

**A COUPLE'S AFFORDABILITY OF CHILD-BEARING:
THE ECONOMIC REASON FOR LOW FERTILITY IN KOREA**

by

Jeongsoo KIM

A THESIS

Submitted to

KDI School of Public Policy and Management

In partial fulfillment of the requirements

For the degree of

MASTER OF DEVELOPMENT POLICY

2014

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DEVELOPMENT POLICY Committee in

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ABSTRACT

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Despite strong economic growth over the past several decades, Korea has a noticeably lower fertility rate than other developed countries. This study examines the economic effect on a couple when having a baby through the analysis of the lifetime income and cost created by raising a child. The present value of a couple's expected lifetime income is 1,352,205,555 KRW at the ages of 30, while the life time cost a couple is 1,061,967,873 KRW. Therefore a couple may expect to take 290,237,682 KRW of economic affordability for child-bearing. Given income and cost of a household, a couple's optimizing fertility decision will be 1.25 of children, which is almost same to the current fertility rate of Korea 1.19 in 2013. The resulting economic constraint helps to explain why many Korean couples find it hard to justify having children, contributing to the low fertility rate throughout the country.

Key words: Low fertility, Lifetime income, Child-bearing cost, Affordability.

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Dedicated to Kiyeon PARK and Eugene KIM

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I . Introduction

Korea is one of the most productive emerging markets in terms of economic development. Korean success is explained by several economy theories: Big push model (Rosenstein 1943), Trickle-down effect (Aghion & Bolton 1997) and Demographic dividend (Bloom 2001). Despite such progress in the past several decades, it is ironic Korea is one of the most unproductive countries in the world in terms of fertility. “The lowest low fertility¹” is threatening the unprecedented growth of Korea. Young couples delay their marriage and child bearing, so the level of total fertility rate² was 1.19 in 2013, which was close to the lowest both historically and globally³. Also demographic structure will be unsuitable for maintaining 50 million of current population size only after 20 years.⁴

Why do young Korean couples hesitate to get married and reluctant to have babies in 2000s? Perhaps most important is the fact that household income is not enough to cover the expensive living cost and educational expense associated with having

¹ Kohler 2002. the level of fertility is under 1.3 by Total Fertility Rate

² TFR: The average quantity of children a female bears in her lifetime, presuming current age-specific birth rates maintains constant around her child-bearing period

³ See Appendix 1.

⁴ UN 2013 “World Population Prospects: the 2012 Revision.” Total Population (both sexes combined) by area. Department of Economic and Social Affairs

children.⁵ Also the young recognize the necessity for human capital investment to have primary job⁶, which put pressure on the young job seekers to delay their marriages. Second young parents prefer one-child family because quality of their child is more important. This is also related to rising opportunity cost for child-raising.⁷

This research starts from Becker (1960) and Galor (2000)'s arguments, the adverse relationship between income and fertility⁸. With rising GNI per capita in Korea as USD \$27,000, young couples highly tend to avoid the burden of child-bearing. Here this study raises questions: (1) how much money can a couple expects to earn over their lifetimes? (2) How burdensome is having a baby when considering living cost and educational cost? (3) How many children can a couple afford, considering their retirement life?

According to life cycle hypothesis⁹ people make the current economic decision based on future surplus or deficit, so do young parents. Couples who don't have

⁵ See Appendix 2,3,4.

⁶ Page 4. Sleebos, Joelle E. (2003). "Low fertility Rates in OECD Countries: Facts and Policy Responses."

⁷ Page 4. Becker (1960). "An economic analysis of fertility. Demographic and Economic Change in Developed Countries."

⁸ Page 4. Galor (2002). "Natural selection and the origin of economic growth."

⁹ Page 6. Modigliani and Albert (1963). "The life cycle hypothesis of saving: Aggregate implications and tests."

sufficient stable income feel anxiety to bear child. This study conducts financial analysis to examine the present value of all cash inflows and outflows seen by Korean couples with children during their lifetimes. Through this analysis one may then help to see why Korean couples often decide not to have children.

This paper also contains quantitative survey analysis. In this section young Koreans show somewhat different opinions from the reality. People regard child-raising much more expensive than real burden. Their low fertility is inevitable choice under the insufficient lifetime income and day care service. People perceive the necessity for fertility increase, requiring more fertility friendly policies. Current taxation benefit and small amount of day care subsidy never succeed to raise fertility rate. More importantly people needs sustainable income stability to cover the expensive child-raising cost.

II. Theoretical Background and Literature Review

2.1 Income and low fertility

Low fertility trend has two important backgrounds: the decrease of possible fertility period and the development of contraception methods. The former is related to delayed marriage and elongated human capital investment, while the latter is outcome of medical development. Recently many researches find the reasons for this low fertility

trend in socioeconomic perspectives: late marriage, individual societal achievement, necessity for higher education, development of social welfare, and transformed family relationship. (Sleeboos 2003)

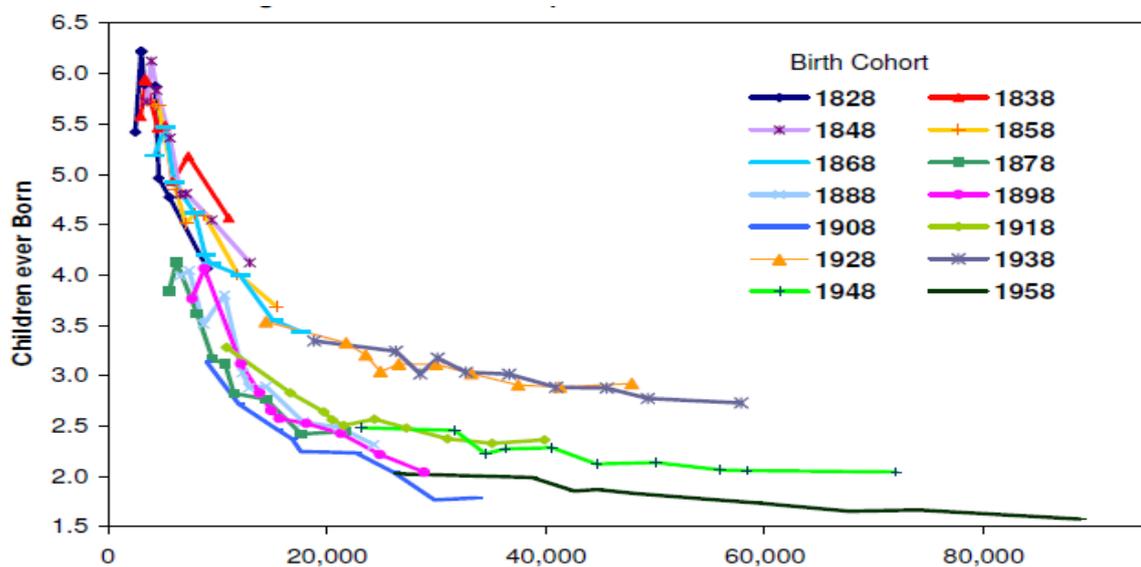
Low fertility becomes a structural demographic trend because contraception has become conveniently available. With the help of easy contraception techniques, fertility becomes economic choice for individual, and economists started to analyze low fertility by using individual utility function. Becker (1960) addressed that rate of return on human capital rises as stock of human capital increases. Also Becker (1960) argued in his another book that rise in income resulted decline in fertility and which related with rise in the opportunity cost of raising children.

According to Becker (1990) the higher women's payroll gets, the more expensive opportunity cost of child-rearing gets. Galor and Weil (2000), Galor and Moav (2002) also reinforced Becker's hypothesis that rise of demand for human capital induces parents to take more value on quality than quantity of children. Galor and Weil (2002) also addressed "the more women are paid as their social participation increases, the more expensive their child-rearing is. The number of children a household reproduces and the amount of human capital invested in each child are conflicted in the end." Jones (2008) argued "By the historical evidences fertility and income obviously has negative

relationship in most countries. The fertility rate tends to decrease as industry acceleration proceeds and country goes into higher development stages.”

On the other hand Clark (2005) argued that Industrial revolution was very important turning point in starting low fertility trend, and the negative relationship between income and fertility started to appear from the industrialized society. With the economic development most countries have experienced growing income and declining fertility at the same time. (Jones and Tertilt, 2008)

Figure 1. The negative relation of US fertility and Occupational Income in 2000 dollars terms.



Source: Jones and Tertilt (2008), US census data

Unlike decrease of mortality or increase of life span, fertility per se has fluctuated by socioeconomic reasons under the current decreasing trend. Even though

low fertility is global trend, there are exceptional countries to overcome previous low fertility trap with increase in TFR. For example Nordic European countries suffered extremely low fertility problem in 1980s, but their fertility rate began rising because of social benefits for childbearing. (Pettersson and Lidbom 2009) And there is another argument for reasons on current fertility rise in Nordic countries. Lesthaeghe and Van de Kaa (1986) proposed the concept of “second demographic transition”, which explains fertility rise from change in family norms and attitude; increase in cohabitation and extra-marital births.

Another technical explanation may help to explain a coming rise in the fertility rate. A low fertility rate may come from postponing child bearing at the moment, and fertility rate rises after finishing “tempo effect.” (Bongaarts and Feeney1998) Tempo means the timing of births within a cohort. It is only numeric change of cohort birth rate that can be recovered in a future period TFR. According to Bongaarts and Feeney (1998) rebound of fertility is just previous postponing childbearing, so adjusted TFR is complementary measure for explanation of fertility rate change.

2.2 Life cycle income and cost estimation

Modigliani and Albert (1963) argue that individual considers not only present wealth but also lifetime income when they make decision, which is Lifecycle Hypothesis

(LCH). Besides LCH proposes that people less consume and more save in present time for preparation for retirement when income is less than the living cost.

US congress passed the Private Securities Litigation Reform Act of 1995, and which contains “forward-looking statement” for safe harbor compliance. Department of Labor (DOL) in US prepares for lifetime income calculator by Reform act of 1995. For estimation of lifetime income this calculator assumed annually 3% income increase, 7% of investment return and 3% of inflation increase.

Korea Institute for Health and Social Affairs (KIHASA 2013), a think tank under the Prime Minister’s Office, announced the whole child-raising cost until 22 years old is about 308,964,000 KRW or monthly expenditure of 1,189,000 KRW per child. This amount is summation of whole expenditure vertically as of 2012. This does not consider retaking fee of SAT, language study in abroad or preparation for marriage, and time value of money is not applied.

III. Affordability of a Couple's Child-Bearing

3.1 Methodology

3.1.1 Overview

According to life cycle hypothesis¹⁰ individual considers its life cycle income when they decide whether they bear a child or not. Becker (1960) argues that child is also durable goods over the individual budget line¹¹. This study proposes that a couple takes into account affordability of its child-bearing when they settle family plan. More importantly a couple should consider how much money could be allocated to child-raising.

A couple's affordability of child-raising could be estimated by the present value of couple's expected income minus the present value of couple's expected living cost. The expected lifetime income consists of expected male income, female income and pensions. While the expected couple's lifetime cost contains a couple's living cost until they die.

¹⁰ Page 6. Modigliani and Albert (1963) "The life cycle hypothesis of saving: Aggregate implications and tests."

¹¹ Page 4 Becker (1960) "An economic analysis of fertility. Demographic and Economic Change in Developed Countries."

3.1.2 Discount Rate Assumption

In order to estimate the economic loss of child-bearing, a couple needs to know net cash-flow as a present value. The time value of money is very important variable to estimate lifetime income and cost. Here this study would take 20 year-maturity Korean Treasury Bond as risk-free interest rate. Because 30 years maturity KTB is issued Sep 2012, the track record is too short to use as a long term risk free rate. To induce real interest rate, the risk free rate is subtracted by Inflation rate. This study uses annual change of Consumer Price Index of Bank of Korea for long term inflation rate.

$$\text{Discount Rate} = \text{Rate of 20yrs maturity Treasury Bond} - \text{Inflation rate} \quad (1)$$

Where, 20 years maturity Treasury bond started to be issued since Jan 2006, it has shown 4.75% of average rate for 8 years. And Average consumer price during the same period was 2.84% annually. Therefore, this study adapts 1.91% of real interest as a discount rate for time value.

Table 1. Annual Change of Consumer Price Index (%)

	2006	2007	2008	2009	2010	2011	2012	2013	Aver.
CPI	2.20	2.50	4.70	2.80	3.00	4.00	2.20	1.30	2.84

Source: KOSIS (Korean Statistical Information Service)

Figure 2. Korean Treasury Bond for 20 years maturity (%)



Source: Bond web

3.2 Expected lifetime income for a household

3.2.1 Methodology

This study assumes the total income of household consists of male income and female income, and uses the statistic data by MOEL (Ministry of Employment and Labor): age distribution and wage profile as of 2013. Each gender shows different age and wage profile in its labor market. There must be limitation of this study because not all couples are both labor workers and there is age gap within a couple. To avoid the noise, this study calculates each gender's expected lifetime income first, and they are summed by the present value at the age of 30 years old.

$$Y_{at}^h = Y_{at}^m + Y_{at}^f \quad (2)$$

Where, Y_{at} is present value of expected income of a household at the certain ages. Here, t stands for time value considered in both male and female

$$Y_{at}^m = W_{at}^m \times P_a^m \quad (3)$$

$$Y_{at}^f = W_{at}^f \times P_a^f \quad (4)$$

Where, W_{at}^m is average wage of male workers and P_a^m represents probability to work which adapt to use employment rate at the ages.

In average Korean couples get to marry at the age of 32.2 years old for male and 29.6 years old for female as of 2013.¹² This study assumes that a couple decides their family plan at the age of 30 years old. Even though average marriage age of male is a bit higher, 30 years old is still reasonable because male need to prepare the marriage at the age of 30 years old.

3.2.2 Expected lifetime income for a household

Estimation of the expected life time income is calculated from current age profile as of 2013. Perhaps women's age and wage profile could be different in near

¹² KOSIS(Korea Statistical Information Service) <http://kosis.kr/statisticsList/statisticsList>

future because of improvement of women's participation. This study can't consider increasing participation rate of women in the future, which is limitation of this study.

Figure 3. Male wage and employment rate as of 2013



Source. Ministry of Employment and Labor (MOEL)

The employment rate of male workers sustains over 70% until ages of 60, while the wage peak is around 45 years old. In the meantime the probability to work is also decreasing. According to life cycle hypothesis¹³, individual makes economic decision considering the time when its income decreases.

¹³ Page 6 Modigliani and Albert (1963) "The life cycle hypothesis of saving: Aggregate implications and tests."

Table 2. Present Value of Male's Expected Income

(Unit, KRW)

Ages	Monthly wage	5yr PV of CF	Employment rate	Present value of Labor income
30 ~ 34	2,566,609	146,760,524	88.4%	840,992,873
35 ~ 39	3,061,203	159,242,014	92.1%	
40 ~ 44	3,422,396	161,961,497	92.1%	
45 ~ 49	3,587,452	154,448,472	91.9%	
50 ~ 54	3,533,892	138,409,781	89.5%	
55 ~ 59	3,208,319	114,316,006	83.4%	
60~65	2,368,233	76,766,178	70.7%	
Ages	National pension Monthly Receipt	Present value	Survival rate	Present Value of National Pension
65 - 69	789,024	23,267,607	97.6%	83,779,154
70 - 74	789,024	21,167,409	95.9%	
75 - 79	789,024	19,256,781	92.8%	
80 - 84	789,024	17,518,612	75.5%	
85 - 89	789,024	15,937,334	47.3%	
Over 90	789,024	14,498,787	14.7%	
Present Value of Male's Expected Income				924,772,027

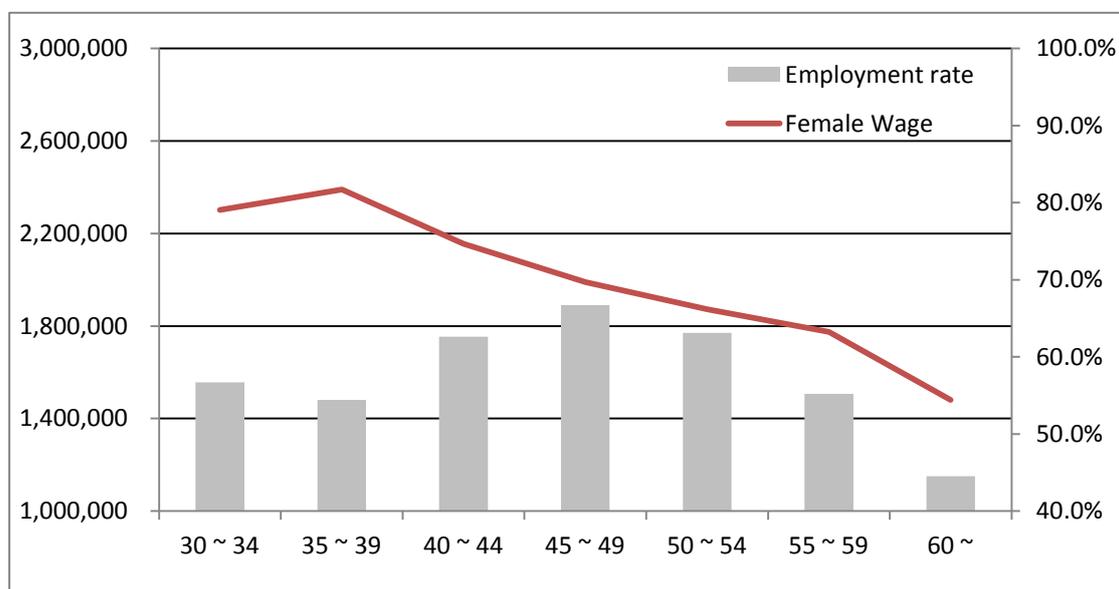
Note: the discount rate for time value is 1.91%, and pension calculated from recipient who 20 years of working by the probability

Source: Estimated from MOEL, KOSIS and NPS data (2013)

The present value of male worker's expected income in lifetime is estimated to 924,772,027 KRW which consists of wage income and pension income. The probability of wage and pension adapt employment rate and survival rate of the ages¹⁴. The reason to use survival rate for probability of cash inflow is that pension is paid until the death.

¹⁴ KOSIS(Korea Statistical Information Service) <http://kosis.kr/statisticsList/statisticsList>

Figure 4. Female wage and employment rate as of 2013



Source. Ministry of Employment and Labor (MOEL)

The employment rate of female workers shows relatively low comparing to male's. The highest employment rate is 66.7% at the ages of late 40s. More importantly wage peak is much earlier than male. According to Becker (1960) the higher women's participation has both income effect and substitution effect on fertility¹⁵. Especially for fertility period ages from 30 to 40 women have the highest payrolls in wage profile. This means the highest opportunity cost female workers pay during the period. That could be another explanation for low fertility in Korea.

¹⁵ Becker (1960) "An economic analysis of fertility. Demographic and Economic Change in Developed Countries."

Table 3. Present Value of Female's Expected Income

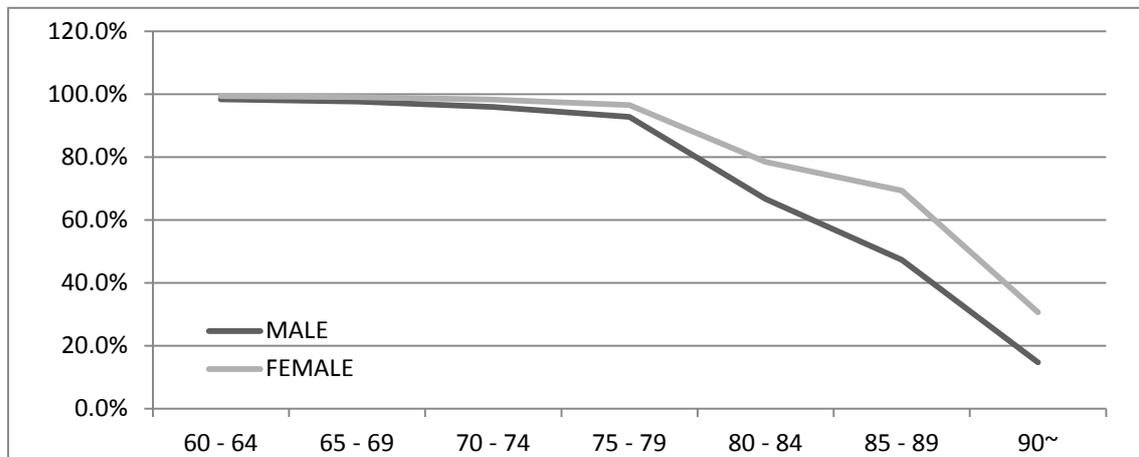
(Unit, KRW)

Ages	Monthly wage	5yr PV of CF	Employment rate	Present value of Labor income
30 ~ 34	2,302,297	131,646,976	56.7%	365,832,323
35 ~ 39	2,389,927	124,322,624	54.4%	
40 ~ 44	2,155,836	102,022,801	62.6%	
45 ~ 49	1,990,456	85,693,937	66.7%	
50 ~ 54	1,871,855	73,313,797	63.1%	
55 ~ 59	1,775,078	63,248,021	55.2%	
60~65	1,480,724	47,997,609	44.5%	
Ages	National pension Monthly Receipt	Present value	Survival rate	Present Value of National Pension
65 - 69	520,388	15,345,769	99.1%	61,601,205
70 - 74	520,388	13,960,618	98.3%	
75 - 79	520,388	12,700,495	96.5%	
80 - 84	520,388	11,554,113	88.3%	
85 - 89	520,388	10,511,208	69.3%	
Over 90	520,388	9,562,437	30.6%	
Present Value of Female's Expected Income				427,433,528

Source: Estimated from MOEL, KOSIS and NPS data (2013)

The present value of female worker's expected income in her lifetime would be 427,433,528 KRW which consists of wage income and pension income. The probability of wage and pension is matched with employment rate and survival rate of the ages too. The reason to use survival rate for probability of cash inflow is that pension is paid only until her death.

Figure 5. Survival rate of male and female after ages 65



Source: KOSIS

The survival rate of female is always higher than male's that is also negative effect on the affordability of child-bearing. First, because the living cost exceeds the pension income of female during retirement and second, female's pension is smaller than male's. Consequently this rule also applies to male, and the resource allocation to child-raising becomes smaller as long as life span increases.

Table 4. Present Value of Couple's Expected Income

Unit, KRW		
Present Value of Male's Expected Income	Present Value of Female's Expected Income	Present Value of Couple's Expected Income
924,772,027	427,433,528	1,352,205,555

Source: Estimated from MOEL, KOSIS and NPS data (2013)

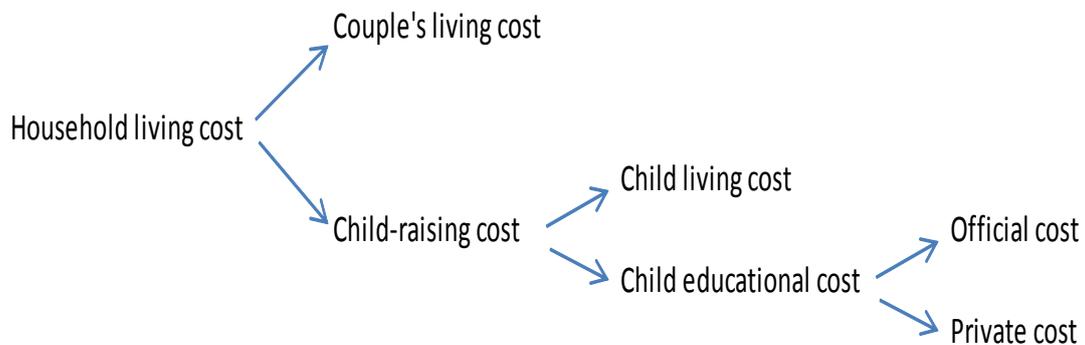
Finally the present value of a couple's expected lifetime income is derived to 1,352,205,555 KRW by the sum of male's and female's life time income.

3.3 Expected lifetime cost for a household

3.3.1 Methodology

For calculating living cost of a couple, this study applies the household living cost of laborers, which is 3,547,558 KRW for 3.35 families as of 2013. (KOSIS) In advance two concepts are necessary to be explained in order to calculate child-raising cost. First one is adult equivalent scale for children. Additionally, education costs are very significant for child-raising in Korea. This study is going to breakdown each items from empirical living cost, and will induce the unit child-raising cost.

Figure 6. Breakdown of Household living cost



3.3.2 Adult equivalent scale for a child

According to Atkinson et al. (1995) the living cost of household doesn't grow proportionately by additional numbers due to economies of scale. Because of fixed living cost and economy of scale, living cost can be saved by increase of family numbers.

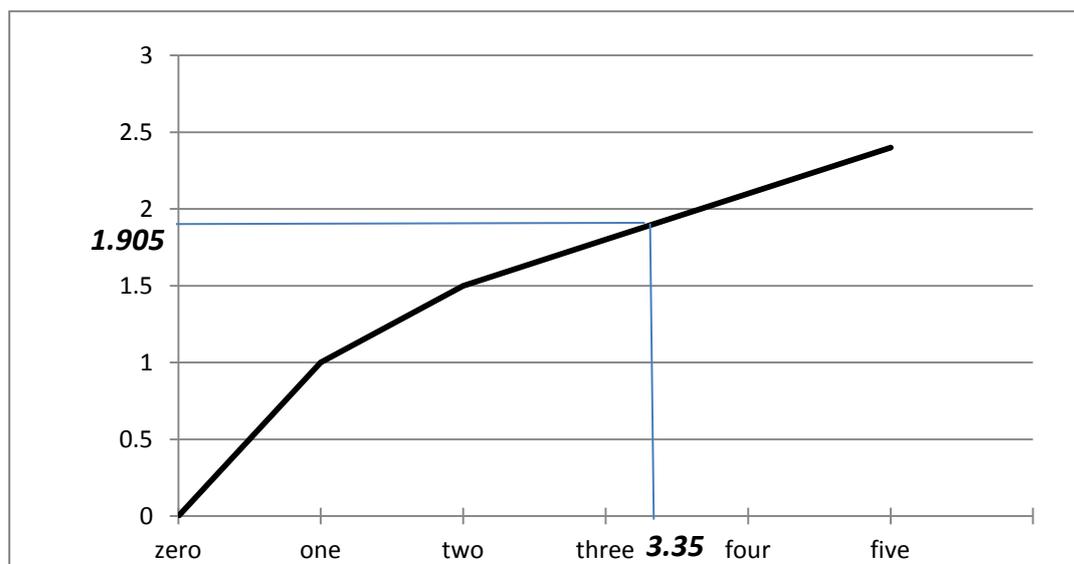
Table 5. Adult equivalent scale (Head Count)

Adult Equivalent consumption	OECD Scale	Modified OECD scale
1 adult	1	1
2 adult	1.7	1.5
2 adult, 1 child	2.2	1.8
2 adult, 2 child	2.7	2.1
2adult, 3child	3.2	2.4

Source: OECD Project on Income Distribution and Poverty

OECD scale includes less economy of scale while modified OECD scale has more economy of scale regarding living cost. Thus, living cost of parents is bigger under the modified OECD scale. Because current couples tend spend on their living more than before, this analysis adapts “modified OECD equivalence scale.”

Figure 7. Adult equivalent scale for Korea



Source. Calculated from KOSIS

For example the announced the average household for employed workers is 3.35, but the living cost is not proportionately grows by the household numbers especially for children. By the adult equivalent scale 3.35 house hold is derived to 1.905 adults for a household in Korea.

3.3.3 Present value of child-raising cost

Child-raising costs include both living cost of the child and education cost. To begin with the empirical total living cost needs to be subtracted by education cost. According to Atkinson, an adult couple's living cost is one and half times of one adult. According to modified OECD equivalence scale, living cost of a child is 0.3 of one adult, and this cost needs to be paid until child's economic independence, the duration is assumed 25 years.

Perhaps an even more important burden for child-raising is education cost in Korea. According to Galor (2002) quality of children is much more preferable than quantity. Especially Korean parents still pay for enormous money to prepare university entrance exam such as SAT and university education tuition. This study assumes that there is no private education cost before elementary school, because private education for high-paying kindergartens is not common and there is government subsidy for kids before elementary school.

The total education cost includes not only official education cost by KOSIS (2013) but also private education cost by Kwon (2012). Analysis for private tutoring fee in Korea by Kwon (2012) is based on “The Survey of Private Education Expenditures” (KNSO, 2008). Lastly, this estimation does not include the additional cost such as retaking SAT or graduate school tuition. In sum the present value of a child’s expected education cost would be 232,247,834 KRW in 2013 terms.

Table 6. Present Value of Child's expected Cost

(Unit, KRW)

Ages	Monthly living cost of a child*			Duration (Years)	Present value of Labor income
0 - 25	508,311			25	121,174,557
Education	Public Education**	Private Education**	Monthly Payment**	Duration (Years)	Present Value of National Pension
Elementary	319,813	202,522	522,335	6	111,073,277
Middle	319,813	265,034	584,847	3	
High	319,813	264,316	584,129	3	
University	1,115,748	336,574	1,452,322	4	
Present Value of Child's expected Cost					232,247,834

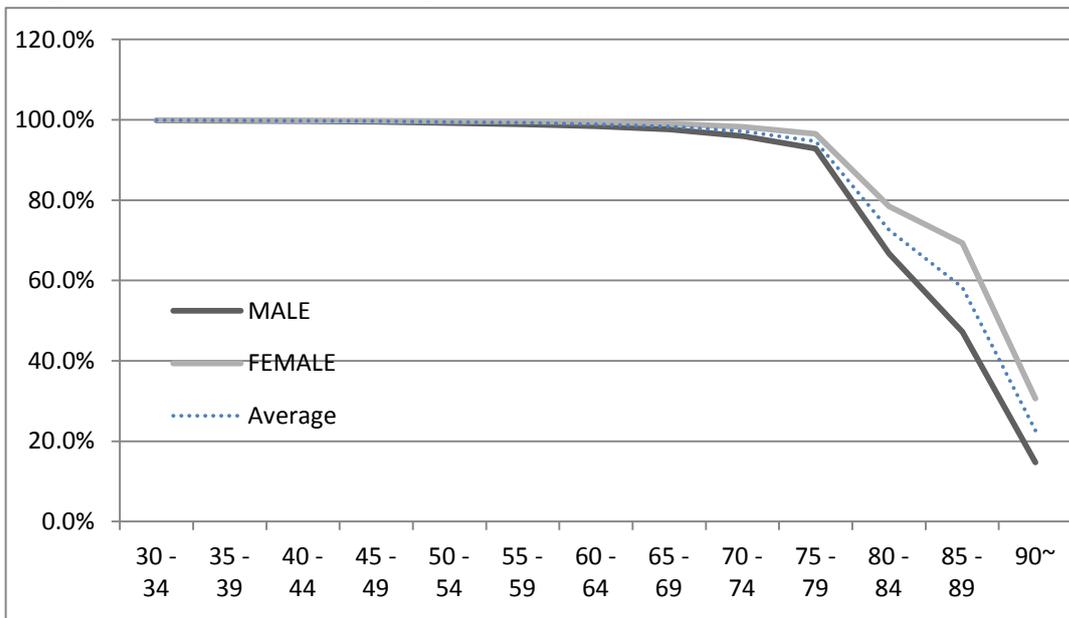
Note: *Official education cost of public and private institution by KOSIS is 319,813 KRW per month, **Moderate case for private tutoring by Kwon (2012) and inflation adjusted

Source: Calculated from KOSIS, Kwon (2012)

3.3.4 Present value of living cost of a couple

A couple needs consider not only child-raising cost but also the living cost of themselves for entire life. The estimation is same procedure with living cost of child-raising. Now the scale is one and half of one adult's living cost following modified OECD equivalent model. This includes the living after retirement. The unit living cost of an adult is 1,694,370 KRW and the living cost of a couple is one and half times of the unit cost of one adult. The average life span in Korea is 81.4 years old and female lives much longer than male. In order to estimate probability of couple's lifetime, this study applies the average survival rate of male and female.

Figure 8. Survival rate of both genders



Source: MOSPA(Ministry of Security and Public Administration), KOSIS

The present value of a couple's expected living cost in their lifetime would be 1,061,967,873 KRW, which is derived by one and half of adult's living cost and average survival rate of both genders. Especially the present value of a couple's living cost increases by the longevity of life, and the increasing living cost is much more threatening couple's affordability of child-raising

Table 7. Present value of a couple's living cost

				Unit, KRW
Ages	Monthly living cost	PV of couple's 5 yr living cost	Average of couple's survival rate	PV of a couple's life time living cost
30 - 34	2,541,554	145,327,880	99.9%	1,061,967,873
35 - 39	2,541,554	132,210,190	99.8%	
40 - 44	2,541,554	120,276,539	99.8%	
45 - 49	2,541,554	109,420,051	99.7%	
50 - 54	2,541,554	99,543,500	99.5%	
55 - 59	2,541,554	90,558,433	99.3%	
60 - 64	2,541,554	82,384,382	98.9%	
65 - 69	2,541,554	74,948,144	98.3%	
70 - 74	2,541,554	68,183,121	97.1%	
75 - 79	2,541,554	62,028,727	94.7%	
80 - 84	2,541,554	56,429,845	81.9%	
85 - 89	2,541,554	51,336,334	58.3%	
Over 90	2,541,554	46,702,577	22.7%	

Source: MOSPA, KOSIS

3.4 Couple's affordability of Child-bearing

According to life cycle hypothesis young couples should take into account not

only current cash flow but also during the retirement¹⁶. Even though they afford to a child raising cost, the anxiety about their living during the retirement still remains. Especially the burden for second child is much more conflicting to their retirement life or the quality education. Not many parents may expect their children's support for their life during the retirement because their children also will face heavy burden of raising grand children. According to the above estimation, the present value of couple's expected lifetime balance is huge deficit especially when they would have two children. Currently a couple who is going to have children economically could bear 1.25 children by the affordability analysis.

Table 8. Affordability of child-raising by present value

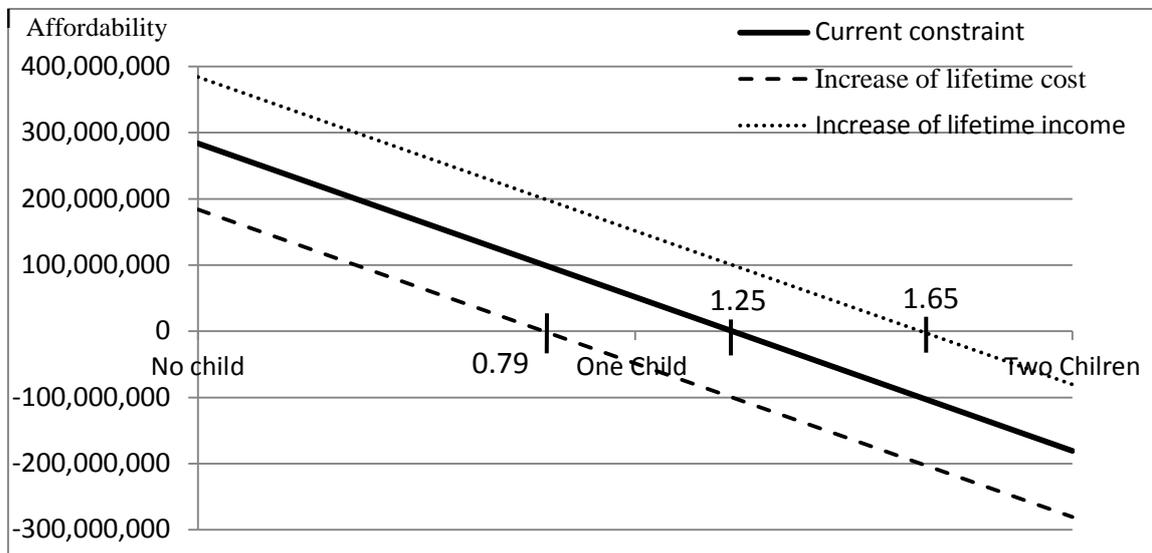
		KRW
Items		Present Value
A Couple's Expected Life Income	(A)	1,352,205,555
A Couple's Expected Living Cost	(B)	1,061,967,873
Affordability of Child-raising	(A-B)	290,237,682
Raising Cost of One Child	(C)	232,247,834
Expected Child-Bearing of a Couple	(A-B)/(C)	1.25 of Children

Source. KOSIS, and estimated

¹⁶ Page 6. Modigliani and Albert (1963) "The life cycle hypothesis of saving: Aggregate implications and tests."

Through financial analysis, this study tries to examine the economic affordability of child-bearing and child-raising burden among young employed workers. This burden threatens the quality of life during retirement and young couples inevitably hesitate to have a baby.

Figure 9. Economic fertility decision by income and cost constraint



Source: Induced from above estimation

If longevity may extend more or other living cost increases, the affordability of child-bearing might decrease to 0.79. However If lifetime income increases by extending working duration or child-raising subsidy¹⁷, the affordability of child-bearing might increase to 1.65. No one could force individuals to bear more children in the

¹⁷ Page 5. Pettersson and Lidbom (2009). “Does child spacing affect children’s outcomes? Evidence from a Swedish reform.”

reason of societal problem. To overcome this burden a couple extends career period especially for women by the help of providing public day care center or institutional subsidy to alleviate educational cost of children.

IV. Survey Analysis

4.1 Survey Samples and Limitation

This study conducted questionnaire surveys over 75 people. Their age distribution is from 24 to 50 years old. 69% of the samples are married, 76% of the samples are male. All samples are living in Seoul or Gyung-gi province.¹⁸ This survey has limitation because the samples are male-biased and regional-biased. Although the causality has limitation to explain the reason of low fertility, this survey analysis could give implication for the policy direction in order to boost fertility.

The sample's wage, age and working experience are all negative to have children. The most significant negative correlation is working experience. This outcome is in line with Becker's negative relationship between income and children¹⁹. The strength of the

¹⁸ See Appendix 5.

¹⁹ Page 5. Jones and Tertilt, 2008 "Fertility Theories: Can They Explain the Negative Fertility-Income Relationship?"

adverseness stays only -0.1 ~ -0.18. This is because children numbers narrows down to one or two nowadays.

Table 9. Correlations among variables

		Children	Wage	Age	Experience
Children	Pearson Correlation	1	-.101	-.160	-.179
	Sig. (2-tailed)		.391	.169	.124
	N	75	75	75	75
Wage	Pearson Correlation	-.101	1	.356**	.160
	Sig. (2-tailed)	.391		.002	.170
	N	75	75	75	75
Age	Pearson Correlation	-.160	.356**	1	.584**
	Sig. (2-tailed)	.169	.002		.000
	N	75	75	75	75
Experience	Pearson Correlation	-.179	.160	.584**	1
	Sig. (2-tailed)	.124	.170	.000	
	N	75	75	75	75

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Survey result Sep. 2014

4.2 Child-raising Burden for Young Couples

According to above estimated the present value of child-raising cost is 232,247,834 KRW per child, but in real world young couples imagine more than this amount of burden for the child-raising. The proportion that someone who regards child-raising cost over 300,000,000 KRW or more is about 51%, which is the amount,

overtakes estimation of KIHASA (2013), 308,964,000 KRW. This reflects how people feel burden on child-raising, and this negatively affect on fertility rate.

Table 10. Child-raising cost expectation from survey

Answer		%
50,000,000		0%
100,000,000		8%
150,000,000		9%
200,000,000		21%
250,000,000		12%
300,000,000		30%
350,000,000 or more		21%
Total		100%

Source: Survey result Sep. 2014

4.3 Counterevidence on Economy Theory

Young couples do not want to put off their current economic status or to sacrifice lifetime income, often choosing to give up having more babies.²⁰ This is because they don't have enough lifetime income comparing to their living cost and child-raising cost. But if they could have more cash inflow including subsidy or could prolong the retirement time, they seem to want more babies.

The average wage of Korean male of 30-34years old is 2,566,609 KRW and female is 2,302,297 KRW. If wage level rises, they would like to have more babies among

²⁰ Page 4. Becker. (1994). Becker, Gary S., Murphy, Kevin M. and Tamura, Robert. (1990). "Human Capital, Fertility, and Economic Growth."

survey participants. This means the reason for avoiding child-bearing is a bit different from the Becker's argument of opportunity cost.²¹ There will be other source of income such as day care subsidy or holding estates, which has positive correlation with child-bearing.

Table 11. Monthly wage and Childbearing from survey

If Monthly payment	Mean of willing to Child-bearing
If your monthly wage is 2,000,000 won or less	1.77
If your monthly wage is 3,000,000 won	2.04
If your monthly wage is 4,000,000 won	2.45
If your monthly wage is 5,000,000 won	2.66
If your monthly wage is 6,000,000 won	2.86
If your monthly wage is 7,000,000 won	2.97
If your monthly wage is 10,000,000 won or more	3.07

Source: Survey result Sep. 2014

Table 12. Day-care subsidy and Childbearing

Day-care Subsidy	Mean of willing to Child-bearing
If subsidy is 100,000 won per child	1.93
If subsidy is 200,000 won per child	2.04
If subsidy is 300,000 won per child	2.16
If subsidy is 400,000 won per child	2.43
If subsidy is 500,000 won per child	2.56
If subsidy is 1,000,000 won per child	2.82
If subsidy covers all expenditure	3.17

Source: Survey result Sep. 2014

²¹ Page 4. Becker (1960) An economic analysis of fertility. Demographic and Economic Change in Developed Countries.

Table 13. Retirement extension and Childbearing

Retirement age	Mean of willing to Child-bearing
If your retirement age is 30 years old	1.49
If your retirement age is 35 years old	1.68
If your retirement age is 40 years old	1.88
If your retirement age is 45 years old	2.15
If your retirement age is 50 years old	2.51
If your retirement age is 55 years old	2.76
If your retirement age is 60 years old or more	3.01

Source: Survey result Sep. 2014

Table 14. Estate size and Childbearing

Estate size	Mean of willing to Child-bearing
If your asset (including house) is 100,000,000 won or less	1.95
If your asset (including house) is 300,000,000 won	2.34
If your asset (including house) is 500,000,000 won	2.68
If your asset (including house) is 700,000,000 won	2.81
If your asset (including house) is 1,000,000,000 won	3.01
If your asset (including house) is 2,000,000,000 won	3.16
If your asset (including house) is 5,000,000,000 won or more	3.24

Source: Survey result Sep. 2014

4.4 Implication for policy

Through the questionnaire survey, this paper intended to prove whether income and fertility is really negatively correlated. Becker's argument could be applied in early stage of development, but Korea already passed through the early stage and faces to extremely low fertility in the world. Many young couples want to have more babies as long as they are guaranteed to have more income and to lessen child-raising cost.

Table 15. Priority for fertility inducement policies

Answers from 75 young couples	Average Value	Standard Deviation
Tax benefit	55.69	23.57
Industry stability	65.99	23.06
Guarantee late retirement	68.43	24.81
Higher wage	74.51	22.87
Subsidy	57.00	27.53
Public day-care center	75.96	22.96
Recognition future threat of low fertility	48.73	27.52

Source: Survey result Sep. 2014

In order to boost fertility, the Korean government focused on giving tax benefit and subsidy as minimum coverage of child-raising cost. However more important inducement for young couples is to serve public day-care service, to raise wage and to guarantee longer retirement. Many young Koreans also recognize that low fertility can save their current pocket, the bigger social burden will return for future generation: higher dependency ratio, depletion of National Pension. Obviously more income and job stability would be the short cut for boosting fertility rate here in Korea.

V. Conclusion

Unfortunately the lowest low TFR in Korea seems very rational economic decision by couple's constraint lifetime budget. Young couples feel anxiety regarding their lifetime income and often decide to delay marriage and to avoid child-bearing in the end. As a result of this societal problem, the fertility rate of Korea dropped to record low of 1.19 in 2013. Income and fertility tend to have an inverse correlation whereby South Korea presents an extreme case of this theory.

The purpose of this study includes illustrating how many children can a couple afford with present couple's lifetime asset or liability may result from having a child in Korea. The present value of a couple's expected lifetime income is 1,352,205,555 KRW at the ages of 30, while the life time cost a couple is 1,061,967,873 KRW. Therefore a couple may expect to take 290,237,682 KRW of economic affordability for child-bearing. Given income and cost of a household, a couple's optimizing fertility decision will be 1.25 of children, which is almost same to the current fertility rate in Korea.

The replacement rate of 2.1 TFR is a too far objective to attain. To reproduce more than two children given economic constraint, a couple needs to reduce living cost with sacrificing their quality of life. Or parents can reduce education cost for their children. However, many economists argue that investing in human capital is highly

correlated to higher economic achievement. (Becker 1960, Galor 2002) According to Galor (2000) parents choose quality of children rather than quantity. Therefore the decreasing TFR in Korea is difficult to restore like Nordic European countries.

The possible decrease of population size and the expectable increase of dependence burden seem to drag down the unprecedented growth of Korea. This study argues that current low fertility will return huge burden on our society and already the anxiety appears: depletion pensions and falling asset price. To prevent these societal disasters Korea needs higher fertility rate, and Korean society can't just criticize young couple's avoidance of child-bearing considering economic burden of child-raising. Rather parents who have children must be compensated by societal support such as providing public day care service or more child-raising subsidy. More importantly to prolong working period and to complement unstable job security would be long-term assignment for sustainable fertility of Korea

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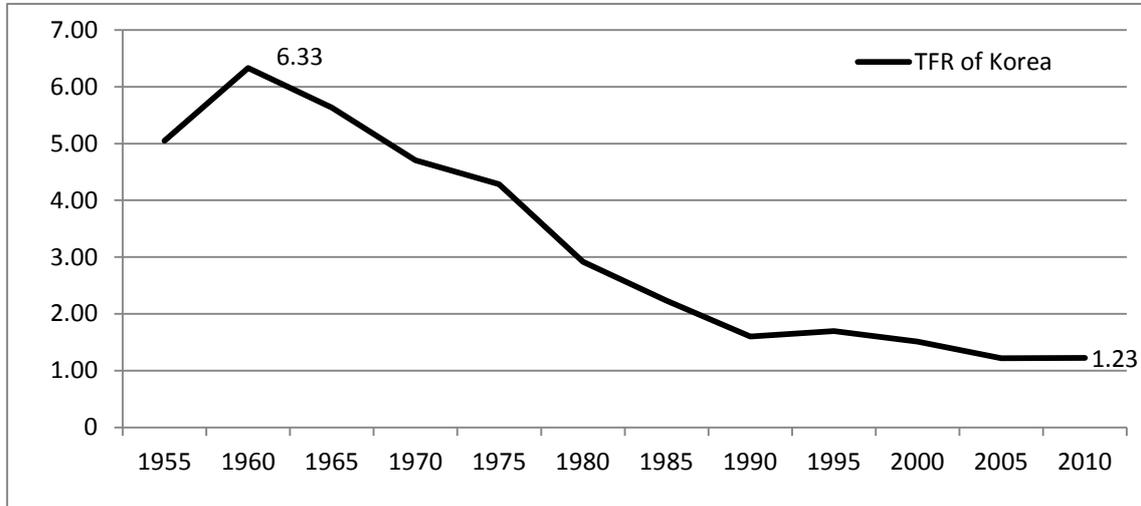
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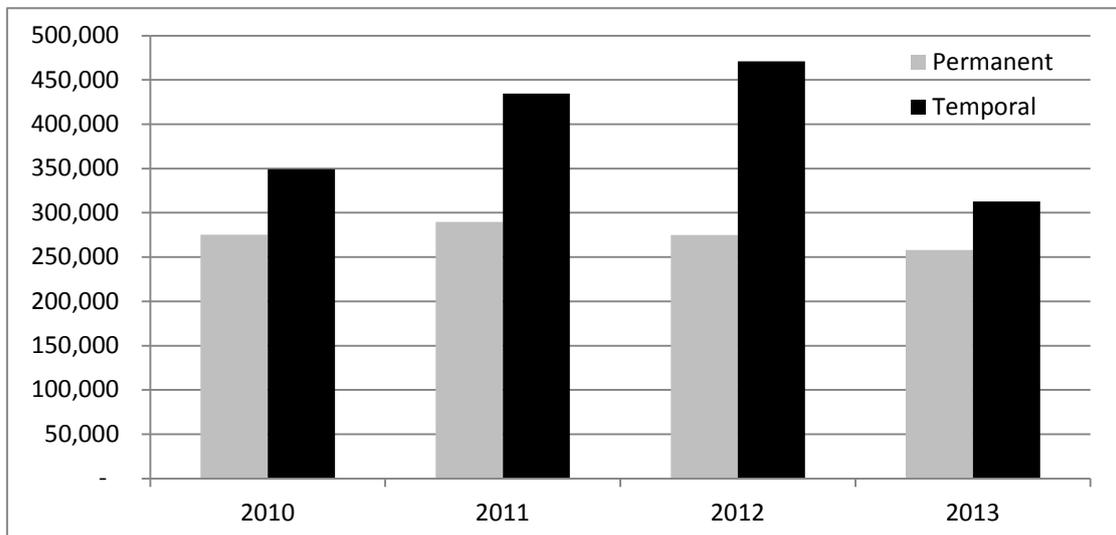
APPENDIX

1. Figure 10. Total Fertility Rate Trend in Korea



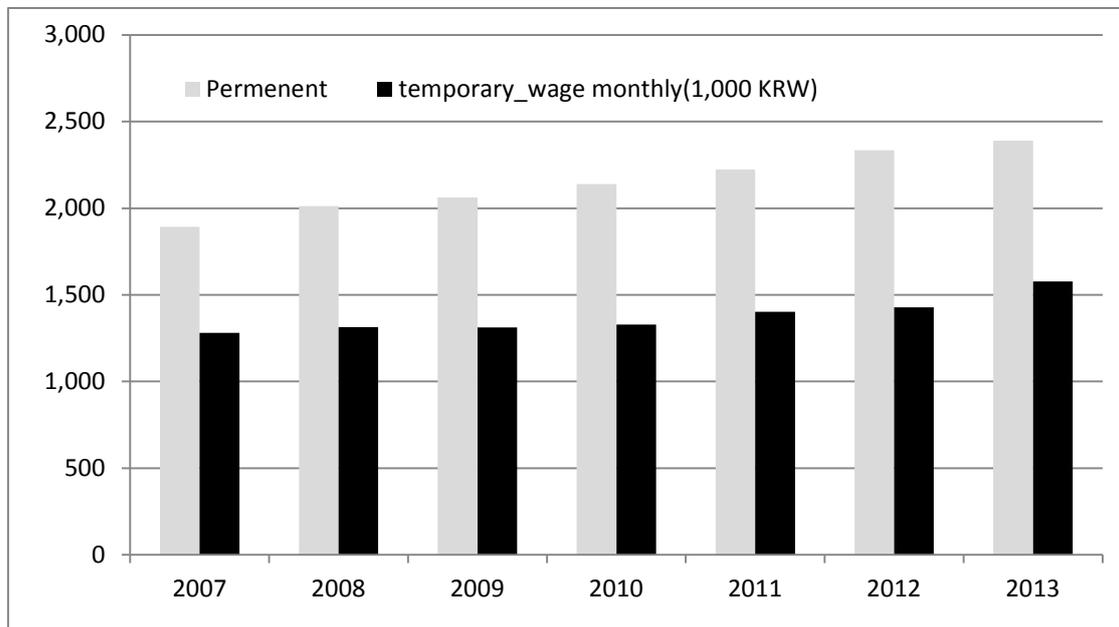
Source. U.N. World Population Prospects: The 2012 Revision

2. Figure 11. Temporary jobs percentage out of initial hiring



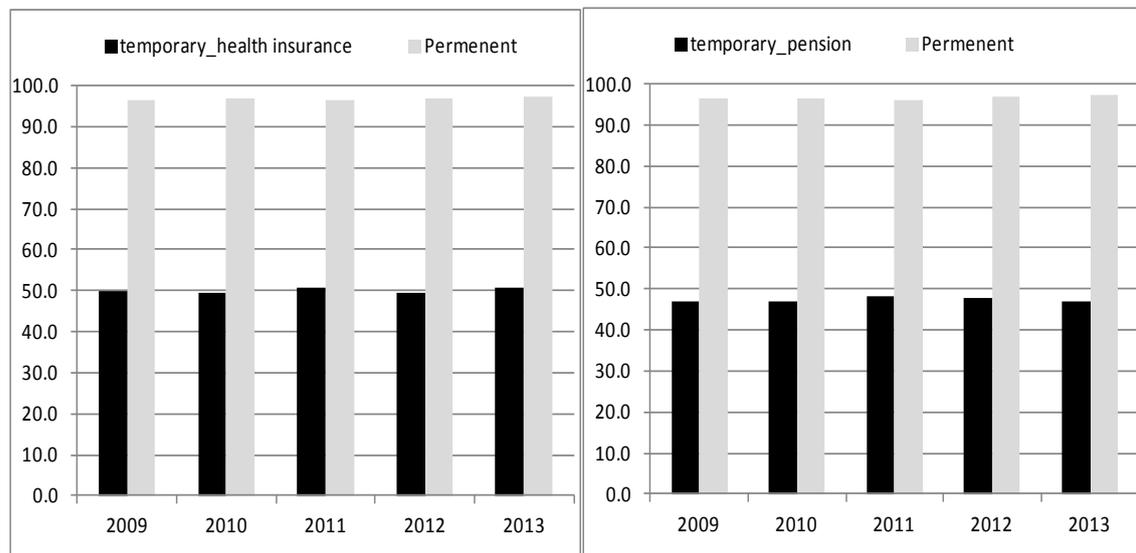
Source. Ministry of employment and labor (MOEL)

3. Figure 12. Temporary jobs' wage



Source. Ministry of employment and labor (MOEL)

4. Figure 13. Social insurance comparison



Source. Ministry of Employment and Labor (MOEL)

5. Questionnaires for Low Fertility Survey

- A. How much money do you expect to spend in raising children total? That includes not only educational cost, but also additional space for housing and living cost until their starting to work.
- B. How many children are you willing to have if your monthly wage is 2,000,000 won or less ~over 10,000,000?
- C. How many children are you willing to have if your asset (including house) is 100,000,000 won or less ~ over 5,000,000,000won?
- D. How many children are you willing to have if your retire age is less than 30 years old or less ~ over 60 years old?
- E. How many children are you willing to have if government monthly pays 100,000 won ~ full coverage per child until 20?
- F. What is necessary for increasing fertility rate? (Scale)

Tax benefit, stable industry, late retirement, higher wage, subsidy, day care center
- G. How much do you have extra income except wage from where you are employed?

That might include financial asset, real estate or your own extra business.
- H. What is necessary to prolong your retirement for five years more, or extend working period 5 years more?