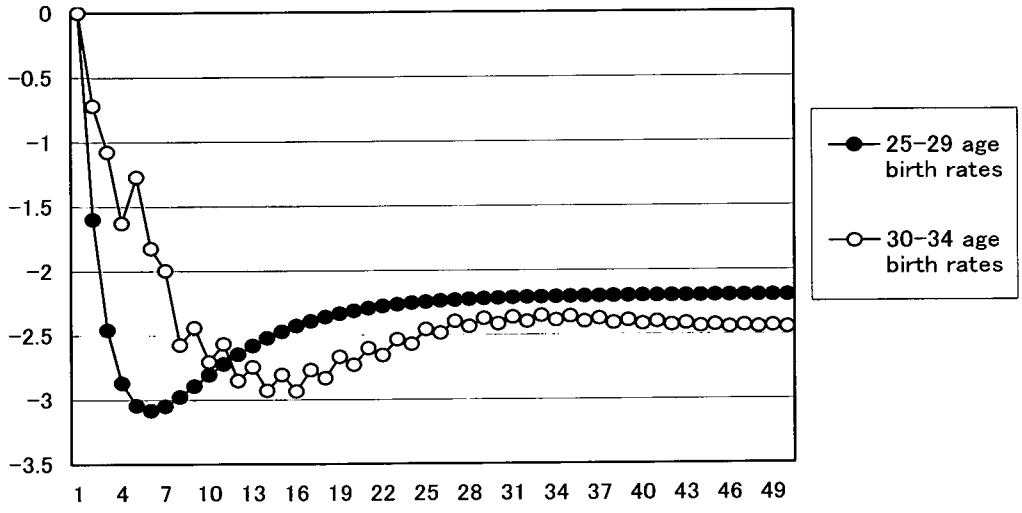
Figure 9 Impulse Response of the birth rates to wages of female regular workers



Source : Masuda (2009a)

5. The cause of the differences between the policy effects on the 25-29 and 30-34 age-groups

It is reasonable to believe that the "opportunity cost of birth and child-care" can explain that the policy effects on the birth rates of the 30–34 age-group are larger than that of the 25–29 age-group. The opportunity cost represents the income that women would have earned had they continued to work and can be expressed as the wages earned by women i.e., the wages of the female regular workers. If the opportunity cost exists and increases to such an extent that it is difficult for women to both work and bear children, then the birth rate decreases (this is known as the "opportunity cost effect"). In this case, the expected sign of wage for a female regular worker is negative.

In Masuda (2009a), through an impulse response analysis based on the VEC model, correlations are found between the wages of the female and male regular workers, the wages of female part-time workers, and birth rates[6]. It is also shown that the opportunity cost effect exists and that the opportunity cost effect of the 30–34 age-group is the largest among the 20–39 age-group.

Figure 9 shows the effects of the wages of female regular workers on the birth rates of the 25–29 and 30–34 age-groups (the opportunity cost effect) and the difference in the opportunity cost effects on the 25-29 and 30-34 age-groups as found in the impulse response analysis in Masuda (2009a). The child-care policy that allows women to both work and take care of children, that is, makes the opportunity cost lower is very effective in the 30-34 age-group.

It is possible that the reason why the policy effects on the female labor force rates of the 30-34 age-group are larger than that in the case of the 25–29 age-group is simply that it is difficult for

women to simultaneously work and care for children. That is, women in the 30–34 age-group find it more difficult than those aged 25–29, and therefore, the policy to promote compatibility between work and child rearing is very effective in the case of the former.

Conclusion

This study has shown the effects of child-care policy, whereby an increase of child-care center capacity raises the age-specific birth rate and female labor force rate (of the 25-29 and 30-34 age-groups respectively), by using time-series and cross-section data of the prefectures in Japan, and making a regression model and simulations based on the model.

In the time-series analysis, which employs a model in which the dependent variables are the birth rate and the female labor force rate, and in the simulation based on the model, it has been shown that the policy effects on the birth rate and the female labor force rate of the 30-34 age-group are larger than the policy effects on the birth rate and the female labor force rate of the 25-29 age-group.

In the cross-section analysis, which employs a model with the birth rate as the only dependent variable, data of seven years (1975, 1980, 1985, 1990, 1995, 2000 and 2005) was used, and the correlation coefficient and the t-value of child-care center capacity showed an up-trend. However, in the early periods, the correlation coefficient and t-value in the case of the birth rate of the 30-34 age-group were negative but in the latter periods the correlation coefficient and t-value became positive. Furthermore, regarding the degree of the increase from a negative value to a positive value, the degree of the 30-34 age-group's increase is larger than the degree of the 25-29 age-group's.

It is clear that these results show that the policy effects on the birth rate and the female labor force rate of the 30-34 age-group are larger than the policy effects on the birth rate and the labor force rate of the 25-29 age-group. In addition, the comparisons of the policy effects on the birth rate with those on the female labor force rate showed that for both age ranges, the policy effects on the birth rate are larger than the policy effects on the female labor force rate.

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 the birth of women. In particular, the results of an impulse response analysis based on a 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."

In this study, the child-care policy effects were shown to some extent. However there is problem to solve; the cause of the negative value of the correlation coefficient and the t-value in the 30-34 age-group in the early periods in the cross-section analysis is example of future themes.

Notes

1) In this study only the 25-29 and 30-34 age-groups are used since the births and the birth rates of these age ranges have the most weight in total.

2) The method to calculate the past birth rate is as follows:

The past birth rates of the 25-29 age-group =
{((25-29 age birth rates (-1)×4) + (20-24 age birth rates (-1)×1) ／5)
+ ((25-29 age birth rates (-2)×3) + (20-24 age birth rates (-2)×2) ／5)
+ ((25-29 age birth rates (-3)×2) + (20-24 age birth rates (-3)×3) ／5)
+ ((25-29 age birth rates (-4)×1) + (20-24 age birth rates (-4)×4) ／5)} ／4

The past birth rates of the 30-34 age-group =
{((30-34 age birth rates (-1)×4) + (25-29 age birth rates (-1)×1) ／5)
+ ((30-34 age birth rates (-2)×3) + (25-29 age birth rates (-2)×2) ／5)
+ ((30-34 age birth rates (-3)×2) + (25-29 age birth rates (-3)×3) ／5)
+ ((30-34 age birth rates (-4)×1) + (25-29 age birth rates (-4)×4) ／5)
+ ((25-29 age birth rates (-5)×4) + (20-24 age birth rates (-5)×1) ／5)
+ ((25-29 age birth rates (-6)×3) + (20-24 age birth rates (-6)×2) ／5)
+ ((25-29 age birth rates (-7)×2) + (20-24 age birth rates (-7)×3) ／5)
+ ((25-29 age birth rates (-8)×1) + (20-24 age birth rates (-8)×4) ／5)} ／8

This calculation is the weighted mean, and the 25-29 age-group has a lag of four years, while the 30-34 age-group has a lag of eight years. The reason for the longer lag of the 30-34 age-group is that the stability of the information is necessary since the trend of the birth rate of the 30-34 age-group forms an inverted U-shape.

3) The same result is shown in Masuda (2009b). In this analysis, an Impulse Response analysis is performed based on the VEC model.

4) Child-care center capacity is an endogenous variable in the VEC model in the estimation of the Johansen Cointegration Test considering correlations, but in the case of the simulation this variable is set up as an exogenous variable for control. After all, only a one-way direction is considered in the equation for the simulation, and in this case, there is no distinction between an endogenous variable and an exogenous variable. This treatment is the same as in the case of the treatment of the wage of the female and male regular worker in the following female labor force rate equation.

5) Bonus and special cash earnings are included.

6) The male wages of the regular workers and the female wages of the part-time workers increase the birth rate. It is possible that this effect is "income effect". Therefore, the wage of the male regular worker and the wage of the female part-time worker are expected to be positive values. The actual income effects are shown in Masuda (2009a).

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