From Cradle to Wallet: Unraveling the relationship between Fertility and Consumption Inequality

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1 Introduction

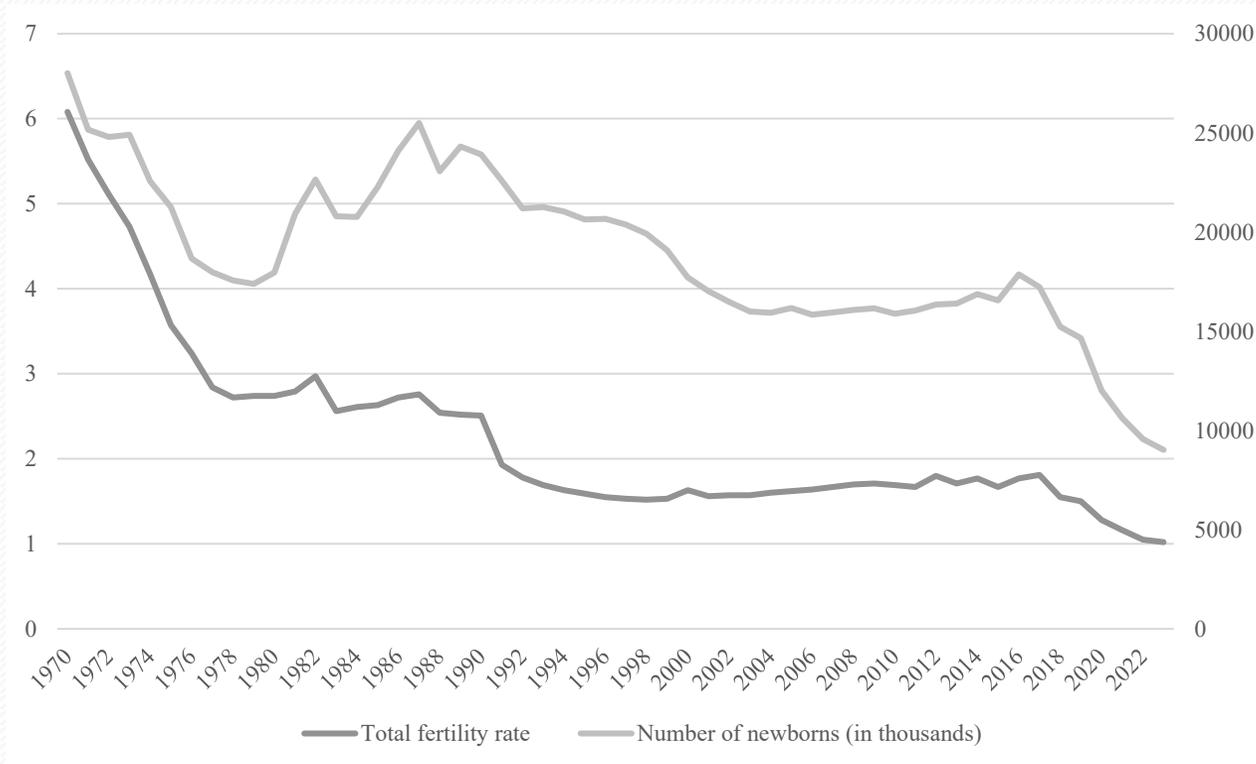# 1.1Backgrounds

Figure 1. Total fertility rate and number of newborns in China (1970-2023)

01 In China, the total fertility rate has experienced a dramatic decline over the past 50 years

02 The financial pressures associated with child-rearing intensify as the number of children in a household increases.

03 Chinese parents not only bear almost full financial burden of raising their children until adulthood but also often save in advance for their children's future marriage and housing expenses.

1.2 Contributions

01 We extend research on fertility.

02 We investigate the influencing factor of household consumption inequality.

03 We analyze the mechanisms behind the impacts to explain how the baseline impact is generated.

2 Literature Review

2 Literature Review

2.1 Consumption inequality

- Recent empirical work has explored the sources of consumption inequality, country-specific contexts, and potential mitigation mechanisms.

2.2 Fertility

- Relaxed fertility rules were found to reduce health investments in firstborns.

- Elevated fertility levels significantly impact intergenerational resource flows, reducing elderly labor force participation.
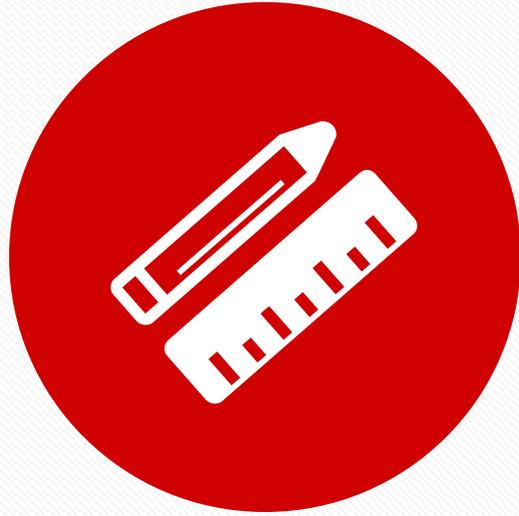
2.3 Children and Consumption

- While consumption inequality and fertility dynamics have each been extensively studied in isolation, the critical intersection of child quantity and household consumption inequality remains conspicuously understudied

- Data from Spain indicate that per capita food spending rises with family size only among the highest-income centiles, suggesting that realizing scale economies requires substantial initial resources

2 Literature Review

2.4 Research gaps

- The critical intersection of child quantity and household consumption inequality remains conspicuously understudied. Despite a substantial body of research examining either consumption inequality patterns

- No study directly addresses how the number of children within a household shapes disparities in consumption.

- Understanding whether larger family sizes exacerbate or mitigate household consumption disparities is essential for designing effective, equity-focused demographic policies.

3 Theoretical analysis and research hypotheses

3 Research Hypotheses

- Hypothesis 1: Household fertility behavior contributes to the reduction of household consumption inequality.

  - More children, more expenditure

  - Low elasticity of subsistence consumption

  - Scale economy and sharing.

- Hypothesis 2: Household fertility behavior contributes to the reduction of household consumption inequality through the channel of the increase in net external aid.

  - Less financial transfer to others

  - More financial aid from parents and other relatives.

3 Research Hypotheses

- Hypothesis 3: Household fertility behavior contributes to the reduction of household consumption inequality through the channel of the reduction in pension expenditures.

  - Less precautionary savings

  - Children's support for elderly parents

  - Risk and medical bill sharing.

- Hypothesis 4:Household fertility behavior contributes to the reduction of household consumption inequality through the channel of household entrepreneurship.

  - More spare time

  - More income

4 Data and Empirical Model

4.1 Data Collection

We selected pooled data from 2012 to 2022 for analysis.

Data are obtained from CFPS.

We process the raw data:

- We take the family code as the matching item and select the families with records in all the three-year data.

- 1% Winsor processing is performed on various consumption expenditure data.

- A total of 46,294 samples are used for the empirical analysis.

4.2 Regression Model

We use an OLS regression to study the effect of fertility on household consumption inequality, and the equation is set as:

$$CspIneq_{ict} = b_0 + b_1\,Fertility_{ict} + X'_{ict}\,\beta + \eta_i + \delta_c + \theta_t + \varepsilon_{ict} \quad (4)$$

where $CspIneq$ refers to household consumption inequality, measured by Kakwani index. $Fertility$ denotes the number of children aged 16 and under in the household. X'_{ict} includes all the control variables. η, δ and θ denote the household, city and year fixed effects, respectively. ε_{ict} represents the error term. The subscript i, c, and t mean household i, city c and year t.

4.3 Variables

4.3.1 Core dependent variable- household consumption inequality

- Consumption inequality refers to differences in consumption structure and consumption levels that exist across different dimensions (such as between different regions, social classes, and groups).

- Assuming there are n households in the region, the average consumption expenditure of these households is denoted as μ_x, and the consumption expenditure of the kth household is denoted as X_k. Let $\mu_{x_i}^+$ denote the average of the samples with consumption expenditure higher than household i, and the proportion of these households is denoted as $\gamma_{x_i}^+$; let $\mu_{lnx_i}^+$ denote the average consumption expenditure of households whose logarithmic consumption values exceed those of household i.

- $$Kakwani_i = \frac{1}{n}\sum_{j=i+1}^{n}(X_j - X_i) = \gamma_{x_i}^+[(\mu_{x_i}^+ - x_i)/\mu_x]$$

- The Kakwani index overcomes the scale issues present in the other two indices, and the weighted average of all individual indices is equal to the Gini coefficient.

- 4.3.2 Core independent variable-household fertility

- We use the number of children aged 16 and under in the household as a measure.

4.3 Definition, Measurement, and Descriptive Statistics of Variables

4.3.3 Control variables

- We also include several control variables. Some are related to the household characteristics, such as total assets, housing and the proportion of family member aged 65 or above. Some reflects the situation of the head of the household, this is because the household head has substantial impacts on the family. These indicators include age, gender, working property, health status. Others are relevant to the district, such as regional GDP.

Table 1 Details of variables.

Variable	Definition
CspIneq	Household consumption inequality
Fertility	Household fertility behavior
Old	The proportion of household members aged above 65
Asset	Total assets of the household
Urban	Whether the family lives in the urban area: Yes, 1; else, 0
IncIneq	Household income inequality
House	Whether the household has its own house: Yes, 1; else, 0
Age	Household head age
Edu	Household head's education years
Worktypr	Whether the head of household is within the system: Yes, 1; else, 0
Marriage	Whether the head of household is a married: Yes, 1; else, 0
Health	The health status of the household head
Gender	The gender of the household head: male, 1; else, 0
GDP	Regional GDP

5 Empirical Results and Analysis

5.1 Baseline results

- Table 2 contains the baseline results. Column (1) is the univariate coefficient without control variables included, while they are added in column (2).

- Both the coefficients are significantly negative, meaning that the more children in the household, the less consumption inequality.

- Thus, H1 is verified.

Table 3 Baseline results.

Variables	CspIneq (1)	CspIneq (2)
Fertility	-0.067***	-0.029***
	(0.002)	(0.001)
Old		0.018***
		(0.004)
Asset		-0.003***
		(0.000)
Urban		-0.043***
		(0.003)
IncIneq		0.340***
		(0.005)
House		0.002
		(0.003)
Age		0.003***
		(0.000)
Edu		-0.006***
		(0.000)
Worktypr		-0.007
		(0.010)
Marriage		-0.072***
		(0.005)
Health		-0.007***
		(0.001)
Gender		0.005**
		(0.002)
GDP		0.000*
		(0.000)
Constant	0.464***	0.326***
	(0.002)	(0.001)

5.2 Robustness Check

- We use the **instrumental variable (IV)** to deal with the possible endogeneity concern in the regression.
- We use the average number of children in other households in the same region as an instrumental variable (IV).
- The F statistics of first-stage IV estimation are large enough; thus, no weak instrumental variable problem is detected. The instrumental variables are still statistically significant in the second-stage regression, so we can conclude that the baseline results remain robust considering the potential endogeneity.

Table 3 Regression results on household consumption.

Variables	Fertility (First stage)	CspIneq (Second Stage)	CspIneq2	CspIneq3	Alternative measurement of fertility	Balanced panel data
	(1)	(2)	(3)	(4)	（5）	（6）
IV	-1.130***					
	(0.012)					
Fertility		-0.029***	-0.005***	-1,486.760***		-0.029***
		(0.004)	(0.000)	(87.318)		(0.003)
Fertility2					-0.049***	
					(0.003)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
C-D Wald F statistic	9017.737					
R^2	0.070	0.070	0.319	0.468	0.420	0.441
Observations	36392	36392	46,294	46,294	46,294	9,678

5.2 Robustness Check

- We use the alternative measurement of consumption inequality, i.e., The Kakwani index is replaced by Podder index and Yitzhaki index.

- we consider another way of measuring the number of children in a family: by constructing a binary variable to indicate whether the family has multiple children (Fertility2).

- Balanced Data are also considered.

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5.3 Mechanism Examination

(1) The mechanism of net external financial aid.

- We use the difference between the financial assistance received by households from outside sources and the financial assistance provided to others as a proxy. (Aid).

- Thus, H2 is verified.

Table 4 The mechanism of external financial aid.

Variables	$CspIneq$
$Fertility$	0.082***
	(0.039)
$Fertility \times Aid$	0.0162***
	(0.0051)
Aid	0.0195**
	(0.010)
Control	YES
R^2	0.670
Observations	46,287

5.3 Mechanism Examination

(2) The mechanism of reduction in pension expenditures.

- The channel variable used to verify the mechanism of reduction in pension expenditures (Pension) is the responses to the question "over the past 12 months, how much did your household spend on commercial insurance?".

- So, we verify H4.

Table 5 The mechanism of reduction in pension expenditures.

Variables	$CspIneq$
$DgtEcon$	0.074***
	(0.034)
$DgtEcon * Emp$	0.0295***
	(0.0092)
Emp	0.0364***
	(0.0127)
Control	YES
R^2	0.593
Observations	46,287

5.3 Mechanism Examination

(3) The mechanism of household entrepreneurship.

- We use a **binary entrepreneurship** indicator $Entre$ to capture household participation in business activities.

- The significantly positive coefficient on the interaction term justifies H3.

Table 6 The mechanism of household entrepreneurship.

Variables	$CspIneq$
$Fertility$	0.094***
	(0.042)
$Fertility * Entre$	0.0187***
	(0.0071)
$Entre$	0.0269*
	(0.142)
Control	YES
R^2	0.574
Observations	46,287

5.4 Discussion of Heterogeneity

(1) Income.

- We used **median household income** as a classification criterion to categorize households into high-income and low-income groups

Table 7 Income heterogeneity

Variables	High-income	Low-income
	(1)	(2)
Fertility	-0.028***	-0.031***
	(0.002)	(0.002)
Control	Yes	Yes
R^2	0.359	0.381
Observations	23,068	22,993

5.4 Discussion of Heterogeneity

(2) Region.

- Households are divided into three sub groups according to the **regions they live in**.

Table 8 Regional heterogeneity

Variables	East	Central	West
	(1)	(2)	(3)
Fertility	-0.033***	-0.033***	-0.022***
	(0.002)	(0.002)	(0.002)
Control	Yes	Yes	Yes
R^2	0.457	0.416	0.376
Observations	19,982	12,051	12,633

6 Conclusions

6 Conclusions

- We find that household fertility reduces household consumption inequality. The baseline finds remains robust after considering the endogeneity concern.

- We prove that increased external aid, household entrepreneurship and reduction in pension expenditures are effective mechanisms.

- Heterogeneities exist in households with different income level and in different regions.

Thank You!