pregnant stood at 34.6%, and those who continued to work stood at 25.0%. However, of the women who continued to work, 5.1% took child-care leave, while 19.9% did not. The employment record of married women had not changed significantly by 2000–04. In fact, maternity retirement had risen to 41.3%, while those who were unemployed prior to becoming pregnant had dropped to 25.2%. While this can be viewed as a result of progress in female employment, the percentage of those continuing to work has hardly increased, standing at 25.3%. The statistical data suggest that the government's measures to tackle the declining fertility rate, which aim at supporting how women balance work with child-bearing and rearing, are not effective in increasing the number of women who continue to work after having children.

[Figure 7 Employment of wives who have given birth to the first child, by year of childbirth.]

The increase in working women, that is, the increase in women's labor force participation and wage levels, has resulted in a rise in the opportunity cost of childrearing (the income earned if a woman continued to work instead of staying at home to bear and rear children = lost earnings). This rise in opportunity costs is likely to have diminished women's motivation to have children, the more so in cases where child-raising support is insufficient and balancing work and childrearing is difficult for the mother.

Concerning the actual employment type and incomes of women who are raising children, Figure 8 shows the number of workers aged between 35 and 49 by gender, annual income bracket and employment type, obtained from the 2007 Employment Status Survey (MIAC 2009). The income distribution for men is comprised of regular staff and employees, and takes a form close to a normal distribution, centering on annual incomes of 4.0 to 4.99 million yen. In contrast, there are two bumps in the income distribution for women: one is the bump of regular staff and employees peaking at an annual income of 3.0 to 3.99 million yen, and the other is the bump of non-regular workers such as part-time workers, peaking at an annual income of 500,000 yen to 990,000 yen. In terms of women's employment type, regular staff and employees account for 41.0% of all working women, while the remaining 59.0% are in non-regular employment. Of the non-regular workers, 46.8% earn incomes of less than 1 million yen, and 73.5% earn less than 1.5 million yen.

[Figure 8 Number of employees by sex, main type of employment and income in 2007 for females aged 35–49.]

As seen from the above, the fact that many women work in non-regular employment positions following marriage results in extremely high opportunity costs. In other words, for single working women, the shift from being single to being married involves high opportunity costs.

## 5. Issues for a Society with a Declining Population

The major demographic changes brought about by declining fertility rates and increasing longevity are a decline in Japan's total population and a society with a rapidly and highly aging population in the long term. In order to support elderly people's lives and people who need social assistance for various reasons, such as illness or unemployment, each society provides social security and other safety nets in one way or another. In Japan, systems such as medical insurance, social insurance, nursing-care insurance, and employment insurance have been created and managed. In addition, in the area of social welfare, various systems such as welfare benefits and child benefits are in place. Nevertheless, the rapid acceleration of a hyper-aging society is a problem that could rock the foundations of the safety net system.

Japan's declining fertility rate since the mid-1970s has led to the emergence of a low fertility society with a TFR of around 1.3, which is extremely low among developed countries. This extremely low fertility rate will result in a massive population decline in the long term, unless the fertility rate recovers. But even if it recovered, it would merely slow the acceleration of the hyper-aging population slightly, as long as it remains below 2.07.

Some take the view that since the declining fertility rate is due to the rise in the percentage of unmarried people and the decline in the fertility rate of married couples due to freedom of choice, we should accept a society with a declining population and readjust various systems to suit such a society. At the same time, it can be said that the rise in the percentage of unmarried people and a decline in the fertility rate of married couples are the result of various existing systems and structures that make it difficult for people to realize their desires.

Fertility rate trends in other countries are varied, but in Northern Europe and many Western European countries such as France, fertility rates are on the rise again following reforms in working patterns, social systems, and the labor market. Looking at these countries' experiences and trends, the issue of declining fertility and the resulting issues of population decline and aging appear to be caused by a mismatch between the system, structure, and practice of Japanese society and natural human reproductive behavior, and dealing with these problems should be one of the main tasks for modern society.

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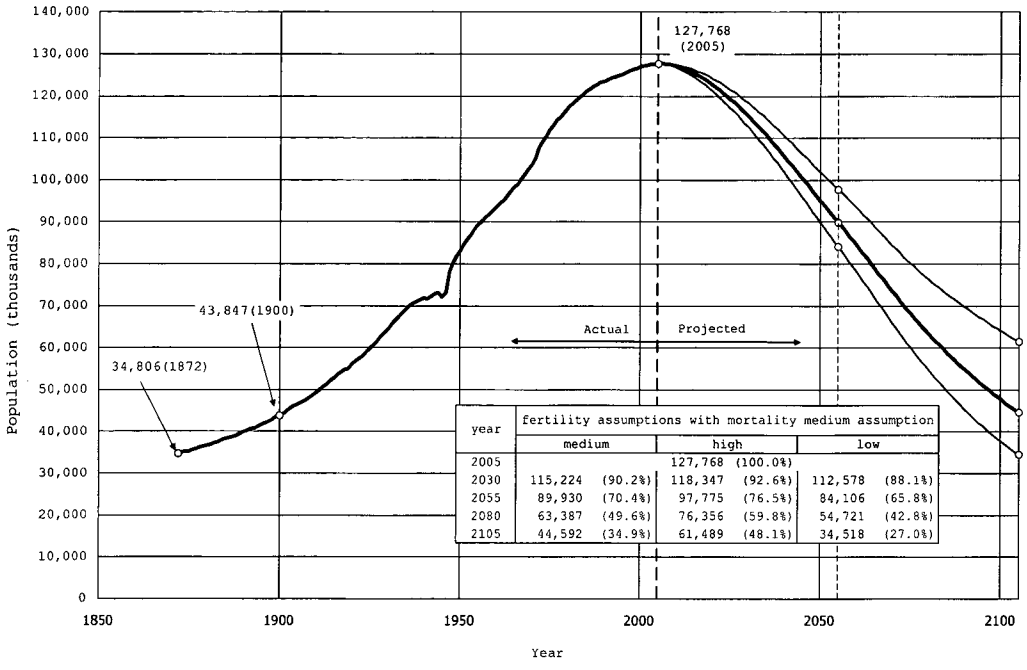
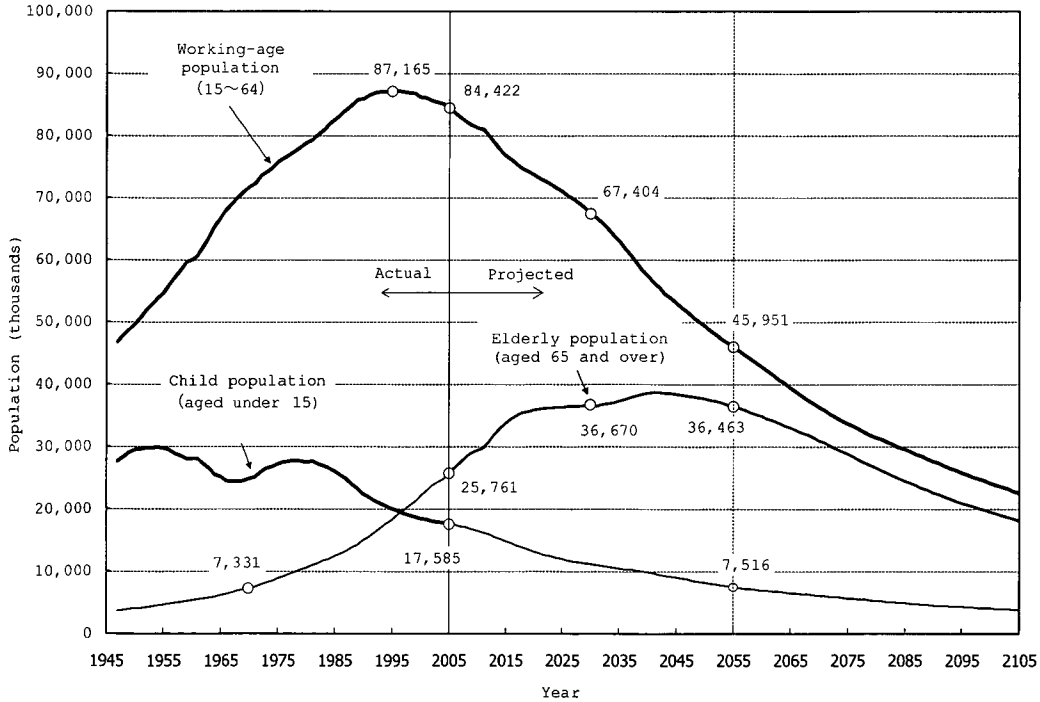
Figure 1 Actual and projected population of Japan, 1872-2105




| year | fertility assumptions with mortality medium assumption | | | | | |
|---|---|---|---|---|---|---|
| | medium | | high | | low | |
| 2005 | | | 127,768 | (100.0%) | | |
| 2030 | 115,224 | (90.2%) | 118,347 | (92.6%) | 112,578 | (88.1%) |
| 2055 | 89,930 | (70.4%) | 97,775 | (76.5%) | 84,106 | (65.8%) |
| 2080 | 63,387 | (49.6%) | 76,356 | (59.8%) | 54,721 | (42.8%) |
| 2105 | 44,592 | (34.9%) | 61,489 | (48.1%) | 34,518 | (27.0%) |

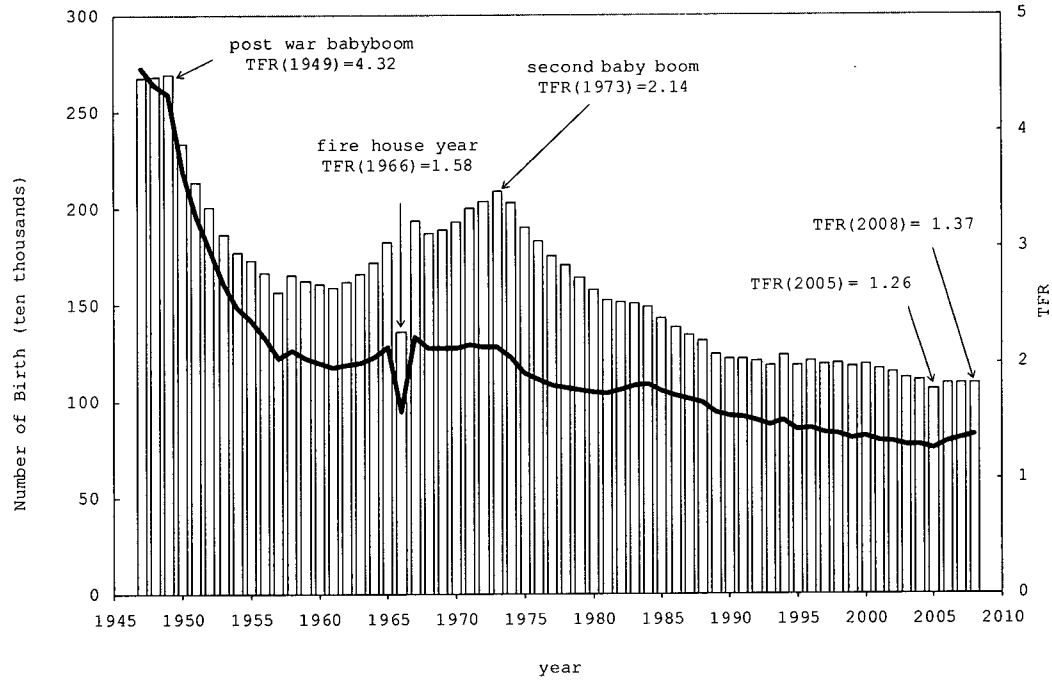
Source: Statistics Bureau, Ministry of IAC, ***Japan Statistical Yearbook 2009***. National Institute of Population and Social Security Research(NIPSSR), ***Population Projections for Japan (projection as of December 2006)***.

Figure 2 Trends in the number of major three age groups,
Medium fertility(with medium mortality) variant



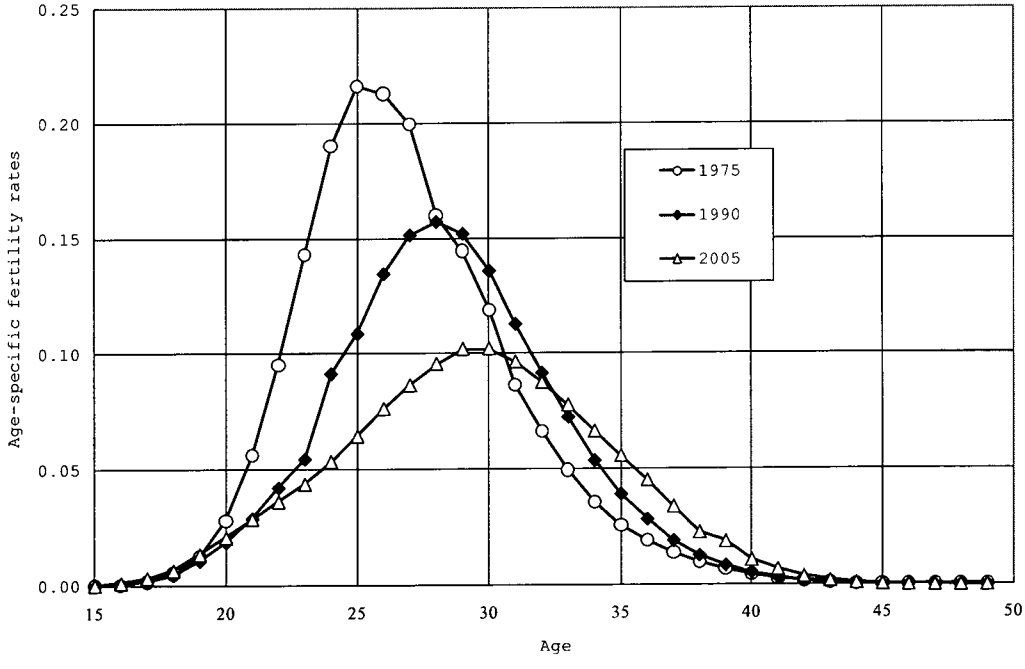

Source: National Institute of Population and Social Security Research(NIPSSR), ***Population Projections for Japan (projection as of December 2006)***.

Figure 3 Trends in number of birth and total fertilty rate



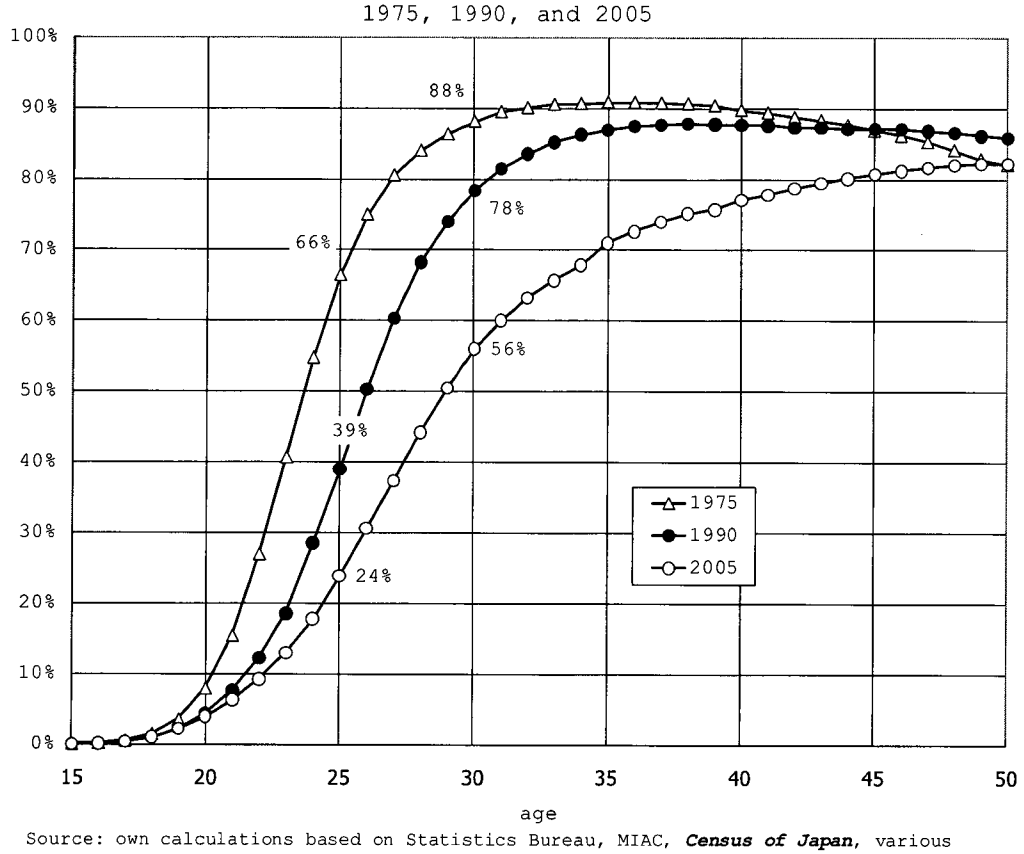

Source: Minstry of Health and Welfare, ***Vital Statistics of Japan***, various yeras.

Figure 4 Age-specific fertility rates, 1975, 1990 and 2005




Source: National Institute of Population and Social Security Research, ***Population Statistics of Japan 2008***, pp.27-28.

Figure 5 Age-specific proportion of married for female, 1975, 1990, and 2005




Source: own calculations based on Statistics Bureau, MIAC, ***Census of Japan***, various years.

Table 1 Distribution of number of births, by survey(Duration of marriage: 15-19 years)

| Survey(Survey year) | None | 1 child | 2 children | 3 children | 4 children or more | Completed fertility |
|---|---|---|---|---|---|---|
| 7th Survey (1977) | 3.0 % | 11.0 | 57.0 | 23.8 | 5.1 | 2.19 |
| 8th Survey (1982) | 3.1 | 9.1 | 55.4 | 27.4 | 5.0 | 2.23 |
| 9th Survey (1987) | 2.7 | 9.6 | 57.8 | 25.9 | 3.9 | 2.19 |
| 10th Survey (1992) | 3.1 | 9.3 | 56.4 | 26.5 | 4.8 | 2.21 |
| 11th Survey (1997) | 3.7 | 9.8 | 53.6 | 27.9 | 5.0 | 2.21 |
| 12th Survey (2002) | 3.4 | 8.9 | 53.2 | 30.2 | 4.2 | 2.23 |
| 13th Survey (2005) | 5.6 | 11.7 | 56.0 | 22.4 | 4.3 | 2.09 |

Souce: Kaneko, R. and Other 2008.

Table 2 Percentage of employed persons by major industry and sex

| Year | Employed persons | Primary industry | | Secondary industry | | Teriary industry | | Unknown | |
|---|---|---|---|---|---|---|---|---|---|
| | | male | female | male | female | male | female | male | female |
| 1975 | 100.0 | 7.0 | 6.8 | 24.5 | 9.5 | 31.2 | 20.6 | 0.1 | 0.2 |
| 1980 | 100.0 | 5.7 | 5.2 | 23.7 | 9.9 | 32.6 | 22.8 | 0.1 | 0.1 |
| 1985 | 100.0 | 5.0 | 4.3 | 22.9 | 10.2 | 33.1 | 24.2 | 0.1 | 0.2 |
| 1990 | 100.0 | 3.9 | 3.2 | 23.0 | 10.3 | 33.2 | 25.8 | 0.3 | 0.2 |
| 1995 | 100.0 | 3.3 | 2.6 | 22.3 | 9.3 | 34.0 | 27.8 | 0.4 | 0.3 |
| 2000 | 100.0 | 2.8 | 2.2 | 21.3 | 8.2 | 34.4 | 29.9 | 0.7 | 0.5 |
| 2005 | 100.0 | 2.8 | 2.0 | 19.2 | 6.9 | 35.0 | 32.2 | 1.1 | 0.8 |

Source: Statistics Bureau, Ministry of IAC, ***Census of Japan***, various years.

Figure 6 Proportion of labor force participation by marital status and age groups for female

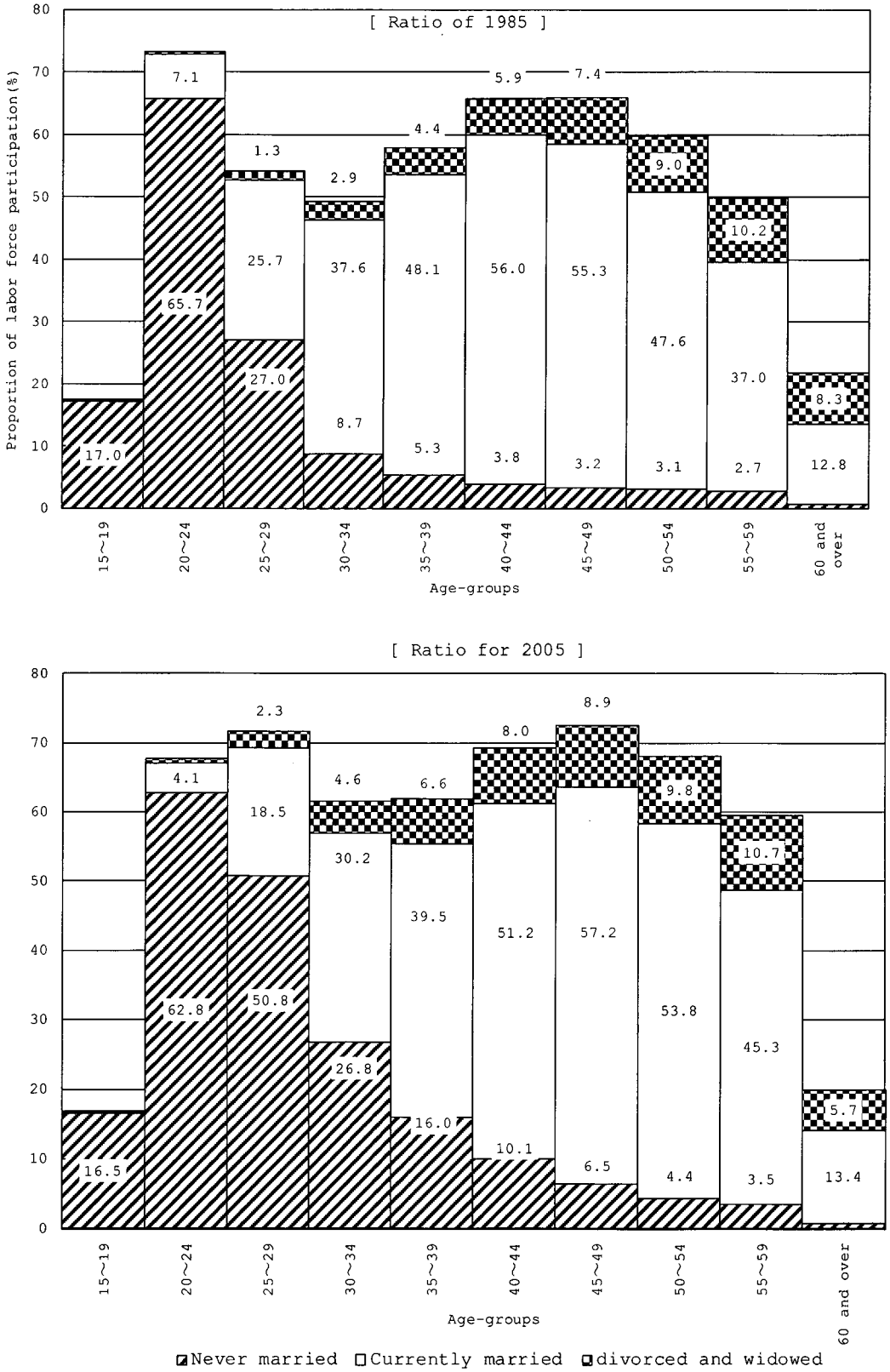
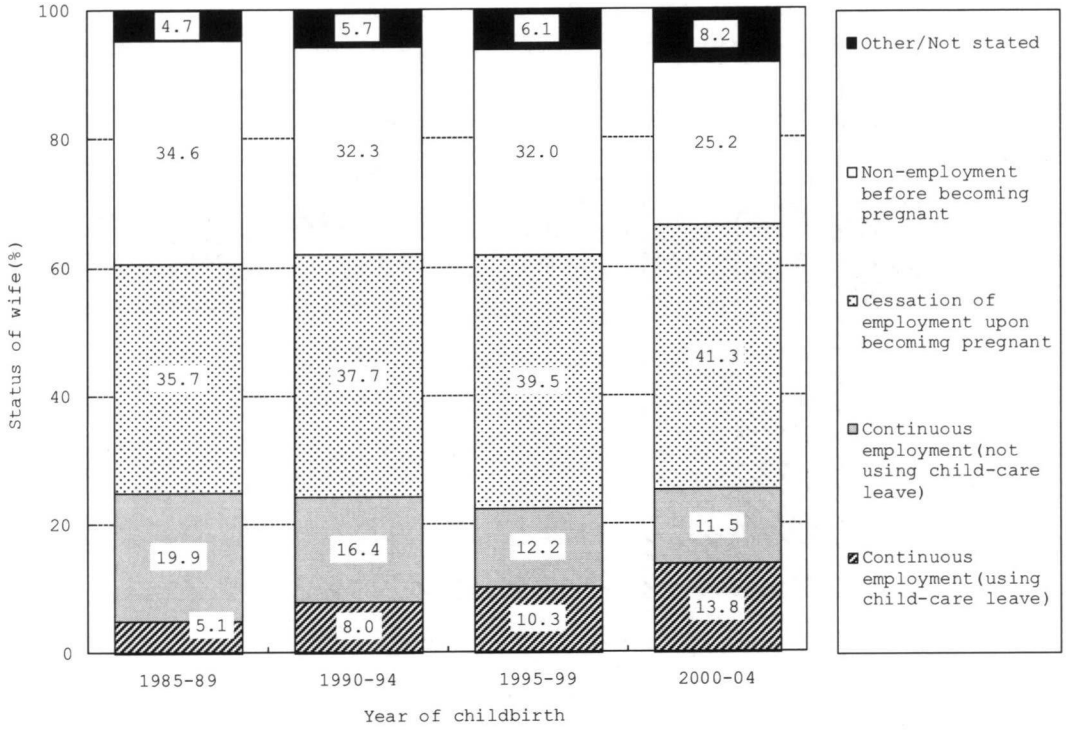
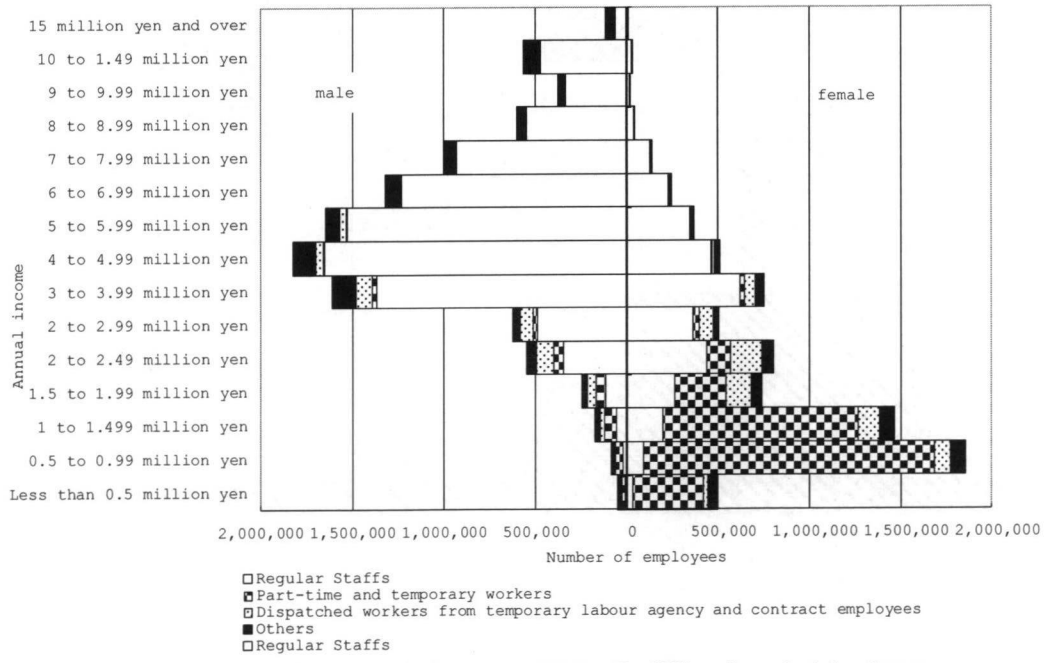


Figure 7 Employment of wives who have birth to the firstchild, by year of childbirth




Sorce: Kaneko, R. and other 2008.

Figure 8 Number of employees by sex, main type of employment and income in 2007 for females aged 35-49




Source: own calculations, based on Statistics Bureau (MIAC), ***The 2007 employment status Survey***.

# The Effects of the Child-care Policy on Birth and Female Labor Force, and its Economic Background Factors

Mikito Masuda

【Abstract】

This study shows the effects of child-care policy in the case where an increase in the child-care center capacities resulted in an increase in the birth rates and the female labor force rates of the 25–29 and 30–34 age-groups. The study uses macro level time-series and cross-sectional data from Japan (at the prefectural level) in a regression model and performs simulations based on the model. The results of this study demonstrate that the policy effects on the birth rates and female labor force rates of the 30–34 age-group are larger than the policy effects on those of the 25–29 age-group. For both the age-groups, the policy effects on the birth rates are larger than the policy effects on the female labor force rates. Further, the reason for the relative strength of the policy effects on the 30–34 age-group can be explained by the degree of incompatibility between the work and birth among women. In particular, the results of an impulse response analysis based on a vector error correction (VEC) model show that the relative strength of the policy effects on the birth rates can be explained by the "opportunity cost of birth and child-care."

要旨

本研究では、日本を分析対象とし、少子化対策である保育政策の実施が出生率および女子労働力率に及ぼす影響を明らかにし、比較を行った。保育政策は女性の出産・子育てと就業との両立を促進させる施策であり、この代理変数としては0-4歳人口当たり保育所定員数を用いている。また、出生率と女子労働力率については、25-29歳と30-34歳という二つの年齢階級を対象としており、ここではこれら二つの年齢階級間での政策効果の比較も行っている。データとしては、マクロ年次時系列データと都道府県別のクロスセクションデータの二つを用いている。その結果、出生率と女子労働力率に対する効果どちらについても、30-34歳の方が25-29歳よりも大きいことが明らかにされた。また、保育政策が及ぼす影響を出生率と女子労働力率について比較してみると、女子労働力率に対する影響よりも出生率に対する影響の方が大きいことが明らかにされた。このことは、両立支援策である保育政策を実施した場合、出産を断念して就業を続ける女性に出産を促す効果の方が、就業を断念して出産を行う女性に就業を促す効果よりも大きいことを示唆している。なお本研究では、保育政策の影響が25-29歳よりも30-34歳の方が大きかった原因を、出産・子育ての機会費用の相対的強さに置いた。

## Introduction

The declining birth rate in Japan has resulted in a number of social problems. In light of this situation, the Japanese family policy aimed at raising the birth rate plays a significant role. In this study, I focused on the child-care policy as part of the family policy and presented the effects of this policy on the birth rate and the female labor force rate in Japan. The child-care policy promotes the compatibility between work and child-care among women. For this study, I adopted the capacity of a child-care center per 0–4 age population as the variables of the child-care policy, and demonstrated the effects of the child-care policy on the birth rate and the female labor force rate of the 25–29 and 30–34 age-groups in Japan.

In this study, econometric methods, using macro level time-series and cross-section data collected in Japan, reveal the effects of child-care policy on the age-specific birth rates and female labor force rates. For the time-series analysis, regression models were built and simulations of the future were conducted on the basis of the model. In this analysis, the data regarding the birth rates and the female labor force rates was used as a dependent variable. In cross-section data analysis, only the birth rates were used as a dependent variable, and in this case, the data used was in seven-year points (1975, 1980, 1985, 1990, 1995, 2000 and 2005).

Through these analyses, the child-care policy effects on the birth rates and the female labor force rates for the age-groups of 25–29 and 30–34 were compared. Further, the economic background factors were illustrated. In this study, the child-care policy effects are assumed to exist if the sign denoting the child-care center capacity is positive.

The child-care policy effects have been analyzed in many works that used different data and methods (Castle 2003, Del Boca 2002, Hilgeman and Butts 2004, Klasen and Launov 2003, Lofstrom and Westerberg 2002, Iryo-Keizai-Kenkyu-Kiko 1996, Kato 2004, Kojima 2005, Sigeno 2005, Sigeno and Dainichi 1999, Syakai-Hosyo no Keizai-Bunseki-Kenkyukai 1997, Nagase 1997, Nagase 1998, Nagase and Takayama 2002, Masuda 2006, 2007a, 2008, 2009b). However, the difference between these works and this study is that the latter compares the policy effects for age-specific birth rates and female labor force rates on the basis of the equation models and simulations as in this study. Hence, the analysis in this study is original and unprecedented.

## 1. Child-care policy effects on birth rate — Analysis using time-series data

### 1.1 The estimation of the birth rate equation

In this section, time-series data is used to show the child-care policy effects on the birth rate. The time-series data is from 1975 to 2005 (31 samples) and consists of macro data collected in Japan. The birth rates are variables that were calculated by dividing the number of age-specific births in *Vital Statistics* (Ministry of Health, Labour and Welfare) by the age-specific population in the *Census* (Ministry of Internal Affairs and Communications). The child-care center capacities are the data in

*The Report of Social Welfare and Administrative Affairs* (Ministry of Health, Labour and Welfare) and were divided by the population of children aged 0-4, in order to reflect the excess and shortage of child-care center capacities. (Hereinafter, child-care center capacities divided by the population of children aged 0-4 are simply expressed as "child-care center capacities.") For the data of the birth rates, only the birth rates of the 25-29 and 30-34 age-groups are used[1].

Table 1 shows the results of the Unit Root Test for the time-series data used in this study. All the data in this study is transformed into Natural Logarithm data to cope with heteroskedasticity. This table shows that all data in this study is first-difference stationary. In the estimation, the birth rates of the 25-29 age-group and child-care center capacity are estimated in the intercept-only model, but the model with intercept and trend is used for all other estimates. Table 2 shows the results of the Johansen Cointegration Test (Trace Test and Maximum Eigenvalue Test), which was conducted to show whether there are any cointegration relations between some variables in some equations used in this study. This table shows that at least one cointegration relationship (long equibrium relationship) between some variables exists. Therefore, it is possible to make the estimation using the data in its original form.

In the estimations of the equations, the dependent variable is the birth rate, and the independent variables are child-care center capacity and the past birth rates. The past birth rates are the past birth rates of the cohorts concerned [2]. Therefore, the past birth rates are treated as exogenous variables and child-care center capacity is treated as an endogenous variable in the VEC model for the estimation of the Johansen Cointegration Test. In the case of the relationships between the birth rate and child-care center capacity, both variables correlate. This study focuses on the effects of child-care policy (the direction from child-care center capacity to the birth rate); however, the inverse direction (the direction from the birth rate to child-care center capacity) is not considered.

Table 1 Unit Root Test (ADF test)

| variables | no difference | first difference | second difference |
|---|---|---|---|
| 25-29 age birth rate | 0.999 | 0.004 *** | 0.000 *** |
| 30-34 age birth rate | 0.982 | 0.000 *** | 0.000 *** |
| Child-care center capacity | 1.000 | 0.030 ** | 0.206 |
| 25-29 age female labor force rate | 0.771 | 0.001 *** | 0.001 *** |
| 30-34 age female labor force rate | 0.674 | 0.003 *** | 0.000 *** |
| 25-29 age wage of female regular worker | 0.985 | 0.011 ** | 0.000 *** |
| 30-34 age wage of female regular worker | 1.000 | 0.001 *** | 0.000 *** |
| 25-29 age wage of male regular worker | 0.847 | 0.068 * | 0.000 *** |
| 30-34 age wage of male regular worker | 0.931 | 0.036 ** | 0.026 ** |

Note: p-value is shown. All the data are Natural Logarithm data.
For the significant level, * is 10%, ** is 5%, and *** is 1%.
In the estimation, the intercept-only model is used for child-care center capacity and 25-29 age birth rate. The model with intercept and trend is used for all other estimations.

Table 2 Cointegration Test (Johansen Test)

| variables | 25-29 age birth rate<br>Child-care center capacity<br>Past birth rate (exogenous) | 30-34 age birth rates<br>Child-care center capacity<br>Past birth rate (exogenous) |
|---|---|---|
| Lags | 6 | 7 |
| Trace Test : p-value | | |
| Alternative hypothesis [cointegration : 1 and more] | 0.000 *** | 0.000 *** |
| Maximum Eigen value test : p-value | | |
| Alternative hypothesis [cointegration : 1 ] | 0.000 *** | 0.000 *** |

| variables | 25-29 age female labor force rate<br>Child-care center capacity<br>25-29 age wage of female regular worker<br>25-29 age wage of male regular worker | 30-34 age female labor force rate<br>Child-care center capacity<br>30-34 age wage of female regular worker<br>30-34 age wage of male regular worker |
|---|---|---|
| Lags | 3 | 3 |
| Trace Test : p-value | | |
| Alternative hypothesis [cointegration : 1 and more] | 0.000 *** | 0.000 *** |
| Alternative hypothesis [cointegration : 2 and more] | 0.000 *** | 0.000 *** |
| Alternative hypothesis [cointegration : 3 and more] | 0.001 *** | 0.001 *** |
| Maximum Eigen value test : p-value | | |
| Alternative hypothesis [cointegration : 1] | 0.000 *** | 0.001 *** |
| Alternative hypothesis [cointegration : 2] | 0.003 *** | 0.001 *** |
| Alternative hypothesis [cointegration : 3] | 0.012 ** | 0.001 *** |

Note : p-value is shown.
For the significant level, * is 10%, ** is 5%, and *** is 1%
In the estimation, the model with trend is used. The AIC (Akaike Information Criteria) is used to determine the lags.

The birth rate equations are as follows (p-value in parentheses):

$$\text{25-29 age-group BR (log)} = -0.526 + 0.21 \times \text{CN (log)} + 1.09 \times \text{PBR (log)}$$
$$(0.266)\ (0.151) \qquad (0.000)$$

Estimation periods: 1979–2005 adj$R^2$: 0.99

$$\text{30-34 age-group BR (log)} = -0.07 + 0.858 \times \text{CN (log)} + 0.344 \times \text{PBR (log)}$$
$$(0.968)\ (0.018) \qquad (0.024)$$

Estimation periods: 1983–2005 adj$R^2$: 0.173

In the equations above, BR is the birth rate, CN is child-care center capacity, PBR is the past birth rate, and log is the Natural Logarithm. Both equations show that child-care center capacity and past birth rates are positive values (the result for child-care center capacity was as I expected). The p-value of the past birth rates shows the strength of this variable, so clearly this variable is very important as the independent variable of the time-series data of the birth rates. In the equation for the

30-34 age-group, child-care center capacity is significant, but it is not significant in the equation for the 25-29 age-group. Therefore this result shows that the policy effects on the birth rate of the 30-34 age-group are strong but the policy effects on the birth rate of the 25-29 age-group are not strong.[3)]

### 1.2 Simulation of future birth rates

A simulation of future birth rates was performed based on the previous equations. In the simulation, child-care center capacity is set up as an exogenous variable, and it increases at an annual rate of 1 percent.[4)] The periods in the simulation fall between 2006 and 2030. It is not necessary to control the past birth rates since this variable is the combination of some lags. Since the birth rate of the 20-24 age-group, which is not set as a dependent variable in the equations, is included also in the past birth rates, however, the birth rate of this age range is set up to be constant from 2005 as an exogenous variable.

In Figure 1, which shows the results of the simulation, it is shown that both the birth rates of the 25-29 and 30-34 age-groups increase due to the effects of child-care policy. These results show that the increase of the birth rate of the 30-34 age-group is larger than the increase of the birth rate of the 25-29 age-group. Figure 2 displays this distinctly; in this figure for both ages, the ratios of the birth rates of each year in the case that child-care center capacity would increase at an annual rate of 1 percent to the birth rates of each year in the case that this variable would be constant from 2005 are shown. This result shows that the increase of the birth rate of the 30-34 age-group is larger than the increase of the birth rate of the 25-29 age-group, which means that the policy effects on the birth rate of the 30-34 age-group are strong but the policy effects on the birth rate of the 25-29 age-group are not strong.

Figure 1 Simulation of future age-specific birth rates

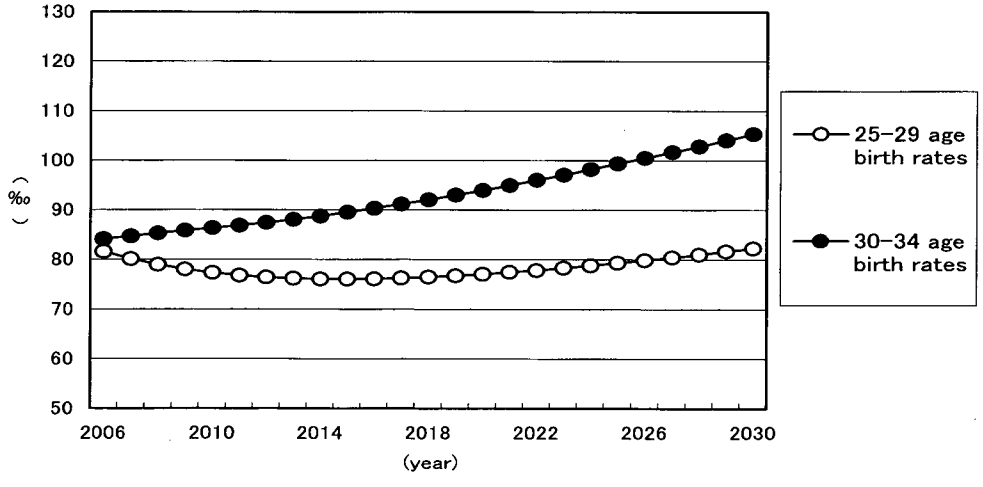


Figure 2 Comparison of child-care policy effects on age-specific birth rates

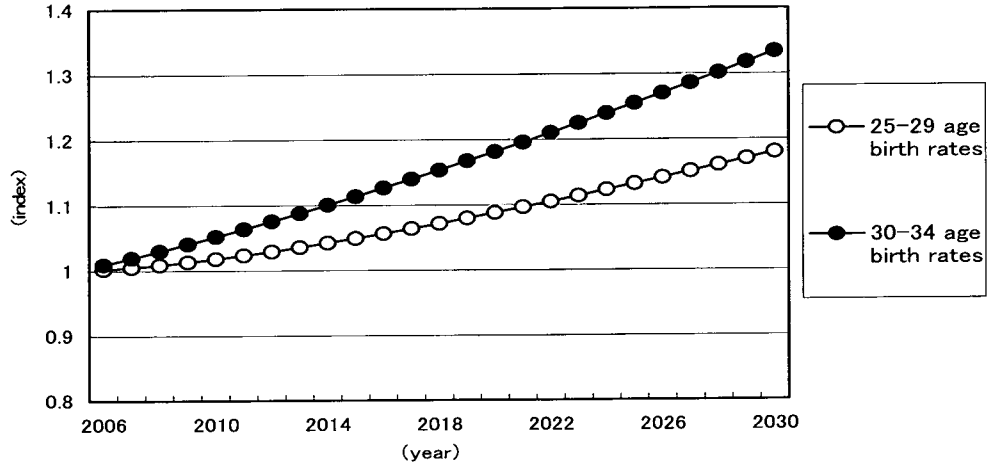



Figure 3 Changes of correlation coefficients of child-care center capacity and age-specific birth rates

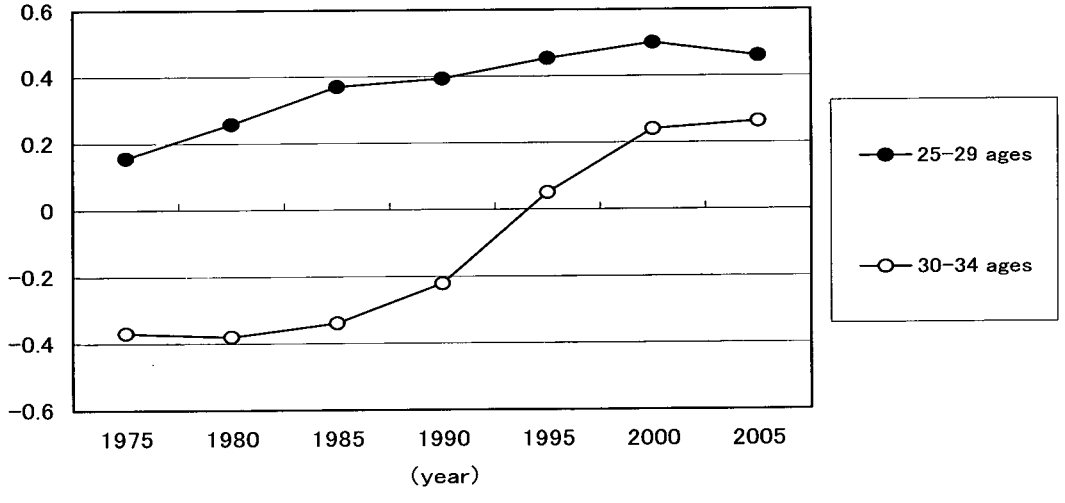
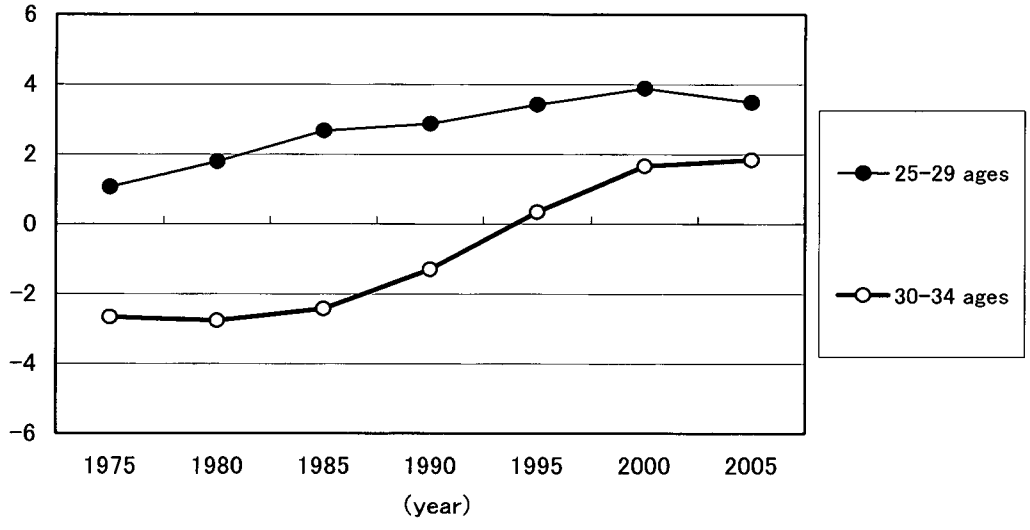


Figure 4 Changes of the t-value of child-care center capacity




## 2. Child-care policy effects on the birth rate — Analysis using cross-section data

In this section, the cross-section data of the 47 prefectures in Japan is used to show the effects of child-care policy on the birth rate. The sources of data on the birth rate and child-care center capacity are the same as those of the data used in the time-series analysis. In the cross-section analysis, the birth rate is a dependent variable, while child-care center capacity is the only independent variable. Data of seven years (1975, 1980, 1985, 1990, 1995, 2000 and 2005) is used, and as for the data on the birth rate, only the birth rates of the 25-29 age-group and the 30-34 age-group are used.

Figure 3 shows the correlation coefficients of the seven years revealed by this cross-section analysis. The up-trend is shown in the changes of the correlation coefficients in the case of both the birth rates of the 25-29 and 30-34 age-groups. In the early periods, the correlation coefficients in the case of the birth rates of the 30-34 age-group are negative, however in the latter periods the correlation coefficients become positive, and regarding the degree of the increase from a negative value to a positive value, the degree of the 30-34 age-group is larger than the degree of the 25-29 age-group. Furthermore, the t-value of child-care center capacity in Figure 4 shows the same tendency as the correlation coefficient in Figure 3.

Therefore, regarding the policy effect whereby the increase of child-care center capacity raises the birth rate, it clear that the degree of increase of the 30-34 age-group is larger than that of the 25-29 age-group. This result is same as that produced by the time series analysis.

## 3. Child-care policy effects on female labor force rate — Analysis by time series data

### 3.1 Estimation of the female labor force rate equation

This section uses time-series data to show the effects of child-care policy on the female labor force rate. The time-series data is macro data collected in Japan from 1975 to 2005 (31 samples). The source of data on child-care center capacity is the same as in the previous analysis, but *Labor Force Survey* (Ministry of Internal Affairs and Communications) is the source of data on the female labor force rate. The dependent variable is the female labor force rate, and the independent variables are the wage of the female and male regular worker (hereinafter simply referred to as the female and male wage in this study) and child-care center capacity, while the inverse direction is not considered. The source of data on these wages[5] is the Wage Census (Ministry of Health, Labour and Welfare). In this analysis also only the 25-29 and 30-34 age-groups are considered.

The female wages are used as the variable that determines labor supply, male wages are used as the variable that causes the labor force of married women to decrease, as indicated by the Douglas=Arisawa Rule. Therefore the female wage is expected to be a positive value while the male wage is expected to be negative.

The results of the Unit Root Test and the Johansen Cointegration Test were shown previously, and it is possible to produce an estimation using the data in its original form. The female labor force rate equations are as follows (p-value in parentheses):

25-29 age-group FLP (log) $= -0.135 + 2.191 \times$ 25-29 FW (log) $- 1.425 \times$ 25-29 MW (log)
(0.833) (0.000) (0.000)
$+ 0.097 \times$ CN (log)
(0.165)
Estimation periods: 1979–2005 adj$R^2$: 0.977

30-34 age-group FLP (log) $= 6.63 + 0.821 \times$ 30-34 FW (log) $- 1.289 \times$ 30-34 MW (log)
(0.000) (0.000) (0.000)
$+ 0.14 \times$ CN (log)
(0.019)
Estimation periods: 1979–2005 adj$R^2$: 0.927

In the equations above, FLR is the female labor force rate, FW is the female wage, MW is the male wage, and CN is child-care center capacity. The signs of these variables are as I expected.

As the p-value indicates, child-care center capacity is significant in the 30-34 age group but not significant in the 25-29 age-group. Therefore, this result means that the policy effects on the female labor force rate of the 30-34 age-group are strong but the policy effects on the female labor force rate of the 25-29 age-group are not strong. This result is the same as in the case of the birth rate equations.

### 3.2 Simulation of future female labor force rates

In this section, a simulation of future female labor force rates is performed based on the equations mentioned above. In the simulation, child-care center capacity is set up as an exogenous variable, and it increases at an annual rate of 1 percent. The periods in the simulation fall between 2006 and 2030. These conditions are the same as those of the simulation of future birth rates. In addition, the female and male wages are set up as an exogenous variable, constant from 2005.

Figure 5 shows the results of the simulation, and also the effects of child-care policy, whereby both the 25-29 and 30-34 age-group's female labor force rates increase. These results show that the increase of the female labor force rate of the 30-34 age-group is larger than the increase of the 25-29 age-group's. Figure 6 displays this more distinctly; in this figure for both age groups, the ratios of the female labor force rates of each year in the case that child-care center capacity increases at an annual rate of 1 percent to the female labor force rates of each year in the case that this variable is constant from 2005 are shown. This result shows that the increase of the female labor force rate of the 30-34 age-group is larger than the increase of the female labor force rate of the 25-29 age-group.

Therefore, this result also shows that the policy effects on the female labor force rate of the 30-34 age-group are strong but the policy effects on the female labor force rate of the 25-29 age-group are not strong. This result is the same as in the case of the birth rate equations.

Figure 5 Simulation of future age-specific female labor force rates

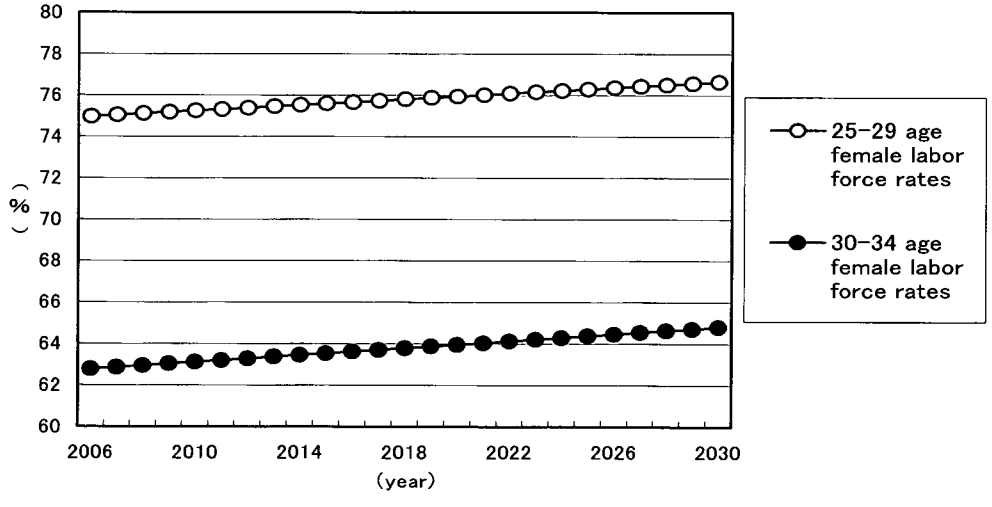


Figure 6 Comparison of child-care policy effects on age-specific female labor force rates

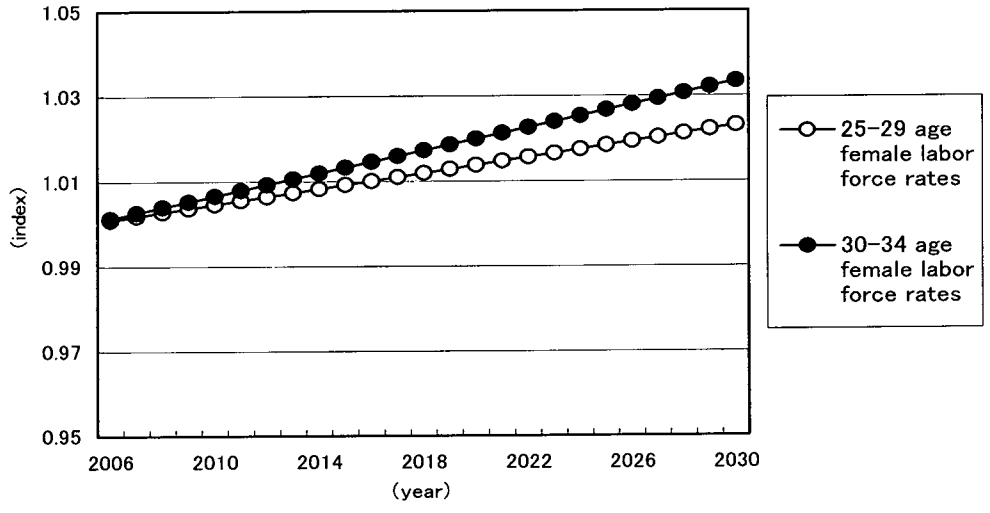



Figure 7 Comparison of child-care policy effects on birth rate and female labor force rate (25-29 age-group)

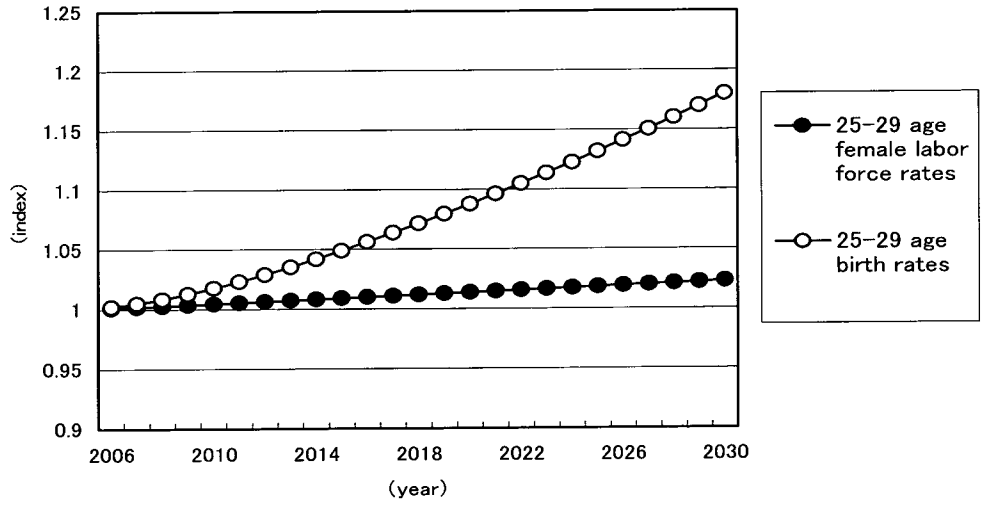
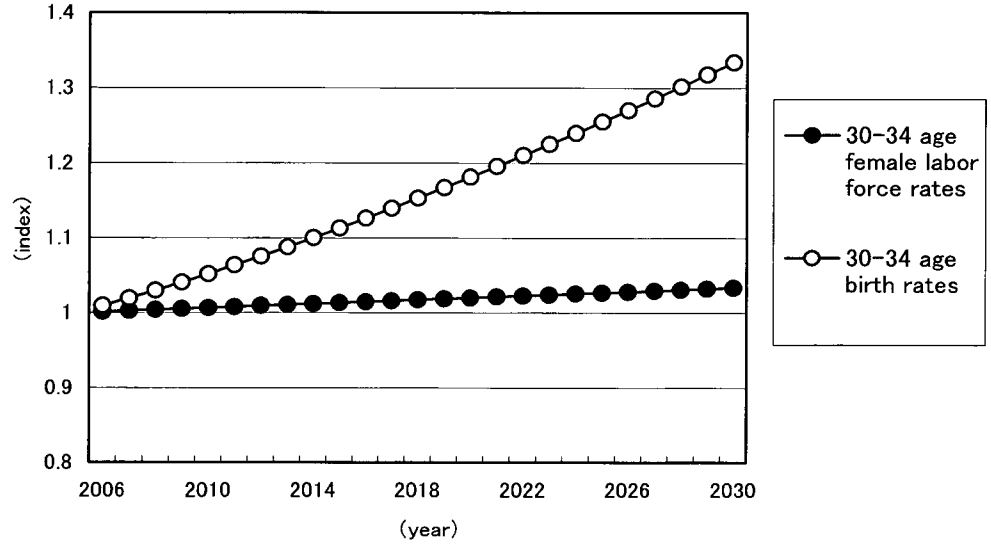


Figure 8 Comparison of child-care policy effects on birth rate and female labor force rate (30-34 age-group)




## 4. Comparisons of the policy effects between the birth rate and the female labor force rate

This section compares the policy effects on the birth rate and the female labor force rate. That is, it shows which rate is affected most by policy.

These comparisons are shown in Figure 7 and Figure 8, which display the policy effects on the birth rate and the female labor force rate for the 25-29 and 30-34 age-groups respectively. These two figures are based on Figure 2 and Figure 6, and show that for both age groups, the policy effects on the birth rate are larger than the policy effects on the female labor force rate.

Therefore this result shows that child-care policy is more effective when it removes obstacles in the case where women abandon giving birth in order to continue working than in the case where women stop working in order to give birth and care for children.