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# The Correlation between Fertility and the Female Labor Force Participation Rate at the Local Level in Korea



Jongseo Park · Jiyoun Yang

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the Female Labor Force Participation Rate  
at the Local Level in Korea

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I

Introduction



The association between fertility and female labor force participation has been constant controversy for several decades. Until the early 1980s, the female labor force participation rate (hereafter FLFPR) and the total fertility rate (hereafter TFR) were negatively related. At the beginning of the 1960s, the massive entry of women into the labor market was coupled with a decline in fertility rates (Adserà, 2005, p. 189). The negative correlation, however, was reversed, becoming positive around the mid-1980s (Ahn and Mira, 2002; Adserà, 2005). We should note that the correlation between the FLFPR and the TFR is negative in some societies while positive in others. What explains this difference? According to Adserà (2004), the labor market institution could be exerting a positive impact on both fertility and the labor force participation of women. It can be assumed that the context of social institution, especially the labor market institution, affect the relationship between fertility and female labor force participation.

It is unclear that the characteristic of the association between the FLFPR and the TFR in Korea. In a given society, how women participate in the labor market, as well as its effects on the TFR, can vary significantly depending on the stage of so-

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cial, industrial, and labor market development (Kim, D., 2007). Moreover, the female employment rate influences the fertility rate by way of changes in the wage levels of men and women alike, and can therefore manifest in unpredictable ways (Ryu, D., 2006). Those who have attempted macro-level analyses to examine this question reached contradictory conclusions due to the difficulty of identifying the exact mechanism of the effect (Kim, T. et al., 2006).

Nevertheless, we need to start making greater efforts to examine the relationship between labor market institution and fertility in Korea. Once we clarify the correlation between the declining fertility rate and the labor market institution in Korea, we can begin to tackle the issue of low fertility phenomenon. This hypothesis forms the basis of this study. The aims of this study are to analyze the correlation between the FLFPR and the TFR and the impact of labor market institution on fertility.

Our analysis proceeds in two phases. In the first phase, we analyze the simple correlation between the FLFPR and the TFR in cities, counties, and boroughs (collectively referred to here as “municipalities”) nationwide. In the second, we investigate the impact of labor market institution (local level) on mean number of children and future fertility intention (individual level) using multilevel analysis.

The correlation between the FLFPR and the TFR is a matter

that requires a macro-level analysis. Conducting such an analysis for a given nation would require dividing the nation into several regions. In this study, we categorized Korea into 162 municipalities by local government except metropolitan cities. The seven metropolitan cities were treated as a single region category, though they had several local governments. Then we divided the rest of Korea into 155 municipalities using the information on the distribution of local governments nationwide, as of 2014, discounting some of the municipalities that have merged or disappeared since 2014. The time-series data used in our analysis span a period of six years from 2008 to 2013, as the Local Employment Surveys (LESs) we used were first carried out in 2008.

For our multi-level analysis, we combined the data available at two levels, i.e., the local level (Level 2) and the individual level (Level 1). The data at the individual level were obtained from the 10-percent sample of the 2010 Population and Housing Census, while the labor market variables at the local level were obtained from the LESs. Because we used the 2010 Census for our individual-level analysis, we aligned all the local-level variables with the year 2010 as well. The individual samples used in our multi-level analysis are confined to women of childbearing age (between 15 and 49). The two dependent variables, i.e., the total number of newborns and the intention to have a child in the future, were analyzed using two models.

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The individual-level independent variables include women's age, education, employment status, and home ownership status, while the local-level independent variables include the proportion of married women in the childbearing-age women population and the sex ratios at birth. The labor market variables include the employment rate, proportion of wage workers in the childbearing-age women population, gender wage gap, and occupational segregation index.

# II

## Literature Review



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# II

## Literature Review <<

Numerous studies have been done so far, outside Korea, on the correlation between the FLFPR and the TFR. Industrialized societies began seeing drops in their fertility rates in the mid-1960s, and the growing public perception tying the phenomenon of the rise in women's education and participation in the labor market prompted a number of major studies. Many previous studies confirmed the fertility rate is negatively associated with female education attainment and wage, at least at the micro-level.

Since the mid-1980s, however, an increasing number of studies have indicated a reversal of this negative correlation (Ahn and Mira, 2002; Hoem, 2000; Kravdal, 1996). Ahn and Mira (2002), in particular, empirically demonstrated the reversal of the cross-sectional correlation between the FLFPR and the TFR using OECD country data. The authors concluded their research by emphasizing the role of institutions, in a social context, toward enabling women to strike a balance between their childcare needs and employment.

Ahn and Mira (2002) explained the reversal of the correlation as a result of the income effect on the fertility rate growing to exceed the substitution effect of women's wages. As the range

of childcare support and services available on the market broadened, women were freed from the past dichotomy of employment and childcare. As a result, the correlation between women's labor force participation and the fertility rate became a positive one.

Adsera (2004, 2005) pointed out that the microeconomic model could explain the general decline in the fertility rate associated with the increasing participation of women in the labor market, but was still incapable of explaining the reversal of the correlation. She criticized the early microeconomic model for failing to note the institutional context of the labor market behind women's wage and employment rates, due to its focus on the simple effect of women's wages on the fertility rate. The author argued that the abrupt increase in female labor force participation in societies where women had been traditionally excluded from the labor market would clash with the rigid labor market system, which catered mostly to male workers, therefore resulting in unemployment and fertility rates among women that are relatively higher than those in more progressive societies.

Hank (2001) directly addressed the relationship between local labor market systems and fertility rates, noting the geographical patterns of low-birth-rate regions that maintained consistent declines in their fertility rates in the late 1960s and early 1970s. The author argued that the population density,

family migration, and occupational structure in the 1990s were also closely correlated to the TFR of the given regions. He conducted a multi-level analysis of West Germany, which he divided into 75 regions. He concluded that, while there were no contextual effects on the differences in local TFRs, the region-to-region variations could mostly be attributable to differences in the spatial distribution of individual characteristics. The local-level variables he considered included the level of urbanization, availability of childcare support facilities, and labor market structure. Labor market structure, in turn, was defined in terms of the number of workers, unemployment rate, and employment rate of women in the given regions.

Another important institutional factor influencing the fertility rate is the availability of childcare facilities. Hank and Kreyenfeld (2003) analyzed how the availability of childcare facilities affected fertility rates at the local level from 1984 to 1999. The authors concluded that the German government's public childcare services had no impact on fertility, mainly because West Germany's childcare system had changed little since 1970.

Stolzenberg and Waite (1984), however, argued that public childcare facilities were important instruments that working mothers could use while retaining their jobs. They argued that, the more childcare facilities are available in a given region, the less stress working women feel about childcare. When women

participate more actively in local labor markets, the labor markets begin to cater to their needs better. This, in turn, increases the chances of employment for women after childbirth (Kravdal, 1996).

As for studies conducted in Korea, we may begin with Ryu (2006). Here, the author remained inconclusive about whether the virtuous cycle of increasing women's labor market participation leading to a rising fertility rate, which was observed in other countries, could manifest in Korea as well.

The micro-level analyses on the correlation between the employment rate of women and the fertility rate remain inconclusive as well. On the one hand, researchers have demonstrated that the fertility rate of employed women falls below that of unemployed women at the individual level. This is especially the case with wage-earning women compared to unemployed women (Lee, S. et al., 2005, p. 385). On the macro level (Kim, T. et al., 2006, p. 121), however, researchers have reported difficulty coming to conclusions due to ambiguity.

Based on our literature review, we present two questions to guide our analysis. First, what is the correlation between the FLFPR and the TFR at the local level? This question requires a simple correlation analysis involving two variables. Second, how do the local labor market institutions affect the fertility rates of individuals? This requires a multilevel analysis involving variables at both the personal and local levels.



## Results

1. Correlation between the female labor force participation and the total fertility rate
2. Impact of labor market institutions at the local level on fertility



## 1. Correlation between the female labor force participation and the total fertility rate

### 1) Descriptive statistics

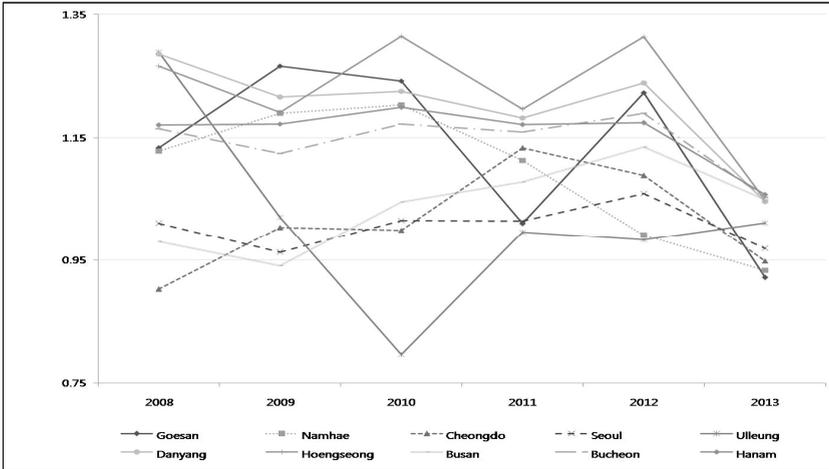
A long-term trend has been noted with respect to TFR at the municipal level in Korea. When we ranked the 162 municipalities in descending order according to the local TFRs as of 2013, the final year of our analysis, no major differences were noted with respect to high-fertility and low-fertility municipalities.

Figure 3-1 shows the trends in TFRs for ten lowest-ranked municipalities in 2013, which are Goesan, Namhae, Cheongdo, Seoul, Ulleung, Danyang, Hoengseong, Busan, Bucheon, and Hanam. The fertility of all these regions were lower than 1.1. From 2008 to 2013, the TFRs of all municipalities, except Ulleung, fluctuated in the range of 0.9-1.3. During these six years, the fluctuations were especially severe in Ulleung and Goesan.

Of the low-fertility municipalities, Seoul, Busan, and Bucheon are highly urbanized cities. The rest, including Goesan, Cheongdo, Danyang, and Hoengseong, are rural counties.

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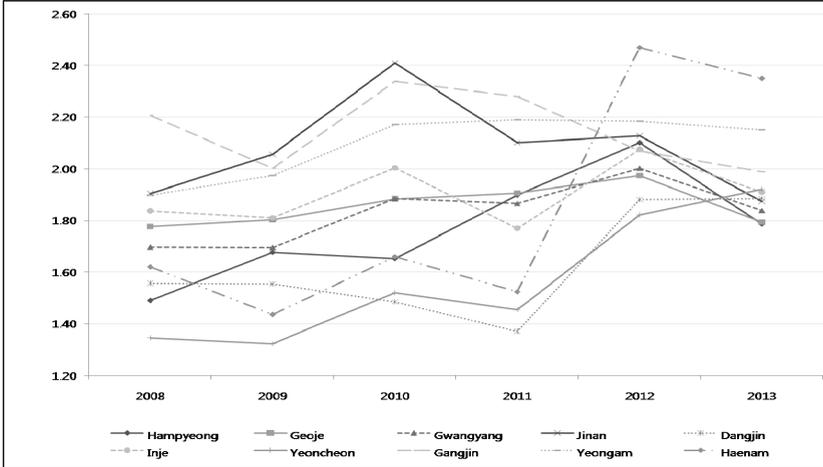
[Figure 3-1] Trends in TFR for low-fertility municipalities (2008 to 2013)



Source: Statistics Korea (each year), *Population Trend Surveys (PTSs)*.

Figure 3-2 illustrates the trends in TFRs for ten high-ranked municipalities in 2013, which are Hampyeong, Geoje, Gwangyang, Jinan, Dangjin, Inje, Yeoncheon, Gangjin, Yeongam, and Haenam. Of these, three—Geoje, Gwangyang, and Dangjin—are relatively urbanized cities, and the rest are rural counties. Although the fertility rate tended to be higher in rural areas, not all high-fertility municipalities were rural counties.

[Figure 3-2] Trends in TFR for high-fertility municipalities (2008 to 2013)



Source: Statistics Korea (each year), *PTSs*

The urban-rural divide was not clear-cut enough to explain the differences in the TFRs among municipalities. In detail, Goesan, Namhae, Cheongdo, Ulleung, Danyang, and Hoengseong were rural area expected to be high-fertility municipalities while they ranked near the bottom of the fertility rate list. From these results, we could assume that institutional determinants such as cultural structure and labor market institutions have an impact on the fertility level of the municipalities.

The availability and characteristics of childcare support facilities could play important role in determining the labor force participation of women and the fertility rates at the local level. The childcare enrolment rates for 0 to 5 years old increased from 46.6 percent to 55.1 percent during 2008-2013. Ranking

the municipalities in descending order according to their TFRs as of 2013, Goesan, Namhae, Danyang, Hoengseong, and Hanam showed above-mean proportions of children attending childcare facilities. In addition, there were five municipalities with below-mean proportions, including Ulleung. Large cities, such as Seoul, Busan, and Bucheon, had ratios ranging between 47 and 49 percent. In other words, no consistent correlations were found between the proportion of children enrolled in childcare facilities and the fertility rates in the 10 lowest-ranked municipalities, nor were such correlations found among the top 10 municipalities. This suggests that the use and availability of childcare facilities are not consistently correlated to the fertility rates. This issue requires in-depth consideration and examination through a multi-level model analysis.

<Table 3-1> Enrolment rate in childcare among children aged 0-5 years

Year		2009	2010	2011	2012	2013
National Mean		46.6	50.5	52.2	55.3	55.1
Low-fertility municipalities	Goesan	55.3	55.9	54.3	56.8	59.8
	Namhae	54.4	58.4	58.1	59.0	63.3
	Cheongdo	48.4	52.4	50.9	51.9	53.6
	Seoul	37.4	40.7	42.8	47.6	48.9
	Ulleung	20.7	30.2	29.2	29.4	23.8
	Danyang	64.6	65.3	63.7	67.2	65.6
	Hoengseong	52.0	59.9	65.3	66.9	64.5
	Busan	40.4	42.9	44.0	46.7	46.5
	Bucheon	34.7	38.2	41.7	45.1	46.4
	Hanam	37.6	44.4	48.8	58.9	61.1

Year		2009	2010	2011	2012	2013
High-fertility municipalities	Hampyeong	47.6	50.6	48.0	48.9	48.6
	Geoje	29.1	31.9	34.9	40.6	42.9
	Gwangyang	55.5	60.6	61.7	64.6	64.6
	Jinan	33.3	32.2	32.4	31.0	32.4
	Dangjin	45.0	50.9	55.8	64.1	65.5
	Inje	36.9	42.2	44.3	46.7	46.4
	Yeoncheon	49.5	56.0	60.3	61.4	56.8
	Gangjin	49.3	46.4	42.3	46.2	47.9
	Yeongam	51.6	51.6	53.7	54.3	56.8
	Haenam	53.5	56.5	56.3	52.6	47.7

Sources: MOHW (each year), *Childcare Statistics*; Statistics Korea (each year), PTSs.

The descriptive statistics of the labor market variables used in our analysis reveal no consistent patterns with respect to female labor force participation in both the low- and high-fertility municipalities. Among the low-fertility municipalities, half had above-mean female employment rates, while the other had below-mean rates, as of 2013. More specifically, Goesan, Cheongdo, Ulleung, and Hoengseong had employment rates exceeding 60 percent. This is characteristic of rural villages, where women work alongside their fathers and husbands in farming or fishing, pulling up the employment rate. Among the 10 high-fertility municipalities, five also had above-mean female employment rates, while the other five had below-mean rates.

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〈Table 3-2〉 Female labor force participation rates (aged 15 and above)

Year		2009	2010	2011	2012	2013
National Mean		51.7	51.0	51.4	52.8	52.5
Low-fertility municipalities	Goesan	57.9	58.2	59.6	65.4	60.3
	Namhae	56.1	55.9	61.8	65.8	64.1
	Cheongdo	68.8	64.0	64.3	63.1	65.9
	Seoul	50.6	49.6	51.2	51.4	52.3
	Ulleung	59.9	61.2	53.6	55.6	63.5
	Danyang	53.0	53.1	56.3	58.5	54.4
	Hoengseong	56.9	57.4	59.9	59.5	60.7
	Busan	45.9	45.4	44.9	44.7	47.5
	Bucheon	47.8	47.6	45.4	43.1	46.7
	Hanam	44.7	44.1	41.4	41.3	45.2
High-fertility municipalities	Hampyeong	61.9	67.9	64.3	63.5	61.6
	Geoje	38.4	33.8	36.6	41.7	40.5
	Gwangyang	46.4	43.6	47.1	49.4	41.1
	Jinan	66.2	60.8	60.9	67.0	58.6
	Dangjin	55.3	48.2	51.3	54.4	50.0
	Inje	54.6	57.4	55.2	60.2	59.0
	Yeoncheon	50.5	45.5	51.7	51.7	49.4
	Gangjin	62.3	60.8	59.7	57.8	61.3
	Yeongam	57.7	57.4	54.6	52.5	49.0
		Haenam	66.1	67.6	70.2	69.4

Source: Statistics Korea (each year), *LESs*.

The female labor force participation rates can vary significantly by age. There are also group-by-group differences, even among employed women. The differences between wage-earning women and non-wage-earning women could lead to considerable differences in various aspects of their daily lives, such as pregnancy, childbirth, and childcare. In this study, we therefore examine the differences in labor force par-

ticipation among different groups of women. Of Korean women of childbearing age, 54.3 percent were employed nationwide as of 2013. Interestingly, eight of the 10 lowest-ranked municipalities with low fertility rates had above-mean female employment rates. On the other hand, only five of the 10 municipalities with the highest fertility rates had above-mean rates. At first glance, no consistent patterns seem to emerge.

〈Table 3-3〉 Labor force participation rates of childbearing-age women

Year		2009	2010	2011	2012	2013
National Mean		53.4	53.2	53.8	54.6	54.3
Low-fertility municipalities	Goesan	60.3	65.3	70.2	65.2	61.2
	Namhae	61.7	55.4	61.8	66.1	64.1
	Cheongdo	66.7	60.5	66.6	61.7	64.3
	Seoul	57.8	56.1	57.7	58.6	59.1
	Ulleung	60.1	65.2	58.0	66.7	65.2
	Danyang	56.8	56.9	63.0	62.9	63.0
	Hoengseong	54.5	57.7	60.0	57.6	56.1
	Busan	52.6	52.0	51.8	51.3	54.4
	Bucheon	54.1	54.9	52.1	49.6	52.0
	Hanam	52.4	50.8	48.6	48.3	50.6
High-fertility municipalities	Hampyeong	58.5	60.9	60.1	57.4	60.3
	Geoje	42.2	33.9	37.3	39.5	41.8
	Gwangyang	44.6	43.6	46.5	48.1	40.3
	Jinan	59.3	60.3	54.8	58.2	53.7
	Dangjin	48.7	45.4	45.8	48.1	45.2
	Inje	56.2	60.6	56.5	59.4	60.2
	Yeoncheon	49.3	47.0	56.2	55.4	55.0
	Gangjin	65.3	64.7	58.5	57.8	56.6
	Yeongam	45.3	44.3	44.7	42.8	38.7
	Haenam	62.6	68.4	68.4	68.2	64.9

Source: Statistics Korea (each year), *LESS*.

We then need to examine whether the differences in the employment status of childbearing-age women affect the fertility rates. The table below lists the proportions of wage-earning women among the populations of childbearing-age women by municipality. With the nationwide mean forming the baseline, we found consistent trends among high- and low-fertility municipalities. Of the 10 low-fertility municipalities, seven had above-mean proportions of wage-earning women, suggesting that, the higher the ratio of wage-earning women, the lower the fertility rate. Of the 10 high-fertility municipalities, eight showed below-mean proportions of wage-earning women. This also suggests that low proportions of wage-earning women were inversely correlated to high fertility rates.

The distribution of women with different employment statuses may be the key to explaining the differences in fertility rates across regions. This may be related to the differences in the working conditions of wage workers and non-wage workers. Wage workers, in general, face far more rigid working conditions than do non-wage workers. They have fixed working hours and vacation policies that limit flexibility in their leisure time and family planning. These working conditions may be preventing women from achieving work-family balance and limiting the fertility intention in general.

(Table 3-4) Proportions of wage workers among populations of childbearing-age women

Year		2009	2010	2011	2012	2013
National Mean		32.5	33.6	34.7	37.2	38.0
Low-fertility municipalities	Goesan	29.1	31.4	36.7	36.5	34.2
	Namhae	32.0	31.4	33.9	42.3	36.0
	Cheongdo	33.4	29.1	34.6	42.2	40.8
	Seoul	43.6	43.7	45.6	47.4	47.8
	Ulleung	41.3	43.3	43.9	48.0	48.6
	Danyang	34.4	36.4	43.1	43.7	42.2
	Hoengseong	29.0	35.4	39.3	38.7	37.0
	Busan	39.7	40.2	40.9	42.4	43.6
	Bucheon	43.2	42.8	40.5	41.2	41.3
Hanam	39.6	38.2	37.6	38.7	41.9	
High-fertility municipalities	Hampyeong	17.6	21.5	27.3	27.6	32.1
	Geoje	33.5	26.0	30.1	33.2	34.6
	Gwangyang	32.6	31.6	35.0	37.1	29.7
	Jinan	29.5	32.0	30.4	31.5	29.8
	Dangjin	26.5	25.0	27.5	33.2	32.7
	Inje	30.8	39.5	33.4	37.3	38.7
	Yeoncheon	25.9	26.3	36.6	36.3	38.9
	Gangjin	29.6	38.3	35.7	36.5	33.8
	Yeongam	20.6	22.8	23.7	28.7	24.5
Haenam	21.7	32.4	31.3	31.4	33.7	

Source: Statistics Korea (each year), *LESS*.

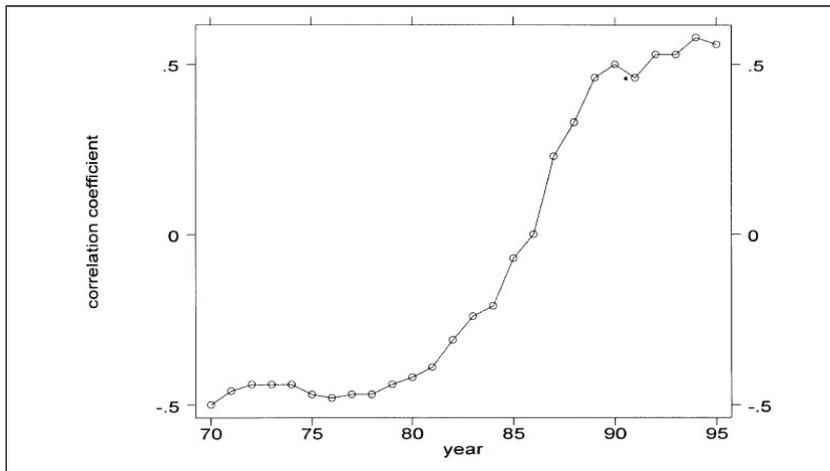
## 2) Correlation analysis

According to some studies conducted abroad, the correlation between the FLFPR and the TFR shifted from negative to positive around the mid-1980s. Ahn and Mira (2002) empirically demonstrated this reversal, as shown in the figure below. This

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reversal reflects the active policy efforts of the governments of these countries, where policymakers have devised and implemented institutional measures that allow women to better balance their careers and family lives.

[Figure 3-3] Cross-country correlation between TFR and FLFPR



Source: Ahn & Mira (2002), p. 670.

In Korea, no decisive correlation has been identified between the FLFPR and the TFR. Studies abroad provide macro-level analyses based on national data, making it impossible to attempt similar analyses within a single nation. In an effort to overcome this limitation, we divided Korea into numerous regions and secured local-level data.

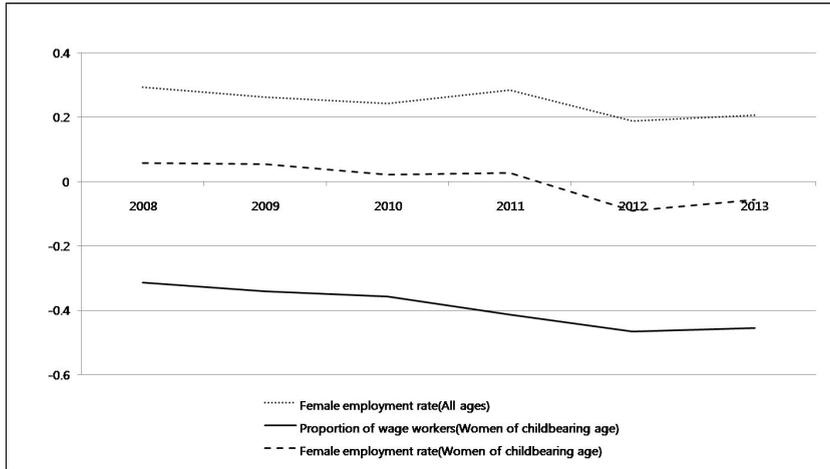
After dividing the entire country into 162 municipalities, we collected data on each one so as to analyze the correlation be-

tween the FLFPR and the TFR. We used three variables of female labor force participation—namely, the employment rate of women aged 15 and above, employment rate of childbearing-age women, and proportion of wage workers among the population of childbearing-age women. We then analyzed the correlation between each of these variables and the total fertility rate.

The findings of our analysis are illustrated in the graph below. On the one hand, the employment rates of women at all ages and proportions of wage workers among the populations of childbearing-age women had statistically significant correlations with the TFR. The female employment rate of all ages and the total fertility showed a positive correlation, while the proportion of wage workers among childbearing-age women were negatively related with the TFR. Note that, between 2011 and 2012, the negative correlation grew stronger, while the positive correlation grew weaker. On the other hand, there were no statistically significant correlations between the employment rate of childbearing-age women and the TFR.

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[Figure 3-4] Correlation coefficients of the TFR and female labor force participation variables (2008 to 2013)



Source: Statistics Korea (each year), *PTS*: Statistics Korea (each year), *LES*.

## 2. Impact of labor market institutions at the local level on fertility

This analysis begins with the hypothesis that individuals' decisions whether to have children are influenced by the character of the labor market institution at the local level, such as employment rate of childbearing age women, proportion of wage workers among childbearing age women, gender wage gap, and job segregation index of a given region. Our multilevel analysis was carried out at two levels (Level 1 for individuals and Level 2 for local societies). As individuals are nested within

local societies, we assume that local characteristics affect individuals' decisions regarding childbirth.

Using the data provided by the 2010 Census, we aligned all individual and local data with the year 2010. Assuming that the fertility rate of a given year is influenced by the institutional environment of the given region, we selected samples of individuals with recent childbirth experiences to limit and define the period of time subject to our analysis. As a result, the samples in our analysis are married women of childbearing age with children aged three or younger as of 2010.

### **1) Impact of labor market institutions on women's total number of children**

#### (1) Descriptive statistics

As character of rural and urban area differs, we divided our individual samples into urban and rural categories. See Table 3-5 for specific details of the sociodemographic characteristics of our samples. The number of children born did not differ significantly between cities and rural towns in relation to mothers' age, educational attainment, and employment status. The number of children born did, however, differ significantly between cities and rural towns depending on whether mothers owned homes.

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<Table 3-5> Sociodemographic characteristics of individual samples

(Units: number of persons, percentage)

Region	All		Rural towns		Cities	
	Freq	Proportion	Freq	Proportion	Freq	Proportion
All	171,773	100	13,153	100	158,620	100
Age						
15-19	302	0.2	60	0.5	242	0.2
20-29	41,655	24.3	3,933	29.9	37,722	23.8
30-39	113,977	66.4	7,355	55.9	106,622	67.2
40-49	15,839	9.2	1,805	13.7	14,034	8.8
Marital status						
Married	167,813	97.7	12,903	98.1	154,910	97.7
Widowed	442	0.3	50	0.4	392	0.3
Divorced	3,518	2.1	200	1.5	3,318	2.0
Employment status						
Wage workers	60,255	35.1	4,007	30.5	56,248	35.5
Self-employed (without other employees)	6,368	3.7	588	4.5	5,780	3.6
Self-employed (with other employees)	3,197	1.9	162	1.2	3,035	1.9
Unpaid workers in family businesses	5,892	3.4	1,568	11.9	4,324	2.7
None of the above	96,061	55.9	6,828	51.9	89,233	56.3
Educational attainment						
Middle school or below	6,868	4.0	1,466	11.1	5,402	3.4
High school	63,974	37.2	6,272	47.7	57,702	36.4
Undergraduate	42,012	24.5	2,841	21.6	39,171	24.7
Postgraduate	58,919	34.3	2,574	19.6	56,345	35.5
Working or not						
Not working	96,061	55.9	6,828	51.9	89,233	56.3
Working	75,712	44.1	6,325	48.1	69,387	43.7
Home ownership						
Owner	83,632	48.7	5,522	42.0	78,110	49.2
Non-owner	88,141	51.3	7,631	58.0	80,510	50.8
Total number of children						
0	43,973	25.6	3,137	23.9	40,836	25.7
1	56,746	33.0	3,691	28.1	53,055	33.5
2	55,840	32.5	4,260	32.4	51,580	32.5
3 or more	15,214	8.9	2,065	15.7	13,149	8.3

Source: Statistics Korea (2010), *Population and Housing Census* (10-percent samples).

In both cities and rural towns, women in their 30s on average had more children than women in other age groups. Women with middle school education or below also had fewer children than women with higher education levels. Also, working women had more children than not working ones. This difference was not so significant in rural towns, but was found to be significant in cities. Finally, no significant difference was observed with respect to the mean number of children borne by women in rural towns depending on whether they owned homes. In cities, however, homeowners on average had 0.3 more children than non-homeowners.

(Table 3-6) Mean numbers of children and sociodemographic characteristics of women

Group		Cities				Rural towns			
		Mean	SD	N	F or T	Mean	SD	N	F or T
Age	15-19	0.2	0.5	242	4011.3***	0.2	0.5	60	425.2***
	20-29	0.9	0.8	37,722		1.1	0.9	3,933	
	30-39	1.4	0.9	106,622		1.7	1.0	7,355	
	40-49	1.0	1.3	14,034		1.0	1.4	1,805	
Educational attainment	Middle school or below	0.9	1.1	5,402	462.9***	1.0	1.2	1,466	111.0***
	High school	1.3	1.0	57,702		1.5	1.2	6,272	
	Undergraduate	1.3	0.9	39,171		1.5	1.0	2,841	
	Postgraduate	1.2	0.9	56,345		1.4	0.9	2,574	
Working or not	Not working	1.4	0.9	89,233	72.2***	1.5	1.0	6,828	6.6***
	Working	1.1	1.0	69,387		1.4	1.1	6,325	
Home ownership	Owners	1.1	1.0	78,110	-49.8***	1.4	1.0	5,522	-1.4***
	Non-owners	1.4	1.0	80,510		1.4	1.1	7,631	

Source: Statistics Korea (2010), *Population and Housing Census* (10-percent samples).

Next, the three variables we chose to control for the basic characteristics of municipalities at the local level were the proportion of married women among the total population of women, sex ratio at birth, and childcare enrolment rate. The results of the descriptive analysis of these factors are presented in Table 3-7. First, the proportion of married women is used to control for the influence of marital status on childbirth, and represents the proportion of married women among the population of childbearing-age women. Second, the sex ratio at birth represents the number of male children per 100 female children. This variable was used to control for the cultural biases and preferences for a certain sex that may exist in certain municipalities. Finally, the childcare enrolment rate was used to control for the policy characteristics of municipalities, and represents the proportion of children aged five or younger enrolled in childcare facilities. The proportion of married women was 58 percent for rural towns, compared to 52.3 percent for cities. Rural towns also had more male children than female children. The proportion of children enrolled in childcare facilities, however, was slightly higher in cities (51.1 percent) than in rural towns (49.8 percent).

〈Table 3-7〉 Local background variables (Level 2)

(Unit: percentage)

Variable		Obs.	Mean	Std. Dev.	Min.	Max.
Proportion of married women	Cities	84	52.3	9.7	23.1	72.3
	Rural towns	78	58.0	10.1	33.2	81.5
Sex ratio at birth	Cities	84	106.8	4.1	95.0	119.2
	Rural towns	78	108.8	12.3	84.3	149.3
Childcare enrolment rate	Cities	84	51.1	10.1	31.9	76.7
	Rural towns	78	49.8	8.9	30.2	74.6

Sources: Statistics Korea (2010), *Population and Housing Census* (10-percent samples); Statistics Korea (2010), PTS: MOHW (2010), *Childcare Statistics*.

As for the institutional characteristics of local labor markets, we measured the employment rate of childbearing-age women, proportion of wage workers among childbearing-age women, gender wage gap, and gender-associated job segregation index (Duncan Index). Table 3-8 presents the results of the descriptive analysis of these variables. Childbearing-age women's employment rate was 49.4 percent in cities, nine percentage points lower compared to the 58.4 percent of rural towns. The proportion of wage workers, however, was 4.1 percentage points higher in cities. There is, in other words, a definite difference in the extent to which urban and rural women participate in their respective labor markets. As for the gender wage gap, women in cities earned 60.3 percent of what their male counterparts earned, which is higher than the 55.6 percent earned by women in rural towns. The gender wage gap is thus greater in rural towns than in cities. Finally, the job segregation

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index was found to be 0.3 (out of a possible 1.0) in both cities and rural towns.

<Table 3-8> Labor market institution Variables (Level 2)

(Unit: percentage)

Variable		Obs.	Mean	Std. Dev.	Min.	Max.
Labor market participation rate of childbearing-age women	Cities	84	49.4	4.4	37.3	61.3
	Rural towns	78	58.4	6.1	43.6	70.2
Proportion of wage workers among childbearing-age women	Cities	84	36.7	4.2	27.5	45.6
	Rural towns	78	32.6	5.3	22.1	44.7
Gender wage gap	Cities	84	60.3	8.0	37.8	82.2
	Rural towns	78	55.6	9.8	29.8	81.9
Gender-associated job segregation index	Cities	84	0.3	0.1	0.2	0.6
	Rural towns	78	0.3	0.1	0.2	0.4

Source: Statistics Korea (2010), *LES*.

## (2) Multilevel analysis

We conducted a multi-level analysis to identify how local institutional contexts affect individuals' decisions regarding childbirth. The unconditional (basic) model analysis shows the rho-value, indicating how explanatory the between-group variances are, to be 0.14 in cities and 0.13 in rural towns. In other words, between-group variances have explanatory powers of 1.4 percent and 1.3 percent, respectively, in cities and rural towns. The absolute sizes of these powers may be small, but the unconditional model is statistically significant itself.

Accordingly, the explanatory power of group-by-group variance in multilevel analysis is slightly greater in cities than in rural towns.

(Table 3-9) Unconditional model

	Cities (N=158,620)		Rural towns (N=13,153)	
	Coef.	Std. Err.	Coef.	Std. Err.
Cons	1.319***	0.013	1.444***	0.018
Sigma _u	0.115	0.010	0.128	0.015
Sigma _e	0.957	0.002	1.096	0.007
Rho	0.014	0.002	0.013	0.003
Chibar2 (01)	1843.31***	0.000	85.31***	0.000

Note: \*\*\* p < 0.001, \*\* p < 0.01, and \* p < 0.05.

As for how individual characteristics influence the number of births, women's age, educational attainment, employment status, and home ownership hold statistical significance in both cities and rural towns. First, the total number of births was higher for women who were older and employed. While high school and undergraduates had more children than women with postgraduate education, women with middle school education or below had even fewer children than those in the other groups. Finally, women living in rented homes had fewer children than women living in their own homes. The extent to which these individual variables influence the total number of births may change from variable to variable, but they were consistently influential in both cities and rural.

The labor market variables have a statistically significant impact on the number of children. In terms of female employ-

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ment rate, it was positively associated with the number of children while proportion of wage workers among the populations of childbearing-age women was negatively related to both of cities and rural towns.

(Table 3-10) Female labor force participation and women's total number of children

	Cities (N=158,620)		Rural towns (N=13,153)	
	Coef.	Std. Err.	Coef.	Std. Err.
Cons	-0.256	0.342	0.837***	0.255
Age	0.027***	0.000	0.009***	0.002
Educational attainment (Baseline = Postgraduates)				
Middle school or below	-0.418***	0.013	-0.417***	0.036
High school	0.069***	0.006	0.155***	0.026
Undergraduate	0.079***	0.006	0.154***	0.030
Working or not (Baseline = working)				
Not working	0.344***	0.005	0.148***	0.020
Home ownership (Baseline = owners)				
Non-owners	-0.204***	0.005	-0.055**	0.020
Proportion of married women	0.001	0.001	-0.000	0.002
Sex ratio at birth	0.003	0.003	0.000	0.001
Childcare enrolment rate	0.003**	0.001	0.003	0.002
Labor market participation rate	0.013**	0.004	0.008*	0.003
Proportion of wage workers	-0.016***	0.004	-0.012***	0.003
Random-effects parameters	Estimate	Std. Err.	Estimate	Std. Err.
Level 2 variance	0.009***	0.002	0.014***	0.003
Level 1 variance	0.852***	0.003	1.163***	0.014

Note: \*\*\* p < 0.001, \*\* p < 0.01, and \* p < 0.05.

When we included the gender wage gap and gender-associated job segregation index in our model, in order to measure the degree of gender discrimination in labor markets, the two variables had positive relationships which are statistically sig-

nificant in only the urban samples. Rather than interpreting these positive correlations as indicative of a proportional relationship between gender discrimination and the number of births, we should note the possibility that there are more opportunities for women to have wage employment in cities than in rural towns, even in highly women-concentrated fields. In other words, the positive correlation between gender discrimination and the number of births in cities is attributable to the greater availability of jobs for women in general.

(Table 3-11) Gender discrimination and women’s total number of children

	Cities (N=158,620)		Rural towns (N=13,153)	
	Coef.	Std. Err.	Coef.	Std. Err.
Cons	-0.828*	0.491	1.829***	0.519
Age	0.027***	0.000	0.009***	0.002
Educational attainment (Baseline = Postgraduates)				
Middle school or below	-0.418***	0.013	-0.415***	0.036
High school	0.069***	0.006	0.156***	0.026
Undergraduate	0.079***	0.006	0.154***	0.030
Working or not (Baseline = working)				
Not working	0.344***	0.005	0.146***	0.020
Home ownership (Baseline = owners)				
Non-owners	-0.204***	0.005	-0.056**	0.020
Proportion of married women	0.000	0.001	0.002	0.002
Sex ratio at birth	0.004	0.003	0.000	0.001
Childcare enrolment rate	0.006***	0.001	0.004	0.002
Proportion of wage workers	-0.008*	0.003	-0.010*	0.004
Gender wage gap (A)	0.015*	0.006	-0.012	0.009
Gender job segregation (B)	1.998*	0.950	-2.263	1.628
A*B	-0.046**	0.018	0.032	0.031
Random-effects parameters	Estimate	Std. Err.	Estimate	Std. Err.
Level 2 variance	0.009***	0.002	0.014***	0.003
Level 1 variance	0.852***	0.003	1.163***	0.014

Note: \*\*\* p < 0.001, \*\*p < 0.01, and \*p < 0.05.

## 2) Impact of labor market institutions on fertility intention

### (1) Descriptive analysis

In our analysis of how labor market variables affect individual family plans, we used the 733,005 women aged 15 to 49, found in the 10-percent samples of the 2010 Census. Of these women, 15.4 percent answered that they intended to have children, while the other 84.6 percent answered that they had no such plans. A cross tabulation analysis of these women's sociodemographic characteristics and future family plans revealed that, the younger, more educated women intended to have more children. Also, the fewer the total number of births per woman, the more likely women were to be planning future births. Moreover, wage-earning women, employed women, and women living in their own homes showed greater willingness to have children than did other women. The correlations of women's education and home ownership may overlap with their age effects. It should be noted, however, that wage-earning women were more willing than others to bear children.

(Table 3-12) Cross tabulation analysis of sociodemographic characteristics and fertility intention

(Units: percentage, number of persons)

Planning to have child(ren)	No	Yes	Total
All	15.4	84.6	100(733,005)
Age			
15-19	23.2	76.8	100( 474)
20-29	34.2	65.8	100( 59,188)
30-39	76.7	23.3	100(291,552)
40-49	98.6	1.4	100(381,791)
Marital status			
Married	83.3	16.7	100(668,701)
Widowed	99.6	0.4	100( 13,471)
Divorced	98.1	1.9	100( 50,833)
Employment status			
Wage workers	83.5	16.5	100(286,469)
Self-employed (without other employees)	91.9	8.1	100( 50,194)
Self-employed (with other employees)	91.8	8.2	100( 27,461)
Unpaid workers in family businesses	92.9	7.1	100( 51,945)
None of the above	17.5	82.5	100(316,936)
Educational attainment			
Middle school or below	95.2	4.8	100( 74,036)
High school	89.3	10.7	100(369,993)
Undergraduate	75.1	24.9	100(113,025)
Postgraduate	76.5	23.5	100(175,951)
Working or not			
Not working	82.5	17.5	100(316,936)
Working	86.2	13.8	100(416,069)
Home ownership			
Owner	79.1	20.9	100(269,183)
Non-owner	87.8	12.2	100(463,822)
Total number of children			
0	32.6	67.4	100( 45,587)
1	65.8	34.2	100(186,883)
2 or more	96.4	3.6	100(500,535)

Sources: Statistics Korea (2010), *Population and Housing Census* (10-percent samples)

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The average proportion of women with spouses was 55.1 percent for all municipalities, with the lowest being 23.1 percent and the highest being 81.5 percent. The sex ratio at birth was 107.8 percent on average, indicating that more boys were born than girls in most municipalities. The childcare enrolment rate varied as well, ranging from 30.2 to 76.7 percent.

〈Table 3-13〉 Local background variables (Level 2)

(Unit: percentage)

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Proportion of married women	162	55.1	10.3	23.1	81.5
Sex ratio at birth	162	107.8	9.1	84.3	149.3
Childcare enrolment rate	162	50.5	9.5	30.2	76.7

Sources: Statistics Korea (2010), *Population and Housing Census* (10-percent samples); Statistics Korea (2010), PTS: MOHW (2010), *Childcare Statistics*.

On average, the employment rate of childbearing-age women was 53.8 percent across all 162 municipalities, and the proportion of wage-earning workers among childbearing-age women was 32.5 percent. In addition, women's wage was 58 percent of men's, and the occupational sex segregation index was 0.3 on average.

〈Table 3-14〉 Labor market institution variables (Level 2)

(Unit: percentage)

Variable	Obs	Mean	Std. Dev.	Min	Max
Labor market participation rate of childbearing-age women	162	53.8	6.9	37.3	70.2
Proportion of wage workers among childbearing-age women	162	32.5	5.9	17.6	47.8
Gender wage gap	162	58.0	9.2	29.8	82.2
Job segregation	162	0.3	0.8	0.2	0.6

Source: Statistics Korea (2010), *LES*.

## (2) Multi-level analysis

As for the unconditional model, the log it analysis of women's future plans to have more children yielded a statistically significant local-level variance of 0.042. In other words, women's future plans regarding whether to have more children varied from region to region.

〈Table 3-15〉 Unconditional model

	Coef.	Std. Err.
Cons	-1.817***	0.017
	Estimate	Std. Err.
	0.042	0.005
Chibar2 (01)	1930.05***	0.000

Note: \*\*\* p &lt; 0.001, \*\*p &lt; 0.01, and \*p &lt; 0.05.

Table 3-16 presents the results of our analysis on how the sociodemographic characteristics of individuals and labor market institutions influence to the fertility intention. In terms of soci-

odemographic variables, age and educational attainment were negatively correlated to the fertility intention, while employment status, home ownership and the number of children were positively correlated. In detail, the women who were not working had 1.14 times higher fertility intention compared to women who were working. And the odds that women who have own house intend to have more children increased by 6 percent than the non-owners. The odds of intending to have more children were decreased by 22 percent for each additional year of age. The odds of intending to have a subsequent child in women with middle school education or below were 72 percent lower than those in women with undergraduate education.

Concerning local level control variable impact, women living in regions with higher sex ratios at birth (i.e., more boys born than girls) were more likely to have additional children. The childcare enrolment rate had no statistically significant correlation.

With regard to the labor market institutions, the odds of intending to have a subsequent child increased by 7 percent for every one-percentage point increase in the employment rate of childbearing-age women. Conversely, for every one-percentage increase in the proportion of wage workers among childbearing-age women, the odds of intending to have a subsequent child decreased by 5 percent.

(Table 3-16) Female labor force participation and fertility intention

	Coef.	Std. Err.	Odds Ratio
Cons	5.412***	0.224	
Age	-0.244***	0.001	0.783
Educational attainment (Baseline = Postgraduates)			
Middle school or below	-1.293***	0.027	0.274
High school	-0.536***	0.011	0.585
Undergraduate	-0.131***	0.012	0.877
Working or not (Baseline = working)			
Not working	0.108***	0.009	1.114
Home ownership (Baseline = owners)			
Non-owners	0.072***	0.009	1.075
Total number of births (Baseline = 2 or more)			
None	3.317***	0.016	27.583
1	1.993***	0.010	7.338
Proportion of married women	0.002	0.001	1.002
Sex ratio at birth	0.004*	0.002	1.004
Child care enrolment rate	0.001	0.001	1.001
Labor market participation rate	0.007***	0.002	1.007
Proportion of wage workers	-0.005*	0.002	0.995
Random-effects parameters	Estimate	Std. Err.	
Level 2 variance	0.013***	0.002	

Note: \*\*\* p < 0.001, \*\*p < 0.01, and \*p < 0.05.

The variables of gender discrimination in local labor markets were found to have no statistically significant correlation to women's plans to have subsequent children.

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<Table 3-17> Gender discrimination and fertility intention

	Coef.	Std. Err.	Odds Ratio
Cons	5.667	0.388	
Age	-0.244***	0.001	0.783
Educational attainment (Baseline = Postgraduates)			
Middle school or below	-1.291***	0.027	0.275
High school	-0.535***	0.011	0.586
Undergraduate	-0.131***	0.012	0.877
Working or not (Baseline = working)			
Not working	0.107***	0.009	1.018
Home ownership (Baseline = owners)			
Non-owners	0.072***	0.009	1.075
Total number of births (Baseline = 2 or more)			
None	3.317***	0.016	27.580
1	1.993***	0.010	7.336
Proportion of married women	0.002	0.001	1.002
Sex ratio at birth	0.004*	0.002	1.004
Childcare enrolment rate	0.002	0.001	1.002
Proportion of wage workers	0.001	0.003	1.001
Gender wage gap (A)	-0.000	0.006	1.000
Gender job segregation (B)	0.245	0.971	1.278
A*B	-0.014	1.826	0.986
Random-effects parameters	Estimate	Std. Err.	
Level 2 variance	0.013***	0.002	

Note: \*\*\* p < 0.001, \*\*p < 0.01, and \*p < 0.05.

# IV

## Policy Implications



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# IV

## Policy Implications <<

The main purpose of this study was to analyze the impact of local-level labor market institutions on fertility rate. More specifically, this study sought to identify how the relationship between the increasing labor force participation of women and the fertility rate has been progressing in Korea. To this end, we divided Korea into 162 municipalities (cities, counties, and boroughs) and analyzed data at both the individual and local levels using simple correlation analysis and multi-level models.

Our simple correlation analysis of the FLFPR and TFR of the 162 municipalities revealed a positive correlation between the employment rate of women aged 15 and above and the total fertility rate. The proportion of wage workers among child-bearing-age women, on the contrary, was found to be negatively correlated to the total fertility rate. The intensity of these correlations has changed since 2012, with the positive correlation growing weaker and the negative one becoming stronger. In other words, the positive correlation between the female employment rate and the fertility rate has been waning, while the negative correlation between the proportion of wage workers and the fertility rate has been growing in intensity.

As for how the local labor market institutions in the 162 mu-

municipalities affect the individuals' number of children in the respective regions, we identified a significant correlation between local labor market institutions and individuals' number of children. The number of children is positively related to the female employment rate (local level), while negatively associated with the proportion of wage workers among local child-bearing-age women.

Women living in municipalities with more rigid labor market structures that favor wage workers appear to be under greater pressure to abandon their plans to have more children. When developing family plans, individuals take into account the characteristics and conditions of their local labor markets. Note that the working conditions of wage-earning women tend to disfavor childbirth and childcare.

The multilevel analysis results revealed certain consistent and definite trends. The number of children and the fertility intention were positively related to the FLFPR while that negatively related to the proportion of wage workers among child-bearing age women. It seems that individuals perceived the local market institutions. Moreover, this labor market institution affects individuals' fertility intention. Lastly, it could be assumed that the condition of wage workers has been hard on childbirth and child caring.

Brewster and Rindfuss (2000) demonstrated that countries where female labor force participation and fertility rate are

positively correlated had switched the direction by changing labor market institutions. In detail, the association between work and family has turned positive by changes in work life and in the social organization of childcare.

The impact of female labor force participation on the fertility rate varies from nation to nation depending on the characteristics and conditions of their labor market institutions. In order to foster an environment that is more favorable to childbirth and childcare, Korean policymakers need to increase women's labor force participation while taking steps to improve the working conditions for wage-earning women at the same time. This study shows that women living in regions with relatively higher proportions of wage-earning women take into account the working conditions of their respective labor markets when planning their careers and family life. The proportion of local wage workers not only indicates the employment status of individuals but also the institutional and contextual working conditions for wage workers. Rather than simply equating increases in women wage workers with decreases in the fertility rate, we need to consider how the institutional makeup of the local labor market—e.g., working hours, wage structure, and ease of promotion—influences women's family plans.



## References

- Kim, D. (2007), *The Asian Financial Crisis and the Change in the Birth Rate in Korea*, Jipmundang: Seoul.
- Kim, T., Lee, S., and Kim, D. (2006), "Total Fertility Rates Differentiated by Demographic and Socioeconomic Factors: Analyzing the Census Data," *Korean Journal of Demographics*, 29(10), pp. 1-23.
- Ryu, D. (2006), "A Macro-Level Empirical Analysis of the Correlation between the Fertility Rate and Women's Labor Supply," *Fiscal Forum*, 122, pp. 26-45.
- Lee, S., Shin, I., Cho, N., Kim, H., Jeong, Y., and Choi, E. (2005), *Causes of the Declining Birth Rate and Comprehensive Countermeasures*, KIHASA.
- Adserà, A. (2004), "Changing fertility rates in developed countries: The impact of labor market institutions," *Journal of Population Economics*, 17(1), pp. 17-43.
- \_\_\_\_\_. (2005), "Where are the babies? Labor market conditions and fertility in Europe," IZA DP, No. 1576.
- Ahn, N. & Mira, P. (2002), "A Note on the changing relationship between fertility and female employment rates in developed countries," *Journal of Population Economics*, 15(4), pp. 667-682.
- Brewster, K. L. & Rindfuss, R. R. (2000), "Fertility and women's employment in industrialized nations," *Annual Review of Sociology*, 26, pp. 271-296.
- Hank, K. (2001), *Regional social contexts and individual fertility decisions: A multilevel analysis of first and second births in*

*Western Germany*. Max Planck Institute for Demographic Research, MPIDR Working Paper WP 2001-015.

Hank, K. & Kreyenfeld, M. (2003), "A multilevel analysis of child care and women's fertility decisions in Western Germany," *Journal of Marriage and Family*, 65(3), pp. 584-596.

Hoem, B. (2000), "Entry into motherhood in Sweden: the influence of economic factors on the rise and fall in fertility, 1986-1997," *Demographic Research*, 2(4), pp. 1-28.

Kravdal, Ø. (1996), "How the local supply of day-care centers influences fertility in 26 Norway: A parity-specific approach," *Population Research and Policy Review*, 15(3), pp. 201-218.

Stolzenberg, R. M. & Waite, L. J. (1984), "Local labor markets, children and labor force participation of wives," *Demography*, 21(2), pp. 157-170.