The Determinants of Childbirth Grants of Local Governments in South Korea

By: Gi-jung Kim

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Martin School of Public Policy and Administration

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Advisor: Nicolai Petrovsky, PhD

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Abstract

Declining fertility is one of the top policy issues in South Korea. To increase the birth rate, the government of South Korea has been enacting several fertility encouragement polices. Although almost all of the birth encouragement policies have been led by the central government, a childbirth grant program was developed by primary local governments themselves. The grant levels vary significantly between local governments.

I examine what explains the differences in the childbirth grant level by analyzing twelve years (2004-2015) of panel data with a fixed-effects model. Prior studies indicate that the extent of demand for a policy and the availability of financial resources are the main factors influencing welfare policies of South Korean local governments. From this point of view, my study focuses on population fluctuation and fiscal capacity of the local governments as the primary explanatory variables while including several socio-economic and political factors as control variables.

According to my estimation results, population change has a statistically significant impact on the grant level (generosity of the grants) offered by primary local governments in the provinces while it has no significant impact in the metropolitan cites. By contrast, the fiscal capacity has a subtle impact only on the grant levels of the municipalities in the metropolitan cities. Interestingly, the grant level of nearby local governments has a positive effect both in the provinces and metropolitan cities.

The results indicate the local governments in the provinces respond more sensitively to population change regardless of their fiscal capacity. Most provinces have more small municipalities facing a shrinking population compared to metropolitan cities. While the stated goal of childbirth grants is increasing births, a competition among local governments not to lose younger people to nearby local governments contributes to increasing childbirth grants.

This suggests the central government intervene in the childbirth grant policy of local governments to alleviate financial burden on the small and poor local governments as well as to increase the birth rate.

1. Introduction

South Korea is experiencing a drastic decrease in fertility. The country also takes in few long-term immigrants. Consequently, its population is aging. Since the 1960s, the birth rate of South Korea has been on a downward trend. In 2005, it reached the lowest rate among OECD countries with 1.08 children per woman.

Figure 1.1: Birthrate of South Korea against Average of OECD Countries (1960-2013)

Source: OECD
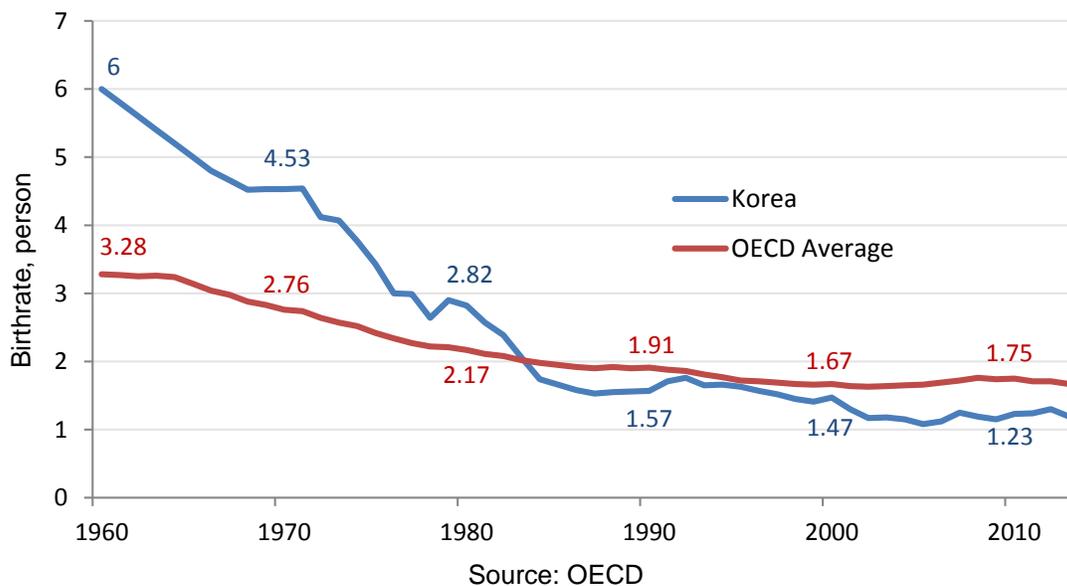
A declining birth rate and aging population lead to a shrinking labor force. Also, taxes to support government pensions for the elderly have to increase. Continuing on the same trajectory will lead to a less vibrant economy. Accordingly, the South Korean government has been enacting several policies to increase the birth rate. They include tax incentives and daycare subsidies.

Almost all childbirth encouragement policies have been led by the central government of South Korea and applied uniformly across the country. There is one exception, however: A

childbirth grant program was developed by primary local governments (PLG) [1] themselves without a guideline or financial support from the central government. This unique, bottom-up grant program was started by two local governments (Ulleung-gun and Hampyeong-gun) in 2002. Over the next ten years the grant program spread to nearly all primary local governments despite a controversy about the effectiveness of the grants in increasing the birth rate.

Figure 1.2: Spread of Childbirth Grant Program by Year (2002-2015)
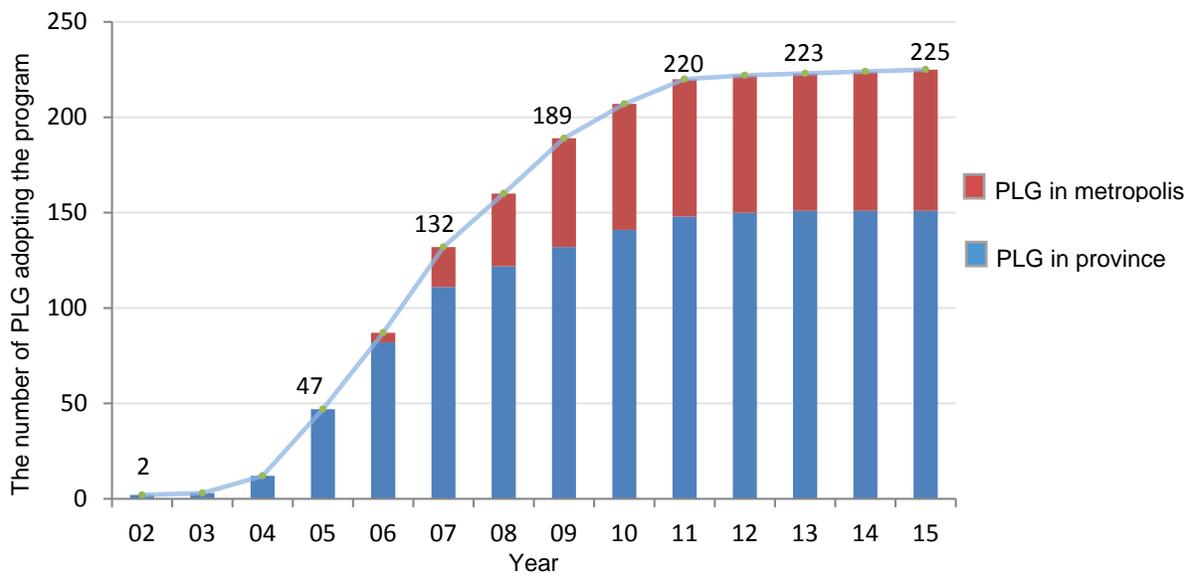
While most primary local governments now provide childbirth grants, how much they pay varies significantly. For example, in 2015, the minimum grant for the third child's birth was zero, while the maximum was 12,000,000 Korean won (about $11,000). Even within the same province there can be large disparities: An average grant paid by Pyeongchang-gun was about ten times larger than that paid by adjacent Hoengseong-gun. What accounts for the differences?

Interest in local government policies has increased steadily in South Korea since local autonomy was launched in the 1990s (Choi, 2012). Recently, as many media cover childbirth grant programs and disparities between the grants provided by different municipalities, there is a

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[1] There are 226 primary local governments in South Korea, 74 PLG in metropolitan cities and 152 in provinces.

rising interest in the size of childbirth grants. While there are several studies exploring the grant program's effectiveness and diffusion phenomenon, there are few studies explaining the determinants of the generosity of the grants. Considering several issues related with the grants – inequality, financial burden and ripple effects[2], there is a need to look at the factors influencing the level of childbirth grants. Therefore, this study examines what causes the differences in childbirth grants paid out by primary local governments.

2. Literature Review

The childbirth grant program is one of several fertility encouragement policies in South Korea. The generosity of the grants is determined by primary local governments themselves. This study will review existing studies about the effectiveness of fertility policies of local governments and policy diffusion to provide a background on the local childbirth grant program. Subsequently, previous studies that analyzed the factors affecting local government policies, and especially social welfare policies, will be reviewed because they might shed some light on why some local government adopt more generous policies than others.

Effectiveness of Fertility Encouragement Policies

Existing studies about the effectiveness of fertility policies examine whether the birthrate substantially increases as a result of fertility encouragement policies. Choe (2015) used a fixed – effects model to analyze the effectiveness of fertility encouragement policies by South Korean metropolitan municipalities. She found that policies directed towards expanding childcare, educational service support, maternity and child-care leave had significant effects on birth rate while financial support such as direct payments to parents for births did not.

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[2] For example, childbirth grants made up about 50% of the children welfare budget in Cheon-An city in Chungcheongnam-do province in 2009 (Lee, J., 2009). Increasing childbirth grants means reducing resources for other programs. Also, the childbirth grant level of a local government affects that of adjacent local governments. (Lee, S., 2013)

Findings about the effectiveness of the childbirth grant programs in South Korea vary between studies depending on sample, time period and analysis model. For instance, the studies looking at all primary local governments revealed the grant program has a significant impact on the birth rate of primary local governments (Choi. 2012; Park & Song. 2014). However, the studies for the local governments in metropolitan cities conclude that the program has no significant impact on the birth rate (Seok. 2011; Lim. 2012). Table 2.1 shows a systematic overview of the existing evidence.

Table 2.1: Previous Studies on the Effectiveness of Childbirth Grants in South Korea

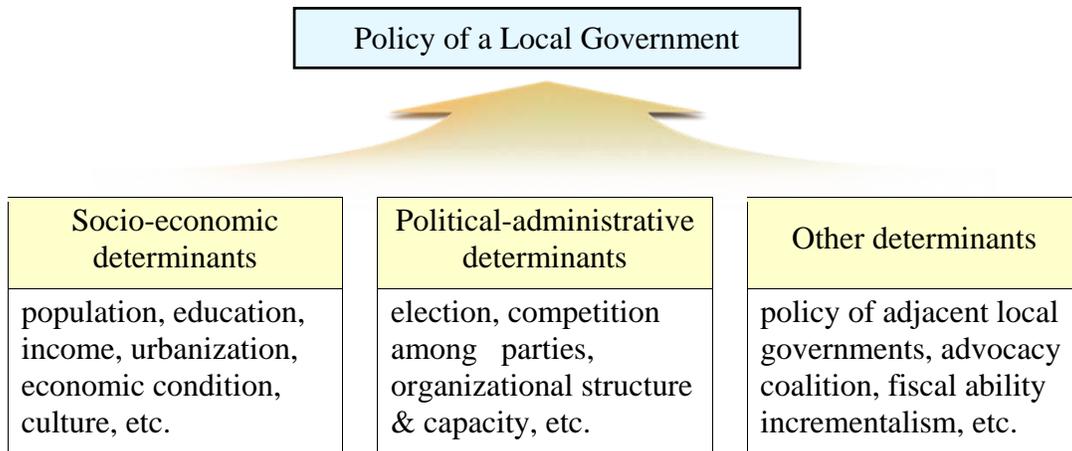| Study	Dependent variable	Explanatory variable	Sample & Time period	Analysis method	Finding
Seok. (2011)	Birth rate	Weighted average grant multiplied by childbirth grant by birth order	25 PLO (primary local governments) in Seoul metropolitan city. 2005-2009	Fixed-effect	No significant effect of the grant on birth rate.
Lim. (2012)	Birth rate	childbirth grants by birth order	74 PLO in 6 Metropolitan cities and 12 PLO in Chungcheongbuk-do province. 2004-2011	Difference in Difference, Fixed effect	No significant effect of the grant on birth rate in the metropolitan cities. Marginal effect on the second child birth in the province.
Baek. (2012)	Birth rate	Childbirth grants by birth order	151 PLO in provinces. 2008-2010	Ordinary least squares	No significant effect of the grant on birth rate.
Choi. (2012)	Number of child births	Childbirth grants by birth order	213 PLO in national level. 2002-2011	Fixed effect, Instrumental variable	The increase of the grant by 1,000,000 Korean Won increases the birth rate of first, second, and third child by 7.7%, 2.3% and 0.6%, respectively.
Park & Song. (2014)	Birth rate	Weighted average multiplied by childbirth grant by birth order	230 PLO in national level. 2005-2011	Fixed-effect	If the average of grants increases to double, the birth rate is expected to increases by 1.54%.
Song & Kim. (2014)	Migration of young women (20-39 years old)	Weighted average multiplied by childbirth grant by birth order	230 PLO in national level. 2005-2011	Fixed-effect	The grants work as a positive motivation to move for young women who are more susceptible to childbirth.

Policy Diffusion

Policy diffusion refers to a process in which a new policy adopted by a government is later adopted by other governments resulting in the gradual increase of the number of governments using that policy (Eystone, 1977). Policy diffusion is also defined as a process in which a policy choice of one government is influenced by the policy choice made by another government (Braun & Gilardi, 2006). Such policy diffusion can occur in various policy areas such as taxation, environment and social welfare. Existing studies on policy diffusion (Braun & Gilardi, 2006; Shipan & Volden, 2008) present a variety of causes to policy diffusion including learning, competition, imitative adaptation, and coercion.

In a study that analyzed the diffusion phenomenon of childbirth grant programs of local governments in South Korea, Lee, J. (2012) stated that the grant programs showed three typical characteristics of policy diffusion (i.e. following an S-shaped pattern, geographical clustering, and diversity amid commonality). He also confirmed that a local government's decision to adopt the policy was significantly influenced by the number of adjacent local governments that introduced the policy, birthrate, and the status of fertility policy establishment by the central government. By contrast, political factors like the election time of a local government have little influence. In a study by Lee, S., (2013) who analyzed panel data of 219 primary local governments from 2002 to 2009, results indicated that the most important factors for a local government to adopt a childbirth grant are the fiscal capacity of a local government and the economic condition of that region. The study, in particular, showed that the childbirth grant level of adjacent regions affects how a local government decides the generosity of their own grants. These two studies, however didn't consider the locational difference between a large city and a rural community, which may determine the pattern of policy choices.

Policy Determinants of Local Governments

As to the determinants of policy, some scholars focus on socio-economic factors while other scholars put more emphasis on political-administrative factors. Also, there are empirical studies pointing out the other factors such as an impact of adjacent governments' policy as one of the important policy determinants (Lee, C., 2009). Figure 2 shows diverse factors which could have an impact on a local government policy.

Figure 2: Determinants of a Local Government Policy

Policy of a Local Government

Socio-economic determinants	Political-administrative determinants	Other determinants
population, education, income, urbanization, economic condition, culture, etc.	election, competition among parties, organizational structure & capacity, etc.	policy of adjacent local governments, advocacy coalition, fiscal ability incrementalism, etc.

There are some relevant lessons in U.S. studies of policy variation between the states. V. O. Key's analysis of Southern politics suggests interparty competition and voting rate of low-income voters can have a significant impact on the welfare policy of state government. When there is a keen competition between parties, the policy process becomes more responsive to the needs of people (V.O.Key, 1949; Soss, Schram, Vartanian, & O'Brien, 2003). Meanwhile, Dye (1992) concluded that social welfare policy decisions are better explained in terms of economic development factors rather than political factors after analyzing groups of factors: socio-economic factors (urbanization, industrialization, income, education), political factors (dispersion of party control, competition between parties, proportional inequity among resident representatives), and other factors (public health, social welfare, expressway, etc.).

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In South Korea, in spite of a relatively short history of local autonomy[3], there are several studies exploring diverse factors influencing the policy of local government. With respect to welfare policy determinants of local governments, unlike policy decisions at the national level[4], the influence of political factors such as election time and competition among parties tend to be insignificant while socio-economic factors such as population and fiscal capacity were found to have significant effect on policy decisions by local governments. (Kim, B., 1995; Kang, 2012; Kim, G., 2013; Lee, S. 2013; Kim, K., 2014, Kim, J. 2015). Table 2.2 summarizes the findings of these studies.

Table 2.2: Studies on the Determinants of South Korean Local Governments' Policy

Study	Dependent variable	Independent & Control Variables	Finding: policy determinants
Kim, B., (1995)	Expenditure per capita	Population, population density, aging population ratio, the rate of recipient of national basic livelihood guarantees, fiscal independence, tax share per capita, # of residents per public official, election	Population, fiscal independence, tax share per capita, population density
Kim, G., (2013)	Social welfare budget ratio	Youth population ratio, aging population ratio, child population ratio, the disabled ratio, the rate of recipient of national basic livelihood guarantees, population density, fiscal independence, local tax per capita, political party of mayor, # of social welfare regulations	Youth population ratio, fiscal independence
Kim, K., (2014)	Elderly welfare budget ratio	Aging population ratio, elderly employment rate, economically active population ratio, GRDP (gross regional domestic product), GRDP per capita, fiscal independence, local tax per capita	Elderly population ratio, fiscal independence
Ko, (2014)	Health care budget per capita	Elderly population ratio, the rate of recipient of national basic livelihood guarantees, local tax burden per resident, the number of hospital, drinking rate, smoking rate, suicide rate, type of local government , political party of mayor	Elderly population ratio, political party of mayor
Kim, J., (2015)	Social welfare expenditure per capita	Aging population & child population ratio, population density, the rate of recipient of national basic livelihood guarantees, fiscal independence rate, type of local government , election, political party of mayor, local tax per capita	Aging population & child population ratio, fiscal independence rate

[3] Since 1990s, the election for local governors and mayors has been held in South Korea. Before the election, the central government appointed the governor and mayor of each local government.

[4] In studies on social welfare policies In Korea on national level, it was found that political factors have significant effect on policy decision (Hwang, 1997; Park, B. 2006).

As the prior studies indicate, various factors can have effects on the decision making on local government policies, and the answer to the question of what factors have more effects is determined variedly based on the detailed contents of policies and the policy-making environments of each local government. Regarding a social welfare policy of South Korean local governments, most studies reveal that social factors have more effects on the social welfare policies than political factors. The policy of a local government can be defined as the means for addressing a social problem of its region. In this respect, South Korean local governments tend to react more sensitively to the factors representing the demand for its policy in that the policy is the means for addressing a social problem of that region.

3. Theoretical Framework

The prior studies I reviewed indicate that the extent of demand for a policy and financial resources available are the main factors influencing social welfare policies of South Korean local governments. Population change is a social factor that represents the demand for childbirth grants. Losing young people means there is a less vibrant economy, there have to be cuts to the local government, and there will be fewer representatives in the National Assembly[5]. Thus, there is a need for a local government to increase population or at least to stop the outflow of population by increasing the birth rate or attracting young couples to its region (Song & Kim, H., 2014).

In addition, as shown in Table 3, local governments in South Korea are financially dependent on the central government. Many of their projects receive financial support from the central government. However, there is no subsidy for the childbirth grants. It means that the local governments have to execute the programs with their own revenues.

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[5] The size of organization and the number of seats in the National Assembly are determined based on population of the each primary local government.
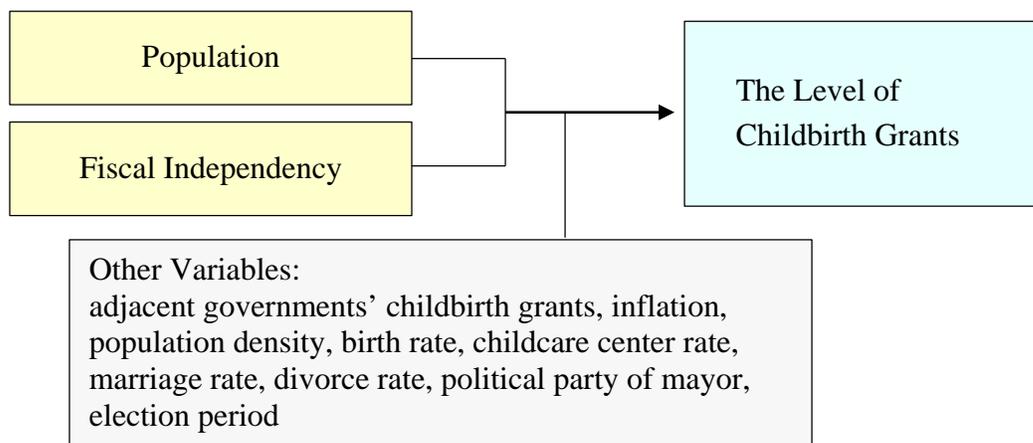
Table 3: Fiscal Independence Rate[6] of South Korean Primary Local Governments

Year	Mean	Std. Dev.	Min	Max
2004	66.8	10.6	47.0	93.3
2005	71.5	8.8	51.9	93.9
2006	69.5	9.3	45.8	92.8
2007	67.4	9.6	39.6	91.7
2008	65.7	10.1	36.4	90.4
2009	65.0	10.9	33.7	91.4
2010	62.3	11.4	30.8	91.6
2011	62.3	10.8	33.0	91.8
2012	62.1	10.6	32.8	90.1
2013	61.3	10.6	31.9	90.0
2014	54.8	10.4	27.8	84.6

Source: Korea Statistical Information Service (KOSIS)

My study therefore focuses on population and fiscal independence as the determinants of childbirth grants. Also, other socio-economic and political factors which seem to have an influence on the dependent variable will be used as control variables.

Figure 3: Research Framework

Population

Fiscal Independency

The Level of Childbirth Grants

Other Variables:
adjacent governments' childbirth grants, inflation, population density, birth rate, childcare center rate, marriage rate, divorce rate, political party of mayor, election period

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[6] The fiscal independence is an inverse measure of a local government's dependence of its budget on the central government, and it is computed as follows:

$$\text{Fiscal independence rate} = \frac{\text{Local tax} + \text{other local gov't income} - \text{municipal bond}}{\text{Total local government accounting budget}} \times 100$$

The hypotheses of this study are as follows:

a.   *"If the population of a local government decreases, the childbirth grants offered by the government will tend to increase."*

b.   *"If the fiscal independence rate of a local government increases, the childbirth grants offered by the governments will tend to increase."*

4. Data and Variables

This study uses twelve years (2004-2015) of panel data on 224[7] primary local governments in South Korea. I collected the childbirth grants data from each local government through the Korea Public Information System (KPIS)[8], and double checked odd looking data by telephone. The other data were collected from the Korea Statistical Information Service (KOSIS), primary local governments and the Korea National Election Commission (KNEC).

The grant level often varies significantly depending on birth order. Thus, the dependent variable, childbirth grants, is measured as a weighted average because it is more appropriate to measure the actual budgetary burden on local governments. The weighted average is calculated by multiplying childbirth grant by birth order with the component ratio of the number of births by birth order as the weighted value.

As shown in Figure 4.1, childbirth grants considerably increased over the course of time, and the grant size increased with birth order. The margin of increase in childbirth grants tends to increase with birth order. Also the disparity in the grant level between local governments increased over time.

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[7] Although there are 226 primary local governments in the South Korea, I exclude two cities: Chunchoen-si and Changwon-si. This is because Chunchoen-si has never had the childbirth grant policy, and Chanwon-si was created by merger in 2010.

[8] The KPIS is a web-based system (www.open.go.kr) where people can request information from public organizations.

Figure 4.1: Average Level of Childbirth Grants by Birth Oder and Weighted Average
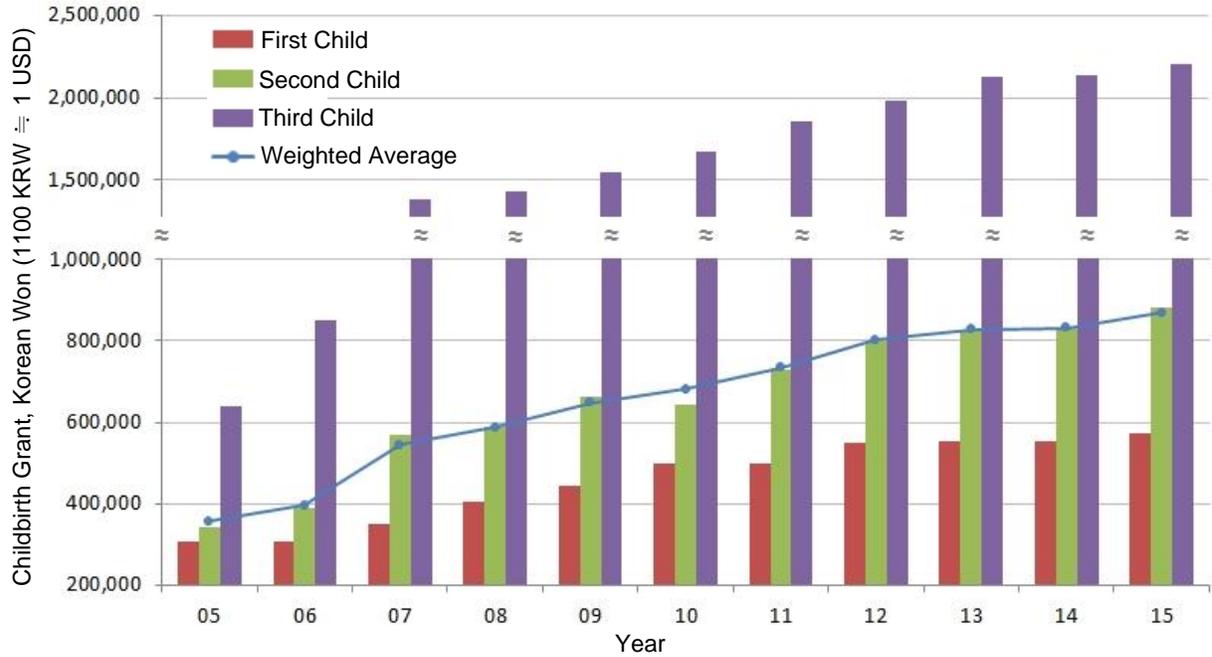
Interestingly, the grant level of primary local governments (PLG) in provinces is much higher - about three times than that of metropolitan municipalities.

Figure 4.2: Difference in Weighted Average of Grants between Province and Metropolis
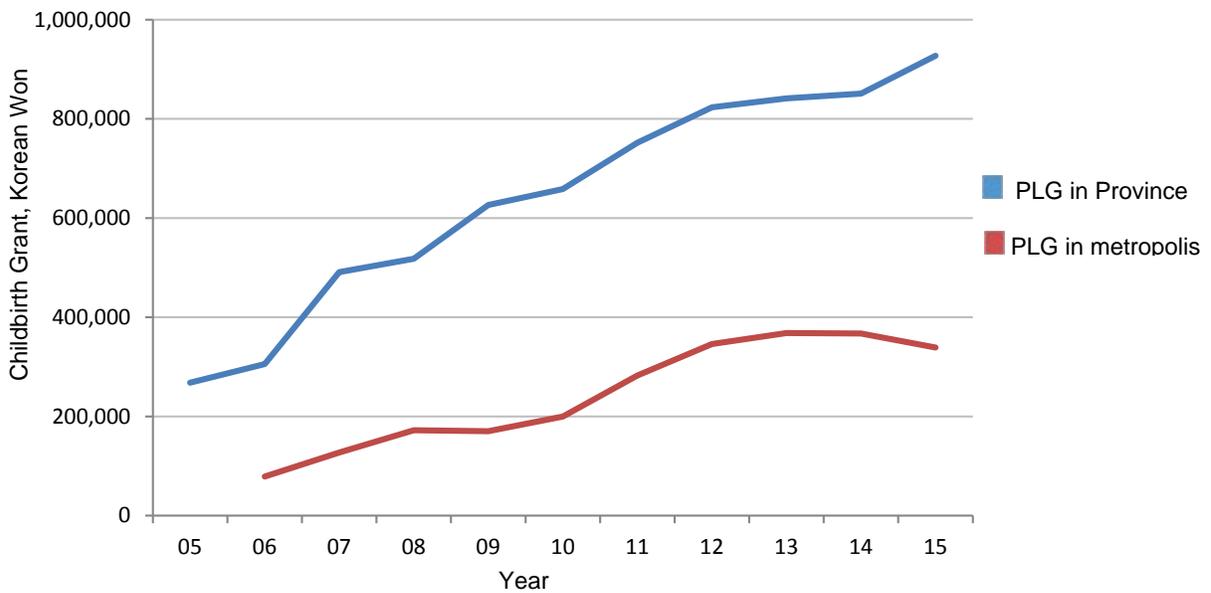
Figure 4.3 shows the average percentage of births by birth order from 2004 to 2015. The first child accounted for the largest proportion at 51.8%, while the second child accounted for 38.3% the third onward about 9.9% of the total number of childbirths. Based on the figures, it was found that about 90% of the total number of childbirths were first and second children. One of the interesting things is that the families with several children were somewhat more common in the provinces than metropolitan cities.

Figure 4.3: Average Percentage of Births by Birth Order (2004-2014)
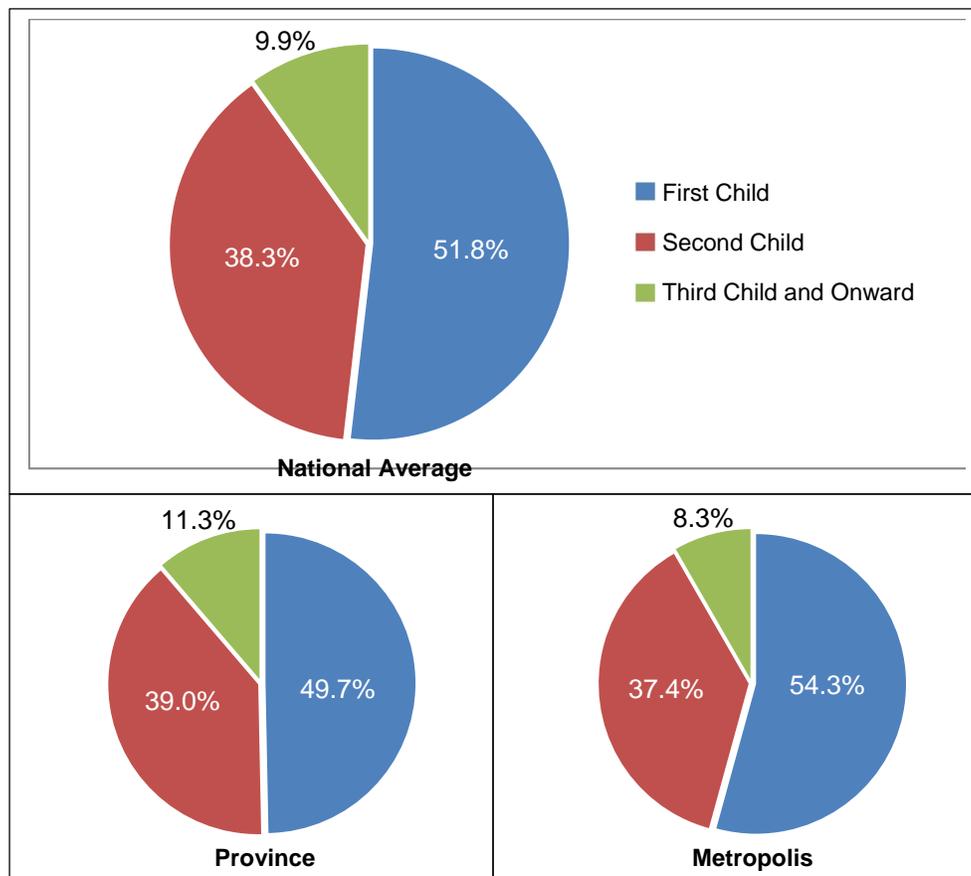
Source: KOSIS

Explanatory variables are population size and fiscal independence rate of each primary local government. The fiscal independence rate shows the degree of financial independence of a local government from the central government.

Control variables include several socio-economic and political factors such as marriage rate and political party of the mayor. All of the variables and data sources are as follows.

Table 4: Variables and Data Source

Variables		Description	Source
Dependent variable	Childbirth grants	Weighted average of childbirth grants in Korean Won	Local gov't
Explanatory variables	Population	The size of population	KOSIS www.kosis.kr
	Fiscal independence rate	Sum of local tax and other income by local government subtracted by outstanding value of municipal bond, and all divided by total local government's annual accounting budget	KOSIS
Control variables	The grant level of nearby local governments	Weighted average of childbirth grants of the province or metropolitan city to which a municipality belongs	KOSIS
	Inflation rate	Consumer price index	KOSIS
	Population density	The number of people per square kilometers	KOSIS
	Birth rate	Total fertility rate	KOSIS
	Childcare center rate	The number of childcare center per 1,000 people	KOSIS
	Marriage rate	The number of marriages per 1,000 people	KOSIS
	Divorce rate	The number of divorces per 1,000 people	KOSIS
	Political party of mayor	Dummy 1: progressive party 0: the other parties	Local gov't
	Election period	Dummy 1: election year or the previous year 0: the other years	KNEC

5. Analysis and Findings

Analysis Methodology: Fixed Effects Model

The primary aim of this study is to examine the impact of two explanatory variables - population size and fiscal independence rate - on local governments' childbirth grants. Since the childbirth grant level is set by each local government, the largest source of endogeneity would be time-invariant factors such as a local preference for larger families and historic or cultural attractiveness of a city to people which should not vary much over time. To address the potential endogeneity from time-invariant factors, I use a fixed effects model. If the omitted time-invariant variables were uncorrelated with the included time-varying covariates, a random effects model would also be a consistent estimator, and it would be more efficient (Hsiao, 2003). However, for the reasons I describe above, I suspect that the independent variables are correlated with the inherent local characteristics. A Hausman test[9] rejects the null hypothesis of no correlation. Therefore, the fixed effects model is a more robust model choice.

In a basic form, the estimation equation of interest is:

$$log(Grant_{i,t+1}) = \alpha_i + \beta_1 log(Popul_{i,t-1}) + \beta_2 Indepen_{i,t} + \beta'_3 X_{i,t} + \gamma_t + \varepsilon_{i,t}$$

where *Grant* is the weighted average of childbirth grants, *Popul* is the size of population, *Indepen* is fiscal independence rate, *X* is set of controls, ε is error term, *i* is each local government, and *t* is year. The grant and population variables are logarithms[10] of each value. The dependent variable is entered as a lead variable, and the population as a lagged variable to take into account the budgetary process[11] of South Korean local governments.

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[9] The Hausman test result is attached in Appendix.

[10] I transform the variables by log to correct positively skewed distributions.

[11] Generally, the decision on the next year budget of a local government is processed from September to December. Thus, local governments use population statistics of previous year when they draw the next year budget because several current statistics are not likely to be available at that time.

Estimation Results

Table 5 summarizes the estimation results for the determinants of primary local governments (PLG)' childbirth grants.

Table 5: Estimation Results

Childbirth grant level	Coefficient		
	(1) Whole PLG	(2) PLG in Province	(3) PLG in Metropolis
Population	-0.698 (0.2228)	-1.462* (0.0168)	1.555 (0.2701)
Fiscal independence rate	0.0125*** (0.0007)	0.00763 (0.0780)	0.0350*** (0.0003)
Nearby local governments' grant level	0.395*** (0.0000)	0.277*** (0.0000)	0.442*** (0.0000)
Inflation rate	-0.00967 (0.8432)	0.0958 (0.1129)	-0.264* (0.0249)
Population density	0.201 (0.7448)	0.723 (0.2880)	0.145 (0.9142)
Birth rate	0.0865 (0.4874)	0.0468 (0.6989)	0.299 (0.5659)
Childcare center rate	0.0407*** (0.0000)	0.0426*** (0.0000)	0.0523 (0.0503)
Marriage rate	-0.000142 (0.2094)	-0.000162 (0.1842)	-0.000411 (0.1101)
Divorce rate	-0.0368 (0.5416)	0.000387 (0.9948)	-0.0257 (0.9070)
Political party of mayor (progressive party)	0.0985* (0.0133)	0.0327 (0.4310)	0.299** (0.0074)
Election period	-0.242* (0.0483)	-0.166 (0.2502)	-0.384 (0.2728)
N	1802	1317	485
The number of PLG	224	150	74

p-values in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

There are several things to notice. First, as shown in Table 5, population has a statistically significant impact on the childbirth grant level of primary local governments in the provinces while it has no significant impact on that of metropolitan municipalities at a 95% confidence level. If the population of a local government decreases by 1 %, the childbirth grant level is expected to increase by 1.46% in provincial municipalities. It indicates that the local governments in provinces are more responsive to the population change. This may due to the fact that the provinces have more small towns that suffer from a serious depopulation problem.

As described in the literature review, the fiscal independence rate tends to positively affect social-welfare expenditure of South Korean local governments. However, the fiscal independence rate has only a subtle impact (coefficient: 0.035) on the grant level just for metropolitan municipalities. It implies that many primary local governments, especially those in the provinces, tend to draw the budget for childbirth grants regardless of their fiscal conditions.

One of the interesting things is that the grant level of nearby municipalities has a positive effect on a primary local government's grant level both in the provinces and metropolitan cities. If the grant level of the nearby local governments increases by 1%, the grant level of a local government is predicted to increase by 0.39%.

Limitation

The fixed effects model implicitly makes a parallel trend assumption. Since the fixed effects model controls time-invariant unobserved variables like indigenous characteristics of local governments, this study also assumes that childbirth grants in any two local governments would have increased at the same rate if those local governments had the same value of the explanatory and control variables. Potentially, there might be time-varying unobservable factors which have an impact on the dependent variable and measurement error resulting in biased

results. While I assumed that local culture such as preference for lager families is time invariant factor, there is the possibility that the local culture changes over just a few years. In addition, the characteristic of a local council which I did not consider in this study, can affect the grants because the budget of a local government has to be approved by the local council.

6. Conclusion and Recommendation

The aging population and declining birth rate have emerged as one of the top policy issues in South Korea. To increase the birth rate, the government of South Korea has been enacting several fertility encouragement polices. Although all the policies have been led by the central government, a childbirth grant program was initiated and diffused by primary local governments. However, the grant levels vary significantly between the local governments.

Therefore, my study examined what caused the different in the grants paid out by the local governments with a focus on population and fiscal independence of the local governments. I chose a fixed effects model to address the potential endogeneity from time invariant factors.

Population change had a statistically significant impact on the childbirth grant level of primary local governments in the provinces while it had no significant impact on that of metropolitan municipalities. By contrast, the fiscal independence rate did not have much impact on the grant level except a subtle influence on that of metropolitan municipalities. Interestingly, the grant level of nearby primary local governments has a positive effect on a local government's grant level both in the provinces and metropolitan cities.

From the estimation results, we can know that, although the stated goal of childbirth grants is increasing births, a competition among the local governments not to lose young population to another nearby local governments contributes to increasing childbirth grants.

Losing young people means further aging of the population and creates the potential to have reduced administrative organization, and to lose representation in the national congress. This is because the size of organization and the number of seats in the national congress is mainly determined based on population of the primary local government. Unlike metropolitan municipalities, the majority of local governments in the provinces are small cities and towns. To some local governments, the dwindling population is serious enough to threaten the very existence of the local government itself. This suggests why the population change has a significant impact in the provinces.

There is a need for the central government of South Korea to intervene in the childbirth grant policies of primary local governments in the perspective of pursing balanced regional development as well as increasing the birth rate. The primary local governments experiencing depopulation tend to be municipalities having relatively larger rural areas because people, especially young people, are likely to leave for metropolitan cities looking for jobs or better living conditions. Also, the fiscal capacity of a small city tends to be weaker compared to those of big cities having lager urban areas. It means that the local government having lower population growth is easily tempted to increase the grants in order to prevent the population outflow even though its fiscal conditions is not good. Therefore, to alleviate financial burden on small local governments, I recommend the central government introduce differential matching funds for childbirth grants depending on the characteristics of the primary local governments such as population size and fiscal capacity.

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Appendix

a. Summary Statistics of Childbirth Grants

Unit: thousand Korean Won (1100 KRW ≒ 1 USD)

Year	Weighted Ave.		First Child		Second Child		Third Child		Fourth Child	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
2005	268	188	167	216	247	841	627	841	695	1,063
2006	292	180	139	273	267	1,479	833	1,479	850	1,564
2007	433	246	166	463	391	1,798	1,384	1,798	1,490	2,104
2008	435	290	182	474	400	1,706	1,437	1,706	1,495	1,958
2009	487	360	195	952	496	1,860	1,534	1,860	1,704	2,293
2010	511	406	214	630	500	2,046	1,655	2,046	1,909	2,554
2011	597	420	226	697	576	2,136	1,845	2,136	2,201	2,695
2012	667	471	244	792	674	2,169	1,985	2,169	2,411	2,838
2013	687	475	250	809	704	2,310	2,114	2,310	2,558	2,946
2014	692	474	251	807	707	2,303	2,123	2,303	2,635	2,997
2015	722	490	275	872	732	2,337	2,177	2,337	2,720	3,087

Source: Data collected from primary local governments

b. Hausman Test

Ho: difference in coefficients not systematic

	chi^2	$Prob>chi^2$
Whole PLG	26.37	0.0033
PLG in Province	22.30	0.0136
PLG in Metropolis	36.06	0.0001