

The Relationship between the Unemployment rate and the Birth rate in Korea

Submitted by: Jung Moon Jang

Undergraduate Economics Program
Tepper School of Business
Carnegie Mellon University

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Advisor: Professor Yaroslav Kryukov

Professor Yaroslav Kryukov
Assistant Professor of Economics
Tepper School of Business
Carnegie Mellon University

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Abstract

Through this research, I have looked at the relationship between the unemployment rate and the birth rate with a focus in Korea. For past few decades, despite the high volume of students obtaining undergraduate degrees, the unemployment rate has constantly increased, bringing about a critical social issue. On the other hand, families have been giving birth to fewer children or no child at all despite the government's efforts to financially aid parents to raise their children. Because of this phenomenon, a new term called 'Sampo generation' has emerged, describing people in their 20s and 30s giving up on three things since they can't economically support themselves: dating, marriage, and giving birth. It has been discovered that the unemployment rate has negative correlation with the birth rate although the labor participation rate has a stronger relationship with the fertility rate. With larger unemployment, the birth rate is decreased whereas with larger participation rate, the number of babies born is increased. Also, interestingly, the effect of unemployment and education are often the opposite for females and males. As people earn more money, however, they postpone their chances of having a child or more although its negative correlation is explained away by education. Lastly, Conservatives have more children than Democrats and Independents and considering the historical and cultural differences between regions, the political affiliations were regarded as proxies for indicating regions that have higher or lower birth rates. However, it has been found that whether the region is relatively urban or rural is a stronger factor determining the birth rates than the political perspectives.

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Introduction

Worldwide, youth unemployment has been one of the ongoing social issues especially after the financial crisis in 2008 concerning many college graduates. In Korea, despite the growing population of students obtaining university education or sometimes above, the unemployment rate has been increased. Another social issue is the aging population with low birth rate. The life expectancy is increasing due to development of new technology that enables people to live longer, but people are having fewer children. Therefore, there are not enough people in the working population and other issues such as paying higher taxes than before, possibility of pension funds running out, and so on are resulted. Suspecting there is a relationship between the increasing unemployment rate and the decreasing birth rate, it has been hypothesized that since the unemployment rate is high, more people are having fewer kids as a consequence because it costs money and time to raise kids which parents in nowadays can't afford with their own incomes. With the birth rate as the dependent variable and the unemployment rate as the main explanatory variable with income level, many regressions have shown significant relationship between the two main variables, but also with other factors such as education levels influencing people's decisions of extending their families.

Related Literature

This section of the paper summarizes the related theoretical papers on the relationship between the fertility rate and the unemployment rate. Somogyi (1935) insisted that there is no direct relation between the declining birth rate and the unemployment rate. He concluded that the decrease in the population does not influence the total amount of consumption without increase in the capital for production. Also, he found out that the change in the consumption rather depends on the purchasing power instead of the change in the number of population.

However, recent studies show that there actually is a relationship between the two main variables. Gutierrez-Domenech (2006) who took a closer look at this relation specifically in Spain focused on the change in the social status in women affecting the change in the birth rate explained that the employment status of women had opposite effects on family formation in Cohort 1945-1960 and Cohort 1961-1977 showing the change in women's role in the society whereas employed men are more likely to get married and have families. Also, educated women tend to delay having their first children due to the cost of raising a kid as well as the opportunity cost of losing a job generating no income. Maria Da Rocha and Fuster (2006) specifically showed that in OECD countries, there is negative correlation between the female participation and fertility rates and that unemployed women are likely to delay their births which results in the reduction in the fertility rate. They mainly focused on the women's decision of having kids affecting the labor market. Ahn and Mira (2002) also pointed out that most of the OECD countries exhibit this negative relationship although in the late 1980s when the unemployment rate increased, the fertility rate and the female participation rates actually had positive sign.

Moreover, Siegers (1987) uses the model by Willis to explain the effect of females participating in the labor market changes the effect of husband's income and thus the fertility

rate. If women participate, there is a positive effect on husband's income whereas the substitution effect on giving birth is negative. Ahn and Mira (2000) also make the similar assertion; in the OECD countries, when wife is unemployed, it creates income and substitution effect while in case of husband, there is only strong income effect.

Many other studies such as Meron and Widmer (2002), and Adsera (2011) all argue that there is a negative relationship between the two main variables. However, these papers used data mostly from western countries such as Spain, France, and OECD countries whereas I am going to focus more on Korea, the country affected mainly by Confucianism meaning the role of women in the society as mother is more emphasized than the western countries. Also, the variables used in this paper are divided into more details; participation rate and education levels of female and male, and political perspectives.

Methods

The panel data consists of variables for 16 different provinces¹ in Korea from 1990 to 2011. The variables that are used the most in the regressions are birth rate, overall unemployment rate, labor participation rate, and employment rates which are also available for female and male, percentages of female and male with high education, income level, and political perspectives². Except for the political views, all of the data were gathered from the Korean Statistical Information Service (KOSIS). However, for the birth rate, because there were no statistics available from 1991 to 1994 and 1996, linear interpolation was used to estimate the data in these years.

Percentages of females and males who obtained high education by province have been calculated by dividing the number of females/males who finished university and above by the total population of females/males of each province. The education levels of females/males by province provided by KOSIS originally consists of 8 categories: unknown, no education at all, elementary, middle school, high school, college, university, and above. However, the categories of college, university, and above have been combined to represent the population of those who have achieved high education. Also, the percentages are only available every 5th year.

For the activity rate by education levels, KOSIS had 6 different categories: elementary and below, middle school, high school, college, university, and above university graduation. In the research, however, these rates have been combined into two groups: people who obtained high school diploma and below as low educated group and all the others as high educated group.

Income levels by provinces are represented with GRDP (Gross Regional Domestic Product) in millions. GRDP is presented with two different categories: GRDP at current prices (2011) and at 2005 prices. However, GRDP at 2005 prices is mainly used in the regressions since it is presented in real dollars.

The political perspectives are categorized into three groups: Conservative, Democratic, and Independents. Also, it is in 5 years apart since the president election takes place every five year. It is the only variable that KOSIS doesn't provide, but National Election commission provides statistics by province.

1. Linear interpolation used for the birth rate

According to KOSIS, since both the number of women and the number of births are categorized by age groups of 5 years apart, the total fertility rate is calculated as followed.

$$\text{Total fertility rate} = \sum \text{Age} - \text{specific fertility rate} \div 1000 \times 5$$

$$\text{Age} - \text{specific fertility rate} = \frac{\text{number of births}}{\text{number of women}} \times 1000$$

Note that the number of women used in the calculation is the number of women from age of 15 to 49 in 1990 and 1995.

2. Unemployment rate

$$\text{Unemployment rate} = \frac{\text{number of people unemployed}}{\text{number of people economically active}} \times 100$$

A person is considered to be economically active if the person has been looking for a job for more than a week. A person is considered to be unemployed if the person is older than 15 and have been economically active.

3. Labor Participation rate

$$\text{Labor Participation rate} = \frac{\text{number of people economically active}}{\text{number of people 15 older}} \times 100$$

Labor participation rate explains the population of 15 and older both employed and unemployed.

4. Employment rate

$$\text{Employment rate} = \frac{\text{number of people employed}}{\text{number of people 15 older}} \times 100$$

¹ Ulsan was designated as a province in 1997 and therefore all of its statistics from 1990 to 1997 is zero.

² See Appendix

General Data Overview

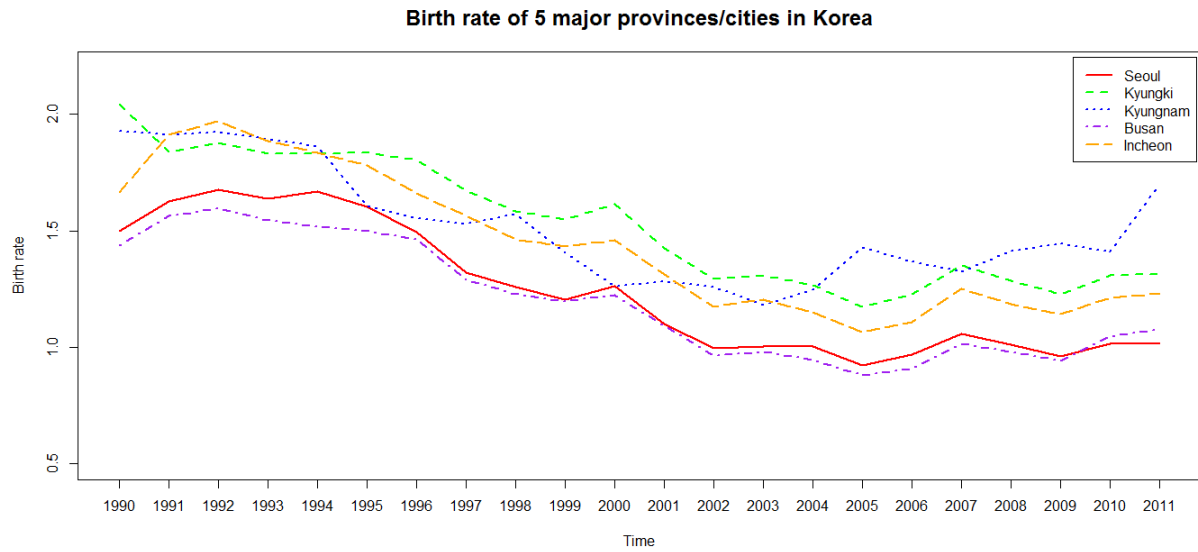


Figure 1 Birth rates of 5 major provinces/cities in Korea

Figure 1 shows the birth rates of 5 major provinces/cities in Korea. Overall, the birth rate displays decreasing trend. However, since 2009, it has been slightly increasing because the economy after the global financial crisis in 2008 is showing the signs of recovery and people resume their postponed plans for marriage and giving birth³. The average birth rate from 1990 to 2011 is 1.449. Also, urban areas have lower birth rates compared to relatively rural areas. Table 1 shows the birth rates of each province and Ulsan, Daegu, Seoul, and Busan are the largest metropolitan cities in Korea that have lower birth rates than other provinces whereas Jeonnam, Jeju, Chungnam, and Kyungnam with higher birth rates are relatively rural areas.

<i>Province/City</i>	<i>Birth rate</i>	<i>Province/City</i>	<i>Birth rate</i>
Jeonnam	1.613	Gwangju	1.483
Jeju	1.577	Gangwon	1.445
Chungnam	1.543	Incheon	1.440
Kyungnam	1.542	Daejun	1.422
Kyungki	1.530	Ulsan	1.402
Chungbuk	1.500	Daegu	1.277
Jeonbuk	1.491	Seoul	1.241
Kyungbuk	1.487	Busan	1.199

Table 1 Birth rates of Provinces/cities in Korea

In Figure 2, it is shown that the unemployment rate fluctuates although in 1997 it skyrocketed because that is when the economy collapsed due to currency crisis and required assistance from International Monetary Fund. In general, since 2000, the unemployment rate has remained approximately 3.4% and youth unemployment has been one of the serious social problems. The unemployment rates of male on average 3.72% while that of female is 2.76%. Regarding the labor participation rates, for male, it is approximately 74.63% while it is 48.72% for females on average. However, as indicated in Figure 3, the labor participation rate of female has changed dramatically dropping significantly during 1997 due to the

³ See Appendix

financial crisis in 1997. Nevertheless, in general, the rate of women getting involved in the labor force has been increasing showing the role of women in society has been changed.

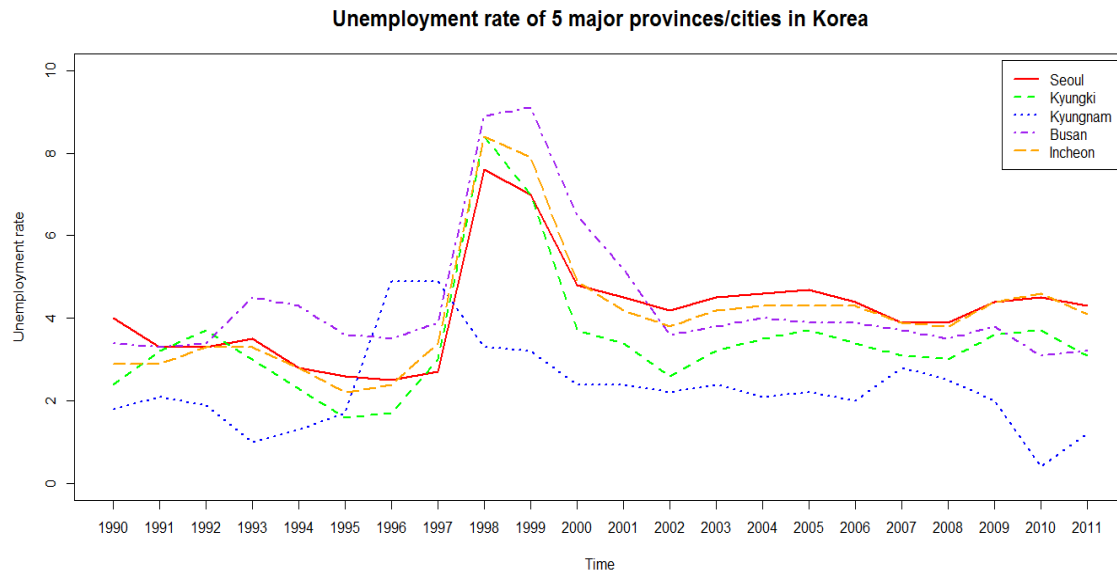


Figure 2 Unemployment rates of 5 major provinces/cities in Korea

The percentages of both female and male fulfilling high education have been increased. Seoul has the highest population of people obtaining at least college education by 63.36% while Jeonnam has the lowest by 29.26% on average. Generally, the difference between men and women finishing university or above is approximately 10%.

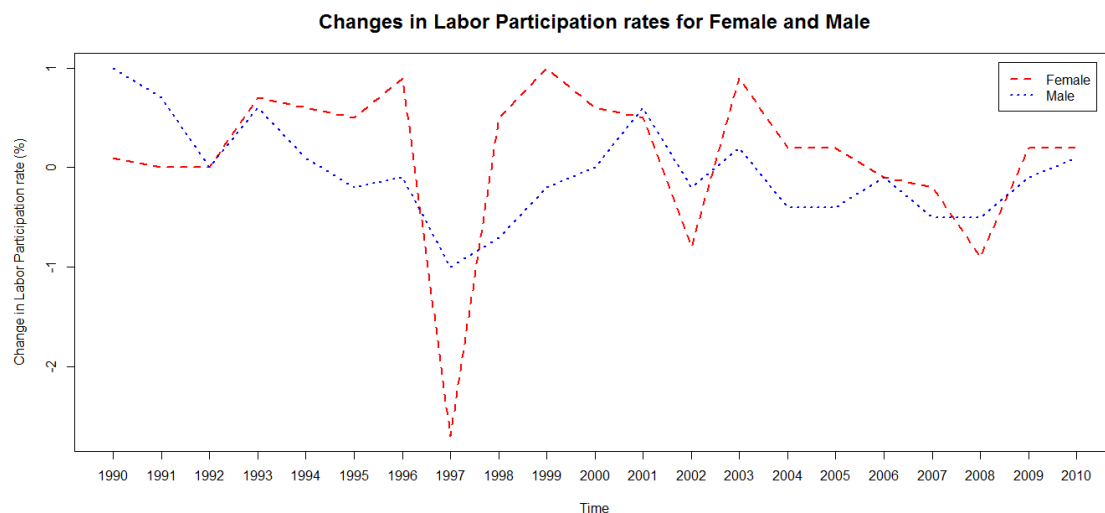


Figure 3 Change in Labor Participation rates for Female and Male

As for the political perspectives, regionalism is also one of the social problems. According to the most recent presidential election in 2012, in Jeonnam and Jeonbuk, Democratic party had 89.3% and 86.3% of the votes while Conservatives won in Kyungbuk and Daegu by 80.8% and 80.1%.

Analysis

I. Overall Unemployment rate / Labor Participation rate

<i>Variable</i>			
<i>Unemployment rate</i>	- 0.00038 (0.01193)		
<i>Labor Participation rate</i>		+ 0.02252 (0.00166)	
<i>Employment rate</i>			+ 0.00154 (0.00768)
<i>Income</i>	- 0.00446 (0.00075)	- 0.00660 (0.00062)	- 0.00661 (0.00056)

Table 2 Regression with Overall Unemployment rate / Labor Participation rates

* Blue indicates significant variable

To analyze the relationship between the unemployment rate and the fertility rate, the first model as shown in the Table 2, only includes the overall unemployment rate and income represented by GRDP at 2005 prices. Both of the explanatory variables display negative correlations with the birth rate although only income level is significant. It is indicated that as people earn more money, they are less likely to have more children since they spend more time working.

Nevertheless, when the labor participation rate is substituted, both of the participation rate and the income levels are significant with opposite correlations. As income levels are increased, people delay their choices of making families whereas as more people are working or at least searching for jobs, the birth rate is likely to increase. In order to investigate whether being employed is significant factor in people making decisions about having a child, employment rate turned out to have no certain important relationship with the birth rate. However, income level in all three models in Table 1 remains significant with negative sign.

II. High education / Political views

<i>Variable</i>			
<i>Unemployment rate</i>	- 0.04149 (0.03860)		
<i>Labor Participation rate</i>		+ 0.02815 (0.00393)	
<i>Employment rate</i>			+ 0.02871 (0.01677)
<i>Income</i>	+ 0.00082 (0.00191)	+ 0.00025 (0.00142)	+ 0.00030 (0.00146)
<i>Females with high education</i>	- 0.16707 (0.02615)	- 0.06012 (0.02328)	- 0.06426 (0.02389)
<i>Males with high education</i>	+ 0.14252 (0.02386)	+ 0.03262 (0.02166)	+ 0.03737 (0.02203)

Table 3 Regression with Education levels of Female and Male

When control variables are added, however, the overall unemployment rate becomes significant. As shown in Table 3, having no job has negative impact on people having a child or more. Interestingly, effect of education is opposite for female and male. As the number of women completing at least university education increases which is the trend at the moment, the fertility rate decreases while it is the opposite for males. This is understandable considering the opportunity cost of having a baby for women. Women have immediate influence from giving birth in terms of going on maternity leave for maximum of three months. Also, in Korea, when women return from maternity leave, because they have been gone from three months, sometimes, their spots are replaced and they get relocated. Due to these consequences, women with high education tend to postpone their decision of making families and instead continue to focus on looking for jobs or working. Female obtaining high education, in fact, throughout all three models is significant.

Consistent with the findings from Table 2, the labor participation rate still has positive relationship with the birth rate showing again the higher the number of people actively involved in the labor force, the higher the number of children born. Income level, nevertheless, unlike the results in Table 2, is not significant anymore because its correlation has been explained away by education levels. People who have fulfilled relatively higher education than others are more likely to find jobs with high income and therefore education gets rid of the relevance of income on the birth rate.

<i>Variable</i>			
<i>Unemployment rate</i>	-0.18829 (0.08086)		
<i>Labor Participation rate</i>		+0.00913 (0.00495)	
<i>Employment rate</i>			- 0.00371 (0.02550)
<i>Income</i>	- 0.00849 (0.00206)	- 0.01006 (0.00213)	- 0.00755 (0.00163)
<i>Conservative</i>	+ 0.01944 (0.00470)	+ 0.01378 (0.00491)	- 0.00628 (0.00491)
<i>Democratic</i>	- 0.00583 (0.00368)	- 0.00805 (0.00386)	- 0.00860 (0.00293)

Table 4 Regression with Political views

Table 4 shows the results of regressions with political perspectives: Conservative and Democratic. Independent is not included in the models due to exact collinearity³. The overall unemployment rate is significant and has a negative sign which is consistent with the results from Table 3. Also, as income is decreased, people delay their choices of forming families. Political views do not explain away the effect of income level. Interestingly, Conservatives has more children than Democrats and Independents. Although only Conservative is significant, the two main parties in the regression have opposite signs. Labor participation rate, as before, have positive correlation. In case with the participation rate, both parties become significant, maintaining the opposite signs and Conservative being more likely to make families than others is valid. However, when the employment rate is regressed against the birth rate, Conservative and Democratic both have negative signs, but only Democratic is significant.

However, considering the regionalism in politics resulted from historical and cultural difference between the provinces in Korea, the political views are proxies for indicating regions with higher or lower birth rates. Majority of people from east-southern part of Korea such as Kyungnam, Kyungbuk,

and Busan support Conservative while those from west-southern part such as Jeonnam and Jeonbuk tend to be Democrats. Therefore, regions such as Busan should have higher birth rate than Jeonnam. Referring to Table 1, however, in fact, Jeonnam has the highest birth rate with 1.613 while Busan and Ulsan are regions with the lowest birth rates. The average birth rate of Kyungbuk and Kyungnam is lower than that of Jeonnam and Jeonbuk.

<i>Province/City</i>	<i>Birth rate</i>	<i>Province/City</i>	<i>Birth rate</i>
Jeonnam	1.612	Jeonbuk	1.492
Jeju	1.598	Incheon	1.489
Kyungnam	1.557	Gangwon	1.461
Kyungki	1.548	Daejun	1.456
Chungnam	1.535	Daegu	1.296
Gwanju	1.530	Seoul	1.262
Chungbuk	1.524	Busan	1.216
Kyungbuk	1.494	Ulsan	1.103

Table 5 Predicted Birth rate from regression with Overall Unemployment rate and Political views

Also, the order of the provinces/cities in Table 5 is similar to that of Table 1 showing Jeonnam and Jeonbuk having higher fertility rate than Kyungnam and Busan. Therefore, we can conclude that whether the area is urban or rural is more significant factor affecting people's choice of having a child and more than the political perspectives

Because in the data, although both political perspective and education levels are available every 5th year, it doesn't overlap. Therefore, doing regression with the two variables in one model couldn't be done⁴.

III. Regressions with lagged variables

<i>Variable</i>			
<i>Unemployment rate_4</i>		- 0.05127 (0.01154)	
<i>Unemployment rate_5</i>	- 0.12831 (0.04019)		
<i>Unemployment rate_6</i>		- 0.16323 (0.04023)	
<i>Employment rate_3</i>			+ 0.05893 (0.01601)
<i>Income</i>	+ 0.00315 (0.00234)	- 0.00341 (0.00147)	- 0.00028 (0.00195)
<i>Females with high education</i>	- 0.15344 (0.03020)		
<i>Males with high education</i>	+ 0.13045 (0.02702)		
<i>Conservative</i>		- 0.00651 (0.00411)	- 0.01359 (0.00437)
<i>Democratic</i>		- 0.01028 (0.00313)	+ 0.00513 (0.00317)

Table 6 Regression with lagged Unemployment rate

Considering how people can be unemployed for more than one period, the overall unemployment rate is lagged. With the education variables, the unemployment rate still has negative correlation. The fifth lag of the unemployment rate is significant indicating the longer the period of one without a job, the lower the chances for one to have children. Also, income level, as what has been found before, is explained away by education. Females and males do still exhibit the opposite effect on the birth rate.

Regarding the political affiliations, instead of Conservative, it is Democratic that is significant. However, consistent with the results from Table 4, Democrats are less likely to extend their families by having more children than Conservatives. The lagged unemployment rates and income are still negative showing there is time effect of being without a job on the fertility rate. The lagged employment rate is also significant with Conservative having negative correlation. This result is also expected with Conservatives being more likely to have more children than other even though unemployed.

Note regressions with the lagged labor participation rate are not included in Table 5. Sums of coefficients from models with lagged participation rate are zero and the models do not display any significant results compared to the regressions with the overall labor participation rate. Please refer to Appendix for more details.

IV. Gender difference

<i>Variable</i>			
<i>Female Unemployment rate</i>	+ 0.03045 (0.03347)		
<i>Male Unemployment rate</i>	- 0.00383 (0.02490)		
<i>Female Labor Participation rate</i>		- 0.05463 (0.00587)	
<i>Male Labor Participation rate</i>		+ 0.04748 (0.00327)	
<i>Female Employment rate</i>			- 0.05370 (0.00598)
<i>Male Employment rate</i>			+ 0.04783 (0.00334)
<i>Income</i>	- 0.00470 (0.00076)	- 0.00339 (0.00060)	- 0.00357 (0.00059)

Table 7 Regression with Unemployment rate / Labor Participation rate for Female and Male

As females and males with high education have the opposite effect on the birth rate, to investigate if unemployment status of gender also has different effects, we have divided the unemployment rate into female and male. The results show that the unemployment rates of female and male are insignificant in Table 6 despite its opposite correlation with the birth rate. However, when the labor participation rates or employment rates are substituted, as more women work or hope to find jobs, the number of babies born is decreased while as more men are hired, they seek to have more children. This results are consistent with what has been found with the overall labor participation rate and employment rate. Income level again has negative correlation with the fertility rate demonstrating the lower the income, the lower the birth rate.

However, when we add the education variables, unlike before, the unemployment rates for both females and males remain insignificant although the education levels do display opposite correlations to the birth rate. Therefore, we conclude that education gets rid of relevance on unemployment on the birth rate, but has the intermediate effect. Also, in the regressions with the labor participation rate and employment rate, only those of males remain significant while females' education levels have significant negative correlations with the dependent variable. This once again indicates how education eliminates the relevance of unemployment status on the fertility rate.

<i>Variable</i>			
<i>Female Unemployment rate</i>	+ 0.02640 (0.08019)		
<i>Male Unemployment rate</i>	- 0.02523 (0.05456)		
<i>Female Labor Participation rate</i>		- 0.01096 (0.01609)	
<i>Male Labor Participation rate</i>		+ 0.02805 (0.00909)	
<i>Female Employment rate</i>			- 0.00669 (0.01584)
<i>Male Employment rate</i>			+ 0.02572 (0.00892)
<i>Income</i>	+ 0.00074 (0.00195)	- 0.00012 (0.00142)	- 0.00000 (0.00142)
<i>Females with high education</i>	- 0.16142 (0.02802)	- 0.04268 (0.02525)	- 0.05081 (0.02448)
<i>Males with high education</i>	+ 0.13474 (0.02617)	+ 0.02117 (0.02245)	+ 0.02866 (0.02181)

Table 8 Regression with Females / Males with high education

With the political views included, however, male unemployment rate becomes significant, but has negative relationship with the number of babies born. In other words, as more men lose their jobs, they decided to give up or delay their chances of extending their families. Income level is significant with negative correlation throughout the three regressions presented in Table 9. Conservatives, as before, have more children than Democrats and Independents, but predicted birth rates from the models from Table 9, which is the same as in Table 5, demonstrate that whether the region is more urban or not is more important factor than political perspectives that influence the birth rate.

<i>Variable</i>			
<i>Female Unemployment rate</i>	+ 0.16277 (0.09976)		
<i>Male Unemployment rate</i>	- 0.29638 (0.09297)		
<i>Female Labor Participation rate</i>		- 0.07642 (0.01754)	
<i>Male Labor Participation rate</i>		+ 0.04732 (0.00940)	
<i>Female Employment rate</i>			- 0.07944 (0.01787)
<i>Male Employment rate</i>			+ 0.04886 (0.00946)
<i>Income</i>	- 0.00660 (0.00219)	- 0.00497 (0.00206)	- 0.00464 (0.00207)
<i>Conservative</i>	+ 0.02087 (0.00465)	+ 0.01432 (0.00405)	+ 0.01468 (0.00400)
<i>Democratic</i>	- 0.00471 (0.00372)	- 0.00424 (0.00329)	- 0.00447 (0.00323)

Table 9 Regressions with Political views with Female / Male Unemployment rate

In Table 10, we see that there is time effect of male being unemployed; the longer the period males are without certain jobs, the lower the birth rate becomes. The education levels and income do not have any significant correlations with the dependent variable anymore. Therefore, no matter the education levels, people are likely to have fewer children when more men lose their jobs. With the labor force participation rate, however, female unemployment rate is the one that has the negative correlation as well as the percentage of males with high education.

<i>Variable</i>			
<i>Female Unemployment rate_6</i>	+ 0.00225 (0.02729)		
<i>Male Unemployment rate_6</i>	- 0.06733 (0.01754)		
<i>Female Labor Participation rate_1</i>		- 0.05295 (0.02995)	
<i>Female Labor Participation rate_2</i>		+ 0.04391 (0.02875)	
<i>Male Labor Participation rate_1</i>		- 0.00599 (0.03586)	
<i>Male Labor Participation rate_2</i>		+ 0.04273 (0.03236)	
<i>Female Employment rate_2</i>			+ 0.00415 (0.01923)
<i>Male Employment rate_2</i>			+ 0.02734 (0.01159)
<i>Income</i>	+ 0.00100 (0.00103)	+ 0.00129 (0.00173)	+ 0.00213 (0.00177)
<i>Females with high education</i>	- 0.00950 (0.02399)	+ 0.02006 (0.03490)	- 0.01650 (0.03640)
<i>Males with high education</i>	- 0.01220 (0.02524)	- 0.05644 (0.03163)	- 0.02329 (0.03293)

Table 10 Regression with Lagged Unemployment Rates and Education for Female and Male

Moreover, instead of education levels, when political views are included with lagged unemployment rates, again, the control variables lose its significance and male unemployment status like what we have seen in Table 10 have negative correlation with the number of babies born. It once again shows that the length of male's unemployment status becomes more significant as the period gets longer. However, with the labor participation rate, we see that female's participation also have negative influence while that of males switch its sign from positive to negative demonstrating that men having longer period of no job has more impact on the fertility rate. Income levels and Democratic have negative signs, as before, displaying its correlation.

<i>Variable</i>			
<i>Female Unemployment rate_4</i>	+ 0.00069 (0.02647)		
<i>Female Unemployment rate_6</i>	+ 0.06429 (0.03830)		
<i>Male Unemployment rate_4</i>	- 0.07348 (0.02177)		
<i>Male Unemployment rate_6</i>	- 0.14628 (0.03487)		
<i>Female Labor Participation rate_5</i>		- 0.04623 (0.01626)	
<i>Female Labor Participation rate_6</i>		+ 0.00392 (0.02017)	
<i>Male Labor Participation rate_5</i>		+ 0.11538 (0.02922)	
<i>Male Labor Participation rate_6</i>		- 0.09288 (0.02843)	
<i>Female Employment rate_5</i>			- 0.04761 (0.01257)
<i>Male Employment rate_5</i>			+ 0.02514 (0.00705)
<i>Income</i>	- 0.00075 (0.00122)	- 0.00456 (0.00151)	- 0.00364 (0.00170)
<i>Conservative</i>	- 0.00410 (0.00299)	- 0.00431 (0.00424)	- 0.00824 (0.00468)
<i>Democratic</i>	+ 0.00007 (0.00257)	- 0.00730 (0.00212)	- 0.00857 (0.00243)

Table 11 Regression with Lagged Unemployment Rates and Political views for Female and Male

Conclusion

In conclusion, it has been found that the unemployment rate does have a negative relationship with the birth rate. However, the labor participation rate has stronger correlation with the number of babies born according to the results seen in the tables. As the unemployment rate increases, however, the birth rate does decrease while as more people are engaged actively in the labor force, people tend to have a child or more. Secondly, Gender has opposite effect of unemployment and education. As the percentages of females obtaining university education or above, they postpone their chances of having babies since women have more immediate impact from giving births than men in terms of physically being off from work and therefore their opportunity cost of delivering a baby is bigger than men. However, it is the opposite for males; men with high education are more willing to make families. Nevertheless, the longer the men's unemployment status becomes, the lower the birth rate gets and there is no time effect on female unemployment rate. Income level has negative correlation indicating as the income levels are increased, people spend more time working and therefore focus their time on their works rather than extending families. However, income effect is explained away by education since people who have fulfilled more education than others are more likely to have higher income. It was also discovered that Conservatives have more children than Democrats and Independents and considering the historical and cultural differences between the regions, the political affiliations are proxies of regions with higher or lower birth rates. However, comparing the actual and predicted birth rate between the regions where the majority of population supports one party or another at extreme, the political views is weaker indication of the regions with higher number of children born and instead whether region is relatively more urban or not is more stronger factor influencing people's decision of having more children.

In order to resolve the low birth rate, the government has implemented many policies to encourage people to have more children such as giving discount on electricity bills for families with more than three children and distributing bigger amount of subsidies as families have more children. However, it is important to have more practical policies and establishing effective flexible working hours for women is crucial. Del Boca (2001) examined married women divided into two groups: those with full time job and those with part-time job and found that as there are more part-time jobs available for women with availability of child-care, the chances of women both working and having more babies are increased since women have more time, income, and physical ability to take care of their children. Also, as mentioned before, working women going on maternity leave in Korea may result in unfair consequences which discourage females to give up their jobs and to make families. Therefore, if the government creates more part-time jobs for women that they don't have to worry about being replaced or relocated and allows them to spend more time with their children even though working and earning certain amount of income, then its effort may be paid off.

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Appendix

² Political views: Independents are omitted in the regressions due to exact collinearity

$$\text{Independents} = 100 - (\text{Democrats} + \text{Conservative})$$

³ After the financial crisis in 2008, the economy has been showing signs of recovery and people have resumed their postponed plans for marriage and having a child or more.

	2005	2006	2007	2008	2009	2010	2011
Birth rate	1.076	1.123	1.250	1.192	1.149	1.226	1.244
Marriage rate	11.46	12.08	12.56	12.04	11.52	12.32	12.62

Table 1 Overall Birth rate and Marriage rate from 2005 to 2011

⁴ Regression with Labor Participation with high/low education level and Political affiliations
Because the percentages of females and males with high education and political perspectives are only available every 5th year but do not overlap, regressing the two variables in one model couldn't be done. However, in the dataset, labor participation rates with low and high education levels have all statistics available from 1990 to 2011 and Table 2 shows the results from running these rates with the political affiliations against the birth rate. It has been indicated that as more people with high education (university or above) get actively involved in the labor force, the birth rate is increased. Also, consistent with the results seen before, income levels have negative correlation showing as people earn more, since they are too occupied with their works, they delay their opportunities to have children. Moreover, Conservatives having more babies than Democrats and Independents is still valid.

Variable	
Labor Participation rate with low education	+ 0.03652 (0.01976)
Labor Participation rate with high education	- 0.01328 (0.01270)
Income	- 0.00865 (0.00204)
Conservative	+ 0.01349 (0.00457)
Democratic	- 0.01170 (0.00406)

Table 2 Regression with Labor Participation rate by education levels with Political views