The Burden of Education Costs in China:

A Struggle for All, but Heavier for Lower-Income Families

Dezhuang Hu, Hongbin Li, Tang Li, Lingsheng Meng, Binh Thai Nguyen*

Abstract

This study examines the level and equity of household education spending in China using representative microdata. We find that education expenditure constitutes a substantial portion of household income, averaging around 17.1%, and in-school expenses constitute the majority of education costs (73%), contrary to the focus on tutoring in media and policy discussions. Moreover, there is an inverse relationship between household income and the fraction of income spent on education, with the top quartile spending 10.6% of their income on education, while the bottom quartile spends a staggering 56.8%. Regression analysis indicates an income elasticity of 0.306, implying that education is a necessity good in China. These results underscore the excessive financial burden imposed by education expenditure, particularly on families in the lower income bracket. It is imperative to implement effective public policies in China that improve the affordability of education for a broader segment of the population.

Keywords: Education Expenditure; Tutoring; Inequality; China

* Dezhuang Hu: Zhongnan University of Economics and Law, dezhuanghu@zuel.edu.cn; Hongbin Li: Stanford University, hongbinli@stanford.edu; Tang Li: Central China Normal University, tangli.whu.edu@gmail.com; Lingsheng Meng: Stanford University, lmeng@stanford.edu; Binh Thai Nguyen: Stanford University, btn1229@stanford.edu.

1. Introduction

The elevated costs of education in China have garnered substantial media coverage (NBC, 2013; Reuters, 2021a; Nikkei, 2021). Families in China allocate a significantly larger proportion of their expenditure on child education when compared to families in other countries (Figure 1). It is perplexing that these costs remain high despite the Chinese government's substantial increase in education spending to over 4% of GDP since 2012, which is in close proximity to the global average of 4.3%.[1] Moreover, the government has recently taken steps to curb costs for families raising children by banning private tutoring, an industry that had reached billions of dollars in value (New York Times, 2021; Reuters, 2021b).[2] However, despite the attention these policy changes and media reports have received, there exists a notable gap in our understanding of education expenses in China, particularly with regard to comprehensive empirical investigations employing nationally representative data.[3]

This study investigates the level of household education expenditure in China using data from the nationally representative China Family Panel Studies (CFPS) dataset. The analysis aims to quantify the amount of education expenditure and assess its proportion in relation to household income. Additionally, it explores how the

[1] The data on China is sourced from the Educational Statistics Yearbook of China. According to the statistics, government spending on education has witnessed a substantial rise, increasing from RMB 62.8 billion in 1991 to RMB 2,315 billion in 2012, and further climbing to approximately RMB 4,600 billion in 2021. The figure for the world average is derived from the 2020 World Bank database.
[2] More specifically, as part of the "Double Reduction" policy, these regulations impose restrictions on private tutoring institutions, prohibiting them from offering academic courses that duplicate the content covered in formal school curricula for primary and secondary school students during weekends, holidays, and school breaks. Additionally, these institutions are mandated to register as non-profit organizations and comply with specified criteria for their facilities, teachers, and educational materials.
[3] Using data from the official Urban Household Survey conducted by the Chinese government in 2007 and 2011, Chi and Qian (2016) quantitatively examine urban household expenditure on education and explore the unequal financial burden it places on lower-income families.

financial burden of education varies across different income levels. To further understand the nature of children's education in China, regression models with a log-log specification are employed to estimate the income elasticity of education expenditure. This estimation provides insights into whether education is considered a luxury or a necessity good in the context of Chinese families. We hypothesize that education is a necessity for Chinese families, and this corresponds to an income elasticity below one.

Our empirical analysis yields several important findings. Firstly, household education expenditure in China is remarkably high, with an average of RMB 8,464 (USD 1,207) per year, accounting for 17.1% of annual income. When compared internationally, the percentage of expenditures on education in China stands at 7.9%,[4] surpassing that of other countries (Figure 1). For example, Japan, Mexico, and the United States typically allocate only 1-2% of household expenditures towards education. While Korea's share of 5.3% ranks second, it falls significantly short of China's share.

Secondly, a detailed breakdown of education expenditures reveals that in-school expenses constitute the majority of education costs, contrary to the focus on tutoring in media and policy discussions. Specifically, 73% of the total expenditure is allocated to in-school expenses, while 12% is dedicated to extra-curricular activities and tutoring. Additionally, the total education expenditure increases as children progress

[4] Unfortunately, we do not have access to income data for other countries in our analysis. However, we do have expenditures data for various countries, which allows us to compare the percentage of household expenditures spent on education.

through different schooling stages, ranging from RMB 3,594 in preschool or primary school to RMB 20,192 in regular college or higher education. Generally, as children advance to higher schooling stages, a larger proportion of the expenses is attributed to in-school costs, while a smaller portion is allocated to extra-curricular activities and tutoring.

Thirdly, we find that the share of education expenditure in household income increases as one moves down the income distribution. In China, families in the highest income quartile allocate 10.6% of their income to children's education. However, what is even more striking is that families in the lowest income quartile spend a significantly larger proportion of their income (56.8%) on education, leaving very little for other expenditure. Again, most of these burdensome expenses are not attributed to private tutoring but rather to in-school costs, which is ironic considering the majority of schools in China are publicly funded and provided.

Our final finding emphasizes the status of education as a necessity in China. We estimate the income elasticity of education expenditure in China to be 0.306. This low elasticity suggests that education expenditure is a priority for families in China, regardless of their income level. The level of elasticity we estimate for China is comparable only to India's income elasticity of 0.28 (Tilak, 2002), but significantly lower than that of other countries. For example, in the United States, the income elasticity ranges from 1.63 to 1.88 (Aguiar and Bils, 2015), while in Latin American countries, it ranges from 0.80 to 3.90 (Acerenza and Gandelman, 2019). In these countries, private expenditures on education are more commonly seen as a luxury

good (with an elasticity greater than 1). Furthermore, our analysis reveals an even lower elasticity for lower income groups in China. In particular, households in the lowest income quartile exhibit an elasticity of 0.09, indicating that education is an absolute necessity for them.

Our findings highlight the significant challenges that households in China face regarding education, particularly those with lower incomes. The high cost of education, driven by the competitive nature of exams, suggests a potentially low social return on these expenses, although further research is needed to evaluate the efficiency gains. An unintended consequence of these high costs is that they may discourage certain families from having children altogether (Xu and Pak, 2021). Additionally, the substantial financial burden of child education disproportionately affects families with limited resources, exacerbating inequality in other areas of expenditure. For impoverished families, the exorbitant cost of education may prevent them from providing further schooling for their children, hindering upward mobility (Liu et al., 2009; Li et al., 2013; Cai and Heathcote, 2022). Therefore, addressing the high private cost of education could not only improve efficiency but also help address equity issues in China.

The findings of this study have important implications for policymaking. It is essential to recognize that simply banning private tutoring may not effectively address the issue of high private education costs. In fact, extracurricular activities and tutoring contribute to a small portion of households' education expenditures, and the majority of expenses (over 70%) are associated with tuition and other fees charged by schools.

Furthermore, merely increasing the government budget for education may not be sufficient; a comprehensive reform of the school system is also crucial. The high private cost of education within schools likely stems from the market power held by highly sought-after schools with limited enrollment opportunities. The scarcity of desirable educational options in China has created a situation where education, which should be provided by the government for the sake of efficiency and equity, instead exacerbates inequality. To address this issue, further research is needed to examine the governance and operations of public schools, providing valuable insights for effective policy interventions.

The remainder of this paper is organized as follows: Section 2 provides a description of the data utilized. Section 3 presents the descriptive and regression results. Finally, Section 4 offers a comprehensive discussion and conclusion.

2. Data

We employ data from the China Family Panel Studies (CFPS), a longitudinal survey initiated in 2010 by the Institute of Social Science Survey at Peking University. The CFPS aims to provide comprehensive data on Chinese households. It includes a baseline survey conducted in 2010, which involved 14,960 households and 42,590 individuals across 25 provinces. Subsequent surveys have tracked these households and their members over the years.[5] For our analysis, we primarily utilize data from the household and individual surveys conducted in 2010, 2012, 2014, 2016,

[5] Household members include all family members in the CFPS 2010 baseline survey and their newborn and adopted children thereafter.

and 2018.

The CFPS is particularly well-suited for our study due to its provision of comprehensive and high-quality data on household income and expenditures, including those pertaining to education. An additional strength of the CFPS is its survey methodology, which covers all members of the household and assigns each respondent a unique ID, enabling us to match parents with their children. To ensure comparability with relevant studies conducted in other countries (Omori, 2010; Acerenza and Gandelman, 2019), we construct a sample consisting exclusively of households with children and parents. Given our specific focus on child education, we further restrict our sample to households with children aged 25 or younger who are currently attending school. Consequently, our final sample comprises 23,786 households with 30,953 children.

Our measurement of household expenditure on education encompasses all costs associated with children's education within the household over a year. Subsequently, we utilize detailed expenditure information to break down this education expenditure measure into three distinct categories: in-school expenses, expenses on extra-curricular activities and tutoring, and other education-related expenses. In-school expenses encompass various items such as tuition, cost of books,[6] after-school programs, food, accommodation, as well as miscellaneous fees related to school-selection, uniforms, physical examinations, and school medical insurance. Extra-curricular activities and tutoring encompass the costs associated with a wide range of

[6] Parents of students in the compulsory schooling stage, specifically grades 1 to 9, are exempt from paying tuition and the cost of books.

classes spanning different disciplines, including arts, sports, and academics. Lastly, the residual category, other expenses, encompasses costs such as transportation, software, stationery, and miscellaneous items that are directly related to education.

Table 1 presents a comprehensive breakdown of education expenditures based on children's schooling stages. As indicated in the fourth row of the table, the total education expenditure per child increases with the schooling stage, ranging from RMB 3,594 in preschool or primary school to RMB 20,192 in regular college or above. The final column of the lower half of the table highlights that, on average, 73% of the expenditure is allocated to in-school expenses, while 12% is dedicated to extra-curricular activities and tutoring.

The education expenditure at various schooling stages differs not only in terms of size but also in composition. Generally, as children progress to higher schooling stages, a larger proportion of the expenses is allocated to in-school costs, while a smaller portion is directed towards extra-curricular activities and tutoring. Specifically, parents of students in or below middle schools have fewer in-school expenses, as much of the in-school costs during the compulsory schooling stage are covered by government funding. However, they tend to spend more on extra-curricular activities and tutoring to prepare their children for the more advanced stages of education, where enrollment opportunities are limited. In comparison, parents of students in or beyond high schools have higher in-school expenses, which are mostly not subsidized by the government. Nevertheless, they allocate less of their budget towards extra-curricular activities and tutoring, as the demand for these

services decreases once their children are already enrolled at a higher level of education.

Our primary income variable is the household's annual income, which is defined as the combined income of the children's parents within the same year. This includes income from all salaried jobs, income generated from running a business or a farm, income from properties such as housing rents and interests, transfer income such as pensions and scholarships, and other sources such as gifts from friends or relatives.[7]

Table 2 presents the summary statistics of our sample. The average annual income of parents in our sample is RMB 49,587. On average, parents are 40 years old. Single-parent households account for 4.4% of all households. The average number of children per household is 1.30. Furthermore, within each household, there is a slightly higher number of boys (0.68) than girls (0.63) on average. In terms of schooling stages, the majority of children in the sample (54.7%) are in primary school or below, while only a small proportion (6.1%) are in regular college or above. As for residency, urban households constitute 45.8% of the entire sample.

3. Results

This section presents the empirical findings of our study. We begin by analyzing the household's financial burden of education, measured by the ratio of education expenditure to parental income. Subsequently, we estimate the income elasticity of

[7] Income from salaried jobs, as well as certain types of transfer income like pensions and scholarships, are recorded at the individual level in the survey. However, other forms of income are captured at the household level. In the case of household-level income, it is assumed that they are distributed equally among individuals who are 16 years old or older and not currently attending school.

education expenditure to determine whether education is considered a necessity or a luxury good in China. Finally, we delve into the heterogeneity of this elasticity across various subgroups, including families with rural or urban residence and different income levels.

3.1. Education Expenditures Relative to Income

Our analysis reveals that our sample parents allocate 17.1% of their household income towards their children's education (Table 3, final column in the first row). While we lack income data for other countries, we can compare internationally the percentage of household expenditures spent on children's education. Figure 1 shows that, as a percentage of total expenditure, education expenses constitute 7.9% in China, which is notably higher in China compared to other countries, both developing and developed. For instance, the ratio of household education expenditure is below 6% for most countries, including France (0.7%), Mexico (1.6%), the United States (1.8%), Japan (2.2%), Colombia (5.0%), and South Korea (5.3%).

Table 3 shows that the ratio of educational expenditure to income is higher for households with more children, although the marginal change in the ratio decreases as the number of children increases. On average, one-child households spend RMB 7,857 per year, two-child households spend RMB 9,982, and households with three or more children spend RMB 11,346. However, considering that income generally does not keep pace with the number of children, households with more children tend to have a higher ratio between educational expenditure and income. Specifically, this

ratio is 15.2% for one-child households, 22.5% for two-child households, and 28.3% for households with three or more children. Clearly, the education expenditure per child decreases with the number of children, which aligns with the theory of quantity-quality trade-off (Becker and Lewis, 1973; Li et al., 2008; Rosenzweig and Zhang, 2009).

Rural households allocate a slightly larger proportion of their income to education. On average, rural households spend RMB 7,147 per year on education, which is 71% of the absolute amount spent by urban households (RMB 10,025 per year). This difference can be attributed, in part, to the significant rural-urban income gap in China. However, the share of income spent on education is larger for rural households (19.6%) than urban households (15.4%).

The level of parental income has an impact on education expenses, both in terms of absolute size and relative to income. Lower-income households allocate a larger proportion of their income towards their children's education, despite spending less in absolute terms. This is partially due to the significant income disparity found in our sample, with households in the fourth quartile earning on average 13.6 times the income of those in the first quartile. As a result, lower-income families have a higher education expenditure to income ratio. For instance, households in the first quartile currently spend the highest percentage of their income on education, accounting for 56.8% of their income, which leaves less than half of their income for other expenditures. In contrast, households in the fourth quartile currently spend only about 10.6% of their income on education.

Considering the substantial proportion of income allocated to education expenses, it is not surprising that a significant number of families experience a deficit between their total expenditure and total income (see Appendix Table A1). In total, 49.7% of all households face this shortfall, with the figure rising to 82.9% for families in the bottom quartile. To cope with this deficit, families may employ various strategies, such as relying on the income of other family members in the household, depleting savings, or resorting to borrowing for consumption and accumulating additional debts. While we are unable to directly test which strategies households are employing, Table A1 provides suggestive evidence. The presence of income from other co-residing adults indicates that parents may receive financial assistance from them. Additionally, 26.9% of households have outstanding debts, and the percentage of households with debts increases as income declines.

The significant expenditure on education by lower-income families indicates that education is likely considered a necessity good in China. This conjecture aligns with prior research highlighting the importance of education for social mobility and future economic opportunities (Jia et al., 2022). Given this context, we anticipate a low income elasticity of education expenditure in China.

3.2. Income Elasticity of Education

To test the hypothesis that education is a necessity good in China, rather than a luxury good, we employ a regression model to estimate the income elasticity of education expenditure. In this model, the dependent variable is the logarithm of

household education expenditure, while the main independent variable is the logarithm of parental income. To mitigate the bias from confounding factors, the regression controls for various household characteristics that may be associated with both education expenditure and parental income. These control variables include the number of children, disaggregated by gender and schooling stage, the region of residency (rural versus urban), and province-fixed effects. We employ robust standard errors for inference.

Consistent with the empirical pattern observed in the earlier descriptive results, our regression analysis confirms that the income elasticity of household education expenditure in China is significantly below one. In Column 1 of Table 4, the coefficient of the logarithm of parents' income, as the sole independent variable, is estimated to be 0.423. This estimate indicates that for every one percent increase in parental income, children's education expenditures increase by 0.423 percent. When we control for urban and provincial fixed effects (Column 2), the estimated elasticity drops slightly to 0.365. However, even after further controlling for additional factors such as the number of children (Column 3), the number of boys and girls (Column 4), and the number of children in different schooling stages (Column 5), the elasticity estimate remains relatively stable. Even when we add parents' age and single-parent household status as controls (Column 6), the elasticity estimate changes little. These findings collectively suggest that the income elasticity of education expenditure in China is below one, supporting the notion that child education is a necessity rather than a luxury good.

The regression results presented so far have been based on a sample comprising households with at least one child currently attending school. However, it is important to acknowledge that some households may choose not to enroll their children in school for income-related reasons. This type of sample selection could bias our estimate of the income elasticity of education expenditure. While we are unable to fully address this issue, we partially assess its potential bias by re-estimating the elasticity using a subsample consisting only of households with children in the compulsory schooling stage (grades 1-9, or roughly ages 6-15), where the enrollment rate is nearly 100% (97%, as reported in Appendix Table A2). Given the very low dropout rate within this subsample, sample selection concerns should be minimal. The regression results based on this subsample are reported in Appendix Table A3, yielding an elasticity estimate of 0.322 (our preferred specification with the richest set of controls in Column 4), which is very close to our baseline estimate of 0.306. Although we cannot entirely correct for sample selection bias in our baseline estimate, this robustness exercise suggests that it is unlikely to be a significant concern.

The below-one elasticity we have estimated suggests that households with lower incomes bear a greater burden of education expenditure relative to their income in China. This low elasticity also places China at the lower end of the spectrum in terms of country-specific elasticities, as shown in Figure 2. Among the available estimates, only a small number of countries have an elasticity below one, including the Bahamas (0.80), Malaysia (0.76), South Korea (0.54), Vietnam (0.53), and India (0.28). It is notable that most of these countries with below-one elasticity are located in Asia, and

China's elasticity is one of the lowest. In contrast, the majority of countries have an elasticity larger than one, with Brazil having the highest elasticity (3.90). In other words, education expenditure is highly responsive to household income and is perceived as a luxury good in those countries.

Apart from household income, there are a few other important determinants of educational expenditure. First of all, having an urban household status increases the spending on child education by 14.8% (Column 2). Furthermore, education expenditure increases with the number of children within the household, indicating that larger families allocate more resources to education (Column 3). Interestingly, one additional girl results in a 41.5% increase in education expenditure, which is very close to the marginal effect of boys (42.8%). This finding suggests a limited gender bias in parental investment in education in China, which aligns with similar observations in the United States (Kornrich and Furstenberg, 2013) and can be attributed to improvements in women's labor market opportunities and societal changes (Lee, 2017). Lastly, education expenditure rises as a child progresses toward higher levels of education (Column 5).

3.3. Elasticities by Residential Status and Income Group

The elasticities of education expenditure may vary across different subgroups of the population due to differences in budget constraints or preferences for education. To examine this possibility, we estimate the same elasticity regressions using subsamples divided by rural and urban status or by income quartiles. All regressions

control for the number of children in different schooling stages and province fixed effects.

The income elasticity of education expenditure is found to be higher for households in urban areas compared to rural areas, as indicated by the results in Columns 1 and 2 of Table 5. We estimate an elasticity of 0.25 for rural households and 0.37 for urban households. The difference in the estimated elasticities suggests that education is more of a necessity good for rural households.

The differences in elasticity across income groups are even more pronounced, as demonstrated in the remaining columns of Table 5. The split-sample analysis reveals that the estimated elasticity roughly increases with income, with the elasticity of the highest income quartile being 5.4 times that of the lowest income quartile. Apparently, education expenditure is far less responsive to changes in household income for lower-income households compared to their wealthier counterparts. Specifically, the elasticity of 0.09 for the lowest income group suggests that their education expenditure remains relatively constant regardless of income, underscoring the essential nature of education expenditure for the most economically disadvantaged households.

4. Discussion and Conclusion

Despite the much-discussed financial burden of education for Chinese families, there is a dearth of systematic research on household education expenditure in China. This paper addresses this gap by utilizing nationally representative data to analyze and

quantify household education expenditure and the household education expenditure-income ratio. Furthermore, it examines how the financial burden of education varies across different levels of household income.

We report several key findings in this study. Firstly, household education expenditure represents a significant burden for families in China, accounting for an average of 17.1% of family income. This share of income spent on education in China is considerably higher than in other countries. Secondly, there is a negative correlation between the fraction of income spent on education and household income. The lowest-income quartile allocates 56.8% of their income to education, while the highest-income quartile only spends 10.6%. This disparity highlights the disproportionate burden of education expenditure on low-income households. Thirdly, we estimate the income elasticity of education expenditure to be 0.306. This low elasticity suggests that education is considered a necessity rather than a luxury good in China, which stands in contrast with the patterns observed in many other countries. The high expenditure on education in China raises concerns as it places a significant financial burden on low-income households, who are the most in need of equitable and affordable education.

One potential explanation for the substantial private expenditure on education in China is the insufficient supply of high-quality educational opportunities coupled with a high demand for such education (Li et al., 2017a). This strong demand can be attributed to China's historical emphasis on education and meritocracy, as well as the perceived high returns associated with education in general (Li et al., 2012b; 2017b,

2022), and elite education in particular (Li et al., 2012c; Jia and Li, 2021). Concurrently, the supply of higher-quality education remains limited due to government-imposed quota systems that restrict the number of students admitted to academic senior high schools and colleges (Li et al., 2017a; Ye, 2015). To allocate coveted opportunities for quality education, China has implemented high-stakes examinations such as the National College Entrance Exams (gaokao). The intense competition for better educational prospects has compelled Chinese families to allocate a significant portion of their budgets to education in order to prepare their children for the fierce competition in the education market.

Our research has significant policy implications as it sheds light on the far-reaching consequences of exorbitant education expenses on society. These expenses not only lead to increased living costs but also contribute to declining fertility rates (Xu and Pak, 2021), potentially hampering China's future growth prospects (Li et al., 2012a). In terms of equity, our findings underscore the disproportionate burden faced by low-income households when it comes to education costs. This highlights the urgent need for a more affordable public education system that promotes equal opportunities for all children.

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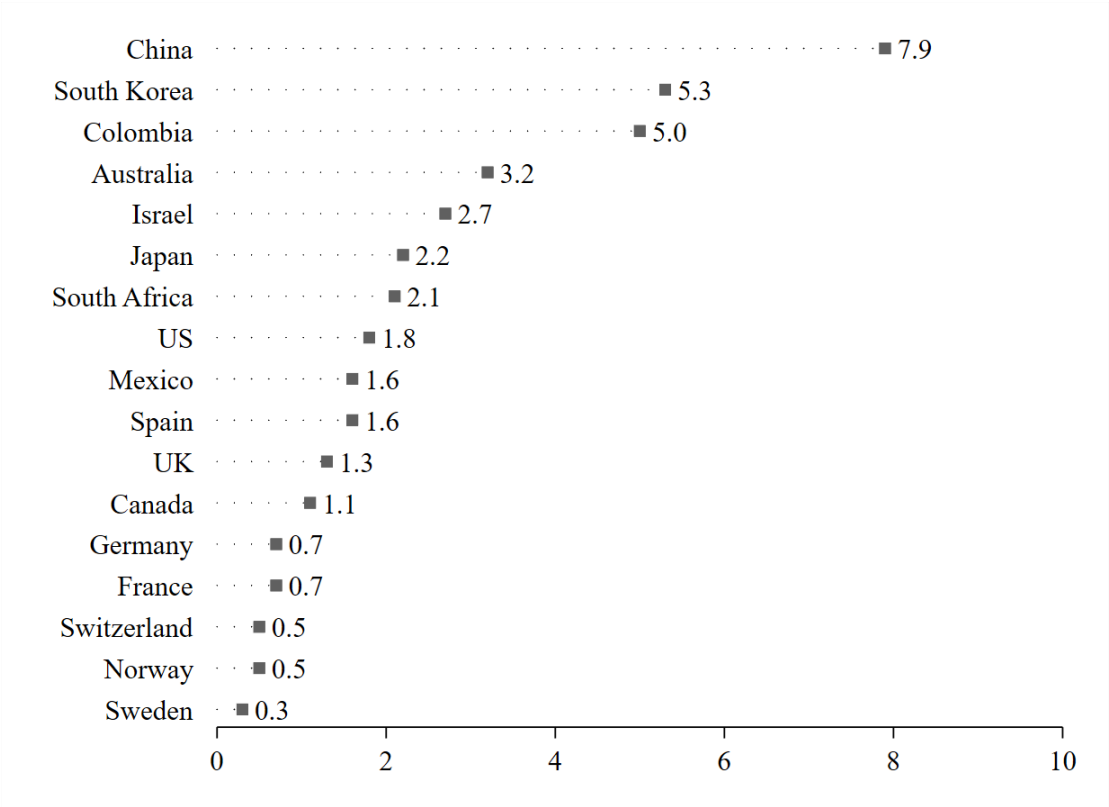
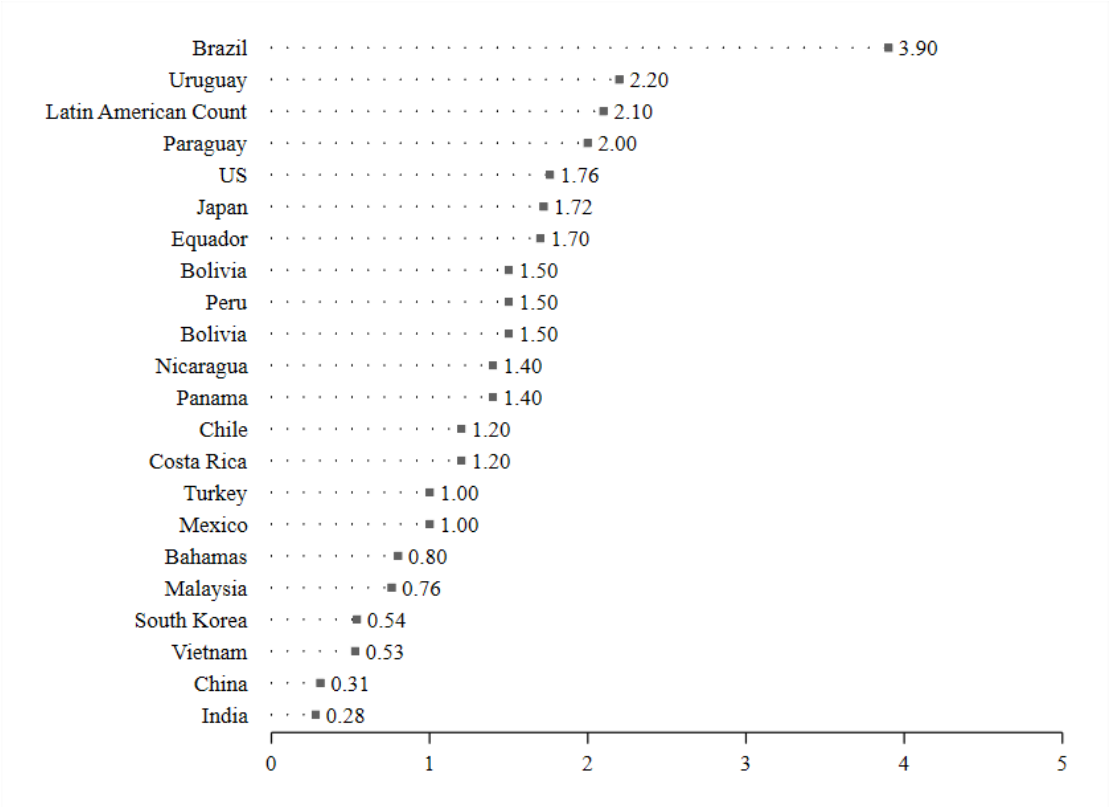
Figure 1: The percentage of household expenditure spent on education by country



Notes: The percentages shown in the graph represent the ratio of education expenditure to total household expenditure for all countries. The percentage for China is derived from a sample of households (N = 70,070) in five waves of the China Family Panel Studies (CFPS) conducted between 2010 and 2018, encompassing households with and without children. On the other hand, the percentages for other countries are obtained from Selvanathan et al. (2022), who calculated them based on data from the National Accounts of OECD Countries (OECD: Paris, various issues) as well as various government statistical department websites and publications specific to each country.

Figure 2: The income elasticity of education expenditure by country



Notes: The income elasticity of education expenditure gives the percentage change in education expenditure resulting from a one percent change in income. The figures for Latin America countries including Chile, Mexico, Peru, Bahamas, Equador, Bolivia, Nicaragua, Uruguay, Costa Rica, Panama, Paraguay, and Brazil are from Acerenza and Gandelman (2019). The US's figure is from Aguiar and Bils (2015). Japan's is from Hashimoto and Heath (1995). Nigeria's is from Jenkins et al. (2019). Sri Lanka's is from Jayasinghe et al. (2019). Turkey's is from Tansel and Bircan (2006). Malaysia's is from Kenayathulla (2013). South Korea's is from Kim and Lee (2010). Vietnam's is from Dang (2007). India's is from Tilak (2002). For countries other than China, Japan, India, and South Korea, the studies utilize household expenditure as a proxy for household income. Moreover, in the case of Turkey, Malaysia, Korea, and Vietnam, the studies employ expenditure on private tutoring as a proxy for education expenditure.

Table 1: Education expenditure per child and its components at different stages of education (CFPS 2010-2018)

	By schooling stage					Overall
	Preschool or primary school	Middle school	High school (academic/ technical)	Junior college	Regular college or above	
Value (RMB)						
In-school expenses	2,252	3,508	8,017	14,402	16,434	4,730
Extra-curricular tutoring	693	967	929	410	581	764
Other expenses	650	757	1,404	2,390	3,178	1,010
Total	3,594	5,233	10,350	17,203	20,192	6,504
% of total education expenditure						
In-school expenses	63%	67%	77%	84%	81%	73%
Extra-curricular tutoring	19%	18%	9%	2%	3%	12%
Other expenses	18%	14%	14%	14%	16%	16%
Total	100%	100%	100%	100%	100%	100%
Sample size	16,928	6,299	4,530	1,305	1,891	30,953

Notes: The statistics are derived from samples taken from five waves of CFPS (China Family Panel Studies) conducted in 2010, 2012, 2014, 2016, and 2018. The samples are limited to households consisting solely of children and their parents. Each household includes at least one child and at least one parent. For the purpose of this analysis, a child is defined as an individual aged 25 or younger who is currently attending school. All the results are computed at the individual child level.

Table 2: Summary statistics (CFPS 2010-2018)

Variable	Observations	Mean	SD	Min	Max
Family-level variables					
Education expenditure (RMB)	23,786	8,464	10,723	50	191,000
Parents' income (RMB)	23,786	49,587	59,680	200	944,667
Parents' average age	23,786	40	6	22	65
Single parent (= 1 if yes)	23,786	0.044	0.205	0	1
Number of children	23,786	1.30	0.56	1	6
One child (= 1 if yes)	23,786	0.738	0.440	0	1
Two children (= 1 if yes)	23,786	0.226	0.418	0	1
Three children or more (= 1 if yes)	23,786	0.037	0.188	0	1
Number of boys	23,786	0.68	0.58	0	5
Number of girls	23,786	0.63	0.63	0	5
Urban (= 1 if yes)	23,786	0.458	0.498	0	1
Child-level variables					
In preschool or primary school (= 1 if yes)	30,953	0.547	0.498	0	1
In middle school (= 1 if yes)	30,953	0.204	0.403	0	1
In high school (academic or technical, = 1 if yes)	30,953	0.146	0.353	0	1
In junior college (= 1 if yes)	30,953	0.042	0.201	0	1
In regular college or above (= 1 if yes)	30,953	0.061	0.240	0	1

Notes: The statistics presented in this table are based on samples obtained from five waves of CFPS (China Family Panel Studies) conducted in 2010, 2012, 2014, 2016, and 2018. The samples are limited to households consisting solely of children and their parents, as well as households that have at least one child and at least one parent. For the purposes of this analysis, a child is defined as an individual aged 25 or younger who is currently attending school.

Table 3: Parental income and education expenditure in China (CFPS 2010-2018)

	Observations	Education expenditure (1)	Parents' income (2)	Percentage (2) / (1)
		Mean (SD)	Mean (SD)	
Overall	23,786	8,464 (10,723)	49,587 (59,680)	17.1%
By number of children				
One child	17,549	7,857 (10,152)	51,657 (62,140)	15.2%
Two children	5,364	9,982 (11,626)	44,362 (52,835)	22.5%
Three children or more	873	11,346 (14,189)	40,094 (43,927)	28.3%
By region				
Rural	12,899	7,147 (9,046)	36,460 (41,948)	19.6%
Urban	10,887	10,025 (12,239)	65,141 (72,463)	15.4%
By quartile of parents' income				
First	5,947	4,919 (6,418)	8,666 (4,547)	56.8%
Second	5,964	7,456 (8,886)	25,100 (4,996)	29.7%
Third	5,941	8,952 (10,078)	46,603 (7,830)	19.2%
Fourth	5,934	12,542 (14,427)	118,197 (84,694)	10.6%

Notes: The statistics presented in this table are based on samples obtained from five waves of CFPS (China Family Panel Studies) conducted in 2010, 2012, 2014, 2016, and 2018. The samples are limited to households consisting solely of children and their parents, as well as households that have at least one child and at least one parent. For the purposes of this analysis, a child is defined as an individual aged 25 or younger who is currently attending school.

Table 4: Estimating the income elasticity of education expenditure (CFPS 2010-2018)

	Dependent variable: Log education expenditure					
	(1)	(2)	(3)	(4)	(5)	(6)
Log parental income	0.423***	0.365***	0.356***	0.356***	0.306***	0.313***
	(0.007)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)
Number of children			0.420***			
			(0.015)			
Number of boys				0.428***		
				(0.018)		
Number of girls				0.415***		
				(0.016)		
Number of children in						
Preschool or primary school					0.093***	0.121***
					(0.014)	(0.014)
Middle school					0.477***	0.456***
					(0.017)	(0.017)
High school (academic/technical)					1.187***	1.142***
					(0.018)	(0.019)
Junior college					1.644***	1.575***
					(0.028)	(0.029)
Regular college or above					1.772***	1.693***
					(0.023)	(0.025)
Parents' average age						0.011***
						(0.001)
Single parent						0.040
						(0.034)
Urban		0.148***	0.201***	0.201***	0.099***	0.096***
		(0.018)	(0.017)	(0.017)	(0.015)	(0.015)
Province FE	No	Yes	Yes	Yes	Yes	Yes
R-Squared	0.116	0.153	0.180	0.180	0.425	0.426
Observations	23,786	23,786	23,786	23,786	23,786	23,786

Notes: The regression results presented in this table are based on samples obtained from five waves of CFPS (China Family Panel Studies) conducted in 2010, 2012, 2014, 2016, and 2018. The samples are limited to households consisting solely of children and their parents, as well as households that have at least one child and at least one parent. For the purposes of this analysis, a child is defined as an individual aged 25 or younger who is currently attending school. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level. Robust standard errors are in parentheses.

Table 5: Estimating the income elasticity of education expenditure for subgroups (CFPS 2010-2018)

	Dependent variable: Log education expenditure					
	By region		By parents' income quartile			
	Rural	Urban	First	Second	Third	Fourth
	(1)	(2)	(3)	(4)	(5)	(6)
Log parental income	0.250***	0.370***	0.090***	0.458***	0.532***	0.482***
	(0.009)	(0.011)	(0.018)	(0.065)	(0.076)	(0.028)
Number of children in						
Preschool or primary school	0.083***	0.110***	0.116***	0.077***	0.108***	0.156***
	(0.017)	(0.022)	(0.027)	(0.025)	(0.027)	(0.028)
Middle school	0.598***	0.294***	0.652***	0.495***	0.492***	0.338***
	(0.021)	(0.026)	(0.035)	(0.031)	(0.031)	(0.034)
High school (academic/technical)	1.390***	0.935***	1.571***	1.289***	1.149***	0.878***
	(0.025)	(0.026)	(0.042)	(0.035)	(0.033)	(0.034)
Junior college	1.873***	1.412***	2.118***	1.770***	1.653***	1.258***
	(0.040)	(0.038)	(0.077)	(0.054)	(0.054)	(0.047)
Regular college or above	2.015***	1.526***	2.315***	2.014***	1.779***	1.362***
	(0.035)	(0.031)	(0.062)	(0.046)	(0.043)	(0.039)
Urban			0.037	-0.019	0.071***	0.244***
			(0.034)	(0.029)	(0.027)	(0.028)
Province FE	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.444	0.385	0.380	0.416	0.399	0.326
Observations	12,899	10,887	5,947	5,964	5,941	5,934

Notes: The regression results presented in this table are based on samples obtained from five waves of CFPS (China Family Panel Studies) conducted in 2010, 2012, 2014, 2016, and 2018. The samples are limited to households consisting solely of children and their parents, as well as households that have at least one child and at least one parent. For the purposes of this analysis, a child is defined as an individual aged 25 or younger who is currently attending school. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level. Robust standard errors are in parentheses.

Appendix Table A1: Household expenditure, income, savings, and liabilities (CFPS 2010-2018)

		By parents' income quartile			
	Overall	First	Second	Third	Fourth
Nuclear family					
Parental income	49,587	8,666	25,100	46,603	118,197
Household total expenditure	48,761	23,880	34,017	46,468	90,810
Education expenditure	8,464	4,919	7,456	8,952	12,542
Has deficits	50.2%	83.2%	55.1%	37.3%	25.3%
Entire household					
Household total income	67,384	26,225	39,571	61,051	142,927
Household total expenditure	64,458	37,025	45,595	60,119	115,253
Total deposit	35,148	10,434	15,573	29,218	85,528
Has outstanding loans	26.9%	34.4%	28.4%	23.2%	21.3%
Observations	23,786	5,947	5,964	5,941	5,934

Notes: The statistics presented in this table are based on samples obtained from five waves of CFPS (China Family Panel Studies) conducted in 2010, 2012, 2014, 2016, and 2018. A nuclear family consists solely of children and their parents. For the purposes of this analysis, a child is defined as an individual aged 25 or younger who is currently attending school. The entire household refers to the household in which the small family resides, consisting of individuals who are economically interrelated and may consist of multiple small families. All forms of expenditure, except for education expenditure, are assumed to be equally allocated to each individual within the household. All forms of income, excluding earnings from salaried jobs, pensions, and scholarships, are equally divided among individuals who are 16 years old or older and not currently attending school. Deficit indicates that household total expenditure exceeds household total income.

Appendix Table A2: Percentage of Children Enrolled in School by Age Group (CFPS 2010-2018)

	Percentage
Age groups	
6-10	97%
11-15	97%
16-20	66%
21-25	20%
Overall	73%

Notes: The statistics presented in this table are based on samples obtained from five waves of CFPS (China Family Panel Studies) conducted in 2010, 2012, 2014, 2016, and 2018. The sample consists of 42,624 children, of which 30,953 are currently attending school.

Appendix Table A3: Estimating the income elasticity of education expenditure for households with only children in the compulsory schooling stage (grades 1-9) (CFPS 2010-2018)

	Dependent variable: Log education expenditure			
	(1)	(2)	(3)	(4)
Log parental income	0.403***	0.369***	0.329***	0.322***
	(0.009)	(0.010)	(0.010)	(0.009)
Number of children in				
Primary school				0.227***
				(0.020)
Middle school				0.740***
				(0.023)
Urban		0.268***	0.138***	0.173***
		(0.021)	(0.021)	(0.021)
Province FE	No	No	Yes	Yes
R-Squared	0.126	0.136	0.197	0.257
Observations	13,678	13,678	13,678	13,678

Notes: The regression results presented in this table are based on samples obtained from five waves of CFPS (China Family Panel Studies) conducted in 2010, 2012, 2014, 2016, and 2018. The samples are limited to households consisting solely of children and their parents, as well as households that have at least one child and at least one parent. For the purposes of this analysis, a child is defined as an individual aged 25 or younger who is currently attending school. *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level. Robust standard errors are in parentheses.