Educational Burden and Intention to Have Another Child among Married or Cohabiting Mothers Aged 20–45: Evidence from CFPS 2022

Jiayi Zhu *

Department of Accounting, Durham University, Durham, United Kingdom

* Corresponding Author Email: vsmh64@durham.ac.uk

Abstract. This study examines the association between household educational burden and the intention to have another child among married or cohabiting women aged 20–45 who have at least one living biological child. Using China Family Panel Studies (CFPS) 2022 data, Probit models are estimated on a common complete-case sample of 2,592 women, with standard errors clustered at the household level. After adjustment for individual characteristics, household economic conditions, family structure, and province fixed effects, a ten-percentage-point increase in the household educational burden ratio is associated with a 1.52-percentage-point decrease in the predicted probability of intending to have a child within the next two years. The estimate is a conditional association rather than a causal or population-average effect. Replacing the burden ratio with the logarithm of household education and training expenditure produces a negative but statistically insignificant association. Exploratory income-group estimates show a negative association in the lower-income subsample but not in the higher-income subsample; without a formal cross-group equality test, this pattern does not establish heterogeneous effects. The findings are consistent with the quantity–quality trade-off framework, subject to measurement, selection, and survey-design limitations.

Keywords: Educational burden, intention to have another child, quantity–quality trade-off, CFPS, Probit model.

1. Introduction

1.1. Research Background and Research Question

In recent years, China's birth rate has continued to decline, and the country entered a period of negative natural population growth in 2022. As fertility policy has gradually shifted from restricting births to supporting fertility, institutional constraints on the number of children have weakened. However, families' actual fertility responses have remained limited. This suggests that decisions about whether to have additional children focus not only on the number of children permitted by policy, but also on practical costs related to housing, childcare, employment, and education. Existing studies have shown that socioeconomic factors have become major forces explaining fertility changes in China since the mid-1990s (Zhao & Zhang, 2018). Research on mothers with one child has also found that economic and physical constraints have a more direct influence on concrete fertility intentions than on the abstract ideal number of children (Liu & Lummaa, 2019).

Among the various costs of childrearing, educational investment is characterized by its long duration, cumulative nature, and strong forward-looking component. Families not only bear current expenses for their existing children, such as tuition fees, extracurricular training, and educational materials, but also anticipate the education resources that an additional child may require over many years. Educational competition may further raise families' expected standards of investment in child quality, thereby increasing the expected cost of an additional child as current educational investment rises. Previous research has found that expenditures of time and money on extracurricular tutoring are associated with lower fertility intentions, and that reducing the burden of extracurricular tutoring may increase intentions to have a second child (Zhou & Chen, 2023). Accordingly, this study addresses the following central question: Does a larger share of household income devoted to

education and training correspond to a lower near-term intention to have another child among mothers who already have children?

1.2. Literature Review and Research Contributions

The first strand of literature explains China's low fertility from the perspective of socioeconomic transformation. Income, education, employment, urban–rural status, and access to public services may all affect fertility plans. Zheng et al. (2016) find substantial socioeconomic differences in fertility intentions among women with one child. Zhu and Hong (2022) further show a gap between parents' ideal of two children and their actual fertility plans, with childrearing pressure being an important factor. Women's education may also influence fertility through income, the opportunity cost of time, and changes in values. Using CFPS data and variation in compulsory-education reform, Zhang and Zhao (2023) find that higher educational attainment delays childbearing and reduces the probability of second- or higher-order births for some women.

The second strand emphasizes the endogenous relationship between the number of children and investment in child quality. Becker and Lewis (1973) [2] argue that, under limited household resources, child quantity and quality interact: higher quality standards raise the shadow price of an additional child. Evidence from China broadly supports this trade-off. Li et al. (2008) use twin births to identify the effect of family size on children's educational outcomes; Liu (2014) exploits the relaxation of the one-child policy; and Rossi and Xiao (2024) show how social spillovers in education investment and childbearing decisions contribute to fertility transitions. Using Chinese life-course data, Baizan and Nie (2024) [1] likewise find that education is negatively associated with transitions to second and third births, although the association varies across cohorts and policy settings.

The third strand directly examines education costs and fertility intentions [3]. Zhang et al. (2022) find that higher local public education expenditure is associated with stronger fertility intentions, suggesting that greater public assumption of education costs may ease household constraints. Existing studies therefore show that education costs matter, but relatively little attention has been paid to distinguishing absolute education expenditure from the burden it creates relative to a household's ability to pay [4].

This study makes three contributions. First, it focuses on the short-term fertility plans of women who already have children, aligning the study population with the decision to have one additional child [5]. Second, it measures educational burden as annual household education and training expenditure relative to net household income and contrasts this measure with absolute expenditure. Third, it reports estimates on a common analysis Becker sample and accounts for dependence among eligible women from the same household, thereby separating specification changes from sample-composition changes [6].

2. Theoretical Framework And Hypotheses

2.1. Educational Burden and the Quantity–Quality Trade-off

According to the quantity–quality trade-off theory, households make simultaneous decisions about the number of children and the amount invested in the quality of each child. Under constraints on income and time, raising the quality standard for each child increases the marginal cost of having an additional child (Becker and Lewis, 1973) [2]. Educational investment is an important component of investment in child quality. Empirical studies from China show a significant relationship between family size and children’s educational outcomes, and that this relationship varies with urban–rural differences in public education resources and household conditions (Li et al., 2008).

When education expenditure accounts for a relatively large share of household income, fewer resources remain available for housing, childcare, healthcare, and daily consumption [7]. Educational competition may also make it difficult for families to absorb these costs simply by reducing investment per child. Evidence that the burden of extracurricular tutoring is negatively associated

with intentions to have a second child provides direct support for this mechanism (Zhou & Chen, 2023). Accordingly, the following hypothesis is proposed:

H1a: A higher household educational burden ratio is associated with a lower probability that a mother intends to have another child within the next two years [8].

2.2. Resource Reallocation and Competing Explanations

Educational burden may not necessarily reduce intentions to have another child. Households can reallocate resources across education, housing, leisure, and other consumption, and current spending does not necessarily represent the marginal cost of an additional child. High absolute education expenditure may reflect higher income or stronger education preferences rather than financial pressure. Fertility plans also depend on spousal preferences, parity, women's age, and the household life cycle [9]. Zhu and Hong (2022) show that the relationship between income and realistic second-child intentions is not simply linear [10]. Under these conditions, the independent association between educational burden and fertility intention may be statistically insignificant. Therefore, the following competing hypothesis is proposed:

H1b: After individual and household characteristics are controlled, household educational burden has no statistically significant association with the intention to have another child.

3. Research Design

3.1. Data Source and Sample Selection

This study uses the 2022 wave of the China Family Panel Studies (CFPS), release version 1.0, downloaded from the Peking University Open Research Data Platform and accessed on September 3, 2026. The adult individual file is linked to the family economic file through the 2022 household identifier (fid22). Variable wording and coding were checked against the official CFPS 2022 full questionnaires and the CFPS-45 database introduction and data-cleaning report (Institute of Social Science Survey, Peking University, 2024a, 2024b, 2024c). The analysis uses QKA205 from the adult module, FP510 from the family economic module, and the generated household-income variable fincome1.

The sample is restricted to women aged 20–45 who are currently married or cohabiting and have at least one living biological child. Starting from 27,001 adult records, the age-and-sex restriction leaves 5,243 women; restricting marital status leaves 3,740; and requiring at least one living biological child yields 3,441 eligible women. Of these, 3,382 have a valid response to QKA205. A valid educational-burden ratio is available for 3,246 women, but 49 of them lack a valid fertility-intention response; consequently, 3,197 women jointly observe the outcome and core explanatory variable. Requiring complete individual controls reduces the sample to 2,858, mainly because education years are missing for 310 records, with smaller losses for employment (13), self-rated health (28), and hukou (4); these categories overlap. Requiring complete household control then produces 2,592 observations, mainly because of missing household wealth (249), urban residence (16), and youngest-child age (1), again with overlap. Table 3 reports this flow explicitly [11].

The unit of analysis is the eligible woman, not the household. More than one woman can satisfy the criteria in an extended or multigenerational household. The initial 3,441 women belong to 3,383 households; 57 households include multiple eligible women. In the final common sample, 2,592 women belong to 2,562 households, of which 30 contain two eligible women. Household-level variables are shared by women in the same household, so all reported inferential statistics use standard errors clustered by fid22. The title, abstract, and conclusions therefore refer specifically to eligible women rather than to all households or all adults of reproductive age.

To make coefficients comparable across specifications, Models (1)– (3) are re-estimated on the same 2,592 complete cases [12]. Among the 3,197 women eligible for the parsimonious specification, the 605 excluded from the common sample are somewhat younger and have slightly higher mean educational burden and fertility intention than retained women. Complete cases have a mean age of

35.55 years and a fertility-intention rate of 7.02%, compared with 34.15 years and 8.26% among excluded records [13]. Complete-case selection may therefore limit external validity, but it no longer mechanically changes the composition of the three reported model samples.

3.2. Variable Definitions

The dependent variable is the intention to have another child. QKA205 asks, "Do you plan to have a child within the next two years?" In the original questionnaire, the response options are Yes (1) and No (5); in the released adult analysis file used here, valid responses are harmonized to Yes (1) and No (0). The analysis retains only 0/1 values and treats negative special codes, inapplicable cases, and missing values as missing. The item is administered conditionally by the CFPS computer-assisted interview and is used here only for women who satisfy the stated age, partnership, and motherhood restrictions [14].

The core explanatory variable is the household educational burden ratio: total household education and training expenditure during the previous 12 months (FP510) divided by total net household income (fincome1), multiplied by 100. The official questionnaire describes FP510 as annual household education and training expenditure, including school-selection fees, tuition, training fees, extracurricular tutoring, and teaching materials; a household reporting no such expenditure is recorded as zero [15]. Because FP510 does not identify the beneficiary, it may include expenditure for adults or household members other than the respondent's children and is not labelled child-specific spending. Fincome1 is a CFPS-generated variable labelled total household net income rather than a directly asked questionnaire item. Ratios with missing or nonpositive income are set to missing. The ratio is winsorized at the 1st and 99th percentiles and divided by 10, so its coefficient represents a ten-percentage-point increase.

Control variables cover individual and household characteristics. Personal control factors include age, age square, years of education, employment status, self-assessed health status and agricultural household registration. Household-level controls include the natural logarithm of household income, the inverse hyperbolic sine of net household assets, number of living biological children, age of the youngest child, and urban residence. Province fixed effects account for unobserved regional differences in economic development, public services, and fertility culture. Given the limited number of respondents intending another birth, time costs, parental opportunity costs, and additional family-structure variables are not entered simultaneously in the baseline model, as shown in Table 1.

Table 1. Variable definitions and coding.

Variable Type	Variable Name	Symbol	Definition and Coding
Dependent variable	Intention to have another child	Fertility	QKA205: plans a child within two years; Yes = 1, No = 0; special codes missing
Core explanatory variable	Household educational burden	EduBurden	100 × FP510 / fincome1; winsorized at p1/p99; divided by 10 in models
Alternative explanatory variable	Log education and training expenditure	LnEduExp	ln(1 + annual household education and training expenditure)
Individual characteristic	Age and age squared	Age, Age²	Respondent's age and its square
Individual characteristic	Years of education	Education	Completed years of schooling
Individual characteristic	Employment	Employment	Employed = 1; otherwise = 0
Individual characteristic	Self-rated health	Health	Higher values indicate better health
Individual characteristic	Agricultural hukou	RuralHukou	Agricultural hukou = 1; otherwise = 0
Household characteristic	Log household income	LnIncome	Natural logarithm of net household income
Household characteristic	Household net assets	IHSAssets	Inverse hyperbolic sine of net household assets
Household characteristic	Living biological children	Children	Number of living biological children
Household characteristic	Age of youngest child	YoungestAge	Age in years of the youngest child
Household characteristic	Urban residence	Urban	Urban residence = 1; otherwise = 0
Regional control	Province fixed effects	Province FE	Province indicator variables

Note: QKA205 is coded 1 for yes and 0 for no in the released analysis file; special negative codes are treated as missing. The educational burden ratio is winsorized at the 1st and 99th percentiles.

3.3. Model Specification

Because the intention to have another child is binary, a Probit model is used to estimate its conditional association with household educational burden. The model is specified as follows:

$$\Pr(\text{Fertility}_i = 1) = \Phi(\alpha + \beta \text{EduBurden}_i + \gamma X_i + \delta H_i + \mu_p + \varepsilon_i) \quad (1)$$

Here, Fertility_i indicates whether woman i tends to have a child within the next two years; EduBurden_i denotes household educational burden; X_i and H_i are vectors of individual- and household-level controls; and μ_p represents province fixed effects. The parameter of interest is β. Because Probit coefficients are not probability changes, average marginal effects (AMEs) are reported. Models (1) – (3) use the same complete-case sample, and standard errors are clustered at the household level. The CFPS cross-sectional weight rswt_natcs22n is unavailable for part of the target sample; estimates are therefore unweighted and apply to the analytical sample rather than the national population. Models were estimated in Python 3 using a maximum-likelihood Probit routine, with household-clustered sandwich covariance estimates; the reproducible scripts and derived results accompany the manuscript. All estimates are interpreted as correlations rather than causal effects.

4. Empirical Results

4.1. Descriptive Statistics

Table 2 reports descriptive statistics for the common estimation sample of 2,592 women. About 7.02% intend to have a child within the next two years. The mean educational burden ratio is 8.55%, annual education and training expenditure averages CNY 9,668, and mean net household income is CNY 146,230. Respondents are on average 35.55 years old and have 1.72 living biological children; 77.5% are employed, 71.0% have agricultural hukou, and 58.2% live in urban areas. Using one common sample ensures that the descriptive statistics correspond directly to all three baseline models.

Table 2. Descriptive statistics for the common estimation sample.

Variable	N	Mean	Med.	SD	Min.	Max.
Intention to have another child	2,592	0.070	—	0.256	0	1
Educational burden ratio (%)	2,592	8.551	—	11.703	0	66.667
Education and training expenditure (CNY 1,000s)	2,592	9.668	—	16.917	0	300.000
Net household income (CNY 1,000s)	2,592	146.230	—	223.926	1.700	5,120.000
Age (years)	2,592	35.549	—	5.460	20	45
Years of education	2,592	10.609	—	4.094	0	22
Employed	2,592	0.775	—	0.417	0	1
Self-rated health	2,592	3.287	—	0.973	1	5
Agricultural hukou	2,592	0.710	—	0.454	0	1
Living biological children	2,592	1.724	—	0.712	1	6
Age of youngest child (years)	2,592	7.999	—	5.495	0	32
Urban residence	2,592	0.582	—	0.493	0	1

Note: N = 2,592 for every variable. Monetary variables are reported in thousands of CNY. The educational burden ratio is winsorized at the 1st and 99th percentiles. Higher self-rated health values indicate better health.

The complete-case screening reduced the eligible sample from 3,441 women to a common estimation sample of 2,592; see Table 3 for the stage-by-stage sample selection and attrition.

Table 3. Sample selection and complete-case attrition.

Selection stage	Remaining N	Loss from previous stage
Eligible women aged 20–45, married/cohabiting, ≥1 living biological child	3,441	—
Valid QKA205 fertility intention	3,382	59
Valid educational-burden ratio (irrespective of QKA205)	3,246	Not nested
Outcome and burden jointly observed	3,197	185 from valid outcome
Complete individual controls	2,858	339
Complete household controls: common estimation sample	2,592	266

Note: The 3,246 observations with a valid burden ratio include 49 women without a valid QKA205 outcome; hence Model (1) has 3,197 rather than 3,246 observations. Models (1)–(3) in Table 4 are estimated on the final common sample of 2,592; the intermediate counts document the complete-case screen.

4.2. Baseline Results

Table 4 presents Probit estimates on the common sample. Model (1) includes only educational burden, Model (2) adds individual characteristics, and Model (3) adds household characteristics and province fixed effects. The burden coefficient remains negative and statistically significant throughout, declining from −0.263 to −0.140 per ten-percentage-point increase. Because sample composition is held constant, this attenuation reflects added covariate adjustment rather than observations entering or leaving the models. In the full model, the AME is −0.0152 ($p = 0.009$): a ten-percentage-point increase in educational burden is associated with a 1.52-percentage-point lower predicted probability of intending another child.

Table 4. Household educational burden and intention to have another child: Common-sample Probit estimates.

Variable / Statistic	Model (1)	Model (2)	Model (3)
Educational burden coefficient (per 10 percentage points)	−0.263***	−0.189***	−0.140***
Household-clustered SE	(0.056)	(0.056)	(0.053)
Average marginal effect	−0.0347	−0.0229	−0.0152
Household-clustered SE of AME	(0.0075)	(0.0069)	(0.0058)
Individual controls	No	Yes	Yes
Household controls	No	No	Yes
Province fixed effects	No	No	Yes
Observations	2,592	2,592	2,592
Households	2,562	2,562	2,562

Note: All models use the same 2,592 women from 2,562 households. Parentheses contain standard errors clustered by fid22. Individual controls include age, age squared, education years, employment, self-rated health, and hukou; household controls include household income, net household assets, number of living biological children, youngest-child age, and urban residence. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Stars refer to Probit coefficients.

Family-structure variables also show clear conditional associations in the full model. The AME for the number of living biological children is -0.0841 ($p < 0.001$), and the AME for the age of the youngest child is -0.0040 ($p = 0.011$). These estimates mainly capture differences across parity and family life-cycle stages and should not be interpreted as causal effects of the number or age of existing children. Most other socioeconomic controls do not reach conventional significance levels in the full model.

4.3. Sensitivity Analysis

As a sensitivity check, the core variable is replaced by the natural logarithm of annual household education and training expenditure. The alternative measure has a coefficient of −0.0185 and an AME of −0.0020; neither reaches conventional statistical significance ($p = 0.125$). This contrast does not establish that the ratio is intrinsically superior. Rather, it suggests that education spending relative to household resources captures a different dimension from absolute spending and that the result is sensitive to measurement choice.

5. Further Comparison and Discussion

5.1. Exploratory Income-Group Comparison

The common sample is divided at annual net household income of CNY 100,000. Each subgroup model includes the same individual and household controls and province fixed effects as Model (3), and standard errors are clustered by household. Table 5 reports the estimates.

Table 5: Probit estimates by household income group.

Statistic	Lower-income group	Higher-income group
Educational burden coefficient (per 10 percentage points)	−0.167***	−0.049
Household-clustered SE	(0.061)	(0.127)
Average marginal effect	−0.0164	−0.0056
Household-clustered SE of AME	(0.0060)	(0.0144)
p value for Probit coefficient	0.006	0.700
Observations	1,320	1,272
Households	1,311	1,251
Full controls and province fixed effects	Yes	Yes

Note: The cutoff is CNY 100,000 in annual net household income. Both models include the full control set and province fixed effects; standard errors are clustered by fid22. No formal cross-group coefficient-equality test is conducted, so the comparison is exploratory. *** $p < 0.01$.

The educational-burden coefficient is −0.167 ($p = 0.006$) in the lower-income group and −0.049 ($p = 0.700$) in the higher-income group. The corresponding AMEs are −0.0164 and −0.0056. This pattern is compatible with a tighter resource constraint among lower-income families, but statistical significance in one subgroup and insignificance in another does not itself prove that the two coefficients differ. A larger sample and a formal interaction test are required for a heterogeneity claim.

6. Conclusions

6.1. Main Findings

Using CFPS 2022 data, this study examines married or cohabiting women aged 20–45 who have at least one living biological child. In the common analytical sample, 7.02% report an intention to have a child within the next two years. In the unweighted Probit model with household-clustered standard errors, a ten-percentage-point increase in household educational burden is associated with a 1.52-percentage-point lower predicted probability of intending another child after individual characteristics, household economic conditions, family structure, and province fixed effects are controlled. The alternative absolute-expenditure measure is negative but statistically insignificant. The income-group comparison is exploratory and does not establish statistically different effects. These estimates are conditional associations for the defined sample and should not be generalized to all Chinese households or interpreted causally.

6.2. Policy Implications

Policies that reduce the private cost of maintaining adequate educational opportunities may ease one component of perceived childrearing pressure. Broader access to affordable childcare, after-school services, and high-quality basic education could be particularly relevant to lower-income, multichild, and high-burden families. Because the estimates are noncausal, these implications should be treated as policy hypotheses rather than predicted program effects.

6.3. Limitations and Future Research

This study has five principal limitations. First, cross-sectional data cannot resolve reverse causality or omitted-variable bias. Second, QKA205 measures a two-year plan rather than an actual subsequent birth. Third, FP510 is household-level education and training expenditure and cannot identify the beneficiary. Fourth, the models are unweighted and do not fully incorporate CFPS stratification and primary-sampling-unit design, although household-clustered standard errors address dependence among multiple eligible women in the same household. Fifth, complete-case analysis excludes 605 women who would enter the parsimonious model and observed differences between retained and excluded records indicate possible selection. Future research should use longitudinal fertility outcomes, beneficiary-specific spending, multiple imputation or inverse-probability methods, survey-design variables, and formal interaction tests.

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