

## Impact of adjusted fertility policies on household consumption patterns in China



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### ABSTRACT

China's fertility policy adjustments have impacted family fertility decisions but have not reversed the declining birth rate, with economic pressures playing a significant role. This study utilized data from the China Household Finance Survey (CHFS) and treated the implementation of China's "two-child" policy as a natural experiment. Using a propensity score matching-difference-in-differences model, the study analyzed data from four periods before and after the policy change to examine how having underage children and additional children affects household consumption behavior. The results indicate that household consumption increases with the number of children, as families with newborns experience higher overall consumption levels. The addition of a second child amplifies this effect, but per capita consumption expenditure decreases as family size grows. Differences in consumption patterns were observed between families with an additional first child and those with a second child. Furthermore, the impact of additional children on household consumption varies significantly depending on the family's education level. The study suggests that the government should design differentiated fertility policies tailored to family characteristics to reduce economic and childcare pressures and create a more supportive environment for family decision-making.

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### 1. Introduction

To address the declining birth rate and the aging population, China began allowing eligible couples to have two children at the end of 2015, replacing the previous one-child policy. However, this policy adjustment did not halt the ongoing decline in birth rates. Therefore, in May 2021, China further optimized its childbirth policy by permitting couples to have three children and implementing various supportive measures such as birth subsidies, extended maternity leaves, and improved childcare services. Since 2022, policy has increasingly focused on promoting a favorable social environment for childbirth and child-rearing while trying to reduce the burden on families. Despite these efforts and a more supportive policy environment, the declining trend in birth rates has not been reversed. From

2017 to 2023, the number of births in China fell for seven consecutive years. Many families are cautious about having more children due to economic pressure and other factors. Recent studies have examined the impact of China's fertility policies on birth rates, revealing complex dynamics. For instance, research indicates that while the "one-child policy" significantly reduced fertility rates, subsequent policies aimed at encouraging higher birth rates, such as the "two-child" and "three-child" policies, have not led to a substantial increase in fertility (Sohail et al., 2024). Additionally, analyses suggest that economic factors play a crucial role in fertility decisions. Higher per capita consumption expenditure has been found to inversely affect fertility rates, indicating that as economic development progresses, the financial burden associated with raising children may deter larger family sizes (Lu et al., 2024). Furthermore, the implementation of family planning policies has coincided with increased costs of child-rearing and a societal emphasis on the quality of offspring. These factors, along with enhanced public education investments, have contributed to sustained low fertility rates, even after policy adjustments intended to stimulate higher birth rates (Zheng, 2024). These

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findings underscore the multifaceted relationship between government policies, economic conditions, and societal attitudes in shaping fertility trends in China.

From an economic perspective, fertility behavior depends on a cost-benefit analysis of child-rearing. The direct costs and opportunity costs to parents of having children directly influence fertility decisions (Bonke and Browning, 2011). Children play a fundamental role in portfolio choice (Love, 2010). The status of children, including their number and age, can affect the accumulation of family wealth (Grinstein-Weiss et al., 2008). The gender of children influences household expenditure (Karbownik and Myck, 2017). Kornrich and Furstenberg (2013) examined changes in spending on children and found that before the nineties, parents allocated the highest expenditure during the teenage years of their children. Post-nineties, spending peaked when children were younger than 6 and in their mid-20s. Maroto (2018) explored how raising children impacts net worth and found that for middle and lower-income families, having children of any age was linked to decreases in wealth, primarily due to the expenses associated with raising children. A large-scale survey in China found that 51% of respondents explicitly cited economic pressure as a reason for not having another child (Zhilei and Yunyan, 2014). Another study on fertility in China showed that 58.9% of childbearing-age women chose not to have more children primarily due to a heavy economic burden (Dan et al., 2018). The studies focused on China indicate that the adjustment of fertility policy has not significantly increased the fertility rate due to economic factors (Yingchun and Zhenzhen, 2020), with the main factor for declining fertility being the increase in the cost of child-rearing. Recent studies have explored how the costs associated with raising children influence family consumption patterns and parental fertility intentions in China. For instance, research indicates that higher child-rearing expenses can lead to reduced consumption levels among parents, thereby affecting their desire to have more children (Dzhumashev and Tursunaliyeva, 2023).

Empirical analyses have also demonstrated that families with more children face greater economic burdens, which significantly impacts their consumption behaviors. Notably, expenditures on housing, transportation, communication, education, and training are substantial for larger families, highlighting the financial challenges of raising multiple children (Lin, 2019).

These findings underscore the complex relationship between child-rearing costs, family consumption patterns, and fertility intentions, suggesting that economic considerations play a crucial role in shaping demographic trends in China.

Brown et al. (2011) have noted a sharp rise in socially observable spending in China in recent years. According to Gibson-Davis and Percheski (2018), the cost of raising children has a significant impact on income distribution and future social

mobility. As income levels rise, families tend to increase their demand for high-value consumer goods. They want to raise exceptional children and therefore show a greater willingness to increase the corresponding expenditure in order to enhance their children's quality. Groups with higher social status strive to improve the quality of their children in order to maintain their status and the position of their descendants. Research on Chinese families indicates that parents with higher education levels often choose to have fewer children and invest more in the quality of their children. The "education arms race" notably suppresses household consumption levels. When there is a mismatch between the willingness and ability to invest in education, Chinese parents who are highly inclined to invest in education reduce their daily household consumption and core expenditures to cover the education expenses for their children (Long and Liang, 2019). Recent research has explored the impact of educational expenditures on family fertility decisions and parental well-being in China. Studies indicate that higher educational costs can lead families to adopt more conservative fertility plans, as the financial burden of education increases overall household expenditures and may reduce spending in other areas. This financial strain can also contribute to heightened anxiety and negative psychological states among parents. For instance, a study published in the *Journal of Family and Economic Issues* examined how education spending affects parenting practices in China. The research found that increased educational expenditures can lead to changes in parenting styles, potentially impacting family dynamics and parental stress levels (Zhang, 2021). Additionally, the "double reduction" policy implemented by the Chinese government aims to alleviate the excessive academic burden on students and reduce the financial pressure on families caused by extracurricular tutoring. This policy acknowledges the significant stress and anxiety experienced by both students and parents due to high educational costs and intense academic competition. These findings highlight the complex relationship between educational expenses, family planning decisions, and parental well-being in China, suggesting that policies addressing educational costs could influence fertility intentions and improve psychological health among parents. Baizan and Nie (2024) found that the family's limited educational resources may lead to pressure on the first child's educational expenses from the second child, so families who focus on the quality of education often carefully consider whether to have a second child.

Ng and Wang (2020) argued that considerations about women's career development lead to delayed and reduced fertility, making policies that subsidize early fertility more efficient. Cardia and Gomme (2018) examined the effects of cheaper childcare leading to increased use of daycare centers. Tudor (2020) found that financial incentives significantly benefited most employed women in terms of fertility rates. Zhang et al. (2022) pointed out that fertility

incentive payments can effectively motivate people to have children. Recent policy developments in China emphasize the importance of a comprehensive fertility promotion system that supports families throughout the entire child-rearing process, encompassing birth, care, and education. In October 2024, China unveiled new measures aimed at building a birth-friendly society. These measures focus on expanding childcare systems and strengthening support in education, housing, and employment to foster a conducive environment for families (Baizan and Nie, 2024).

There is limited research on how family fertility decisions influence consumption behavior in China following changes in fertility policies. Addressing this gap is essential for understanding the economic challenges associated with these decisions. Previous studies on fertility policies do not fully apply to the current Chinese context, where policies have been adjusted. This study aims to examine the effect of the number of children on family consumption and financial pressures in China and explore how these factors may influence fertility decisions. By analyzing the relationship between family size and consumption patterns, the study seeks to identify trends in household spending and preferences among Chinese families. Investigating the financial impact of family size will provide insights into the factors influencing fertility decisions under economic pressure. The findings will help policymakers better understand family consumption behavior and fertility choices in China, enabling the development of more effective policies to reduce childcare costs and improve family well-being.

## 2. Methods

Based on the discussion of the existing literature, this study examines the effects of the number of children and the addition of newborns on household consumption by constructing baseline regression models and propensity score matching-difference-in-differences models.

### 2.1. Data source

This study uses the four waves of longitudinal survey data from the China Household Finance Survey (CHFS) from 2013 to 2019. The survey covers 29 provinces (autonomous regions, municipalities directly under the central government) and 345 counties (districts, cities) nationwide. After excluding samples with missing information, we obtained 11,131 valid samples in 2013, 10,058 valid samples in 2015, 10,069 valid samples in 2017, and 9,354 valid samples in 2019.

### 2.2. Variable selection

In the empirical model, the dependent variable is household consumption, which is calculated as the sum of different types of household expenditure. In

this study, the classification standards of the National Bureau of Statistics of China are used to analyze the different consumption categories and consumption structures. Specifically, household consumption is divided into eight main categories: food expenditure, clothing expenditure, housing expenditure, household goods and services expenditure, education and entertainment expenditure, transportation and communication expenditure, medical and healthcare expenditure, and other expenditure.

The core explanatory variable in this study is the number of underage children in the household. According to Chinese law, residents under the age of 18 are considered minors. Therefore, the number of minor children in this study refers to the number of children in the household who are under 18 years old. A difference-in-differences model is applied to establish a natural experiment based on the implementation of the "two-child" policy in 2016. Families with additional children are placed in the treatment group, while other families form the control group. To analyze the impact of the "two-child" policy on household consumption, the study also examines whether children born after 2016 are first-born or second-born.

Taking into account the urban-rural economic disparities in China, as well as the influence of family wealth status and individual differences on consumption behavior (Alharthey, 2019), this study sets control variables at three levels: Regional, household, and individual. Indicators for the type of region (urban area coded as 0, rural area coded as 1) are included in the model as dummy variables. At the household level, the variables mainly include total assets, total income, total debt, family size, number of properties, and the ratio of elderly dependents to working-age family members. Individual-level variables include characteristics of the household head, such as age, education level, household registration type, marital status, and health status. Descriptive statistics of the data can be found in Table 1.

### 2.3. Empirical model design

To verify the relationship between the number of children and household consumption, the baseline equation is set as follows:

$$Consume_{it} = \beta_0 + \beta_1 Childnumber_{it} + \beta_2 \omega_{it} + \beta_3 \gamma_{it} + \beta_4 \sigma_{it} + \varepsilon_{it} \quad (1)$$

where,  $Consume_{it}$  represents household consumption expenditure.  $i$  represents different households, and  $t$  denotes different time periods.  $Childnumber_{it}$  represents the number of underage children in the surveyed households,  $\omega_{it}$  is a binary variable representing the type of region used to control for the influence of urban-rural differences on household consumption.  $\gamma_{it}$  is a vector controlling for household characteristics and  $\sigma_{it}$  is a vector controlling for information about the household

head.  $\varepsilon_{it}$  is the random disturbance term? Since the behaviors of different households are assumed to be independent, we assume that  $\varepsilon_{it}$  is mutually independent across different households, and we employ a fixed effects model for panel data regression. The coefficient  $\beta_1$  is the main regression coefficient of the baseline model, and its economic implication is the impact of the number of minor children in the household on family expenditure.

This study uses the implementation of the two-child policy as a natural experiment, with 2016 designated as the year of policy shock. Data from the CHFS 2013 and CHFS 2015 surveys represent the pre-policy period, while data from the CHFS 2017 and CHFS 2019 surveys represent the post-policy period. The treatment group includes families with additional children born after January 2016, while other families form the control group. The study compares differences between the two groups before and after the policy was implemented. Since the omitted variables in the baseline model are assumed to remain constant, at least in the short term, a difference-in-differences model is applied to

estimate the average treatment effect of the policy. The specific model is as follows:

$$Comsume_{it} = \alpha_0 + \alpha_1 Newborn_{it} * Time_t + \alpha_2 Newborn_{it} + \alpha_3 Time_t + \delta_1 \omega_{it} + \delta_2 \gamma_{it} + \delta_3 \sigma_{it} + \mu_{it} \quad (2)$$

where,  $Newborn_{it}$  is a binary variable with  $Newborn_{it}=1$  indicating the presence of newly born children in the household after January 1, 2016; otherwise,  $Newborn_{it}=0$ .  $Time_t$  is also a binary variable where  $Time_t=1$  represents the implementation of the two-child policy and  $Time_t=0$  otherwise.  $Newborn_{it} * Time_t$  is the interaction term between the treatment variable and the time variable, where its coefficient represents the average treatment effect of the implementation of the two-child policy. The meanings of other variables are the same as in Eq. 1.

In this study, the propensity score matching-difference-in-differences model is used to address the problem of sample balance between groups. Individual matching is used to balance the samples in the treatment and control groups to meet the balance requirements.

**Table 1:** Descriptions and descriptive statistics of each variable

Variables	2013-2015			2017-2019		
	Observations	Mean	SD	Observations	Mean	SD
Total family assets (RMB)	21189	744982.5	1704785	19423	1139204	2488190
Total family liabilities (RMB)	21189	91476.2	453591	19423	80096.1	355048.5
Total family income (RMB)	21189	66367.84	187735.4	19423	98936.7	323728
Number of underage children	21189	0.7412	0.8573	19423	0.7047	0.8597
Elderly dependency ratio	21189	0.0135	0.0756	19423	0.0788	0.2395
Number of newborn children	21189	0.2072	0.6102	19423	0.0655	0.2574
Household registration type	21189	1.4317	0.5669	19423	1.5174	0.6893
Marital status	21189	2.1535	0.8052	19423	2.2035	0.8974
Physical condition	21189	2.9728	1.124	19423	2.4953	0.9894
Age	21189	47.0425	8.5192	19423	48.0665	8.2586
Area type	21189	0.4217	0.4938	19423	1.2815	0.4848

SD: Standard deviation

### 3. Results

#### 3.1. The impact of the number of children on total household consumption

Regression 1 in Table 2 represents the baseline regression model without adding any control variables. Regressions 2 to 4, respectively add region type, family characteristics, and head of household characteristics as control variables based on the baseline model. In the four baseline regression models, the regression coefficients of  $Childnumber_{it}$  are all positive at the 1% significance level, indicating that the more underage children there are, the higher the level of household consumption. We interpret the results using the regression results of regression 4 as an example. The regression coefficient of  $Childnumber_{it}$  is 0.088, which means that the number of underage children has a positive effect on household consumption. For each additional underage child, the logarithm of household consumption increases by 8.8%, and household consumption actually increases by 9.2%.

As the family's total assets, total income and total liabilities increase, an increase in the number of children leads to a rising trend in family

consumption. For every 1% increase in the family's total assets, total income and total liabilities, the family's expenditure increases by 9.6%, 8.5%, and 5.1%, respectively, when the number of children increases by one. Among the household head characteristic variables, the regression coefficient of physical condition is significant at the 5% level, indicating that families with better physical condition tend to increase consumption with an increase in the number of children. The regression coefficient of the age variable is significantly negative at the 10% level, suggesting a negative relationship between family consumption and the number of children as family members' age increases. One explanation for this is that the effects of raising children of different ages on family consumption are different. Families with older household heads tend to adhere to conservative, traditional consumption values.

#### 3.2. The impact of number of children on per capita household expenditure

The empirical analysis of how an increase in the number of children affects per capita household expenditure shows that per capita total expenditure,

per capita household expenditure, per capita housing expenditure, per capita clothing expenditure, and per capita household goods expenditure decrease significantly with an increase in the number of children (as shown in Table 3). This result suggests that raising more children leads to a crowding-out effect on the welfare level of family members. Conversely, a rise in the number of children does not significantly reduce per capita expenditure on food, education, medical care, and communication. This suggests that as the number of children increases,

the total amount of related expenditure rises, thus imposing a heavier economic burden on the family. It is worth noting that among the controlled variables, only per capita household assets, marital status, and age characteristics have a significant effect on per capita education expenditure. This indicates that education expenditure has a strong rigidity characteristic during the process of child-rearing and that shifting the educational pressure from the family to society can greatly alleviate the parenting pressure on families.

**Table 2:** Baseline regression model result

Variables	Reg(1)	Reg(2)	Reg(3)	Reg(4)
	Logarithm of family expenditure			
Number of underage children	0.115***(0.0084)	0.115***(0.0084)	0.091***(0.0177)	0.088***(0.0194)
Area type		0.046(0.032)	0.0185(0.0959)	-0.023(0.1007)
Logarithm of total family assets			0.0927***(0.0123)	0.092***(0.0128)
Logarithm of total family income			0.080***(0.0100)	0.0817***(0.011)
Logarithm of total family liabilities			0.050***(0.0078)	0.050***(0.0085)
Elderly dependency ratio			0.050(0.060)	0.055(0.0616)
Household registration type				0.000***(0.0000)
Education level of household head				-0.008(0.0133)
Marital status				-0.011(0.0218)
Physical condition				0.027***(0.0119)
Age				-0.004*(0.0029)
Constant	10.453***(0.0086)	10.433***(0.0081)	6.942***(0.1132)	8.177***(0.2345)
Sample size	40612	40612	40612	40612
R <sup>2</sup>	0.1109	0.111	0.188	0.1767

\*\*\*: p<0.01

**Table 3:** The impact of number of children on per capita household expenditure

Variables	1	2	3	4	5	6	7	8	9
Number of underage children	-0.058*** (0.0199)	-0.028 (0.0214)	-0.1511*** (0.0378)	-0.030 (0.0518)	-0.073*** (0.0273)	-0.024 (0.047)	-0.049 (0.0317)	-0.097*** (0.0346)	0.123 (0.2018)
Area type	-0.021 (0.1005)	-0.035 (0.0878)	-0.044 (0.1781)	-0.075 (0.2233)	-0.013 (0.1167)	-0.364* (0.227)	-0.170 (0.1378)	-0.0945 (0.1482)	0.009 (1.471)
Logarithm of total family assets	0.105*** (0.0127)	0.095*** (0.0131)	0.1268*** (0.023)	0.107*** (0.36)	0.015*** (0.0185)	0.0206 (0.0284)	0.1553*** (0.0213)	0.1394*** (0.0204)	0.332 (0.2054)
Logarithm of total family income	0.059*** (0.010)	0.058*** (0.0106)	0.080*** (0.0178)	0.005 (0.0262)	0.093*** (0.0136)	-0.0198 (0.0223)	0.060*** (0.0166)	0.058*** (0.0162)	0.1019 (0.137)
Logarithm of total family liabilities	0.050*** (0.0082)	0.005 (0.0081)	0.056*** (0.0141)	0.007 (0.0230)	-0.0051 (0.0117)	0.0584*** (0.0193)	0.0219 (0.0139)	0.025* (0.0139)	0.092 (0.0984)
Elderly dependency ratio	0.0765 (0.063)	0.103 (0.020)	0.019 (0.1177)	0.040 (0.17)	0.029 (0.0964)	0.0318 (0.1785)	-0.066 (0.100)	-0.024 (0.1290)	1.238* (0.7235)
Household registration type	0.0001*** (0.000)	0.0001*** (0.000)	0.0001*** (0.000)	0.00001 (0.00002)	0.0002*** (0.0000)	0.0001*** (0.0000)	0.00001*** (0.00001)	0.0003*** (0.0000)	0.0001 (0.0001)
Education level of household head	-0.016*** (0.0130)	-0.018 (0.0125)	-0.0061 (0.0263)	0.0167 (0.1700)	0.0139 (0.0178)	0.042 (0.0301)	-0.0004 (0.0249)	0.022 (0.022)	-0.040 (0.1095)
Marital status	0.0197 (0.0220)	0.033 (0.021)	-0.003 (0.0225)	0.113** (0.0312)	0.0080 (0.0288)	0.0508 (0.050)	-0.002 (0.0369)	-0.016 (0.0323)	0.146 (0.2794)
Physical condition	0.031*** (0.0118)	-0.006 (0.0124)	0.033 (0.0225)	0.034 (0.0312)	-0.010 (0.0159)	0.1424*** (0.029)	-0.019 (0.0192)	-0.025 (0.0206)	0.102 (0.1739)
Age	-0.009*** (0.0031)	-0.005 (0.0033)	-0.0165*** (0.0058)	-0.018** (0.0087)	-0.009 (0.0053)	-0.005 (0.0073)	-0.003 (0.0052)	-0.009 (0.0204)	-0.043 (0.0312)
Constant	7.471*** (0.2322)	6.891*** (0.243)	4.945*** (0.4488)	6.038*** (0.6239)	3.98*** (0.0351)	5.168*** (0.5171)	4.438*** (0.372)	4.274*** (0.4117)	1.887 (3.227)
R <sup>2</sup>	0.2023	0.0948	0.0386	0.0257	0.07	0.0775	0.1756	0.1707	0.1674

\*\*\*: p<0.01; \*\*: p<0.05; \*: p<0.1; 1: Per capita total expenditure; 2: Per capita food expenditure; 3: Per capita housing expenditure; 4: Per capita education expenditure; 5: Per capita clothing expenditure; 6: Per capita medical expenditure; 7: Per capita communication expenditure; 8: Per capita household goods expenditure; 9: Per capita other expenditure

### 3.3. The impact of additional children on household expenditure

To accurately identify the causal relationship between additional children and household expenditure, this study employs the strategy of a natural experiment and further analyzes it with a difference-in-differences model. The estimated average treatment effects generated by different estimation methods are shown in Table 4.

In Table 4, panel A, Regression 1 shows the estimation of the DID model without covariate

matching, while Regression 2 matches household characteristics and regional feature variables. Regressions 3 and 4 use a different kernel matching to test the robustness of the regression. The results show a significant positive coefficient for household expenditure in families with additional children.

In panel B, the regression equations contain control variables for household and household head characteristics. The coefficients remain significantly positive, indicating a significant increase in household expenditure among families with newborns, even among families with similar household and head-of-household characteristics.

**Table 4:** The impact of additional children on household expenditure

Panel A	Reg(1)	Reg(2)	Reg(3)	Reg(4)
Variables			<b>Logarithm of family expenditure</b>	
Newborn*time	0.183*** (0.0230)	0.184*** (0.0300)	0.184*** (0.0300)	0.184*** (0.0300)
Matching method		Radius matching	Kernel matching	Kernel matching
Matching kernel			Gaussian	Tricube
Panel B			<b>Logarithm of family expenditure</b>	
Variables				
Newborn*time	0.113** (0.0500)	0.226** (0.0920)	0.116*** (0.0500)	0.114*** (0.0500)
Matching method		Radius matching	Kernel matching	Kernel matching
Matching kernel			Gaussian	Tricube

\*\*\*: p&lt;0.01; \*\*: p&lt;0.05

### 3.4. The differential impact of having a first child versus a second child

This study investigates the changes in expenditure and consumption structure before and after the birth of a child among families with one child and families with two children. It identifies 2440 families with one child and 1733 families with two children in the panel data and presents the expenditure data before and after birth for both groups in [Table 5](#).

In families where the first child is born, consumption expenditure increases by 6.6% after birth, with expenditure on housing, daily necessities, and transportation and communication exceeding the overall increase in total household consumption expenditure. In families with a second child, consumption expenditure increases by 27.0% after birth, with the increase in expenditures on daily necessities, transportation, and communication, as well as medical care exceeding the increase in total household consumption.

After the birth of the first and second child in families, expenditure on food and clothing shows an increase in absolute amounts but a decrease in proportion within total household consumption. Expenditure on daily necessities, transportation and communication, medical care, and other expenditures as a proportion of total household consumption shows an upward trend after the birth of a first or second child in families. Moreover, in families with the addition of a second child, the growth trend in spending on medical care is even more pronounced.

The changes in housing consumption show opposite trends in families with one and two children. After the birth of the first child, housing expenditure in one-child families increased by 26.7%, with their share of total household consumption rising from 13.57% to 16.16%. Conversely, in two-child families, housing expenditure decreased by 1.5% after the birth of the second child, and its proportion in total household consumption fell from 15.55% to 12.06%. In the CHFS survey, housing expenditure includes rent, utilities, property management fees, heating costs, home decoration, and maintenance costs. The difference in housing consumption between families with one and two children can be attributed to the increased need for housing after the birth of the first child due to the need for childcare, which leads to a

significant increase in related housing expenditure. Conversely, the marginal demand for housing decreases after the arrival of the second child, while the housing adjustments made after the birth of the first child remain effective. Moreover, with the crowding-out effect of increased demand for other consumption needs and the possibility of saving for future housing improvements, housing expenditure in families with two children may even fall slightly after the birth of the second child.

In families with newborns of the first or second child, the proportion of expenditure on education and entertainment shows a downward trend. In families with the addition of one child, the amount spent on education and entertainment decreases, while in families with the addition of a second child, although the amount spent increases, the proportion decreases. This is because, in the CHFS survey, education and entertainment expenses include expenditures on education, entertainment, and travel. For families with new children, opportunities for entertainment and travel for adult family members decrease, and education expenditures are limited for children between the ages of 0 and 3. In families with two children, as the first child grows older, the need for education expenses arises, and expenditure on education and entertainment begins to increase.

## 4. Heterogeneity analysis

In order to further examine the heterogeneous impact of additional children on family consumption, this research conducts a heterogeneity analysis on different categories of family consumption and families from different social strata.

### 4.1. Heterogeneity across categories of consumption

The regression results for consumption in the sub-categories are shown in [Table 6](#). Panel A displays the regression results of the number of underage children in a household with consumption in various sub-categories. From the results in [Table 6](#), it can be observed that there is a significant positive correlation between the number of underage children and household expenditures on food, education, clothing, medical care, communication, and living supplies, while the estimated coefficients for housing expenses and

other expenses are small and not significant. This may be due to the lower marginal effect of household housing expenses, while the consumption expenditure brought about by raising children is concentrated on food, medical care, communication, education, and clothing. Other expenses, which are

mainly included in statistical surveys, such as luxury goods expenditure, legal service expenditure, and other consumer expenditure, are not highly correlated with the behavior of raising children, hence the insignificant coefficients.

**Table 5: The differential impact of having a first child versus a second child**

	Before the birth of the first child		After the birth of the first child		Before the birth of the second child		After the birth of the second child	
	1	2	1	2	1	2	1	2
Total expenditure	62645.34	100%	66782.27	100%	64442.16	100%	81831.11	100%
Food expenditure	21801.53	34.80%	22036.32	33.00%	22185.15	34.43%	27083.85	33.10%
Clothing expenditure	2926.61	4.67%	2933.95	4.39%	2849.79	4.42%	3310.85	4.05%
Housing expenditure	8498.44	13.57%	10791.21	16.16%	10019.02	15.55%	9866.13	12.06%
Household goods expenditure	4658.06	7.44%	5698.51	8.53%	4505.66	6.99%	6134.27	7.50%
Communication expenditure	11191.13	17.86%	13156.72	19.70%	11786.55	18.29%	16631.55	20.32%
Education expenditure	6738.50	10.76%	4436.53	6.64%	6360.66	9.87%	7288.83	8.91%
Medical expenditure	5303.77	8.47%	5704.58	8.54%	5366.14	8.33%	8350.67	10.20%
Other expenditure	1529.32	2.44%	2028.07	3.04%	1377.50	2.14%	3168.79	3.87%

1: Consumption amount; 2: Proportion

This research utilizes a natural experiment and the PSM-DID model to examine the impact of the addition of children on consumption in eight major categories of household spending. The relevant results are summarized in Panel B of Table 6. The regression results indicate that among matched families with newborn children before and after the implementation of the “Two-Child” policy, the coefficients for expenditures on food, clothing, medical care, communication, and living supplies are

significant, while those for educational expenses, housing expenses, and other expenses are not significant. The explanation for the change in the results for educational expenses is that educational expenses have a lagging characteristic; young children have a relatively low demand for educational expenses during the 0 to 3 years old period. Hence, the increase in educational expenses due to the addition of new children is not significant.

**Table 6: Heterogeneity across categories of consumption**

Panel A	1	2	3	4	5	6	7	8
Number of underage children	0.129*** (0.204)	-0.05 (0.0376)	0.123** (0.0525)	0.065** (0.0268)	0.1419*** (0.0483)	0.089*** (0.0324)	0.0537* (0.0335)	0.238 (0.1994)
R <sup>2</sup>	0.0897	0.0241	0.0208	0.0607	0.0763	0.1751	0.1544	0.1766
Panel B (radius matching)	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
Newborn*time	0.1828*** (0.0508)	0.109 (0.0972)	0.154 (0.1371)	0.1569** (0.0684)	0.583*** (0.1322)	0.382*** (0.078)	0.0214** (0.0930)	0.691 (0.7608)
R <sup>2</sup>	0.0715	0.0232	0.0184	0.0506	0.064	0.147	0.1154	0.1423

\*\*\*: p<0.01; \*\*: p<0.05; \*: p<0.1; 1: Food expenditure; 2: Housing expenditure; 3: Education expenditure; 4: Clothing expenditure; 5: Medical expenditure; 6: Communication expenditure; 7: Household goods expenditure; 8: Other expenditure

#### 4.2. The consumption heterogeneity across different levels of education

The quantity-quality trade-off theory and the relative income hypothesis, respectively argue the influence of income and social status on family fertility and consumption behavior. Therefore, this study performs an analysis of heterogeneity based on the differences in the educational attainment of surveyed families. The research results are shown in Table 7.

This study categorizes the sample into three groups based on the educational attainment of household heads: (1) junior high school or below, (2) high school, vocational school, and college, and (3) undergraduate and higher degrees. Regression results show that for households with education levels below a bachelor's degree, having additional children significantly increases family consumption, with significance at the 1% level. In households with

the lowest education level, new children significantly increase spending on food, clothing, medical care, and communication. For the middle education level group, the increase is significant for food, clothing, communication, household goods, and other expenses. However, for the highest education level group, the addition of children does not significantly affect various expenditures. This indicates that families with higher education levels experience no notable changes in consumption behavior due to additional children, while families in the two lower education groups show clear impacts on consumption. In all three groups, the effect of new children on education expenses is not significant. This aligns with earlier findings, as education expenditures for young children are typically low. The precautionary savings theory suggests that families anticipate higher childcare costs in the future and may save for these expenses, especially in families with higher educational backgrounds. This

savings behavior can reduce current consumption. Therefore, small-scale economic incentives, such as cash or consumption subsidies, are more effective in

encouraging spending among families with lower education levels but have minimal impact on families with higher education levels.

**Table 7: The consumption heterogeneity across different levels of education**

	Junior high school or below		High school, vocational school, and college		Undergraduate and higher degrees	
	Newborn*time	R <sup>2</sup>	Newborn*time	R <sup>2</sup>	Newborn*time	R <sup>2</sup>
Total expenditure	0.206***(0.0688)	0.1134	0.271***(0.0958)	0.1705	0.011(0.1476)	0.2449
Food expenditure	0.167***(0.0760)	0.0635	0.396***(0.0977)	0.0873	0.106(0.1158)	0.1378
Housing expenditure	0.153(0.1263)	0.0332	-0.110(0.2221)	0.0203	-0.3281(0.3365)	0.0168
Education expenditure	0.089(0.2319)	0.0276	-0.0428(0.2566)	0.0373	0.1515(0.2810)	0.0717
Clothing expenditure	0.170*(0.099)	0.0523	0.335***(0.146)	0.0559	-0.157(0.1806)	0.0713
Medical expenditure	0.4448***(0.178)	0.0622	0.331(0.286)	0.0517	0.342(0.4022)	0.1086
Communication expenditure	0.4690****(0.1086)	0.1121	0.3672***(0.1692)	0.1956	0.2435(0.2242)	0.2987
Household goods expenditure	0.1473(0.1269)	0.1169	0.6540****(0.1946)	0.0973	0.029(0.3464)	0.0503
Other expenditure	0.3915(1.2995)	0.1357	4.714****(1.2692)	0.3398	-0.4305(1.4741)	0.3346

\*\*\*: p<0.01; \*\*: p<0.05; \*: p<0.1

**5. Robustness test**

**5.1. Parallel trend test**

The article adopts a regression approach to conduct a parallel trend test on the samples of the experimental group and the control group. Two dummy variables were set for the two years before the implementation of the two-child policy in 2016, and they interacted with the experimental group, reflecting the "difference between the experimental group and the control group in the years before policy implementation." Regression of total household consumption with the interaction term yields regression results, as shown in Table 8. From Table 8, it can be observed that the coefficients for both periods before policy implementation are

negative and not significant, while the coefficient after policy implementation becomes positive and significantly stronger. Therefore, there is reason to believe that the implementation of the two-child policy has an impact on family fertility behavior and household consumption, indicating the robustness of the experimental research results. Table 8 illustrates that the coefficient increases and becomes significantly stronger in the period after policy implementation. Given that the influence of fertility on household consumption persists over the long term, it is expected to continue exerting a significant impact on household consumption in subsequent periods following the policy implementation, which is consistent with the actual situation.

**Table 8: Parallel trend test**

	Before2*treated	Before1*treated	current*treated	After*treated
One-to-one nearest neighbor matching	-980.0934 (2429.419)	-3155.519 (1935.596)	14517 (3049.69)	3332.57 (3829.869)
p> t	0.687	0.103	0	0
Kernel matching	-1061.157 (2419.031)	-3099.275 (1928.34)	15802.92 (3039.469)	33396.1 (3815.05)
p> t	0.661	0.108	0	0

**5.2. Placebo test**

To verify the promotion of family consumption growth through the implementation of the two-child policy, this study selects the years before the policy implementation for analysis. Assuming the policy implementation year is 2015 since the data for 2015 were collected in 2014 and thus unaffected by the policy, the data for the unaffected years are adjusted to 2013. Meanwhile, the data for 2015, 2017, and 2019 are considered as the samples affected by the policy. Regression analysis is conducted on the data, and the findings indicate that the coefficient of the double difference is not significant. Therefore, the results of this experimental study are robust.

utilizes household consumption expenditure as an indicator of the economic costs faced by families and examines how the act of raising children influences family economic behavior. The logic of this research is to examine how the number of children and the addition of a newborn child in Chinese families affect family consumption, to explore the differentiated impacts of having an additional first or second child, and further explore the economic pressures of raising children and adding to the family. The aim is to provide a practical basis for constructing a policy support system that enhances family quality of life by alleviating the economic pressure of raising children through targeted policy compensation.

**6. Conclusions**

Consumption is not only a reflection of the current material standard of living but also a comprehensive embodiment of a family's economic welfare and quality of life. Therefore, this research

The research constructs a natural experiment based on the implementation of the "universal two-child" policy in 2016 and uses the Propensity Score Matching-Difference-in-Differences model to analyze the data from four periods of the China Household Finance Survey (CHFS2013-2019) before and after the adjustment of the fertility policy. The results show that, after controlling for relevant factors, the



more underage children there are in a family, the higher the family's consumption level. There are significant differences in the consumption effects of adding a first child versus adding a second child, especially in terms of housing and education. Analysis of class heterogeneity shows that the consumption effects of adding children are more pronounced in families with lower levels of education. Based on this, the research takes full consideration of China's national conditions and suggests that policy system design should be more refined, accounting for the characteristics of both childbirth and child-rearing behaviors. It proposes the construction of a stratified and categorized fertility policy support system that integrates long-term and short-term strategies, complementing 'family-oriented' with 'societal-oriented' approaches. This ensures that policies are targeted and effective, alleviating the consumption constraints faced by multi-child families and effectively addressing current challenges. Specifically, this study puts forward the following policy recommendations.

Firstly, the differential effects of raising children in different categories of expenditure should be differentiated, and targeted compensation schemes should be provided. Empirical research findings indicate that education and healthcare expenditures exhibit the strongest rigid characteristics, while the economic pressure of raising children leads to a crowding-out effect in the share of expenditures on daily necessities and clothing. Therefore, compensation for education and healthcare expenditure can alleviate the pressure, while compensation for expenditure on daily necessities and clothing can stimulate consumption expansion and improve family welfare.

Second, phased subsidies should be provided to families with newborn children. Empirical research findings demonstrate significant consumption effects associated with having newborn children. Whether it is families with a newborn first child or a newborn second child, the share of expenditures on daily necessities, transportation and communication, and healthcare significantly increases in household consumption. Therefore, subsidies for maternal and child supplies, transportation and communication, maternal and child healthcare, and medical expenses are essential during infancy.

Third, establishing a safeguard system with long-term mechanisms to alleviate educational anxiety. Empirical research results show that although the impact of additional children on education expenditure is not significant, education expenditure is positively correlated with the number of children. Currently, society evaluates the quality of children mainly through education, and the education of children is a long-term process. In the long term, it is necessary to streamline the education guarantee system from early childhood education to compulsory education and higher education, expand the breadth and depth of education subsidies, improve the sustainability of education guarantees,

and take into account parents' concerns about the future.

Fourth, distinguish between different stages of family fertility decision-making and provide different policy compensations. Based on the changes in housing consumption before and after the birth of the first child in families, it can be inferred that living conditions may be a threshold restricting the decision-making of families to have the first child. Therefore, it is necessary to improve the system of affordable housing and housing subsidies to reduce the difficulty of "settling down." Incentives for "multiple children" can be achieved through a "staggered policy" for multi-child families, such as staggered increases in cash subsidies and staggered increases in tax deductions for child education, medical care, housing loans, and other expenses.

Fifth, taking into account the varied needs of different demographic groups, tailored policy measures should be implemented. According to the results of heterogeneous analysis among different population groups, it is inferred that for families with lower levels of education and whose consumption is significantly affected by the addition of new children, consumption subsidies are effective in stimulating consumption. However, for groups with higher levels of education, subsidy policies are less effective in stimulating consumption. A "deinstitutionalized" childcare service system is more effective in reducing childcare concerns and improving quality of life.

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## Compliance with ethical standards

## Conflict of interest

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