birth cohort to be a categorical variable (e.g., Eun, 2001). Birth cohort has three categories: up to 1970 (baseline category), 1971 through 1980, and 1981 and later.

Educated women with careers are more empowered by the knowledge of their reproductive rights and the benefits of fewer children, which leads to low childbirth hazards for them compared to women with low levels of education (e.g., Kravdal & Rindfuss, 2008). Hence, we include education as a control variable. Education is broken down into three categories: up to high school graduation (baseline category), attending college or graduate schools, and college graduation or more. Finally, urbanicity of residence is included as a categorical variable because it is widely known that women in rural areas tend to receive lower wages but give birth to more children (White et al., 2008). This variable is measured with three levels: city (baseline category), rural, and metropolitan area.

Statistical Models

We fit our data to the Cox proportional hazards model (Cleves, Gould, & Gutierrez, 2004). We choose the Cox model for hazard patterns over analytical time periods since the descriptive results indicate the adequacy of the model, as we will describe shortly. We fit three analytical models by parity. The first model predicts fertility hazard using women's wage variables and other control variables. Here women's wage variables represent women's wage levels and a category indicating that a woman chooses to stay out of labor force. Hence, we can examine the effects of labor force participation compared with the baseline category (Lehrer & Nerlove, 1986).

However, the estimates on women's wages are likely to be biased under the framework of the first model, as there were considerably distinguishable effects of the confounding variables between sub-

populations divided by labor force participation status (Allison, 2002). In the second model, we omit women who are out of labor force to assess the women's wage effect among women in the labor force. Finally, it is of particular interest from the gender equity perspective to determine whether there are differential fertility hazards according to the percentage of wife's wages in household income. To investigate this possibility, we replaced women's wages in the second model with categories embodying the percentages of female wages in household income.

Finally, we are concerned with the fact that there were households from which more than one woman was drawn. In this case, there may be an unobserved correlation among women within households, which could lead to bias in the variance estimation. We address this concern by specifying the option [cluster] in our data analysis, which is designed to account for correlation among women within households (Cleves et al., 2004).

Results

Descriptive Statistics

Table 1 summarizes the descriptive statistics according to variables included in our analyses. We compute person-years at risk of first (or second childbirth), numbers of a first (or second) childbirth and incidence rates. Incidence rates can be interpreted as "the ratio of new children in a particular period divided by the person-years lived in a population (Preston, Heuveline, & Guillot, 2001)." We multiply the original rate by 1,000 to simulate incidence rates for 1,000 women. This measure can be interpreted as indicating how many children a woman would give birth to for one year of duration of 1,000 females at risk of a first (or second) childbirth (Kim, 2014). Additionally, note that fertilities are displayed according to variables and parity for complete information.

Table 1.
Person-years, number of childbirths, and incidence rates by variables

Variable	First child (N=2,712)[1]			Second child (N=1,102)[1]		
	Years	Births	Incid.[2]	Years	Births	Incid.[2]
Total	15,879	642	40.45	4,164	531	127.51
Age						
15-19	5,539	7	1.30	11	1	119.50
20-24	5,495	94	17.15	164	31	191.93
25-29	3,396	413	121.50	1,167	245	209.82
30-34	918	115	125.69	1,174	218	185.57
35-39	314	11	33.77	710	32	45.42
40-44	121	2	18.82	578	3	5.35
45-49	96	0	0.00	360	0	0.00
Women's wage						
Up to 100	3,523	129	36.59	902	52	57.74
More than 100-200	2,958	152	51.34	660	58	88.28
More than 200	588	61	103.09	341	36	106.15
Out of the labor force	8,811	301	34.16	2,261	384	170.00
% of women's wage in household						
Up to 30	2,906	92	31.54	640	60	93.70
More than 30-70	2,750	149	54.15	889	70	78.48
More than 70	1,412	101	71.37	373	17	44.84
Out of the labor force	8,811	301	34.16	2,261	384	170.00
Household income						
Up to 200	5,397	299	55.35	1,659	205	123.71
More than 200-400	6,719	236	35.17	1,803	234	130.04
More than 400-600	2,421	72	29.72	469	65	139.16
More than 600	1,341	35	26.34	234	26	111.55
Home ownership						
Own home	1,242	36	28.70	389	34	87.23
Reclaimable down payment	3,396	329	96.94	1,731	240	138.77
Monthly rent	10,791	247	22.91	1,887	228	120.78
Others	450	30	67.35	157	29	183.88

Notes. The numbers of years and events may not add up to the total numbers as a result of rounding up to an integer. 1) N denotes the number of respondents who may have more than one record. 2) We multiply the original incidence rates by 1,000. 3) Unit of women's wages and household income is 10,000 KRW.

Table 1.
Continued.

Variable	First child (N=2,712)[1] Years	Births	Incid.[2]	Second child (N=1,102)[1] Years	Births	Incid.[2]
N of household members						
1-2	1,911	423	221.31			
3[3]	1,858	57	30.92	3,556	436	122.72
4	6,781	63	9.25	354	46	129.50
5 or more	5,328	99	18.62	254	49	191.81
Living with a parent						
No	1,840	462	250.79	3,962	488	123.24
Yes	14,038	181	12.88	202	43	211.17
Marital status						
Married	962	453	471.00	3,920	527	134.52
Non married	14,917	189	12.70	244	4	14.95
Birth cohort						
Up to 1970	882	70	79.45	2,245	169	75.35
1971-1980	7,308	542	74.13	1,853	352	190.03
1980 or later	7,688	30	3.96	66	10	145.65
Education						
Up to high school	6,508	207	31.88	2,221	257	115.72
Attending college	3,968	35	8.80	141	18	124.70
College or more	5,403	400	74.03	1,802	256	142.26
Urbanicity						
City	3,824	185	48.31	1,220	171	139.91
Rural	186	18	98.13	90	20	226.27
Metropolitan area	11,869	439	37.02	2,854	340	119.09

Notes. The numbers of years and events may not add up to the total numbers as a result of rounding up to an integer. 1) N denotes the number of respondents who may have more than one record. 2) We multiply the original incidence rates by 1,000. 3) This category represents 1-3 members for the second child.

The first row shows that, on average, approximately 40.45 first children and 127.51 second children per 1,000 women would be born if women were under the same fertility risk for one year. We present incidence rates by age intervals in the second row block, although age serves as the analytical time. We observe the highest fertility levels for

the first childbirth in 25-34. We find that the age intervals of 20 through 34 are the prime time for the second childbirth. Sharply enhanced incidence rates for the second childbirth appear to indicate that young women who gave birth to their first child tended to rush into the second childbirth. However, the dramatic fall in incidence rates after age 35 reflects the previous finding that those who did not give birth to a baby before age 36 were likely to forgo childbirth, whether a first or second childbirth (Park & Kim, 2003).

Across two parities, fertility statistics on women's wages reveal a tendency for women with high wages to have experienced a high risk of childbirth. For instance, women who earned up to 1 million KRW would give birth to 36.59 first children, whereas those who received more than 2 million KRW would deliver 103.09 first children. This gap by wage levels appears to be similar for the second childbirth, although the difference is less pronounced. One interesting finding in the row block is that women out of the labor force registered the lowest fertility for the first childbirth, but those women were the most fertile for the second childbirth. This result clearly demonstrates the M-shaped women's labor force participation in Korea, in which young women leave the labor force when they marry or become pregnant and do not return until they give birth to the desired number of children or raise children to an age when they do not need mothers' intensive care (Lee & Cho, 2005).

The fourth row block displays differential fertility according to the percentage of women's wages in household income. With respect to the first childbirth, we can observe that the higher percentages of women's contributions to household income are correlated with greater fertility risks. More interestingly, the fertility gaps feature a well-spaced gradient in which a jump to the higher category appears to have raised a similar amount of fertility risk across categories. However, the tendency is reversed for the second childbirth. In other words, incidence rates decreased remarkably as the percentage increased for the second childbirth.

Because graphical representation would substantially refine our understanding of the previous observations, Figures 1 and 2 are presented below. Figure 1 describes fertility hazard schedules for first childbirths over the reproductive ages by our main causal variables, women's wages and their percentages (Cleves et al., 2004). In the graphs, the x-axis re-

fers to age in years, and the y-axis marks the hazard rates for the first childbirth.

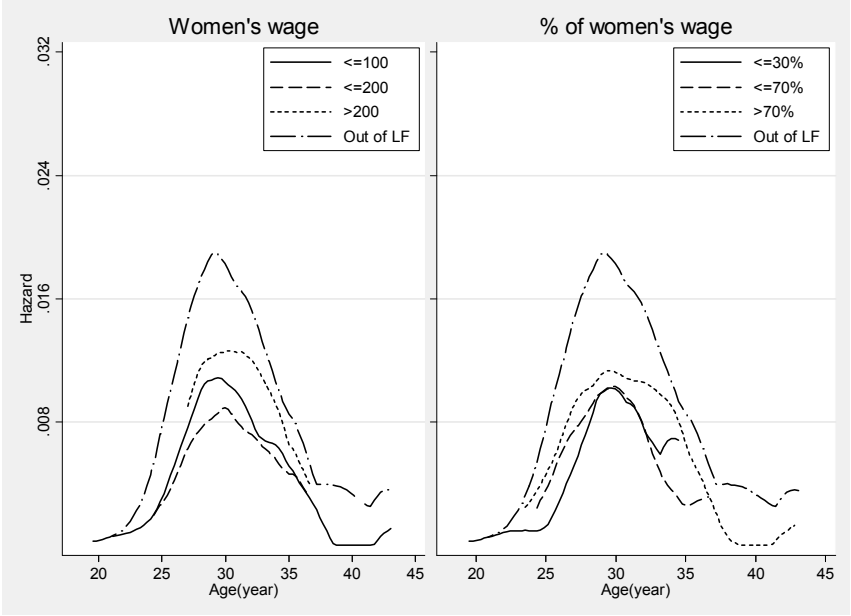

Figure 1. *Hazard rates of the first childbirth by women's wages and their percentages*

Notes. Unit of women's wages is 10,000 KRW. Out of LF refers to women out of the labor force.

First, we observe that hazard rates increased as women aged until approximately 30, but they decreased thereafter, forming a sort of normal distributions. The hazard curves on the left panel show remarkable proportionalities by categories of women's wages with arresting hazard gaps at the peak but decreasing gaps toward tails, which increases our confidence in choosing the Cox model. However, the hazard curve for women out of the labor force shows the highest level across all ages, which appears to contradict our previous findings that those women did not register the highest fertility rates in Table 1. This finding was observed simply because a dominant portion of risk exposure for those women occurred when they were in school, which inflated the denominator in the fertility rate that led to the low fertility rate. As they grad-

uated from schools and entered the labor force, the denominator of the hazard curve displayed in Figure 1 became considerably small, unraveling the true trajectory of the hazard rate. We also find that women earning more than 2 million KRW experienced higher hazards than women receiving up to 1 million KRW. Women in the wage category between 1 million KRW and 2 million KRW exhibited the lowest fertility level.

The graph in the right panel shows the hazard curves according to the percentage of women's wages in household income, which appears to support the proportional hazard assumption once again. The hazard curve for women out of the labor force is the same as we observed in the left panel, as expected. The difference between women with percentages of up to 30 and those with percentages of 31 to 70 appears negligible, whereas women with percentages greater than 70 exhibited somewhat higher fertility hazards compared with the other two groups.

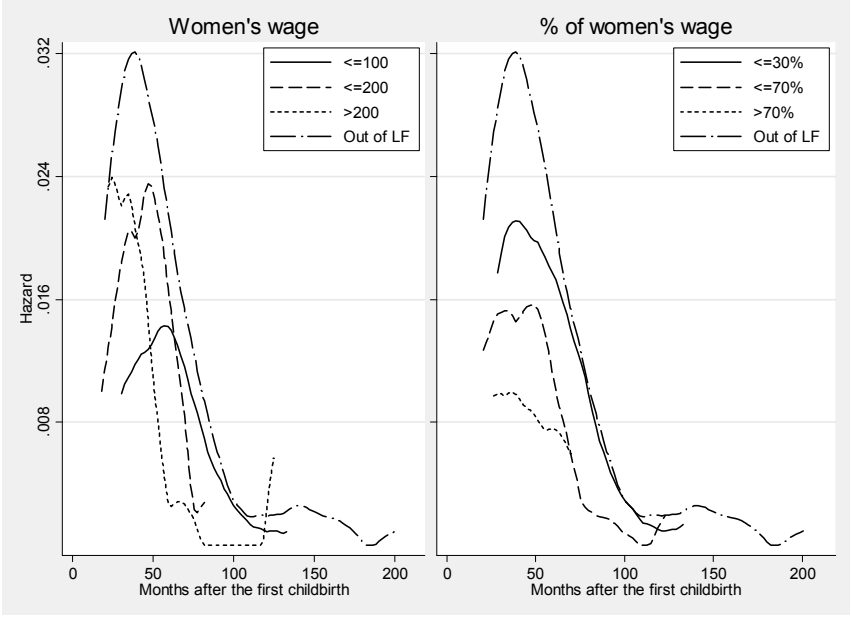

Figure 2. *Hazard rates of the second childbirth by women's wages and their percentages*

Notes. Unit of women's wages is 10,000 KRW. Out of LF refers to women out of the labor force.

Figure 2 above provides hazard schedules for the second childbirth according to women's wages and their percentages. Note that the x-axis in Figure 2 indexes months after the first childbirth because the risk of second childbirth begins from the birth of the first child. Hazard curves for the second childbirth are distinguished from those for the first childbirth in that the former did not form normal distributions but left truncated normal distributions. Namely, hazard rates began at high levels from the number of months after the first childbirth and then increased until approximately 42 months to decline along the steep curves. These patterns are likely to have emerged because women who preferred to have a second child must have made this decision one or two years after the first childbirth, feeling rushed to obtain the desired number of children.

The hazard rates according to women's wages appear to deviate from the proportional hazard assumption. The main force behind the non-proportionality is the atypical hazard function of women who enjoyed more than 2 million KRW in wages. These women did not show an increase but a constant decrease from the initial level. This finding is consistent with the argument that only selective women with high wages were willing to have a second child and that these women hastened to complete their fertility schedules to return to their careers as soon as possible (Park & Kim, 2003). It is worth noting that women out of the labor force were not matched with the other wage groups in their enhanced hazard rates for the second childbirth (Kim, 2014). Nevertheless, it is evident that women earning between 1 million KRW and 2 million KRW traced along a higher hazard curve than women receiving up to 1 million KRW. By contrast, it is notable to recognize that as the percentage of women's wages in household income increased, the levels of fertility hazards decreased in the right panel.

Statistical Results

Table 2 below exhibits the coefficients in three Cox regression models for the first childbirth. The model number refers to the models introduced in the statistical method section.

Table 2.
Statistical results for the first childbirth

Variable	Model 1 Est.		Model 2 Est.		Model 3	
		S.E.		S.E.		
Women's wage						
More than 100-200	0.038	(0.166)	0.001	(0.169)		
More than 200	0.618 **	(0.230)	0.647 **	(0.235)		
Out of the labor force	0.551 ***	(0.143)				
% of women's wage						
More than 30-70					0.124	(0.186)
More than 70					0.116	(0.235)
Household income						
More than 200-400	-0.274 *	(0.125)	-0.407 *	(0.169)	-0.306	(0.195)
More than 400-600	-0.454 *	(0.197)	-0.682 **	(0.226)	-0.424	(0.258)
More than 600	-0.320	(0.241)	-0.627 *	(0.305)	-0.307	(0.329)
Home ownership						
Reclaimable down payment	0.286	(0.232)	0.417	(0.324)	0.408	(0.314)
Monthly rent	0.249	(0.240)	0.396	(0.323)	0.362	(0.314)
Others	0.225	(0.360)	0.184	(0.510)	0.179	(0.514)
N of household members						
3	-0.084	(0.247)	-0.057	(0.300)	-0.057	(0.301)
4	-0.148	(0.294)	0.465	(0.284)	0.454	(0.294)
5 or more	0.527 †	(0.298)	1.378 ***	(0.326)	1.333 ***	(0.336)
Living with parents	-0.357	(0.334)	-0.702 †	(0.367)	-0.739 *	(0.376)
Non married	-2.588 ***	(0.212)	-2.357 ***	(0.223)	-2.320 ***	(0.239)
Birth cohort						
1971-1980	0.033	(0.210)	0.018	(0.265)	-0.005	(0.260)
1980 or later	-0.496	(0.390)	0.012	(0.464)	0.029	(0.462)
Education						
Attending college	-0.724 *	(0.307)	-0.189	(0.349)	-0.192	(0.350)
College or more	-0.115	(0.119)	-0.162	(0.164)	-0.121	(0.163)
Urbanicity						
Rural	-0.586 †	(0.318)	-0.456	(0.558)	-0.434	(0.574)
Metropolitan area	-0.193	(0.125)	-0.277	(0.168)	-0.233	(0.166)

Notes. 1) Unit of women's wages and household income is 10,000 KRW. P-values: † <0.1, *<0.05, **<0.01, and ***<0.001

In modern causal inference literature, confounding variables are supposed to influence women's wages and fertility levels such that those coefficients on confounding variables do not recover marginal or total effects (Wooldridge, 2002). Those coefficients instead represent condi-

tional effects not mediated through women's wages because we add women's wages to the models. For instance, we should exclude women's wages from the models if we wish to estimate the effect of educational attainment on fertility because one of the critical theoretical mechanisms is mediated through the wage effect. If we included educational attainment and women's wage, then we would be in a grey area when we interpret the coefficients on educational attainment. Thus, we focus on interpreting coefficients on the main variables of interest in this paper, although the other coefficients are listed in the result tables.

Several interesting patterns emerge from Table 2. First, we discover that high women's wages were likely to enhance fertility hazards, although the effect had categorical rather than linear effects. To illustrate, women in the category of the 1-to-2 million KRW exhibited exp(0.038)=1.039 times the hazard rates as women in the category of 1 million KRW or less. However, the hazard rates steeply increased as exp(0.618)=1.855 times for women in the category above 2 million KRW. In addition, the hazard rates sustained as exp(0.551)=1.735 times for the out-of-labor-force category. The first coefficient is not statistically significant at the conventional α-0.05 level, whereas the last two coefficients are, suggesting that the first difference may stem from mere chance. We also test the difference of the coefficients on the 1-2 million KRW and more than 2 million KRW categories to obtain a statistically significant difference at the α-0.05 level.

The results in the second are still consistent with the previous findings, although the effect parameters exhibit slight changes in size. In other words, we detect a minor difference between women earning up to 1 million KRW and women earning 1 to 2 million KRW but a vast difference between the former women and women with wages above 2 million KRW. Regarding differential fertility according to the percentage of women's wages in household income (Model 3), we observe that the differences are negligible in both effect size and statistical significance.

Table 3 below delivers estimates in various Cox models for the second childbirth.

Table 3.
Statistical results for the second childbirth

	Model 1		Model 2		Model 3	
Value	Est.	S.E.	Est.	S.E.		
Women's wage						
More than 100-200	0.307	(0.240)	0.303	(0.246)		
More than 200	0.248	(0.313)	0.095	(0.382)		
Out of the labor force	0.834***	(0.176)				
% of women's wage						
More than 30-70					-0.427†	(0.234)
More than 70					-0.327	(0.393)
Household income						
More than 200-400	0.112	(0.129)	-0.226	(0.261)	-0.108	(0.282)
More than 400-600	0.473*	(0.209)	0.316	(0.353)	0.420	(0.379)
More than 600	0.411	(0.333)	0.258	(0.562)	0.305	(0.529)
Home ownership						
Reclaimable down payment	0.051	(0.234)	0.933†	(0.532)	0.983†	(0.530)
Monthly rent	0.066	(0.240)	0.774	(0.537)	0.830	(0.536)
Others	0.300	(0.323)	1.214†	(0.640)	1.322*	(0.644)
N of household members						
4	-0.101	(0.340)	0.256	(0.609)	0.225	(0.610)
5 or more	-0.079	(0.358)	0.666	(0.587)	0.617	(0.596)
Living with parents	0.255	(0.356)	0.698	(0.595)	0.631	(0.606)
Non married	-0.894	(0.562)	-1.042	(0.732)	-0.904	(0.718)
Birth cohort						
1971-1980	-0.021	(0.126)	0.159	(0.262)	0.217	(0.259)
1980 or later	-0.436	(0.437)	0.011	(1.053)	0.106	(1.093)
Education						
Attending college	-0.096	(0.380)	0.281	(0.580)	0.381	(0.528)
College or more	-0.314**	(0.121)	-0.106	(0.259)	0.039	(0.268)
Urbanicity						
Rural	0.447	(0.335)	-0.544	(0.858)	-0.428	(0.834)
Metropolitan area	-0.073	(0.115)	0.008	(0.223)	0.047	(0.223)

Notes. 1) Unit of women's wages and household income is 10,000 KRW. *P*-values: † <0.1, *<0.05, **<0.01, and ***<0.001

From Table 3 we find that women with high wages were more likely to give birth to a second child than women with low wages. However, these estimates are not statistically significant, particularly because of the small number of childbirths for women in the labor force, as Table 1 demonstrated. Women out of the labor force were strikingly more likely

to give birth to a second child than any other groups in the labor force (all differences are statistically significant). This finding appears to reflect the social milieu in which a dominant portion of women does not return to the labor force until they complete their fertility schedules (Park & Kim, 2003). The coefficients from Model 2 do not deliver distinguishably different results from those of Model 1.

Finally, it is somewhat surprising to find that women whose wages contributed to 30% to 70% of household income were likely to exhibit lower fertility hazards than women whose contribution was less than 30%. Although this estimate is not statistically significant at the conventional α-0.05 level, its p-value is 0.068. The effect size is exp(-0.427)= 0.652, meaning that the fertility hazard of the former group was less than two-thirds of the fertility hazard of the latter group. We argue that this finding indicates a substantively significant effect because 1) the effect size is not negligible, 2) the numbers of events in these groups are too small to properly evaluate their statistical significance as Table 1 documented, and 3) its p-value is 0.068.

Conclusion

Our findings can be summarized as follows. Regarding the first childbirth, we found that women who earned more than 300 sustained higher levels of hazard rates than women having garnered up to 100. However, the percentage of women's wages in household income did not make a perceptible mark on fertility hazards. Analysis of second childbirth data revealed that women out of the labor force enjoyed starkly distinguished hazard rates compared with all other wage groups. High shares of women's wages in household income appeared to depress fertility hazards.

It is quite astonishing to observe that women's wages had a positive effect on fertility hazards for the first childbirth but not for the second. Particularly given that previous studies reported the negative effect of women's wages (J. Kim, 2009; Min, 2008), we are urged to speculate the underlying reasons for the positive effect for the first childbirth. Leaving further study for future work, we can only provide two plausible scenarios. First, positive theoretical mechanisms might prevail over negative mechanisms in Korea. For instance, the economic resource ar-

gument could be more appropriate for explaining childbearing behaviors of Koreans than the opportunity cost argument (e.g., Workman & Lee, 2011). Furthermore, it seems plausible that women who chose to bear a first child did not realize the work-family conflict to its full extent. The second explanation would be that previous studies assigned women out of the labor force to the zero wage category, such that the fertility-enhancing effect of remaining out of the labor force was traversed into the low wage effect. However, we believe that we should compare women in the labor force to properly evaluate the women's wage effect.

We also wonder why women whose wages contribute more than 30% to 70% of household income were less likely to give birth to a second child than women whose wages were less than 30%. As we discussed in the theoretical background section, this result may be linked to son preference running through gender equity. In other words, females with high wages would be more empowered to argue for their own reproductive rights than those with low wages, so that they would discontinue having children even if they did not have a son.

Another afterthought would be that these women suffer from the "second shift" more than any other groups (Hochschild, 1989). These women would not enjoy the luxury to decrease their workloads in the labor market because they would be obliged to contribute to their household income as a result of the low wages of their husbands. By contrast, these women would fail to earn wages that would be sufficient to diminish household labor, such that they would or could not voice the gender equity in their families. In other words, these women would be caught in the middle of the work-family conflict because their gendered positions (Sung, 2003). It is also worth noting that this finding is remarkably consistent with S. Kim and E. Kim's study (2007) showing that housewives in the range of relative income between 40 percent and 60 percent spent longer hours doing housework than any other housewives (see also Yoon, 2010).

We must acknowledge certain limitations to properly evaluate our contribution to the current knowledge on the effect of women's wages on differential fertility in Korea. We are primarily concerned with the fact that our results were based on an observational study, which is vulnerable to the omitted variable bias (Wooldridge, 2002). There could be a confounding variable that was not measured but that affected both the

causal variables and outcome variables. One possibility may be beauty or physical attractiveness, which has been demonstrated to influence women's wages and fertility hazard rates in a positive direction (Jokela, 2009). In this case, our positive estimates would be upwardly biased. Therefore, readers should exercise due caution when interpreting our results.

Our analysis is also limited in scope in that we included only first and second childbirths. Distinguished childbearing and childbirth behaviors may be widely practiced for higher-parity childbirth decisions (Kim, 2007). After analyzing Swedish longitudinal data, for instance, Heckman and Walker (1990) found that the effect of women's wages on completed fertility worked through the decision of bearing a third child. This finding is likely to be particularly relevant in Korea, which registered the lowest-low fertility levels in the study period because of forgoing third childbirth and higher parity. In other words, it is critical to understand which characteristics are associated with the third childbirth decision when most women who are capable of more childbirth are ensconced with at most two children. Our next step should tackle this issue by extending our analysis to higher levels of parity.

Despite these limitations, we are certain that analyses presented in this paper contribute measurably to the current knowledge on the factors that cause Korea to exhibit lowest-low fertility. Beyond scholarly interests, our findings also have direct bearings on policy formulation in Korea, wherein there is a strong drive to attract women into the labor force to handle the diminishing labor force, which partly stems from lowest-low fertility. For instance, there is a continuous effort by government to pull women out of the home into the labor force (Yeo, S. Kim, E. Kim, & Choi, 2013). However, our results demonstrate that jobs with low wages would further entrench low fertility rates, propelling a vicious cycle. Those jobs will also fail to attract and attach women to the labor market. Therefore, our message is as follows. By creating decent jobs with high wages, we can improve women's labor participation rates and boost fertility rates as an ideal solution to addressing the ongoing lowest-low fertility issue.

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