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**The Impact of Social Security on Fertility Preference:**

**Evidence from China Health and Nutrition Survey**

This paper intends to present whether the attendance of the new rural commercial medical system (NRCMS) has an eliminative effect on people’s traditional thought of ‘raising a child to provide for the old age’. Using a dataset of 4589 observations obtained from the China Health and Nutrition Survey, it performed a logistic model using different time segments of data and a linear difference-in-difference analysis to estimate the net effect of NRCMS. Moreover, it introduced distance to mom to be the instrumental variable to solve for the endogeneity problem raised by family features. The empirical results justify a significantly negative effect of the participation of NRCMS on people’s general fertility preference.

**Keywords:** fertility preference, logit model, difference-in-difference, NRCMS, traditional thought, cross term, distance to mother

1. **Introduction**

Since the 1980s, the Chinese government has implemented a family planning policy, effectively reducing the number of people born in China. However, this policy has also brought along many drawbacks. Whether it is possible to control the population economically and voluntarily is a difficult problem for policy makers. This article attempts to explore whether social security, especially rural medical security, can be an alternative answer to this problem in rural area. Considering this, the article mainly focuses on the impact of economic factors on the concept of fertility.

For hundreds of years, raising children has been a traditional way of maintaining one’s quality of life at her old age. In ancient society that lacks effective means of wealth savings and insurance, having children and receiving support after their children were adults (usually a fixed amount of return per month) in order to achieve smooth consumption and sustain life is the first type of fertility, where children take on an economic function of savings. When parents are aging, if they are seriously ill, their children usually have to squander their lives and save their parents' lives. This is the second economic function of childbirth - insurance. The realization of these two economic functions must rely on the implicit contract of society, and the implementation of implicit contract mainly depends on morality and customs. China's traditional concept of fertility can be summarized into two points: raising children and preventing aging and patriarchal women. Child rearing is a typical economic motive. The patriarchal attributes of society can also be attributed to economic considerations: after the daughter is married, the economy and life are no longer independent, and it is difficult to make the same contribution to the parents in the retirement of the parents. Both fertility concepts reflect these two economic functions.

As the urban social security system became complete after the Reform and Opening-up, children raising gradually disappeared in the urban area as a source of pension for the aged because of the complete coverage of a new pension system; however, the coverage rate in the rural area is way too far from that of the urban area and children raising remains to be the major source of pension for people’s late years. Meanwhile, people tends to raise a boy rather than girl because the boys can better provide life source to the aged to some extent. This naturally brings about the concern that how will social security affect people’s fertility preference in the rural area.

The establishment of a sound social security system has a multi-directional impact on the economic motivation of fertility intention. On the one hand, social security has an alternative effect on "raising children and preventing old age". Families change from "self-insurance" mode to "social safety net" mode, which has a negative impact on the optimal number of births. On the other hand, social security relaxes the budget constraints of low-income families, and the income effect makes the optimal number of births increase. Current studies, both theoretical and empirical, mostly support the substitution of social security for fertility.

This paper uses CHNS data to assess the impact of the establishment of a new rural cooperative medical care system on the fertility preference of rural women (rural families) from 2000 to 2009. The regression results of the logit model indicate that participation reduces the fertility preference of rural families. The results of the Difference-In-Difference estimates using the data from 2000 to 2004 show that our conclusion is robust.

1. **Literature Review**

In economics, the theoretical study on the impact of social security on the number of births is mainly carried out under the neoclassical framework of maximizing household utility. Barro & Becker initially discussed the negative impact of the increase in social security tax rate on the number of births under the single altruistic hypothesis, and most of the follow-up studies have reached similar conclusions (Nishiruma & Zhang, 1995; Rosati, 1996; Wigger, 1999). Other studies have examined the effects of increased levels of social security on fertility under the two-way altruistic hypothesis (Ehrlich & LUI, 1998; Baldwin & Jones, 2002) and found a more significant alternative. However, the conclusions of the above studies were all based on the Pay-As-You-Go or Fully Funded social security system, and did not consider similar to the new rural pension insurance. The income effect brought about by the social security policy of a specific group of people and enjoying state subsidies.

Empirical research on the relationship between social security and fertility can be divided into two categories. One is a cross-country study of national or regional observations, in the form of cross sections or panels. Holm (1975) studied the impact of social security programs on total fertility rates with cross-country data from 67 countries and reached a significant negative impact. The authors believe that social security has as much impact on fertility as education, income, etc. Traditional factors. Boldrin et al. (2005) also reached similar conclusions on the relationship between the social security tax rate and the total fertility rate in 1997 in 104 countries. Holmqvist (2011) specifically studied data from 1960-2007 in sub-Saharan African countries and found that the introduction of a subsidized pension system resulted in 0.5-1 fewer children per woman. The second is a time series study based on long-term data from a certain country or region. For example, Cigno et al. (2002)'s study of German time series data shows that the increase in social security coverage has a negative impact on production; the study of Italian time series data from 1931-1984 shows the amount of per capita pension. For every 10% increase, the total fertility rate drops by 0.02, which is quite weak (Cigno & Rosati, 1992).

Another type of literature related to this paper relates to the impact of the new rural cooperative medical system on rural residents' work, consumption, migration and other behaviors. Gan Li et al (2010) applied CHNS data research to prove that the government's subsidies for the new rural cooperative medical system will incite 2.36 times the growth of rural residents' consumption. Bai Chongen et al (20 1 2) The analysis of rural fixed-point observation data from 2003 to 2006 also affirmed the positive effect of NCMS on the consumption of rural residents, and believed that this effect is lower in income or health status. Stronger in poor families. Bai&Wu (2014) decomposes the impact of NRCMS on consumption into the effects of income and preventive savings in the theoretical model and provides empirical evidence. Qin Xuezheng and Zheng Zhi (2011) used CHNS data to prove that the discrimination policy of NCMS in participating and visiting in different places led to the “shackle effect” and “pullback effect” of labor mobility.Qi Liangshu (2011) used the micro-panel data covering 30 provinces and autonomous regions in China from 2 003 to 2006, and found that the new rural cooperatives played a role in reducing the incidence of poverty, increasing the income of low-income farmers, and reducing inequality in villages. An important role. Since the pilot in 2003, the implementation of the new rural cooperative medical system in promoting the health of rural residents and ensuring the peasants' diseases have been controversial (Zhu Hengpeng, 2009), but as the most extensive social security coverage for rural residents in China. The system, its profound impact on the major economic behaviors and family decisions of the insured population, has been affirmed by the above studies.

Wang Tianyu and Peng Xiaobo(2005), studied ‘Reproduction and Social Welfare’ topic in China. They employed a theoretical model and divided the impact of NRCMS into 2 categories: income effect which refers to the income increase caused by the implementation of insurances; and the spillover effect, which indicates the decreasing willingness to reproduce since there is less need to raise a child for insuring themselves. By employing Logit Models and Probit Models, the empirical results proved the spillover effects dominates.

**3. Data**

**3.1 Data Sources**

The data used in this paper is from China Health and Nutrition Survey (CHNS), an ongoing international collaborative project between the Carolina Population Center and the Chinese Center for Disease Control and Prevention. The information about demographic characteristics, socioeconomic status and fertility view are provided from the data set. The survey covered the urban and rural areas of China's eastern, central and western regions in nine provinces (Liaoning, Heilongjiang, Shandong, Jiangsu, Henan, Hubei, Hunan, Guangxi, Guizhou) for ten rounds (1989, 1991, 1993, 1997, 2000, 2004, 2006, 2009, 2011, 2015).

Sample clearing primarily comes from three restrictions: 1) only rural observations are kept: NRCMS was extensively advertised in rural areas and targeted at rural residents; furthermore, fertility view change of rural family is our interest; 2) only ever married women under 52 years old are kept, because fertility view of only this sample group is available and meaningful; 3) only data from 2000 to 2009 are kept: to better measure the effect of the new insurance system, we keep only data covering a time period from before pilot phase to after extensive development stage of NRCMS. Other literatures related to NRCMS also set the same study period (Wang & Peng, 2015 and Ma et al., 2010). Finally, the dataset covers 4589 observations for 4 rounds (2000, 2004, 2006, 2009).

**3.2 Variables**

Details of variable identification are shown in Table 1. The explained variable *child* is identified by binary choice question “do you want another child”. *insurance* is included as a key explanatory variable to depict whether the observation attends NRCMS; meanwhile, a dummy variable *post* identifying insurance implementation time is incorporated to perform difference-in-difference analysis. Implementation time is set at 2003 when NRCMS was authorized officially by central government. Interaction of the previous two variables *insurance\*post* is the DID variable, measuring the effect of attending new rural medical system on fertility view.

Control variables are categorized into three groups. The first group includes parental personal attributes, such as age, education and attendance of other commercial medical insurance. The second group depicts the family background including current number of children and household wealth level. The third group controls the effects of traditional idea. To measure the strength of traditional notion of “raising more children for the old age”, we incorporate the instrumental variable *distance\_m* distance to wife’s mother. To illustrate, whether the observation lives close to her mother is strongly correlated with the strength of the traditional fertility view. A wife, for example, is likely to visit or care about her parents more frequently and fulfill her responsibility of caring her own parents at old ages, if she lives close to her parents. Observations caring their own parents are exposed to the ideas of “raising children for the old age” or “more children bring more happiness” passed on from their parents. Women grown up in family with strong traditional fertility view rooted are more likely to raise more children for her old age.

**Table 1-Variable Identification**

|  |  |  |
| --- | --- | --- |
| Variables Description | | Values |
| Explained Variable | |  |
| child | Want another child | 1=yes, 0=no |
| Explanatory Variables | |  |
| insurance | Attend new rural commercial medical system | 1=yes, 0=no |
| post | Post or before insurance implementation | 1=post2003,0=before2003 00000=before 2003 |
| insurance\*post | DID variable |  |
| Control Variables | |  |
| 1. Personal Attributes of Couple | |  |
| otherinsurance | Wife attends other commercial medical insurance | 1=yes, 0=no |
| age\_w | Age of wife |  |
| age\_h | Age of husband |  |
| edu\_w  edu\_h | Education level of wife  Education level of husband | 0=none, 1=primary, 2=junior, 3=senior, 4=technical, 5=university, 6=master or higher |
| 1. Family attributes | |  |
| lnpcinc | ln (per capita household net income) |  |
| childnow | number of children currently alive |  |
| 1. Traditional ideas of raising children for old age | |  |
| distance\_m | Live far away from mother | 1=live in different cities, 0= same city |

**3.3 Summary Statistics**

Table 2 contains some summary statistics on entire sample. Among the whole 4589 observations, 9.8% have incentive to give birth to another child and 77.9% attend NRCMS. The median couple in the sample are around 39 years old, attain junior middle school education level, raise one child and live close to wife’s parents.

**Table 2-Summary Statistics**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Variables Mean St.dev Min Max | | | | | | | Observations |
| Panel A: Whole sample (2000,2004,2006,2009) | | | | | | | |
| child | 0.0981 | 0.285 | 0 | | 1 | 4589 | |
| insurance | 0.779 | 0.574 | 0 | | 1 | 4589 | |
| otherinsurance | 0.385 | 0.712 | 0 | | 1 | 4589 | |
| age\_w | 39.34 | 8.026 | 18.3 | | 52 | 4589 | |
| age\_h | 39.97 | 8.861 | 19.2 | | 61 | 4589 | |
| edu\_w | 1.744 | 1.284 | 0 | | 5 | 4589 | |
| edu\_h | 2.193 | 1.088 | 0 | | 6 | 4589 | |
| lnpcinc | 8.237 | 1.046 | 0.602 | | 12.13 | 4589 | |
| childnow | 1.023 | 0.751 | 0 | | 6 | 4589 | |
| distance\_m | 0.094 | 0.267 | 0 | | 1 | 4589 | |
| Panel B: Partial sample (2000,2004) | | | | | | | |
| child | 0.1163 | 0.321 | 0 | 1 | | 1881 | |
| insurance | 0.572 | 0.608 | 0 | 1 | | 1881 | |
| post | 0.593 | 0.491 | 0 | 1 | | 1881 | |
| insurancepost | 0.381 | 0.601 | 0 | 1 | | 1881 | |
| otherinsurance | 0.246 | 0.558 | 0 | 1 | | 1881 | |
| age\_w | 38.45 | 8.365 | 18.3 | 52 | | 1881 | |
| age\_h | 39.94 | 8.679 | 20.3 | 60.8 | | 1881 | |
| edu\_w | 1.654 | 1.095 | 0 | 5 | | 1881 | |
| edu\_h | 2.052 | 1.028 | 0 | 5 | | 1881 | |
| lnpcinc | 7.914 | 1.002 | 0.602 | 10.93 | | 1881 | |
| childnow | 0.973 | 0.888 | 0 | 6 | | 1881 | |
| distance\_m | 0.086 | 0.280 | 0 | 1 | | 1881 | |

Table 2 Panel B reports the summary statistics for survey year 2000 and 2004, two rounds before and after the insurance was officially launched. Not surprisingly, compared to whole sample in Panel A, fewer observations attend NRCMS (57.2%) and more want to raise another child (11.63%).

In terms of the distribution of insurance attendance and fertility view for whole sample, Table 3 shows that observations who attend NRCMS has weaker tendency to raise another child, which is in accordance with our assumption that participation reduces the fertility preference of rural families. Only 9.1% of the insured want to raise another child and the proportion is smaller than that of the uninsured (12.4%).

**Table 3-Insurance Attendance and Fertility View**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Want no more child | Want another child | Total |
| Attend insurance | 3251 (90.9%) | 324 (9.1%) | 3575 (100%) |
| Not attend insurance | 888 (87.6%) | 126 (12.4%) | 1014 (100%) |

**4. Method**

**4.1 Logit Model**

Logit model is a good choice to explain the dummy variable “whether to raise another child”. In this model, we utilize four-year data from 2000 to 2009. The model is expressed as follows.

We estimate the probability of wanting to have another child (child=1), given the insurance attendance status and other control variables of individual i at time t. Then, we make a robustness test using different time period and different model separately. We first reset the logit data period to 2000-2004, which contains two survey rounds before and after the system was officially authorized (at 2003), to analyze the instant effect of new insurance system on the fertility preference of rural women. Then we use the difference-in-difference method to eliminate effects of unobserved heterogeneity that does not change as time goes by.

**4.2 Linear Difference-In-Difference Model**

The linear difference-in-difference model is expressed as follows:

is the dummy variable identifying the treated group, which is measured by whether the individual attend the NRCMS; the control group is, therefore, those who don’t attend the new insurance. Adverse causality may exist in this insurance participation issue and it can be solved by using an instrumental variable “whether the insurance is promoted in the village individual lives in”; however, we do not include this instrumental variable because of data limitation and this may be one of the limitations of the paper. is another dummy variable and it is assigned as 1 when survey year is 2004 and 0 for 2000 data. The effect of attending NRCMS on fertility choice is measured by parameter . combines all the control variables mentioned above.

**5. Empirical Results**

**5.1 Logit Model**

**Table 4 Logit model results of four-year data**

|  |  |  |  |
| --- | --- | --- | --- |
| Child |  | (1) | (2) |
|  |  |  |  |
| insurance |  | -1.311\*\* | -1.137\*\* |
| income |  | 0.404 | 0.539 |
| age\_wife |  | -0.151\* | -0.167\*\* |
| age\_husband |  | -0.073 | -0.059 |
| educ\_wife |  | 0.857\* | 0.805\* |
| educ\_husband |  | 0.404 | 0.558 |
| momdistance |  | 3.031 | 3.961 |
| otherinsurance |  | -0.941 | -0.163\* |
| childnow |  |  | -0.317\* |
|  |  |  |  |
| observation |  | 4589 | 4589 |
| R-squared |  | 0.068 | 0.077 |

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 4 shows the empirical results of the logit model of four-year data from 2000-2009. The variable we pay most attention to is *insurance*, which indicates whether the individual attends the new rural commercial system or not. Model (2) includes number of children currently alive as a control variable while model (1) does not.

From the empirical results we can see that in both models, wife’s characteristics have stronger effect on her view of fertility preference. The increment of the wife’s age has a downward effect on the probability of wanting another child. However, the women who have higher education tend to want more children. The other indicators are not significant in model (1). After we control for number of children currently alive, *otherinsurance* and *childnow* becomes significantly negative. Women who attend other commercial medical systems have a low probability of wanting another child. And those who currently have children also tend to hold a negative view in fertility.

Both of the coefficients of *insurance* are significantly negative, which indicates that the probability of wanting another child is significantly lower of the women who attend the NRCMS than those who do not. This result is in accordance with our intuition that NRCMS provides an alternative way of preparing for the old other than giving birth to children.

However, as this result covers 4 year of data and may not be a best measure of the instant effect of the attendance of NRCMS on people’s fertility view, we reapply the logit model restricting the time segment to 2000-2004, which covers only two survey rounds, to test for our robustness of previous results. The empirical result of model (3) is shown in Table 5.

**Table 5 Logit model results of two-year data**

|  |  |  |
| --- | --- | --- |
| Child |  | Model (3) |
|  |  |  |
| insurance |  | -0.609\* |
| income |  | -0.5 |
| age\_wife |  | -0.222\* |
| age\_husband |  | 0.01 |
| educ\_wife |  | 0.396 |
| educ\_husband |  | 0.265 |
| momdistance |  | -0.351 |
| otherinsurance |  | -0.893\* |
|  |  |  |
| observation |  | 1881 |
| R-squared |  | 0.054 |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 | | |

From Table 5 we can see the result is generally the same with that using longer time segment. In this model, the *insurance* is less significant, but it illustrates a negative effect on women’s fertility preference. In addition, the wife’s age and the attendance of other insurance is negatively related to the probability of wanting another child. The consistence of the results demonstrates that our analysis of logit model using four-year data is robust, and the attendance of NRCMS has a substitution effect on people’s behavior of having children to prepare for the old.

**5.2 Linear Difference-in-difference Model**

The following Table 6 presents the results of linear difference-in-difference models covering data of two rounds of survey from 2000 to 2004.

**Table 6 Linear DID results of four-year data**

|  |  |  |  |
| --- | --- | --- | --- |
| Child |  | (4) | (5) |
|  |  |  |  |
| insurance |  | -0.021 | -0.022 |
| post |  | 0.132\*\*\* | 0.134\*\* |
| Insurance\*post |  | -0.024\*\* | -0.013\* |
| income |  | -0.03 | -0.03 |
| age\_wife |  | -0.014\* | -0.014\* |
| age\_husband |  | 0.002 | 0.002 |
| educ\_wife |  | 0.017 | 0.017 |
| educ\_husband |  | 0.012 | 0.012 |
| momdistance |  | -0.044 | -0.045 |
| otherinsurance |  |  | -0.003\*\* |
|  |  |  |  |
| observation |  | 1881 | 1881 |
| R-squared |  | 0.134 | 0.134 |
| \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 | | | |

As mentioned before, the key variable in these two models is *insurance\*post*, which indicates obtaining new rural cooperative insurance in 2004. More specifically, model (4) presents the original model introduced in section 4.2, while model (5) including another control variable *otherinsurance*, which indicates whether the individual obtained another insurance or not.

Complying with the results of logit-models, the empirical results illustrates that citizens joining NRCMS after 2003 actually have less preference for fertility, which is reflected by the negative and significant coefficient of *insurance\*post*. Moreover, by including another control variable, the coefficient of the variable of interest in model 5 still remains significant and negative, which validates the robustness of our DID results. Also, by controlling whether this individual obtains other insurances, the partial effect of joining NRCMS in 2004 becomes smaller since the negative effect of insurances are partly absorbed by the new control variable. All in all, both linear DID models validate our initial assumptions and strengthen the robustness of logistic regressions.

Additionally, the coefficients of *post* are significant and positive in both models. We reckon that this may be caused by a general increment of wealth which is not fully covered by the other control variables. Following up, as expected, the age of wife has a negative impact on willingness to obtaining another child. Besides, the control of *otherinsurance* included in model 5 appears significant and negative. This may indicate that, generally, the negative effect of insurances on child birth domains.

**6. Conclusion and Discussion**

It is true that the attendance of the new rural commercial medical system (NRCMS) has a significant effect on people’s willingness of whether wanting another child or not, and that most results are in accordance with our initial hypothesis. When estimating the effect by Logit model of the whole sample, the result is significant, indicating that the NRCMS can eliminate people’s traditional thought of ‘raising a child to provide for the old age’ to some extent. At the same time, we find that whether having a child or not leads to different influence levels on the relationship of insurance and people’s general birth preference. Actually, for household with a child already, the insurance system will eliminate people’s willingness of having another child even further. The introduce of *childnow* also makes our instrumental variable, distance to mom, captures the situation better.

Thankfully, the cross-term insurance\*post is significantly negative in all models, providing empirical evidence to our intuition, and the use of difference-in-difference method and instrumental variable largely solve the endogeneity problem raised by family features. However, for household with a child already, wife’s mom or dad tends to live near them and take care of the child, making our IV disturbed. Besides, there may still exist some heterogeneity that we cannot capture but influence people’s choices on medical insurance and fertility tendency.

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