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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 performs a logistic model using different time segments of data and a linear difference-in-difference analysis to estimate the net effect of NRCMS. The empirical results justify a significantly negative effect of the participation of NRCMS on people's general fertility desire for wanting a new child.

Keywords: fertility desire, logit model, difference-in-difference, NRCMS, traditional thought, son preference

1. Introduction

Since the 1980s, the Chinese government has implemented a family planning policy, effectively reducing the number of newborns in China. However, this policy has brought many drawbacks. Whether the policy is possible to control the population economically and voluntarily is a difficult problem for policymakers. This article attempts to explore whether social security, especially rural medical security, can be an alternative answer to decrease the number of newborns in especially rural areas. Considering this, the article mainly focuses on the impact of the new rural commercial medical system (NRCMS) on the willingness of giving birth to a child.

For hundreds of years, raising children has been a traditional way of maintaining one's quality of life at his/her old age. In an ancient society that lacks effective means of economic reserve 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 and reserve economic wealth for the parents. 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 purpose of having childbirth - insurance. The realization of these two economic purposes 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.

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 at older ages. Meanwhile, people tend to raise a boy rather than a girl because boys can provide better life sources to the aged at a larger extent of having stronger human capitals and not leaving the family after marriages. This naturally brings about the concern that how will the availability of a social security system affect people’s willingness to give birth to a child in a rural area.

The establishment of a sound social security system possibly has opposite impacts on the economic motivation of willingness of fertility. 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 which is needed under the absence of social security system. On the other hand, the social security system relaxes the budget constraints of low-income families, and the income effect makes the optimal number of births increase. From comparative studies, both theoretical and empirical, mostly support the substitution effect of social security for fertility and stand for the change in the direction of a negative impact.

In October 2002, China clearly stated that governments at all levels should actively guide farmers to establish a new type of rural cooperative medical system (NRCMS) that focuses on coordinating major illnesses. This paper extracts the first pilot of 256 rural areas in 2003 from China Health and Nutrition Survey (CHNS) dataset to study the impact of the establishment of a new rural cooperative medical care system on the fertility preference of rural women (rural families). Since 2003, the central government has arranged cooperative medical subsidies for farmers participating in the new cooperative medical system in the central and western regions except urban areas at a rate of 10 yuan per capita per year, and the local fiscal subsidies shall be no less than 10 yuan per capita per year. The annual payment standard of individual farmers should not be less than 10 yuan, and areas with good economic conditions can increase the payment standard accordingly. As of December 2004, a total of 310 counties across the country had participated in the new rural cooperative medical system, with 19.45 million households and 68.99 million farmers participating in the cooperation, with a participation rate of 72.6%.

Logit model is chosen in this paper to explain the dummy variable 'whether to raise another child'. 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.

From the empirical results of logit models, both coefficients of *insurance* are significantly negative, which indicates that the probability of wanting another child is significantly lower for 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. The results of the Difference-In-Difference estimates using the data from 2000 to 2004 show that our conclusion is robust.

2. Literature Review

Beneficial social security programs have effects on family-based choice such as fertility (Ehrlich and Liu, 2007). Previous researches documented a negative impact of the expansion of the social security system on the birth rate (Barro and Becker, 1989; Nishiruma and Zhang, 1995). Especially, Boldrin and Jones (2002) found a sizeable effect of government-provided pensions on fertility, based on the framework that parents expect their children to take care of them at their old ages. However, most of the studies were based on the Pay-As-You-Go or Fully Funded social security system, which is not similar to the new rural pension insurance in China.

Since first launched in 2003, the impacts of the NRCMS on the economy and growth have been studied by many researchers in China. The literature analyzing the New Rural Cooperative Medical System in China found significant impacts of the new system on work, consumption, migration, and other behaviors of people in the rural area. Ma et al. (2010), using data from CHNS, showed that the new rural cooperative medical system significantly increased the household food consumption in China's rural area. Bai et al. (2012) analyzed the rural fixed-point observation data from 2003 to 2006 and concluded that the NRCMS is positively related to the non-healthcare consumption of people in the rural areas. Their results indicated that the effects of the NRCMS are stronger among families with lower income and worse health status. These results are consistent with research done by Qi (2011), which suggested that the NRCMS plays an important role in reducing poverty, alleviating inequality, and improving household income of farmers, using the micro-panel data covering 30 provinces and autonomous regions in China from 2003 to 2006.

Other influences of the NRCMS include preventive savings (Bai and Wu, 2004), labor mobility (Qin and Zhi, 2011), and the health status of people in rural areas (Zhu, 2009). As extensive studies documented the positive effects of the NRCMS on the economy and welfare, very few researchers analyzed the relationship between the NRCMS and fertility, which is strongly related to labor supply and economic growth in the rural areas. Wang and Peng (2015)

suggested that the impacts of NRCMS on fertility can be divided into income effect and split-over effect, which influent fertility rate in opposite ways. The income effect is induced by the NRCMS as it improves the household income in rural areas. The increase in income will then lead to an increase in the fertility rate. Meanwhile, since people with insurance and pensions might be more independent from their children at their old ages, they may have less tendency to give birth and raise children. The spillover effect refers to the decreased fertility rate due to this decreased tendency.

Empirical methods to analyze the relationship between social security and fertility can be divided into two categories. Research in both categories indicated a negative relationship between social security programs and the fertility rate. The first one is to conduct cross-country studies on national or regional observations, in the form of cross-sections or panels. For example, Holm (1975) studied the impact of social security programs on total fertility rates with cross-country data from 67 countries and found a significant negative impact. The author concluded that social security has as much impact on fertility as other traditional factors, such as education and income. Boldrin et al. (2005) reached similar conclusions on the relationship between the social security tax rate and the total fertility rate in 1997 using the data 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 a lower fertility rate per woman. The second method is to conduct time series studies based on long-term data from a certain country or region. For example, Cigno et al. (2002) using time series data in German showed that the increase in social security coverage has a negative impact on reproduction. A study of time series data in Italy from 1931-1984 showed that for a 10% increase in the amount of per capita pension, the total fertility rate drops 2% (Cigno and Rosati, 1992).

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. This survey reveals information about demographic characteristics, socioeconomic status, family relationship, agricultural status, health status as well as fertility view. It covers 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).

The part of insurance status, family structure, demographic characteristics, as well as fertility preference, are more of our concern in this dataset. To investigate our topic, the sample clearing primarily comes from four restrictions: 1) Only sample from the pilots of NRCMS in 2003 are kept; 2) 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; 3) we drop the group of sample women who are unmarried or over 50 years old, to make the variable of fertility preference meaningful; 4) we only use data from 2000 to 2009, which contains four rounds (2000, 2004, 2006, and 2009): to better measure the effect of the new insurance system, we make sure our data cover a time period from before pilot phase to after extensive development stage of NRCMS. Other literature 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 *anotherchild* is identified by binary choice question ‘do you want another child’. This question appears in the

ever-married women set of surveys, which indicates that our dependent variable contains only the fertility preference of women. *NRCMS* is included as a key explanatory variable to depict whether the observation attends NRCMS. Implementation time is set at 2003 when NRCMS was authorized officially by China's central government. Interaction of the two variables *insurance*post* is the DID variable, measuring the effect of attending new rural medical system on fertility view.

Table 1-Variable Identification

Variables	Description	Values
Explained Variable		
anotherchild	Want another child	1=yes, 0=no
Explanatory Variables		
NRCMS	Attend new rural commercial medical	1=yes, 0=no
post	Post or before insurance	1=post2003,0=before2003
*NRCMS*post*	DID variable	
Control Variables		
(1) Personal Attributes of Couple		
commercial_insurance	Wife attends other commercial	1=yes, 0=no
wife_age	Age of wife	
husband_age	Age of husband	
wife_educ	Wife's year of education	
husband_educ	Husband's year of education	
(2) Family attributes		
household_income	Household net income	
household_size	Quantity of household members	
son_now	Already have a son	1 = have a son, 0 = do not
daughter_now	Already have a daughter	1 = have a daughter, 0 = do not
(3) Traditional ideas of raising children for old age		
mother_alive	Wife's mother still alive	1= still alive, 0= not alive
mother_in_law_alive	Wife's mother-in-law still alive	1= still alive, 0= not alive

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 the current number of sons & daughters, family size, as well as household income level. The third group controls the exogenous effects of traditional idea. To measure the strength of traditional notion of 'raising more children for the old age' as well as 'a son could better carry on the family's lineage', we incorporate two proxy variables *mother_alive* and *mother_in_law_alive.* These two variables provide information about whether the wife's and husband's mother is still alive. To illustrate, whether the observation's mother or her husband's mother is still alive is strongly correlated with both the couple's 'burden' of caring for their parents as well as the impact of their parents' traditional thought. A wife, for example, is likely to visit or care about her parents and be impacted by the traditional thought of Chinese elder people more frequently. In other words, 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 grow up in families with strong traditional fertility view rooted are more likely to raise children for her old age.

3.3 Summary Statistics

Table 2 contains the summary statistics on the samples. Among the observations, 12.5% of them have an incentive to give birth to another child and 61.6% attend NRCMS. The mean age of the wives and husbands in the sample are 38.787 and 40.711 respectively.

Table 2 Panel B reports the summary statistics for the survey years 2000 and 2004, and these two rounds of surveys are implemented before and after the NRCMS was officially launched. Not surprisingly, compared to the whole sample in Panel A, fewer observations attend NRCMS (50.7%) and more want to raise another child (13.7%).

Table 2-Summary Statistics

Variables	Mean	St.dev	Min	Max	Observations
Panel A: Whole sample (2000,2004,2006,2009)					
anotherchild	.125	.331	0	1	1822
NRCMS	.616	.487	0	1	1822
commercial_insurance	.061	.24	0	1	1822
wife_age	38.787	7.383	18.7	49.9	1822
husband_age	40.711	7.752	15.3	77.8	1822
wife_educ	8.621	3.902	0	16	1822
husband_educ	9.645	3.426	0	18	1822
household_income	28738.201	38245.562	0	900600	1822
household_size	4.083	1.394	2	11	1822
son_now	.297	.457	0	1	1822
daughter_now	.235	.424	0	1	1822
mother_alive	.744	.436	0	1	1822
mother_in_law_alive	.685	.465	0	1	1822
Panel B: Partial sample (2000,2004)					
anotherchild	.137	.344	0	1	690
NRCMS	.507	.5	0	1	690
commercial_insurance	.101	.301	0	1	690
wife_age	38.499	7.506	18.8	49.9	690
husband_age	40.478	7.915	15.3	65.5	690
wife_educ	8.527	3.89	0	8.527	690
husband_educ	9.637	3.436	0	9.637	690
household_income	20688.168	20701.957	0	20688.168	690
household_size	4.08	1.356	2	4.08	690
son_now	.471	.499	0	1	690
daughter_now	.373	.484	0	1	690
mother_alive	.741	.438	0	1	690
mother_in_law_alive	.671	.47	0	1	690

In terms of the distribution of insurance attendance and fertility view for the whole sample, Table 3 shows that observations who attend NRCMS have a 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

We implement a logit model to explain the social security's effect on women's inclination to have another child. In this model, we utilize four-year data from 2000 to 2009.

$$\Pr(\text{child} = 1|insurance_{it}, X_{it}) = \frac{1}{1 + \mathrm{e}^{-(\alpha+\beta insurance_{it}+\delta X_{it})}}$$

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 periods and different models 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 the 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 do not change as time goes by.

4.2 Linear Difference-In-Difference Model

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

$$child_{it} = \alpha + \beta_1 insurance_{it} + \beta_2 post_{it} + \gamma insurance * post_{it} + \delta X_{it} + \varepsilon$$

where $insurance_{it}$ is the dummy variable identifying the treated group, which is measured by whether the individual attends the NRCMS; the control group is, therefore, those who do not 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 specific village individual lives in'; however, we do not include this instrumental variable because of data limitation. $post_{it}$ is another dummy variable and it is assigned as 1 when the survey year is 2004 and 0 for 2000. The effect of attending NRCMS on fertility choice is measured by parameter γ. X_{it} contains a set of key control variables mentioned above.

5. Empirical Results

5.1 Logit Model

Table 4 shows the empirical results of the logit model which covers four-year data from 2000-2009. More specifically, we only include the standard control variables in our first regression, while model (2) includes the information whether the couple already has a son or a daughter as control variables. Moreover, model (3) takes whether the couple's parents are alive in control, to investigate whether the traditional thoughts of the previous generation would affect their willingness to have another child. And model (4) contains all the variables mentioned above.

Table 4 Logit model results of four-year data

VARIABLES	(1) anotherchild	(2) anotherchild	(3) anotherchild	(4) anotherchild
NRCMS	-0.444**	-0.533**	-0.435**	-0.527**
	(0.212)	(0.215)	(0.214)	(0.217)
commercial_insurance	-0.257	-0.153	-0.264	-0.167
	(0.332)	(0.336)	(0.333)	(0.337)
household_income	2.12e-06	1.38e-06	2.09e-06	1.38e-06
	(1.57e-06)	(1.68e-06)	(1.59e-06)	(1.70e-06)
household_size	-0.154**	-0.161**	-0.165**	-0.170**
	(0.0658)	(0.0660)	(0.0663)	(0.0665)
wife_age	-0.137***	-0.139***	-0.138***	-0.140***
	(0.0302)	(0.0302)	(0.0304)	(0.0304)
husband_age	-0.0315	-0.0329	-0.0258	-0.0278
	(0.0294)	(0.0294)	(0.0298)	(0.0298)
wife_educ	-0.0187	-0.0263	-0.0204	-0.0277
	(0.0289)	(0.0293)	(0.0291)	(0.0294)
husband_educ	0.0618**	0.0651**	0.0611**	0.0643**
	(0.0307)	(0.0311)	(0.0309)	(0.0312)
son_now		-0.736***		-0.730***
		(0.254)		(0.254)
daughter_now		-0.321		-0.282
		(0.264)		(0.264)
mother_alive			0.0199	0.0166
			(0.235)	(0.235)
mother_in_law_alive			0.293	0.248
			(0.226)	(0.228)
Constant	4.477***	4.887***	4.155***	4.606***
	(0.825)	(0.843)	(0.905)	(0.924)
Observations	1,822	1,822	1,822	1,822
Pseudo R-squared	0.188	0.197	0.190	0.198

Standard errors in parentheses

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

From the empirical results, we can see that in all four regressions the coefficient of *NRCMS* is significant in explaining the probability of willingness to have another child, which indicates that the attendance of the new social security would have a downward effect on fertility desire. 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, the attendance of other insurances does not have any significant effect. One possible reason is that NRCMS has higher coverage and provides better benefits than other kinds of insurances. Besides, the increment of the wife's age has a downward effect on the probability of wanting another child. While a husband's education level has a positive impact on the wife's fertility desire, the wife herself 's education level does not matter.

The result of regression (2) corroborates with our speculation that the phenomenon of 'prefer sons to girls' generally exists. To illustrate, women who already have a son are less likely willing to give birth to another child than those who do not. However, we do not observe similar circumstances in girls. In other words, people have the demand of having a son to prepare for their old age or carry on their families' lineage. Moreover, the information about the couples' parents does not have significant explanatory power on 'whether want to have another child', which may indicate that rural women's traditional thoughts are not affected by their previous generations' behavior. Nevertheless, it is also possible that 'whether the wife or husband's mother is still alive' is not an appropriate proxy for previous generations' thought. We could come up with that 'distance to parents' may be a better proxy for it is more correlated with the interaction between the couple and the previous generation, but we failed to include it because of data limitation.

However, the empirical result discussed above may not be the 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

VARIABLES	(5) anotherchild	(6) anotherchild
NRCMS	-0.525*	-0.597**
	(0.278)	(0.289)
commercial_insurance	-0.659	-0.668
	(0.459)	(0.489)
household_income	4.81e-06	3.80e-06
	(3.83e-06)	(3.87e-06)
household_size	-0.0103	0.0851
	(0.117)	(0.119)
wife_age	-0.0558	-0.0682
	(0.0569)	(0.0590)
husband_age	-0.108*	-0.107*
	(0.0563)	(0.0584)
wife_educ	0.0390	0.0151
	(0.0480)	(0.0505)
husband_educ	0.119**	0.100*
	(0.0526)	(0.0548)
son_now		-1.406***
		(0.318)
daughter_now		-0.945***
		(0.322)
Constant	2.488*	3.911***
	(1.323)	(1.407)
Observations	690	690
Pseudo R-squared	0.231	0.279

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

From Table 5 we can see the result is generally the same as that using a longer time segment. In this model, the *NRCMS* still illustrates a negative effect on women's fertility desire. The consistency of the results demonstrates that our analysis of the 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 the survey from 2000 to 2004.

Table 6 Linear DID results of four-year data

Anotherchild	(7)	(8)
NRCMS	-0.021	-0.022
post	0.132***	0.134**
*NRCMS*post*	-0.024**	-0.013*
ln(household_income)	-0.03	-0.03
wife_age	-0.014*	-0.014*
husband_age	0.002	0.002
wife_educ	0.017	0.017
husband_educ	0.012	0.012
commercial_insurance		-0.003**
observation	690	690
R-squared	0.134	0.134
*** p<0.01, ** p<0.05, * p<0.1		

As mentioned before, the key variable in these two regressions is *NRCMS*post*, which indicates obtaining new rural cooperative insurance in 2004. Complying with the results of logit models, the empirical results illustrate that women joining NRCMS after 2003 actually have less desire for a new child, which is reflected by the negative and significant coefficient of *NRCMS*post*. Moreover, by including another control variable *commercial_insurance*, part of the dependent variable is explained by the coefficient of the cross term still remains significant and negative, which validates the robustness of our previous results. However, we notice that the effect

of the cross term is really small, which could be explained by the tiny time interval between the start time of NRCMS and the time of the survey in 2004. In this sense, people who joined this insurance may not be fully aware of the compensation and benefits of the NRCMS.

Additionally, the coefficients of *post* are significant and positive in both models. We reckon that this may be caused by a general increment of rural residents' wealth as well as a change of fertility perception which is not fully covered by the control variables.

6. Conclusion and Discussion

Based on the research result, the attendance of the new rural commercial medical system (NRCMS) has a significant effect on people's willingness of giving birth to another child, and that most results are in accordance with our initial hypothesis. In this paper, we implemented two different models to examine the effect of NRCMS on people's willingness whether wanting another child or not. First, we adopted the logit model and utilize data from 2000 to 2009. We estimated the probability of wanting to have another child, given the insurance attendance status and other control variables of individual i at time t. From the empirical results, we found that in all four regressions the coefficient of NRCMS is significant in explaining the probability of willingness to have another child, which indicates that the attendance of the new social security would have a downward effect on fertility desire. Besides, we made a robustness test using different time periods and different models separately, and we implemented a linear DID model to eliminate the effects of unobserved heterogeneity that does not change as time goes by.

To conclude, the results from the logit model and the DID model are in accordance with each other, and we may get the conclusion from this research that the effect of NRCMS on people's willingness whether wanting another child or not is significantly negative. To put it in other words, people tend to be less willing to give birth and raise another child after they voluntarily enroll in the insurance program, specifically, the NRCMS in this study. These results are in accordance with our intuition that social security provides an alternative way of preparing for the old other

than giving birth to children. However, the attendance of other insurances does not have any significant effect. One possible reason is that NRCMS has higher coverage and provides better benefits than other kinds of insurances. Moreover, we verified the existence of son preference by including son-related variables.

As mentioned before, our research also has potential limitations. First, due to data limitation, our sample size is relatively small when we add control variables. Although the CHNS's coverage is high, the sample size is not large enough when we drop the observations that are not on the pilot list. Moreover, we included the information of whether the couples' parents are alive but failed to include their distance. More specifically, if the couple and their parents are in the same village, they are more likely to be influenced by their parents, and more likely to care for the elder generation. Therefore, we anticipate that those who live near their parents would be more likely to have the willingness to have more children.

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