Theoretical Mechanism and Empirical Analysis of "Cold" Response to "Two-Child" Policy

Weidong Jin, Jiejing Gong, Zhonggen Mao*

Recently, the policy of relaxing the "two-child" birth control has obviously met a "cold" response, and China's population growth is facing a huge risk of "cliff-type" decline. Using text analysis and quasi-experimental method, this paper theoretically and empirically demonstrates the change of fertility costs in urban and rural areas and its influence on fertility rate, and then on the effect of "two-child" fertility policy. The results show that, in recent years, as fertility costs change, the fertility desire of rural families has greatly reduced, while those of urban families has increased slightly, then the fertility desire of urban and rural areas declines in general. At the same time, the actual fertility rate is much lower than the desirable fertility level, so the "two-child" policy fails to achieve satisfactory results. the key to the future population policy reform in China is to draw lessons from the historical experience of developed countries and eliminate the adverse effects of changes in fertility costs through fertility incentives measures.

Keywords: fertility policy, fertility costs, text analysis, quasi-experimental analysis

1. Introduction

For a long time, China's family planning policy has made outstanding contributions to restraining excessive population growth and maintaining the coordinated development of population reproduction and material reproduction. However, along with the continuous decline of fertility level, China's population problem has changed from the challenge of high fertility rate to the difficulties of low fertility rate, such as population aging, fewer children and shortage of labor supply. Recently, the series of progressive fertility policy reform from "two-child policy for couples who are both

* Weidong Jin (email: jinweidong@sdufe.edu.cn), Professor, School of Economics, Shandong University of Finance and Economics, China; Jiejing Gong, Master Student, School of Economics, Shandong University of Finance and Economics, China; Zhonggen Mao (email: mangen@swufe.edu.cn, corresponding author), Director and Professor, Western China Economic Research Center at Southwestern University of Finance and Economics, China. Fund Projects: Major project of Shandong Soft Science Research Program "Thoughts and Countermeasures of Scientific and Technological Innovation Promoting Supply-Side Structural Reform" (2016RZB01041), Shandong Social Sciences Planning Research Project "Quality–Oriented Standardization Construction of Urban and Rural Compulsory Education" (16CGLJ10), Shandong Provincial Colleges and Universities Superiority Discipline Talents Team Training Program.

from a single child family", "two-child policy for couples where either the husband or the wife is from a single child family" to "universal two-child policy" is the positive response to the change, which has aroused widespread concern in society.

Unlike the optimistic estimates of a few scholars, most of the surveys and studies show that the above-mentioned fertility policy has met an obvious "cold" response, which is far from the desired expectations (Qiao, 2015). Figure 1 shows that the family planning reform has produced the short-term fertility fluctuations, but has not completely changed the general trend of continued decline in fertility. The "cold" response of "two-child" policy highlights the shortcomings of fertility research in China (Zheng, 2015), as well as the urgency and necessity of exploring other fertility determinants besides the population policy.

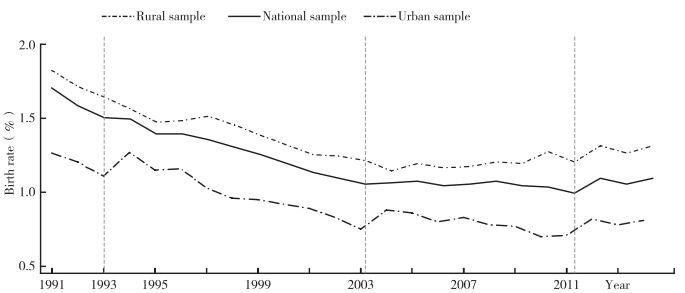

Figure 1. Family Planning Reform and Fertility Rate Change

Notes: Longitudinal axis represents the birth rate, which refers to the ratio of 0-year-old population to the total population in China; Considering the time lag of childbearing, the fluctuation of childbearing in 1993, 2003 and 2011, especially in urban areas, is mainly due to the previous family planning reform that include: the important amendments to family planning regulations made by some provinces and municipalities (such as Beijing, Fujian, Hubei, Yunnan, Guangxi, Shaanxi, Guangdong, Liaoning, Jilin and Anhui), the formally implemented of Population and Family Planning Law and China's Population and Family Planning Regulations in 2002, the policy that abolishing the birth spacing restrictions in some provinces and municipalities from 2007 to 2009.

Sources: *China Population and Employment Statistics Yearbook* and *China Population Statistic Yearbook.*

The new family economics indicate that childbearing is strictly one family behavior, which could bring costs and benefits to families. In order to maximize utility, families make decisions in children fertility and general commodity consumption, which leads to the fertility changes. Under the condition of the popularization of contraceptive methods, the fertility research based on family decision-making is both realistic and reliable (Butz and Ward, 1979). Moreover, with the development of society and economy, the self-centered modern birth culture has made childbearing as the durable consumer goods, which increases the importance of family decision analysis (Yin, 2013).

Therefore, this paper demonstrates the reproductive decision-making of micro-families, and identifies the reason for the "cold" response to "two-child" policy, which is of great significance to the research on fertility and reform of policy in china. In

addition, along with a series of recent fertility policy reform, population development is substantially changing (Shi and Yang, 2014). The resulting local fertility experiments also provide a rare empirical basis for the study.

2. Literature Review

For a long time, fertility in many countries continuously has declined along with the economic development, and individual characteristics, family characteristics and institutional environment are considered as the main determinants. Fertility control and family support policies are considered as the effective means to regulate the population development (Luci-Greulich, 2013). Unlike this kind of analysis, the sequential model fertility theory holds that the cost-benefit analysis of economics has more advantages (Udry, 1983) in the study of "high-birth", which has been supported by some empirical evidence (Schröder *et al.*, 2016). Moreover, the traditional fertility concepts, such as "raising sons to support parents in their old age", "more happiness comes with more offspring" have gradually declined. Parents increasingly deliberate fertility from their own utility (Li and Luo, 2009), which increases the importance of cost-benefit analysis in fertility research in China. Since the 1960s, economists represented by Leibnstein and Becker have gradually introduced cost-benefit analysis into the study of micro-family fertility, which results in cost-utility theory, quantity-quality substitution theory, endogenous fertility model and intergenerational wealth flow theory.

In order to serve the specific practice of family planning reform, Chinese scholars have also discussed the fertility decision-making of micro-families (Hu and Mu, 1995). However, due to the difficulty in measuring fertility costs and benefits, many papers study people's subjective evaluation of fertility costs and benefits and the resulting fertility changes with the method of simple linear regression, statistical description, and speculative analysis based on social questionnaires. Theses studies have important reference value for understanding the law of population development and evaluating the effect of family planning reform in China. However, few papers have fully demonstrated the fertility decision-making mechanism of micro-families based on cost-benefit analysis framework, and provided direct empirical evidence. This restricts the practical guiding significance of above research, and becomes the important reason for the wrong prediction of the "two-child" policy by academic circles and government (Zheng, 2015). In addition, questionnaire carried out in only one region or for few people could lead to systematic bias in sample selection, and the simple statistical methods of analyzing the reproductive behavior decision-making could also lead to missing variables and endogenous problems, which is easy to produce different or even contradictory research conclusions.

In summary, this paper uses the cost-benefit model to demonstrate the fertility decision-making mechanism of micro-family and explore the reasons of "cold" response to "two-child" policy. Contributions are made in the following three aspects.

First, taking into the consideration that the actual fertility rate in many areas in China is far below the level of policy fertility, this paper analyzes the micro-family fertility decision-making mechanism from the point of fertility demand, and expects to obtain the reliable knowledge about the change of fertility. Second, the data of China Family Panel Studies (CFPS) covered 16000 household samples that include all family members. Based on the data, this paper tests the birth decision of micro-families, which could avoid the systematic bias in sample selection. Third, many empirical studies about the fertility behavior generally have the problems of missing variables and endogenous problems, this paper uses the quasi-experimental method and instrumental variable method to effectively avoid the possible estimation errors.

3. The Theoretical Mechanism of "Cold" Response to "Two-Child" Policy

Considering the long-term implementation of different family planning policies in rural and urban areas, this paper uses text analysis method to establish a cost-benefit model of family fertility decision-making in urban and rural areas, which is conductive to differentiate the fertility level of urban and rural areas with different fertility desire and the determined effect of "two-child" fertility policy.

3.1. Equilibriom of Family Planning in Urban and Rural Areas

This paper collects a large amount of literature on fertility behavior, and uses data mining to find the textual descriptions of fertility costs and fertility benefits. Since most married couples in China that have one child and few have more than three children, most of research focuses on the cost and benefit of "two-child" (Zheng, 2009). In view of this, this paper limits the fertility costs to the marginal costs when giving birth to the second child, and the benefits of the second child could be interpreted as the marginal fertility benefits. Therefore, the cost-benefit model is used to analyze the "two-child" fertility decision-making.

3.1.1. Difference in Fertility Costs between Urban and Rural Families

Many literatures have emphasized the fertility expenditure has an important impact on the decision-making of "two-child", but it also suggests that the relative value of fertility expenditure, rather than the absolute value, has a significant determinant role. In order to effectively reflect the subjective perceived pressure of fertility costs, this paper uses the ratio of fertility expenditure to per capita disposable income as the measurement index. In face of fertility expenditure which is almost the same in the urbam and rural areas, more than 3 times of income gap between urban and rural areas could make the rural households face greater pressure of fertility costs (Chen, 2011), which is illustrated in Figure 2 that the marginal fertility cost curve C_2 of rural families is higher than curve C_1 of urban families.

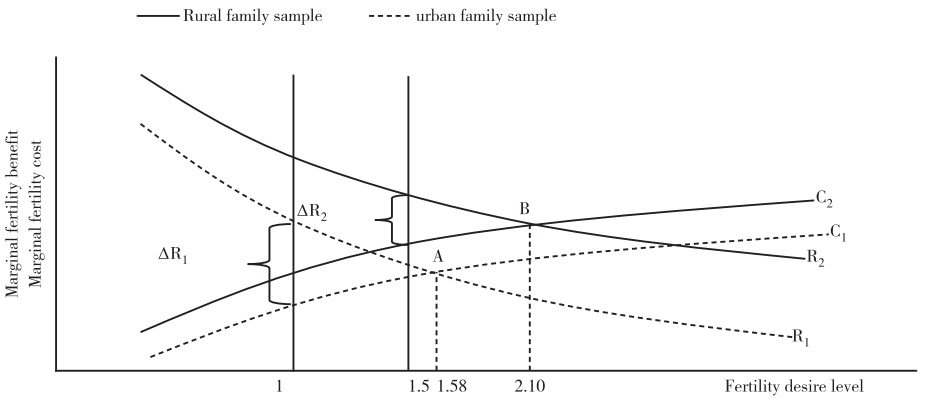

Figure 2. Analysis of Cost-Benefit of Fertility Desire Level in Urban and Rural Areas in 2001

Notes: The horizontal axis represents the fertility desire level, while the vertical axis represents the marginal fertility cost and marginal fertility benefit; The points A and B are the equilibrium points of urban and rural family fertility decision-making without fertility control, which is corresponding to 1.58 and 2.10 children.

3.1.2. Difference in Fertility Benefits between Urban and Rural Families

The surveys shows that the traditional concept of childbearing in rural families is stronger, and the purpose of raising children is to carry on the family line, to support parents in their old age and to increase economic income, while the emotional psychological needs in the perspective of modern reproductive culture have become the main motivation for urban families (Li and Xiang, 2010; Xu and Qu, 2011). Since "one-child" could basically meet the psychological needs of childbearing, fertility benefits of "two children" are different in the rural and urban families under influence of different

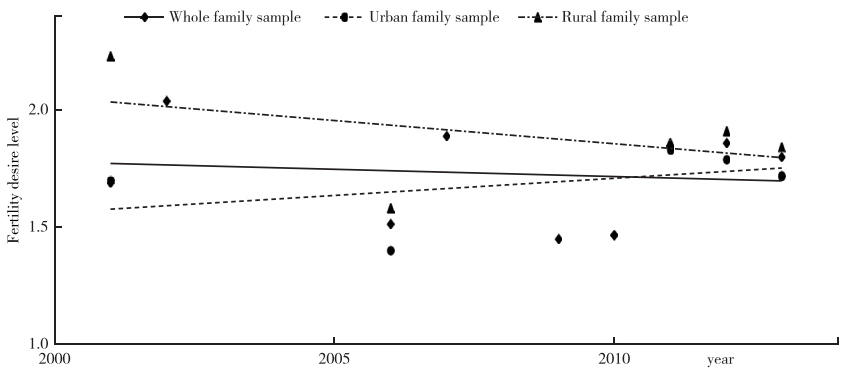

Figure 3. The Latest Changes of Fertility Desire Level in Urban and Rural Households

Note: the horizontal axis represents the year, the vertical axis represents the level of willingness to give birth. On the whole, the curve of whole family sample generally locates between urban and rural family sample curves.

fertility cultures (Zheng, 2009),[1] which indicates that the marginal fertility benefit curve R_2 of rural families is higher and steeper than curve R_1 of urban families.

Taking into account the above two factors as well as the fact that the starting year for the "two-child policy for couples who are both from a single child family" was 2002, based on the existing literature, this paper uses the text analysis method to calculate the desired fertility level of urban and rural households in 2001 (1.58 and 2.1 respectively), which is shown in Figure 2[2]. The equilibrium of fertility decision-making between urban and rural families is the point of A and B, while ΔR_1 and ΔR_2 is the difference between marginal fertility benefit and cost of urban and rural families under the policy of "one child" and "one and half a child" respectively.

3.2. The Reason of "Cold" Response to "Two-Child" Policy

As shown in Figure 3, the desired fertility level of rural households decreased from 2.1 in 2001 to 1.8 in 2013 while the level of urban households increased from 1.58 to 1.75, which indicates that the overall fertility level of urban and rural residents has been declining. In addition, it is difficult to implement fertility intention into fertility behavior, and the difference between them could even reach more than 0.4 (Hou, 2014). Therefore, it could be inferred that the actual fertility rate of urban and rural families is far below the level of "two-child" policy, which results in the inevitable phenomenon of "cold" response to "two-child" policy.

3.2.1. Pressure of Fertility Costs in Rural Families Increases Rapidly

In rural areas, the cost of raising children, education and marriage has increased rapidly as opposed to lower income level (Tan, 2015; Liu, 2016), which increases the pressure of fertility costs of rural families. Therefore, without the change of fertility culture, the marginal fertility cost curve C_2 for rural households in Figure 4 rises rapidly, and the fertility equilibrium point changes from pint B to point B', which indicates that the desired fertility level obviously decreases. This explains the significant reduction in the fertility level of rural families in Figure 3.

Hypothesis 1: The pressure of fertility costs of rural households rises rapidly, which inevitably reduces their desired fertility level.

---

[1] At the same time, urban residents generally feel the benefits of only child in the influence of different family planning polices in urban and rural areas, and the two-child fertility benefits has a low evaluation (Zheng, 2009; Tan, 2015).

[2] Based on the text analysis, all data is from the research literature. For the missing value of the desired fertility level in some years, this paper replaces these values with the idea fertility value. The accounting standard is that the desired fertility level is generally lower than the ideal fertility level (0.2) (Li, 2011).

3.2.2. Pressure of Fertility Cost in Urban Families Decreases Rapidly

The per capita disposable income of urban residents increased by 4.28 times from 2001 to 2014 (see *China Statistical Yearbook* over the years), and the self-centered urban consumer culture developed rapidly (Dai and Lu, 2001), which relieved the pressure cost perceived by urban families. Therefore, the survey data shows that the proportion of urban families who choose not to have two children due to the cost pressure has significantly decreased, the desired fertility in urban families has been rising slowly, which has gradually narrowed the gap with rural families (Zheng, 2009; Li, 2011), which explains the small increase in the fertility level of urban households that is shown in Figure 4.

Hypothesis 2: With the pressure of fertility costs of urban families decreases slowly, their desired fertility level increases slightly.

To sum up, differences of fertility costs between urban and rural areas would eventually lead to the general decline of the desired fertility. The "cold" response to "two-child" policy is the inevitable result. However, this theoretical analysis would need more empirical evidence to support.

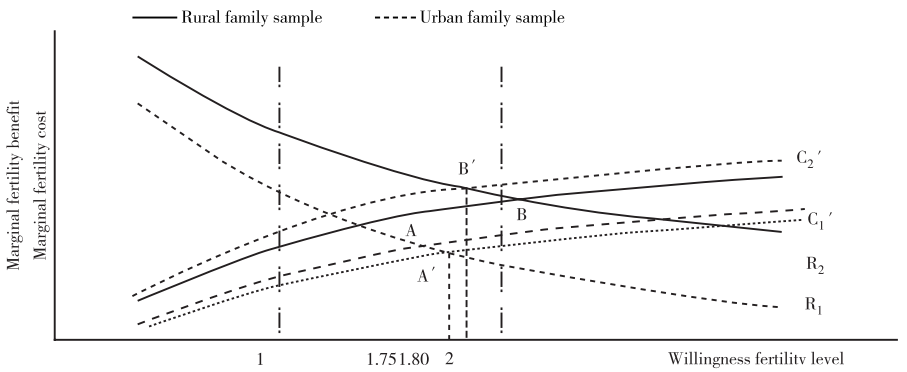

Figure 4. Change of Fertility Desire Level in Urban and Rural Areas

Notes: The horizontal axis represents the fertility desire level, while the vertical axis represents the marginal fertility cost and benefit. C_2' is the latest marginal fertility cost curve of rural households, while C_1' is the latest marginal fertility cost curve of urban households. A' and B' represents the latest equilibrium points of fertility decision-making of urban and rural households without fertility control. According to the above analysis, their corresponding level of fertility desire should be 1.75 and 1.80.

4. Test Method and Data Description

In order to avoid possible problems of sample selection bias, missing variable and endogeneity, this paper uses the quasi-experimental methods (including DID and DDPSM) to test the change of fertility costs and verify the above theoretical analysis of the "cold" response to "two-child" policy based on the household micro-survey data.

4.1. Test Method of Fertility Costs

DID analysis is to select two groups of samples that include the policy implementation and non-implementation. By comparing the changes before and ofter policy implementation, actual effect of policy reform could be reflected. However, DID analysis requires that no difference between the two groups exists the two samples, which limits the reliability of the conclusions. Making use of the advantages of DID analysis, DDPSM analysis could eliminate the difference of observable feature between experimental group and control group by propensity score matching. With the method of DDPSM, this paper finds a matching control group sample for each "two-child" family, which could accurately estimates the change of fertility costs of "two-child".

It is generally believed that family makes the fertility decision. This paper selects family samples in China Family Panel Studies (CFPS). According to relevant literature, "two-child fertility policy for couples who are both from a single child family" was first piloted in Hubei, Gansu and Inner Mongolia in 2002, and launched in all provinces and cities in November 2011. The "two-child fertility policy for couples where either the father or mother is from a single child family" was first proposed in 2010, and was formally implemented in the whole country after the Third Plenary Session of the Eighteenth Central Committee in 2013. Therefore, in order to obtain more "two-child" family samples, and to reflect the latest changes in fertility costs, two quasi-experimental analyses are conducted with the CFPS family samples in 2010, 2012 and 2014. In the first quasi-experimental analysis, family with one child from 2010 to 2012 is taken as the control group, while family with two children in the period from 2010 to 2012 is taken as the experimental group. In the second quasi-experimental analysis, family with one child from 2012 to 2014 is taken as the control group, while family with two children in the period from 2012 to 2014 is taken as the experimental group. In this way, the change of fertility costs of "two-child" could be tested through comparing the results of two DDPSM analyses.[1]

Since there are many factors affecting fertility costs and some of the factors could affect family fertility decision-making, the selectivity bias between experimental group and control group appears. Many control variables, including family characteristic variables (per capita income, per capita health status, population dependency ratio), household head variables (age, gender, type of household registration) are introduced into the estimation equation:

---

[1] This paper analyzes the changes of fertility costs in recent years rather than only one family planning policy, with which to verify the reason for "cold" response to "two-child" fertility policy. Moreover, as mentioned above, Family planning policies have obvious gradual characteristics, and there is no clear time node. Therefore, the two quasi-experimental analyses involved no reform time point and effect delay of family planning policy.

$$C_{ijt} = \alpha + \beta \cdot D_{ij} + \gamma \cdot DT_t + \theta \cdot D_{ij} \cdot DT_t + \phi \cdot X_{ijt} + \varepsilon \cdot \psi_{ijt} + \zeta \cdot Z_{ij} + u_{ijt} \quad (1)$$

In the equation, C_{ijt} represents the fertility costs of family i in the group j in the year of t, and D_{ij} is the dummy variable of fertility. If the number of children increases from one to two in the period from 2010 to 2012 or from 2012 to 2014, the family would be in the experimental group sample of quasi-experimental analysis, and D_{ij} is 1, while the family with one child would be in the control group sample, and D_{ij} is 0. DT_t is the time dummy variable. In the first quasi-experimental analysis, value of sample in 2010 is 0 while in 2012 is 1. In the second quasi-experimental, value of sample in 2012 is 0 while in 2014 is 1. $D_{ij} \times DT_t$ is the interactive term of time and the two-child fertility, and the estimated coefficient is the actual impact of two-child fertility. X_{ijt} represents the household head characteristic variable of family i in group j in the year of t. Ψ_{ijt} is household characteristic variable of family i in the group j in the year of t. j with the value of 1 and 2 is the sample of urban and rural respectively. t with the value of 0 and 1 is the year of 2010, 2012 and the year of 2012, 2014 respectively. In addition, the dummy variable Z_{ij} of eastern, central and western regions is added in the estimation equation to control the influence of regional factors.

4.2. Data Sources and Indicators

The data used in this paper are from China Family Panel Studies (CFPS) conducted by China Social Science Research Center of Peking University. To estimate the missing values in family samples, this paper carries out the regression interpolation according to the characteristics of household heads and families. In total, and 1050 urban household samples and 1427 rural household samples are obtained. In the two quasi-experimental analyses, the new added family samples that from 2010 to 2012, as well as from 2012 to 2014 were deleted in order to eliminate the impact of newly established and changing marriage families.

4.2.1. Explanatory Variable and Explained Variable

This paper selects the dummy variable of whether to have two children as the explanatory variable, and the family consumption is selected as the explained variable to reflect the perceived pressure of fertility costs perceived by families in urban and rural areas. As in the previous analysis, in the decision-making of "two-child" reproduction, affordable or unaffordable, is mainly reflected by a subjective self-perception, rather than the absolute level of fertility costs and benefits (Zheng, 2009). In order to effectively reflect the family's perceived fertility costs, the household consumption is used as the proxy variable in the estimation equation (1). The selection method of proxy variables has three advantages. Firstly, consumption change could better reflect the pressure of

perceived fertility costs. Secondly, in compared with fertility expenditure and family income, there is no obvious causal endogeneity between consumption and fertility behavior. Thirdly, in addition to the direct fertility expenditure, the household consumption could reflect the fertility costs pressure caused by the opportunity costs. In addition, in order to eliminate the impact of family size, household consumption is replaced by per capita household consumption in this paper.

4.2.2. Selection of Control Variables

The household consumption as the proxy variable of fertility cost pressure is affected by many factors such as family characteristics and household head characteristics. Therefore, these factors are used as control variables in the estimation equation in this paper.

First is per capita household income. The sum of wage income, business income, property income, transfer income and other income are regarded as the measure index of family income. At the same time, relevant data has been deflated with 2010 as the base period.

Second is the family dependency ratio. This variable is defined as the ratio of population under the age of 14 and above the age of 65 to the population aged between 15 and 64. According to the life cycle hypothesis, people usually save during the working life and consume during the non-working life. Therefore, the greater the number of non-working member in one family is, the higher the household consumption is.

Third is per capita health status and the participation in insurance. According to the theory of preventive saving, health status and insurance participation of residents determine the uncertainty of future expenditure, which affects their current consumption. The measurement method of health status is that, the criterion for the situation of health status is to assign the health self-evaluation of family members with per capita, into seven grades. That is, very healthy, relatively healthy and healthy families are assigned with 1, general healthy family is assigned with 2, and the unhealthy, relative unhealthy and very unhealthy family are assigned with 3. The criteria for the situation of participating in insurance are that participating in insurance is assigned with 1 and not participating in the insurance is assigned with 0. Among them, the categories of insurance include endowment insurance, medical insurance and working insurance.

Fourth is the age, sex, occupation, household registration type and education level of household head. These factors are introduced into the estimation equation as control variables, which is because that these factors are related with consumption concept and are the important factors that determine family consumption. Dummy variables are also used to indicate the gender and household registration type. “Male” and “urban household registration” are assigned with 1 while “female” and “rural

household registration" are assigned with 0. Referring to the Classification of Careers in China Family Panel Studies (CFPS), as well as to the research of Li and Xiang (2010), the occupation of household head is also measured with dummy variables, and occupations are divided into five categories: the heads of state organizations, party organizations, enterprises and institutions are assigned with 1, professional and technical personnel are assigned with 2, employees of commerce, service industry, production and transportation equipment operators and related personnel are assigned with 3, those of agriculture, forestry, animal husbandry, fishery and water conservancy are assigned with 4, and those of unemployed, housekeeping workers are assigned with 5. In addition, this paper uses the schooling years to reflect the educational level of household head. Below the primary school is assigned with 0, primary school is assigned with 6, junior high school is assigned with 9, senior high school, vocational high school, secondary technical school and technical school are assigned with 12, junior college and higher vocational school are assigned with 15, undergraduate school is assigned with 16, postgraduate school is assigned with 19, doctoral is assigned with 22.

Fifth is regional dummy variable. Influenced by the level of economic development, traditional cultural concepts and geographical resources and environment, consumption behavior of residents in different regions is naturally different. Moreover, in previous family planning reform, the time and intensity of regional reform are also different. For example, the "one child and half" policy was widely implemented in rural areas in 1984, and the "two-child policy for couples who are both from a single child family" was implemented in Hubei, Gansu and Inner Mongolia in 2002. Therefore, the regional dummy variable is added to the estimation equation.

4.2.3. Statistical Analysis of Related Variables

Obviously, the consumption level of experimental group is significantly lower than that of control group no matter before or after the birth of the second child, which indicates that there are other factors affecting the consumption behavior of experimental group and control group besides the factor of "two-child" birth. Therefore, other control variables must be added into the estimated equation (1).

In addition, there are also significant differences between experimental group and control group in terms of occupation, household registration, education level and dependency ratio of household head no matter before or after the birth of second child. This further demonstrates that there is indeed sample selection bias between the experimental group and control group, and families with high occupational level, rural household registration, low education level and high dependency ratio could be more inclined to have the second child. Therefore, in order to solve the estimation

errors, these characteristics of household and household head are introduced into the estimation equation as control variables in this paper. On this basis, sample matching is carried out in quasi-experimental analysis.

Table 1. Household Consumption and Characteristics of Household

	First quasi experimental analysis					Second quasi experimental analysis				
	Total sample mean	Mean of 2010		Mean of 2012		Total sample mean	Mean of 2012		Mean of 2014	
		Experimental group	Control group	Experimental group	Control group		Experimental group	Control group	Experimental group	Control group
Explained variable										
Per capita household consumption	8.89 (0.82)	8.26 (0.77)	8.76 (0.77)	8.55 (0.77)	9.11 (0.80)	9.07 (0.86)	8.70 (0.74)	9.03 (0.85)	8.76 (0.83)	9.19 (0.85)
Characteristic of household head										
Age	44.62 (10.13)	45.28 (12.95)	43.48 (9.75)	47.27 (12.95)	45.44 (9.76)	47.21 (11.09)	47.33 (12.78)	46.07 (10.80)	49.33 (12.78)	48.07 (10.80)
Sex	0.74 (0.44)	0.81 (0.39)	0.74 (0.44)	0.81 (0.39)	0.74 (0.44)	0.75 (0.44)	0.79 (0.41)	0.74 (0.44)	0.80 (0.40)	0.74 (0.44)
Occupation	3.70 (1.15)	4.06 (1.02)	3.67 (1.16)	4.06 (1.02)	3.67 (1.16)	3.40 (1.07)	3.51 (1.01)	3.38 (1.07)	3.51 (1.01)	3.38 (1.07)
Household registration type	0.41 (0.49)	0.12 (0.32)	0.42 (0.49)	0.14 (0.34)	0.44 (0.50)	0.34 (0.47)	0.15 (0.35)	0.36 (0.48)	0.15 (0.35)	0.36 (0.48)
Education level	8.43 (4.45)	6.58 (4.27)	8.61 (4.42)	6.58 (4.27)	8.61 (4.42)	7.89 (4.57)	7.00 (4.31)	8.15 (4.48)	6.78 (4.41)	7.88 (4.67)
Family characteristics										
Per capita income	8.90 (1.10)	8.45 (0.87)	8.92 (0.93)	8.27 (1.32)	8.99 (1.22)	8.95 (1.20)	8.67 (1.33)	8.96 (1.20)	8.41 (1.25)	9.05 (1.15)
Per capita health	1.53 (0.49)	1.55 (0.47)	1.62 (0.50)	1.45 (0.45)	1.44 (0.48)	1.42 (0.47)	1.44 (0.44)	1.46 (0.48)	1.41 (0.43)	1.39 (0.46)
Population dependency ratio	0.22 (0.17)	0.28 (0.12)	0.21 (0.17)	0.41 (0.11)	0.20 (0.17)	0.24 (0.17)	0.27 (0.12)	0.23 (0.17)	0.39 (0.10)	0.22 (0.17)
Participation in insurance	0.95 (0.23)	0.91 (0.28)	0.94 (0.24)	0.97 (0.18)	0.95 (0.22)	0.98 (0.14)	0.99 (0.11)	0.97 (0.18)	1.00 (0.00)	0.99 (0.11)
Observed value	2477	214	2263	214	2263	2452	273	2179	273	2179

Notes: In order to reduce the influence of dimension and heteroscedasticity of data samples, this paper takes logarithmic progressing of per capita consumption, which could not reduce the accuracy of fertility cost.
Source: China Family Panel Studies (CFPS) (2010, 2012, 2014).

5. Empirical Test of "Cold" Response to "Two-Child" Policy

According to previous theoretical analysis, the rapid growth of fertility expenditure forces family member to reduce per capita consumption, which forms the perceptible pressure on fertility costs. In the short term, fertility culture and the fertility income

changes little, and the perceived pressure of fertility cost forces people to change the fertility decision-making, which is an important reason for the "cold" response of "two-child" policy. In order to test the judgment, this paper conducts a quasi-experimental analysis of per capita consumption changes of household samples before and after the birth of second child, which is shown in Table 2.

Table 2. Analysis of Fertility Costs of Urban and Rural Households

	Family per capita consumption	Consumption of parents	Leisure of parents
	(1)	(2)	(3)
A All family samples			
θ_{OLSi11}	–0.115*** (–4.37)	–0.215*** (–2.91)	–0.117*** (–3.17)
θ_{DIDi11}	0.076* (1.89)	–0.278** (–2.20)	–0.114* (–1.86)
$\theta_{DDPSMi11}$	–0.077** (–1.96)	–0.176 (–1.38)	–0.199*** (–3.19)
Observation value	2211	2347	2359
θ_{OLSi21}	–0.114*** (–4.41)	–0.237*** (–2.77)	–0.082** (–2.06)
θ_{DIDi21}	–0.061 (–1.57)	–0.356*** (–2.87)	–0.255*** (–3.75)
$\theta_{DDPSMi21}$	–0.168*** (–4.20)	–0.244** (–1.98)	–0.232*** (–3.25)
Obserrvation value	2191	2368	2149
$\theta_{DDPSMDDDi1}$	–0.091	–0.068	–0.033
B Urban family samples			
θ_{OLSi12}	–0.034 (–0.64)	–0.179 (–0.60)	–0.150 (–1.27)
θ_{DIDi12}	0.034 (0.41)	–0.889** (–2.08)	–0.272** (–2.55)
$\theta_{DDPSMi12}$	–0.126 (–1.57)	–0.946** (–2.23)	–0.341*** (–3.00)
Observation value	801	992	1030
θ_{OLSi22}	–0.169*** (–2.93)	0.280 (0.98)	–0.361*** (–3.97)
θ_{DIDi22}	0.150 (1.55)	0.022 (0.05)	0.224** (2.01)
$\theta_{DDPSMi22}$	–0.089 (–0.89)	–0.142 (–0.31)	0.125 (0.99)
Observation value	661	795	785
$\theta_{DDPSMDDDi2}$	0.037	0.804	0.466

	Family per capita consumption	Consumption of parents	Leisure of parents
	(1)	(2)	(3)
	C Rural family samples		
θ_{OLSi13}	–0.134*** (–4.34)	–0.157** (–2.13)	–0.123*** (–3.32)
θ_{DIDi13}	0.050 (1.12)	–0.037 (–0.29)	–0.159** (–2.28)
$\theta_{DDPSMi13}$	–0.108** (–2.44)	–0.087 (–0.66)	–0.164** (–2.31)
Observation value	1372	1415	1329
θ_{OLSi23}	–0.078*** (–2.70)	–0.265*** (–3.19)	–0.019 (–0.45)
θ_{DIDi23}	–0.080* (–1.79)	–0.276** (–2.24)	–0.308*** (–3.97)
$\theta_{DDPSMi23}$	–0.177*** (–3.89)	–0.252** (–2.02)	–0.300*** (–3.67)
Observation value	1558	1603	1366
$\theta_{DDPSMDDDi3}$	–0.069	–0.165	–0.136

Notes: In order to eliminate the influence of the outliers, this paper truncated the consumption data of family and parents. At the same time, in the estimation equation, the clustering robust standard error is used, and the clustering is carried out at individual level in order to avoid the autocorrelation of random error item caused by consumption inertia. In addition, in order to prove the possible sample selection bias, missing variables and endogenous problems in traditional fertility research, the regression results of three methods are used, and the least squares estimation equation is as follows: $Cijt = \beta_0 + \beta_1 \times D_{ij} + \beta_2 D T_t + \beta_3 \cdot X_{ijt} + \beta_4 \times \psi_{ijt} + \beta_5 \times Z_{ij} + \varepsilon_{ijt}$.The estimation equation of DID and DDPSM is equation (1). *** indicates that p<0.01, **indicates that p<0.05, and * indicates that p<0.1. The value in the brackets is the *t* value of cluster robust standard error. θ_{OLSijk}, θ_{DIDijk} and $\theta_{DDPSMijk}$ represent the estimation results. Among them, *i*=1, 2, 3, which is correspondence to different interpreted variables respectively. *j*=1, 2, which represents different sample intervals. 1 represents the period from 2010 to 2012, and 2 represents the period from 2012 to 2014. *k*=1, 2, 3, which corresponds to different family sample. 1 represents all family sample, 2 represents urban family samples and 3 represents the rural family samples. Three order difference $\theta_{DDPSMDDDik} = \theta_{DDPSMi2k} - \theta_{DDPSMi1k}$.

5.1. Change in Fertility Costs between Urban and Rural Households

Statistical analysis of variables in Table 1 shows that there is sample selection bias in the estimation equation (1), which results in the estimation errors. Moreover, the estimation results of DID and DDPSM are obviously different, which also proves this judgement. Therefore, the method of DDPSM is used for the correlation analysis, and

more reliable results are expected.[1]

In Table 2 (C), the birth of "two-child" significantly reduces the per capita consumption of rural households, which indicates that the birth of "two-child" has caused perceived cost pressures, and significantly squeezes out the household consumption. In addition, in comparison with the period from 2010 to 2012, the per capita consumption decreased more significant more in the period from 2012 to 2014 ($\theta_{DDPSM123}$=–0.177<$\theta_{DDPSM113}$=–0.108) and more significant($t_{DDPSM123}$=–3.89<$t_{DDPSM113}$=–2.44), which indicates that the perceived fertility costs of "two-child" by rural families is growing rapidly and the cost pressure is rising. The fertility desire is inevitably reduced, and the hypothesis 1 is preliminarily verified.

In Table 2 (B), the birth of "two-child " reduces the consumption level of urban households with the not obvious level ($t_{DDPSM112}$=–1.57, $t_{DDPSM122}$=–0.89). Therefore, there is no obvious cost pressure for urban families to bear the second child, or the perceived fertility costs of the second child is small, which has not obviously squeezed out the household consumption. At the same time, in comparison with the period from 2010 to 2012, the decline urban household consumption in the period from 2012 to 2014 decreased ($\theta_{DDPSMDDD12}$=0.037>0). It can be inferred that the pressure of fertility costs of urban households has not increased, or even decreased, which leads to slight increasing level of fertility desire. This confirms the hypothesis 2.

In Table 2 (A), the birth of the second child significantly reduces the household consumption ($\theta_{DDPSM111}$=–0.077<0, $\theta_{DDPSM121}$=–0.168<0). Moreover, in comparison with the period from 2010 to 2012, the family consumption in the period from 2012 to 2014 decreased more ($\theta_{DDPSMDDD11}$=–0.091<0), which indicates that the birth of second child results in the increasing cost pressure and squeezed out the household consumption. In the situation that fertility culture in short-term and fertility benefits are difficult to change, the increasing cost pressure inevitably leads to the decline of fertility desire level. This verifies the hypothesis 1 and 2, as well as the theoretical analysis of cold response to "two-child" policy.

5.2. Robustness Test

In order to test the robustness of the above empirical analysis results, this paper re-

[1] In Table 2, there is no significant difference between the estimated coefficients of OLS and DDPSM except for the absolute values of coefficients. However, this paper argues that there is still a possibility of bias in sample selection. As shown in Table 1, the difference of occupation and education level between experimental group and control group would overestimate the fertility costs of "two-child", and the difference of household registration type and dependency ratio would lead to underestimation bias, which ultimately makes it difficult to form an accurate judgement for the change of urban and rural fertility costs. Moreover, although many control variables have been included in the estimation equation (1), there is still a problem of missing variable, which leads to the estimation error of OLS. In addition, OLS estimation results are not significantly different from DDPSM method, which indicates that it would not affect the accuracy of DDPSM. Therefore, this paper mainly uses DDPSM method for correlation test to solve the problem of sample selection bias and the possible missing variables.

estimates the equation (1) from two aspects: replacing measurement indicators and changing research methods. Due to limited space, the above empirical results are not given. The robustness test results further proves the theoretical analysis of different changes in fertility costs between urban and rural areas, as well as the "cold" response to "two-child" policy.

6. Conclusions and Policy Implications

In recent years, fertility level of China has been continuously declining, and the problems related to low fertility rate such as fewer children, aging, labor shortage and gender imbalance have become the main obstacles to population development. Therefore, China has implemented a series of policy reforms that aimed at relaxing the "two-child" birth control. However, exploring the reasons for "cold" response to "two-child" policy is not only an urgent task for China's fertility research, but also an important prerequisite for future family planning reform.

According to some studies, the cost of raising children, education and marriage, as well as the opportunity costs have risen rapidly in recent years, which result in the perceptible pressure of fertility costs for many families. In the short term, in the situation that fertility culture and fertility benefits are difficult to change significantly, the perceptible pressure of fertility costs becomes the key to reducing the fertility desire, which restrains the effect of the "two-child" policy. Using the text analysis method, this paper theoretically demonstrates the impact of fertility desire change on "two-child" policy. The results show that, on the one hand, the cost pressure of "two-child" in rural households has rised rapidly, which makes the fertility desire decline dramatically; on the other hand, the cost pressure of "two-child" in urban households has slowly declined, which makes the fertility desire grow slightly. Eventually, two factors led to the overall decline in fertility level in urban and rural areas. Since the actual fertility rate is far below the desired fertility level, the "cold" response to "two-child" policy is the inevitable results. Based on the micro-survey data, this paper uses quasi-experimental method to verify the different changes of fertility costs between urban and rural areas, which provide empirical evidence for the above theoretical analysis.

Therefore, in the condition of fertility deregulation, China should change the endogenous and low fertility desire. First, drawing on the historical experience of Japan, Korea and European countries, China should introduce fertility incentives involving economic, education, and family services as soon as possible to realize the socialization of family fertility costs. Second, these fertility incentives should not only solve the difficulties of family expenditure on childbearing, but also alleviates the impact of rapid rise in childbearing cost in rural families. Third, the concepts of "late marriage and late childbearing", "fewer and better childbearing" and "one child for a

couple" should be changed. At the same time, the psychological benefits of childbirth should be improved to eliminate the adverse effects of the constantly growing fertility costs.

References

Butz, W. P., & Ward, M. P. (1979). The Emergence of Countercyclical U. S. Fertility. *American Economic Review*, 69(3), 318-328.

Chen, Y. (2011). Analysis of Farmers' Fertility Cost: A Perspective of Urban-Rural Comparison. *Journal of Nanjing College for Population Programme Management* (*Nanjing Renkou Guanli Ganbu Xueyuan Xuebao*), 27(2), 27-29.

Dai, H., & Lu, H. (2001). Consumer Culture and Consumer Revolution. *Sociological Studies* (*Shehuixue Yanjiu*), 5, 117-125.

Hou, J., Huang, S., Xin, Z., Sun, L., Zhang, H., & Dou, D. (2014). Changes of Chinese Population Fertility Willingess: 1980–2011. *Social Sciences in China* (*Zhongguo Shehui Kexue*), 4, 78-97.

Li, B., & Xiang, H. (2010). A Study on Fertility Willingness and Influencing Factors of Different Generations of Childbearing Age—Taking Wuhan City Circle as an Example. *Population & Economics* (*Renkou Yu Jingji*), 3, 13-20.

Li, J., & Luo, W. (2009). Analysis of Intergenerational Differences in Reproductive Intention—Taking Jiangsu Province as an Example. *Journal of China Agricultural University* (*Social Sciences Edition*) (*Zhongguo Nongye Daxue Xuebao-Shehui Kexueban*), 26(3), 21-30.

Li, Y. (2011). Analysis of Fertility Concept and Behaviors in Low Fertility Areas. Ph.D. Dissertation of Graduate School of Chinese Academy of Social Sciences, 2011.

Liu, X. (2016). How Family Planning Affects Income Inequality?—Form the Perspective of Intergenerational Income Flow. *China Economic Studies* (*Zhongguo Jingji Wenti*), 1, 71-81.

Luci-Greulich, A., & Thvenon, O. (2013). The Impact of Family Policies on Fertility Trends in Developed Countries. *European Journal of Population*, 29(4), 387-416.

Qiao, X. (2015). Choice of Future Reproductive Policy from the Implementation Effect of the "two-child" Policy. *China Journal of Population Science* (*Zhongguo Renkou Kexue*), 2, 26-33.

Schröder, J., Schmiedeberg, C., & Brüderl, J. (2016). Beyond the Two-Child Family: Factors Affecting Second and Third Birth Rates in West Germany. *Journal of Family Research*, 28(1), 3-18.

Shi, Z., & Yang, Y. (2014). Reproductive Willingness and Behavior of Families that Consistent with the Policy of "Individual Couple Two-Child". *Population Research* (*Renkou Yanjiu*), 5, 27-40.

Sun, W., Sun, A., & Wang, Y. (2016). Does Family Planning Damage China's Entrepreneurship? *China Journal of Economics* (*Jingji Xuebao*), 2, 138-160.

Tan, X. (2015). Study on the Influencing Factors of Fertility Willingness of Individual Couple Two-Child from the Perspective of Cost-Utility—Based on the Survey of Individual Couple Family in Xuzhou City. *South China Population* (*Nanfang Renkou*), 2, 1-12.

Hu, C., & Mu, G. (1995). Research on Low Fertility—Supplementary and Development of Population Transition Theory. *Social Sciences in China* (*Zhongguo Shehui Kexue*), 1, 83-98.

Udry, J. R. (1983). Do Couples Make Fertility Plans One Birth at a Time? *Demography*, 20(2), 117-128.

Xu, Y., & Qu, L. (2011). Fertility Willingness and Influencing Factors of Women of Childbearing Age in Individual Couple Family—Based on the Survey of Ezhou, Huang Shan and Xiantao. *Chinese Journal of Population Science* (*Zhongguo Renkou Kexue*), 2, 76-84.

Yin, W., Yao, Y., & Li, F. (2013). Fertility Assessment and Fertility Policy Adjustment—Based on the Analysis of Current Fertility Level in Mainland China. *Social Sciences in China* (*Zhongguo Shehui Kexue*), 6, 109-128.

Zheng, Z. (2015). Study on Fertility and Family Planning from the Perspective of Family and Women. *Chinese Journal of Population Science* (*Zhongguo Renkou Kexue*), 2, 16-25.

Zheng, Z., Li, Y., & Liao, S. (2009). Study on Cost-Benefit of Fertility under the Low Fertility Level—A Survey from Jiangsu Province. *Chinese Journal of Population Science* (*Zhongguo Renkou Kexue*), 2, 93-102.