The Effect of the Cost of Children on Recent Fertility Decline in Japan
(preliminary)

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In this paper, the effect of the cost of children on fertility rate is estimated in order to verify the hypothesis that the recent fertility decline in Japan was caused by the rise of the cost of children. As cost of children, two types of measures were used. One is the cost from the Rothbarth model of equivalence scale, and the other is the monthly expenditure for children (per child). Since the cost of children itself is an endogenous variable, instrument variable estimation was made. In the estimation where the number of children is used as the dependent variable, the cost of children showed statistically significant negative effects on fertility.

Thus, as a policy implication, decreasing the cost of children is likely to affect the fertility rate positively. The examples for these policies are extension of the subsidies for education or for young children.

1. Introduction

The total fertility rate (TFR) in Japan has been declining since 1973, and it reached the very low level of 1.32 in 2003(Figure1). This level is far below the replacement rate of 2.08. This rapid decline in fertility rate caused the rapid aging of the Japanese society, making its social security system into bankrupt. Thus, it is very important to analyze why this rapid decline has occurred.

Recently the delay of childbearing of young married couples is said to account for more than half of this fertility decline (Suzuki, 2000). The high cost of children is said to be one of the causes of this delay. Table 1 shows the supporting data from the National Fertility Survey (11th, 1997) by the National Institute of Population and Social

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Security Research. According to this table, among the many married women who answered that they plan to have smaller number of children than ideal number, more than 30% chose the reasons that educating children is too costly or raising children (in general) is too costly.

Therefore, in this research, the effect that the cost of children has on the fertility is estimated, in order to examine whether the high cost of children in Japan account for the declining fertility. The cost of children takes two types in this research. The first is the expenditure for children (per child) in the month preceding the survey, and the second is the cost estimated using the equivalence scale, which is explained in another paper (Oyama 2004).

The rest of the paper is organized as follows. The next section explains the data, the section 3 shows the estimation result, and the last section concludes.

2. Data

The data used is a panel data from the Household Survey by the Institute for the Research on Household Economics. The data consists of the observations for the 7 years from 1993 to 1999. The survey started with 1500 women aged 24 to 34 (cohort A), and 500 women aged 24 to 27 are added from 1997 (cohort B). Only the data of married women from both cohorts is used in this research. The variable definition is shown in table 2, and the summary statistics of the pooled data are in table 3.

The cost of children are shown as three variables. ExpPerChild is the per child expenditure in the preceding month of the survey, CostRothA is the cost of one children estimated with Rothbarth model of equivalence scale, using the data of cohort A only. CostRothAB is the cost of one children estimated using data of both cohort A and B.
The random effect estimation results of cost of Rothbarth model using the pooled data of cohort A and B for three differently urbanized areas are shown in table 4, and we can see that cost of children is highest in the urban area, and lowest in the rural area. In estimation which follows, these numbers from the pooled regression are not used, but the estimation results for 3 areas for each of the 7 years are used as CostRothAB and CostRothA. As for the dependent variable, ChildNum is the number of children each woman has.

3. Estimation Results

Estimation results are shown in table 5a to table 6. The estimated equation is

\[ \text{NumChild} = \alpha_0 + \alpha_1 \text{CostChild} + \alpha_2 \text{WiShool} + \ldots + \text{u} \]

In the table 5a, the dependent variable is the number of children each wife has, and the coefficient estimates of the cost variables are the main result we want to see. In this table, very simple OLS and ordered probit estimation results of this equations are shown. The three types of cost of children shows statistically significant negative effect on the number of children as expected. As for the other variables, both the wife’s schooling and husband’s schooling have negative effect on the number of children. Wife’s full-time or part-time work have negative effect on fertility. Owing a house raise the number of children, while residing with someone other than the couple and children decreases the number of children.

In table 5b, the estimation results of random effect IV and fixed effect IV models are shown. Since the cost of children are the endogenous variable, the instrument variables for their endogeneity are used. They are the share of girls among children, the dummy variables for the educational level the wife want to give to her children (good college,
college, junior(2-year) college, Professional(senmon-gakko) high school, the educational level the children themselves want), and dummy variables on the type of the school where the oldest child goes (municipal, national or private).

In table 5c, same random effect IV and fixed effect IV estimation was made, but with different set of instrumental variables. Here, the instruments are the average number of children, share of girls among children, 2-year lagged type of the school where the oldest child went (municipal, national or private).

In the all three estimations, we can easily find that all three measures of the cost of children have statistically significant negative effect on the number of children. That is, if the parents spend more on each child’s education, they tend to have fewer numbers of children.

Next, in table 6, the estimation using prefecture-level instruments are shown. The monthly expenditure for children is the only cost of children, and the estimation was made with random effect IV and fixed effect IV. The estimation (3) (4), and (5) (6) uses different set of instrumental variables. For equation (3) and (4), the instruments are GirlShare, the educational level the wife wants the children to attain, (GoodCollege, College, JuniorCollege, Professional, HS, Self), the type of school the oldest child goes (Municipal, National Private), and other prefecture-level IVs which are kogakureki, PubDaycare, Yochien, PubHS, PubUniv and UnivShingaku. As for (5) and (6), the IVs are AvgAge, GirlShare, 2-year-lagged type of the school the oldest child goes (MunicipalL2, NationalL2, PrivateL2), kogakureki, PubDaycare, Yochien, PubHS, PubUniv, UnivShingaku. In these estimations, the expenditure for children has negative effect on fertility, again. Therefore, the hypothesis that the high cost of children decreased the fertility rate is confirmed again.
As for the other variables, the effects are similar in all estimations. If husbands are older, they tend to have more children. If wife is working fulltime (WiWorkFull) or part-time (WiWorkPart), they tend to have fewer children. If the couple owns a house, they tend to have a larger number of children. Lastly, residing with family members other than the couple and children tend to decrease the number of children. This other family member can include both of the couple’s parents and other relatives. Since many existing literature found that residing with couple’s parents increase their number of children, estimation which distinguish the parents and other relatives will probably show more detailed results, and this is to be done in the next version of this paper.

4. Conclusion and Further Research

In this paper, the effect of the cost of children on fertility is estimated in many estimation methods and various instrumental variables. In those estimations with number of children as the dependent variable, it is shown that higher cost of children decreases the number of children. Therefore, the high cost of educating and raising children is one of the causes of the fertility decline in Japan. Therefore, policies which decreases the cost of children are likely to mitigate the decline of the fertility rate.

For further research, estimating hazard model and doing simulation of the policy effect are planned. Since the wives in the observations are relatively young, most of them are not likely to finish their birth-giving. The hazard estimation with the timing of the first birth as the dependent variable can treat this problem, since it is the stylized fact that women who gave birth in later years of her life tend to have smaller completed fertility. Also, simulating the effect of the subsidy to small children or subsidy to education will be very interesting and important.
Figure 1

- Total marital fertility rate (TMFR)
- TFR
<table>
<thead>
<tr>
<th>Reason</th>
<th>age &lt;25</th>
<th>25-29</th>
<th>30-34</th>
<th>35-39</th>
<th>40-44</th>
<th>45-49</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot give birth (biologically)</td>
<td>11.1</td>
<td>4.4</td>
<td>7.1</td>
<td>13.0</td>
<td>16.7</td>
<td>19.7</td>
<td>14.3</td>
</tr>
<tr>
<td>Do not want to give birth at higher age</td>
<td>5.6</td>
<td>8.3</td>
<td>20.7</td>
<td>40.3</td>
<td>46.9</td>
<td>32.6</td>
<td>33.6</td>
</tr>
<tr>
<td>Educating children is too costly</td>
<td>55.6</td>
<td>49.4</td>
<td>46.9</td>
<td>33.1</td>
<td>30.2</td>
<td>22.1</td>
<td>32.8</td>
</tr>
<tr>
<td>Raining children (in general) is too costly</td>
<td>72.2</td>
<td>68.3</td>
<td>54.0</td>
<td>39.4</td>
<td>27.0</td>
<td>20.2</td>
<td>35.6</td>
</tr>
<tr>
<td>Mental and physical burden of raising children too large</td>
<td>22.2</td>
<td>17.8</td>
<td>32.1</td>
<td>24.6</td>
<td>18.7</td>
<td>13.3</td>
<td>20.3</td>
</tr>
<tr>
<td>Houses too small</td>
<td>27.8</td>
<td>23.3</td>
<td>21.3</td>
<td>13.9</td>
<td>9.5</td>
<td>7.1</td>
<td>12.8</td>
</tr>
<tr>
<td>Want to have the same# of children as others</td>
<td>-</td>
<td>1.1</td>
<td>0.9</td>
<td>0.9</td>
<td>1.4</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>Children interfere with wife's job</td>
<td>11.1</td>
<td>12.8</td>
<td>13.9</td>
<td>17.9</td>
<td>12.6</td>
<td>7.8</td>
<td>12.5</td>
</tr>
<tr>
<td>Children interfere with hobby or leisure</td>
<td>5.6</td>
<td>11.7</td>
<td>9.0</td>
<td>8.3</td>
<td>3.1</td>
<td>1.6</td>
<td>5.4</td>
</tr>
<tr>
<td>Want youngest child become adult before our retirement</td>
<td>5.6</td>
<td>6.1</td>
<td>12.3</td>
<td>13.2</td>
<td>11.3</td>
<td>6.0</td>
<td>9.8</td>
</tr>
<tr>
<td>other</td>
<td>16.7</td>
<td>13.3</td>
<td>17.6</td>
<td>12.5</td>
<td>10.3</td>
<td>6.6</td>
<td>11.1</td>
</tr>
<tr>
<td>missing</td>
<td>-</td>
<td>4.4</td>
<td>3.4</td>
<td>7.4</td>
<td>7.6</td>
<td>19.3</td>
<td>10.1</td>
</tr>
<tr>
<td># of obs.</td>
<td>18</td>
<td>180</td>
<td>324</td>
<td>447</td>
<td>514</td>
<td>638</td>
<td>2121</td>
</tr>
</tbody>
</table>

Source: National Fertility Survey (1997), the National Institute of Population and Social Security Research
References


