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Income inequality and educational expenditures on children: Evidence from the China Family Panel Studies

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ABSTRACT

Using the data from the China Family Panel Studies from 2010 to 2018, we find that rising income inequality causes parents to spend more on children's education, both in school and out of school. The impact of income inequality on out-of-school expenditures is significant at intensive and extensive margins, especially for study-related tutoring participation. Furthermore, we find some empirical evidence suggesting that in response to rising inequality, mothers spend more time on children's education and there exists a substitution effect between time and money. Further analysis suggests two potential reasons for the rising education spending: (1) a higher income inequality resulting from rising skill premium strengthens parents' long-lasting cultural attitude towards education to higher levels, inducing them to spend more on educational investment, and (2) a higher income inequality increases the value of higher education, leading to a stronger demand for better educational opportunities, and then, more intense education competition, forcing parents to invest more in education.

1. Introduction

In recent decades, household expenditures on children's education have increased dramatically in China. From 2010 to 2018, the total educational expenditures per child increased by around 30 percent from 2,900 to 3,710 RMB, with most of the rise being accounted for by out-of-school expenditures, increasing from 280 to 1,050 RMB (Wang & Cheng, 2021). This rapid rise in family educational expenditures has drawn widespread attention in Chinese society. Excessive tutoring activities after school impose a burden on students, both physically and psychologically. Meanwhile, off-campus tutoring translates into heavy financial burdens for parents. In response to the nationwide concern about this issue, China's Ministry of Education launched a set of "double reduction" policies in July 2021, which imposed a ban on off-campus tutoring, mainly for children at the compulsory education stage or younger.[1] Although

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[1] The "double reduction" policies aim to reduce the burden of excessive homework and off-campus tutoring on students. The link to the policies is http://www.moe.gov.cn/jyb_xxgk/moe_1777/moe_1778/202107/t20210724_546576.html.

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there is an ongoing debate concerning the effectiveness of the policies, it is important to investigate the underlying reasons for the mounting family educational expenditures.

Accompanying the increasing trend in educational expenditures is the rapid increase in income inequality after Chinese's economic transformation.[2] One may expect there to be a relationship between income inequality and household educational expenditures. *First of all*, parental decisions regarding children's educational investment is likely affected by income inequality, one of the most important macroeconomic conditions. Indeed, after China joined the World Trade Organization (WTO) in 2001, the Chinese labor market experienced an increasing demand for skilled workers, which significantly increased wage inequality between skilled and unskilled workers (Han, Liu, & Zhang, 2012; Fan, 2019). Evidence has also been found for increasing wage premium for skilled workers, which establishes the importance of SBTC in deriving income inequality in China via the lens of China's success in attracting foreign direct investment (Han et al., 2012; Ge & Yang, 2014) and capital-biased technological changes (Zhang, Wan, Wang, & Luo, 2017). That said, parents are likely to take income inequality as a proxy of skill premium, and one may expect that rising income inequality might induce parents to value education attainment more, and thus, invest more in their children's education in the hope of improving their educational opportunities and boosting competitiveness in the future labor market.

We investigate our research questions using a biannual household dataset from the China Family Panel Studies (*hereafter* CFPS) from 2010 to 2018. The children's module in the CFPS data contains rich information on family expenditures on in-school and out-of-school education for each child aged between 1 and 15 years old. In addition, the CFPS data provides non-pecuniary information regarding children's education, such as parents' expectations about their children's educational attainment, and parents' and children's time spent on tutoring activities. The detailed information enables us to conduct rigorous empirical analyses that provide novel and interesting insights into the effect of income inequality on educational expenditures.

Our estimation results derived from the CFPS data suggest that income inequality has a significant and positive effect on children's educational expenditures. In the baseline specification, income inequality is measured by the Gini coefficient of the annual family net income per capita within a reference province-cohort group (i.e., families in the same province and with household heads in the same cohort), as defined in Jin, Li, and Wu (2011) and Meng, Wu, and Zhan (2016). We find that a one-percentage-point rise in the Gini, on average, increases a family's expenditure on a child's education by 5.4 percent. Given that households' annual educational expenditure per child averages approximately 3,426 RMB, our result indicates an increase in the educational expenditure by approximately 184 RMB.

Our in-depth analysis of in-school and out-of-school education spending delivers interesting results. The impact of income inequality on family educational expenditures operates through both in-school and out-of-school spending. Specifically, a one-percentage-point rise in the Gini is associated with an increase in in-school education spending for a child by 4.5 percent (about 87 RMB). Even though the nine-year compulsory education policy in China suggests that most children in our sample need not pay for tuition in public schools, there still exist some expenditures (e.g., transportation, school selection fee, accommodation, and private school tuition) resulting from school selection by parents who wish to pursue high-quality education. Given this, the significant impact on in-school expenditures provides empirical evidence for school selection induced by rising inequality. We also examine the link between income inequality and out-of-school expenditures, with our results showing that rising income inequality increases out-of-school spending at both *intensive* and *extensive* margins. In particular, a one-percentage-point rise in the Gini coefficient significantly increases the out-of-school spending by 4.1 percent (around 38 RMB); at the *extensive* margin, while the same change in the Gini increases the likelihood of engaging in study-related tutoring programs by 2.1 percentage points. In sharp contrast, the effect on talent-related tutoring programs is insignificant and smaller in magnitude.

Our main results are robust to different measures of income inequality and alternative model specifications used to address the omitted variable biases. Specifically, we use city-year fixed effects and county-year fixed effects models to control for local market condition, employ family and child fixed effects to capture time-invariant features, and apply Emily Oster's method to address the issue of selection on unobservables. In addition, by using different measures of income inequality, we find that parents are not sensitive to the tails of the income distribution but rather care more about the inequality of mid-income distribution. More importantly, parents seem to be more concerned about their children falling into the poor class as opposed to climbing up to the top class.

We also explore how income inequality affects the allocation of household monetary and non-monetary resources. Our results suggest that rising inequality induces households to allocate more family pecuniary resources to education as opposed to other expenditure categories (i.e., clothes and social activities), leading to a compositional shift towards education spending in family expenditures and income. With respect to impacts on time allocation, we find that mothers spend more time on tutoring children in reaction to an increase in the income inequality, while such an effect is muted for fathers, indicating that mothers seem to play a leading role in educational childcare, which squares well with the findings in some recent studies (Yang, 2018; Zhang, Qin, & Zhou, 2020; Wang, Zhou, & Zhang, 2021). In addition, some evidence is found in support of a possible substitution effect between time and money. In the face of a higher income inequality, although all families value education more, the adjustment of education-related behavior differs greatly across income groups; that is, the families from the high-income class tend to purchase tutoring services available on the market, while the low-income families rely more on increasing the mother's own time on tutoring children.

Further analysis explores two potential explanations for the positive effect of income inequality on household educational expenditures. The first is related to the long-lasting cultural attitude towards education. Intuitively, a higher income inequality resulting

[2] Zhang (2021) conducts a comprehensive survey for the evolution of income inequality in China; according to estimates from various sources, the nationwide Gini coefficient of individuals' annual income has increased from 0.37 in 1997 to 0.47 in 2016. Zhang (2021) concludes that there is an overall upward trend in the Gini coefficient over the period of 1978 to 2016.

from rising skill premium likely strengthens parents' cultural view of education to even higher levels, inducing them to invest voluntarily more in children's education. The second explanation is the intense education competition observed in China. A rising income inequality also likely increases the value of higher education, giving rise to a stronger demand for better educational opportunities among parents, and thus, fiercer education competition. Hence, parents are pressured to invest more in children's education. We find empirical evidences supporting these explanations. The results show that the impacts of rising income inequality on household educational expenditures are higher in areas where Confucian philosophy takes a deeper root, and higher among families where mothers are well educated. Meanwhile, the impacts are more pronounced among families living in areas with higher competition of college enrollment and among children who are close to entrance examinations at different education stages.

In our view, these findings make interesting and important contributions to the literature. *First*, we contribute to the set of studies on the determinants of household educational expenditures. Most existing studies focus on the micro-level determinants of education spending, such as household and parental characteristics. Our paper attempts to examine the link between macro-level income distribution and household educational expenditures for young children. This connection is largely missing in the literature, and especially in the Chinese context, which features rapidly increasing income inequality in the past two decades.

Second, different from some recent works that focus on some particular part of inequality, such as inequality of opportunities in Song and Zhou (2019), gender inequality in Wang and Cheng (2021), we consider all determinants of income inequality, and examine the impacts of overall inequality of income. This allows us to explore the different mechanisms underlying the rising household education spending. The two channels discussed in this paper, cultural attitude towards education and education competition, are particularly relevant for China, "a transition economy that emphasizes the economic incentives, but lack of market means for allocating resources, and redistribution function for the government" (Zhou & Song, 2016). In addition, our finding are consistent with the seminal paper of Doepke and Zilibotti (2017), which explores the underlying reason of helicopter parenting style.[3] Our work echoes their results by exploring parents' behavior in terms of educational investment, which serves as an important way to increase children's prospects.

Third, our work also provides a rich picture of how income inequality shapes overall educational expenditures, its various components, and the time spent on educational tutoring. The empirical evidence suggests that income inequality plays an important role in driving the rising trend of out-of-school expenditures at both the *intensive* and *extensive* margins, which advances our understanding of the mounting household educational expenditures observed in China.

The paper proceeds as follows. Section 2 proposes two possible hypotheses based on related theoretical predictions. In particular, a brief description of the cultural norms concerning education and the key features of the Chinese education system is provided. Section 3 reviews the literature on educational expenditures. Section 4 lays out the empirical model and Section 5 describes the data. Section 6 reports the empirical results in the baseline specifications, followed by a variety of robustness checks and a discussion on the impacts on family resource allocation. Finally, Section 7 explores the underlying explanations and Section 8 concludes.

2. Theoretical considerations and hypotheses

This section reviews two strands of literature, both of which shed light on the potential relationship between income inequality and household educational expenditures. In particular, we connect household spending on children's education with cultural norm that place a high value on education and the intense education competition observed in China.

2.1. Cultural attitude towards education

The Chinese have traditionally placed a high value on education, which is likely a long-lasting effect of Confucian cultures (Chen, Kung, & Ma, 2020; Li & Xie, 2020; Si, 2021). Indeed, according to the Confucian philosophy, being a government official is "held in the highest regard" in society (Si, 2021), and the key channel to such a position in imperial China is to take the civil examinations known as *keju*, which is viewed as an opportunity for every male in imperial China to advance himself socially (Bai, 2019).[4] Under the civil examination system, academic achievement was positively correlated with potentials for political power and prestige, which, in turn, "provided the greatest opportunity for the rapid accumulation of wealth".[5] Hence, the high returns to education rationalize the male obsession with academic success in imperial China.

Confucian philosophy has deep roots in Chinese culture, placing a particular emphasis on education, which is evident in many well-known statements, e.g., "to be a scholar is to be at the top of society" (Chen, Huang, Lu, & Zhang, 2021). Nowadays, given that the main route to personal and familial success in China is still through tests of educational merit (*to be discussed in Section 2.2*), the returns to education remain high (Zhang, Zhao, Park, & Song, 2005; Li, Meng, Shi, & Wu, 2012), which explains why the cultural attitude

[3] Helicopter parenting is a kind of parenting style where parents care more about their children's drive for achievement while protecting them from various risks that can harm their future prospects.

[4] The civil exam was established in the Sui Dynasty in AD 605 and served as the primary means for recruiting government officials in the Ming (1368–1644) and Qing (1644–1910) Dynasties.

[5] As pointed out in Bai (2019), "although the gentry class comprised only about 2 percent of the population, they received around 24 percent of the national income."

towards education persists even though the circumstances (i.e., the civil examinations) that originally gave rise to the importance of education have changed.[6] As a result, Chinese parents demonstrate strong enthusiasm for their children's academic performance, a phenomenon known as "education fever" (Mok, Wong, & Zhang, 2009; Zheng, 2017).

Notably, income inequality, which is an outcome of changes in macroeconomic conditions, may influence the response of households influenced by the cultural view concerning education. In particular, the rising skill premium, the key reason for enlarging income inequality as documented in Zhang (2021), may strengthen the the long-lasting cultural attitude towards education, and thus increase parents' emphasis on education to even higher levels (Ding, Yue, & Sun, 2009; Chen et al., 2021). As a result, the cultural view that a good education is a prerequisite to securing a good job, a high income, and an advancement in social status is further strengthened, then the households invest more in children's education. We call this hypothesis "*cultural attitude towards education.*".

It is worth pointing out that the "cultural attitude towards education" hypothesis is expected to be stronger in areas where Confucian culture has deeper roots. In such areas, households likely hold a stronger cultural belief in education and thus respond more drastically to changes in income inequality (or skill premium).

2.2. The Chinese education competition

The education competition in China is intense. The Chinese education system comprises three stages: compulsory education (including primary and junior high schools), senior high school (including academic or vocational high schools), and higher education (including two-or three-year college, bachelor's degree and above). Enrollment in academic high school requires junior high school graduates to take the high school entrance examination (i.e., *Zhongkao*). Admissions into colleges are based on college entrance examinations (i.e., *Gaokao,*hereafter CEE). Both enrollments are based on students' performance in the entrance examinations, and are highly competitive.[7] The CEE, viewed as the most important "life-changing opportunity" to achieve personal and familial success, is even more competitive.

Two key features of the Chinese education system may explain the fierce education competition. The first is that, starting from 1978, the Chinese education system took "an elite education model" characterized by key-point schools at various administrative divisions.[8] The second feature is the uneven distribution of educational resources. China's limited educational resources are, in general, distributed based on performance-based funding allocation, leading to severe allocation imbalance. Take higher education, for example, where the 116 elite universities (i.e., *211 universities and 985 universities)* are the major recipients of educational resources, accounting for 72 percent of government research funds from 2009 to 2013 (Yaisawarng & Ng, 2014).

These two features interact with each other, leading to uneven education quality across schools and regions at each stage of education. From this, two unprecedented outcomes arise. Compulsory and academic high education schools that seek funds tend to select top students for their key classes. Parents who seek opportunities in quality education (i.e., key-point classes or schools) have to invest more in education by attending after-school tutorials to enhance their children's academic competitiveness in school. The rapid growth of after-school tutorials, in turn, reinforces the demand for quality education. Thus, the limited supply of quality education cannot meet the rapid increase in the demand for quality education, giving rise to an intense education competition at various education stages.

For higher education, a direct consequence of the allocation imbalance is an ever-widening disparity in education returns between the elite and the ordinary universities (Zhang, 2013; Zhou & Xie, 2020; Jia & Li, 2021). This explains why the competition remains intense regardless of the rapid increase in college enrollment induced by the large-scale expansion of higher education in 1999.[9] As noted in Zhang (2013), the fierce competition is attributed to pursuits of opportunities at the elite universities, rather than the access to higher education. The limited opportunities at the elite universities are crucial to understanding the mounting competition. According to Li, Loyalka, Rozelle, Wu, and Xie (2015), even though the total college enrollment increased by around five times from 1998 to 2006, enrollment in elite universities, such as the 211 and 985 universities, expanded by a mere 30 percent. Among students who complete compulsory education, the probabilities of entering the 211 universities and the 985 universities averaged 5.38 percent and 1.73 percent in 2018, respectively.[10] In addition, the enrollment rates for elite universities vary substantially across provinces, ranging from 2.74 to 13.99 percent for the 211 universities, and from 1.10 to 5.81 percent for the 985 universities in 2017.[11]

[6] Taking the civil examinations known as keju is viewed as an opportunity for every male in imperial China to advance himself socially (Bai, 2019).

[7] As reported by the National Bureau of Statistics in 2019, only 57.8 percent of junior high school graduates enroll in academic high schools. The link to the data is http://www.stats.gov.cn/tjsj/zxfb/202002/t20200228_1728913.html.

[8] As documented in Wu (2013) and Wu (2017), the education authority classifies schools as key or non-key, and key schools are then further divided into national, provincial, municipal, and district (county) priorities.

[9] The college enrollment in 1998 was 1.08 million and rose to 9.15 million in 2019. Likewise, the enrollment rate rose from 33.75% in 1998 to 88.73% in 2019.

[10] The probability of entering the 211 (985) universities in 2018 is the share of the enrolled students by 211 (985) universities among the number of secondary school students who graduated in 2015. For the enrolled students, we add up the number by each 211 (985) university in 2018, and the link to the data is https://gkcx.eol.cn/school/search. For the number of secondary school graduates in 2015, the link to the data is http://www.moe.gov.cn/srcsite/A03/s180/moe_633/201508/t20150811_199589.html.

[11] The enrollment number of students by 211 (985) universities in each province in 2017 is obtained by adding up the enrollment number by each university. The link is https://gkcx.eol.cn/school/search. The total number of enrollment in 2017 is from the Education Statistics Bulletin in the Ministry of Education of China. The link is http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/.

The income inequality may affect the education competition. To see this, Han et al. (2012) attributes the rising income inequality observed after China's accession to WTO to higher returns to college. As a result, income inequality likely drives up the value of higher education, especially at the elite universities, thus reinforcing parents' desire for better educational opportunities at earlier stages. Hence, the education competition becomes more intense given that the supply of high-quality education cannot freely adjust in the short run and households have to invest more in education. We call this hypothesis " *education competition*".

The education competition channel is particularly relevant for the Chinese labor market. There are two reasons for this. *First*, the Chinese labor market is still underdeveloped and the education degree obtained by job seekers helps deliver useful messages about their unobserved ability, which partially addresses the labor market failure, raises job match quality, and improves wage outcomes. *Second*, college graduates generally lack rich working experience and must therefore convey information regarding their potential productivity through their academic credentials (i.e., college/university diploma).

It is worth pointing out that the two mechanisms discussed above are different although they both rely on the rising skill premium as the main explanation. To see this, the "cultural attitude towards education" mechanism motivates Chinese parents to initiate more education investment for their children, while the education competition mechanism forces the Chinese parents to invest in education. In nowadays the main route to personal and familial success in China is still through tests of educational merit, the high returns to education rationalize the parental obsession with academic success in China and explain why the Chinese parents are willing to invest a great deal of familial resource in their children' education. This is quite different from the mechanism induced by education competition. In the latter case, the fierce competition suggests that if the parents choose not to invest, their children would have low chances to obtain quality education, leading to low opportunities of getting into colleges (especially the elite universities), and then, poor position in market competitiveness later on. Meanwhile, the "cultural attitude towards education" is in nature a cultural phenomenon, and may not be easily influenced by government policies. In contrast, the education competition mechanism can be influenced by the government intervention (education-related policies and budget). As discussed above, the large-scale expansion of higher education in 1999 has significant effects on the education competition.

3. Literature review

Many empirical studies have investigated the determinants of household educational expenditures. There is an international consensus regarding the relationship between household characteristics and family education spending. For example, some studies show that household income has a significant positive effect on educational expenditure (Lazear, 1988; Chung & Choe, 2001; Chi & Qian, 2016; Wang & Cheng, 2021). Additional factors related to parental characteristics, including parental educational level, age, race, and occupation, have significant impacts on household educational expenditures (Mauldin, Mimura, & Lino, 2001). Moreover, the region of residence influences family educational expenditures (Mauldin et al., 2001; Chen et al., 2020). For example, Chen et al. (2020) explain regional variations in education by the cultural norms in valuing education. They find that the prefecture-level density of *jinshi*—the highest qualification in China's civil examination system in the *Ming-Qing* period (c.1368–1905) has a long and persistent impact on human capital today.

Our study is most closely related to the existing studies on the linkage between income inequality and household educational expenditures. Jin et al. (2011) use the Urban Household Survey dataset from 1997 to 2006 to find that income inequality measured by the province-cohort Gini coefficient positively influences family education spending in urban China.[12] A similar empirical result is obtained by Sun and Wang (2013). Both papers attribute the positive effect to the status-seeking hypothesis.[13] More recently, Song and Zhou (2019) and Wang and Cheng (2021) study children's educational expenditures by using different measures of income inequalities at the regional level. In particular, Wang and Cheng (2021) focus on gender inequality, which allows them to explore the role of the gender behavior change (i.e., female bargaining power) in shaping the relationship between wage gaps and parental investment in child education. Song and Zhou (2019) emphasize the importance of inequalities resulting from factors beyond people's control and find a negative effect on household education spending.

In line with the results in the existing studies, our work makes distinctions in three ways: *first*, our study digs deep to investigate the effects of income inequalities on various aspects of education spending, such as in-school versus out-of-school expenditures, intensive versus extensive margins of out-of-school expenditures, and time spent on tutoring children by parents, thus painting a richer picture of the effect of inequality on parental educational investment. *Second*, our paper explores some *alternative* mechanisms and provides empirical evidence to show that both the cultural norms that place a high value on education and the education competition resulting from parents' strong desire for high-quality education resources are important explanations for why income inequalities influence household expenditures on children' education. Hence, we view our study as a complement to the existing literature. *Third*, our results deliver important policy implication for the "double reduction" policies that place a strict ban on private tutoring in China. In particular, the detected relationship between income inequality and parental educational investment suggests that the government should take into account the inequality of family income when they think about how to reduce the study burden for students and financial burden for households. Besides, the central insight behind the two underlying mechanisms suggests that some actions that aim to increase the supply of quality education, or balance the education resource allocation might be helpful in mitigating the

[12] The main goal in Jin et al. (2011) is to present empirical evidence for the observed negative (positive) linkage between income inequality and consumption net of educational expenditure (savings).

[13] The social-seeking suggests that rising income inequality motivates parents to invest more in children's education in order to achieve high social status in the future.

education competition, and hence, ease the family financial burden caused by the mounting education spending.

4. Empirical models

Our empirical work estimates the impacts of income inequality within cohorts in the same province on children's educational expenditures, which is expressed as follows:

$$\ln\left(edu\_\exp_{ihjt}\right) = \alpha + \beta Gini\_income_{hjt} + \gamma X'_{ihjt} + \lambda Z_{hjt} + \delta_{jt} + \epsilon_{ihjt}, \quad (1)$$

where $\ln(edu\_\exp_{ihjt})$ refers to the logarithm of the educational expenditures for child i of household h in province j in year t.[14] The key variable of interest, $Gini\_income_{hjt}$, is "Gini coefficient of annual family net income per capita" for household h in province j in year t. β measures the effect of income inequality on educational expenditures.

We measure the Gini in year t within a reference province-cohort (plus or minus five years) group. For example, for a child in a family with a 30-year-old head in a province, the reference group includes families with heads aged 25 to 35 in the same province. The parents are assumed to take into account income inequality within a province-cohort group for two reasons. *First*, we believe that the province-cohort group is a plausible reference group for parental decisions regarding children's education. Individuals likely compare themselves with those who live in the same province where they face similar macroeconomic conditions (i.e., education-related institutions and policies) and are of similar ages (Clark & Oswald, 1996; Jin et al., 2011). *Second*, we adopt the reference group at province level rather than at more disaggregated regional levels because the existing literature finds that income inequality at province/state level has significant impacts on individual and household socioeconomic behaviors, including household consumption and investment in education (Alvarez-Cuadrado & El-Attar Vilalta, 2018; Wang & Cheng, 2021). Meanwhile, as the intra-provincial migration is relatively sizable and prevalent in China, individuals are likely to pay attention to and respond to the inequality of the income distribution within a province.[15]

Moreover, X_{ihjt} measures the children's characteristics correlated with educational expenditures, including age and gender. Z_{hjt} refers to family characteristics, such as the logarithm of the family net income per capita, mother's age and education level, and the number of siblings.[16] The identification of the effect of income inequality can be challenged by omitted variable bias. For example, the trend of education competition can be correlated with both income inequality and educational expenditures. Given that income inequality is measured at province level, we include the province-year fixed effect, δ_{jt}, in the model to control for time-variant unobservables at province level. Thus, the identification of our model relies on variations in the non-linear temporal changes in income inequality across province-cohort groups. The standard errors are clustered at the province-child's age level because that educational expenditures vary across different age groups and are correlated with provincial policies.

5. Data and descriptive statistics

We use the CFPS dataset to conduct the empirical analysis. The CFPS dataset is a longitudinal survey of Chinese families and individuals that was launched in 2010 by the Institute of Social Science Survey of Peking University in China. The CFPS respondents are tracked through biennial follow-up surveys. Five publicly released waves, surveyed from 2010 to 2018, are used in our study. The first wave of the CFPS covers 25 provinces (excluding Inner Mongolia, Xinjiang, Tibet, Hainan, Ningxia, and Qinghai), representing approximately 95 percent of the national population. Using a multistage probability sampling procedure, it sampled 14,960 households and 33,600 individuals and collected rich information at the individual, family, and community level.

The children's module of the CFPS dataset provides rich information regarding education spending on children aged 1 to 15, including total annual expenditures and a detailed breakdown of in-school and out-of-school spending. For in-school spending, the survey includes tuition-related spending (expenditures on tuition and book purchases) and non-tuition related spending, such as expenditures on transportation, accommodation, and a lump-sum payment used for school selection. According to the school-district based enrollment policy of compulsory education in China, children are, in general, officially assigned to their geographically nearest public schools. If such a choice is not accepted, parents can send their children to schools where they typically have to pay school selection fees and incur additional costs for transportation and accommodation. Thus, non-tuition in-school expenditures reflect parents' effort to pursue places at more distant, high-quality schools for their children.

The information on out-of-school spending includes children's participation in out-of-school tutoring and the associated expenditures. There are two main categories of out-of-school tutoring, namely study-related and talent-related tutoring. Study-related tutoring, in general, aims to promote academic performance or intelligence development, while talent-related tutoring, not directly related to academic performance, primarily involves musical instruments, chess, calligraphy, painting and sports. In addition, the CFPS dataset provides other education-related information, such as parental time spent on tutoring children and children's time spent on tutorial activities, which enables us to examine the impacts on the allocation of family non-monetary resources.

[14] To deal with zeros in estimation, we add the educational expenditures by 0.01 before taking the natural logarithm.

[15] According to the 2020 census data in China, the total migration population has reached 376 million, accounting for more than one-quarter of the total national population. Among them, approximately 67% of migrants are intra-provincial. The link to the data is http://www.stats.gov.cn/tjsj/zxfb/202105/t20210510_1817176.html.

[16] The net income is family income minus agriculture production cost if a family has agriculture income.

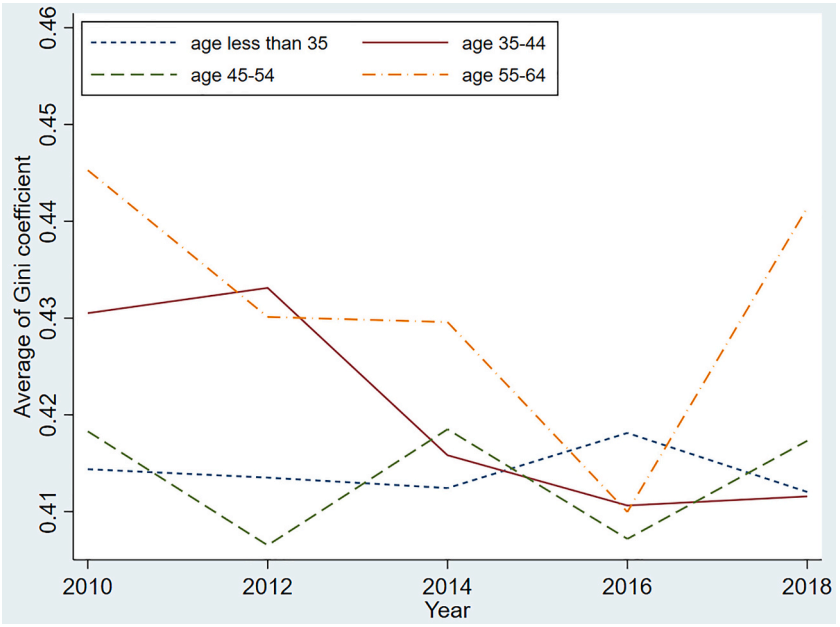

Fig. 1. The Gini coefficient across agegroups.

Table 1
Summary statistics.

Variable	Obs (1)	Mean (2)	Std. Dev. (3)	Min (4)	Max (5)
Inequality Measures					
Gini of family income per capita	10440	0.419	0.051	0.188	0.595
Educational Expenditure					
Edu exp.	10440	3426	6418	0	119000
Edu exp. share of income	10440	0.064	0.106	0	1
Edu exp. share of income per capita	9919	0.194	0.233	0	1.065
Edu exp. share of expense	10436	0.054	0.078	0	0.825
Edu exp. share of expense per capita	9777	0.184	0.217	0	0.937
In-school					
In-school edu exp.	10440	1928	3862	0	100000
Out-of-school					
Out-of-school edu exp.	10440	933	3692	0	100000
Study-related tutoring	9937	0.112	0.315	0	1
Talent-related tutoring	9937	0.087	0.281	0	1
Control Variables					
Family income per capita	10440	16715	17608	151	186667
Mother's education level	10440	8.884	4.071	0	22
Age of mother	10440	34.937	6.047	22	55
Number of siblings	10440	0.824	0.811	0	6
No sibling	10440	0.381	0.486	0	1
Having one sibling	10440	0.453	0.498	0	1
Having two siblings	10440	0.138	0.345	0	1
Having more than two siblings	10440	0.028	0.166	0	1
Age of child	10440	7.831	4.266	1	15
Boy	10440	0.527	0.499	0	1

We focus on the sample with children aged 1 to 15 years in urban families, including preschool-age children (1–5 years) and children engaged in compulsory education (6–15 years). The reasons for this choice are twofold. *First*, although schooling-related expenditure on early childhood (0–3 years old) education is, on average, negligible, investment in early childhood education is important. As stressed in Heckman, Humphries, and Veramendi (2018), the returns to early childhood education are the highest among all developmental stages, and a growing number of Chinese parents are aware of its importance. *Second*, we exclude education spending beyond compulsory education, because under the stricter high school enrollment system only half of junior high school graduates enroll in academic high schools, and thus the education investment in high school stage is conditional on whether the child has the ability to attend high school. In addition, many Chinese parents believe that children should attend high-quality schools at each

Table 2
Effects of income inequality on educational expenditures.

	Log Educational Expenditure		
Dependent variables	(1)	(2)	(3)
Gini of family income per capita	4.845**	7.586***	5.381***
	(2.344)	(2.162)	(1.835)
Log family income per capita		0.625***	0.579***
		(0.068)	(0.062)
Mother's education level		−0.033*	0.035**
		(0.018)	(0.015)
Age of mother		0.236***	−0.026**
		(0.028)	(0.011)
Number of siblings		−0.417***	−0.130*
		(0.089)	(0.077)
Age of child			0.576***
			(0.051)
Boy			−0.157**
			(0.077)
Province*Year FE	Yes	Yes	Yes
Observations	10,440	10,440	10,440
Adjusted R^2	0.060	0.144	0.266

Note: Cluster standard errors at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

stage to ensure a higher chance of enrolling in key-point high school and further to good colleges in the future. Thus, many children are loaded up with tutorial classes from a very young age. Furthermore, the Chinese policy makers are more concern about the excessive out-of-school tutoring burdens of young age children, and the "double-reduction" policy mainly imposed stringent regulations for children at the compulsory education stage or younger.

Nevertheless, we are aware of the trade-off that we do not capture larger variations in education spending that occur in senior high school education and above. To ensure the robustness of our baseline results, we will further include the sample of high-school-age children in Section 6.3.

We further limit our attention to families with household heads aged 25 to 65 years and mothers aged 22 to 55 years. Thus, we focus on parents who likely have children aged 1 to 15 years. Following Jin et al. (2011), we exclude outliers with annual family net income per capita outside the range of 1 to 99 percentile of the distribution, families whose expenditure is more than five times their income, and families with more than 10 individuals. Thus, our final sample includes 5,126 children from 3,840 urban families in 389 counties in 25 provinces. There are 2,415 valid observations in the 2010 wave, 1,784 in the 2012 wave, 1,934 in the 2014 wave, 2,102 in the 2016 wave and 2,205 in the 2018 wave.[17]

In the baseline analysis, we measure the income inequality by using the Gini coefficient of the annual family net income per capita within a province-cohort group, where the reference group includes families with household heads aged within a five-year gap in the same province. Fig. 1 plots the trend of the average Gini coefficient from 2010 to 2018, indicating that there exists a large variation in the trend of the Gini coefficient across age groups. The main dependent variable is the logarithm of educational expenditure for each child, which contains total spending and its two main components, in-school and out-of-school expenditures.

Table 1 reports the summary statistics. The average Gini of annual family net income per capita within the reference province-cohort group is approximately 0.419. The average annual educational expenditure per child is 3,426 RMB, accounting for more than 20 percent of annual family income per capita. The ratio of total annual family education spending to annual total family expenditure is around 8.3 percent.[18] In comparison, the expenditures on food and leisure account for 33.9 percent and 2.1 percent of total expenditures, respectively. Among the educational expenditures, the average in-school educational expenditure is *1,928* RMB, accounting for *56.3* percent of the total education spending. The out-of-school expenditure averages 933 RMB, which is around half the amount of in-school expenditures. Moreover, at the extensive margin, 11.2 percent of children in the sample participate in study-related tutoring while 8.7 percent of children engage in talent-related tutoring.[19] The statistics of the other variables reported in Table 1 are in line with the literature (Zhang & Xie, 2016; Zhang & Song, 2021). For example, the average education level of mothers is 8.9 schooling years. As for children, 52.7 percent of the sample are male and 38.1 percent of children have no sibling, 45.3 percent have one sibling, 13.8 percent have two siblings, and 2.8 percent have more than two siblings.[20]

[17] Approximately, 22, 26, 22, 18, and 12 percent of respondents were surveyed once, twice, three times, four times, and five times, respectively.
[18] The ratio is slightly smaller than the ratio of 11.4 percent in the 2018 China Statistical Yearbook (http://www.stats.gov.cn/tjsj/ndsj/2018/indexch.htm). The reason for this gap is that the expenditure in the Statistical Yearbook is the sum of expenditures on education and entertainment.
[19] The tutoring participation rates are in line with those released by the China Family Panel Studies 2018–2019, with the counterparts being 15.3 percent for study-related tutoring and 6.8 percent for talent-related tutoring among children aged 3–18 years. See more detail via the link https://www.thepaper.cn/newsDetail_forward_4294467.
[20] The average number of siblings is 0.824, consistent with the finding in Zhang and Song (2021).

Table 3
Effects of income inequality on different educational expenditures.

	In-school	Out-of-school		
	All	*Intensive*	*Extensive*	
	Exp.	Exp.	Study-related	Talent-related
Dependent variables	(1)	(2)	(3)	(4)
Gini of family income per capita	4.521**	4.111***	1.139*	0.914
	(2.005)	(1.578)	(0.680)	(0.727)
Log family income per capita	0.377***	0.713***	0.146***	0.242***
	(0.069)	(0.071)	(0.024)	(0.033)
Mother's education level	0.015	0.211***	0.030***	0.061***
	(0.015)	(0.015)	(0.006)	(0.007)
Age of mother	−0.025**	0.015	−0.000	−0.006
	(0.012)	(0.009)	(0.004)	(0.005)
Number of siblings	−0.058	−0.492***	−0.117***	−0.127***
	(0.080)	(0.074)	(0.034)	(0.038)
Age of child	0.551***	0.370***	0.115***	0.025***
	(0.045)	(0.021)	(0.008)	(0.010)
Boy	−0.172**	−0.366***	−0.008	−0.302***
	(0.083)	(0.100)	(0.039)	(0.045)
Province*Year FE	Yes	Yes	Yes	Yes
Observations	10,440	10,440	9,753	9,299
R^2	0.224	0.238	0.172	0.177

Note: In the first column, the dependent variable are the logarithm of in-school educational expenditures. At the intensive margin, the dependent variables are the logarithm of out-of-school educational expenditure per child in the Column (2). In Columns (3)–(4), the dependent variables are dummy variables indicating whether a child attend study-related and talent-related out-of-school tutoring, respectively. Columns (1)–(2) employ OLS regression; Columns (3)–(4) use probit model. Cluster standard errors at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

6. Empirical results

We analyze the impact of income inequality on a child's total educational expenditures and conduct in-depth analyses to illustrate how income inequality shapes a child's educational expenditures in more detailed categories, such as in-school and out-of-school spending, and the intensive and extensive margins of out-of-school spending. We also conduct various robustness checks and investigate the impacts of income inequality on the allocation of monetary and non-monetary family resources.

6.1. Impacts on children's educational expenditures

Table 2 reports the results of the baseline OLS estimates from Eq. (1). In Column (1), we regress the logarithm of a child's educational expenditures on the Gini coefficient of a reference province-cohort group, only controlling for province-year fixed effects. The estimated coefficient of the Gini is 4.845 and is statistically significant. This result suggests that a one-percentage-point rise in the Gini is associated with a rise in the average educational expenditure per child by 4.845 percent. To put this in perspective, given that households' annual educational expenditure per child averages around 3,426 RMB per household, our result suggests that the annual educational expenditure increases by approximately 166 RMB.

The estimated changes in educational expenditures from the sample regression, however, cannot be fully attributed to income inequality as different families may respond differently to the changes in income distribution. To address these concerns, we control for a set of family characteristics, such as family net income per capita, the mother's age and education level, as well as the number of siblings (Column 2). We add children's characteristics, such as their age and gender, to control for potential confounding factors related to grade level and gender preference of parents (Column 3). In both cases, the estimates remain positive and statistically significant at the 1 percent level. Most notably, in Column (3) when all the control variables are included, the coefficient of the Gini is 5.381, indicating that a one-percentage-point rise in the Gini increases a family's expenditure on a child's education by 5.381 percent, corresponding to roughly 184 RMB in magnitude. The magnitude of coefficients on income inequality are rather similar to the estimates in Jin et al. (2011), in which educational expenditures increase by 5.06 percent with one-percentage-point rise in the Gini coefficient.[21]

The estimated coefficients on the control variables deliver results that are consistent with the literature on household educational expenditures. For instance, the educational expenditure per child is higher in rich and well-educated families (Lazear, 1988; Chi & Qian, 2016), decreases with the number of siblings, consistent with the quantity-quality trade-off theory as highlighted in Becker and Lewis (1973) and Li, Zhang, and Zhu (2008). The characteristics of children account for approximately 30 percent of the impact of

[21] In addition, we would like to point out that although our estimates are not directly comparable with the ones in Sun and Wang (2013), Song and Zhou (2019) and Wang and Cheng (2021) due to the different measure of income inequality, our main findings do not contradict their results.

income inequality on education spending per child (Lazear, 1988; Mauldin et al., 2001; Chi & Qian, 2016). In particular, the educational expenditure increases with a child's age and is higher for girls (Zhang & Xie, 2016).

6.2. Impacts on in-school versus out-of-school expenditures

To better understand the impact of income inequality on different types of educational expenditures, we conduct an analysis by decomposing total educational expenditures into in-school and out-of-school spending.[22] With respect to out-of-school expenditures, we estimate the impacts on the likelihood of participating in two types of out-of-school tutoring activities, study-related and talent-related tutoring (*extensive margin*), as well as the impacts on the amount of out-of-school tutoring expenditure (*intensive margin*). Table 3 reports the estimation results.

Column (1) presents the estimated effect of income inequality on the logarithm of in-school spending. The estimated coefficient of the Gini is 4.521, statistically significant at the 5 percent level, suggesting that rising income inequality has a significant impact on in-school expenditures. This finding is likely to be related to the non-tuition component of in-school spending. Although most children (aged 6 to 15) in our sample enjoy free compulsory education, and thus do not need to pay for tuition, there still exists school selection payment by parents who desire high-quality education for their children.[23] Indeed, among in-school spending, the average non-tuition expenditure on accommodation, transportation, and school selection transfers are roughly 444 RMB, accounting for around 23 percent of overall in-school expenditures.

Columns (2)–(4) show the estimated impacts of rising income inequality on out-of-school expenditures at both the *intensive* and *extensive* margins. In Column (2), the estimated coefficient of the Gini is positive and statistically significant at the 1 percent level. Intuitively, when the Gini increases by one percentage point, the out-of-school educational expenditure for a child significantly increases by 4.111 percent, amounting to roughly 38 RMB.

The positive effect also appears at the *extensive* margin. In the CFPS survey, for each sampled child, the parent or guardian was asked "In which of the following types of extracurricular/home tutoring has the child ever participated or is currently participating?" With this question, we construct two dummy variables indicating whether a child participated in study-related or talent-related out-of-school tutoring in the last year, respectively. As shown in Column (3), rising income inequality leads to higher participation in study-related tutoring; indeed, a one-percentage-point rise in the Gini coefficient increases the likelihood of engaging in out-of-school tutoring by 2.096 percentage points.[24] A comparison shows that income inequality has a stronger correlation with study-related tutoring as opposed to the talent-related tutoring. This suggests that rising income inequality causes parents to invest more in children's academic ability in the hope of improving children's class performance, thus placing them in a more favorable position in high school or college entrance examinations (Chi & Qian, 2016). Interestingly, we find that the age of the child has positive and significant effects on the participation rates for both study-related and talent-related tutoring and that the impact is much more pronounced for the former. This might be because parents tend to allocate more resources to study-related tutoring as their children approach the high school entrance exam.

The coefficients of other control variables are as expected. For instance, girls incur higher in-school and out-of-school spending and they are also more likely to attend talent-related tutoring. Moreover, both in-school and out-of-school expenditures are higher in families with more educated parents, higher family income, and fewer siblings, which squares well with the results in Jin et al. (2011). In addition, we investigate the effects of income inequality across income groups and find a significant and larger impact for families with higher income; the coefficient estimates of income inequality are significantly positive and sizable for the middle-income and high-income families, whilst being insignificant for the low-income families. The results are reported in Table A1 in the Appendix.

6.3. Robustness checks

We conduct a battery of sensitivity analyses to check the robustness of our baseline results. More specifically, we use alternative measures of income inequality and address the issue of possible omitted variables, including local market conditions, family or individual's unobserved characteristics, and selection on other unobservables.

6.3.1. Different measurements of income inequality

In our baseline specification, we use the Gini coefficient to measure income inequality. A potential concern is that this measure may be sensitive to extreme values (Atkinson, 2008; Wan, 2008). To address this concern, we use the ratios of incomes at different percentiles to capture the dispersion of income distribution. In particular, we use the ratio of the 90th to the 10th percentile of income distribution (P90/P10) and the ratio of the 75th to the 25th percentile of income distribution (P75/P25) to measure the income disparity between high-income and low-income groups. The regression results are reported in Panels A and B of Table 4. For total educational expenditures, all the coefficients are statistically different from zero at the 1 percent level, implying that the baseline

[22] There is also a category of "miscellaneous expenditures on education", which accounts for approximately 15 percent of total education spending. Since the CFPS dataset does not provide detailed information regarding what these expenditures are for, we exclude this category in the analysis in this subsection.

[23] Wang and Cheng (2021) find that around 20 percent of children aged 5 to 18 years in China study in private schools.

[24] The estimate as shown in Column (3) is 1.139, which translates into an increase in the participation rate by 2.096 percentage point $(2.096 = exp(1.139) - 1)$.

Table 4
Robustness check: alternative measures of inequality.

	Total	Out-of-school	In-school
Dependent variables	(1)	(2)	(3)
Panel A			
P90/P10	0.044***	0.024	0.023
	(0.017)	(0.016)	(0.019)
Baseline controls	Yes	Yes	Yes
Observations	10,440	10,440	10,440
Panel B			
P75/P25	0.332***	0.259***	0.185*
	(0.102)	(0.095)	(0.112)
Baseline Controls	Yes	Yes	Yes
Observations	10,440	10,440	10,440
Panel C			
Bottom 10% income share	−28.744*	2.918	−23.672
	(16.444)	(13.384)	(17.388)
Baseline Controls	Yes	Yes	Yes
Observations	10,440	10,440	10,440
Panel D			
Bottom 25% income share	−15.674***	−10.969**	−7.588
	(5.538)	(5.411)	(5.827)
Baseline Controls	Yes	Yes	Yes
Observations	10,440	10,440	10,440
Panel E			
Top 10% income share	2.059	1.996	2.163
	(2.047)	(1.525)	(2.143)
Baseline controls	Yes	Yes	Yes
Observations	10,440	10,440	10,440
Panel F			
Top 25% income share	3.787*	2.341	3.390
	(2.162)	(1.627)	(2.333)
Baseline controls	Yes	Yes	Yes
Observations	10,440	10,440	10,440

Note: Cluster standard errors at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. See Table 2 for baseline control variables.

estimates on Gini coefficients are not driven by the extreme values. For in-school and out-of-school educational expenditures, the estimated coefficients suggest that the impacts are heterogeneous across percentile ratios; the impact on out-of-school and in-school educational expenditures is significant for the P75/P25 ratio, whilst being insignificant for the P90/P10 ratio. This implies that parents are more concerned about the dispersion of the middle part of the income distribution than they are about the extreme tails.

We then further explore whether parents are eager to climb up to the high-income class or are more concerned about falling into the low-income class. To this end, we use the income share of different parts of the distribution as a measure of inequality (Piketty, Yang, & Zucman, 2019). In Panels C to F of Table 4, we report the results for the income share of the bottom 10 percent, bottom 25 percent, top 10 percent, and top 25 percent, respectively. The results show that when the income share of the bottom 25 percent decreases, parents tend to invest more in their children's education, especially in out-of-school tutoring, whereas they do not respond to an increase in the top income share (the top 10 or 25 percent share). Meanwhile, the impacts on in-school spending are all insignificant. These results, in line with those using measures of income ratios, provide further empirical evidence that parents are not sensitive to the tails of the income distribution but rather care more about the inequality of mid-income distribution. More importantly, parents seem to be more concerned about their children falling into the poor class as opposed to climbing up to the top class.

One possible explanation for this result is that under the Confucianism culture, Chinese parents tend to be conservative and risk averse (Ge, Kong, Dadilabang, & Ho, 2021). Hence, they expect their children to locate in the middle part of the income distribution in the future, and are willing to invest in children's education to ensure their children not to fall into the poor class.

6.3.2. Possible omitted variable bias

A. Local market conditions

In the baseline model, we use the province-year fixed effects to capture the time-variant unobservables at province level, which might be correlated with both educational expenditures and the income inequality measured within the year-province-cohort groups. Nevertheless, family education spending might also be subject to the supply (or price) of education service at more disaggregated levels (e.g., cities or counties). For instance, for children who attend kindergartens or who are at the compulsory education stages, the school enrollment policy is primarily overseen by an educational authority at the city level, while the provision of education services during the compulsory education stages is also determined by local government. Meanwhile, the prices of education services are likely correlated with local labor costs and housing prices, which tend to be closely linked with income inequality (Roback, 1982). In

Table 5
Robustness check: alternative specifications.

	Total	Out-of-school	In-school
Dependent variables	(1)	(2)	(3)
Panel A: city-year fixed effect			
Gini of family income per capita	5.364***	3.103*	5.204**
	(1.980)	(1.703)	(2.095)
Baseline controls	Yes	Yes	Yes
Observations	9,852	9,852	9,852
Panel B: county-year fixed effect			
Gini of family income per capita	5.313***	3.229*	5.285**
	(1.960)	(1.702)	(2.081)
Baseline controls	Yes	Yes	Yes
Observations	10,439	10,439	10,439
Panel C: family fixed effect			
Gini of family income per capita	2.468	3.007*	1.210
	(1.940)	(1.760)	(2.024)
Controls	Yes	Yes	Yes
Observations	10,440	10,440	10,440
Panel D: child fixed effect			
Gini of family income per capita	3.588*	3.159*	1.250
	(1.887)	(1.877)	(2.021)
Controls	Yes	Yes	Yes
Observations	10,440	10,440	10,440

Note: In Panels A and B, cluster standard errors at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1, see Table 2 for control variables. In Panels C and D, we only control for the logarithm of family income per capita, and drop the time-invariant parents' or child's characterisitics.

Table 6
Robustness check: controlling for educational stage.

	Total	Out-of-school	In-school
Dependent variables	(1)	(2)	(3)
Gini of family income per capita	2.645*	3.049*	2.064
	(1.458)	(1.556)	(1.707)
School_kindergarten	6.219***	1.082***	5.923***
	(0.575)	(0.234)	(0.504)
School_primary school	4.037***	1.825***	3.893***
	(0.698)	(0.393)	(0.610)
School_junior high school	1.912*	0.618	2.233**
	(1.067)	(0.594)	(0.961)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	10,440	10,440	10,440
Adjusted R^2	0.421	0.241	0.342

Note: Cluster standard errors at the province-child age level are presented in parentheses,***p < 0.01, **p < 0.05, *p < 0.1. For the educational stage dummies, the omitted group is nursery school. See the baseline control variables in Table 2.

addition, the supply (or price) of out-of-school tutoring is related to whether local markets are well developed or not. For example, it would be easier for parents to find tutoring opportunities for their children in economically developed regions as opposed to in underdeveloped regions.

To address this concern, Panels A and B of Table 5 replace the province-year fixed effects with city-year fixed effects and county-year fixed effects, respectively, to control for any time-variant city-level or county-level characteristics that might be related to both income inequality and family educational expenditures. Table 5 shows that the baseline results are robust when more disaggregated level fixed effects are considered.

B. Family or children's characteristics

Decisions regarding household education spending may be affected by other observed or unobserved characteristics of families or children. For example, education spending might rely on family structure. Families with elderly dependents may invest less in children's education due to financial constraints. Meanwhile, parents from different cohorts may have different parenting preferences. Hence, the estimates from our baseline model may capture the correlation between income inequality and educational expenditures across different cohorts of parents. Moreover, parental decisions regarding education investment might also depend on children's ability (Yi, Heckman, Zhang, & Conti, 2015).

To address this issue, we use the panel feature of the CFPS data and control for unobserved time-invariant characteristics of families (i.e., parents) and children. It is relatively restrictive to use family or child fixed effects because the identification in these specifications

Table 7
Robustness check: high-school-age children included.

	Total	Out-of-school	In-school
Dependent variables	(1)	(2)	(3)
Gini of family income per capita	4.694**	5.213***	4.623**
	(2.083)	(1.555)	(1.974)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	11,579	11,579	11,579
Adjusted R^2	0.135	0.206	0.233

Note: Cluster standard errors at the province-child age level are presented in parentheses,***p < 0.01, **p < 0.05, *p < 0.1. See the baseline control variables in Table 2.

Table 8
Robustness check: selection on unobservables.

	Baseline effect $\dot{\beta}(t)[R^2]$	Controlled effect $\widetilde{\beta}(t)[R^2]$	Bias-adjusted $\beta^* R_{max}$=1.3R	$\delta for \beta = 0$ given R_{max}
	(1)	(2)	(3)	(4)
Total	4.845(2.344)[0.072]	5.381(2.93)[0.275]	24.250	−1.313
Out-of-school	2.352(1.35) [0.102]	4.111(2.61)[0.238]	30.024	−0.392
In-school	4.219(1.75)[0.050]	4.521(2.25)[0.224]	21.808	−1.136

Note: Cluster standard errors at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. See Table 2 for baseline control variables.

only comes from within-family(child) variations in education spending in response to changes in income inequality over time.

Panels C and D in Table 5 report the results. With family fixed effects or child fixed effects, the coefficients of out-of-school spending remain statistically significant, while those for in-school spending become insignificant. Intuitively, in-school spending within a family or for a child is fairly inelastic. After controlling for the unobservable features of families or children, in-school spending is unlikely to change unless the child changes his or her school. In contrast, out-of-school expenditures are much more flexible and could adjust to changes in income inequality.

To allow for nonlinear changes in education spending across the education stages, we add the education stage dummies into our baseline model. As shown in Table 6, the main results are consistent with the baseline model. Moreover, the estimates on the education stage dummies are all positive for overall education spending, in-school and out-of-school spending. In particular, the coefficient for in-school spending is much higher for kindergarten than those for compulsory education stages (primary school and junior high school). A possible explanation for this is that kindergarten is non-compulsory education and parents have to pay tuitions. Meanwhile, many Chinese parents believe that children should be trained to "win at the starting line" from early childhood. For these parents, it is important to discover and develop children's interests as early as possible. They also believe that children should attend high-quality schools at each stage to ensure a higher chance of enrolling in key-point high school and further to good colleges in the future. Moreover, many Chinese parents believe that the younger the child, the better they learn and absorb knowledge. As a result, many children are loaded up with tutorial classes from a very young age.

So far, our results are based on the sample of children under the age of 16, and one concern might be whether the results still hold among children of older age. To this end, we add the high-school-age children who are between 16 and 18 years old into the baseline sample.[25] As shown in Table 7, the corresponding results are consistent with the baseline ones; a rise in income inequality increases the total educational expenditures of children, as well as for in-school and out-of-school expenditures. Nevertheless, the magnitude of the coefficients is slightly smaller than that of the baseline ones. This result squares well with the pattern we show in Table 6 that the Chinese parents tend to invest in education at the early age of their children. Also, this result seems to suggest that the educational expenditures at higher stage of education may rely more on children's innate ability, and thus, are less responsive to the rising income inequality.

C. Selection on Unobservables

Although we have found that our results are robust to consideration with local market conditions and family or children's time-invariant characteristics, there might exist some unobserved time-varying individual and provincial characteristics, which could lead to potential omitted variable bias. To address this issue, we employ the bounding approach proposed by Oster (2019).

We first calculate the bias-adjusted coefficient (β^*), given the assumed degree of selection on unobservables relative to observables (δ) and the theoretical maximum R-squared (R_{max}) when all relevant unobservables are included. Following Oster (2019), we set $R_{max} = 1.3R$ and $\delta = 1$ in our application, where R denotes the R-squared in our baseline model containing all observed control variables. Columns (1)–(3) in Table 8 report the estimated coefficients of income inequality without control variables, a full set of

[25] For those who already drop out of school, their educational expenditures are treated as zero.

Table 9
Effects of income inequality on family expenditures.

	Education	Food	Clothes	Health-related	Car	Social activities
Dependent variables	(1)	(2)	(3)	(4)	(5)	(6)
Gini of family income per capita	6.695***	1.405*	−0.414	1.762	2.091	−2.034
	(2.184)	(0.762)	(1.088)	(1.467)	(2.611)	(1.503)
Log family income per capita	0.491***	0.329***	0.656***	0.621***	1.635***	0.642***
	(0.070)	(0.031)	(0.048)	(0.060)	(0.107)	(0.061)
Family size	−0.225***	0.091***	0.091***	0.327***	0.398***	0.147***
	(0.051)	(0.020)	(0.030)	(0.035)	(0.068)	(0.037)
Number of children	1.040***	−0.058	0.009	−0.133*	−0.331***	−0.096
	(0.088)	(0.037)	(0.052)	(0.070)	(0.125)	(0.082)
Household head's age	−0.005	−0.001	−0.029***	0.006	−0.026***	−0.001
	(0.008)	(0.003)	(0.003)	(0.005)	(0.009)	(0.005)
Household head's education level	0.055***	0.027***	0.042***	0.069***	0.159***	0.021*
	(0.015)	(0.006)	(0.008)	(0.012)	(0.021)	(0.012)
Province*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,116	10,116	10,116	10,116	7,728	10,116
Adjusted R^2	0.064	0.141	0.149	0.081	0.217	0.642

Note: All dependent variables are the logarithm of each type of family expenditures, including family educational expenditures, spending on food, clothes, health-related(public medical care and commercial insurance), car purchasing, and social activities which refer to the total value of the gifts/cash gifts given out last year. The standard errors are clustered at the province-household head's age level,***p < 0.01, **p < 0.05, *p < 0.1.

Table 10
Effects of income inequality on educational expenditure shares.

	Educational exp. as a share of			
	Family expenditure	*Family expenditure per capita*	*Family income*	*Family income per capita*
Dependent variables	(1)	(2)	(3)	(4)
Gini of family income per capita	0.0583**	0.3127***	0.0668*	0.2184**
	(0.027)	(0.085)	(0.037)	(0.089)
Baseline controls	Yes	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes	Yes
Observations	10,436	9,777	10,440	9,919
Adjusted R^2	0.112	0.084	0.163	0.115

Note: Cluster standard errors at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. See Table 2 for baseline control variables.

control variables as in the baseline model in Column (3) of Table 2, and both a full set of control variables and unobservables, respectively. The biased adjusted coefficients in Column (3) are still positive. This indicates that our results meet the standard suggested by Oster (2019) that the set $[\widetilde{\beta},\beta^*(R_{max},1)]$ does not include zero. Hence, the omitted variable bias cannot drive out the statistical significance of income inequality.

Meanwhile, we compute the value of δ when $\beta = 0$ under a given value of R_{max}. Column (4) shows that the values of δ for the income inequality are all greater than the cutoff value of 1 except for the out-of-school expenditures. This implies that the potential omitted variables would need to be at least around one time as important as the full set of observed variables to produce zero impact of income inequality on educational expenditures. Overall, the results produced by using Oster's approach provide further supporting evidence for the robustness of our baseline estimates.

6.4. Impacts on allocation of family resources

This subsection explores whether income inequality affects the way households allocate their monetary and non-monetary resources.

6.4.1. Impacts on allocation of monetary resources

Our baseline results show that income inequality has a positive and significant effect on educational expenditures. We are interested in two questions: (1) whether a rise in income inequality also increases other types of expenditures, and (2) whether the increase in educational expenditures crowds out other types of family expenditures. Answering these questions would be of great help to exploring the underlying mechanisms of rising educational expenditures.

To proceed, we first investigate the impact of income inequality on various types of family expenditures, including basic consumption (food and clothes), health care (public medical care and commercial insurance), car purchasing, and social activities. Table 9 demonstrates that a rise in the Gini coefficient also increases educational expenditures for a family as a whole but has no significant

Table 11
Effects of income inequality on time spent on tutorings.

	Hours in tutoring		Hours in tutorial class
	Father	Mother	Total
Dependent variables	(1)	(2)	(3)
Panel A: Whole sample			
Gini of family income per capita	0.412	2.565**	1.817**
	(0.872)	(1.132)	(0.849)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	9,521	9,521	9,936
Adjusted R^2	0.045	0.100	0.183
Panel B: Subsample by family income			
Bottom 33%	−0.887	4.367**	−0.387
	(1.468)	(2.031)	(1.345)
Middle Class	1.927	1.188	1.392
	(1.451)	(1.825)	(1.491)
Top 33%	0.264	2.280	3.554**
	(1.474)	(1.860)	(1.490)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes

Note: The dependent variables in Columns (1)–(2) are the logarithm of the total weekly hours spent on helping children with homework by fathers and mothers, respectively; The dependent variable in Column (3) is the logarithm of the average weekly hours spent by children in tutorial classes in the latest month that was not a vacation. Cluster standard errors at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. See Table 2 for baseline control variables.

effect on other household expenditures except for a marginal effect on food expenditures.

To further explore whether the educational expenditures crowd out other types of expenditures, we use the share of education spending in family expenditure (per capita) and family income (per capita) to test the distributional effect of income inequality. The results in Table 10 suggest that a rise in income inequality indeed induces the household to allocate more monetary resources towards education as opposed to other types of expenditures.

These results suggest that channels related to education may be key to understanding the relationship between income inequality and family resource allocation. We will explore the underlying channels in the next section.

6.4.2. Impact on allocation of non-monetary resources

In addition to the effects on parental educational investment, income inequality might also shape parents' and children's behavior in terms of time allocation. In particular, we are interested in whether income inequality affects (1) parental time spent on tutoring children, and (2) children's time spent on tutorial activities. Furthermore, we want to determine whether the role of income inequality varies across income groups. To this end, we divide the whole sample into three income subgroups: the bottom one-third of the income distribution, the middle class, and the top one-third of the income distribution within the same province. The results are reported in Panels A and B in Table 11.

Panel A shows that the impacts on the hours spent by mothers are positive and statistically significant, whilst being insignificant for fathers.[26] This result implies that mothers play an important role in educational childcare, in line with the findings in the literature on time investment (Guryan, Hurst, & Kearney, 2008; Musick, Meier, & Flood, 2016). More recently, some studies have found evidence supporting the notion that, in China, mothers play a more important role in education-related childcare than fathers do (Yang, 2018; Zhang et al., 2020; Wang et al., 2021). Our results, together with the findings in the literature, suggest that mothers play a vital role in childcare, not only in routine care, but also in tutorials closely related to children's academic performance in schools.[27] Likewise, income inequality also imposes a significantly positive effect on children's time spent on tutorial activities. This result echoes the findings presented in Table 3. Intuitively, when the parental educational investment responds actively at both the *intensive* and *extensive* margins, it is clear to see that children tend to engage in after-school tutorial activities for a longer time.

The results in Panel B show that the effects of income inequality on mothers' hours engaged in educational tutoring and children's hours spent on tutoring activities differ substantially across income groups. Mothers from low-income families significantly increase their time spent on tutoring children, while mothers from high-income families choose to invest in out-of-school tutoring for their children. This sharp contrast suggests that while a higher income inequality motivates all families to place an even higher value on

[26] We further explore whether mothers sacrifice their work time in order to tutor their children. The results reported in Table A2 in the Appendix show that rising income inequality has a significant and positive effect on mothers' labor force participation. These results suggest that in response to increasing income inequality, mothers not only allocate more time to their children's education tutorials but also adjust by participating in market activities to bear the heavier financial burden of the family. In contrast, the impact of income inequality on the father's labor supply is insignificant.

[27] We find that in our sample nearly half of children (47.1%) are tutored only by their mother at home; in sharp contrast, merely 16.3% of children are tutored only by their father, and only 13.3 percent are tutored by both parents.

Table 12
Mechanism analysis –parental expectation for education.

	Expected education year	Expected test scores
	(1)	(2)
Gini of family income per capita	3.040***	1.203**
	(1.145)	(0.564)
Baseline controls	Yes	Yes
Province*Year FE	Yes	Yes
Observations	8,182	6,751
$(Pseudo)R^2$	0.112	0.041

Note: The dependent variables in the Column (1) is the parental expected education year for their child. The dependent variable in the Column (2) is the grade categorized by parental expected test scores (i.e. below 70, 70 to 80, 80 to 90, 90 to 100 and 100). Column (1) employs OLS regression, and Column (2) uses ordered probit model. Cluster standard errors at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. See Table 2 for baseline control variables.

education, families from different income classes choose different ways to enhance their children's academic performance in schools. In particular, the parents who are not financially constrained (high-income class) tend to engage in market tutoring services through more monetary educational investment, while parents who are financially constrained have to carry out tutoring themselves. Intuitively, the high-income families, likely having high opportunity cost of time, are willing to purchase tutorial services available on the market to replace their own tutoring time. These results provide some suggestive evidence for the substitution effect between time and monetary resources.

7. Testing mechanisms

We have found that income inequality has a robust and significant impact on households' educational expenditures. As the income inequality in the past two decades increased significantly due to the rising skill premium, one would expect that parents may value education more, and allocate more resources toward children's education in order to improve their children's social-economic status in the future. In this section, we explore two potential channels through which income inequality leads to higher educational expenditures: (1) a rising income inequality induced by skill premium strengthens parents' cultural attitude towards education, inducing them to invest more in their children's education; and (2) a higher income inequality resulting from rising skill premium gives rise to a strong desire for quality education, leading to fierce education competition and forcing parents to spend more on educational expenditures. We believe both are important channels behind the positive correlation between income inequalities and household investment in children's education and they may also reinforce each other's effects. Besides, we explore some alternative explanations, while find no empirical evidence to support them.

7.1. Cultural attitude towards education hypothesis

As discussed in Section 2, traditional parental decisions regarding children's education have been strongly influenced by Confucianism, the leading philosophy in China (Chen et al., 2020; Si, 2021). Under the Confucian philosophy, education attainment is crucial to achieving personal and familial success, and parents show a great enthusiasm for their children's academic performance. This traditional view of education is likely strengthened in the face of higher income inequality resulting from the skill premium, thus motivates parents to place greater emphasis on education. In view of this, the households influenced more by the traditional view of education are likely to be more responsive to income inequality and to invest more in their children's education. We call this mechanism cultural attitude towards education.

We test this cultural transmission in two ways. First, given that education still serves as the most important channel for young people to seek higher social status (Jin et al., 2011), gain prestige (Chen et al., 2021), and achieve upward mobility (Yang & Qiu, 2016; Heckman et al., 2018), parents who expect their sons to become dragons (wang zi cheng long) and their daughters to become phoenies (wang nv cheng feng) are more likely to respond to income inequality. They may place a higher value on their children's education, which translates into higher educational expectations. For the transmission channel that operates through parents' expectation for children's education attainment, we examine the effect of income inequality on (1) the expected years of education by parents and (2) the expected test score by parents. The results are reported in Columns (1) and (2) in Table 12, respectively, and show that a rise in income inequality significantly increases parents' expectations of both academic performance (i.e., expected test scores) and educational attainment (i.e., expected years of education).

Second, we exploit the implications of heterogeneous responses of cultural attitudes about education to income inequality. More specifically, if the obsession for children's educational attainment is influenced by cultural norms deeply shaped by Confucian culture, we would expect a more significant positive relationship between income inequalities and parental educational expenditures in regions where Confucianism has deeper roots. In such areas, households hold a stronger cultural belief that a good education leads to greater personal success (i.e., higher wage outcomes). Thus, they are more responsive to rising income inequality and tend to allocate more family resources to their children's education. In addition, the cultural norms regarding education are transmitted within families, passing down from one generation to the next. For instance, Chen et al. (2020) argue that the educated elite families in ancient China

Table 13
Mechanism analysis – cultural attitude towards education.

	Total	Out-of-school	In-school
Dependent variables	(1)	(2)	(3)
Panel A: Regions more influenced by Confucianism			
Gini of family income per capita	7.561***	8.628***	6.061**
	(2.656)	(2.608)	(2.763)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	4,327	4,327	4,327
Panel B: Regions less influenced by Confucianism			
Gini of family income per capita	4.766*	−0.672	5.006*
	(2.546)	(2.155)	(3.005)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	4,239	4,239	4,239
Panel C: Families with well-educated mothers			
Gini of family income per capita	8.724***	7.639**	7.722**
	(3.143)	(3.081)	(3.380)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	3,858	3,858	3,858
Panel D: Families with poorly-educated mothers			
Gini of family income per capita	3.900*	1.510	3.828
	(2.032)	(1.773)	(2.340)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	6,582	6,582	6,582

Note: In Panels A and B, we use the average city-level *jinshi* density in the Ming–Qing period as the threshold to divide provinces into regions more or less influenced by Confucianism. Panel C are families in which mother's education are above high school, whereas Panel D are families in which mother's education are below high school. See Table 2 for baseline control variables. Standard errors clustered at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

internalized the culture of valuing education and transmitted it across generations. Thus, it is reasonable to conjecture that families with well-educated parents are more likely to hold traditional attitudes towards education and thus pass down such attitudes to the next generation through investments in education. In the face of higher income inequality, these households may react more actively and spend more on their children's education. Since the existing studies have widely documented the vital role of mothers' characteristics, the educational attainment in particular, in the process of children's cognitive and non-cognitive development (Grossman, 2000), and in determining household spending on children's education (Cui, Liu, & Zhao, 2019; Wang & Cheng, 2021; Wang et al., 2021), we expect household investment in children's education to be higher in families where mothers have higher education attainments.

For the cultural transmission that operates via cross-sectional and vertical heterogeneous influence of Confucian philosophy, we examine the effect of income inequalities for (1) households in the regions more influenced by Confucianism (i.e., with a higher *jinshi* density in the Ming and Qing period) versus those in the regions less influenced by Confucianism (i.e., with a lower *jinshi* density in the Ming-Qing period); and (2) households with well-educated mothers (i.e., education above high school) versus those with less-educated mothers (i.e., education below high school). The results are reported in Table 13.

Consistent with the intuition discussed above, the comparison of the point estimates in Panels A and B shows that the impact of income inequality on household educational expenditures is larger in size and significantly positive in the regions more influenced by Confucianism. In contrast, the effect on out-of-school educational expenditures becomes insignificant and much smaller in size in the regions where Confucianism has weaker influence.[28] Likewise, the results in Panels C and D confirm the views expressed in our discussion above. Income inequality has stronger effect on household educational expenditures in families with well-educated mothers. In terms of the effects on out-of-school and in-school educational expenditures, a sharp contrast arises across two types of families: the significant effects on after-school tutoring and in-school fees only appear in the households where the mothers hold higher education attainments.

7.2. *Education competition hypothesis*

As discussed in Section 2, the fierce education competition at various education stages is a direct consequence of the limited supply

[28] In addition, we find that in the regions more influenced by Confucianism, income inequality has a significantly positive effect on participating in study-related tutoring and talent-related tutoring, as shown in Table A3 in the Appendix, whereas the impacts are negative and insignificant in the regions less influenced by Confucianism.

Table 14
Mechanism analysis – education competition.

	Total	Out-of-school	In-school
Dependent variables	(1)	(2)	(3)
Panel A: High competition for college entrance exam			
Gini of family income per capita	8.511***	4.457**	7.299**
	(2.458)	(1.965)	(2.871)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	5,349	5,349	5,349
Panel B: Low competition for college entrance exam			
Gini of family income per capita	1.770	3.218	1.424
	(2.407)	(2.370)	(2.516)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	5,091	5,091	5,091
Panel C: High pressure for the entrance exam			
Gini of family income per capita	0.132	6.884**	−0.682
	(2.080)	(3.212)	(3.036)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	2,976	2,976	2,976
Panel D: Low pressure for the entrance exam			
Gini of family income per capita	2.573	2.136	2.085
	(2.033)	(2.165)	(2.383)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	6,095	6,095	6,095

Note: In Panels A and B, we use the average provincial college admission rate in the last year to divide provinces into high or low competition groups. Panel C includes only children in grade near entrance exam, whereas Panel D includes children not in grade near entrance exam. See Table 2 for the baseline control variables. Standard errors clustered at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

of quality education and parents' obsessive pursuits of high-quality education resources, especially in the form of the elite universities. The income inequality resulting from skill premium may exaggerate the education competition since it likely increases the value of the elite universities, thus reinforcing parents' demand for better educational opportunities at earlier stages. As a result, they respond by investing more in children's education to a higher income inequality. We call this hypothesis"*education competition.*".

To assess the education competition hypothesis, we exploit the implications of heterogeneous competitiveness of entrance examinations at different education stages. As discussed in Section 2, under the Chinese education system, students in regions with a low college admission rate face high education competition. Moreover, since enrollment at various education stages is based on students' relative performance in entrance examinations, the education competition becomes more intense when the students are in the grades when the entrance examinations take place.[29] Hence, we would expect the effect of income inequalities to be stronger for students who are in the last year of pre-school, and in Grades 6 and 9 (i.e., admissions for primary schools, junior high schools, and academic senior high schools). Given these, we examine the effect of income inequalities on household education spending for (1) households in the provinces with low college admission rates versus those in the provinces with high college admission rates; and (2) children who approach entrance examinations and thus face high pressure versus those who do not. The results are reported in Table 14.

Consistent with the explanation elaborated above, the results in Panels A and B show that income inequality has a significant and positive impact on educational expenditures in the provinces with high education competition, while the effect is smaller and insignificant for the provinces with low competition. In particular, with a higher level of competition, the households respond to a higher income inequality by spending more on both out-of-school and in-school expenditures. The results in Panels C and D in Table 14 reveal that the effect of income inequality on out-of-school expenditures are positive and statistically significant at the 5 percent level among the children who face greater pressure to perform well on entrance examinations, while the coefficients of income inequality on

[29] Even though the enrollment in public schools at the compulsory education stage often depends on the school district based on students' residence, and does not require a school entrance exam, parents are still willing to make efforts to increase their children's academic performance in order to seek chances to enroll in better outside-of-district public schools or even private schools. The reason for the strong school selection motive, as discussed in Section 2, is that only around half of junior school graduates can enroll in academic senior high schools, the key path for higher education in China.

Table 15
Mechanism analysis – alternative explanations.

	Total	Out-of-school	In-school
Dependent variables	(1)	(2)	(3)
Panel A: Regions with higher income uncertainty			
Gini of family income per capita	4.776*	3.236	3.806
	(2.678)	(2.343)	(2.971)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	4,358	4,358	4,358
Panel B: Regions with lower income uncertainty			
Gini of family income per capita	7.841**	4.246	6.429*
	(3.362)	(2.979)	(3.472)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	2,973	2,973	2,973
Panel C: Regions with poorer social safety net			
Gini of family income per capita	4.097*	2.049	3.729
	(2.151)	(2.109)	(2.502)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	5,077	5,077	5,077
Panel D: Regions with better social safety net			
Gini of family income per capita	6.625**	5.765**	5.516**
	(2.707)	(2.449)	(2.760)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	5,363	5,363	5,363

Note: In Panels A and B, we use the average of city-level proportion of families who experienced a decrease in income to divide cities into high or low income uncertainty groups. In Panels C and D, we use the city-level ratio of the number of contributors to the social security program to the number of workers who are under age 60 and have not retired, to proxy for the development of social safety net and use the average of city-level ratio to divide cities into regions with better/poor social safety net. See Table 2 for the baseline control variables. Standard errors clustered at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

children in other grades are not significantly different from zero.

7.3. Other possible explanations

A rising income inequality may also increase future uncertainty. Many studies have shown that a rise in uncertainty may result in more precautionary savings and less consumption.[30] Indeed, parents may view educational expenditures as an investment rather than consumption (Heckman, Lochner, & Todd, 2008; Henderson, Souto, & Wang, 2020). In this case, in response to a rising uncertainty, they may choose to reduce other types of consumption and invest more in education.

In this section, we investigate the uncertainty channel in two possible ways: (i) uncertainty resulting from risk of getting lower income; and (ii) uncertainty due to poor social safety net. However, no empirical evidence has been found to support the hypothesis regarding uncertainty.

Risk of getting lower income. We measure the downward income risk by calculating the city-level proportion of families (for families that are surveyed at least twice) that experienced a decrease in income in the sample years.[31] Then we divide our sample into two groups by the average of the city-level proportion of families who experienced an income decline. The results are shown in Panels A and B in Table 15, which show that there are no significant differential impacts of income inequality on educational expenditures across the two groups of regions.

Poor social safety net. Following Jin et al. (2011), we use city-level coverage rate of the social security system to proxy the development of the social safety net. The coverage rate is measured by the ratio of the number of contributors to the social security

[30] For example, literatures document that increasing saving rate can be explained by macroeconomic uncertainty induced by higher income uncertainty (Meng, 2003; Chamon, Liu, & Prasad, 2013; Zhou, 2013), poor social safety net (Chamon & Prasad, 2010; Bai & Wu, 2014), institutional changes (Ma, 1993; He, Huang, Liu, & Zhu, 2018), and etc.

[31] Around 70.7% of families are surveyed more than two times in our sample.

program to the number of workers who are under age 60 and have not retired. Specifically, we examine the effect of income inequalities for households in the regions with poorer social safety net (i.e. with a lower city-level coverage rate) versus those in the regions with better social safety net (i.e. with a higher city-level coverage rate). The results are shown in Panels C and D in Table 15. Overall, we do not find that the estimates of the coefficients of income inequality are larger among cities with poorer social safety net. Instead, the coefficients of income inequality are larger and significant among cities with better social safety net. The above results provide suggestive evidence that parents does not increase their educational expenditures in response to rising income inequality to cope with uncertainty in the future.

8. Conclusion

Using the CFPS dataset, our study empirically investigates the effect of rising income inequality, one of the most important features of China's economic transformation, on household educational expenditures for children. Our results provide a rich picture of how income inequality influence parents to allocate their family resources (monetary and non-monetary) to their children's education. We find that a rise in income inequality significantly increases the education spending per child and the positive influence largely operates through out-of-school expenditures at both the *intensive* and *extensive* margins. In addition, we find that the rising income inequality induces mothers to allocate more time to educational tutoring. More interestingly, some evidence is detected that suggests a possible substitution effect between time and money; families with high income tend to purchase more market tutoring services in response to rising income inequality, while low-income families respond by tutoring their children more by themselves. Further exploration shows that the Confucian philosophy, and fierce education competition in China are two important channels behind the positive correlation between income inequalities and household investment in children's education.

Our findings deliver interesting implications for the ongoing "double reduction" policy, which imposes stringent regulations on private tutoring. First of all, the detected relationship between income inequality and parental educational investment suggests that the government should take into account the inequality of family income when they think about how to reduce the educational and financial burden for students and households. Second, the central insight underlying the above-mentioned two mechanisms is that the increase in skill premium, the key driving force of the rising inequality of income, motivates parents to value education more and boosts their desire for quality education. Hence, some actions that aim to increase the supply of quality education or balance the education resource allocation might be helpful in mitigating the education competition. Lastly, our results imply that the "double reduction" policy may have an adverse effect for low-income families. Under this policy, parents from all income classes still seek private tutoring opportunities.[32] As a result, there emerges a black market for private tutoring and therefore the cost of tutoring goes up substantially. The low-income families cannot afford this even more costly private tutoring and consequently have to reduce investment in their children's education. Moreover, our baseline results show that low-income families respond the least to rising income inequality. When these two pieces are put together, the investment in children's education from low-income families likely falls behind those from other income groups. In this view, the "double reduction" policy could have an unintended negative impact on intergenerational education mobility, leading to a long-lasting effect on human capital accumulation of children from disadvantaged households.

Data availability

The authors do not have permission to share data.

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Appendix A. Tables

[32] A survey on children's out-of-school tutoring documents that 80% of parents increased their children's tutorial classes after the "double reduction" policy. See https://new.qq.com/rain/a/20211122A01FAD00.

Table A1
Heterogeneous effects by family income.

	Total	Out-of-school	In-school
Dependent variables	(1)	(2)	(3)
Panel A: Bottom 33%			
Gini of family income per capita	4.229	3.796	3.285
	(3.042)	(2.583)	(3.360)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	3,177	3,177	3,177
Panel B: Middle class			
Gini of family income per capita	8.168***	0.825	5.388*
	(2.831)	(2.652)	(2.994)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	3,476	3,476	3,476
Panel C: Top 33%			
Gini of family income per capita	6.286**	8.511***	5.762*
	(3.072)	(2.809)	(3.199)
Baseline controls	Yes	Yes	Yes
Province*Year FE	Yes	Yes	Yes
Observations	3,787	3,787	3,787

Note: Cluster standard errors at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. See Table 2 for baseline control variables.

Table A2
Effects of income inequality on parental labor force participation and hours worked.

	Labor force participation		Hours worked per week	
	Father	Mother	Father	Mother
Dependent variables	(1)	(2)	(3)	(4)
Gini of family income per capita	0.975	1.568***	−0.084	−0.275
	(0.646)	(0.504)	(0.326)	(0.494)
Log family income per capita	0.307***	0.220***	0.035*	0.018
	(0.028)	(0.021)	(0.018)	(0.020)
Mother's education level	0.021***	0.045***	−0.010***	0.012**
	(0.006)	(0.005)	(0.003)	(0.006)
Age of mother	−0.002	0.009***	−0.005**	−0.002
	(0.005)	(0.003)	(0.002)	(0.004)
Number of siblings	−0.038	−0.098***	0.018	−0.088***
	(0.029)	(0.021)	(0.015)	(0.024)
Age of child	−0.005	0.037***	0.002	0.018***
	(0.006)	(0.004)	(0.003)	(0.006)
Boy	−0.081*	0.042	0.048**	0.066***
	(0.043)	(0.030)	(0.019)	(0.025)
Baseline controls	Yes	Yes	0.072	0.100
Province*Year FE	Yes	Yes	Yes	Yes
Observations	7,773	9,986	6,019	5,329

Note: The dependent variables in Columns (1) and (2) are whether fathers or mothers work now, respectively, the dependent variable in Columns (3) and (4) are the logarithm of the hours worked per week for fathers and mothers, respectively. Cluster standard errors at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. See Table 2 for baseline control variables.

Table A3
Mechanism analysis on tutoring – cultural attitude towards education.

	Study-related tutoring	Talent-related tutoring
Dependent variables	(1)	(2)
Panel A: Regions more influenced by Confucianism		
Gini of family income per capita	2.574**	1.916*
	(1.098)	(1.089)
Baseline controls	Yes	Yes
Province*Year FE	Yes	Yes
Observations	3,820	3,518
Panel B: Regions less influenced by Confucianism		
Gini of family income per capita	−1.178	−0.783
	(1.167)	(1.177)
Baseline controls	Yes	Yes
Province*Year FE	Yes	Yes
Observations	3,827	3,417

Note: We use the average city-level *jinshi* density in the Ming–Qing period as the threshold to divide provinces into regions more or less influenced by Confucianism. Standard errors clustered at the province-child age level are presented in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1. See Table 2 for baseline control variables.

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