



The Effect of Family Members' Perceived Upward Mobility on Marriage and Childbirth Using Heckman Sample Selection Model*

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Abstract

This study analyzed the effect of perceived upward mobility of parents and children in marriage and during childbirth using the two-stage Heckman sample selection mode in 20 to 44-year-olds living in Seoul. The main results are as follows: First, high economic and residential stability increased the probability of marriage and having numerous children. Furthermore, unstable and poor housing environments were identified as factors that increased the likelihood of being unmarried and not having children. Third, it was found that social conflict is a negative factor in marriage; however, childbirth was determined by personal circumstances rather than macroscopic social issues. Furthermore, well-equipped care and childcare infrastructure was associated with an increase in the number of children. Even if the possibility of the upward mobility of parents is not high, the more the possibility of upward mobility of children is, the higher the probability of marriage. Sixth, it was found that there should be at least a moderate level of parents' and a high level of children's upward mobility to increase the possibility of childbirth. Despite spending huge amount of money to address the low birth rate, the fertility rate in Korea continues to decline, thereby resulting in concerns about the national extinction beyond the population cliff. Hence, this study suggests detailed policy directions aimed to increase marriage and childbirth rates.

Keywords Social Class Mobility, Family, Marriage, Childbirth, Heckman Sample Selection Model

주제어 계층이동, 가족, 결혼, 출산, 헤크만표본선택모형

1. Introduction

Since 2002, the Republic of Korea has had an ultra-low fertility rate of less than 1.3, and it is expected to see a record low of 0.73 total fertility rate in 2023. This is one of the lowest levels in the world, being less than half the rate of industrialized countries experiencing low birth rates (1.3 to 1.8), or the OECD average (1.6). Worse yet, Korea is the only country on earth with a total fertility rate of less than 1. The country's current birth rate is far below 2.1, which is required to main-

tain the size of the country's population, and moreover the rate continues to decline, raising concerns about the sustainability of society and the risk of the country's demise (Yoon, 2022; Lee, 2023).

While this ultra-low birth rates vary by region, it is notable that the fertility rates are observed to be lower in metropolitan areas with a densely concentrated population (Lim et al., 2018). In Seoul, the capital city of the country, the total fertility rate in 2022 is 0.59, the lowest among the country's 17 provinces, and has been declining since 2012 when the

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rate was 1.06. Within the city, Gangdong-gu, Seongdong-gu, and Nowon-gu show the highest total fertility rate of 0.72 among Seoul's 25 districts ("Gu"), but this is still lower than the national average, indicating that Seoul is suffering the most from the low fertility rate problem.

Late marriage and non-marriage, which could lead to the absence of or postponed childbirth are pointed out as the culprit of the low birth rate (Kim and Hwang, 2016). In Korea, people tend to consider marriage as a prerequisite of childbirth, but an increasing number of people now think marriage is not a must but a choice. Since a low birth rate has multi-faceted and complex aspects, diversified approaches and considerations are needed to identify the reason people do not choose marriage and childbirth (Song, 2016; Byun, 2017; Cho et al, 2019; Kim, 2022).

Marriage and childbirth are largely influenced by one's subjective perceptions towards marriage, family and gender roles, in addition to one's current socioeconomic conditions, including educational backgrounds, income level, occupation, etc. (Do and Choi, 2018; Lim and Seo, 2021; Park et al., 2022). Subjective perceptions of an individual are formed by various factors, not only by traditional norms and one's prospects for their own and their children's future (Lutz et al., 2006; Kim, 2022; Park et al., 2022). People who think their future is insecure are more reluctant to have a child, and parents' desire to give only good things to their children could lead them to give up on having and raising children.¹²⁾

Since a family cannot be made up of either a parent or the child alone but requires both, it is timely and meaningful to examine the relation between people's perceptions towards the future of their family (including one for their children) and marriage and childbearing. This is particularly so given the ever-declining childbirth rate and the young generation's hopelessness and anxiety about their future. Yet, existing studies have mostly focused on individual situations or tend to look at parents' and their child' situations separately; as a result, most of these works have failed to properly capture the fact that people make their choices regarding marriage and childbirth based on their perceptions of the future of all family members. In Korea, social norms dictate that marriage comes first and is followed by childbirth in general, and this is why late marriage and non-marriage can contribute to a low birth rate. Nevertheless, existing research has focused on policies for married couples and their childbirth,

without properly considering a general life course that leads from marriage to childbirth.

Against this backdrop, this study aims to identify the impact of the perceived possibility of upward social mobility both for the parents and their child on their decision about marriage and the number of children they want to have. The study primarily focuses on Seoul where the declining birthrate problem is most serious. It should be noted that we empirically analyzed the determinants of marriage and the number of children in two stages based on Heckman sample selection model, considering the traditional life course in which marriage and childbirth take place in that order, rather than the converse. Based on the results, we provide implications that would help strengthen the country's low birth rate policy.

II. Literature Review

Previous relevant studies mainly reviewed the impact of demographic and economic characteristics of households, housing characteristics, and characteristics related to recognition and values on marriage and childbirth. Specifically, it has been shown that as age (demographic factor) becomes higher, the likelihood of marriage increases (Oh and Lim, 2016), but fertility declines (Song, 2014; Lim and Seo, 2021). It was found that education has both positive and negative effects on marriage and childbirth; although higher levels of education had a positive effect thanks to favorable occupational conditions or relatively higher income (Shin et al., 2009; Jin and Jung, 2010; Yeom, 2013; Kang and Ma, 2017), it also had some negative aspects since longer years spent on education may delay marriage and childbirth (Kim and Sun, 2011; Lee and Choi, 2012; Do and Choi, 2018; Lim, et al., 2018). Regarding household income, which is an economic characteristic, the likelihood of marriage and childbirth went up with increased economic stability made possible by higher income and the presence of debt (Lee and Choi, 2012; Kim, H.S., 2017; Lim, et al., 2018; Kim and Cho, 2022).

In terms of housing characteristics, detached houses and multi-family houses with ample room for living have a positive effect on childbirth (Lee and Choi, 2012; Park, 2019). However, a study by Lee and Seo (2021) found that apartments with relatively convenient living conditions and good educational environments also had a positive effect on fertil-

ity. As for occupancy type, home-owners with higher housing stability were found to have higher marriage and fertility rates (Kim, K.A., 2017; Lee and Roh, 2017; Lim et al., 2018; Lee and Seo, 2019).

Residential neighborhoods have also been found to be related with marriage and fertility, with different neighborhoods having relatively different impacts on marriage and fertility (Kim and Park, 2019; Bae, 2019; Lim and Seo, 2021). Lee and Seo (2021) examined the effect of housing characteristics on the childbirth intention of married women in five residential areas in Seoul and found that the effect of housing characteristics on childbirth is different depending on the residential area.

As for personal perception and value characteristics, a number of studies have been conducted on individuals' perceived necessity of marriage and childbirth and traditional values about marriage; the results showed that the more one feels that marriage or having children is necessary and holds traditional values for marriage and family, the higher the likelihood of marriage and childbirth (Kim and Sun, 2011; Woo and Jang, 2019; Lim and Seo, 2021). In addition, Kim (2022), who identified the impact of individuals' perceptions of the future on marriage and fertility, found that the probability of future upward mobility (i.e., one's prospect to move to a better position in the future) is an important factor in the decision to marry and have children. Park et al. (2022) analyzed the relationship between perceived socioeconomic stability, opportunity and equality, and class mobility and attitudes toward marriage and childbirth in order to examine the low fertility issue based on social conditions. The results showed that socioeconomic stability, assessed with one's economic situation and outlook at present and in five years, was not a significant variable, but the more positive one's perception toward opportunity and equality of a society (e.g. income distribution and balanced cross-region development, etc.), the more significant one values marriage and childbirth. When examining perceived class mobility for the parent and their children, respectively, the probability of upward mobility for the parents was not a significant factor, but people who think more positively about the upward mobility of their children tend to believe that marriage and having children are an essential part of life.

Through the review of the preceding studies outlined above, it was found that various factors ranging from

marriage- and family-related values to one's current situations including individual or household characteristics (e.g. age, education, and income), and housing stability characteristics (e.g. housing types, occupancy types, and residential areas) affect marriage and childbirth.

As we have reviewed above, expectations or prospects for the future can affect marriage and childbirth and those two life events generally occur in sequence; existing studies, however, focused on the cross-sectional characteristics and circumstances of individuals or households and set either marriage or childbirth as a dependent variable when examining their implications. In addition, since the family is not composed of only the individual, people tend to decide marriage and childbirth by considering their expectations of the future for all family members together. Most studies, however, only considered the subjects' marital values and whether they find marriage and childbirth necessary, and only some recent studies examined the subjects' perception of upward class mobility in the future, or their perceived future upward mobility for the parents and their children separately. Although the outlook and perceived future of a family (parents and children) may differ from that of the person (parent) and of each child, previous studies have not fully reflected the perceived likelihood of the entire family's upward class mobility down the road.

In an effort to supplement the limitations posed by the previous research, this study reflected the life course from marriage to childbirth using the two-stage Heckman sample selection model and examined the correlations between marriage/childbirth and the possibility of class mobility of a family by comprehensively considering the perceived future of the subject (parent) and his/her child separately. The study was conducted on subjects living in Seoul, with the lowest fertility rate in the country.

III. Analytical Framework

1. Methodology

Previous studies to identify factors affecting marriage include both unmarried and married people, but those looking into childbirth mostly considered married people as the subjects. If the targets are limited to married people, however, the sample selection bias is likely to increase as the

sample is not randomly drawn but people whose marital status is single ('not married') are arbitrarily excluded. With this in mind, this study used the Heckman sample selection model to compensate for the sample selection bias.

The Heckman sample selection model assumes that the factors affecting marriage and the number of children (childbirth) are different, and hence the factors determining marital status and the number of children born can be analyzed in two stages. The selection equation (Eq. (1)) that estimates the variable (z) for marital status in Stage 1 and the regression equation (Eq. (2)) that estimates the variable (y) for the number of children in Stage 2, both of which were used by this study, can be expressed as follows (Park and Cho, 2016):

$$(Stage\ 1)\ z^* = w'\gamma + u, \ z = \begin{cases} 1 & \text{if } z^* > 0 \\ 0 & \text{if } z^* \leq 0 \end{cases} \quad (1)$$

$$(Stage\ 2)\ y^* = x'\beta + \epsilon, \ y = \begin{cases} y^* & \text{if } z^* > 0 \\ 0 & \text{if } z^* \leq 0 \end{cases} \quad (2)$$

where w and x are independent variables, and β and γ are parameters to be estimated. μ and ϵ are the error terms, and the standard deviations of the error terms are 1 and σ , which are normally distributed (Min and Choi, 2021).

In Stage 1, the probit model is used to estimate the probability of sample selection, and in Stage 2, the OLS regression model (OLS) is applied to only the samples ($z=1$) selected in Stage 1. The OLS is shown in Eq. (3) below (Greene, 2003; Lee and Lee, 2013):

$$\begin{aligned} E[y|z=1] &= x'\beta + E[\epsilon|\mu > -w\gamma] \\ &= x'\beta + \rho\sigma \frac{\phi(-w'\gamma)}{1 - \Phi(-w'\gamma)} \\ &= x'\beta + \beta_\lambda \lambda(-w'\gamma) \end{aligned} \quad (3)$$

In Equation (3), $\Phi(\bullet)$ is the standard normal cumulative density function, and $\phi(\bullet)$ is the standard normal probability density function. The inverse Mills ratio (IMR), the ratio of the two functions, is the probability that each observation will be momentarily excluded from the sample and can be expressed as $\lambda(-w'\gamma)$. IMR is added as a new independent variable for the second stage analysis, and a significant value

of the IMR indicates that the use of the Heckman sample selection model is valid. Also, $\rho\sigma(\beta_\lambda)$ serves as the regression coefficient and σ is the standard error of the regression model residuals, and $\rho(\rho)$ is the correlation between the residuals in the first and second analytical stages, with a value between -1 and 1. If the correlation coefficient of the residuals is high, the estimate of the OLS without IMR includes sample selection bias (Cho, 2017; Lim et al., 2018).

2. Data and Variables

The empirical analysis utilized the Seoul Survey (2022) conducted by the Seoul Government. The Seoul Survey aims to analyze changes in Seoul, evaluate policy performance, and monitor changes in citizens' quality of life, attitudes, and values in order to formulate relevant municipal projects. It is the most suitable data for the purpose of this study because it contains information on the marital status and children of households living in Seoul, as well as household head characteristics, economic characteristics, residential characteristics, and the residents' perceptions of socio-economic risks living in the city and the possibility of upward mobility for themselves and their children.

The age range for the analysis is 20-44 years old, which is the range utilized in previous studies (Statistics Korea, 2013; Lim et al., 2018), where marriage, childbirth, and child-rearing are major events in a family's life cycle. In the empirical analysis, we included 5,574 households out of a total of 20,000 households whose head of household age met the analytical criteria, excluding non-response and missing data. Of these, 1,712 are single and 3,862 are married households.

For the dependent variable using the Heckman sample selection model, we used 'marital status' for the first stage and 'number of children' for the second stage analysis (See Table 1). In Stage 1, we categorized all households into single (0) and married (1), with 69.3% of households being married. In Stage 2, the number of children in married households was set as a dependent variable, with a minimum of 0 and a maximum of 3, and a mean of 0.3.

The independent variables were divided into socio-economic characteristics, residential characteristics, perceived risk of socio-economic situation, and upward mobility likelihood of family members (which are believed to affect marriage and number of children based on previous stud-

Table 1. Variables and descriptive statistics

Variable		Description	Mean	S.D.	Min	Max		
Dependent	(Stage 1) Marital status	0=Single, 1=Married	0.693	0.461	0	1		
	(Stage 2) Number of children	Total number of children in a household	0.331	0.564	0	3		
Independent	Age	Age of the head of a household	36.681	4.870	20	44		
	Socio-economic characteristics	Education	1=Middle school and below, 2=High school and below, 3=University and below, 4=Graduate school or higher	2.908	0.341	1	4	
		Income	1=Less than 2million won 2=Less than 2 to 4 million won 3=Less than 4 to 6 million won 4=Less than 6 to 8 million won 5=More than 8 million won	2.856	0.871	1	5	
		Debt	0=No, 1=Yes	0.552	0.497	0	1	
	Residential characteristics	Housing type	APT	0=Other, 1=APT (reference)	0.413	0.492	0	1
			Detached	0=Other, 1=Detached house	0.226	0.418	0	1
			Multi	0=Other, 1=Multi house	0.361	0.480	0	1
		Housing tenure	Homeowner	0=Other, 1=Homeowner	0.210	0.408	0	1
			Jeonse	0=Other 1=Jeonse	0.564	0.496	0	1
			Rent	0=Other 1=Rent (reference)	0.226	0.418	0	1
		Region	Central	0=Other, 1=Central (reference)	0.080	0.272	0	1
			Northeast	0=Other, 1=Northeast	0.350	0.477	0	1
	Southeast		0=Other, 1=Southeast	0.212	0.409	0	1	
	Northwest		0=Other, 1=Northwest	0.122	0.328	0	1	
	Risk perception	Risk perception	Southwest	0=Other, 1=Southwest	0.235	0.424	0	1
			Unemployment	The seriousness of unemployment 1=Not serious at all ~ 5=Very serious	3.745	0.851	1	5
			Economic crisis	The seriousness of financial crisis, etc. 1=Not serious at all ~ 5=Very serious	3.771	0.873	1	5
		Social conflict	The seriousness of the wealth gap, inequality, and generational conflict, etc 1=Not serious at all ~ 5=Very serious	3.684	0.840	1	5	
		Upward mobility chance	OL-CL	0=Other, 1=Oneself low-children low (reference)	0.180	0.384	0	1
OL-CM			0=Other, 1=Oneself low-children middle	0.058	0.234	0	1	
OL-CH			0=Other, 1=Oneself low-children high	0.031	0.173	0	1	
OM-CL			0=Other, 1=Oneself middle-children low	0.048	0.213	0	1	
OM-CM			0=Other, 1=Oneself middle-children middle	0.238	0.426	0	1	
OM-CH			0=Other, 1=Oneself middle-children high	0.126	0.332	0	1	
OH-CL	0=Other, 1=Oneself high-children low		0.015	0.123	0	1		
OH-CM	0=Other, 1=Oneself high-children middle	0.037	0.189	0	1			
OH-CH	0=Other, 1=Oneself high-children high	0.267	0.443	0	1			
N				5,574				

ies), and the independent variables for the first and second stage analyses were the same. First, the age and education of the household head, which are socioeconomic characteris-

tics, were found to be 36.7 years old on average and university graduate or lower, respectively. Household income, which represents the economic power of the household,

was 4 to 6 million won or lower on average, and 55.2% of the households had household debt.

Next, residential characteristics included housing type, occupancy type, and residential areas. The housing type was divided into apartment, detached house, and multi-family house, and the occupancy type was divided into home owners, jeonse (lump-sum housing lease), and rent, with apartment and rent serving as the reference variables. As for the housing types, apartment (41.3%) was the highest, followed by multi-family house (36.1%), and detached house (22.6%). In terms of occupancy type, jeonse was the highest with 56.4%, followed by rent (22.6%) and home owners (21.0%), indicating a higher proportion of renters (79.0%) than homeowners. Residential areas were divided into five living areas in Seoul, with the central area as the reference variable. Among the residential areas, the largest number of households lived in the northeast (35.0%) and the smallest in the central area (8.0%).

Risks that occur in cities can affect lives, and socioeconomic factors are a major variable in marriage and childbearing (Chun, 2013; Kim and Jeon, 2020). In this regard, the risk perception of the socioeconomic situation in the city considered in the study was assessed in terms of unemployment, economic crises (e.g. financial crises), and social conflicts (e.g. wealth gap, inequality, and generational conflicts); all three categories were perceived as slightly serious, with a score of 3.8 for unemployment and economic crises and 3.7 for social conflicts.

Finally, we investigated the perceived probability of family members' upward mobility; as a key variable of this study, it means the perceived likelihood of socioeconomic status changes of the subject (parents) and his/her children. We used two questions for the subject and his/her children, respectively, by asking: "How likely or unlikely do you think it is that your (or your child's) socioeconomic status will become higher in our society?". We first collapsed the five-point scale responses to a three-point scale (low, moderate, high), and combined the scores to the responses for the likelihood of upward mobility for themselves and their children. With this method, we could draw a total of nine categories, and 'Low' for oneself and 'Low' for the children (OL-CL) was respectively used as the reference variable. It should be noted that marriage and childbirth are past events, while the likelihood of upward mobility is a current

perception, and thus there may be a time difference in perception. Existing studies, however, have shown that subjective perceptions do not change significantly over time (Walsh et al., 1996; Na and Cha, 2010), and given that it is not uncommon for families to make a decision for marriage and childbirth based on the possibility of upward mobility, this study assumed that people had the same perceptions toward marriage and childbearing decisions in the past as they do today. Regarding the perception of upward mobility, the highest percentage of responses were 'High-Oneself' and 'High-Children' (OH-CH, 26.7%), followed by 'Moderate-Oneself' and 'Moderate-Children' (OM-CM, 23.8%), and 'Low-Oneself' and 'Low-Children' (OL-CL, 18.0%), indicating that the subjects generally perceive their own and their children's upward mobility similarly. The two categories with the lowest percentages were found to be 'High-Oneself' and 'Low-Children' (OH-CL, 1.5%) and 'Low-Oneself' and 'High-Children' (OL-CH, 3.1%).

IV. Results of Empirical Analysis

1. The Impact of Perceived Upward Mobility of Family Members on Marriage

The analysis showed that the $IMR(\lambda)$ value is statistically significant, indicating that sample selection bias occurs within the analysis with the OLS (See Table 2). Therefore, using the Heckman sample selection model was found to be valid.

In the first stage of the analysis designed to identify the factors that influence the perceived upward mobility of family members to marriage, it was found that all socioeconomic characteristics have a significant impact on the likelihood of getting married. Age is positively related to the likelihood of marriage, but age squared is negatively related to the likelihood of marriage, indicating that the likelihood of marriage increases up to a certain level and then decreases with age. This may be attributable to the fact that one's attitude toward marriage changes or people tend to give up on getting married as they pass the 'marriageable age' with time (Lee, 2019). Higher education level had a negative impact on marriage, as a long period of education delays marriage and reduces its probability, as explained in previous studies (Kim and Sun, 2011; Do and Choi, 2018). Higher household

Table 2. Empirical results

Classification		(stage 1) marriage		(stage 2) childbirth		
		B	S.E.	B	S.E.	
Intercept		-10.348***	1.221	-7.620***	0.835	
Socio-economic characteristics	Age	0.370***	0.068	0.420***	0.042	
	Age2	-0.004***	0.001	-0.006***	0.001	
	Education	-0.199***	0.064	0.015	0.031	
	Income	0.955***	0.033	0.011	0.024	
	Debt	0.546***	0.045	0.096***	0.025	
Residential characteristics	Housing type	Detached	-0.172***	0.061	-0.041	0.027
		Multi	-0.182***	0.055	-0.092***	0.025
	Housing tenure	Homeowner	0.774***	0.071	0.136***	0.044
		Jeonse	0.768***	0.057	0.070*	0.041
	Region	Northeast	0.131	0.085	0.048	0.041
		Southeast	0.149	0.092	0.131***	0.044
		Northwest	0.235**	0.102	0.107**	0.047
	Southwest	0.156*	0.089	0.065	0.043	
Risk perception	Unemployment	0.034	0.032	-0.018	0.014	
	Economic crisis	-0.028	0.030	-0.006	0.014	
	Social conflict	-0.054*	0.031	0.007	0.014	
Upward mobility chance	OL-CM	0.203*	0.107	-0.021	0.047	
	OL-CH	0.098	0.136	0.095	0.059	
	OM-CL	-0.224**	0.113	0.043	0.054	
	OM-CM	-0.032	0.069	0.029	0.032	
	OM-CH	0.338***	0.085	0.148**	0.036	
	OH-CL	0.195	0.181	0.036	0.084	
	OH-CM	-0.049	0.124	0.025	0.060	
	OH-CH	-0.019	0.069	0.109***	0.031	
Inverse mills ratio (λ)			0.263***			
ρ			0.422			
σ			0.625			

Note: p<0.01(***), p<0.05(**), p<0.1(*)

income, which is a proxy for economic stability, increased the probability of marriage, consistent with previous studies (Lee and Choi, 2012; Lim et al., 2018). Household debt was found to have a positive effect on marriage; this cannot be interpreted to mean that household debt increases the likelihood of marriage, but rather that marriage creates situations that require married households to borrow money, for wedding preparations and getting a home for the family.

Regarding housing characteristics, living in a detached or multi-family houses rather than an apartment, and renting rather than owning or jeonse, were found to be negatively

related to marriage. This is because when it comes to marriage, apartments are what people desire most because of the convenient living environment, and owning a home or Jeonse are preferred to monthly renting because of relatively higher residential stability. Also, people tend to delay marriage to secure their preferred living space (Kang and Ma, 2017; Byun et al., 2018), and thus the likelihood of being unmarried increases when living in places other than apartments or by monthly renting. These findings confirmed that convenient living conditions and residential stability are important factors in the decision about marriage (Lim et al.,

2018; Lee and Seo, 2019).

The probability of marriage decreased when living in the central area compared to the northwest or southwest areas. High housing prices and the lack of a preferred housing environment for a family have a negative impact on marriage (Do and Choi, 2018; Lim et al., 2018). In this regard, the central area had relatively higher housing prices (both for purchasing and jeonse)³⁾ than the northwest and southwest areas, while having relatively lower ratio of apartments (preferred housing type for married couples) and after-school care centers and care facilities (factors considered when couples decide to have a baby after getting married)⁴⁾. These factors may explain the lower probability of marriage among residents of the central area.

Next, in terms of risk perception of socioeconomic factors, only social conflict was found to have a significant impact; the more severe the perceived problems such as wealth gap, inequality, or generational conflict are, the higher the likelihood of being unmarried is. Wealth gap or inequality that exists in society makes it difficult for individuals to take the general life course that starts from meeting a loved one to getting married and having a child only on the basis of one's individual achievement and creates disparities in life course fulfillment by class (Oh, 2020). These aspects seemed to have influenced the above findings for perceived risks of socioeconomic conditions. In addition, generational conflict stemming from different perceptions of marriage, housework, and childbirth between generations can lead to family conflict, and this can be a negative factor for marriage. From this, it can be inferred that risks existing in cities such as social conflict are relevant to individuals' lives, especially marriage, and hence mitigating social conflict can play a role in increasing the likelihood of marriage.

Finally, regarding the likelihood of upward mobility of family members, the key characteristic dealt with in this study, we found that 'Low-Oneself' and 'Moderate-Children' (OL-CM), 'Moderate-Oneself' and 'Low-Children' (OM-CL), and 'Moderate-Oneself' and 'High-Children' (OM-CH) categories had a significant impact. Compared to the reference variable 'Low-Oneself' and 'Low-Children' (OL-CL), the probability of marriage decreases for 'Moderate-Oneself' and 'Low-Children' (OM-CL) category. This suggests that the less optimistic people are about their children's future than their own, the more negative they are

about marriage, and this had a greater impact than perceiving the entire family members (including oneself and their children) as less likely to move up the social ladder. Conversely, the more they expected their children to be more likely to move upwardly the social class than themselves (OL-CM and OM-CH), the more likely they were to decide to marry, even if they did not perceive their and their children's probability to move upward as high. These findings suggest that in order to mitigate non-marriage and late marriages that eventually lead to not having children or delayed childbearing, and thus a serious low fertility rate, it is necessary to provide people with an optimistic outlook that their offspring will have a higher socioeconomic status than the parents themselves.

2. The Impact of Perceived Upward Mobility of Family Members on Childbirth

With the results from the first stage analysis examining the impact of family members' upward mobility on marriage, in the second stage analysis we also examined the effect of family members' upward mobility on the number of children born. We found that age and household debt were significant socioeconomic characteristics, with age being associated with an increase in the number of children born up to a certain age, similar to the biological fertility range, and then decreasing thereafter (Song, 2014). Household debt was found to be positively related to having more children. It appears that a married couple, in general, needs to borrow money to finance the increased expenses for childcare and housing after delivery (e.g. lump-sum renting (jeonse) or home owning, improving the living environment, etc.) (Kim, H.S., 2017).

In terms of housing and occupancy types included in the housing characteristics, apartments with relatively better education and living conditions, and jeonse or owning a home with more stable housing environment than renting, were positively associated with fertility and multi-child birth, in line with previous studies (Kim, K.A., 2017; Lee and Noh, 2017; Lee and Seo, 2021). This suggests that housing stability and living conditions are important factors for childbearing as well, just as they are for marriage. In terms of residential areas, the number of children born was found to be higher in the southeast and northwest regions⁵⁾ than

in the central area. Given that decent childcare infrastructure can effectively increase regional fertility rate (Park and Jang, 2022), the likelihood of having a child is higher in the southeast and northwest regions equipped with childcare infrastructure such as regional offices of community child centers, after-school care classes, and Together Care Centers (government-run after-school care facilities), etc. than in the central region. From these results, this study concludes that expanding local after-school care and childcare infrastructure is important to improve fertility rates.

Interestingly, despite that the subjects perceived living in a city was risky, with the scores of unemployment, economic crisis, and social conflict being 3.6 or higher on average, none of the variables had a significant effect on fertility. This suggests that the decision to give birth may be largely determined by personal circumstances rather than macro socioeconomic situations.

Finally, the likelihood of upward mobility of family members was a major driver in increasing the number of children born in the 'Moderate-Oneself' and 'High-Children' (OM-CH) and 'High-Oneself' and 'High-Children' (OH-CH) categories. In other words, respondents were more likely to have multiple children when they perceived they are likely to climb up the social ladder and their children are highly likely to be upwardly mobile. Regarding marriage, the respondents answered that one can marry if his/her children's likelihood of upward mobility is high (even if their own probability of upward mobility is low), as examined in the Stage 1 analysis, but childbearing was found to be more likely to occur when one's upward mobility is at least moderate and one's children's upward mobility is high. This suggests that people need a much higher probability of family upward mobility to decide to have a child than they do to decide to marry, and that the low fertility problem can be resolved by creating an environment where people can expect their children to have a high probability of upward mobility.

V. Conclusions and Implications

This study empirically analyzed the effect of family members' upward mobility on marriage and childbearing using a two-stage Heckman sample selection model for individuals aged 20 to 44 years who live in Seoul and are in

the marriageable and childbearing period of their life cycle. The key findings are as follows:

First, higher economic security and housing affordability were found to increase the probability of marriage and having multiple children. Second, low housing stability (e.g. unstable or poor housing types or environment) was found to increase the likelihood of being unmarried and not having children. Third, social conflict was found to be a negative factor in marital choices, but people's decision to give birth to one (or more) baby may be determined by personal circumstances rather than macro socioeconomic conditions. Fourth, a well-equipped after-school care and childcare infrastructure in the neighborhood was found to increase the number of children born. Fifth, the more optimistic people are about their children's upward mobility, the more likely they are to marry, even if they are not likely to be upwardly mobile themselves. Sixth, the likelihood of childbearing was found to increase with at least a moderate level of upward mobility for the respondent (parent) and a high level of upward mobility for the child.

Despite investing a large amount of money to counteract the declining birthrate, the birthrate continues to decline, leading to concerns about a population cliff, and even the country's demise over time. Various policies are being established for married people to raise the fertility rate, but, given that marriage is perceived as a prerequisite for childbirth in Korea, it is necessary to consider measures to increase both the marriage rate and fertility rate.

In this regard, this study makes the following policy recommendations.

First, a family's pessimistic outlook may lead to non-marriage or not having children. Therefore, rather than implementing policies with short-term effects at best that are centered on jobs, housing, and private education expenses for married households only, rather cross-generational policies to address unmarried households' anxiety regarding their future should be considered as well. More specifically, the aim of policies to increase the marriage rate should be to lead people to expect a more positive future for their children than their own future, while policies to raise fertility rates should be geared at creating an environment where both the parents and their child can expect a positive future together.

Second, regarding a housing policy that is considered

central to fertility policy, housing stability and good living conditions are important factors in the virtuous cycle that leads from being single to getting married and having a child, and thus should continue to remain as a key project to mitigate the low fertility problem. However, as people's willingness to marry and give birth may change depending on the housing and occupancy type, it is necessary to proactively reflect the needs of households that are planning for marriage and childbirth.

Finally, given that the decision to have a child is influenced by regional after-school care and childcare infrastructure, more investment should be made in building such infrastructure.

While this study bears significance in that it examined the chance of upward mobility of all family members to increase marriage and fertility rate and provides policy implications to address the ever-declining birthrate, it also has the following limitations. First, as the number of children variable can only be obtained from household head data, the unit of analysis was set to a household, which prevented us from including 20 to 44-year-olds who do not form independent households but are members of a household. Thus, going forward, it is necessary to conduct further studies that consider this population group as well. In addition, the perceived possibility of class mobility may change depending on the individual and social situations, but due to the limitations of the data, we were unable to capture such changes. Therefore, in-depth research on the changing time and environment that affect marriage and childbearing should be conducted based on time series data.

Note 1. "Youths giving up marriage and childbirth due to future insecurity," Joong-Ang Ilbo, January 7, 2021.

Note 2. "I can't bear the inheritance of poverty..." I can't get married without money," The Asia Business Daily, May 17, 2023.

Note 3. According to Seoul Basic Statistics, the sales price index in Seoul in 2022 was 99.5 in the downtown area, 98.2 in the northwest area, and 98.9 in the southwest area, while the rental price index was 96.8 in the downtown area, 95.9 in the northwest area, and 96.1 in the southwest area, showing that both the sales price index and the rental price index were higher in the downtown area.

Note 4. The ratio of apartments to total housing units in Seoul (2020 Housing Survey) is 48.6% in the downtown area, 50.2% in the northwest area, and 56.7% in the southwest area, and the number of daycare centers (childcare statistics) in the downtown area is the lowest at 241 (5.1%) out of the total 4,712 in Seoul. The average number of childcare facilities such as community childcare centers and after-school care centers by region (Seoul

iCare Portal; <https://icare.seoul.go.kr>) is also 8.1 in the downtown area, 15.9 in the northwest, and 17.7 in the southwest, with the downtown area having the lowest units.

Note 5. According to Seoul iCare Portal on the average number of childcare facilities by region, there are 6.3 community childcare centers in the downtown area, 13.5 in the southeast, and 15.3 in the northwest; regarding after-school care centers, there are 11.0 in the downtown area, 30.8 in the southeast, and 22.0 in the northwest; as for Together Care Centers, there are 7.0 centers in the downtown area, 9.8 in the southeast, and 10.3 in the northwest.

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