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Analysis of Declining Birth Rates in South Korea

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ABSTRACT

The decline in the total fertility rate in South Korea has reached the lowest position worldwide, in 2022 the total fertility rate is 0.78 children per woman. This study aims to see the effect of the number of marriages, the number of elderly population, divorce rates, and house prices on the total fertility rate in South Korea. By taking several samples of areas namely the metropolitan cities (광역시) of Kwangju, Deajon, and Ulsan. Special self-governing city (특별자치시) of Sejong, Gangwon Province (강원도), North Jeolla Province (전라북도), and Special Self-Government Province (특별자치도) of Jeju. This study used Korean Statistics data (KOSIS 국가통계포털) with a panel data test tool (Data pool). The results of this study show that the factors of the decline in the total fertility rate in South Korea are reduced marriage rates and soaring elderly population.

Keywords: *total fertility rate, marriages rates, elderly population, south korea*

INTRODUCTION

The decline in the *birth rate in* South Korea was based on the strengthening of family planning regulations and the establishment of the Planned Parenthood Federation of Korea (PPFK) in 1961. Where the population of the Korean Peninsula at that time reached two million inhabitants and the fertility rate reached six children per woman. The following year, PPFK conducted an intensive campaign on the number of children in the family, and contraceptives for men which at that time were funded by the state. The campaign yielded maximum results. So in 1995, the total fertility rate was 1.74 and in 2010 it was 1.23 per woman (nationally) (Mahmoudi, 2017). However, in some districts and provinces in South Korea, especially the metropolitan cities of Seoul, Busan and Daegu, there was an earlier decrease in *TFR*, which was 0.93 children per woman in 2005. Then in 2017, fertility rates decreased throughout South Korea. So that the South Korean government at that time, took a policy of increasing the birth rate. However, the policies implemented did not increase the birth rate significantly. (Pusat Pengembangan Sumber Daya Manusia Gyeongsangnam, 2021);(Sekolah Pascasarjana Sastra dan Strategi Masa Depan KAIST, 2020).

Table 1 South Korea Population Data 2018 – 2022

Year	Regional Administration	Population		Grand Total	*Total Fertility Rate*
		Man	Woman		
2018	Nasional	25,601,961	25,698,918.5	51,300,879.5	0.98
2019	Nasional	25,609,342	25,728,081.5	51,337,423.5	0.92
2020	Nasional	25,606,080.5	25,743,178.5	51,349,259.0	0.84
2021	Nasional	25,589,102	25,744,150.5	51,333,252.5	0.81
2022	Nasional	25,540,042	25,719,107.5	51,259,149.5	0.78

Source : KOSIS 국가통계포털 (Korean Statistik)

This study uses the demographic transition theory adopted from previous research, namely (Yun et al., 2022);(Mahmoudi, 2017);(Cho, 2021);(Seo, 2019);(Bank Korea, 2017). And this research also complements his theory (Van De Kaa, 2004), i.e. Second Demographic Transition. This theory states that the low birth rate can be caused by changes in family life such as living together without marriage, maturation of marriage, fertility and childbirth, increasing number of women without children, and increasing number of single parents. And the *Exposure Factor* theory from Bonggaarts (1978) says that what affects *exposure factors* are marital behavior, contraceptive use, breastfeeding behavior, and intentional abortion (Adioetomo & Samosir, 2010). Based on previous research references, this study used variables such as the number of marriages, the number of elderly residents, the number of divorce cases and house prices on the *total fertility rate* in South Korea (Un & Park, 2020);(Hae Bong, 2023);(Cheol-hee & Ji-eun, 2017);(Park & Sohn, 2018);(Jeon et al., 2021);(J. H. Kim & Choi, 2023).

The purpose of this study was to see the effect of the number of marriages, the number of elderly residents, divorce cases, and house prices on the decline in the birth rate in South Korea. Research can identify a variety of social, economic, and cultural factors that contribute to the decline in birth rates. Through a careful scientific approach, the study can highlight the importance of public policies aimed at responding to and addressing declining birth rates. Moreover, a better understanding of the causes behind this decline can also help the government in devising appropriate strategies and programs to stimulate birth growth. As such, the study not only provides valuable insights for social science and demography, but also has direct implications for public policies aimed at maintaining demographic balance and sustainable development in South Korea.

METHOD

The data in this study comes from Statistics Korea (KOSIS 국가통계포털) covering 2018 – 2022. Data analysis using panel data regression using StataMP 17 software to handle statistical test analysis. The study area consists of: the three major cities (광역시) of Kwangju, Deajon, and Ulsan. Special Autonomous City (특별자치시) Sejong, Gangwon Province (강원도), North Jeolla Province (전라북도), and Jeju Special Self-Government Province (특별자치도).

Administratively, the Republic of Korea is divided into 1 special city, 6 metropolitan cities, 1 special autonomous city, 7 provinces, and 2 special autonomous provinces. Metropolitan City is a first-tier city that has the same status as the province. Special self-governing cities are of equal status with provinces. However, the city is the center of the state administration. And special self-governing

provinces represent greater autonomy over all things and powers in the administration of the provinces. However, major cities with populations of 500,000 or more, except Seoul and other metropolitan cities, can have administrative districts below the city. In addition, the administrative area equivalent to the province is a metropolitan city, there are also special cities, special government cities, and special provinces. (Ministry of the Interior and Safety, 2021)

This study uses panel data regression, which is a combination of time series data *and* cross section *data*. with the following equation:

$$\boldsymbol{Y_{TFR} = \alpha + b_1 X_{1\,JP} + b_2 X_{2\,JPL} + b_3 X_{3\,KPER} + b_4 X_{4\,PIR} + \varepsilon}$$

Information :

Y : *Total Fertility Rate*
α : Konstanta
X_1 : Number of marriages
X_2 : Number of Elderly Population
X_3 : Divorce Cases
X_4 : House Price (PIR)

In analyzing panel data models, there are three kinds of approaches, namely Common effect model (OLS), Fixed effect model (FEM), and Random effect model (REM). In choosing the best model, there are three stages of testing, namely the f-statistical test which is used to choose between OLS and FEM models; the Langrange Multiplier (LM) test is used to choose between OLS and REM models; The Hausman test is used to choose between FEM and REM models. After that, *the Goodnes of Fit test* (Classical Assumption Testing) is carried out, namely Test F, Test T and R2 to meet the requirements of the Best Linear Unbised Estimator (Hidayat et al., 2017).

RESULTS AND DISCUSSION

The Hausman test aims to choose whether the Fixed effect model or Random effect model is the best to use. The results of hausman testing are as follows:

Table 2. Hausman Test

Test of H0: Difference in coefficients not systematic		
chi2(4)	=	(b-B)'[(V_b-V_B)^(-1)](b-B)
	=	12.22
Prob > chi2	=	0.0158

Source : Processed Data StataMP 17

Based on the results of the analysis of the Hausman test in the table above, *a chi-squared value* of 12.22 was obtained with a probability of 0.0158 < 0.05, then the model chosen in the Hausman test is a *fixed effect model*. From the results of research using the *fixed effect model*, the panel data regression equation was obtained as follows:

Table 3. "Regresi Data Panel *(Fixed Effect Model"*

Fixed-effects (within) regression	Number of obs =	35
Group variable: code	Number of groups =	7
R-squared:	Obs per group:	
Within = 0.8195	min =	5
Between = 0.7090	avg =	5.0

Overall = 0.5493				max =	5
			F(4,24)	=	27.23
corr(u_i, Xb) = -0.9964			Prob > F	=	0.0000

Y	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
X1	.0000966	.0000274	3.53	0.002	.0000401	.0001531
X2	-8.35e-06	1.91e-06	-4.37	0.000	-.0000123	-4.41e-06
X3	-4.76e-06	.0000768	-0.06	0.951	-.0001632	.0001537
X4	-.0013462	.0015158	-0.89	0.383	-.0044745	.0017822
_cons	4.574444	.9040103	5.06	0.000	2.708658	6.440229
sigma_u	1.4354792					
sigma_e	.04856097					
rho	.9988569	(fraction of variance due to u_i)				

Source : Processed Data StataMP 17

$$\boldsymbol{TFR = 4.574444 + 0.0000966_{JP} - 8.3506_{JPL} - 4.7606_{KPER} - 0.0013462_{PIR}}$$

The equation above explains that the percentage of birth rate in 7 provinces is 4.57% when the variables of marriage rate, elderly population, divorce rate, and house price are considered constant. If you look at the value of the coefficient of the number of marriages marked positive at 0.0000966 with a probability value of < 0.05 or 0.002 which explains that if there is one marriage, then the number of marriages only increases the birth rate by 0.0000966% if other factors are constant. Regarding changes in the number of elderly population, judging from the negative value coefficient of -8.3506 with a probability value of < 0.05, which is 0.000, it explains that if the elderly increase by one unit of the elderly population, then if the factor remains, the birth rate will decrease by 8.3506%. For the variable divorce case, this can be seen from the negative coefficient value of -4.7606 with a probability value of > 0.05, which is 0.951 explaining that when the number of divorce cases increases, the birth rate decreases by 4.7606%. And the house price variable seen from the value of the negative value coefficient of -0.0013462 with a probability value of > 0.05 which is 0.383 explains that if the price of a house increases by one unit, then the birth rate decreases by 0.0013462% assuming this factor is constant.

Uji Statisticians

The regression results of the fixed *effect model panel data* show the R2 value in table 1.1.3, which is 0.7090, this illustrates that 70.90% of the number of marriages, the number of elderly residents, divorce cases and house prices (in some metropolitan areas, special self-governing cities, provinces, and special self-government provinces) affect the *total fertility rate* in South Korea. The probability value of the F-statistic of 0.000 means that the number of marriages, the number of elderly residents, divorce cases and house prices are statistically significant to the *total fertility rate* in South Korea. The variable probability value (P > |t|) is small from α < 0.05 with a relevance level of 5% so that the variables that are significant to the *total fertility rate* are the number of marriages and the number of elderly population.

The Effect of Number of Marriages on *Total Fertility Rate* in South Korea

The regression coefficient value of the variable panel data of the number of marriages is 0.0000966 which means that if the number of marriages increases by one unit, then the total fertility rate increases by 0.0000966%. The statistical value is 3.53 and the probability value is 0.002 < 0.05. It can be concluded "that the marriage rate has a significant influence on the birth rate in South Korea".

The results of this study are in line with (Adioetomo & Samosir, 2010) The view that marriage affects the fertility of a population. Then based on *the theory of Second Demographic Transition,* fertility is influenced by changes in cohabitation, namely maturation of marriage and fertility time. And those results are in line with previous research (Un & Park, 2020) Where the number of marriages compared to age affects total fertility "i.e. the younger the age of a man and a woman, the greater his desire to have children". And this study also compared the variables of the number of children, the length of work of the husband, and satisfaction in establishing relationships that had a significant effect on the desire of husbands and wives to have children. This is also reinforced by a study (H. S. Kim et al., 2022) "Which shows that the decline in the birth rate is influenced by negative perceptions of women in their 20s and 30s towards marriage, childbirth and child needs. And (Budi Suharto, 2020) said that the marital variable is a factor that affects the number and change of population. If the number of marriages increases, this will have an impact on increasing the birth rate. "The high and low birth rate of the population is closely related and depends on the age structure, number of marriages, age of marriage, use of contraceptives, unemployment, education level, employment status of women and economic development" (Suwito, 2020). In addition to the opinions of South Korean youth who are concerned about South Korea's economic condition, difficulties in balancing work and family responsibilities, domestic problems and job instability, an authoritarian patriarchal culture and discrimination against pregnant women (Pusat Pengembangan Sumber Daya Manusia Gyeongsangnam, 2021);(Hwang, 2023);(Yun-Jeong, 2020); (Hidayatulloh & Kurniasih, 2023); Park Seunghyeon 2017 dalam (Yoo et al., 2021); (Lee & Ho Lee, 2021); (Yun et al., 2022);(임석회 & Yim, 2019).

The Effect of the Number of Elderly Population on *Total Fertility Rate* in South Korea

The regression coefficient of the variable panel data for the number of elderly residents is (–8.3506) which means that if the number of elderly residents increases by one unit, the fertility rate decreases by 8.3506%. The statistical value is -4.37 and the probability value is 0.000 < 0.05. It can be concluded that the number of elderly population has a significant influence on the birth rate in South Korea.

Research findings on the effect of population aging on the total birth rate in South Korea are consistent with the demographic transition theory, which states that the birth rate began to decline sharply during the industrialization phase. Starting from changes in childbirth behavior and access to contraceptive methods, as well as community education and health improvement. Both *the Second Demographic Transition theory* and the Bonggaarts theory show that the fertile and pregnant periods are determining factors in the increase in the number of elderly population. Namely because the birth rate decreases in an area, the number of elderly people continues to increase, followed by a person's life expectancy. According to Mantra (Fadli et al., 2023), A person's age is an important demographic variable. Because it affects the demographic and socioeconomic patterns of each family. And the results of this study have been proven (Hae Bong, 2023). The main reason for the decline in the birth rate is the aging of the population. This factor has persisted in Korean society for the past 50 years. According to other studies, an aging population has an impact on the decline in the labor force (Cheol-hee & Ji-eun, 2017) which assumes a labor supply model based on current sex and age, labor force and total

employment by 2050, this figure is expected to decline to 88%, and 83% of current levels. In addition, this has an impact on labor productivity and the burden of caring for the elderly population (Son & Seolwoong, 2023). In terms of the number of elderly people, there are several other factors that contribute to the decline in the total birth rate, such as the cost of marriage and childcare, labor market conditions that limit the distribution of domestic work, and socio-cultural factors, including changes in education levels and equality values (Kyung-hoon, 2017). Areas directly affected by the phenomenon of super-old societies, namely rural areas, will become super-old communities by 2029, and all 37 regions, including major cities, will join the group, followed by Sejong City (administrative capital) which will be the last (K. W. Kim & Kim, 2020).

The Effect of Divorce Cases on *Total Fertility Rate* in South Korea

The regression coefficient value of the variable panel data of divorce cases is -4.7606 which means that if the divorce case increases by one unit, then the total fertility rate decreases by 4.7606%. The statistical value is 0.06 and the probability value is 0.951 > 0.05. It can be concluded that the effect of divorce has a negative value and is not significant for the birth rate in South Korea.

This divorce case study is in line with the theory of *Second Demographic Transition* which states that the increase in the number of single parents in a country is a factor in reducing fertility (birth rate). However, due to divorce, the husband and wife cannot live in the same house. So they have no chance of having children. Thus, the reasons for divorce that lead to a decrease in birth rates in some regions of South Korea have no significant effect in South Korea. Research (Park & Sohn, 2018) said that financial problems are the main cause of conflict between couples and are often the main reason for divorce. The results showed that the process of marital conflict caused by financial problems consisted of conflict escalation and resolution efforts. Failure of resolution attempts leads to an escalation of conflict, which creates a negative cycle. However, the reduction of conflict as a positive value of resolution efforts is influenced by communication skills, and the presence of children is a factor that prevents the transition to negative outcomes. So young men and women in South Korea do not want to marry because they are not ready to take care of the household and fear the financial resources of their families and children. (Sekolah Pascasarjana Sastra dan Strategi Masa Depan KAIST, 2020).

The Effect of House Prices on *Total Fertility Rate* in South Korea

The regression coefficient value of the house price variable panel data is -0.0013462 which means that if the house price increases by one unit, then the total fertility rate decreases by 0.0013462%. The statistical value is 0.89 and the probability value is 0.383 > 0.05. It can be concluded that house prices have a negative value and are not significant to the birth rate in South Korea.

House price survey consistent with research (J. H. Kim & Choi, 2023), that house prices (PIR) negatively affect fertility rates. Previous research assumed that areas with active economic activity and high house prices tended to have low marriage and birth rates. But (Jeon et al., 2021) Provides an overview of the relationship between house prices and total fertility. that the intention to give birth is more prevalent living in non-metropolitan and renting houses. Refers to factors such as demographics, socioeconomics, housing situation, surrounding environment and housing expectations. If these factors have a significant effect on the fertility intentions of the new couple. In addition to complex factors such as population, society, economy, and housing, a single policy should be considered to reduce the total birth rate in South Korea.

CONCLUSION

Based on the previous discussion, it can be concluded that the metropolitan city areas (광역시) of Kwangju, Deajon, and Ulsan. Special self-governing city (특별자치시) of Sejong, Gangwon Province (강원도), North Jeolla Province (전라북도), and Special Self-Government Province (특별자치도) of Jeju. Factors of the decline in *total fertility rate* are caused by reduced marriage rates and increasing number of elderly population. Where evidenced by statistical values on both factors < α 0.05. However, rising divorce cases and stable housing prices may be driving factors for the decline in *the total fertility rate* in South Korea.

The results of this study emphasize the significance of considering population aspects in decision making related to an area. However, to further deepen understanding and refine relevant policies, further research is needed. In particular, in the context of South Korea, awareness from various segments of society, especially the younger generation, on population sustainability issues is important. This includes cultural transformation from authoritarian patriarchal patterns to gender equality, as well as efforts to address discrimination against pregnant women in the workplace. Furthermore, the South Korean government should insist that the country's economy remains well managed by responsible government agencies. Future studies could expand its reach to include the entire South Korean region and include population migration variables in its analysis.

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