

Effects of Children on Marital Stability: Case of Korean Women*

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Abstract

Using the Korean Longitudinal Survey of Women and Families, this study investigates the effects of the number of children on marital stability. In particular, we implement the fixed effects panel data model to control for possible endogeneity arising from fertility decision. The main empirical results reveal that the number of children deter the dissolution of marriage. In particular, an increase in the number of children by one was found to reduce the likelihood of divorce by 1 percentage points. Further, it is shown that the number of children is likely to affect marital stability much less for those who are socio-economically advantageous.

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I. Introduction

For the last 25 years, the total fertility rate has been constantly decreasing while the crude divorce rate has been increasing in South Korea. This phenomenon may represent the underlying changes in traditional Korean family culture. Conventionally, getting divorced

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and having no children used to be stigmatized as shameful behavior by Korean adults. However, social perception of divorce and fertility may have changed considerably, prompting academics to pay attention to the causal relationship between the two variables beyond mere correlation. Theoretically, most economic analyses have predicted that children are likely to increase marital stability (Becker, 1974, 1977; Weiss, 1997). According to Becker (1974), from the economic viewpoint, marriage is the formation of a partnership for the purpose of common production and common consumption. From this viewpoint, people decide to have a family when the expected utility from the marriage exceeds that from remaining single. However, as Weiss (1997) suggested, information on the partners' various traits affecting married life is rather limited and the quality of the match is more or less uncertain at the time of marriage. As a result, the possibility of marital dissolution naturally arises. Marriage dissolution is likely to be deterred as the value of marriage, which largely depends on a couple's various marital-specific investments, increases (Becker, 1974, 1977). Marital-specific investment is the investment belonging not to each member of a couple but to the couple itself and its value deteriorates in the case of marital dissolution compared to the case of remaining married. One of the most important marital-specific investments is children. In this respect, the presence and number of children as an accumulation of marital-specific investment renders the expected utility from remaining married larger than the expected utility from marital dissolution and, as a result, boosts marital stability. However, some literature argues against these theoretical predictions, which are well summarized in the meta-analysis of Twenge et al. (2003). According to these studies, which are mainly in the fields of psychology and sociology, contrary to the aforementioned theoretical predictions, children play a significant role in destabilizing marital status. These

theoretical arguments are as follows. First, children are financially expensive and, thus, create a financial burden on parents, resulting in marital instability. Second, in addition to the existing social roles, having children adds the role of parent to the couple and this generates additional stress and conflicts between them. Finally, children-in particular, young children-restrict parents' freedom and, further, cause marital dissatisfaction. Thus, there seems to be no theoretical consensus on whether children affect marital stability, and we need to turn to empirical investigations. Apart from this theoretical ambiguity regarding the sign of the effects, there is another significant problem that is worth investigating. As Becker et al. (1997) argues, causality may run in both directions. That is, marital stability may also affect decision to have children. For example, as Vuri (2003) explains, when unobserved divorce inclination exists, this affects both marital stability and fertility and, as a result, an endogeneity problem arises due to the simultaneity. Clearly, we are likely to obtain biased results unless we control for this kind of endogeneity problem properly.

Using the Korean Longitudinal Survey of Women and Families, this study examines how the number of children affect marital stability in Korea based on the theoretical considerations described above. We also investigate the possible heterogeneous effects based on various characteristics of our samples such as women's age and calendar year of the first marriage. Finally, we investigate the effect of presence of child and the number of children given having child on the divorce probability. For these purpose, we implements the fixed effects linear probability panel data model in which we explicitly control for the endogeneity of fertility decision.

The rest of the paper is structured as follows. In section 2, we review the previous literature with a special focus on empirical research. Next, we describe the data set used in the empirical work,

present descriptive statistics of variables and explain the empirical model in section 3. Section 4 presents and discusses empirical results. Finally, section 5 concludes the paper by summarizing the main findings and suggests important future research directions.

II. Literature Review

Broadly speaking, there have been two distinct research trends in analyzing the effects of fertility on marital stability. One is the approach using survival analysis and the other approach adopts instrumental variable estimation methods.

In the stream of research using the survival analysis method, an early prominent study is that of Waite and Lillard (1991). They investigated the effects of fertility on marital dissolution using a proportional hazard model and found that there were heterogeneous effects across different child age groups. That is, younger children have a deterrent effect whereas older children have a destabilizing effect. Along a similar empirical approach, Todesco (2011) investigated the same problem with special reference to the traditional vision of marriage in Italy. They found that children born to married parents increased marital stability, but children born out of wedlock had no impact on marital disruption. Recently, using Chinese micro data and the Cox proportional hazard model, Xu et al. (2015) found that premarital children increased the probability of marital dissolution whereas a higher number of children, younger children, and the presence of sons have a significantly stabilizing effect on marriage life. Meanwhile, using a proportional hazard model, Andersson and Woldemicael (2001) examined whether children's gender affects marital stability. According to their analysis, for mothers with two children, having one child of each sex is likely

to decrease the probability of marital dissolution.

However, these studies have a limitation in that they did not consider the endogeneity of the fertility decision. That is, as described in the previous section, the presence of children could affect marital stability but, at the same time, marital stability may exert influence on the couple's willingness to have a child. Based on Lillard (1993), Lillard and Waite (1993) estimated simultaneous equations for marital hazards and marital conception to take account of this kind of simultaneous relationship between fertility and marital dissolution. They found that firstborn and other children have contrasting effects on marital stability; the firstborn child has a stabilizing effect but subsequent children have a destabilizing effect. Similar to Lillard and Waite (1993), Steele et al. (2005) also estimated simultaneous equations, which consist of two transitions (separation and marriage) from the cohabitation state and fertility model within marriage and cohabitation. They also demonstrated that the effects are different depending on child age groups. Finally, Svarer and Verner (2008) estimated a similar joint model of fertility behavior and relationship duration to control for the endogeneity of fertility regarding marital stability. In this case, children were found to have an adverse effect on marital stability after controlling for selectivity bias.

Next, studies based on the instrumental variable estimation method have attempted to handle the possible endogeneity problem of fertility and uncover the causal relationship between fertility and marital stability. In this line of research, Vuri (2001) used the sex of two previous children as an instrumental variable for fertility movement of couples who had already two children. According to their study, fertility had a destabilizing effect on marital stability, which was contrasted with a stabilizing effect from the conventional least squares method. Similar to Vuri (2001), Silles (2014) used sex

composition and, in addition, twin births as instrumental variables to investigate the effects of children on marital dissolution. They found that the number of children had almost no impact on marital dissolution for women who have children younger than 12 years old whereas there is a causal relationship for mothers who have children older than 12 years old. Bellido et al. (2016) implemented analysis using the number of siblings and multiple births as instrumental variables. Their investigation revealed that children born during the first marriage have significantly deterrent effects on marital dissolution but children born before the first marriage have a detrimental effect on marital stability. Finally, Lundborg et al. (2016) adopted in vitro fertilization (IVF) treatment, which had not been previously used in this type of research, as an instrumental variable. They claim that IVF treatment success is an effective instrumental variable because the observed IVF success is independent of the marriage or labor market experience trajectory. According to the authors, fertility has a positive effect on marital stability, but the effect is small in size and a short-run feature.

A few studies have adopted a different approach from the two lines of research described above. Using propensity score matching methods, Vuri (2003) investigated whether the presence and number of children affect marital stability. She found that, although the presence of a child decreases the divorce probability, the effect is just postponed until the children get older. Further, the number of children is found to be beneficial to marital stability but the effects are found to be small. Jacobsen et al. (2001) used twin births as a natural experiment in their analysis. They found that unplanned children have almost no effect on the subsequent divorce or remarriage of women who are married.

In Korea, there is no research investigating the effects of children on marital instability. However, there are some research that have

tried to figure out the factors affecting divorce decision between the partners. Using the Cox proportional hazard model, Hong et al. (2009) showed that the marital duration is affected by the birth cohorts of partners, educational attainment, each partner's income and household income based on Korean Labor and Income Panel Study (KLIPS) in 1998-2007. Further, Lee (2013) examined whether the cultural differences between partners play a role in decision making regarding divorce. She found out that in fact marital dissolution is affected by cultural differences such as family background and religion, using non-parametric mixed proportional hazard model with grouped hazard discrete time duration. The work also used KILPS in 1998-2008.

Overall, the empirical results from previous literature are fairly mixed in their evaluation of fertility effects on marital stability and it may be due to both the methodology and the context in which the society for analysis is placed.

III. Data and Methodology

1. Korean Longitudinal Survey of Women and Families

The data used in the empirical analysis is taken from the Korean Longitudinal Survey of Women and Families (KLoWF), administered by the Korean Women's Development Institute.¹⁾ KLoWF is a nationally representative and ongoing longitudinal survey that has been conducted since 2007 to design more flexible and effective

1) In Korea, we have an access to several panel data such as Korean Labor and Income Panel Study. We chose KLoWF for analysis because the data was initiated and designed to focus on women's problem in Korea, which attracted our interest. As we saw in the literature review section, previous research in Korea used KLIPS only. Therefore, it may be worth utilizing the other panel data in this respect.

policies that capture the changes in economic and overall lifetime activity. Since wave 2 was conducted in 2008, the institute has collected data every two years. The first wave of data was collected from 9,997 women aged between 19 and 64 years old in 9,068 households and the 7th, the most recent wave, was collected in 2018. In this research we used the data up to the 6th wave. Until the 6th wave, the retention rate of the original sample was 70.1%. In response to the attrition, 2,049 new households were added to the panel in the 6th wave. The questionnaire comprises three parts: information on the household, on the individual woman, and on employment. The household questionnaire contains information on general characteristics related to the family structure, housing conditions, household consumption, and household wealth and debts. The individual questionnaire contains questions about marital experiences, fertility experiences, housework, child rearing, and health. The employment questionnaire includes information on contract type, labor income, working hours, and so on.

2. Fertility and Marriage History

In our analysis, the most important information is the fertility and marital history of each woman. In particular, the first wave has a full history of female fertility rate. That is, the total number of children that each woman has given birth to, each child's birth year and month, and each child's gender were surveyed and recorded. Since the second wave, all the fertility history has been recorded each year and the outcome of pregnancy, that is, alive or dead, has been additionally recorded. Therefore, we could trace comprehensive fertility history up to 2016. With regard to marital history, above all, we have information on the year and month of the first marriage for each woman. In addition to this, information on year and month of the marriage to the current husband is also available. For those in

the first wave who are currently married, we included the samples that have at most two years difference between the time of the first marriage and the time of the marriage to the current husband to control for an unobserved marriage trajectory before the first wave.²⁾ For those who are divorced in the first wave, we also included samples that have at most two years difference between the time of the first marriage and the time of the marriage to the now divorced husband. In our analysis, in investigating the relationship between the number of children and marital stability, we compare married with divorced or currently separated (divorced, hereafter) women. After deleting those for whom we do not have information on year and month of the first marriage, and that of the marriage to the current or divorced partner, and have longer than two years difference between the time of first marriage and the marriage to the current or divorced partner, we have 8,036 individuals in the first wave (married=7,713, divorced=323). Based on the first wave samples, we construct panel data for empirical analysis and explore the effect of stock of children on marital stability.

3. Variables and Descriptive Statistics

As explained in the previous subsection, we used panel data consisting of 8,036 individuals in the first wave. Furthermore, we added a few individuals who newly entered into the panel each year and deleted those who have missing information for the necessary covariates in the estimation. In addition, we deleted individuals who had remarried after experiencing divorce.³⁾ Finally, we have 38,421 observations in our unbalanced panel data (n=8,250 and T=6). Table

2) We allow two years because there may be a time difference between actual marriage and the marriage being reported to the administrative office.

3) In this respect, we investigate the relationship between the stability of first marriage and the number of children.

1 presents pooled descriptive statistics for this final data set.

〈Table 1〉 Descriptive Statistics

variables		
divorce	0.042(0.187)	
	divorced	married
number of children****	1.728(0.896)	2.210(0.946)
presence of child***	0.911(0.285)	0.971(0.168)
age***	49.71(8.909)	47.07(10.80)
religious***	0.507(0.500)	0.575(0.494)
Education Level		
less education***	0.388(0.487)	0.302(0.459)
high school*** [reference]	0.481(0.500)	0.408(0.491)
more education***	0.131(0.337)	0.290(0.454)
Economic Status		
not working*** [reference]	0.382(0.486)	0.506(0.500)
employee***	0.404(0.491)	0.222(0.416)
own business***	0.174(0.379)	0.110(0.314)
helping family business***	0.006(0.074)	0.142(0.349)
individual business*** ^b	0.034(0.182)	0.020(0.140)
Health Status		
poor health*** [reference]	0.324(0.468)	0.132(0.338)
fair health***	0.308(0.462)	0.267(0.443)
good health***	0.368(0.482)	0.601(0.490)
Income Group		
first quintile*** [reference]	0.597(0.491)	0.181(0.385)
second quintile**	0.222(0.416)	0.202(0.401)
third quintile***	0.077(0.266)	0.227(0.419)
fourth quintile***	0.064(0.244)	0.189(0.391)
fifth quintile**	0.040(0.197)	0.201(0.401)
Place of Residence		
Seoul*** [reference]	0.146(0.353)	0.102(0.302)
Incheon/Gyeonggi	0.150(0.357)	0.162(0.369)
Busan/Ulsan/Gyeongnam	0.191(0.393)	0.199(0.399)
Daegu/Gyeongbuk**	0.105(0.306)	0.125(0.330)
Daejeon/Chungnam	0.112(0.316)	0.112(0.315)
Gangwon/Chungbuk	0.101(0.302)	0.097(0.296)
Gwangju/Jeolla/Jeju	0.195(0.396)	0.203(0.402)

Note: ^a ** and *** indicate that average values of each variable for two groups are significantly different at 5% and 1% level using *t*-test, respectively.

^b This status is based on the outsourcing contract by which a firm contract out some tasks and pay commissions to a worker. Typical examples in south Korea include insurance agents, A/S technicians, delivery workers, and so on.

The main dependent variable is the dummy variable that takes 1 if a woman is divorced and 0 otherwise. In the data set, the proportion of this category is 4.2%. The explanatory variables in the empirical analysis are investigated according to marital status (married and divorced) to determine whether there are differences between the two groups. The average number of children for married women is 2.210 whereas it is 1.728 for divorced women. This difference is statistically significant at the 1% level.

Regarding age, those who are married are slightly younger compared to those who are divorced. There is also a difference in educational attainment between the two groups. Those who are married are relatively better educated compared to those who are divorced. Those who are divorced are more likely to be employees, run their own business or work as individual business as an employee compared to those who are married. In contrast, those who are married are more likely to help in the family business than those who are divorced. There is a significant difference in self-rated health status between the two groups. Health status for the divorced group is rather evenly distributed across three health statuses. However, good health is dominant for those who are married. With regard to real household income, those who are married are more likely to have a higher level of household income. Finally, regional dummies do not show much differences between the two groups except for few regions such as the capital city.

As can be seen in the descriptions above, the number of children is significantly different between the two groups and those who are married have more children.⁴⁾ In the formal empirical analysis, after controlling for the unobserved and observed heterogeneity, we investigate whether the number of children affects marital stability.

4) The coefficient of correlation between divorce and the number of children is -0.1024.

4. Estimation Method

As discussed in the literature review, to correctly analyze the effects of the number of children on marital stability, it is crucial to control for the possible endogeneity caused by individual unobserved heterogeneity. For this purpose, the current study adopts the fixed effects panel data model. As revealed in section 2, the papers that used panel data model have been quite rare in the marriage stability-fertility literature. In this regard, our research would be one of few works to use the panel data estimation method in the fertility-marital stability literature to control for the endogeneity problem. We estimate the linear probability model in which the dependent variable takes the value of 1 if an individual is divorced and 0 otherwise. The main explanatory variable of interest is the number of children. The empirical model is as follows:

$$d_{it} = \gamma tfert_{it} + X_{it}\beta + \alpha_i + u_{it}, \quad t = 1, 2, \dots, T_i$$

Here, d is the dichotomous variable which takes the value of 1 if an individual is divorced and 0 otherwise. $tfert$ is the number of children and X contains all the other independent variables. α captures individual unobserved heterogeneity and u is a disturbance term. The coefficient gamma is the main interest in this model and it tends to be biased if we use the simple least squares method because the unobserved individual heterogeneity, α , is substantially likely to be correlated with the variable $tfert$. To overcome the problem, we estimate the fixed effects linear probability panel data model although our dependent variable is a binary variable.⁵⁾ In case

5) In this respect, it is important to have enough variations in the number of children over time. In our data, we have 568 individuals among 8,250 women who experienced the changes in the number of children during the data time.

of a binary dependent variable, discrete choice models with fixed effects cannot be considered because of well-known incidental parameter problem.⁶⁾ Further, the random effects model is based on a stronger assumption than the fixed effects model. That is, the individual-specific effect is assumed to be a random variable uncorrelated with the explanatory variables.⁷⁾ Therefore, we implement fixed effects linear probability model.

IV. Empirical Results

1. Main Results

The main empirical results are presented in Table 2.

The first column presents the result from our empirical model, fixed effects linear probability panel model. First, we see that the estimated coefficient for the main explanatory variable, $\hat{\gamma}$, has a statistically significant and negative value. This implies that the divorce probability decreases by about 1 percentage points as the number of children increases by one. In terms of the divorce rate, 4.2%, in the sample, this magnitude is substantial. To investigate the effect of endogeneity of the number of children on the estimation result, we present the result from ordinary least squares (OLS) in the second column in Table 2. In this case, the estimated coefficient for the number of children is -2.7 which is also statistically significant

6) See Lancaster (2000) and Chapter 15 in Wooldridge (2010) for further details on this issue.

7) In a way of relaxing the strong assumption, correlated random effects panel data model was presented. In this model, the correlation between individual specific effect and the explanatory variables are allowed. We also estimated this model. But, we do not present the results in this work because it does not converge properly in many cases in the subsample analysis. Only result for the whole sample is presented in Appendix for a comparison.

〈Table 2〉 Main Estimation Results

	Fixed effects LPM	OLS ^b
number of children	-0.010 ^{***a} (0.003)	-0.027 ^{***} (0.003)
age	0.007 ^{***} (0.001)	0.017 ^{***} (0.002)
age squared	-0.004 ^{***} (0.001)	-0.018 ^{***} (0.002)
religious	-0.004 ^{***} (0.001)	-0.014 ^{***} (0.003)
less education	0.032(0.034)	-0.008(0.008)
more education	0.022 ^{**} (0.009)	-0.018 ^{***} (0.004)
employee	0.008 ^{***} (0.002)	0.049 ^{***} (0.005)
own business	0.009 ^{***} (0.002)	0.037 ^{***} (0.007)
helping family business	-0.005 [*] (0.003)	-0.035 ^{***} (0.004)
individual business	0.015 ^{***} (0.004)	0.048 ^{***} (0.014)
fair health	-0.001(0.002)	-0.042 ^{***} (0.006)
good health	-0.002(0.002)	-0.056 ^{***} (0.006)
second quintile	-0.008 ^{***} (0.002)	-0.097 ^{***} (0.007)
third quintile	-0.016 ^{***} (0.002)	-0.137 ^{***} (0.008)
fourth quintile	-0.021 ^{***} (0.002)	-0.146 ^{***} (0.009)
fifth quintile	-0.027 ^{***} (0.002)	-0.155 ^{***} (0.009)
Incheon/Gyeonggi	-0.005(0.005)	-0.018 ^{**} (0.008)
Busan/Ulsan/Gyeongnam	-0.040 ^{***} (0.009)	-0.008(0.009)
Daegu/Gyeongbuk	-0.001(0.010)	-0.020 ^{**} (0.009)
Daejeon/Chungnam	0.004(0.009)	-0.007(0.010)
Gangwon/Chungbuk	-0.059 ^{***} (0.009)	-0.021 ^{**} (0.010)
Gwangju/Jeolla/Jeju	-0.034 ^{***} (0.010)	-0.013(0.009)
constant	-0.127 ^{***} (0.019)	-0.018 ^{***} (0.031)
number of observations	38,169	38,169

Note: ^a Values in parentheses are the standard errors of the estimates. ^{***}, ^{**}, and ^{*} denote statistical significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

^b In OLS estimation, the estimated coefficients for year dummies are omitted in the report.

and negative. However, the magnitude of the coefficient is considerably large in absolute terms compared to the one derived from the fixed effects panel data model. That is, the decreasing effects of the number of children on divorce rate tend to be overestimated without taking account of endogeneity of fertility decision. For example, if those who are in a happy marriage life have both a strong preference for having a child and a lower divorce

probability, then there could be an overestimation (in absolute terms) without controlling for endogeneity due to the unobserved marriage satisfaction. Thus, we confirm that unobserved individual specific effect plays a role in fertility decision and we are likely to have a biased estimator without considering the effect.

We move on to the discussion of results for other explanatory variables. Regarding age, as an individual ages, the divorce rate is observed to increase. But, this effect is nonlinear. That is, the increasing effect of age on divorce probability is decreasing in age. We presume that a religious individual may have a high value of the marriage life and be unwilling to get divorced. Indeed, this is the case in our sample. When someone is religious, the divorce rate decreases by 0.4 percentage points. Regarding education level, those who have education attainment more than high school level tend to have a higher divorce probability whereas those who are less educated than high school level have no significant difference in divorce probability compared with high school graduates. Depending on the education attainment level, the attitude to divorce or the quality of marriage life could be different across individuals.⁸⁾ Regarding economic status, those who work in any form tend to have a higher divorce probability compared to those who do not work except for those who are currently helping family business. There may be a factor that affects both the motivation to work and divorce preference.⁹⁾ Taking account of unobserved individual heterogeneity, health status measured by self-rated health does not seem to have an effect on divorce rate. Compared to the first income quintile, those who have higher level of household income tend to have a lower divorce rate.¹⁰⁾ Further, we observe that the income

8) For the recent discussion on this issue, see Boertien and Härkönen (2018).

9) In this respect, Vignoli et al. (2018) verified that there is a selection effect caused by unobserved heterogeneity affecting both the motivation to work and divorce probability.

effect on divorce probability is monotonic. From the statistical significance of estimated coefficients, there seem to be cultural differences in different income groups with regard to divorce. Finally, we see that there are some regional variations in divorce rate.

2. Heterogenous Effects

In addition to the total sample, we separately estimated the model using the subsamples constructed by a couple of individual characteristics. First, we constructed subsamples by calendar year of first marriage. This enables us to understand the entire picture of how the number of children affects marital stability through various stages of the life cycle in a dynamic way. Here, cohort I, cohort II, and cohort III denote those who married during 1958-1979, 1980-1999, and 2000-2016, respectively. The results for these subgroups are presented in Table 3.

The first row in Table 3 shows the effects of the number of children on the divorce probability. Here, we see that an increase in the number of children leads to a decrease in the divorce probability in all cohorts, and the magnitude of the estimated coefficients is largest for cohort II. The number of children has the smallest effect on the divorce probability in cohort III, who entered the marriage life most recently. These results could be interpreted in two ways. First, among various phases of marital life cycle, the number of children does not affect divorce likelihood much in the early phase of the marital life cycle because it is likely that the costs of raising children exceed the benefits of having children in this phase, resulting in higher divorce probability. As Bellido et al. (2016) discussed, in this

10) Recently, Jackson et al. (2017) revealed that lower income couples did not have less satisfying marriages on average, however, experience significantly greater fluctuations in marital satisfaction.

<Table 3> Effects of the Number of Children on Marital Status: Year of First Marriage

	Cohort I ^b	Cohort II	Cohort III
number of children	-0.030***(0.004)	-0.034***(0.004)	-0.011***(0.002)
age	0.002(0.002)	0.004***(0.002)	0.007***(0.002)
age squared	-0.001(0.002)	-0.001(0.002)	-0.006*(0.003)
religious	0.002(0.001)	-0.007***(0.002)	-0.004*(0.002)
less education	-0.004(0.012)	0.019**(0.009)	0.022(0.022)
more education	-0.060**(0.026)	-0.021***(0.006)	-0.003(0.006)
employee	-0.0005(0.002)	0.016***(0.002)	0.015***(0.003)
own business	0.005(0.003)	0.016***(0.003)	0.004(0.005)
helping family business	-0.006**(0.003)	-0.018***(0.005)	-0.008(0.008)
individual business	-0.005(0.009)	0.022(0.006)	0.021***(0.007)
fair health	0.001(0.001)	-0.007**(0.003)	-0.018***(0.005)
good health	0.0003(0.002)	-0.009***(0.003)	-0.025***(0.005)
second quintile	-0.003**(0.001)	-0.026***(0.003)	-0.039***(0.004)
third quintile	-0.006***(0.001)	-0.043***(0.003)	-0.047***(0.004)
fourth quintile	-0.008***(0.002)	-0.049***(0.003)	-0.056***(0.005)
fifth quintile	-0.006**(0.003)	-0.058***(0.003)	-0.063***(0.005)
Incheon/Gyeonggi	-0.011(0.009)	-0.003(0.007)	-0.010(0.006)
Busan/Ulsan/Gyeongnam	-0.050***(0.011)	-0.023**(0.009)	-0.016**(0.008)
Daegu/Gyeongbuk	-0.065***(0.014)	-0.010(0.010)	-0.001(0.009)
Daejeon/Chungnam	-0.049***(0.013)	0.029***(0.010)	-0.019**(0.009)
Gangwon/Chungbuk	-0.078***(0.013)	-0.023**(0.011)	-0.025***(0.009)
Gwangju/Jeolla/Jeju	-0.039***(0.012)	0.0004(0.009)	-0.020**(0.008)
constant	0.111*(0.063)	0.012(0.036)	-0.055(0.040)
number of observations	10,305	20,407	7,457

Note: ^a Values in parentheses are the standard errors of the estimates. ***, **, and * denote statistical significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

^b Cohort I, Cohort II, and Cohort III denote those who married during year 1958-1979, 1980-1999, and 2000-2016, respectively.

case, a child may act as a competitor for scarce time and money resources in the household rather than as a public household good. Second, another interpretation may be that the results reflect the differences in cultures across generations. That is, those who have married recently may be likely to have more open attitudes to divorce compared to those who married in the past. It used to be deemed a virtue for parents, in particular, mothers, to tolerate and sacrifice many aspects of life especially when they had a child in the

household. However, this is no longer the case. Empirical results seem to reflect such a cultural change.

Regarding age, as an individual ages, divorce probability tends to increase in cohort II and III. Also, being religious turns out to decrease divorce probability in cohort II and III. More education is likely to decrease divorce probability in cohort I and II whereas less education is likely to increase it in cohort II. Compared to those who do not work, those who work in any form tend to have a higher divorce probability except for those who are currently helping family business whenever the estimated coefficients are statistically significant. In the case of self-rated health, those who are healthier are likely to have a lower divorce probability in cohort II and III. The relationship is monotonic. One possible reason may be that bad health status negatively affects other household members. In particular, it affects the spouse mentally and financially resulting in a higher divorce probability.¹¹⁾ Income level has a substantial effect on the divorce probability in all cohorts. As income level increases, divorce probability is monotonically reduced. Finally, we see that there are apparent regional variations in divorce rate.

Next, we constructed subgroups according to women's age. Age I is the youngest group and age III is the oldest. Note that the division by age does not necessarily coincide with grouping by the year of the first marriage.

11) To date, there have been numerous studies focusing on the effects of marital status on health. See Guner et al. (2018) for the recent discussion. However, in contrast, there is no research on the effects of health on marital stability, which can be an avenue of future research.

<Table 4> Effects of the Number of Children on Marital Status: Age Groups

	Age I ^b	Age II	Age III
number of children	-0.014*** ^a (0.002)	-0.040*** (0.003)	-0.029*** (0.004)
age	0.020*** (0.003)	0.007*** (0.002)	0.008 (0.007)
age squared	-0.024*** (0.005)	-0.004* (0.002)	-0.005 (0.005)
religious	-0.004** (0.002)	-0.006*** (0.002)	0.0008 (0.002)
less education	0.013 (0.014)	0.002 (0.007)	-0.006 (0.013)
more education	-0.014*** (0.004)	-0.024*** (0.006)	-0.055** (0.024)
employee	0.016*** (0.002)	0.017*** (0.002)	0.005* (0.003)
own business	0.007 (0.004)	0.016*** (0.003)	0.0003 (0.005)
helping family business	-0.004 (0.006)	-0.017*** (0.004)	-0.015*** (0.004)
individual business	0.005 (0.006)	0.028*** (0.006)	-0.008 (0.014)
fair health	-0.009** (0.004)	-0.003 (0.002)	-0.002 (0.002)
good health	-0.015*** (0.004)	-0.006*** (0.002)	-0.002 (0.002)
second quintile	-0.029*** (0.003)	-0.017*** (0.002)	-0.003* (0.002)
third quintile	-0.038*** (0.003)	-0.030*** (0.003)	-0.004 (0.003)
fourth quintile	-0.046*** (0.004)	-0.034*** (0.003)	-0.009** (0.004)
fifth quintile	-0.050** (0.004)	-0.041*** (0.003)	-0.007 (0.004)
Incheon/Gyeonggi	-0.005 (0.005)	-0.0004 (0.007)	-0.004 (0.013)
Busan/Ulsan/Gyeongnam	0.0008 (0.007)	-0.023*** (0.008)	-0.016 (0.015)
Daegu/Gyeongbuk	-0.004 (0.007)	-0.018* (0.009)	-0.032* (0.018)
Daejeon/Chungnam	-0.009 (0.007)	0.0002 (0.010)	-0.024 (0.017)
Gangwon/Chungbuk	-0.009 (0.007)	-0.015 (0.010)	-0.029* (0.017)
Gwangju/Jeolla/Jeju	-0.005 (0.007)	-0.004 (0.009)	0.006 (0.015)
constant	-0.278*** (0.057)	-0.032 (0.057)	-0.134 (0.227)
number of observations	10,534	21,443	6,192

Note: ^a Values in parentheses are the standard errors of the estimates. ***, **, and * denote statistical significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

^b Age I, Age II, and Age III denote those who were younger than 40, older than 40 and younger than 60 years old, and older than 60 years old.

From Table 4, we see that the number of children affects the divorce probability least for age I group, which is similar to the result in Table 3. The effect is strongest in age II. Regarding age, as an individual ages, the divorce rate is observed to increase in age I and II. This effect is nonlinear. That is, the increasing effect of age on divorce probability is decreasing in age. Being religious is likely to decrease divorce probability in age I and II. Whereas less education has no effect on the divorce probability in any age group, more education has a significant effect in all age groups. Further, this effect

monotonically increases across the age groups. Compared to those who do not work, those who work in any form tend to have a higher divorce probability except for those who are currently helping family business. This effect is particularly evident in age II. Better health serves to reduce the divorce probability in particular in age I. Regarding income level, as income level increases, divorce probability is monotonically reduced in all the cohorts. Income level affect the divorce probability most in age I.

We present the effect of the number of children on divorce probability by educational subgroups in Table 5.

<Table 5> Effects of the Number of Children on Marital Status: Education Level

	Less education	High school	More education
number of children	-0.041*** (0.004)	-0.023*** (0.003)	-0.009*** (0.002)
age	0.008*** (0.001)	0.010*** (0.001)	0.002 (0.001)
age squared	-0.006*** (0.001)	-0.007*** (0.001)	0.001 (0.001)
religious	-0.001 (0.002)	-0.008*** (0.002)	-0.004** (0.002)
employee	0.010*** (0.002)	0.019*** (0.003)	0.007*** (0.002)
own business	0.005 (0.003)	0.018*** (0.005)	0.012*** (0.003)
helping family business	-0.004 (0.003)	-0.012** (0.006)	-0.022*** (0.06)
individual business	0.041*** (0.009)	0.013** (0.007)	0.026*** (0.006)
fair health	0.001 (0.002)	-0.011*** (0.004)	-0.003 (0.004)
good health	-0.001 (0.002)	-0.012*** (0.003)	-0.008** (0.004)
second quintile	-0.005*** (0.002)	-0.037*** (0.003)	-0.003 (0.004)
third quintile	-0.007*** (0.002)	-0.054*** (0.003)	-0.015*** (0.004)
fourth quintile	-0.006*** (0.002)	-0.062*** (0.004)	-0.023*** (0.004)
fifth quintile	-0.004 (0.003)	-0.071*** (0.004)	-0.030*** (0.004)
Incheon/Gyeonggi	-0.039*** (0.014)	-0.002 (0.008)	-0.003 (0.005)
Busan/Ulsan/Gyeongnam	-0.052*** (0.017)	-0.029*** (0.010)	-0.007 (0.007)
Daegu/Gyeongbuk	-0.095*** (0.017)	-0.015 (0.011)	0.015* (0.008)
Daejeon/Chungnam	-0.010 (0.018)	-0.0003 (0.011)	0.010 (0.007)
Gangwon/Chungbuk	-0.052*** (0.017)	-0.043*** (0.012)	-0.010 (0.008)
Gwangju/Jeolla/Jeju	-0.016 (0.016)	-0.030*** (0.010)	-0.001 (0.007)
constant	-0.044 (0.041)	-0.111*** (0.029)	-0.011 (0.024)
number of observations	11,698	15,687	10,784

Note: ^a Values in parentheses are the standard errors of the estimates. ***, **, and * denote statistical significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

We see that the effects are strongest in the lowest educational attainment group, less strong in the middle group, and, least strong in the highest educational attainment group. Regarding age, as an individual ages, the divorce probability is observed to increase in high school or less education level. This effect is nonlinear. Having any religion tends to decrease the divorce probability in high school or more education. The effect is strongest in the most educated group. Regarding economic status, those who work in any form tend to have a higher divorce probability compared to those who do not work except for those who are currently helping family business. This phenomenon is clearly seen in high school or more education. In the case of self-rated health, those who are healthier are likely to have a lower divorce probability in high school education group. Regarding income level, as income level increases, divorce probability is monotonically reduced in all the education groups. The effect is most evident in high school education group.

Table 6 shows the results for various health groups constructed by self-rated health. The number of children is found to have significant effects on the divorce probability in all the health groups. The effect is monotonic across health status groups and strongest in the poor health group. In all health groups, as an individual ages, the divorce rate tends to increase. This effect is nonlinear. Being religious is likely to decrease divorce probability in poor and good health group. Regarding education level, having both less and more education attainment exhibit to decrease the divorce probability in fair and good health group. Regarding economic status, those who work in any form tend to have a higher divorce probability compared to those who do not work except for those who are currently helping family business, in both fair and good health group. But, the pattern is quite different in poor health group. Except for those who are employees, working status turns out to decrease divorce probability.

Income level play a significant role in determining the divorce probability in all the health groups. The effects are more or less monotonic.

〈Table 6〉 Effects of the Number of Children on Marital Status: Self-rated Health

	Poor health	Fair health	Good health
number of children	-0.049*** ^a (0.005)	-0.029***(0.003)	-0.017***(0.002)
age	0.011***(0.002)	0.007***(0.001)	0.007***(0.001)
age squared	-0.009***(0.002)	-0.006***(0.001)	-0.006***(0.001)
religious	-0.007***(0.004)	-0.003(0.002)	-0.003***(0.001)
less education	-0.018(0.013)	-0.019***(0.008)	-0.017****(0.006)
more education	-0.020(0.016)	-0.031****(0.007)	-0.014****(0.004)
employee	0.019****(0.006)	0.028****(0.003)	0.010****(0.002)
own business	-0.027****(0.008)	0.026****(0.005)	0.015****(0.003)
helping family business	-0.017***(0.007)	-0.014****(0.005)	-0.011****(0.004)
individual business	-0.033*(0.019)	0.029****(0.009)	0.014****(0.005)
second quintile	-0.014****(0.004)	-0.020****(0.003)	-0.010****(0.002)
third quintile	-0.026****(0.005)	-0.033****(0.003)	-0.023****(0.002)
fourth quintile	-0.033****(0.006)	-0.039****(0.004)	-0.029****(0.002)
fifth quintile	-0.030****(0.007)	-0.044****(0.004)	-0.035****(0.003)
Incheon/Gyeonggi	-0.008(0.017)	-0.012(0.009)	-0.002(0.005)
Busan/Ulsan/Gyeongnam	-0.026(0.019)	-0.021***(0.010)	-0.014***(0.006)
Daegu/Gyeongbuk	-0.037*(0.019)	-0.004(0.012)	-0.012*(0.006)
Daejeon/Chungnam	-0.006(0.021)	0.005(0.011)	-0.011(0.006)
Gangwon/Chungbuk	-0.082****(0.021)	-0.016(0.012)	-0.006(0.007)
Gwangju/Jeolla/Jeju	-0.009(0.018)	-0.017*(0.010)	-0.009(0.006)
constant	-0.082(0.063)	-0.049(0.035)	-0.105****(0.017)
number of observations	5,343	10,286	22,540

Note: ^a Values in parentheses are the standard errors of the estimates. ***, **, and * denote statistical significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Finally, Table 7 presents the results for various economic activity groups. For a comparison purpose, we categorize three working groups, running own business, helping family business, and working as individual business as an employee into one group ('other'). The number of children affects divorce probability in all the economic activity groups. As discussed in the previous subsection, there may

be a factor that affects both the motivation to work and divorce preference. The effect is greatest in employee group. For this group, trade-off between benefit from having a child and cost of raising a child while working might be largest. In all economic activity groups, as an individual ages, the divorce rate tends to increase and the effect is nonlinear. Having any religion tends to decrease the divorce probability in not working and employee group. Regarding education level, having both less and more education attainment exhibit to decrease the divorce probability in employee group. Less education turns out to increase divorce probability in not working whereas it decreases the divorce probability in other group. Regarding income level, as income level increases, divorce probability is monotonically reduced in all the economic activity groups.

〈Table 7〉 Effects of the Number of Children on Marital Status: Economic Status

	Not working	Employee	Other
number of children	-0.015*** ^a (0.002)	-0.039***(0.005)	-0.028***(0.004)
age	0.004***(0.001)	0.017***(0.002)	0.011***(0.001)
age squared	-0.003***(0.001)	-0.014***(0.002)	-0.009***(0.001)
religious	-0.003***(0.001)	-0.006*(0.003)	-0.003(0.002)
less education	0.024***(0.006)	-0.028***(0.012)	-0.024****(0.009)
more education	-0.003(0.005)	-0.033****(0.009)	-0.010(0.009)
fair health	-0.004****(0.002)	-0.014****(0.006)	0.004*(0.002)
good health	-0.006****(0.002)	-0.020****(0.006)	0.003(0.002)
second quintile	-0.010****(0.002)	-0.050****(0.005)	-0.002(0.002)
third quintile	-0.013****(0.002)	-0.073****(0.006)	-0.007****(0.003)
fourth quintile	-0.015****(0.002)	-0.084****(0.006)	-0.008****(0.003)
fifth quintile	-0.018****(0.002)	-0.093****(0.006)	-0.017****(0.003)
Incheon/Gyeonggi	0.00001(0.004)	0.001(0.012)	-0.020(0.012)
Busan/Ulsan/Gyeongnam	-0.026****(0.006)	-0.015(0.013)	-0.034***(0.014)
Daegu/Gyeongbuk	0.002(0.006)	-0.042****(0.015)	-0.021(0.015)
Daejeon/Chungnam	0.007(0.006)	0.018(0.015)	-0.028*(0.016)
Gangwon/Chungbuk	-0.022****(0.006)	0.010(0.016)	-0.072****(0.016)
Gwangju/Jeolla/Jeju	-0.003(0.006)	-0.020(0.013)	-0.033***(0.014)
constant	-0.040****(0.014)	-0.194****(0.050)	-0.157****(0.034)
number of observations	19,087	8,743	10,339

Note: ^a Values in parentheses are the standard errors of the estimates. ***, **, and * denote statistical significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

3. Presence of Child and the Number of Children given Having Children

In this subsection, we investigate the effect of the presence of child and number of children given having children on the divorce probability, separately. The results are presented in Table 8. For the purpose of brevity, we focus on the estimated coefficient of the variable of interest and do not discuss the results for other covariates.

(Table 8) Effects of the Number of Children on Marital Status: Economic Status

	child vs. childless	children>0
having child	-0.002(0.006)	
number of children		-0.011*** ^a (0.003)
age	0.006***(0.001)	0.006***(0.001)
age squared	-0.003***(0.001)	-0.004***(0.001)
religious	-0.004***(0.001)	-0.004***(0.001)
less education	0.032(0.034)	0.032(0.040)
more education	0.022***(0.009)	0.026***(0.009)
employee	0.009***(0.002)	0.009***(0.001)
own business	0.009***(0.002)	0.010***(0.002)
helping family business	-0.005*(0.003)	-0.005*(0.003)
individual business	0.015***(0.004)	0.015***(0.004)
fair health	-0.001(0.002)	-0.001(0.002)
good health	-0.002(0.002)	-0.002(0.002)
second quintile	-0.007***(0.002)	-0.007***(0.002)
third quintile	-0.016***(0.002)	-0.015***(0.002)
fourth quintile	-0.021***(0.002)	-0.020***(0.002)
fifth quintile	-0.027***(0.002)	-0.025***(0.002)
Incheon/Gyeonggi	-0.006(0.005)	-0.009(0.005)
Busan/Ulsan/Gyeongnam	-0.041***(0.009)	-0.044***(0.009)
Daegu/Gyeongbuk	-0.002(0.010)	-0.007(0.010)
Daejeon/Chungnam	0.003(0.009)	-0.0001(0.009)
Gangwon/Chungbuk	-0.060***(0.009)	-0.059***(0.009)
Gwangju/Jeolla/Jeju	-0.034***(0.010)	-0.039***(0.010)
constant	-0.126***(0.019)	-0.106***(0.020)
number of observations	38,169	37,011

Note: ^a Values in parentheses are the standard errors of the estimates. ***, **, and * denote statistical significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

The first column is the result from the model in which we used a binary variable of whether having a child or not as the main explanatory variable, instead of the number of children. We see that whether having a child or not does not play a role in determining the divorce probability. The second column shows the result from the model in which we utilized only those who have children in the estimation. In contrast, in this framework, we confirm that the number of children has an effect on the divorce probability. Having one more children significantly reduces the divorce probability by 1.1 percentage points.

V. Conclusion

This study analyzed the effects of the number of children on marital stability using Korean longitudinal data. In particular, to control for the possible endogeneity arising from fertility decision, we implemented the fixed effects linear probability panel data model that are quite rare in the literature. Based on this methodology, we confirmed that fertility decision is likely to be endogenous and this endogeneity created overestimation (in absolute terms) of the coefficient of interest, resulting in biased outcomes regarding the effects of children on the divorce probability. The main empirical results indicated that the number of children significantly deter marital dissolution. Notably, an increase in the number of children by one reduces the likelihood of divorce by 1 percentage points. This magnitude is substantial because the divorce rate is 4.2 percentage in the sample. Next, we investigated the heterogeneous effects for various subgroups constructed according to various characteristics of women. Specifically, we found that the number of children has the least effect on marital dissolution for both those who have most

recently married and those who are in the youngest age group. We conjecture that this shows the changing attitude toward divorce in Korean society. Furthermore, we also found that the number of children is likely to affect marital stability much less for those who are socio-economically advantageous. Finally, we found that whether having child or not does not have an effect whereas the number of children given having child has a significant effect on the divorce probability.

Our analysis has one important limitation. We do not include the decision to marry in the analysis. However, marriage formation, marriage break-up, and the decision to have children are very likely to be intermingled. For example, those who have a strong divorce inclination may have a strong preference for delaying marriage itself. In this case, for those who are married, children may have no or very little effects on marital instability and the results from cohort III and age I in our analysis may reflect this type of dynamic unforeseen mechanism. Therefore, future work should take account of the marriage decision more explicitly in the analytical framework.

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Appendix. Estimation Results for Correlated Random Effects Panel Data Model

	Correlated Random Effects
number of children	-2.129*** ^a (0.201)
number of children (marginal effect)	-0.015*** ^a (0.001)
age	1.430*** ^a (0.173)
age squared	-0.993*** ^a (0.163)
religious	-0.325(0.223)
less education	5.260(3.601)
more education	1.801(2.119)
employee	0.201(0.274)
own business	0.489(0.393)
helping family business	-2.359** ^a (1.173)
individual business	0.904(0.759)
fair health	0.078(0.268)
good health	0.171(0.280)
second quintile	-0.608** ^a (0.250)
third quintile	-1.358*** ^a (0.303)
fourth quintile	-1.617*** ^a (0.345)
fifth quintile	-1.910*** ^a (0.395)
Incheon/Gyeonggi	-0.891(1.055)
Busan/Ulsan/Gyeongnam	-3.681** ^a (1.639)
Daegu/Gyeongbuk	-1.641(1.559)
Daejeon/Chungnam	-0.375(1.660)
Gangwon/Chungbuk	-3.791** ^a (1.776)
Gwangju/Jeolla/Jeju	-5.719** ^a (2.981)
constant	-33.68(4.315)
number of observations	37,925

Note: ^a Values in parentheses are the standard errors of the estimates. ***, **, and * denote statistical significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

^b Estimated coefficients of the average values of the explanatory variables in the CRE model are not reported. The estimated coefficients of 14 out of 22 average values are statistically significant.

자녀가 우리나라 여성의 이혼에 미치는 영향

이 용 우*

논문초록

본 연구는 여성 가족 패널자료를 이용하여 자녀의 수가 우리나라 여성의 이혼에 미치는 영향을 분석한다. 특히 자녀를 가질 것인가의 결정에 존재하는 내생성을 통제하기 위하여 고정효과 패널데이터 모형을 방법론으로 채택한다. 주요 분석 결과를 통해 볼 때 자녀의 수가 결혼생활의 안정성을 증가시키는 것을 알 수 있다. 특히, 다른 변수를 통제할 때 자녀의 수가 한 명 늘어나면 이혼확률은 약 1% 포인트가 감소하는 것으로 나타난다. 더 나아가 사회경제적으로 상대적으로 우위에 있는 사람들에게 자녀 수의 효과의 크기는 그렇지 않은 사람들에 비해 크지 않은 것으로 나타난다.

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