Private Tutoring Regulation and Household Education Investment in China*

Marty Haoyuan Chen† University of Maryland
Le Kang‡ Nanjing University
Wei Lu§ Hangzhou Normal University
Yi Wei¶ Peking University
Jingyi Xing|| University of Maryland

Feburary 2026

Abstract

This paper studies how households with school age children respond to China's nationwide ban on private academic tutoring for students in compulsory education. Using a nationally representative household panel on education expenditures from 2017 to 2023, we show that the ban led to a modest decline in participation in and spending on private commercial tutoring, with an accompanying large increase in out-of-pocket parental spending on in-school education services. As a result, the share of household consumption on education rose, indicating reallocation across educational inputs rather than a reduction in total education investment. The behavioral responses vary across household types. Private academic tutoring spending decreased among households below the top income quartile but increased substantially among high-income households. Correspondingly, point estimates suggest that students from high-income households were more likely to rank at the top of their classes after the policy. We also find that the decline in private tutoring spending was driven entirely by urban households, whose baseline tutoring expenditures were much higher than those of rural households. Meanwhile, increases in out-of-pocket in-school education spending were similar across income groups and between urban and rural households. Overall, our findings highlight substitution toward alternative forms of academic support under the ban and the heterogeneous impacts of the policy.

JEL Codes: I28, I24, K23, D10
Keywords: Government Bans, Private Tutoring, Household Spending and Investment, Education Policy, Double Reduction Policy

*This paper was previously circulated as "Government Bans, Household Spending, and Academic Performance: Evidence from Private Tutoring in China". We would like to thank Melissa Kearney, Andrew Sweeting, Ginger Zhe Jin, Chenyu Yang, Nolan Pope, Shang-Jin Wei, Nancy Qian, Hanming Fang, and seminar and conference participants at the University of Maryland, Nanjing University, NBER Chinese Economy Working Group Meeting, DC IO Day, the 9th CCER Summer Institute, the 9th Forum for Chinese Labor Economists for helpful comments and discussions. We are very grateful to Zibin Huang for sharing the Census population data which helped to conduct useful robustness checks. All errors are our own. The authors declare that they have no relevant or material financial interests that relate to the research described in this paper.

†Department of Economics, University of Maryland (hchen915@umd.edu).
‡School of Education, Nanjing University (lekang@nju.edu.cn).
§School of Education, Hangzhou Normal University (wlu@hznu.edu.cn).
¶China Institute for Educational Finance Research, Peking University (weiyipku@pku.edu.cn).
|| Department of Economics, University of Maryland (jiyxing@umd.edu).

1 Introduction

Private coaching and tutoring services have expanded rapidly in many countries as competition for school admissions has intensified and public schooling has struggled to fully meet rising demand for academic instruction (Dawson, 2010). At the same time, growing concern has emerged over excessive parental investment in private education. Such investment can increase financial and academic pressure on families and students (Mori and Baker, 2010) and generate negative externalities for society, including declines in fertility (Kim, Tertilt and Yum, 2024). In response, education authorities in several countries have introduced regulations aimed at curbing the expansion of the private tutoring sector.

A growing literature examines the consequences of private tutoring regulation, documenting effects on student mental health, online education expenditures, labor market outcomes, and fertility intentions (Meng et al., 2025; Zhao, Shi and Wang, 2024; Liu, Wang and Chen, 2022; Huang et al., 2025). However, due largely to data limitations, much less is known about how households adjust their education spending portfolios in response to such regulations. In particular, it remains unclear whether policies that restrict private tutoring reduce overall household investment in education or instead induce substitution toward alternative forms of academic support.

This paper addresses this gap and is the first to use nationally representative survey data to study the effects of a large scale government intervention in the private tutoring sector in China. In 2021, China implemented a nationwide ban on private academic tutoring for students in compulsory education (i.e. primary and middle school). The policy restricted new entry into the private tutoring market and prohibited existing providers from offering for-profit academic tutoring services to compulsory education students. The stated objectives of the regulation were to alleviate students' academic pressure and to reduce household spending on private academic education.

In this paper, we examine how households with school age children responded to this policy. We focus on changes in private tutoring participation and spending, out-of-pocket spending on in-school education services, and total household education expenditures. We further investigate whether the effects of the policy differ across household types, including by income, urban and rural residence, and parental education. By documenting both substitution patterns across educational inputs and heterogeneity in household responses, this paper provides new evidence on the economic mechanisms through which private tutoring regulations affect families and students.

We employ a difference-in-differences design to estimate the effects of the regulation. Because the policy explicitly targeted private academic tutoring for students in compulsory education, we use students enrolled in high school as a comparison group and examine differential changes in outcomes between these two groups before and after the policy. This approach allows us to net out common shocks affecting all households over time, including those associated with the COVID pandemic. We further demonstrate the robustness of our findings by estimating our main specifications after matching treatment and control households using Coarsened Exact Matching (CEM), which improves balance across a rich set of observable student and household characteristics.

Our primary data source is the China Institute for Educational Finance Research – Household

Survey (CIEFR-HS), a nationally representative panel survey that provides detailed information on education related activities and expenditures in China. The survey contains comprehensive measures of household spending across both in-school and out-of-school educational inputs, including private academic and non-academic tutoring, as well as parent reported measures of student academic performance. In addition, the dataset includes rich demographic and socioeconomic characteristics at both the student and household levels. The data span the period from 2017 to 2023, allowing us to track changes in household education spending and outcomes before and after the implementation of the private tutoring ban and to examine substitution patterns across different forms of tutoring and educational support.

Our main results show that the private tutoring ban primarily reshaped how households allocate education spending rather than reducing overall investment. In simple pre-post comparisons among students in compulsory education, we observe sizable declines in participation in and spending on private academic tutoring following the policy. However, when we compare these changes to those experienced by high school students using a difference-in-differences design, the estimated reductions in private academic tutoring spending are considerably smaller in magnitude and generally not statistically significant. This contrast suggests that part of the pre-post decline might reflect common shocks affecting all households, most notably the COVID pandemic, rather than the causal effect of the policy alone.

In contrast, both the pre-post and difference-in-differences analyses consistently show a large increase in out-of-pocket spending on in-school education services among students in compulsory education. This increase is evident in both levels and as a share of household consumption, and is substantially larger than the estimated decline in private tutoring expenditures. As a result, total education spending for compulsory education students increased relative to high school students, indicating substitution from private tutoring toward in school educational inputs rather than a contraction in education investment.

We find substantial heterogeneity in household responses. Households in the lower and middle segments of the income distribution reduced private academic tutoring expenditures following the policy, whereas high-income households increased their spending on private academic tutoring. The private tutoring ban led to increases in participation in and spending on 1-on-1 private academic tutoring, and this is almost entirely driven by households in the top quartile of the income distribution. Consistent with these spending patterns, point estimates suggest that students from high-income households were more likely to rank at the top of their classes after the policy. Moreover, reductions in private tutoring participation, time, and expenditures were concentrated among urban households, which had substantially higher baseline tutoring spending and likely faced more stringent enforcement of the regulation than rural households. In addition, students with college-educated mothers exhibited lower education spending following the ban, consistent with substitution toward home based academic support among more educated parents.

Finally, we conduct a series of robustness checks to validate our findings. Our results are robust to matching treatment and control households using CEM, to alternative identification

strategies exploiting cross-city variation in pre-policy tutoring penetration, and to excluding survey waves potentially affected by pandemic related sampling disruptions. Taken together, these findings highlight the reallocation of education investments induced by the private tutoring ban and reveal substantial heterogeneity in its effects across households.

Related Literature. Our paper contributes to multiple bodies of literature. First, our paper contributes to the recent literature specifically looking at private tutoring regulation in China. Researchers have studied the impacts of private tutoring regulation on students' mental health, online expenditures, employment, and fertility intention and they found that the *Double Reduction Policy* is associated with lower student anxiety, changes in learning material purchases, fewer job postings by tutoring firms, and higher fertility intentions (Zhao, Shi and Wang, 2024; Liu, Wang and Chen, 2022; Huang et al., 2025; Meng et al., 2025).

Within this literature, our paper is most closely related to Liu et al. (2025), who examine the effects of China's private tutoring ban and document increases in private tutoring enrollment and household tutoring expenditures. Our study differs from theirs along several important dimensions. First, Liu et al. (2025) rely on an online survey conducted in 2023, which provides a cross sectional post policy observation and may be subject to selection concerns associated with online survey participation. In contrast, we use a nationally representative household panel survey collected by the China Institute of Educational Finance Research. This allows us to examine household changes in education expenditures before and after the policy and substantially reduces concerns about sample selection. Second, Liu et al. (2025) proxy for policy exposure using variation in the frequency of relevant keywords in local government documents and online news articles. Our empirical strategy exploits the fact that the policy explicitly targeted students in compulsory education, with high school students serving as a natural comparison group. We further enhance comparability by matching compulsory education and high school students on a rich set of household and student characteristics. Together, these differences allow us to offer a more precise assessment of how households adjust education spending in response to the private tutoring ban.

Our study also contributes to the economic literature on educational investment, externalities, and parental decision making. Classic work by Akerlof (1976) highlights that individuals may overinvest in education when private returns exceed social returns, giving rise to inefficiently high levels of investment. In the context of education, Ramey and Ramey (2010) argue that scarcity in college admissions generates competitive externalities, whereby families engage in costly educational investments to improve relative rankings rather than absolute skill accumulation. Such dynamics imply that decentralized educational investment decisions may lead to socially excessive effort and spending, motivating policy intervention. Recent work has examined the potential role of public policy in correcting these externalities. Kim, Tertilt and Yum (2024) develop a quantitative model of private education investment and show that government interventions such as education investment taxes or pro natal transfers can reduce excessive private spending and mitigate the associated externalities. Our paper complements this line of research by providing direct

empirical evidence on how households adjust education spending in response to a large scale regulatory intervention that restricts private education markets.[1]

More broadly, our analysis relates to the literature on parental investment in children. Guryan, Hurst and Kearney (2008) document large socioeconomic gradients in parental time investments, with higher educated parents devoting substantially more time to educational child care activities such as teaching and homework assistance. Subsequent work has emphasized that parents adjust both time and monetary inputs in response to institutional constraints and policy changes. Our findings that households substitute from private tutoring toward in-school education services and potentially toward home based tutoring among more educated parents are consistent with this framework and highlight the importance of considering multiple margins of parental investment.

Finally, our paper relates to a broad literature examining the empirical effects of government bans and prohibitions. A number of studies in this literature use detailed survey or administrative data to evaluate how bans affect individual behavior and market outcomes (Adda, Berlinski and Machin, 2012; Carpenter and Nguyen, 2021; Bhutta, Goldin and Homonoff, 2016; Friedberg, Hynes and Pattison, 2021). A central insight from this work is that bans often generate substitution and complementarity across related goods or activities, which can substantially shape their overall effects (Conlin, Dickert-Conlin and Pepper, 2005; Adda, Berlinski and Machin, 2012; Carpenter and Nguyen, 2021; Gao and Petrova, 2022; Bhutta, Goldin and Homonoff, 2016). Recent studies further emphasize that the effectiveness of prohibition policies depends critically on policy design and targeting. For example, Balia, Brau and Nieddu (2023) show that bans can be effective when they are narrowly targeted toward populations exposed to high risk environments. Relatedly, Friedberg, Hynes and Pattison (2021) highlight the importance of heterogeneous responses across demographic and socioeconomic groups. Our paper contributes to this literature by showing that China's private tutoring ban induced substantial substitution across educational inputs and generated heterogeneity across households, underscoring the importance of accounting for both behavioral adjustment and distributional effects when evaluating prohibition based policies.

The remainder of the paper is organized as follows. In Section 2, we discuss the institutional background and enforcement of the private tutoring ban. Section 3 describes our data source and empirical strategy. Section 4 presents our main results on household private tutoring participation and education expenditures. Section 5 discusses the heterogeneous effects of the policy. Section 6 conducts several robustness checks. Section 7 concludes the paper.

[1]Outside the education sector, there is a growing body of research on externalities and related policy interventions. In environmental economics, a large body of work evaluates regulatory instruments designed to address pollution externalities, including quantity regulations, standards, and corrective taxes (Buchanan and Tullock, 1975; Montgomery, 1972; Ellerman and Montero, 1998; Carlson et al., 2000; Fowlie, Holland and Mansur, 2012; Hahn and Stavins, 2011; Deschênes, Greenstone and Shapiro, 2017; Schmalensee and Stavins, 2019). These studies emphasize that policy design shapes both behavioral responses and substitution across inputs.

2 Institutional Background

2.1 Private Tutoring Regulations

Over the past several decades, households have markedly increased their investments in children's education, alongside a substantial rise in students' academic pressure. Since the mid-1990s, parental time devoted to childcare has grown dramatically, with particularly large increases among college-educated parents (Guryan, Hurst and Kearney, 2008; Ramey and Ramey, 2010). A leading explanation for this trend is intensifying competition for college admissions. Parents increasingly engage in relative educational investments aimed at improving their children's rankings and differentiation in examinations and admissions processes, a phenomenon described as the "rug rat race" (Ramey and Ramey, 2010). This competitive dynamic is especially pronounced in East Asian countries such as South Korea and China, where access to higher education is largely determined by high-stakes, centralized entrance examinations. At the same time, heightened competition in education entails significant costs: it can adversely affect students' physical and mental health (Fan, Zhang and Li, 2025; Noh et al., 2020) and generate broader societal consequences, including reductions in fertility (Kim, Tertilt and Yum, 2024).

In response to rising academic pressure on students and growing financial burdens on families, several East Asian countries have implemented education policies aimed at alleviating these concerns. Japan, for example, introduced major reforms in the 1970s under the framework of Yutori education, which reduced instructional hours and trimmed curricular content in the formal school system.[2] However, the lack of regulatory oversight of the private tutoring sector undermined the intended effects of the reform. As formal schooling became less rigorous, demand for educational services outside the school system increased sharply, effectively reallocating academic pressure rather than reducing it (Entrich, 2017).

By contrast, South Korea has pursued a more direct strategy to regulate private tutoring since the 1980s. In 1980, the government imposed a comprehensive ban on private tutoring. This policy, however, generated substantial unintended consequences. Concerned parents increasingly relied on underground markets, which drove tutoring prices upward (Dawson, 2010). After a constitutional court ruling, the ban was lifted in 2000. The government subsequently shifted its focus toward improving the quality of public education as a substitute for private tutoring, but this strategy did not succeed in reducing demand. Between 2006 and 2009, an additional policy restricted all private tutoring activities after 10 p.m. Empirical evidence indicates that this regulation did not lower overall participation or total expenditures. Instead, it induced a shift toward more costly one on one or small group tutoring arrangements (Choi and Cho, 2016; Lee, Lee and Jang, 2010).

Reducing students' academic burden has been a central objective of education policy in China since the 1950s. In the early decades from 1950 to 1970, reforms primarily emphasized physical health and overall well being. By the 1980s, concerns about exam oriented education became

[2] See https://en.wikipedia.org/wiki/Yutori_education.

increasingly salient, and the pursuit of high admission rates began to dominate educational priorities. During the nineteen nineties and the early two thousands, policy attention shifted toward promoting a more holistic liberal arts education. Reforms in this period focused on the formal school system and included limits on homework time, the removal of nonessential examinations, reductions in competition based evaluations, and revisions to curricula and instructional materials. However, these school centered reforms coincided with the rapid expansion of the private tutoring industry, particularly in areas related to standardized testing and school admissions. As a consequence, policy attention gradually extended beyond the formal school system. Over the past decade, Chinese education authorities have increasingly emphasized regulation of the private tutoring sector, reflecting a broader effort to reduce educational pressure and to curb the commercialization of academic achievement outside formal schooling.

In 2013, China's Ministry of Education implemented a reform aimed at alleviating student stress by lowering the difficulty level of in-school instructional materials. However, because high-stakes admission examinations remained largely unchanged, this policy created a widening mismatch between classroom content and exam expectations. As a result, parents increasingly turned to private tutoring services to supplement their children's preparation, fueling further growth in the shadow education sector and ultimately undermining the policy's intended effect.

In response to the persistent academic pressure and escalating private education expenditures, the State Council introduced the *Double Reduction Policy* in July 2021, marking a significant regulatory shift. The policy imposed a comprehensive ban on for-profit academic tutoring in core school subjects for students in compulsory education. It prohibited the establishment of new tutoring businesses and required existing providers, regardless of class size or organizational structure, to cease operations or convert to non-profit status. In effect, it became illegal to offer paid instruction in core academic subjects outside the formal school system. Enforcement was delegated to local authorities, with penalties imposed on violators primarily through a centralized government reporting and monitoring system.[3] The policy's stated objectives were twofold: to reduce the academic burden on students and to limit household expenditures on private tutoring.[4] It represents one of the most aggressive attempts by a national government to regulate the private tutoring industry and to reshape the broader education ecosystem. Importantly, the policy was introduced without little prior signaling and came as a complete surprise to the public. One immediate consequence was a sharp decline in the stock prices of Chinese education companies following the announcement of the *Double Reduction Policy*.[5]

Although the regulation did not explicitly differentiate enforcement intensity across tutoring formats, some types of private tutoring were likely more affected than others. One-on-one tutoring sessions, for example, may have been less susceptible to detection and intervention due to their lower visibility and smaller participant base. In contrast, large-group classes and firm-organized sessions faced greater scrutiny, given their scale and higher likelihood of being reported. Institu-

[3] See Section 2.3 for details on enforcement mechanisms.

[4] See https://en.wikipedia.org/wiki/Double_Reduction_Policy.

[5] See, for example, https://www.nytimes.com/2021/07/26/business/china-private-education.html.

tional providers, in particular, were more exposed to regulatory oversight and thus faced a higher probability of penalties compared to individual tutors operating informally.

This paper studies how households with children respond to the *Double Reduction Policy*. Notably, because China's compulsory education system covers grades 1 through 9, the regulatory restrictions, such as the entry ban and non-profit requirement, did not apply to tutoring services aimed at high school students.[6] We leverage this institutional distinction to estimate the effects of the policy, comparing outcomes across directly affected and unaffected segments of the tutoring market.

2.2 In-School Education Services

In China, some schools offer in-school academic tutoring outside regular class hours. These sessions are typically held five days a week for two hours per day. They are most often structured as supervised independent reading led by school teachers. In some cases, they also involve group-based homework assistance. Although participation is not mandatory, student attendance rates are high: recent estimates suggest that approximately 84 percent of students participate in these sessions after the *Double Reduction Policy* (Gong and Gao, 2023).

About one-third of schools offer in-school tutoring free of charge, while the remaining two-thirds charge a nominal fee. The average out-of-pocket cost is approximately 392 RMB ($\approx$ 54 USD) per semester and 2 RMB ($\approx$ 0.3 USD) per hour, substantially lower than the cost of private tutoring (Gong and Gao, 2023).[7] In contrast, our data indicate that private academic tutoring costs an average of 61 RMB ($\approx$ 8 USD) per hour. As the supply of private tutoring has contracted following the 2021 regulatory reforms, many schools have expanded their after-school academic offerings to meet the residual demand.

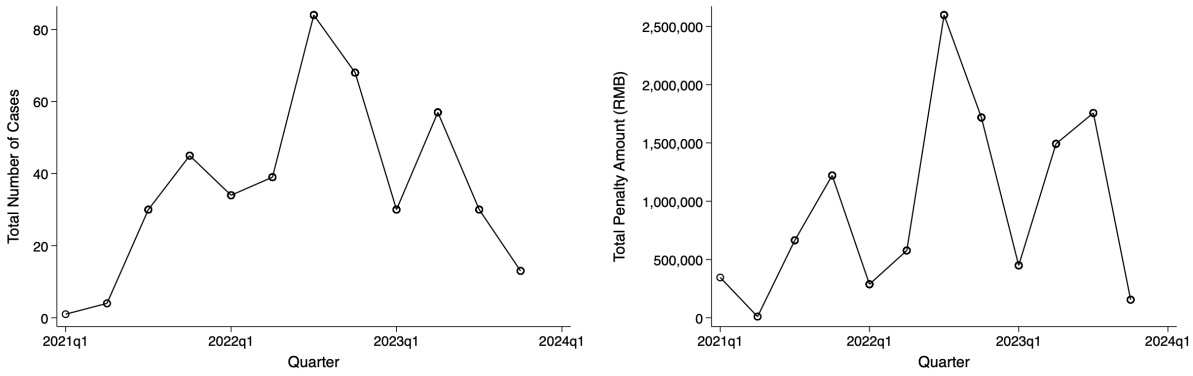
In-school tutoring provides a substantially more affordable, though typically lower quality alternative to private tutoring. Importantly, in-school academic tutoring is not subject to the regulatory restrictions imposed by the *Double Reduction Policy*.

2.3 Enforcement of Private Tutoring Bans in China

> *"Anyone who, in violation of national regulations, establishes a private school (including other private educational institutions) without authorization shall be ordered to cease operations and refund collected fees by the local education administrative department or the human resources and social security administrative department of the county-level or higher local people's government, in coordination with relevant departments such as public security, civil affairs, or market regulation. In addition, the organizer shall be fined not less than one time and not more than five times the amount of the illegal gains."*

[6] See https://en.wikipedia.org/wiki/Compulsory_education_in_China.

[7] Based on Gong and Gao (2023), the average fee for one semester of in-school tutoring is 392 RMB ($\approx$ 54 USD). A semester typically spans 19 weeks, or roughly 190 hours, yielding a cost per hour of about 2.06 RMB ($\approx$ 0.3 USD).



(a) Total Number of Cases

(b) Total Amount of Penalty

Figure 1: Penalty Records on Illegal Private Tutoring Activities in Zhejiang Province

— *Articles 64 & 65, Law of the PRC on the Promotion of Private Education.*[8]

The regulation specifies that organizers of illegal private tutoring activities are subject to financial penalties. In this subsection, we document the enforcement of the private tutoring ban using evidence on administrative penalties and the resulting contraction in tutoring supply.

We construct a dataset from publicly available administrative records in Zhejiang Province that covers all reported cases of illegal tutoring between two thousand twenty one and two thousand twenty three.[9] Each record reports the date and location of the violation, a description of the offense, the monetary penalty, and the penalized entity. Appendix A1 provides examples of these records. The data show that penalties depend primarily on illicit revenue and prior violations. Organizers are typically required to refund illegally collected fees and pay an equal amount as a fine, implying larger penalties for higher revenue classes. Repeat offenders face escalating fines that reflect cumulative enforcement.

Figure 1 displays the number of enforcement cases and total penalties by quarter from 2021 to 2023. Both measures rise sharply in the third quarter of 2021 following the implementation of the *Double Reduction Policy* and more than double over the subsequent year. Enforcement peaks in the summer of 2022 and declines in 2023, consistent with widespread exit from the tutoring market. Over the sample period, authorities in Zhejiang issued 435 enforcement actions with total penalties of 11,274,086 RMB ($\approx$ 1,573,440 USD). Of these cases, 63 percent involved institution-based tutoring providers, while the remaining 37 percent targeted individual tutors. Although both groups were penalized, institutions likely faced greater regulatory scrutiny.

[8] The above paragraph is google translated to English.

[9] Zhejiang is one of the most populous and economically developed provinces in China, with a population exceeding 64 million in 2021.

In Figure 2, we present the number of private academic tutoring facilities at each Chinese province (or municipality) in 2019 and 2023. In May 2019, there were 188,980 private academic tutoring institutions in the country. By June 2023, only 23,621 of these institutions remained in operation, indicating an 87.5 percent decrease compared to the pre-policy level.[10] The sharp decline in private tutoring supply indicates a massive shutdown of private tutoring facilities following the regulation.

Both the administrative penalty records and the change in private tutoring supply suggest strong regulatory enforcement of the private tutoring ban, which is directly linked to household responses in private tutoring spending. In the next section, we describe the data sources and the econometric framework used to examine how households responded to this policy.

3 Data Sources and Empirical Strategy

3.1 China Institute of Educational Finance Research — Household Survey

A central challenge for empirical research on private tutoring regulations is the lack of comprehensive, detailed data on individual education expenditures. Due to the legal penalties associated with private tutoring, price and sales information from the supply side is largely unavailable. Tutoring services vary widely in terms of pricing, class size, and organizational structure, and there is substantial heterogeneity in household preferences and constraints across China. As a result, most existing empirical studies rely on third-party data sources that are often limited in scope or granularity. One main contribution of this paper is the introduction of a novel dataset: a national panel survey on household investments in both public and private education.

We design and implement a nationally representative household survey panel on education expenditures: the China Institute of Educational Finance Research – Household Survey (CIEFR-HS). The survey has been conducted biennially since 2017 and covers thousands of households with students in all grades across 29 provinces in China.[11] CIEFR-HS is the first national survey in China that provides detailed household-level data on educational expenditures, particularly those related to private tutoring. It is one of the chapters under the China Household Finance Survey (CHFS), whose main purposes are to collect comprehensive micro-level data on Chinese households and to understand their financial behaviors and demographic patterns. Since the dataset covers both the pre- and post-policy periods, it is particularly well suited for our analysis of the private tutoring ban's impacts on household education expenditures.

The dataset includes rich information on household spending on both private tutoring and out-of-pocket in-school activities. For private tutoring, we observe not only total expenditures and participation but also disaggregated details on the tutoring type (e.g., academic versus non-

[10] Section 3.2 describes the dataset that we use to create Figure 2.

[11] Due to the COVID-19 pandemic, the third wave of the survey was conducted in two parts: the first in 2021, prior to the implementation of the *Double Reduction Policy*, and the second in 2022, after the policy took effect. In Section 6, we show that our main conclusions hold after excluding the data from 2021 and 2022.

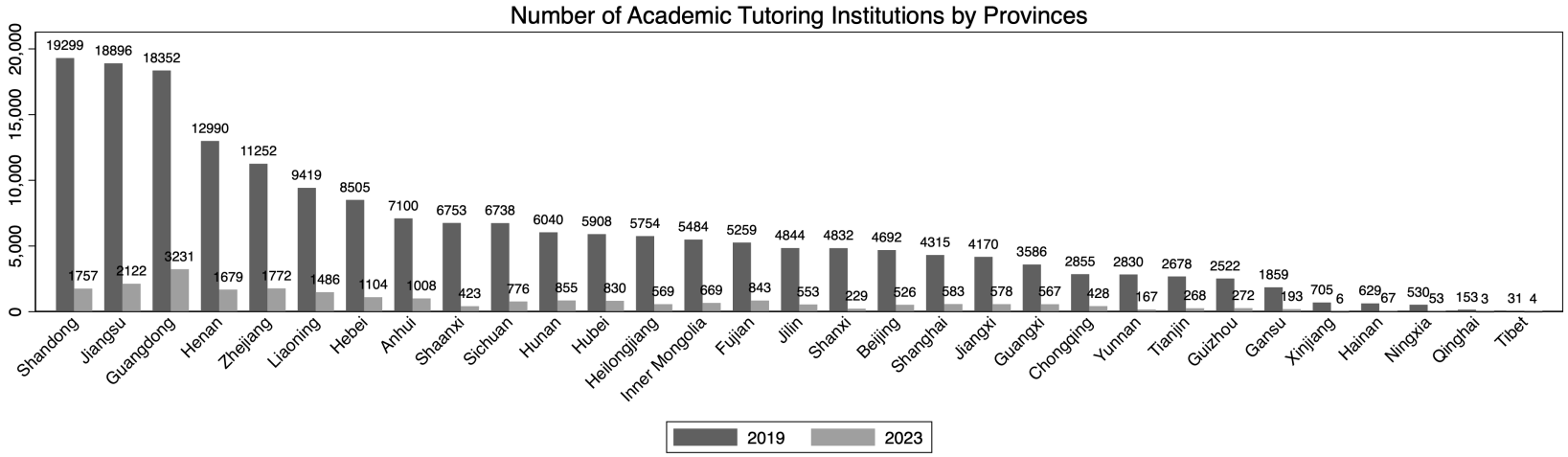


Figure 2: Number of Private Academic Tutoring Institutions by Provinces in 2019 and 2023

academic), class size (e.g., 1-on-1 versus group tutoring), and hours spent. In addition, we observe comprehensive demographic and socioeconomic characteristics at the student and household levels, including student age and gender, only-child status, parental education, rural/urban residence, household income, public school attendance, and school quality.

Student academic performance is reported by parents on a five-point scale, ranging from 1 to 5, corresponding to "top of the class", "above average", "average", "below average", and "others", respectively. In China, students in grades 1 through 12 have at least one parent-teacher meeting per semester, and parental attendance is expected. These meetings serve as a primary channel through which parents receive detailed information about their child's academic performance, including subject-specific and overall rankings. As a result, parents are generally well informed about their children's relative standing in school. One potential concern is that parent-reported academic performance may not constitute a fully objective measure. However, this will not impose serious threats on our empirical framework and identification as long as the policy did not introduce a differential change in the measurement errors (i.e., parent's definition on these rankings did not change abruptly before and after the policy) between the treated and control samples.

Our analysis sample consists of nationally representative households with children in grades 1 through 12 across 29 Chinese provinces, spanning the period from 2017 to 2023. During the first survey wave in 2017, some parents misinterpreted the expenditure categories and mistakenly reported total education spending, including both in-school and out-of-school components, under the in-school category. Given this misinterpretation, we exclude out-of-pocket in-school education spending data from 2017. In subsequent survey waves, we revised the survey questions and instructions to ensure parents correctly understood the definitions of each category. We applied the same approach to ensure accurate reporting of academic tutoring hours.

Additionally, we argue that parents truthfully report their educational expenditures in the survey for the following reasons. First, while the CIEFR-HS focuses specifically on household educational expenditures, the CHFS – the broader survey in which the CIEFR-HS is embedded – covers a wide range of household spending categories (e.g., real estate investments, automobile purchases, and financial investments). Therefore, systematic misreporting of education spending is unlikely. Second, the legal penalties associated with the private tutoring ban are imposed on providers rather than parents, so there is no direct incentive for households to conceal their tutoring participation or spending information. Finally, although the survey collects detailed household and individual characteristics, it is conducted anonymously and contains no personally identifiable information. The respondents are asked to describe the nature of tutoring services (e.g., subject, class size, and organizer), but they do not disclose the identity of the tutors. These design features minimize the risk that parents would misreport tutoring participation or expenditures under the private tutoring regulation.

3.2 Data on Private Tutoring Supply

To complement our main CIEFR-HS data, we construct additional datasets on private tutoring supply by web scraping data from review and navigation platforms. Specifically, we web-scraped data from Dianping (the Chinese version of Yelp) and Gaode Maps. This dataset contains the names and locations of all nationwide tutoring facilities in 2019 (i.e., two years before the policy's implementation), and an indicator for whether each facility remained open in 2023 (i.e., two years after the policy's implementation).

Before the private tutoring ban was implemented, the "Tutoring and Educational Training" section of Dianping aggregated information on tutoring facilities across all cities in China, including facility names, specific addresses, customer reviews, and category classifications (such as academic tutoring for school advancement, music or art training, vocational training, etc.). In May 2019, we collected information on approximately 188,980 academic tutoring facilities from Dianping. These institutions were distributed across 31 provinces (including municipalities), 324 prefecture-level cities, and 2,246 districts and counties nationwide. Subsequently, after the policy was carried out, likely due to regulatory restrictions, Dianping shut down its "Tutoring and Educational Training" section and users could no longer find any search results within this section.

To understand the changes in the tutoring sector after the private tutoring ban, we further utilize data from Gaode Maps. Based on the geographic information of academic tutoring institutions we collected on Dianping, we identify the retention of each tutoring facility in June 2023 using the Point of Interest service (also known as POI Search) provided by Gaode Maps Open Platform. The POI service is a type of Web API that allows users to search for location information using text-based keywords, which can include structured addresses. By passing the addresses collected from Dianping as search keywords into the POI Search API, we obtain the corresponding business names associated with those addresses. Then, if the business name returned by Gaode Maps for a given address matches the business name collected from Dianping, we consider the facility to have remained in operation; otherwise, we treat it as being shut down.[12]

In our dataset, we observe that the number of private academic tutoring facilities dropped from 188,980 in 2019 to 23,621 in 2023, representing an 87.5% decline. This is consistent with the number disclosed by the government.[13] We use this dataset to present the change in private tutoring supply after the policy in Figure 2. We also use it to examine the policy's heterogeneous effects across areas with different levels of pre-policy private tutoring penetration in Section 6.

[12] Minor differences in business names are treated as the same business. That said, this approach may introduce some measurement error. For example, some facilities may have relocated and continued operating at a new address; some may still be at the original address but have changed to a more discreet name; and some newly opened institutions may not be captured by our dataset.

[13] According to China's Ministry of Education, the number of private academic tutoring institutions was reduced by 87.1 to 95.6 percent following the *Double Reduction Policy*. See https://news.youth.cn/gn/202209/t20220909_13988908.htm.

3.3 Descriptive Evidence

Table 1 reports the summary statistics for the analysis sample, which includes 43,415 students in grades 1 through 12 from 2017 to 2023. Demographic characteristics are broadly similar between households with children in compulsory education (i.e., primary and middle school) and those with children in high school. The one exception (besides age) is the only child status. Students in compulsory education in our sample are much less likely to be the only child in their families. This is not a result of the tutoring ban, but is due to the termination of China's *One Child Policy* in 2015 and the fact these students and their parents are much younger than high school students and their parents. Across years, we observe an increase in the proportion of mothers with education levels above high school following the implementation of the *Double Reduction Policy* in 2021. This pattern likely reflects the entry of more recent child cohorts in the later survey waves, combined with the rapid expansion of college enrollment in China during the early 2000s. We also observe an increase in the share of rural households during this period. In this paper, we control for these demographic variables in all our regressions, and we further adopt Coarsened Exact Matching (CEM) as a robustness check in Section 6.

All expenditures are denominated in Chinese RMB and deflated to real 2016 values. Education spending is defined as the sum of private tutoring spending and out-of-pocket in-school education spending. Private tutoring consists of private academic tutoring, private non-academic tutoring, and online education spending. Academic private tutoring refers to instruction in core school subjects such as Math and English, while non-academic tutoring includes extracurricular activities such as Music and Sports. Out-of-pocket in-school education spending primarily involves tuition and costs associated with after-school tutoring or homework assistance. Given that approximately 90 percent of students in our sample attend public schools, where tuition fees are relatively stable over time, most of the observed variation in out-of-pocket in-school education spending reflects changes in after-school tutoring expenses rather than tuition costs.

Before the private tutoring ban, roughly one quarter of households in the full sample reported participation in private academic tutoring, with average annual tutoring expenditures of about 2,000 RMB per household.

After the policy took effect, both tutoring participation and related household spending declined sharply. The share of students participating in any academic tutoring fell from roughly 26 to 28 percent before the policy to about 13 to 15 percent afterward. Average household spending on private academic tutoring declined from 1,698 RMB to 966 RMB for students in compulsory education, and from 2,357 RMB to 1,499 RMB for students in high school. These patterns show that similar declines occurred for households with children in compulsory education, who were directly targeted by the policy, and for households with children in high school, who were not directly affected. By contrast, spending on private non academic tutoring changed little over the same period for both groups of households.

Patterns differ for school provided in-school education spending. Out of pocket in school education expenditures increased slightly for students in compulsory education, from 1,946 RMB

Table 1: Summary Statistics

	Compulsory Education (CE)		High School (HS)	
Sample Size: 43,415	Pre-2021	Post-2021	Pre-2021	Post-2021
Demographics				
Female	0.460	0.455	0.476	0.484
Age	11.527	11.625	17.562	17.508
Only Child	0.399	0.347	0.599	0.574
Public School	0.911	0.929	0.858	0.833
Household Income	79185	78822	76875	73007
Mother Education > HS	0.364	0.440	0.353	0.379
Rural Area	0.419	0.440	0.358	0.436
Main Outcome Variables				
Any Tutoring	0.367	0.273	0.294	0.164
Academic Tutoring	0.279	0.148	0.262	0.128
Non-Academic Tutoring	0.184	0.170	0.086	0.046
Total Education Spending	4703	3867	9325	8181
In-School Education Spending	1946	2001	6584	5978
Private Tutoring Spending	2604	1867	2846	2203
Academic Tutoring Spending	1698	966	2357	1499
Non-Academic Tutoring Spending	795	759	377	448
Online Education Spending	111	142	112	256
Academic Perform. (Top of Class)	0.179	0.161	0.137	0.124
Academic Perform. (Above Average)	0.290	0.303	0.298	0.289
Academic Perform. (Average)	0.398	0.414	0.455	0.472
Academic Perform. (Below Average)	0.116	0.097	0.101	0.103
Observations	25,268	8,805	6,682	2,660

Notes: Household income and all education expenditures are denominated in RMB and deflated to real 2016 values. Private tutoring spending is the sum of academic tutoring spending, non-academic tutoring spending, and online education spending. Total education spending is the sum of private tutoring spending and in-school education spending. Reported academic performance ranking ranges from 1 to 5, corresponding respectively to top, above average (excluding top), average, below average (excluding bottom), and others. These classifications are mutually exclusive. Table A2 reports more detailed summary statistics by each survey wave.

to 2,001 RMB, but declined substantially for high school students, from 6,584 RMB to 5,978 RMB. This divergence suggests that households with children in compulsory education may partially substitute private tutoring with school based academic support following the policy. Consistent with institutional differences, average in school education spending is considerably higher for high school students than for those in compulsory education, reflecting tuition fees outside the compulsory education system. Taken together, total education spending declined for both groups, from 4,703 RMB to 3,867 RMB for compulsory education households and from 9,325 RMB to 8,181 RMB for high school households.

Importantly, the policy was implemented during the COVID pandemic, which likely placed downward pressure on education spending for all households. This common shock implies that simple pre-post comparisons for households with children in compulsory education may confound policy effects with pandemic related spending reductions. This concern motivates our em-

pirical strategy of using households with high school students as a comparison group to account for common shocks and spending trends unrelated to the *Double Reduction Policy*.

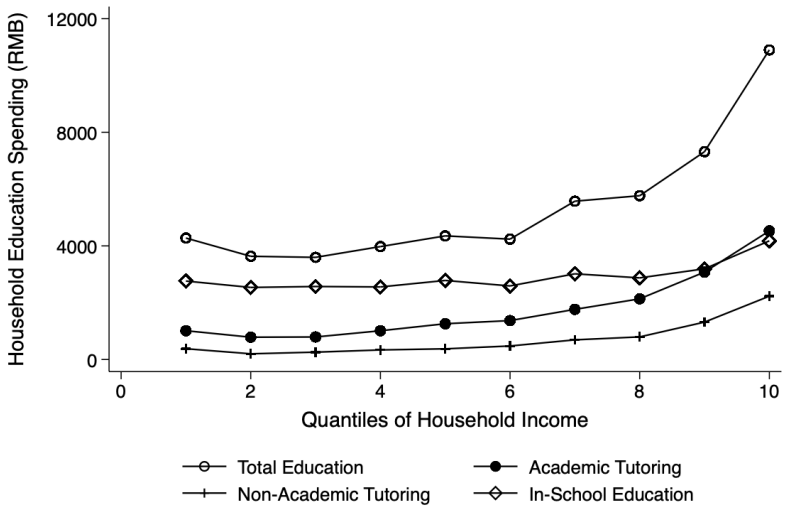


Figure 3: Household Education Spending by Income Percentiles

Note: For each province-year, households are categorized into each income percentile separately. All education expenditures are denominated in RMB and deflated to real 2016 values.

Moreover, there are different education spending patterns across household income levels. Figure 3 presents average household education spending by income percentile during our sample period. We observe that household spending on academic private tutoring increases with income nonlinearly, as does the total education spending. In particular, households within the top 20-30 percent of the income distribution spend much more than others below. Put differently, households in higher income brackets allocate significantly more financial resources to private academic tutoring, resulting in substantially higher overall education expenditures. By contrast, out-of-pocket in-school education spending exhibits relatively small variation across household income percentiles. This is because approximately 90 percent of students in our sample attend public schools, where tuition fees are relatively stable over time and largely uniform across schools. This evidence implies the heterogeneity in household income regarding private academic tutoring expenditures and total education expenditures. It also motivates us to examine the heterogeneous effects of the private tutoring ban across household income in Section 5.1.

In summary, the descriptive evidence indicates a substantial decline in household spending on private academic tutoring following the implementation of the private tutoring ban. At the same time, households with children in compulsory education and those with children in high school exhibit distinct adjustments in private tutoring expenditures, out-of-pocket in-school education spending, and total education spending. These differential patterns motivate our identification strategy. In addition, private tutoring expenditures vary systematically across the income distribution, with notably higher spending among households in the top 20-30 percent compared

with lower income groups, providing the basis for our analysis of income heterogeneity. The next subsection introduces the empirical strategy used to formally examine these patterns.

3.4 Empirical Strategy

We employ a difference-in-differences framework to estimate the effect of the *Double Reduction Policy*. Because the policy specifically targeted students in compulsory education, we use high school students as a comparison group and examine the differential changes in outcomes between students in primary or middle school (grades 1-9) and those in high school (grades 10-12). Our identification strategy relies on the assumption that, in the absence of the policy, trends in education expenditures for students in grades 1-9 and grades 10-12 would move in parallel over time.

There are tradeoffs involved in using high school students as the comparison group. As discussed in Section 2, the *Double Reduction Policy* applies only to students in compulsory education; private tutoring services for high school students are not subject to the regulatory restrictions. This institutional distinction makes high school students a natural control group for identifying the policy's effect on students in primary and middle school. However, the policy may have generated spillover effects on high school students, as some private tutoring companies that were forced to exit the market had previously offered services to both compulsory education and high school students. If the above spillover effects exist, we may have underestimated the impacts of the private tutoring ban. That said, high school students remain a valuable comparison group, as they help account for the general impact of the COVID-19 pandemic on education expenditures. In our main regression tables, we report results from both a pre-post analysis using the compulsory education sample and a difference-in-differences specification. Presenting both sets of estimates allows us to provide a more complete picture of household responses to the policy.

Studies on China's private tutoring ban have employed several different identification strategies. Zhao, Shi and Wang (2024) and Liu, Wang and Chen (2022) exploit variation in the release dates of official documents across cities to identify policy impacts; however, it might generate biased results because most tutoring providers and parents have anticipated the implementation and taken actions as soon as the State Council in China introduced the *Double Reduction Policy* in July 2021. Liu et al. (2025) measure policy intensity using the frequency of relevant keywords in cities' official documents or online news articles. Huang et al. (2025) use the number of children aged 5 to 14 in each city as shifters in policy intensity. By contrast, our paper takes advantage of the household-level panel data on education expenditures and directly uses high-school students as the comparison group. We also conduct robustness checks using alternative identification strategy in Section 6.

In our regression model below, we directly control for variation related to the pandemic by constructing a COVID-19 index based on the number of confirmed cases for each province-year. Additionally, we include a measure of local high school competitiveness – defined as the ratio of middle school graduates to new high school enrollments at the province-year level — to account for regional differences in academic pressure and school transitions (Liu et al., 2025).

The main econometric model takes the following form:

$$Y_{igt} = \alpha_t + \mu_g + \delta_c + \beta Post_t \times CompulsoryEduc_g + \Gamma X_{it} + \epsilon_{igt} \quad (1)$$

where Y_{igt} is the outcome of interest for student i in grade g and year t. $Post_t$ is a dummy variable that is equal to 1 for years after 2021 and 0 for years before and including 2021. $CompulsoryEduc_g$ is a dummy variable that indicates whether the student observation is in compulsory education grades. α_t, μ_g, δ_c are year, grade level, and city fixed effects, respectively. X_{it} is a vector of individual and family characteristics, as well as the COVID-19 index and high school competitiveness index. Individual and family characteristics include age, gender, rural/urban residence, parental education, family income, public school attendance, school quality, and only-child status. We use robust standard errors in the regressions. The coefficient of interest is β, representing the difference-in-differences estimates of the policy's impacts on students in compulsory education, relative to high school students.

4 Effects on Private Tutoring Participation and Education Spending

In this section, we examine the impacts of the *Double Reduction Policy* on household private tutoring participation and spending, out-of-pocket in-school education spending, and total education spending. We present results from both a pre-post analysis focusing on students in compulsory education and a difference-in-differences analysis comparing students in compulsory education with those in high school.

Private Tutoring Participation. Table 2 reports the estimated effects on private tutoring participation. The upper panel presents a pre-post analysis of changes in private tutoring outcomes for students in compulsory education following the implementation of the private tutoring ban. The lower panel reports difference-in-differences estimates comparing students in compulsory education with high school students. For both academic and non-academic tutoring, we consider two outcomes: an indicator for participation and total hours spent per year.

Following the implementation of the private tutoring ban, both participation rates and annual hours spent on private academic tutoring declined for students in compulsory education. Point estimates indicate that, relative to high school students, students in compulsory education were 1.3 percentage points less likely to participate in private academic tutoring after the policy, and their time spent on academic tutoring fell by 12 hours per year. This pattern is largely driven by the sharp post-policy contraction in the supply of private academic tutoring services, as illustrated in Figure 2.[14] Non-academic tutoring participation increased by a magnitude comparable to the decline in academic tutoring participation, as shown in Columns 3 and 4. However, total hours devoted to non-academic tutoring declined, although the estimated effect is not statistically significant. Overall, these results suggest that the private tutoring ban reduced academic tutoring

[14]Columns 2 and 4 contain fewer observations because tutoring hours in 2017 are excluded to ensure accurate reporting.

Table 2: Effects on Private Academic and Non-Academic Tutoring Participation

	Academic Tutoring		Non-Academic Tutoring	
	(1) Dummy	(2) Hours per Year	(3) Dummy	(4) Hours per Year
Panel A: Pre-Post Analysis				
Post	-0.114***	-14.681***	-0.017***	4.832*
	(0.006)	(3.342)	(0.006)	(2.695)
Observations	34,073	23,196	34,073	23,196
Panel B: Diff-in-Diffs				
Post × CE	-0.013	-12.094**	0.013*	-5.451
	(0.009)	(5.346)	(0.007)	(6.701)
Dep. Mean	0.24	56.01	0.16	23.85
Observations	43,415	29,506	43,415	29,506

Notes: Robust standard errors are in parentheses. We exclude tutoring hours in 2017 to ensure accurate reporting within our sample. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

participation and intensity among students in compulsory education, while generating limited substitution toward non-academic tutoring.

Private tutoring spending, out-of-pocket in-school education spending, and total education spending. Panel A of Table 3 reports estimated policy effects on education expenditures measured in levels. Among children in compulsory education, spending on private academic tutoring declined significantly by 320 RMB (≈ 46 USD) following the regulation. However, when compulsory education students are compared with high school students, the estimated decline in private academic tutoring spending becomes smaller in magnitude and statistically insignificant. Two factors may explain this discrepancy between the pre-post and difference-in-differences estimates. First, since the timing of the policy coincided with the COVID-19 pandemic, the pre-post decline may partly reflect the effects of the COVID pandemic rather than the policy itself. Second, although the private tutoring ban formally targeted only compulsory education, it may have generated spillovers that reduced private academic tutoring spending among high school students as well.

At the same time, estimates for private non-academic tutoring spending are negative but not statistically significant. When private academic, private non-academic, and online tutoring expenditures are combined, total private tutoring spending declined by an amount equivalent to roughly 15 percent of its sample mean.

In contrast, out-of-pocket spending on school provided education increased significantly by 236 RMB (≈ 34 USD) in the pre-post analysis and by 915 RMB (≈ 132 USD) in the difference-in-differences specification.[15] This pattern is consistent with substitution toward in-school education services following the policy. As a result, total education spending, defined as the sum of private

[15]Columns 4 and 5 contain fewer observations because in-school education spending in 2017 is excluded to ensure accurate reporting.

Table 3: Effects on Education Spending

Spending	(1) Private Academic	(2) Private Non-Academic	(3) Private Tutoring	(4) In-School Education	(5) Total Education
Spending in Levels					
Panel A: Pre-Post Analysis					
Post	-320.193***	-59.376	-374.644***	236.173**	-275.720
	(92.924)	(53.191)	(119.349)	(98.092)	(170.334)
Observations	34,073	34,073	34,073	23,196	23,196
Panel B: Diff-in-Diffs					
Post × CE	-49.304	-161.805	-328.710	915.226***	449.466
	(175.321)	(103.068)	(223.024)	(254.490)	(367.972)
Dep. Mean	1638.63	702.14	2466.95	2899.35	5338.53
Observations	43,415	43,415	43,415	29,506	29,506
Spending as a Share of Household Consumption					
Panel C: Pre-Post Analysis					
Post	-0.007***	-0.002***	-0.009***	-0.003**	-0.010***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)
Observations	34,071	34,071	34,071	23,194	23,194
Panel D: Diff-in-Diffs					
Post × CE	-0.002	-0.002***	-0.004**	0.025***	0.022***
	(0.001)	(0.001)	(0.002)	(0.003)	(0.004)
Dep. Mean	0.02	0.01	0.02	0.04	0.06
Observations	43,412	43,412	43,412	29,503	29,503

Notes: Robust standard errors are in parentheses. Private tutoring spending is the sum of academic tutoring spending, non-academic tutoring spending, and online education spending. Total education spending is the sum of private tutoring spending and in-school education spending. In-school education spending and total education spending in 2017 are excluded from the analysis because, during the first survey year, respondents mistakenly reported total education expenditures (combining both in-school and private tutoring spending) as in-school spending alone. After 2017, we revised the survey questions and instructions to prevent this error. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

tutoring and in-school education expenditures, declined for students in compulsory education in the pre-post analysis but increased relative to high school students, although neither estimate is statistically significant.

To assess how education spending changed relative to overall household consumption, we also examine the effects of the policy on the share of household education spending in total consumption. Panel B of Table 3 reports the corresponding estimates. Overall, the patterns are similar to those in Panel A. The pre-post analysis shows that private academic tutoring spending as a share of total household consumption declined significantly by 0.7 percentage points, corresponding to a 35 percent reduction. In contrast, the estimate from the difference-in-differences specification is considerably smaller and statistically insignificant.

Relative to households with high school students, households with children in compulsory education allocated a 0.4 percentage point lower share of total consumption to private tutoring spending and a 2.5 percentage point higher share to out-of-pocket in-school education spending. Together, these changes imply a 2.2 percentage point (37 percent) increase in the share of total household consumption devoted to education following the private tutoring ban.

In summary, the results in Tables 2 and 3 indicate that participation in and spending on private academic tutoring, the direct target of the *Double Reduction Policy*, declined for students in compulsory education after the policy was implemented. However, similar declines were also observed among high school students. Consequently, relative to high school students, those in compulsory education did not experience a statistically significant reduction in private academic tutoring participation or spending attributable to the policy. In contrast, households with children in compulsory education experienced a significant increase in out-of-pocket in-school education spending, both in absolute terms and relative to households with high school students. We interpret this pattern as evidence that households substituted private tutoring expenditures with increased spending on in-school educational services following the *Double Reduction Policy*. As a result, total education spending, measured both in levels and as a share of household consumption, increased significantly.

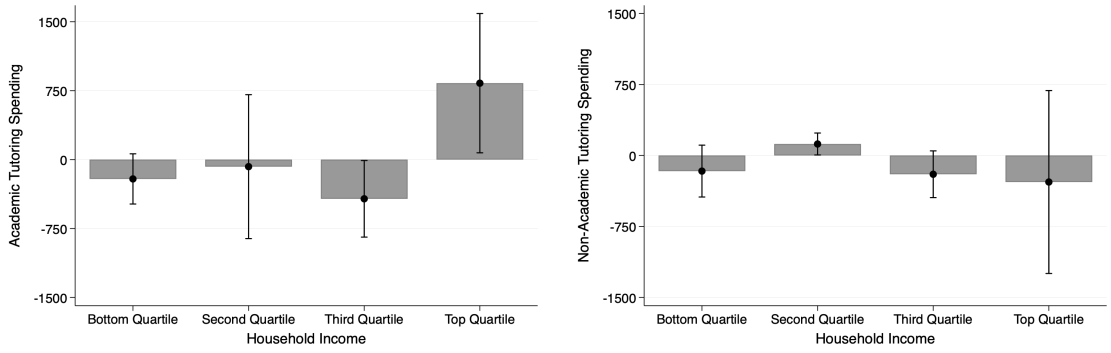
5 Heterogeneous Effects of the Private Tutoring Ban

Our main findings indicate that the *Double Reduction Policy* was associated with a weak reduction in household private tutoring spending but a large increase in out-of-pocket in-school education expenditures. We next examine whether the policy generated heterogeneous effects across several dimensions. Specifically, we first analyze whether the policy produced differential impacts on household education spending and students' reported academic performance across income groups. We then study heterogeneity in policy effects between urban and rural households and across levels of mothers' education.

5.1 Heterogeneity by Household Income

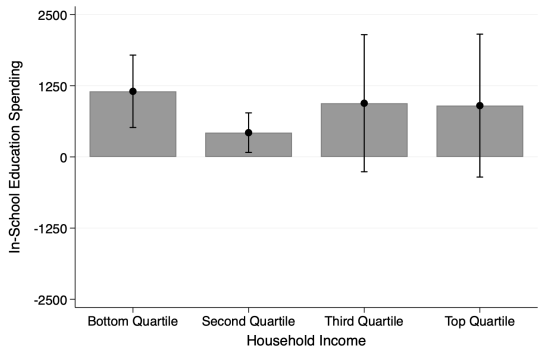
As shown in Figure 3, household spending on private academic tutoring varies with income. This pattern suggests that households at different income levels may respond differently to the private tutoring regulation. To examine such heterogeneity, we proceed as follows. For each year and each province, we rank households by income and divide the sample into four equal sized groups: the bottom quartile, the second quartile, the third quartile, and the top quartile. We estimate policy effects separately for each income group using a difference in differences specification analogous to Equation 1.

Household Education Spending. Figure 4 presents heterogeneous effects of the policy on education spending by household income. Panel (a) shows that, relative to households of comparable income with high school students, households with children in compulsory education in the

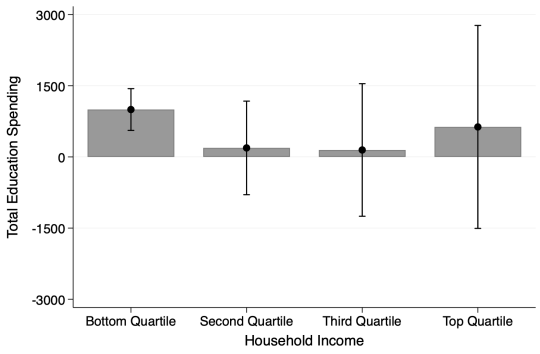


(a) Private Academic Tutoring Spending

(b) Private Non-Academic Tutoring Spending



(c) In-School Education Spending



(d) Total Education Spending

Figure 4: Heterogeneous Effects on Household Education Spending by Household Income

Note: Standard errors clustered at the grade level. For each province-year, households are categorized into each income percentile separately. Control variables include age, gender, rural/urban residence, parental education, family income, public school attendance, school quality, only-child status, COVID-19 index, and a measure of high school competitiveness. Year, grade, and city fixed effects are also included. Total education spending is the sum of private academic tutoring spending, private non-academic tutoring spending, and in-school education spending. All education expenditures are denominated in RMB and deflated to real 2016 values.

top income quartile significantly increased their spending on private academic tutoring. In contrast, households below the top income quartile either reduced their private academic tutoring expenditures or exhibited little change.

On the other hand, changes in private non-academic tutoring spending were small and statistically insignificant across all income groups. Increases in out-of-pocket in-school education spending were observed for every income group, with the largest gains among households in the bottom income quartile. As a result, total education spending rose significantly for households in the bottom income quartile, while estimates for higher income groups were positive but statistically indistinguishable from zero.

To further examine differential changes in private tutoring and education spending between high-income households and others following the policy, we implement a triple-differences specification. Motivated by Figure 3, which shows that households in the top income quartile spend

substantially more than other households, and by Figure 4, which indicates that these households increased their private academic tutoring spending in contrast to other groups, we define households in the top quartile of the income distribution as high-income households.

We interact $Post_t$ (an indicator for whether the policy has been implemented or not in year t), $CompulsoryEduc_g$ (an indicator for compulsory education students), with $HighInc_{it}$ (an indicator for household i being in the top income quartile of household i's province in year t). β_1 measures the policy's differential impacts on outcome variables Y_{igt} among high-income households, relative to households in the middle and lower tiers of the income distribution. We include the same set of fixed effects and controls as in the main analysis. The model takes the following form:

$$\begin{aligned} Y_{igt} =& \alpha_t + \mu_g + \delta_c + \beta_1 Post_t \times CompulsoryEduc_g \times HighInc_{it} + \Gamma X_{it} \\ &+ \beta_2 Post_t \times CompulsoryEduc_g + \beta_3 Post_t \times HighInc_{it} \\ &+ \beta_4 CompulsoryEduc_g \times HighInc_{it} + \epsilon_{igt} \end{aligned} \tag{2}$$

Table 4 reports the triple differences estimates.[16] Following the private tutoring ban, students in compulsory education from households in the top income quartile exhibited significantly higher spending on private academic tutoring (1,047 RMB, 58 percent of its sample mean) relative to students from lower income households. This finding is consistent with Figure 4(a), which highlights the distinct tutoring spending responses of high-income households. We find no statistically significant differential effects across income groups for other categories of education spending.

These results suggest that the overall reduction in private academic tutoring spending (measured in levels) was driven primarily by households outside the top income quartile, while households in the top income quartile were largely unaffected by the private tutoring ban in terms of their private academic tutoring expenditures. In addition, households in the bottom income quartile experienced a significant increase in out-of-pocket in-school education spending, consistent with the expansion of more affordable academic support options following the policy. Building on these findings, we next examine whether similar income based heterogeneity emerges in students' academic outcomes.

Students' Academic Performance. We next use student academic performance data to examine how the private tutoring ban affected academic outcomes. Our earlier results show that middle and low income households experienced substantially larger reductions in private academic tutoring spending following the ban. This pattern raises the question of whether students from these households were differentially affected in terms of academic performance. Therefore, we analyze heterogeneity in the policy's effects on reported student academic outcomes across the household income distribution using the triple differences specification described in Equation 2.

Table 5 presents the triple-differences estimates. From Columns 1 through 4, the dependent variables are indicators representing whether students are reported to be ranked as the "top of class", "above average", "average", or "below average", based on their academic performance

[16]The sample is restricted to households with students in grade 3 or above, when academic performance becomes more relevant for admission outcomes.

Table 4: Income Heterogeneity: Effects on Education Spending

Spending	(1) Private Academic	(2) Private Non-Academic	(3) Private Tutoring	(4) In-School Education	(5) Total Education
Post × CE × High-Inc	1047.279**	-214.488	643.930	-191.857	-136.551
	(345.769)	(461.484)	(617.287)	(676.664)	(1237.884)
Dep. Mean	1816.93	606.93	2551.00	3168.86	5652.79
Observations	36,064	36,064	36,064	24,615	24,615

Notes: Robust standard errors are clustered at the grade level. We restrict the sample to households with students in grades 3 or above, when academic performance starts to become important for admission purposes. High-income households refer to households within the top quartile of the income distribution in a province-year. Private tutoring spending is the sum of academic tutoring spending, non-academic tutoring spending, and online education spending. Total education spending is the sum of private tutoring spending and in-school education spending. In-school education spending and total education spending in 2017 are excluded from the analysis because, during the first survey year, respondents mistakenly reported total education expenditures (combining both in-school and private tutoring spending) as in-school spending alone. After 2017, we revised the survey questions and instructions to prevent this error. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Income Heterogeneity: Effects on Reported Academic Performance

	(1) "Top of Class"	(2) "Above Average"	(3) "Average"	(4) "Below Average"
Post × CE × High-Inc	0.018	-0.027	-0.022	0.021
	(0.012)	(0.028)	(0.029)	(0.020)
Dep. Mean	0.15	0.28	0.42	0.11
Observations	36,064	36,064	36,064	36,064

Notes: Robust standard errors are clustered at the grades level. These academic performance categories are mutually exclusive. We restrict the sample to households with students in grades 3 or above, when academic performance starts to become important for admission purposes. High-income households refer to households within the top quartile of the income distribution in a province-year. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

within class.[17] That is, the dummy variable is equal to one if the student's academic performance ranking falls within the corresponding range specified by the variable.

Point estimates indicate that, relative to students from households in the top income quartile, a smaller share of students from lower income households ranked at the top of their class following the ban. At the same time, these students were also less likely to be ranked in the below average category. Taken together, these patterns suggest that the private tutoring ban may have disadvantaged high achieving students from lower income households while benefiting lower achieving students from the same income groups.

One possible interpretation is that high performing students from non high-income households, who relied more heavily on private tutoring prior to the policy, lost access to an important source of academic support and experienced a decline in performance. By contrast, high-income households may have been better able to maintain access to private tutoring services despite the

[17] These academic performance categories are mutually exclusive.

Table 6: Effects on 1-on-1 vs. Group Private Academic Tutoring

For academic private tutoring:	(1) 1-on-1 Dummy	(2) 1-on-1 Spending	(3) Group Tutoring Dummy	(4) Group Tutoring Spending
Panel A: Diff-in-Diffs				
Post × CE	0.011**	435.078***	-0.006	-248.080
	(0.005)	(163.733)	(0.009)	(155.037)
Observations	30,207	30,207	30,207	30,207
Panel B: Triple Diff-in-Diffs				
Post × CE × High-Inc	0.048***	1494.259***	-0.005	634.357***
	(0.001)	(115.073)	(0.006)	(40.485)
Dep. Mean	0.03	376.12	0.19	1157.36
Observations	30,207	30,207	30,207	30,207

Notes: Robust standard errors are in parentheses. We drop all observations in 2019 data because the survey did not ask about the size of tutoring classes in that year. High-income households refer to households within the top quartile of the income distribution in a province-year. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

ban, for example, through informal arrangements or higher cost alternatives, thereby mitigating adverse effects on their children's academic outcomes. On the other hand, lower performing students from non high-income households may have benefited from the expanded availability of in-school academic support following the policy, allowing them to improve relative to their peers. Meanwhile, lower performing students from high-income households, who faced reduced access to readily available private tutoring and had weaker incentives to intensify academic competition, may also have experienced declines in academic performance.

1-on-1 versus group tutoring. The finding that high-income households did not reduce private tutoring expenditures following the ban likely reflects their financial resources and greater ability to adapt to the regulation. To further investigate this pattern, we exploit detailed information on private tutoring arrangements and examine how the effects of the policy vary by tutoring class size. Specifically, we compare household participation in and expenditures on 1-on-1 private academic tutoring with those on group based private academic tutoring.

Table 6 reports the estimated effects on participation in 1-on-1 private tutoring, spending on 1-on-1 private tutoring, participation in group private tutoring, and spending on group private tutoring in Columns 1 through 4. The sample size is smaller for this analysis because information on tutoring class size is missing for some observations.[18] Panel A shows that, following the regulation, students in compulsory education increased their participation in 1-on-1 private academic tutoring by 1.1 percentage points (37 percent) relative to high school students. Spending on 1-on-1 tutoring rose by 435 RMB (≈ 63 USD), representing a 116 percent increase relative to its sample

[18] All observations from 2019 are excluded because the survey did not collect information on tutoring class size in that year. When class size varies across academic subjects, we use math class size as the representative measure for each student.

mean. In contrast, participation in and spending on group private academic tutoring, defined as classes with more than one student, had a small and insignificant decrease.

Panel B further examines whether responses differed between high-income households and other households. For this analysis, we employ a triple-differences estimator as described in Equation 2. The results indicate that, following the regulation, households in the top income quartile significantly increased participation in 1-on-1 private academic tutoring by 4.8 percentage points and raised associated expenditures by 1,494 RMB ($\approx$ 215 USD) per year relative to households in lower income quartiles. In addition, despite an overall decline in group academic tutoring spending, high-income households also had a relative increase in their spending on group private academic tutoring by 634 RMB ($\approx$ 91 USD) following the ban.

The above evidence suggests that the private tutoring ban led to increases in participation in and spending on 1-on-1 private academic tutoring, and this is almost entirely driven by households in the top quartile of the income distribution. This differential response across income groups reflects the distinct constraints households faced in adapting to the ban. Even under strong regulatory enforcement, 1-on-1 classes are almost impossible to detect or intervene against, making them the primary avenue for continued access to private academic tutoring.

However, the shift to 1-on-1 tutoring imposed substantial barriers that disproportionately affected lower-income households for the following reasons. First, the financial burden increased dramatically. Our data suggests that, in 2022, the average cost of a 1-on-1 private academic tutoring session was 176 RMB ($\approx$ 25 USD) per hour, nearly 95 percent higher than group tutoring sessions. Second, as tutoring providers moved underground to evade regulatory oversight, finding private tutors became increasingly difficult, creating information barriers. These financial and informational constraints, intensified by the ban, particularly restricted families in low- and middle-income tiers. Wealthier households, in contrast, were better positioned to overcome these barriers. They could more easily afford the higher costs of 1-on-1 tutoring and likely held information advantages in navigating the underground market, facing fewer frictions in their search for private tutors. This enabled them to shift toward more exclusive forms of tutoring characterized by smaller class sizes and higher costs.

5.2 Heterogeneity between Urban and Rural Households

Urban and rural families present very different patterns in education spending, especially regarding private tutoring expenditures. In our sample period, urban families on average spent 2,565 RMB ($\approx$ 370 USD) annually on private academic tutoring, compared to only 332 RMB ($\approx$ 48 USD) spent by rural families. Given this distinction, we study the heterogeneous impacts of the private tutoring ban between urban and rural households.

We split the sample into rural and urban households and conduct the analysis separately for each subsample. Table 7 reports the effects on tutoring participation, and Table 8 reports the effects on education spending. In absolute terms, both urban and rural households experienced declines in participation rates and annual hours devoted to private academic tutoring following the intro-

Table 7: Heterogeneity: Effects on Tutoring Participation for Rural vs. Urban Households

	Academic Tutoring		Non-Academic Tutoring	
	(1) Dummy	(2) Hours per Year	(3) Dummy	(4) Hours per Year
Rural Families				
Panel A: Pre-Post Analysis				
Post	-0.086***	-8.251	0.010	6.384**
	(0.008)	(5.039)	(0.007)	(2.913)
Observations	14,450	10,021	14,450	10,021
Panel B: Diff-in-Diffs				
Post × CE	0.009	3.793	0.030***	7.358
	(0.011)	(6.401)	(0.008)	(4.900)
Dep. Mean	0.14	35.08	0.06	8.90
Observations	18,007	12,546	18,007	12,546
Urban Families				
Panel C: Pre-Post Analysis				
Post	-0.142***	-21.557***	-0.044***	3.436
	(0.009)	(4.723)	(0.009)	(4.102)
Observations	19,620	13,174	19,620	13,174
Panel D: Diff-in-Diffs				
Post × CE	-0.028**	-22.287***	0.016	-13.343
	(0.014)	(7.968)	(0.011)	(11.143)
Dep. Mean	0.31	71.50	0.23	34.92
Observations	25,406	16,959	25,406	16,959

Notes: Robust standard errors are in parentheses. We exclude tutoring hours in 2017 from the analysis to ensure accurate reporting within our sample. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

duction of the private tutoring ban, with larger reductions observed among urban households. Private academic tutoring expenditures also declined for both groups after the policy.

When comparing compulsory education students with high school students, different patterns emerge across urban and rural households. Among urban households, students in compulsory education reduced their participation and time spent in private academic tutoring relative to high school students, while the reduction in spending was not statistically significant. Nevertheless, among rural households, we do not observe significant differences in participation or time spent on private academic tutoring between compulsory education students and high school students following the policy. Private academic tutoring spending among rural compulsory education households increased slightly relative to their high school counterparts. This sharp contrast between the urban and rural families partially reflects the large differences in the baseline tutoring expenditures.

Table 8: Heterogeneity: Effects on Education Spending for Rural vs. Urban Households

Spending	(1) Academic Tutoring	(2) Non-Academic Tutoring	(3) Private Tutoring	(4) In-School Education	(5) Total Education
Rural Families					
Panel A: Pre-Post Analysis					
Post	-278.620***	18.156	-307.453**	335.206**	-10.260
	(67.552)	(44.092)	(125.859)	(155.115)	(203.327)
Observations	14,450	14,450	14,450	10,021	10,021
Panel B: Diff-in-Diffs					
Post × CE	148.089*	130.612*	300.411**	871.940***	1263.570***
	(77.681)	(69.910)	(119.245)	(294.361)	(331.064)
Dep. Mean	332.33	120.86	486.96	2532.06	3045.94
Observations	18,007	18,007	18,007	12,546	12,546
Urban Families					
Panel C: Pre-Post Analysis					
Post	-490.833***	-102.059	-564.952***	117.396	-762.456***
	(148.826)	(85.407)	(189.056)	(114.692)	(252.400)
Observations	19,620	19,620	19,620	13,174	13,174
Panel D: Diff-in-Diffs					
Post × CE	-224.129	-269.637	-712.184*	889.468**	-106.951
	(289.325)	(171.431)	(368.216)	(373.666)	(574.916)
Dep. Mean	2564.53	1114.18	3870.40	3170.58	7034.20
Observations	25,406	25,406	25,406	16,959	16,959

Notes: Robust standard errors are in parentheses. Private tutoring spending is the sum of academic tutoring spending, non-academic tutoring spending, and online education spending. Total education spending is the sum of private tutoring spending and in-school education spending. In-school education spending and total education spending in 2017 are excluded from the analysis because, during the first survey year, respondents mistakenly reported total education expenditures (combining both in-school and private tutoring spending) as in-school spending alone. After 2017, we revised the survey questions and instructions to prevent this error. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

As a result, compulsory education students in urban areas experienced a decline in total private tutoring spending following the policy, as shown in Column 3 of Table 8. In contrast, compulsory education students in rural areas exhibited an increase in total private tutoring expenditures. Out-of-pocket in-school education spending increased by a similar magnitude for both urban and rural compulsory education students. Taken together, these patterns led to a substantial divergence in changes in total education spending across urban and rural areas, as reported in Column 5. Specifically, rural compulsory education students experienced a significant increase in total education spending after the policy, whereas no statistically significant change was observed for their urban counterparts.

The heterogeneous effects on private tutoring spending between urban and rural students may

reflect several underlying factors. First, competition for school admissions is more intense in urban areas, leading to substantially higher demand for private academic tutoring among urban students. In response, urban areas offer a greater supply of private tutoring services, particularly through formal tutoring institutions. This results in a large baseline gap in private tutoring spending between urban and rural students, which may limit the scope for further reductions in rural areas following the ban. Second, these differences may also arise from variation in policy enforcement across urban and rural areas. Administrative capacity in China differs markedly between cities and rural villages. Urban governments typically possess greater resources, more formal institutional structures, and stronger regulatory oversight, while rural governance tends to be more informal and decentralized. As a result, enforcement of the private tutoring ban was likely more stringent in urban areas, which may help explain why we do not observe comparable reductions in private tutoring expenditures among rural students.

5.3 Heterogeneity by Mother's Education

Another important question is whether parents substituted toward other forms of academic support following the *Double Reduction Policy*. One potential margin of adjustment is home tutoring, whereby parents take on a more active role in tutoring their children. The feasibility of home tutoring depends largely on parental education, as more educated parents are likely better equipped to provide academic assistance at home. If households substituted toward home tutoring, we would expect larger reductions in private tutoring spending among households with more educated parents. We test this hypothesis by examining heterogeneity in policy effects across mothers' education levels. Figure A1 and Table A3 report the effects on education spending, while Table A4 presents the corresponding results for students' reported academic performance.

We find that, following the ban, students with college educated mothers exhibited lower private tutoring spending (combining academic and non academic tutoring), smaller increases in out-of-pocket in-school education spending, and lower total education spending relative to other students. However, these estimates are not statistically significant. Although we cannot directly observe home tutoring due to data limitations, these patterns are consistent with potential substitution toward home based academic support among more educated parents after the private tutoring ban. They suggest that, under the constraints imposed by the policy, parents with higher education levels may have been better able to compensate for the reduction in external tutoring by providing academic assistance at home. This interpretation is consistent with existing evidence on the relationship between parental education and parental time investments in children. For example, Guryan, Hurst and Kearney (2008) show that more educated parents devote substantially more time to educational childcare activities. Within the literature on China's private tutoring regulation, prior studies find that the tutoring ban increased parental involvement in family education (Zhao, Shi and Wang, 2024; Liu, Wang and Chen, 2022).

Table 9: Coarsened Exact Matching: Effects on Tutoring Participation

	Academic Tutoring		Non-Academic Tutoring	
	(1) Dummy	(2) Hours per Year	(3) Dummy	(4) Hours per Year
Post × CE	-0.020*	-14.200**	0.014	2.954
	(0.011)	(6.261)	(0.009)	(6.415)
Dep. Mean	0.23	52.43	0.14	20.80
Observations	37,298	24,840	37,298	24,840

Notes: Robust standard errors are in parentheses. The CEM estimator matches households with compulsory education students and those with high school students if they fall into the same bin for the following attributes: student gender, public school attendance, household income, mother's education, rural/urban residence, only-child status, province-level COVID-19 index, and province-level high school competitiveness index. We exclude tutoring hours in 2017 to ensure accurate reporting within our sample. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

6 Robustness Checks

This section presents a series of robustness checks for our main empirical results. First, we apply Coarsened Exact Matching (CEM) to improve the comparability of the treatment and control groups by matching households on a rich set of child and household characteristics, thereby yielding a more balanced sample. Second, we implement an alternative identification strategy that exploits cross city variation in pre-policy private academic tutoring penetration to assess whether the resulting estimates are consistent with our main findings. Finally, we re-estimate our main specifications after excluding data from 2021 and 2022 to address potential confounding effects arising from survey disruptions during the COVID-19 pandemic.

Coarsened Exact Matching. From Table 1, we see that some demographic variables differ between students in compulsory education and those in high school. Although we include all these variables as controls in our empirical analysis, this may still raise concerns on the comparability between the two groups. We address this issue by following Iacus, King and Porro (2012) and adopting a Coarsened Exact Matching (CEM) estimator to construct the control group. CEM estimators prioritize sample balance at the expense of sample size. This method helps mitigate the selection issues and gives us the best chance of identifying households and students who are comparable on unobservables.

We match the treatment and control groups based on several key household and student characteristics. Specifically, the CEM estimator matches students in compulsory education and students in high school if they fall into the same bin for the following attributes respectively: student gender, public school attendance, household income, mother's education, rural/urban residence, only-child status, province-level COVID-19 index, and province-level high school competitiveness index. We use the default binning algorithm on the variables. The above procedures drop approximately 15% of the observations that are unmatched.

Tables 9 and 10 present the CEM estimates for private tutoring participation and education

Table 10: Coarsened Exact Matching: Effects on Education Spending

Spending	(1) Private Academic	(2) Private Non-Academic	(3) Private Tutoring	(4) In-School Education	(5) Total Education
Panel A: Spending in Levels					
Post × CE	71.115	-31.799	4.374	668.977***	511.550
	(203.913)	(78.161)	(233.269)	(245.543)	(340.134)
Dep. Mean	1445.39	577.53	2120.04	2548.48	4597.17
Observations	37,298	37,298	37,298	24,840	24,840
Panel B: Spending as a Share of Household Consumption					
Post × CE	-0.003**	-0.001*	-0.005**	0.022***	0.019***
	(0.002)	(0.001)	(0.002)	(0.004)	(0.004)
Dep. Mean	0.01	0.01	0.02	0.04	0.06
Observations	37,295	37,295	37,295	24,837	24,837

Notes: Robust standard errors are in parentheses. The CEM estimator matches households with compulsory education students and those with high school students if they fall into the same bin for the following attributes: student gender, public school attendance, household income, mother's education, rural/urban residence, only-child status, province-level COVID-19 index, and province-level high school competitiveness index. Private tutoring spending is the sum of academic tutoring spending, non-academic tutoring spending, and online education spending. Total education spending is the sum of private tutoring spending and in-school education spending. In-school education spending and total education spending in 2017 are excluded from the analysis because, during the first survey year, respondents mistakenly reported total education expenditures (combining both in-school and private tutoring spending) as in-school spending alone. After 2017, we revised the survey questions and instructions to prevent this error. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

spending respectively. The magnitudes and statistical significance of CEM estimates are similar to those presented in Section 4.

Following the ban, private academic tutoring participation among students in compulsory education declined by 2.0 percentage points relative to high school students, and time spent on academic tutoring fell by 14.2 hours per year. We do not find differential changes in participation or time devoted to private non-academic tutoring after the policy. When measured in levels, students in compulsory education did not experience statistically significant changes in either private academic or private non-academic tutoring expenditures relative to high school students. However, the share of household consumption devoted to private academic and private non-academic tutoring declined by 0.3 and 0.1 percentage point, respectively, resulting in an overall reduction of 0.5 percentage point in the share of consumption spent on private tutoring.

Consistent with the findings in Section 4, out-of-pocket in-school education spending increased significantly, both in levels and as a share of household consumption. This increase exceeded the decline in private tutoring expenditures. As a consequence, total education spending rose by 512 RMB (≈ 74 USD), and the share of household consumption allocated to education increased by 1.9 percentage points.

Exploiting variation in private academic tutoring penetration across cities. Our main analy-

sis exploits policy variation between students in compulsory education and those in high school to identify the effects of the private tutoring ban. We now consider an alternative identification strategy to assess the robustness of our main findings. Specifically, we use the private academic tutoring supply data constructed in Section 3.2 and exploit cross city variation in pre-policy private academic tutoring penetration, measured as the number of private academic tutoring facilities per 1,000 students in 2019. The sample is restricted to households with students in compulsory education, consistent with the scope of the policy.

We estimate a difference-in-differences specification with the following model:

$$Y_{igt} = \alpha_t + \mu_g + \delta_c + \beta Post_t \times HighPenetration_i + \Gamma X_{it} + \epsilon_{igt} \tag{3}$$

where β captures the differential impact of the private tutoring ban in cities with above median tutoring penetration relative to those with below median penetration. We include the same set of fixed effects and control variables as in Equation 1.

We report the estimates in Tables 11 and 12. Following the implementation of the policy, cities with above-median private academic tutoring penetration experienced significantly larger declines in private academic tutoring participation, time spent, and expenditures relative to cities with below median penetration. In contrast, we find limited differential responses in private non academic tutoring, with the exception of a 3.3 percentage point decline in participation, suggesting only modest spillovers to the non-academic tutoring sector.

One notable difference between the results in Table 12 and those reported in Section 4 is the out-of-pocket in-school education spending. After the ban, households in high penetration cities exhibited relatively lower in-school education expenditures compared with those in low penetration cities. This pattern likely reflects selection differences across cities prior to the policy. Average in school education spending in high penetration cities before the policy was 2,500 RMB (360 USD), compared with 1,485 RMB (214 USD) in low penetration cities. With a higher baseline level of in school spending, households in high tutoring penetration cities may have had less scope or need to further increase in school education expenditures in response to the ban. In addition, cities with extensive private tutoring markets may have relied more heavily on private provision prior to the policy, making substitution toward in school services less pronounced.

As a consequence of these patterns, total education spending declined substantially in high penetration cities relative to low penetration cities following the policy. Taken together, these findings reinforce our main results by showing that the private tutoring ban had stronger effects on private academic tutoring outcomes in areas where the tutoring sector was more developed prior to the policy. Despite differences in the adjustment margins, the overall evidence from this alternative identification strategy is consistent with our baseline conclusions regarding the contraction of private tutoring and the reallocation of education spending following the *Double Reduction Policy*.

Dropping 2021-2022 sample. One limitation of our analysis arises from the data collection process. Due to pandemic-related restrictions and travel difficulties, the third survey wave was conducted over two years, 2021 and 2022. Consequently, some households were surveyed in 2021

Table 11: Effects on Tutoring Participation for Cities with Low vs. High Tutoring Penetration

	Academic Tutoring		Non-Academic Tutoring	
	(1) Dummy	(2) Hours per Year	(3) Dummy	(4) Hours per Year
Post × High-Penetration	-0.079***	-24.903***	-0.033***	5.863
	(0.010)	(5.695)	(0.010)	(4.358)
Dep. Mean	0.25	59.18	0.18	26.03
Observations	32,596	22,624	32,596	22,624

Notes: Robust standard errors are in parentheses. We restrict the sample to households with students in compulsory education. Tutoring penetration is defined as the city-level number of tutoring facilities per 1,000 students in 2019. High penetration refers to cities with above-median tutoring penetration. We exclude tutoring hours in 2017 to ensure accurate reporting within our sample. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 12: Effects on Education Spending for Cities with Low vs. High Tutoring Penetration

Spending	(1) Academic Tutoring	(2) Non-Academic Tutoring	(3) Private Tutoring	(4) In-School Education	(5) Total Education
Post × High-Penetration	-944.908***	-8.280	-920.669***	-617.214***	-1899.526***
	(124.560)	(79.435)	(161.628)	(188.450)	(272.931)
Dep. Mean	1553.70	808.62	2484.97	1986.12	4456.50
Observations	32,596	32,596	32,596	22,624	22,624

Notes: Robust standard errors are in parentheses. We restrict the sample to households with students in compulsory education. Tutoring penetration is defined as the city-level number of tutoring facilities per 1,000 students in 2019. High penetration refers to cities with above-median tutoring penetration. Private tutoring spending is the sum of academic tutoring spending, non-academic tutoring spending, and online education spending. Total education spending is the sum of private tutoring spending and in-school education spending. In-school education spending and total education spending in 2017 are excluded from the analysis because, during the first survey year, respondents mistakenly reported total education expenditures (combining both in-school and private tutoring spending) as in-school spending alone. After 2017, we revised the survey questions and instructions to prevent this error. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

and reported expenditures for 2020, while others were surveyed in 2022 and reported expenditures for 2021. Although we treat the 2021 and 2022 samples as separate waves in our empirical analysis, differences in the geographic composition of respondents across the two years could potentially introduce bias.

To address this concern, we conduct an additional robustness check by excluding the 2021 and 2022 survey waves and estimating our main specifications using only the 2017, 2019, and 2023 waves. Tables A5 and A6 report the corresponding results in tutoring participation and education spending. We find no evidence that variation in sample composition across the 2021 and 2022 survey rounds affects our main findings.

7 Conclusion

This paper studies China's nationwide ban on private academic tutoring for students in compulsory education. Using a nationally representative household panel on education expenditures from 2017 to 2023, we analyze how families adjusted their education investments in response to the *Double Reduction Policy*. Our analysis shows that the policy reshaped the composition of household education spending rather than reducing overall investment. Although participation in and expenditures on private academic tutoring declined, households sharply increased out-of-pocket spending on in-school education services, leading to higher total education expenditures and a larger share of household consumption devoted to education.

We document substantial heterogeneity in household responses. Reductions in private academic tutoring expenditures were concentrated among households in the lower and middle portions of the income distribution, while high-income households expanded their private tutoring spending. Consistent with these patterns, students from high-income families were more likely to rank at the top of their classes following the policy. We also show that the reductions in private tutoring participation, time, and expenditures were concentrated among urban households, which had substantially higher baseline tutoring spending and likely faced stronger enforcement of the regulation, while rural households experienced more limited changes. Finally, we find evidence consistent with substitution toward home based academic support. Students with college educated mothers exhibited lower private tutoring participation and lower overall education spending following the ban, suggesting that more educated parents may have been better able to compensate for the loss of external tutoring by providing academic assistance at home.

Taken together, our findings highlight important distributional consequences of the private tutoring ban. Although the policy aimed to reduce educational pressure and household spending, its effects were uneven across households. High-income families were better positioned to substitute toward less regulated and more expensive forms of academic support, such as one on one tutoring, while lower and middle income households faced sharper reductions in access to private tutoring without comparable alternatives. As a result, the policy may have widened disparities in access to effective academic support and contributed to unequal academic outcomes.

Our results underscore the importance of accounting for substitution across educational inputs and heterogeneity in household responses when evaluating prohibition based policies. Regulations that restrict private markets may alter how families invest in education without necessarily reducing total investment or academic competition. Future research could build on our findings by examining how such policies affect parental time investments, student well being, and longer-run educational and labor market outcomes, thereby providing a more comprehensive assessment of the welfare implications of large scale education reforms.

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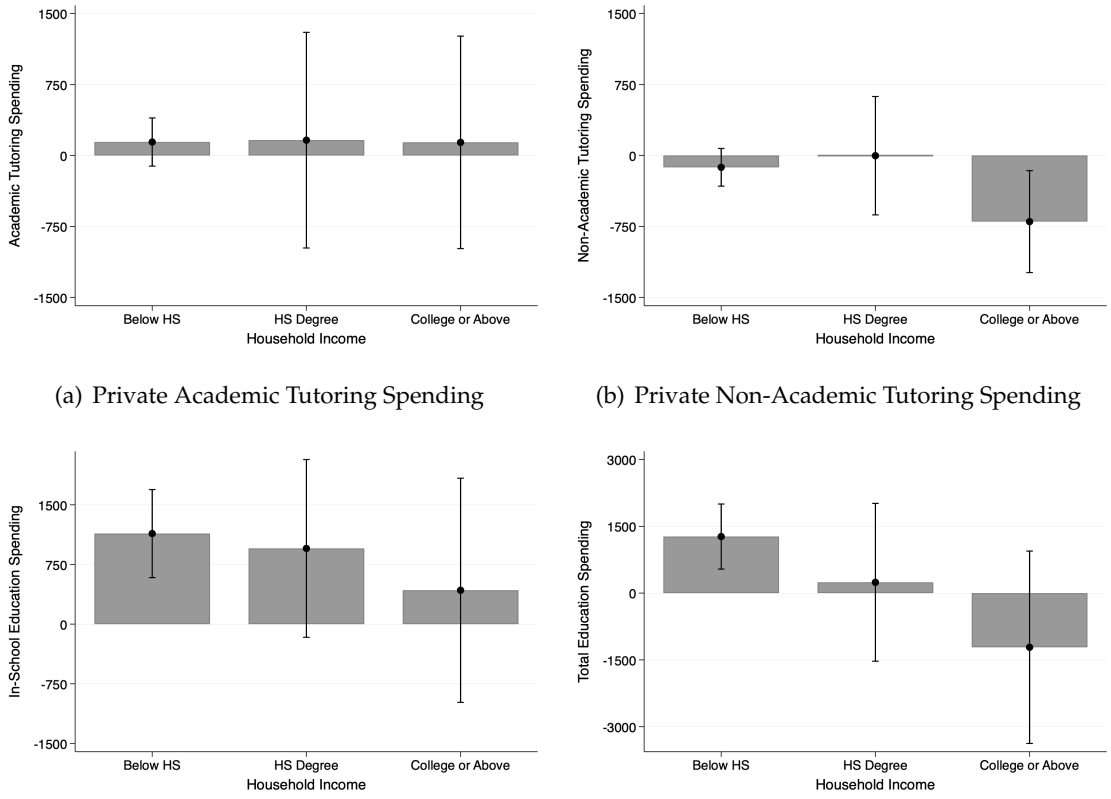
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Appendix: Supplementary Materials



(a) Private Academic Tutoring Spending

(b) Private Non-Academic Tutoring Spending

(c) In-School Education Spending

(d) Total Education Spending

Figure A1: Heterogeneous Effects on Private Tutoring by Mother's Education

Note: Students are divided into three groups based on maternal education: below high school, high school degree, and college or above.

Table A1: Examples of Administrative Penalty Records in Zhejiang Province

Case ID	Case Date	City	Penalized Party	Type of Organization	Penalty Amount (RMB)	Case Summary	Violation and Decision
No. 000137 [2022] Hangzhou-Xihu	12/12/22	Hangzhou	Zhu **	Individual	3,800	Zhu **, on July 8, 2022, illegally organized illegal private tutoring activities at Room 102, Unit 2, Building 11, Jialvyuan North, Xihu District, Hangzhou, Zhejiang Province.	Such conduct violated Article 12 of the *Law of the People's Republic of China on the Promotion of Private Education*. Pursuant to Article 64 of the same law, an administrative penalty of RMB 3,800 is hereby imposed.
No. 000201 [2023] Haining	5/20/23	Haining	Jinyaoshi Art Training Co., Ltd.	Firm	42,560	Haining Golden Key Art Training Co., Ltd., from January 31 to February 24, 2023, organized English subject training courses for primary school students at Rooms 301-304, Jiuhu Commercial Building, Haizhou Subdistrict, Haining City, Zhejiang Province, without obtaining a private tutoring permit. During this period, the company employed 8 teachers and enrolled 107 students, obtaining illegal income totaling RMB 42,560.	Such conduct violates Article 12 of the *Law of the People's Republic of China on the Promotion of Private Education* and constitutes an act of unauthorized operation of a private educational institution. In accordance with Article 64 of the same law, the following administrative penalties are hereby imposed: (1) an order to cease the operation of the tutoring; and (2) a fine equal to the amount of illegal income, i.e., RMB 42,560.
No. 001551 [2023] Zhuji	8/1/23	Zhuji	Xing Weilai Private Tutoring Co., Ltd.	Firm	26,400	Since April 2023, Xing Weilai Private Tutoring Co., Ltd., organized mathematics lessons for three students and collected a total fee of RMB 7,600. On June 5, Xing Weilai received a Notice of Order to cease academic tutoring operation, after which it refunded the fees. On June 14, law enforcement officers from our Bureau conducted an on-site inspection of Xing Weilai and found that it organized pre-exam tutoring sessions in mathematics and science for nine students, collecting an additional fee of RMB 1,200. On June 28, law enforcement officers from our Bureau conducted a follow-up inspection and found no ongoing subject-based educational training activities. In summary, Xing Weilai Private Tutoring Co., Ltd., illegally collected a total of RMB 8,800 in private tutoring fees.	This conduct violates Article 12 of the *Law of the People's Republic of China on the Promotion of Private Education*. It is hereby decided to impose an administrative penalty on Xing Weilai Private Tutoring Co., Ltd., consisting of a fine equivalent to three times the amount of the illegal gains. Accordingly, a fine of RMB 26,400 is imposed.
No. 000377 [2023] Shaoxing-Keqiao	10/13/23	Shaoxing	Chitu Private Tutoring Co., Ltd.	Firm	11,550	On August 9, 2023, Chitu Private Tutoring Co., Ltd., illegally operated private academic training at Rooms 322-326, Building 1, Platinum Commercial Building, Binhai Industrial Zone, Maan Subdistrict, Keqiao District, Shaoxing City for primary school students. The total amount of tutoring fees collected was RMB 11,550.	This conduct violates Article 12 of the *Law of the People's Republic of China on the Promotion of Private Education*. Pursuant to Article 64 of the same law, the following administrative penalty is hereby imposed: a fine of RMB 11,550.
No. 000864 [2023] Taizhou-Huangyan	11/10/23	Taizhou	Motong Private Tutoring Co., Ltd.	Firm	1,000	On November 7, 2023, Motong Private Tutoring Co., Ltd., conducted academic training for two students at [*address omitted for privacy*], Toutuo Town, Huangyan District, without obtaining a private tutoring permit. Tuition fees were charged at RMB 500 per month, with a total of RMB 1,000 collected.	This conduct of providing illegal academic private tutoring lessons violated Article 12 of the *Law of the People's Republic of China on the Promotion of Private Education*, constituting the illegal operation of a school or other educational institution. Given that the facts of the violation are clear, evidence is sufficient, and the Party Concerned has ceased operations and refunded the collected fees, the following administrative penalty is imposed pursuant to Article 64 of the same law: a fine of RMB 1,000.

Table A2: Summary Statistics by Year and Compulsory Education Status

	Complusory Education					High School				
	2017	2019	2021	2022	2023	2017	2019	2021	2022	2023
Demographics										
Female	0.452	0.460	0.477	0.439	0.459	0.485	0.470	0.463	0.509	0.480
Age	11.49	11.51	11.63	11.72	11.60	17.60	17.53	17.53	17.55	17.50
Only Child	0.434	0.382	0.354	0.354	0.346	0.625	0.565	0.609	0.605	0.570
Public School	0.906	0.910	0.925	0.920	0.931	0.855	0.855	0.874	0.842	0.832
Household Income	85240	75208	73351	66243	81722	86501	68797	69078	73572	72923
Mother Education > HS	0.394	0.359	0.306	0.350	0.461	0.372	0.332	0.352	0.348	0.384
Rural Area	0.407	0.414	0.453	0.460	0.435	0.340	0.365	0.396	0.465	0.432
Main Outcome Variables										
Any Tutoring	0.380	0.362	0.346	0.304	0.266	0.355	0.231	0.276	0.225	0.154
Academic Tutoring	0.299	0.269	0.253	0.181	0.140	0.326	0.193	0.246	0.184	0.119
Non-Academic Tutoring	0.180	0.187	0.188	0.200	0.163	0.109	0.0659	0.0712	0.0760	0.0418
Total Education Spending	.	4720	4666	4169	3798	.	8935	10304	9461	7992
In-School Education Spending	.	2015	1804	2249	1943	.	6478	6852	7136	5808
Private Tutoring Spending	2401	2705	2862	1920	1854	2973	2458	3453	2326	2185
Academic Tutoring Spending	1614	1750	1782	1000	958	2574	1893	2888	1728	1466
Non-Academic Tutoring Spending	734	808	909	812	747	342	418	379	162	490
Online Education Spending	53	147	172	108	149	56	147	186	442	228
Academic Perform. (Top of Class)	0.180	0.172	0.191	0.145	0.165	0.137	0.136	0.140	0.149	0.120
Academic Perform. (Above Average)	0.300	0.290	0.265	0.270	0.311	0.291	0.304	0.303	0.245	0.296
Academic Perform. (Average)	0.392	0.401	0.409	0.444	0.407	0.457	0.454	0.452	0.499	0.468
Academic Perform. (Below Average)	0.129	0.108	0.105	0.117	0.0923	0.115	0.0894	0.0928	0.101	0.103
Observations	10,877	9,674	4,717	1,652	7,153	3,032	2,610	1,040	342	2,318

Notes: This table reports the summary statistics by year and by compulsory education status. Household income and all education expenditures are denominated in RMB and deflated to real 2016 values. Private tutoring spending is the sum of academic tutoring spending, non-academic tutoring spending, and online education spending. Total education spending is the sum of private tutoring spending and in-school education spending Reported academic performance ranking ranges from 1 to 5, corresponding respectively to top, above average (excluding top), average, below average (excluding bottom), and others. These classifications are mutually exclusive. In-school education spending and total education spending in 2017 are excluded from the analysis because, during the first survey year, respondents mistakenly reported total education expenditures (combining both in-school and private tutoring spending) as in-school spending alone. After 2017, we revised the survey questions and instructions to prevent this error.

Table A3: Heterogeneity: Effects on Education Spending by Mother's Education

Spending	(1) Private Academic	(2) Private Non-Academic	(3) Private Tutoring	(4) In-School Education	(5) Total Education
Post × CE × College	-13.340	-400.433	-738.150	-923.917	-2504.596**
	(605.173)	(296.241)	(724.834)	(773.264)	(1190.523)
Dep. Mean	1816.93	606.93	2551.00	3168.86	5652.79
Observations	36,064	36,064	36,064	24,615	24,615

Notes: Robust standard errors in parentheses. We restrict the sample to households with students in grades 3 or above, when academic performance starts to become important for admission purposes. College refers to households with mothers who have a college degree or above. Private tutoring spending is the sum of academic tutoring spending, non-academic tutoring spending, and online education spending. Total education spending is the sum of private tutoring spending and in-school education spending. In-school education spending and total education spending in 2017 are excluded from the analysis because, during the first survey year, respondents mistakenly reported total education expenditures (combining both in-school and private tutoring spending) as in-school spending alone. After 2017, we revised the survey questions and instructions to prevent this error. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Heterogeneity: Effects on Reported Academic Performance by Mother's Education

	(1) "Top of Class"	(2) "Above Average"	(3) "Average"	(4) "Below Average"
Post × CE × College	0.005	-0.065**	0.021	0.017
	(0.022)	(0.028)	(0.030)	(0.018)
Dep. Mean	0.15	0.28	0.42	0.11
Observations	36,064	36,064	36,064	36,064

Notes: Robust standard errors are in parentheses. These academic performance categories are mutually exclusive. We restrict the sample to households with students in grades 3 or above, when academic performance starts to become important for admission purposes. College refers to households with mothers who have a college degree or above. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Drop 2021-2022 Sample: Effects on Tutoring Participation

	Academic Tutoring		Non-Academic Tutoring	
	(1) Dummy	(2) Hours per Year	(3) Dummy	(4) Hours per Year
Post × CE	-0.012	-16.092***	0.015*	-4.533
	(0.010)	(6.017)	(0.008)	(7.984)
Dep. Mean	0.24	56.31	0.16	25.67
Observations	35,664	21,755	35,664	21,755

Notes: Robust standard errors are in parentheses. Survey years 2021-2022 are not included in this table. We exclude tutoring hours in 2017 to ensure accurate reporting within our sample. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A6: Drop 2021-2022 Sample: Effects on Education Spending

Spending	(1) Academic Tutoring	(2) Non-Academic Tutoring	(3) Private Tutoring	(4) In-School Education	(5) Total Education
Panel A: Spending in Levels					
Post × CE	-115.797	-201.858*	-401.653*	872.360***	234.717
	(184.461)	(117.404)	(236.550)	(274.178)	(390.390)
Observations	35,664	35,664	35,664	21,755	21,755
Panel B: Spending as a Share of Household Consumption					
Post × CE	-0.001	-0.003***	-0.004**	0.030***	0.027***
	(0.001)	(0.001)	(0.002)	(0.004)	(0.004)
Observations	35,664	35,664	35,664	21,755	21,755

Notes: Robust standard errors are in parentheses. Survey years 2021-2022 are not included in this table. Private tutoring spending is the sum of academic tutoring spending, non-academic tutoring spending, and online education spending. Total education spending is the sum of private tutoring spending and in-school education spending. In-school education spending and total education spending in 2017 are excluded from the analysis because, during the first survey year, respondents mistakenly reported total education expenditures (combining both in-school and private tutoring spending) as in-school spending alone. After 2017, we revised the survey questions and instructions to prevent this error. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.