Educational Inequality and Family Size: Evidence from the 1980s Rural Economic Reform in China

Tianyu Zheng

February 5, 2026

Abstract

Using evidence from late-twentieth-century China, we show that educational attainment is the primary mechanism through which smaller family size leads to better future income. The negative effect of family size on education intensifies sharply for birth cohorts in the 1970s, coinciding with the implementation of the Family Planning Policy and the abolition of the People's Communes. We investigate whether this discontinuity arises from intra-household resource dilution due to rural decollectivization or from stricter enforcement of the Family Planning Policy in better-endowed households. Employing Difference-in-Differences methodology, we find that the dominant driver of this relationship is the quantity-quality tradeoff under decollectivization, while the Family Planning Policy plays only a minor and short-term role.

1 Introduction

The late twentieth century marked a period of profound economic transformation in China, with GDP per capita rising from approximately \$100 in 1970 to nearly \$1,000 by 2000.[1] While this growth improved socioeconomic conditions nationwide, it also coincided with rising disparities in outcomes across individuals from different family backgrounds. One key factor contributing to these disparities may be family size—specifically, the number of siblings a child has.

To assess how family size affects socioeconomic outcomes over time, we first analyze the relationship between future annual income and individual background characteristics. Our findings reveal that educational attainment serves as the key mechanism through which smaller family size enhances future earnings. A deeper examination of educational outcomes further demonstrates that the gap between children from smaller and larger families widened sharply in the late 1970s.

We propose two primary explanations for the historical rise in disparities linked to family size. The first is *resource dilution* under market liberalization and privatization, and the second is the *endogeneity of family size* induced by the Family Planning Policy, which had been implemented more strictly on households with higher socioeconomic status. This paper aims to disentangle the distinct effects of these mechanisms.

1.1 Resource Dilution Under Rural Decollectivization

The first explanation, resource dilution, posits that parents in larger families allocate fewer financial and temporal resources to each child. This mechanism intensified after China's economic reforms shifted responsibility for education and healthcare from collective institutions to individual households.

Prior to the 1980s, rural households consists over 80% of China's population. Almost all of them were operated under the collective farming system of People's Communes. Education and healthcare were institutionally provided: children in the same village attended the same state-funded elementary school, with minimal parental cost or choice. Following the dissolution of the People's Communes and rationing system in the early 1980s, rural households faced a market-oriented economy akin to other developing nations. Families now bore direct responsibility for schooling costs and decisions, exacerbating resource constraints for larger families.

This structural shift represents an exogenous shock. Children born in the 1970s reached school age just as their parents confronted these new financial pressures. For larger families, the combined effect of reduced collective support and increased private costs created disproportionate barriers to educational attainment.

Extensive research documents that the People's Communes were phased out and replaced by the Household Responsibility System (HRS) between 1980 and 1983, with limited exceptions occurring as

[1] All values are in current US dollars.

early as 1979. This regional variation in the timing of abolition serves as the basis for our Difference-in-Differences estimation strategy.

1.2 Endogeneity of Family Size Under the Family Planning Policy

The second explanation centers on the endogeneity of family size. While prior studies document a negative correlation between family size and child outcomes, this relationship may reflect unobserved parental characteristics—such as education, income, or social status—rather than a causal effect.

China's Family Planning Policy provides a unique quasi-experimental setting to address this endogeneity. Enforcement intensity varied systematically: stricter implementation targeted households with higher socioeconomic status and urbanized regions, effectively compelling better-educated and wealthier families to have fewer children. This selective compliance introduces endogeneity, as families with advantageous traits (e.g., parental education, social capital) disproportionately reduced fertility, confounding estimates of family size effects.

The Family Planning Policy evolved in phases. Initial efforts from 1973 promoted "Later, Longer, Fewer" births through incentives for delayed marriage and smaller families. This gradual approach transitioned into the stricter One-Child Policy after 1979, which institutionalized penalties for noncompliance. The enforcement rigor correlated with regional development and household socioeconomic status (SES), creating exogenous variation in fertility behavior.

To isolate the causal effect of family size, we leverage this variation by comparing two groups: (1) the younger child in an 2-child household, and (2) the elder child born in the same year in a similar 2-child household that continued having another child in later years despite policy pressures. If stricter enforcement in high-SES households induced compliance, the latter group likely represents lower-SES families with weaker policy adherence. Consequently, children in noncompliant households may exhibit systematically worse outcomes due to negative selection (e.g., worse parental traits correlated with noncompliance). This design helps disentangle the impact of negative selection from resource dilution since both the family size and the birth year have been controlled.

The remainder is organized as follows. section 2 summarizes previous literature about family size, birth order, the Family Planning Policy, and the 1980s rural decollectivization reform in China. section 3 describes the data and provides preliminary analysis. section 4 outlines the test and presents the main estimates. section 5 concludes.

2 Literature Review

With an extensive theoretical literature following G. Becker (1960) and G. S. Becker and Lewis (1973) that postulates a trade-off between child quantity and quality within a family, a vast amount of literature has confirmed that the educational attainment negatively correlates with the family size. (Blake, 1981; Downey, 1995) However, the results sometimes become noneligible after include several instrumental variables, such as the last-born are twins and the sex mix of the first two children, especially in latest research in the 21st century. (Black et al., 2005; De Haan, 2010)

Another strand of literature has confirmed the existence of a negative birth order effect (or a positive first-born advantage) on educational attainment and occupation, with the latter persisting to a lesser extent after controlling for education. (Behrman & Taubman, 1986; Booth & Kee, 2009; Mechoulan & Wolff, 2015) Some researchers argue that eldest son might receive extra care from parents and extra benefits from intra-household resource allocation, while others suggests that birth-order differences occur because of stronger endowment effects that favor firstborns.

Most previous economic research regarding the abolition of the People's Communes are focused on incentives and local information to explain its prevalent success on improving agricultural production. (Krusekopf, 2002; Lin, 1987, 1988) Few quantitative research on households has been done due to the lack of micro-level data.

Recently, Chen and Xie (2025) successfully investigates the impact of the abolition of People's Communes on rural fertility. This paper exploits the staggered implementation of agricultural decollectivization to show that the abolition of collective farms led to a significant decline in rural fertility, independent of the impact of family planning policies. These findings are in line with our assumption that decollectivization imposed financial constraints in household decisions.

Prior research on China's Family Planning Policy broadly aligns with the *quantity-quality trade-off* hypothesis, though estimated effects on child outcomes are generally modest. Rosenzweig and Zhang (2009) leverages twin births as a natural experiment to study the One-Child Policy's impact, finding that fertility reductions led to moderate gains in human capital accumulation. Even under optimistic assumptions, however, the policy increased college enrollment probabilities by less than 9%. Similarly, Li and Zhang (2017) exploits regional variation in enforcement intensity as an instrumental variable, demonstrating that stricter implementation in certain prefectures reduced family size and produced small but statistically significant improvements in educational attainment. These findings suggest that while the trade-off exists, its practical magnitude is limited by institutional and socioeconomic constraints.

Not all consequences of reduced fertility are positive. Cameron et al. (2013) reveals unintended psychological costs: the One-Child Policy exacerbated negative personality outcomes among only children, such as reduced conscientiousness and agreeableness. After controlling for educational advantages, the net effect of being an only child becomes adverse.

Our study makes three key contributions to the literature. (1) First, we reevaluate the effects of family size and birth order using a novel dataset from late twentieth-century China, offering new insights into these relationships in a developing economy context. (2) Second, by leveraging an exogenous shock that imposed binding financial constraints on households, we provide robust evidence for the quantity-quality trade-off in child outcomes. (3) Third, we develop an approach to separately identify the effects of two concurrent nationwide reforms, addressing a critical challenge in causal inference.

3 Data

The dataset utilized in this paper is sourced from the Chinese Household Income Project (CHIP), which comprises a representative random sample of private households in mainland China. This project was conducted in 1988, 1995, 1999, 2002, 2007, 2008, 2013, and 2018. The dataset provides detailed micro-level information about individual and household characteristics, including demographic features and financial status.

This paper primarily utilizes data from the latest survey conducted in 2018, which includes information from 36,259 individuals across 11,506 households in urban areas and 35,007 individuals from 9,239 households in rural areas. The sampling rate aligns with China's urbanization rate of 59.6% in 2018. We will focus on individuals born between 1956 and 1990. As shown in Table 1, after applying these criteria, our dataset consists of 39,309 observations, with 20,871 from urban areas and 18,438 from rural areas.

Table 1: Summary Statistics

	(1) Total		(2) Rural		(3) Urban	
	mean	sd	mean	sd	mean	sd
Age in 2018	44.895	9.851	45.700	9.964	44.184	9.694
Female = 1	0.498	0.500	0.485	0.500	0.511	0.500
Num of Sib + Self	3.538	1.733	3.817	1.767	3.292	1.665
Birth Order	2.372	1.514	2.488	1.560	2.269	1.466
Househead = 1	0.410	0.492	0.376	0.485	0.439	0.496
Num of Depend Child	0.633	0.801	0.613	0.856	0.651	0.749
Years of Edu	9.409	3.567	7.779	2.931	10.818	3.467
Log Annual Income	10.711	0.859	.	.	10.711	0.859
Observations	39309		18438		20871	

The primary strength of our dataset lies in its comprehensive information regarding individual characteristics and family background attributes, such as the number of siblings and their birth order. However, there are some limitations to consider. For instance, the dataset lacks detailed information about the siblings beyond their count, and we do not have data on whether any twins are part of the family. This information could have been useful as an instrumental variable to represent an exogenous shock related to the number of siblings. Additionally, the dataset consists only of cross-sectional data rather than panel data on individuals and households.

Table 2 presents a cross-tabulation of family size and birth order. Each cell indicates both the frequency of our sample that falls into the specified family size and birth order category. About 86% of the respondents have five or fewer siblings, including themselves. Respondents that have six or more siblings have been categorized into one group. For family sizes of four or less, the distribution of birth order is relatively close to a uniform distribution. The minor imbalance observed in the birth order of respondents with five siblings may be attributed to mortality selection. Larger family sizes were more

Table 2: Distribution by Family Size and Birth Order

Family Size	**Birth Order**						**Total**
	1	2	3	4	5	6+	
1 child	3,434	0	0	0	0	0	3,434
2 child	5,118	4,132	0	0	0	0	9,250
3 child	3,075	3,188	2,686	0	0	0	8,949
4 child	1,622	1,897	1,900	1,867	0	0	7,286
5 child	740	889	1,070	1,057	1,202	0	4,958
6+ child	383	562	800	893	960	1,834	5,432
Total	14,372	10,668	6,456	3,817	2,162	1,834	39,309

common prior to the implementation of the 'One Child' policy in the late 1970s, suggesting that elder children in those families were more likely to have died before this survey was conducted.

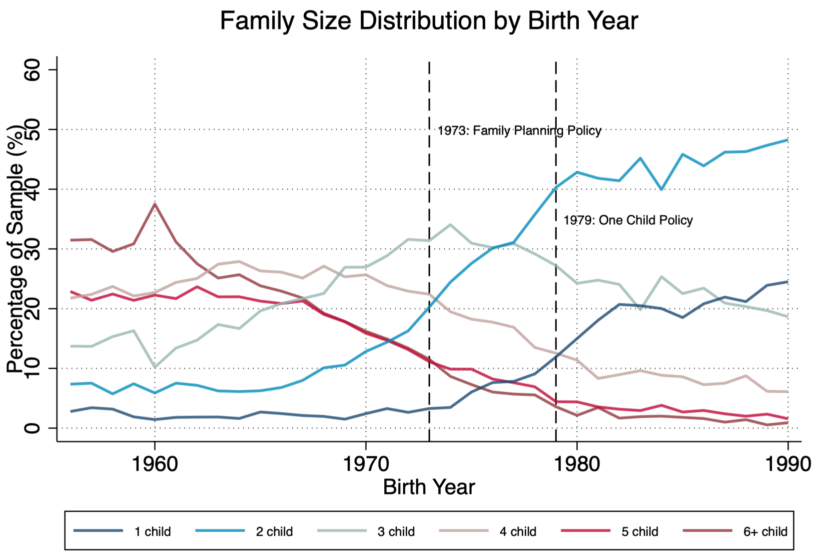

Figure 1: Family Size Distribution by Birth Year

Figure 1 illustrates the distribution of family sizes by birth year cohort, capturing how fertility patterns changed before and after China's family planning policies. The percentage of n-child family reflected in Figure 1 is defined as the percentage of our respondents that have n siblings include himself or herself, which is distinct from the percentage of households that have n children.

Prior to the implementation of the Family Planning Policy in 1973, families with three or more children dominated the distribution. Following the policy's introduction, we observe a rapid demographic transition - the proportion of 1-child and 2-child families increases sharply while the share of families with four or more children declines precipitously. However, even after the implementation of the One Child Policy in 1979, approximately 45% of sampled individuals came from two-child families, a proportion roughly double that of single-child families (about 22-23%). The observed pattern suggests that the policy resulted in roughly equal numbers of families stopping at one child versus having two children, once we account for the complete cohort. It could be attributed to the policy that included an exemption for rural families whose firstborn was a daughter, allowing them to have a second child after a specified interval.

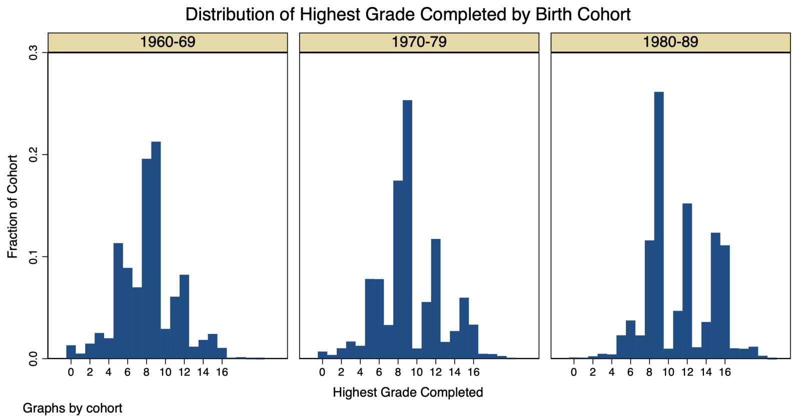

Figure 2: Distribution of Highest Grade Completed by Cohorts

Figure 2 presents the distribution of the highest grade completed across three birth cohorts. The distribution exhibits clear peaks at grades 5, 6, 8, 9, 11, and 12, reflecting two important institutional features of China's education system. First, students frequently exit the education system either immediately after completing an educational stage or one year prior, as the final year of each stage is typically dedicated to preparation for articulation exams. Second, the notable concentration at grade 5 stems from regional variation in compulsory education systems, with some areas implementing a 5-4 structure (5 years of primary school followed by 4 years of junior high school) rather than the more common 6-3 structure.

Based on these patterns, we construct several measures of educational attainment: (1) total years of education; (2) junior high school completion (defined as completing 9 or more years of education); and (3) senior high school completion (12 or more years). We exclude primary school completion from our analysis since primary school completion rates had already reached near-universal levels by the 1970s, offering limited variation for analysis. To better capture household decision-making at critical junctures, we introduce two additional indicators: (4) junior high school articulation (whether a grade 9 student continues to senior high school) and (5) senior high school articulation (whether a grade 12 student pursues higher education). These transition measures allow us to examine educational continuation decisions at specific institutional thresholds.

Figure 3 presents the evolution of average educational attainment across birth cohorts. Cohorts born during the early 1960s experienced a temporary decline in educational attainment, likely reflecting the disruptive effects of the Cultural Revolution. Beginning with cohorts born in the late 1960s, we observe a sustained and rapid increase in educational attainment. This upward trend was particularly pronounced

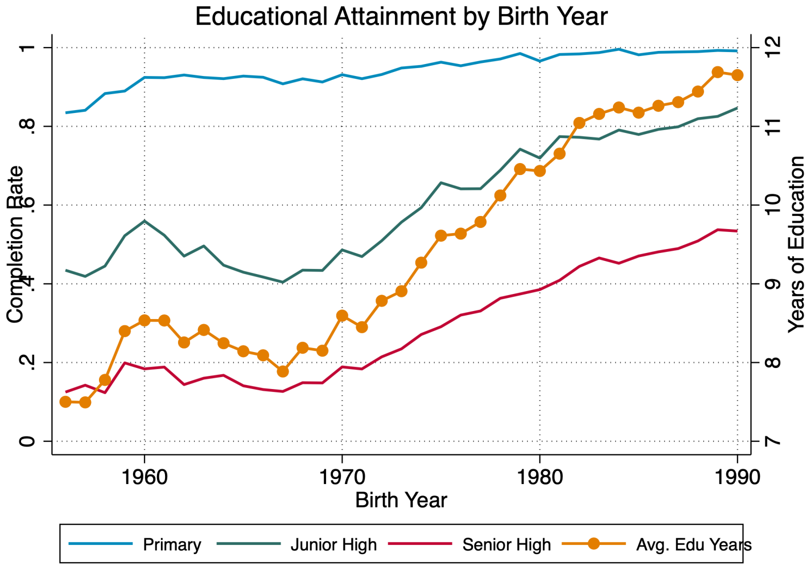

Figure 3: Educational Attainment by Birth Year

for senior high school completion rates, which approximately doubled from 20% to 40% within a single decade. This acceleration in educational attainment coincides with China's economic reforms and the Family Planning Policy.

To exploit the staggered abolition of the People's Communes for our further analysis, we require information on respondents' native place and corresponding decollectivization timelines. Our dataset provides the province of residence at age 14, which we use as a proxy for respondents' birth and upbringing locations.[2]

Table 3: The Year of Agricultural Decollectivization by Province

1981	**1982**		**1983**
Anhui	Hebei	Hubei	Beijing
Hunan	Shanxi	Hunan	Tianjin
Guizhou	Inner Mongolia	Guangdong	Liaoning
Yunnan	Zhejiang	Guangxi	Jilin
	Jiangsu	Hainan	Heilongjiang
	Fujian	Chongqing	Shanghai
	Jiangxi	Sichuan	Jiangsu
	Shandong	Shaanxi	
	Henan	Gansu	
	Xinjiang		

Note: The data is adapted from Chen and Xie (2025). Provinces not listed (Tibet, Qinghai, Ningxia, Taiwan) either lack documented decollectivization years in available sources or are not applicable in this scenario.

The decollectivization timeline, presented in Table 3, is constructed from Chen and Xie (2025) and Chen and Lan (2020). The County-level abolition time is defined as the first year when more than 50%

[2]County-level data would offer more precise geographic variation, but access is restricted. Due to time constraints for this thesis, we did not pursue the data application process.

of production teams adopted the Household Responsibility System (HRS). The Province-level abolition time is defined as the year when over 80% of agricultural counties within the province implemented HRS.

This staggered reform implementation provides quasi-experimental variation for our identification strategy, allowing us to compare outcomes across birth cohorts differentially exposed to the policy change during their formative years.

4 Empirical Methodology

4.1 Primary Channel: Educational Attainment

To investigate the effects of family size and birth order on individual outcomes, we estimate the following regression model:

$$y_{it} = \sum_n \delta_n \cdot FamilySize_n + \sum_k \gamma_k \cdot BirthOrder_k + \beta \mathbf{X}_{it} + \phi_i + \phi_t + \epsilon_{it} \tag{1}$$

where y_{it} represents the outcome variable of the individual, born in province i, with total number of siblings n, birth order k, and birth year t. The model involves a set of dummy variables indicating the number of siblings, capturing the impact of family size. Similarly, it also includes dummy variables for the individual's rank within their siblings, addressing the potential role of birth order effects. $\mathbf{X}_{it}$ is a vector of control variables, including individual characteristics such as gender and education. To account for unobserved heterogeneity across regions and birth cohorts, we include province fixed effects, ϕ_i, and time fixed effects, ϕ_t. The term ϵ_{it} represents the error term.

By including both family size and birth order in the regression model, we aim to disentangle their separate contributions to the outcome variable, while controlling for potential confounders through $\mathbf{X}_{it}$ and fixed effects. This approach allows us to isolate the causal effects of sibling-related factors on individual outcomes.

Table 4 presents the effects of the family size and birth order on log current income and log household financial assets controlled for basic demographic characteristics. Rural households are excluded from this preliminary analysis due to the distinct economic structure, where income primarily depends on arable land ownership and access to product markets rather than individual characteristics. This arrangement will not largely reduce the robustness of our analysis since over 60% of current urban residents in China were born and raised in rural area.

As shown in Table 4 (1) & (2) and Figure 5 (green line), when education is not controlled for, the coefficients for family size dummy variables are significantly **negative**, and decrease with the number of siblings. The results are consistent with the quantity-quality trade-off theory, which posits that larger family sizes dilute resources per child, leading to reduced investment in human capital and, consequently, lower income levels.

However, when education is controlled for (orange line in Figure 5), all the coefficients for family size dummy variables become **positive**. There are no significant differences among families with 2 to 6+ siblings, which indicates that the income disparity primarily exists between only-child families and those with siblings. This pattern can be partially attributed to negative personality outcomes of being an only child, which is in line with Cameron et al. (2013).

The coefficients for family size dummy variables in Table 4 (5) & (6) exhibit a similar pattern. When

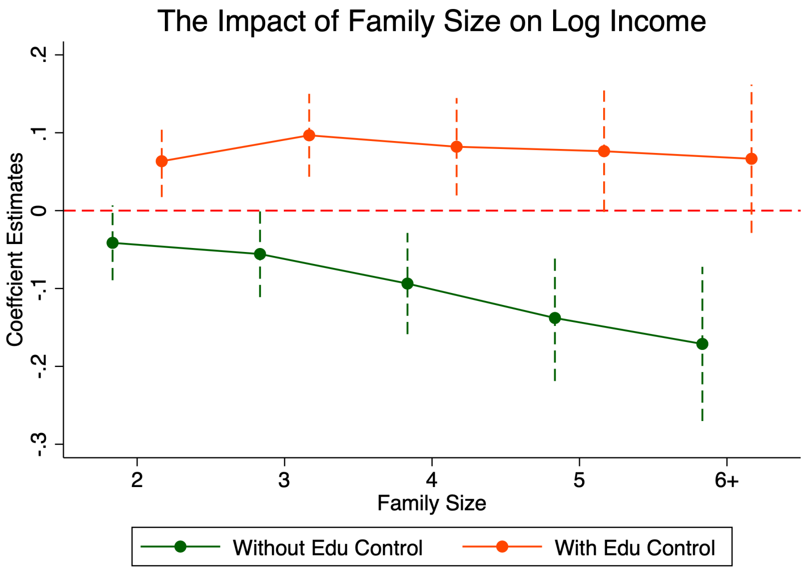

Figure 4: The Impact of Family Size on Log Income With/Withou Education Control

controlled for education, the magnitude of negative family size effect on log household financial assets is significantly reduced.

In Table 4, the coefficient for education is positive and highly significant across all specifications. One additional year of education leads to approximately 7.9% increase in annual earnings. Meanwhile, the inclusion of education diminishes or even reverses the negative impact of family size. This suggests that education is likely the primary channel through which family size affects income and socioeconomic outcomes.

The estimated coefficients for birth order rank are statistically insignificant across all specifications examining log annual income (Table 4 (1)-(4)). This suggests that birth order exerts negligible influence on earnings outcomes compared to other factors like family size and educational attainment. However, we uncover an interesting pattern regarding inter-generation wealth transfer: as shown in columns (5)&(6) of Table 4, higher birth order is positively associated with household financial assets. This finding implies that later-born children may enjoy advantages in inheriting parental property.

In the following parts, we will focus on education since it is the primary channel through which family size affects socioeconomic outcomes. To streamline the analysis, the sibling rank variables will be dropped in further analysis.

4.2 The Decollectivization Reform

Figure 5 presents the relationship between family size and educational attainment across birth cohorts. The figure reveals a striking temporal pattern: for cohorts born before the mid-1970s, we find little evidence of a negative correlation between family size and educational attainment. However, for post-mid-1970s cohorts, a clear negative relationship emerges, with the educational attainment of only children far ahead of the rest of the population, suggesting a structural change in the quantity-quality tradeoff for children's education. Figure 8 and Figure 9 present a similar trend based on different indicators.

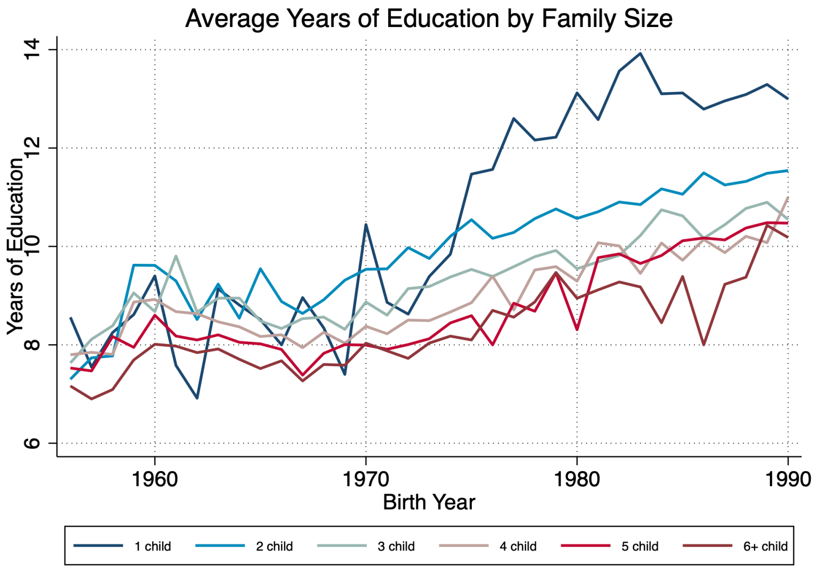

Figure 5: Average Years of Education by Family Size

We utilize the Difference-in-Difference method to quantitatively estimate the impact of rural decollectivization economic reform on family size effects. This timeline of the reform is recorded in Table 3.

$$y_{it} = \sum_n \delta_n \cdot FamilySize_n + \sum_n \lambda_n \cdot FamilySize_n \cdot D_{it} + \beta \mathbf{X}_{it} + \phi_i + \phi_t + \epsilon_{it} \tag{2}$$

where $y_i t$ is the outcome variable (years of education, junior/senior high school articulation decision), D_{it} indicates post-reform exposure, ϕ_i represents province fixed effects, and ϕ_t captures time fixed effects.

Table 5 presents the estimated effects of family size and the change in these effects. As shown in Column (1) and visualized in Figure 6, the interaction terms are significantly negative and comparable in magnitude to baseline family size effects, indicating that the reform amplified the negative relationship between family size and years of education. Specifically, in the pre-reform period, children from 1-child families received 0.86 more years of education than children from 2-child families, and this disparity increased by 0.79 years in the post-reform period.

The baseline family size effects in our analysis are pronounced due to our choice of birth year as the discontinuity point in the Difference-in-Differences (DiD) design. However, the decollectivization reforms (1980–1983) likely affected not only children born after the policy implementation but also slightly older cohorts who were still enrolled in school during the reform period.

To better capture the household decision pattern on education in a specific year, we exploit the junior and senior high school articulation decision to explore the impact of decollectivization reform on older

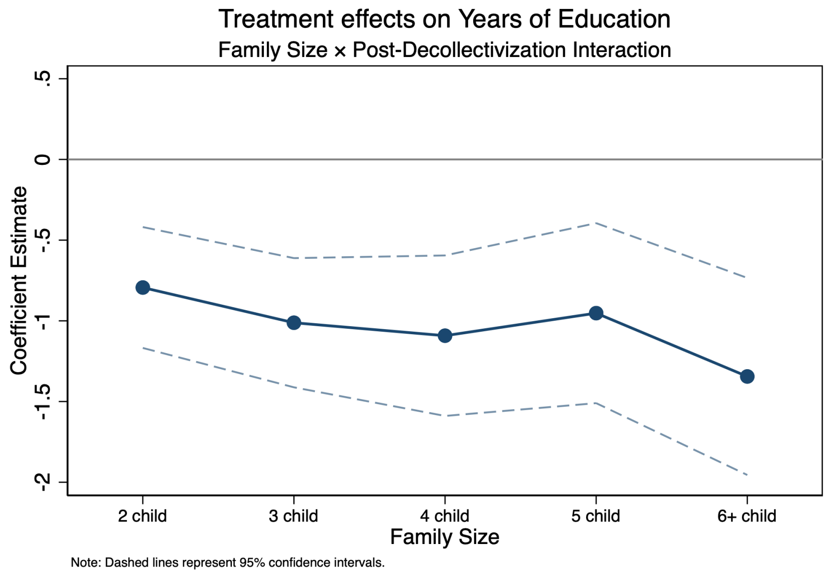

Figure 6: DiD Estimates: Change in Family Size Effects on Years of Education

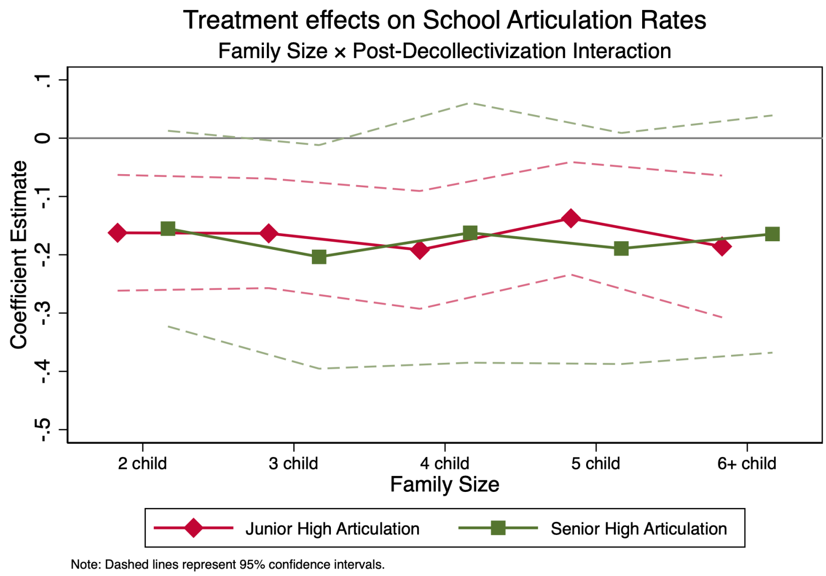

Figure 7: DiD Estimates: Change in Family Size Effects on Articulation Decision

cohorts still in school. As shown in Table 5 (2)&(3) and Figure 7, the baseline family size effect is insignificant across both specifications. The treatment effects are strongly negative on junior high school articulation decision, which is defined as whether to go to a senior high school (or a professional high school) in Grade 9. The treatment effects on senior high school articulation exhibits a weaker but still negative trend.

The weaker negative family size effects at the senior high school level (Articulation Decision at Grade 12) likely reflect track preference, where a large proportion of high-ability students often choose vocational tracks (terminal professional high schools) rather than academic senior high schools back in the 1980s in China. This pattern would lower the senior high school articulation rate since a large percentage of high-ability students in Grade 12 did not consider college education.

4.3 The Family Planning Policy

As the Family Planning Policy (FPP, 1973) and One Child Policy (OCP, 1979) overlapped temporally with the rural decollectivization reforms (1980-1983), the negative family size effects identified in previous subsection could alternatively reflect selection effects from fertility restrictions. Households with higher socio-economic status typically enforced birth limits more strictly, potentially creating a spurious correlation where higher socioeconomic status simultaneously reduces family size and increases educational investment.

To disentangle these effects, we exploit this situation: Consider two children A (first-born) and B (second-born) born in the same year from two different 2-child families in the same area. If our hypothesis holds, Family A's decision to have a second child represents stronger resistance to family planning regulations since the FPP is gradually strengthened in the 1970s and 1980s, implying potentially lower socioeconomic status. This will result in a "firstborn disadvantage" in our dataset.

We estimate the following regression model for samples born in 2-child families:

$$\begin{aligned} y_{it} = \lambda_0 \cdot FirstBorn + \lambda_{FPP} \cdot FirstBorn \times D_{it}^{FPP} + \lambda_{OCP} \cdot FirstBorn \times D_{it}^{OCP} \\ + \lambda_{Female} \cdot FirstBorn \times Female + \beta \mathbf{X}_{it} + \phi_i + \phi_t + \epsilon_{it} \end{aligned} \tag{3}$$

where $FirstBorn$ is a dummy variable for first-born child, $D_{it}^{FPP}, D_{it}^{OCP}$ indicate post-FPP exposure and post-OCP exposure respectively, ϕ_i represents province fixed effects, and ϕ_t captures time fixed effects.

Table 6 presents the coefficient estimates for our model. The coefficient estimates on first-born alone are positive, which is in line with most previous research on birth order effect. The interactive term between first-born and post-1973 is negative in all three specifications, however, the interactive term between first-born and post-1979 rises back to positive levels which offsets that between first-born and post-1973.

This non-monotonic pattern implies a time-bound ”first-born disadvantage” during 1973–1979, where first-borns in 2-child families received 0.47 extra fewer years of education compared to later-borns. While this suggests family size endogeneity accounts for part of the intensified negative relation between family size and educational attainment, it does not suffice to break the validity of our previous assumption based on the rural decollectivization.

5 Conclusion

This study examines the impact of family size on future socio-economic outcomes in late-twentieth-century China. Our findings suggest that educational attainment is the primary channel through which family size influences long-term socioeconomic outcomes. Smaller families are associated with better educational outcomes, which in turn lead to higher future income. The negative effects of larger family sizes on education became more pronounced during the 1970s and 1980s, coinciding with significant structural changes in rural China, such as the dissolution of the People's Communes and the enforcement of the Family Planning Policy.

Our empirical analysis, employing the Difference-in-Differences methodology, supports the quantity-quality trade-off theory. We find that larger families, particularly those formed before the economic reforms, encountered substantial educational barriers due to the dilution of family resources following decollectivization. Although the stricter enforcement of the Family Planning Policy in better-endowed households may introduce endogeneity in family size, its effects were more limited and short-term compared to the deeper and more lasting structural changes brought about by rural economic reforms.

This research advances our understanding of the relationship between family size, birth order, and educational outcomes in China, especially in the context of rural economic reforms that shifted the responsibility for education onto individual households. These findings have important policy implications, particularly for developing countries undergoing similar economic transformations, where such reforms may exacerbate educational inequalities.

However, there are limitations to the study, most notably the reliance on cross-sectional data, which constrains our ability to establish causal relationships over time. Future research would benefit from panel data that tracks individuals over an extended period, enabling a more comprehensive analysis of the long-term effects of family size and policy changes on socioeconomic outcomes.

Appendix

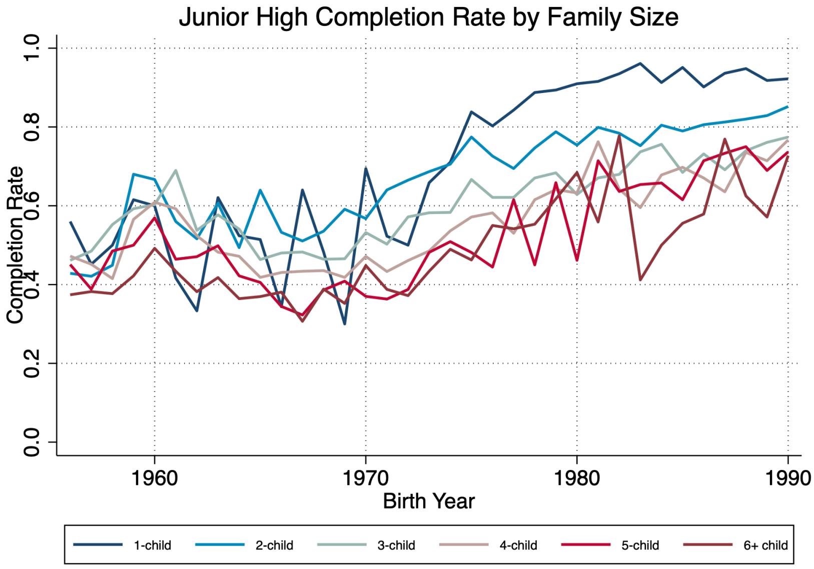

Figure 8: Junior High School Completion Rate by Family Size

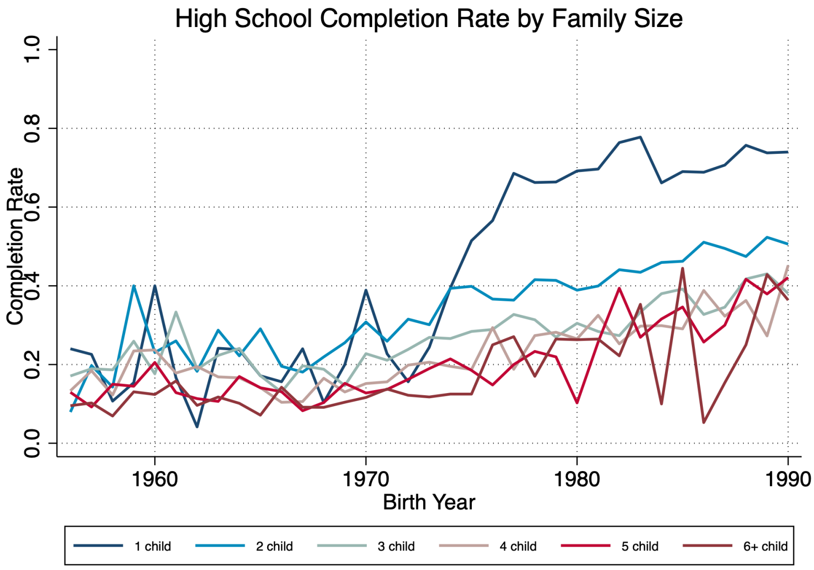

Figure 9: Senior High School Completion Rate by Family Size

Table 4: Family Size and Birth Order Effects on Income and Assets

	(1) Log Income	(2) Log Income	(3) Log Income	(4) Log Income	(5) Log Assets	(6) Log Assets
Age in 2018	0.0409***	0.0449***	0.0498***	0.0531***	0.0509***	0.0694***
	(0.0136)	(0.0134)	(0.0130)	(0.0127)	(0.0169)	(0.0165)
Age^2	-0.000633***	-0.000680***	-0.000620***	-0.000661***	-0.000501**	-0.000554***
	(0.000165)	(0.000162)	(0.000157)	(0.000154)	(0.000203)	(0.000198)
Female = 1	-0.424***	-0.427***	-0.409***	-0.411***	0.0634***	0.125***
	(0.0141)	(0.0138)	(0.0134)	(0.0132)	(0.0179)	(0.0175)
# of Child	0.0133	0.0190*	0.0350***	0.0381***	-0.00907	0.0105
	(0.0105)	(0.0104)	(0.0100)	(0.00991)	(0.0124)	(0.0122)
Family Size						
2 child	-0.0573**	-0.0413*	0.0516**	0.0635***	-0.228***	-0.0846**
	(0.0247)	(0.0245)	(0.0237)	(0.0235)	(0.0362)	(0.0354)
3 child	-0.0804***	-0.0557**	0.0783***	0.0968***	-0.421***	-0.199***
	(0.0282)	(0.0282)	(0.0272)	(0.0272)	(0.0396)	(0.0389)
4 child	-0.120***	-0.0936***	0.0648**	0.0820**	-0.546***	-0.265***
	(0.0331)	(0.0332)	(0.0319)	(0.0319)	(0.0448)	(0.0442)
5 child	-0.171***	-0.138***	0.0539	0.0763*	-0.635***	-0.308***
	(0.0412)	(0.0413)	(0.0398)	(0.0398)	(0.0522)	(0.0516)
6+ child	-0.209***	-0.171***	0.0384	0.0666	-0.796***	-0.408***
	(0.0506)	(0.0505)	(0.0487)	(0.0486)	(0.0601)	(0.0596)
Birth Order						
2	-0.0120	-0.0110	-0.00333	-0.00232	0.0352	0.0477**
	(0.0187)	(0.0183)	(0.0178)	(0.0174)	(0.0240)	(0.0234)
3	-0.0369	-0.0362	-0.0373	-0.0354	0.0907***	0.0816***
	(0.0249)	(0.0244)	(0.0237)	(0.0232)	(0.0308)	(0.0301)
4	-0.0176	-0.0238	-0.0255	-0.0277	0.114***	0.0824**
	(0.0335)	(0.0329)	(0.0320)	(0.0314)	(0.0399)	(0.0390)
5	0.0397	0.0321	0.0102	0.00439	0.175***	0.117**
	(0.0450)	(0.0442)	(0.0430)	(0.0422)	(0.0525)	(0.0514)
6+	0.0195	-0.00102	-0.0163	-0.0314	0.226***	0.150**
	(0.0568)	(0.0558)	(0.0543)	(0.0532)	(0.0625)	(0.0614)
Years of Edu			0.0791***	0.0793***		0.115***
			(0.00209)	(0.00208)		(0.00276)
FE	No	Yes	No	Yes	Yes	Yes
EduControl	No	No	Yes	Yes	No	Yes
r2	0.085	0.123	0.172	0.209	0.091	0.141
N	13546	13546	13448	13448	28384	27902

Standard errors in parentheses

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

Table 5: DiD Estimates for Family Size Effects on Educational Attainment

	(1) Years of Education	(2) Junior High Articulation	(3) Senior High Articulation
2 child	-0.855***	0.041	0.105
	(0.133)	(0.042)	(0.067)
3 child	-1.393***	-0.007	0.130
	(0.156)	(0.037)	(0.094)
4 child	-1.723***	-0.043	0.075
	(0.147)	(0.043)	(0.076)
5 child	-1.981***	-0.061	0.102
	(0.166)	(0.040)	(0.082)
6+ child	-2.287***	-0.098*	0.084
	(0.185)	(0.048)	(0.077)
Post-Decollective	0.890***	0.161**	0.292***
	(0.299)	(0.070)	(0.097)
2 child × Post	-0.793***	-0.162***	-0.155*
	(0.183)	(0.049)	(0.082)
3 child × Post	-1.012***	-0.163***	-0.204**
	(0.196)	(0.046)	(0.094)
4 child × Post	-1.092***	-0.192***	-0.162
	(0.243)	(0.049)	(0.109)
5 child × Post	-0.952***	-0.137***	-0.189*
	(0.273)	(0.047)	(0.097)
6+ child × Post	-1.345***	-0.186***	-0.164
	(0.299)	(0.059)	(0.099)
Observations	38065	14743	5278
R-squared	0.227	0.066	0.080

Standard errors in parentheses

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

Table 6: First-Born Disadvantage on Educational Outcomes for 2-Child Families

	(1) Years of Education	(2) Junior High Completion	(3) Senior High Completion
First-born	0.259*	0.033*	0.028
	(0.133)	(0.017)	(0.020)
First-born × Female	0.010	0.010	-0.005
	(0.128)	(0.020)	(0.020)
First-born × Post-1973	-0.474**	-0.046**	-0.056
	(0.222)	(0.021)	(0.033)
First-born × Post-1979	0.328	0.026	0.047
	(0.231)	(0.022)	(0.041)
Female	-0.015	-0.011	0.024**
	(0.115)	(0.015)	(0.010)
Observations	9050	9050	9050
R-squared	0.124	0.121	0.086

Standard errors in parentheses

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

References

Becker, G. S., & Lewis, H. G. (1973). On the interaction between the quantity and quality of children. *Journal of political Economy*, *81*(2, Part 2), S279–S288.

Becker, G. (1960). An economic analysis of fertility. *Universities-National Bureau. Demographic and economic change in developed countries.*

Behrman, J. R., & Taubman, P. (1986). Birth Order, Schooling, and Earnings. *Journal of Labor Economics*, *4*(3, Part 2), S121–S145.

Black, S. E., Devereux, P. J., & Salvanes, K. G. (2005). The more the merrier? the effect of family size and birth order on children's education. *The Quarterly Journal of Economics*, *120*(2), 669–700.

Blake, J. (1981). Family size and the quality of children. *Demography*, *18*(4), 421–442.

Booth, A. L., & Kee, H. J. (2009). Birth order matters: The effect of family size and birth order on educational attainment. *Journal of Population Economics*, *22*(2), 367–397.

Cameron, L., Erkal, N., Gangadharan, L., & Meng, X. (2013). Little emperors: Behavioral impacts of china's one-child policy. *Science*, *339*(6122), 953–957.

Chen, S., & Lan, X. (2020). Tractor vs. animal: Rural reforms and technology adoption in china. *Journal of Development Economics*, *147*, 102536.

Chen, S., & Xie, B. (2025). The abolition of people's communes and fertility decline in rural china. *Journal of Development Economics*, *172*, 103375.

De Haan, M. (2010). Birth order, family size and educational attainment. *Economics of Education Review*, *29*(4), 576–588.

Downey, D. B. (1995). When bigger is not better: Family size, parental resources, and children's educational performance. *American sociological review*, 746–761.

Krusekopf, C. C. (2002). Diversity in land-tenure arrangements under the household responsibility system in china. *China Economic Review*, *13*(2-3), 297–312.

Li, B., & Zhang, H. (2017). Does population control lead to better child quality? evidence from china's one-child policy enforcement. *Journal of Comparative Economics*, *45*(2), 246–260.

Lin, J. Y. (1987). The household responsibility system reform in china: A peasant's institutional choice. *American Journal of Agricultural Economics*, *69*(2), 410–415.

Lin, J. Y. (1988). The household responsibility system in china's agricultural reform: A theoretical and empirical study. *Economic Development and Cultural Change*, *36*(S3), S199–S224.

Mechoulan, S., & Wolff, F.-C. (2015). Intra-household allocation of family resources and birth order: Evidence from France using siblings data. *Journal of Population Economics*, *28*(4), 937–964.

Rosenzweig, M. R., & Zhang, J. (2009). Do population control policies induce more human capital investment? twins, birth weight and china's "one-child" policy. *The Review of Economic Studies*, *76*(3), 1149–1174.