Unintended Consequences of China's Double Reduction Policy: Its Immediate and Intergenerational Impacts

Xin Liu* Xin Meng† Guangqian Pan‡ Guochang Zhao§

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Abstract

Like many East Asian societies, China has faced increasing competition in the education market. China's household spending on private tutoring has skyrocketed, while mental and physical health issues among teenagers have become increasingly prevalent. To address this growing concern, in July 2021, the Chinese government launched the "Double Reduction" (DR) policy, aimed at reducing both students' excessive school homework burden and after-school private tutoring. Using a specially designed household survey, a constructed policy enforcement index, and a difference-in-differences (DID) strategy, this paper evaluates the policy's impacts on its intended objectives. We find that, on average, the DR policy increased children's private tutoring enrolments, households' private tutoring expenses, and the time parents spend helping with schoolwork. At the same time, it also increased mothers' likelihood of participating in the labor market. However, these effects are not uniformly distributed: children from low-income households were negatively affected in terms of private tutoring participation, which consequently led to a decline in their academic performance.

Keywords: Education Policy, Private Tutoring, Academic Outcome, Intergenerational Inequality, Parent Outcome

JEL Classification Code: I21, I24, J22, J24, D04, D13

*Research School of Finance, Actuarial Studies and Statistics, Australian National University, email: xin.liu@anu.edu.au

†Research School of Economics, Australian National University, e-mail: xin.meng@anu.edu.au

‡Business School, The University of Sydney, e-mail: guangqian.pan@sydney.edu.au

§Research Institute of Economics and Management, Southwestern University of Finance and Economics, e-mail: guochangzhao@swufe.edu.cn

1 Introduction

Parental investment in children's education is a key channel through which the intergenerational transmission of income and wealth occurs (Guryan et al., 2008). In societies where education yields high returns, rational parents would invest heavily in their offsprings' education, due both to their altruistic motives and/or concerns for their own care in age. In some societies where education itself is a status symbol, education is sought after as an investment even when its financial returns are not particularly attractive (Kim et al., 2024). Governments invest in education because it has strong positive externalities. At the same time, due to the crucial role that education plays in the intergenerational transmission of income, wealth, or status, governments that prioritise equality may also seek to limit private educational investment.

Like many East Asian societies, China has seen a significant increase in returns to education over the past 40 years (Zhang et al., 2005; Appleton et al., 2005; Yang, 2005; Meng, 2012; Huang et al., 2022). Combined with its traditional Confucian reverence for education and intellectuals, the society has become a place with fierce competitions among schools, students, and parents with regard to students' education achievements (Kim et al., 2024). To enhance children's educational performance, schools and parents exert increasing pressure on students to work harder, assign them more and more homework, and enrol them in extensive private tutoring, which deprives them of leisure time or time to take responsibility for household chores. Two inevitable consequences have emerged: household spending on private tutoring has skyrocketed (Zhou et al., 2023) and mental health and physical health issues among teenagers are becoming increasingly prevalent (Hou and Chen, 2021; Dong et al., 2023). These developments may potentially exacerbate future income inequality among the next generation and deprive society of a healthy and knowledgable workforce (Zhang and Xie, 2016; Zhang and Bray, 2018; Guo and Qu, 2022).

To mitigate undersirable consequences that have befallen other East Asian countries,[1] the Chinese government embarked on a continued effort to reduce students' excessive homework burden. Starting as early as 1988, various government agencies have made numerous announcements and implemented a range of policies to reduce students' educational burden. Despite these efforts, the pressures on students appeared to increase year after year. By 2019, after decades of policy interventions, China had developed one of the largest and fastest-growing K-12 private tutoring industries, with a market value between 200 and 300 billion USD, which is equivalent to near half of that year's total public

[1]To reduce students' educational burden and parental educational spending, the South Korean government has adopted many policies since the 1960s (Kim, 2004). In 2006, the South Korean government introduced a curfew that prevents private tutoring organisations from operating after 8:00 p.m. (Choi and Choi, 2016). Similarly, the Japanese government implemented a policy to reduce curriculum coverage and decrease students' time spent at school (Goodman, 2003).

spending on education in China (Deloitte, 2019).[2] Studies evaluating the impact of the Chinese government's policies in curbing the unchecked increase in educational burdens generally suggest that these efforts have been ineffective. If anything, the measurable trend of students' burden and spending on private tutoring kept increasing (For the most recent literature, see Yang, 2019; Xiang, 2019; Chen and Zhang, 2020; Zhou et al., 2023; Qian and Chen, 2024).[3]

In July 2021, amid the Covid-19 pandemic, China launched a new campaign known as the "Double Reduction" (DR) policy. This initiative aimed to both reduce students' excessive school homework burden and regulate out-of-school private tutoring. The broader goals of the DR policy were to promote balanced development for students, control household education expenditures, and relieve parents from the extra time input into their children's education. Ultimately, the policy was designed to reduce intergenerational education and income inequality (Zang, 2022).

The policy measures introduced this time were notably detailed. For example, the policy regulates the amount of homework teachers are allowed to assign for each grade level. On the private tutoring side, the policy banned for-profit operations, restricted the hours and days tutoring institutions could operate, and significantly reduced the incentives for these institutions to remain in business. One reason for previous policies' failure was because they were vague and hard to monitor (Chen and Zhang, 2020). In contrast, the DR policy specifies and quantifies the restrictions, allowing various levels of government to more effectively monitor its implementation. Leveraging the detailed nature of the DR policy, we generate a policy enforcement measure by tracking the frequency of keywords related to specific monitoring methods, which enables us to assess variations in enforcement over time and across regions.

The announcement of the DR policy sent shock waves into society. According to the *Financial Times*, on the day the policy was introduced, the value of Chinese education stocks plummeted by nearly 60% (Agnew et al., 2021). Households also responded almost immediately. As the DR policy restricted institutional tutoring and the homework load, parents reacted by switching to individualised private tutoring (Hale, 2023). This can be seen in Figure 1, in which we use the Baidu (China's leading search engine) search frequency to show that while interest in institutional tutoring slightly tapered off following the introduction of the DR policy, interest regarding individualised tutoring surged significantly.

In this paper, we use a newly conducted online survey to investigate whether the DR policy achieved its intended objectives. The survey was designed specifically for this purpose and collected a rich array of education- and parenting- related information. As indicated above, we construct an

[2]The data on China's public education spending for 2019 are obtained from Ministry of Education of China and National Bureau of Statistics of China (2020)

[3]For a detailed review of this line of literature on the evaluation of the earlier policies related to the reduction of students' burden in the Chinese language, see Chen and Zhang (2020); Zhou et al. (2023).

annualised policy-enforcement-intensity measure by city. We use the frequency that certain DR policy enforcement-related keywords appeared in the city's government documents or news articles for each city in each year. Using a difference-in-differences (DID) approach with individual-level fixed effects, we examine whether the DR policy reduced students' educational burden as measured by participation in private tutoring, household spending on private tutoring, and parental time spent on their children's education.[4] We also investigate the DR policy impact on children's academic achievement, as well as mothers' labour force participation and full-time employment. Finally, we explore the policy effect on intergenerational inequality in private tutoring spending and children's academic outcomes.

Our results show that the DR policy did not reduce, but instead increased, the likelihood of children being enroled in private tutoring, primarily in individualised tutoring rather than large-scale institutional classes. The policy led to increases in both academic- and arts/physical education (PE)-related tutoring. In addition, the DR policy increased households' private tutoring spending, though children's educational performance, on average, remained unaffected. The DR policy also induced an increase in parental time spent in helping with their children's schoolwork and increased mothers' labour market participation. These results suggest that anxious parents, uncertain about the future, took strategic actions in response to the introduction of the DR policy to boost their children's future competitiveness. Since the most enforceable aspects of the DR policy involve limiting schools from assigning excessive homework and discouraging institutional private tutoring, parents turned to the less enforceable parts of the policy by increasing the use of individualised tutoring and increasing their own effort to offset potential disadvantages from the reduction in school educational efforts.[5]

However, these average impacts of the DR policy were not uniformly experienced across all households. Further investigation reveals that the increase in children's private tutoring and tutoring spending occurred primarily among households in the second income quartile and above, with the effect becoming stronger as household income rises. Households in the bottom income quartile did not increase their use of private tutoring or increase spending on their children, resulting in a decline in their children's educational performance. Interestingly, the low-income households spent much more time helping with their children's schoolwork to compensate for their inability to enrol their children in private tutoring. In addition, mothers from low-income households also increased their labour supply (both labour force participation and full-time work), presumably to help pay for the future need to increase spending on their children's education, such as private tutoring, even though they were

[4]There is a large body of literature that examines the determinants and consequences of private tutoring as a major parental investment (Dang, 2007; Jung and Lee, 2010; Ryu and Kang, 2013; Jheng, 2015; Zhao, 2015; Zheng et al., 2020; Wiseman, 2021; Kang, 2023).

[5]Although previous research has shown that private tutoring in China positively affects academic performance (Guo et al. (2020)), under the DR policy, the surge in tutoring seems to have acted as a counterbalance to the reduction in schoolwork.

currently unable to.

If we regard the households in the second income quartile as the aspirational class in the society, it seems that to achieve their aspiration for their children they compensated for the need to pay more for their children's education by working more, while those in the first income quartile were unable to compensate despite the fact that they also worked more. Instead, they tried to spend more of their leisure time helping their children with their homework. These findings suggest that there may be a long term intergenerational consequences of the DR policy: if children's current educational performance can be translated into their future income level, the impact of the DR policy will exacerbate income inequality in the next generation and hinder the government desire to reduce future income inequality even though the ultimate objective of the DR policy is to do so. The fact that when they are unable to pay for the private tutoring they sacrifice more of their own leisure time to help their children's school work and to work harder in the market place suggest that they are an aspirational group. Unfortunately, in reality their children's current academic performance has been adversely affected by the DR policy. These findings suggest potential long-term intergenerational consequences of the DR policy. If current educational performance translates into future income levels, the policy may exacerbate income inequality in the next generation. Ironically, although the DR policy aims to reduce future income inequality, its actual impact could widen the gap, particularly for children from lower-income households who are unable to benefit from private tutoring due to household budget constraints.

Our paper contributes to the growing body of literature evaluating the DR policy. Due to the lack of micro-survey data, most existing literature on evaluating the DR policy has relied on internet search frequency data to indirectly infer the policy's impacts on the demand for institutionalised private tutoring and its substitution effects (Liu et al., 2022; Zhao et al., 2024).[6] We are the first to use household survey data to directly examine the behavioural implications of the DR policy on outcomes for both children and their mothers.

In addition, unlike most existing studies on the DR policy, which primarily rely on the timing of the policy implementation to identify the average treatment effect, we construct a measure of policy enforcement intensity to examine the heterogeneity of treatment effects across regions. The nonlinear relationship between enforcement intensity and policy outcomes offers new insights into the dynamics of policy implementation as well as potential strategic responses from households.

Furthermore, existing literature on the impact of the DR policy and/or similar policies introduced in other countries or within China in other periods predominately focuses on average effects (Choi and Choi, 2016; Zhou et al., 2023; Liu et al., 2022; Zhao et al., 2024; Dai, 2023a). Our study contributes to

[6]Another branch of the research focuses on the policy's impact on the education industry itself: its growth and employment (Dai, 2023a; Huang et al., 2024).

this body of work by examining the policy impact across different income groups. Previous literature (Becker and Tomes, 1979; Tomes, 1981; Becker and Tomes, 1986; Mulder et al., 2009) has highlighted the importance of education and human capital in the intergenerational transmission of wealth and income. The DR policy intended to equalise the amount of educational help children receive from schools and families to equalise their educational achievements. Our paper is the first to empirically show that the DR policy in fact caused unintended consequences of increasing education costs and unequally distributing of private educational resources. These unintended educational inequalities, accompanied by China's long-held social preference for education achievement, could lead to worsening intergenerational income distribution and long-term social losses.

Finally, this paper is related to a broad literature on policy designs and their unintended adverse consequences. Previous studies have found that policies designed for one purpose often ignore its general equilibrium impact on other aspects of the market or societies (see, e.g., Johnston, 2021; Timpe, 2024). While the DR policy may initially appear to have achieved what it planned to do — schools indeed reduced students' homework, and many private tutoring institutions were shut down, its actual objectives were undermined. To compensate for the reduced homework, households, on average, increased children's private tutoring enrolments, leading to higher tutoring costs. This disproportionately affected poorer households, limiting their ability to use private tutoring to make up for the lack of school homework and consequently leading to a decline in their children's academic performance. In a society with deep-rooted respect for education and intense market competition, the demand for education is inelastic. In such circumstances, policy designs that ignore potential household reactions will inevitably lead to unintended consequences.

The remainder of the paper is organised as follows. The next section outlines the institutional background of China's education system, its evolution, and the details of the DR policy. Section 3 describes our survey and the data used in the paper. Section 4 details the model specification and validates our identification strategy. Section 5 presents the results, and the concluding remarks are discussed in the last section.

2 Background

China has had a long history of respect for education. In the seventh century B.C., one of the early Chinese philosophers, Guan Zhong, stated, "Planting grains will yield results within the year, offering immediate but temporary benefits. Planting trees takes longer to bear fruit, but their rewards are sustained over a longer period. Cultivating and educating people has the most profound and lasting impact, as educated individuals contribute to society in numerous ways over their lifetimes." This sentiment might be considered one of the earliest discussion of "human capital" in history.

Throughout history, Chinese philosophers and rulers have engrained its society with aspirations for education and to be educated. They have placed a high value on education as a means for moral development and societal improvement. They established the civil servant examination system (the *Keju* system) to select rulers and managers of society, allowing any member of the society to rise to the top through education. As Mencius famously stated, "Those who labour with their minds govern others; those who labor with their strength are governed by others." Over the past thousands of years, these teachings have made Chinese society aspire to become the educated and intellectuals (Watkins, 2000). Legends, such as the one about Mencius' mother moving house three times to help her son focus on education (Known as "Meng Mu San Qian"), more than two millennia ago, and numerous stories of "Tiger Mothers" in the twentyfirst century, all highlight how deeply Chinese society values and aspires to academic excellence (Schuman, 2015; Yen and Wu, 2015).

This cultural belief is the foundation for Chinese learning and teaching. That, fueled with the status-conscious nature of Chinese society and the increasing demand for educated people in the marketplace since China's economic reform, has driven ever-growing competition among schools, students, and parents to have students achieve better class rankings and succeed in school entrance exams (Guo and Qu, 2022). In a 2012 PISA survey, the OECD identified that among 62 countries and regions, including 15-year-old students in Shanghai, Chinese students, on average, spent the most number of hours doing homework, around 14 hours weekly (OECD, 2014). Zhao et al. (2024) uses a nationally representative survey, the China Education Panel Survey (CEPS) and finds that in 2013-14 academic year, Chinese students in grades 7 and 9 spent an average of 2.13 hours each weekday doing homework. In addition, parents also enrol children into additional private tutoring and the demand has been so high that in the past ten years, the private tutoring industry has had an annual growth of over 10% up until 2018 and by 2019 the industry has a $100 billion USD market size (Deloitte, 2019; McMorrow et al., 2021).

The persistent pressure placed by families and society on children to excel academically, which begins when the children are young, has led to significant adverse effects on their mental and physical health (Hou and Chen, 2021; Dong et al., 2023; Zhao et al., 2024). This intense educational competition has not only driven up family education costs but has also exacerbated educational inequality and potential intergenerational income disparities (Zhang and Xie, 2016; Zhang and Bray, 2018; Guo and Qu, 2022).

Over the years, the Chinese government has made relentless efforts to mitigate the extremely high academic expectations and pressure placed on children by parents and society. Initiatives have included administrative mandates for schools to reduce homework hours and in-school time, but they met with limited success (Yang, 2019; Xiang, 2019; Chen and Zhang, 2020; Zhou et al., 2023; Qian

and Chen, 2024). The most recent major reform before the Double Reduction policy was the "Thirty Education Burden Reduction Policies" in late 2018 and 2019. While the policies outlined a framework to regulate both in-school and after-school education practices, their effect was limited due partly to its narrow scope and partly due the Covid-19 pandemic that emerged n late 2019.[7] Despite these policies, China's K-12 after-school education market still grew by 18% in 2018 (Deloitte, 2019).

2.1 The Double Reduction Policy

2.1.1 Policy restrictions

By early 2021, Covid lockdowns were largely over. The Chinese government picked up the momentum from its 2018–19 reform and introduced the "Double Reduction" policy on July 24, 2021. Formally titled "The Notification about Further Reducing Students' Homework Burden and Their After-School Private Tutoring Burden for the Compulsory Schooling Age," the policy aims to reduce both homework and after-school private tutoring, hence the term "Double Reduction". The policy primarily targets children enroled in compulsory education, that is, grades 1 to 9 (Qian and Chen (2024)).[8]

Two main reforms regarding homework reduction were introduced. First, the policy stipulates that students in grades 1 and 2 should not be assigned any homework. For grades 3 to 6, homework should not exceed one hour per day, and for grades 7 to 9, it should not exceed 90 minutes daily. Second, the policy urges schools to provide more after-class activities to students to meet their education needs. For example, teachers are encouraged to assist students with their homework on campus. If possible, students, especially primary school students, should be able to finish all their homework on-campus under teachers' assistance. It also asks schools to encourage students to attend other after-class activities on campus, such as science education, art training, physical exercises, and physical work activities. The policy requires these after-class activities to extend the school hours until parents finish their work so to reduce the parental child-care burden. For junior high schools, the on-campus training can be in the evenings.

To reduce after-school academic tutoring, the most prominent restriction targets after-school K-12 academic tutoring institutions. From an opertational perspective, the DR policy prohibits issuance of licenses for these institutions and requires existing institutions serving the compulsory schooling ages to convert from for-profit to not-for-profit institutions. Furthermore, the policy bans private tutoring activities on weekends, and school and public holidays, and restricts weekday tutoring to before 8:30 p.m. for in-person sessions. Tutoring institutions are also prohibited from assigning

[7]The pandemic led to widespread school closures, and online learning and private tutoring became essential tools to substitute face-to-face teaching and maintain continuity of education.

[8]In China pre-college education consists of three stages: primary school (grades 1–6), junior high school (grades 7–9), and senior high school (grades 10–12). Primary and junior high school are classified as compulsory education.

homework to students. Local authorities are to monitor the content of private tutoring materials, and advertisements for tutoring institutions were banned.

From a financial perspective, the policy prevents tutoring institutions from obtaining funding from financial markets.[9] Subsequently, initial public offerings (IPOs) for companies in the sector, whether onshore or offshore, are forbidden. Tuition fee payments are also restricted to a maximum of three months' worth of tutoring fees or 5,000 RMB. Moreover, regulators are authorized to monitor the institutions' bank accounts to detect any violations.

The effects on private tutoring institutions were immediate. On the day the policy was introduced, the share prices of leading publicly listed private tutoring companies dropped by 60%. Analysts forecast that the size of China's tutoring market would collapse by 76%, to $24 billion (McMorrow et al. (2021)). Dai (2023a) finds an immediate negative impact of the "Double Reduction" policy on the stock prices of education companies in China. Online job postings in the sector also plummeted by 89% within four months (Huang et al., 2024). One year after the policy's introduction, the number of registered tutoring institutions declined by more than 90%, and the average fee dropped by 40% for the remaining institutions. All the remaining institutions have been converted into not-for-profit entities (Chinese Ministry of Education, 2022).

2.1.2 Policy exemptions

Subject matter: The goal of the DR policy is to reduce students' ***academic tutoring*** burden; ***non-academic tutoring*** is generally exempted from the restrictions (Chinese Ministry of Education, 2021a). Specifically, the "academic subjects" include morality and law, Chinese, history, geography, mathematics, foreign languages (including English, Japanese, and Russian), physics, chemistry, and biology. In contrast, "non-academic" subjects include physical education, arts, music, painting, and general practice activities (including information technology, life-skills, and other hands-on learning).
Age groups: The main purpose of the DR policy was to reduce educational burdens for children in compulsory education (Grades 1 to 9). The policy enacted only minimal restrictions for students in senior high school. Table 1 highlights the key differences between policies for students in compulsory education and senior high school. Notably, there is no restriction on the amount of homework that senior high schools can assign to their students (Chinese Ministry of Education, 2021b). In addition, most restrictions imposed on after-school academic tutoring institutions for compulsory education students are not applicable to senior high school students (Chinese Ministry of Education (2021b)). For example, tutoring institutions for senior high students can remain as for-profit organisations. As

[9]Consequently, publicly traded institutions were forced to exit the regulated market in response to the regulatory development. For instance, TAL Education, one of the industry leaders, traded on the New York Stock Exchange, ceased offering after-school tutoring services on academic subjects for students in grades 1–9 in mainland China as of December 31, 2021.

of February 2024, there were still 6,499 senior high after-school tutoring institutions, of which 2,484 are for-profit organisations. Overall, private tutoring institutions serving senior high school students were less affected by the Double Reduction policy compared to those serving compulsory education age groups.

2.1.3 Policy enforcement

Like many policies implemented in China, the RD policy, despite being introduced nationwide, relied heavily on local governments for enforcement. Since July 2021, different provinces and cities have employed various tools to monitor compliance among schools, business registrations authorities, and private tutoring institutions. Enforcement measures have included official supervision, formal inspections, undercover visits, public disclosure of institutions that violated policy requirements, and denouncement of noncompliant institutions. We use these enforcement measures to measure the strength of regional policy enforcement in our subsequent analyses.

2.2 Other relevant events

The DR policy was introduced in the second half of 2021, and our data covers 2019–2023. During the period, two other events occurred that may also affect household behaviour regarding educational investment as well as local governments' DR policy enforcement.

One of these events was the Covid-19 pandemic that began in the early 2020 and lasted until the end of 2022. The severity of the disease outbreak varied across regions and over time, leading to differing local government responses. During the initial stage of the Covid, Wuhan and its surrounding areas experienced a complete lockdown, while most other regions in China were less affected. As the virus spread more widely, more regions were affected. Effective public health responses, such as contact tracing, broad-based testing, mask-wearing, isolated lockdowns, and school closures, eventually curbed the initial spread of the disease. By early 2021, China was largely open. However, in 2022, the emergence of the Omicron variant rendered previous responses less effective, and the country faced renewed lockdowns until the end of 2022.[10] Inevitably, these various lockdowns and school closures affected how local governments and households responded in the education sector, which in turn, might have affected their reactions to the DR policy. A study by Deng et al. (2022) reveals that there was an increase in the education gap between the rich and the poor during the Covid-19 lockdown periods.

Another event relevant to our study is the "Education Streaming" policy. China's upper secondary education comprises two streams: the academic (senior high schools (SH)) and the technical streams

[10]Studies have shown that the lockdown policies during Covid-19 negatively impacted the labour market in China (Zeng et al., 2022; Gong et al., 2024).

(vocational schools (VS)). At the dawn of China's reform era, upper secondary education was predominately academic. For instance, in 1980, more than 85% of upper secondary students were enroled in the academic stream. In 1983, the government set a goal to achieve parity between the two streams by 1990 to address the shortage of skilled workers during China's rapid industrialisation (Wang and Guo, 2019). This goal was achieved by 1985, and the share of the VS enrolment peaked at approximately 65% in 1995–1996. However, a significant shift occurred in 1998, when the VS share again declined sharply. This change was driven by several factors. First, the government ended job assignments for VS graduates. Second, (2) the large-scale higher education expansion in 1999 increased enrolments at SHs (Wang and Guo, 2019; Yu, 2019). Third, many vocational schools were upgraded to vocational colleges (Wang and Guo, 2019; Yu, 2019). In the first two decades of this century, the Chinese central government issued two policies aimed at increasing VS enrolment, both with little success.

In 2019 a new policy, titled the "National Vocational Education Reform Implementation Plan," was introduced to rebalance VS and SH education. This plan mandated that each region allocate a fixed share of their junior high school graduates to enrol in the academic stream of senior high schools. We refer to this policy as the "Education Streaming" policy. Local governments determine the fixed share based on their capacity and market demand. The introduction of this policy generated widespread media interest and public anxiety (Jiang, 2024). It can be argued that the strength of the "Education Streaming" policy's implementation could be correlated with local governments' efforts to implement the DR policy. At the same time, the households' reaction to the two policies may have reinforce each other.

3 The Survey and the Data

3.1 The survey

In October 2023, we conducted an online household survey entitled, "Double Reduction and Household Education Decision Survey," using the survey platform Wenjuanxing (www.wjx.com). Wenjuanxing is a leading service provider in China for creating and distributing online questionnaires. It offers free tools for questionnaire designing and charges a fee for collecting online surveys and providing a sampling service. As of 2023, the platform boasted over 6.2 million registered members, which serves as the sampling pool. Their sample pool maintains a gender balance of 48% male and 52% female, with the primary age groups being 20–30 (41.3% of the total sample) and 30–40 (32.5% of the total sample). Geographically, while the sample pool covers individuals from all provinces in China, it disproportionately contains respondents from developed regions like Guangdong, Beijing, and Shanghai.

Our survey specifically targets mothers of children in grades 1 through 12 and has a sample size around 10,000. Because in general online surveys are more likely to attract more-educated urban dwellers and surveys of our type are more likely to attract mothers with children in primary schools,[11] to strike a balance, we set two sampling requirements: First, at least 50% of the sample mothers should have an education level below senior high school; second, at least 40% of the children should be attending junior high school or higher.

In September 2023, we initiated three rounds of pilot surveys, each consisting of a sample of 200 respondents, to refine the questionnaire and detect potential sampling inbalances. After this validation process, the formal survey began in October 2023 and lasted approximately two months. The final sample consists of 10,120 valid responses.[12]

Figure A1 in Appendix A compares the sample geographic distribution with the population distribution from the 2020 Population Census. It shows that the provincial share of our sample is roughly consistent with the provincial share of the population. To the extent that our sample does not fully reflect the population distribution, we adjust our results using the population weight generated from the 2020 Population Census. To gauge the representativeness of our sample concerning the age of children and the education level of mothers, we compare our sample distribution with that from the 2020 China Family Panel Survey (CFPS) data. Figure A2 in Appendix A shows that relative to the CFPS sample, our survey over-sampled boys, and for both genders we have more 7- and 13-year-olds. Regarding the mother's education level, our sample mothers have a much higher level of education than the population average. Of the mothers of children age 6–15 in CFPS sample, 81% have a senior high or lower education level, while our sample only has 63% of mothers with an education level at or below the senior high school level. As far as these sampling biases are concerned, we need to be cautious when interpreting our results.

Our survey collects, retrospectively, information from 2019 to 2023, relating to children's private tutoring experiences, spending on private tutoring, children's academic ranking within their respective classes, as well as the time parents spent assisting their children with school homework. In addition, we asked the respondents to report on basic demographic information for parents and children, parental labour market involvement, and income. Finally we also assess their parenting style.

[11] We observed this pattern during our three rounds of pilot surveys.

[12] There were also 4,201 responses deemed invalid.

3.2 Sample and summary statistics

Our main sample includes children who were enroled in grades 1–9 (aged 6–15) for each of the five years between 2019 and 2023.[13] Table 2 reports the summary statistics for key variables used in the paper that relate to parents. Panel A presents some basic parental characteristics. On average, mothers in our main sample (grades 1–9) are around 36 years of age, while their husbands are about one year older. Parents of children in senior high school, are, understandably, older. Around 37% of mothers and 55% of fathers in the main sample have at least a college degree and these proportions are similar for parents with senior high school children. Of the mothers, 96% are in their first marriage; the rate for parents with older kids is much lower, at 91%.

Panel B of Table 2 reports variables that changed over time. We observe, for our main sample, that both mothers' labour force participation and their full-time employment increased between 2019 and 2023, especially since 2021. Additionally, the average income for both parents has increased significantly. This general trend is also observed for the sample of parents whose children enroled in senior high schools, although the sample size for this group, especially in the early years, is very small. Furthermore, for the main sample, the data show that parental time spent helping children with their homework increased sharply. In 2019, 36% of parents spent less than five hours weekly helping children with their homework, but this decreased to 29% in 2023. This though is opposite for the sample of older children. If we ignore the 2019 data (with seven observations), a much larger share of parents spent less than five hours helping children with their homework.

Table 3 summarises some important outcome variables for children. For the main sample (grades 1–9), participation in private tutoring increased significantly. However, for the senior high school sample, the increase is less pronounced. Conditional on participating in the private tutoring, the majority used institutionalised private tutoring services, and this general trend has remained consistent over time.

3.3 The policy intensity measure

To measure regional variation in the enforcement of the DR policy, we explore the monitoring methods used by various levels of government. Using these methods as keywords, we searched each prefecture-level city's official website and relevant news articles during three periods: July 24, 2021 to December 31, 2021; January 1, 2022 to December 31, 2022; and January 1, 2023 to December 31, 2023. We focused on the frequency of five keywords: 1) DR undercover visits, 2) DR blacklist, 3) DR inspections, 4) DR violations, and 5) DR public disclosures. The search results are shown in Figure 2. There is a large variations in the frequency of these keywords across cities and over the three periods.

[13] Later we also use children who were enrolled in senior high school (aged 16–18) as an attempt to assess the sensitivity of our estimated effects.

3.4 Variables measuring Covid-19 severity

To account for the impact of the pandemic on government and household behavior, we include measures that capture regional Covid-19 conditions. During the Covid period, China's regional health commissions provided daily updates to the public on their website on local and imported new cases, cumulative cases, number of recoveries, and deaths, and they occasionally detailed travel histories of confirmed cases. We downloaded mainly the daily case number data and generated two variables to be included in our estimation: the annual average of the daily new cases and the standard deviation (SD) of the daily new cases for each year.

Our dataset covers the period from January 21, 2020, to December 21, 2022, for 344 prefectural regions.[14] On average, the annual daily number of new cases is 5.1, with a SD of 17.3. However, as shown in Figure 3, the primary disruption occurred in 2022.

3.5 Education Streaming

To accurately measure the Education Streaming policy across different regions, we employ the ratio of senior high school enrolments to junior high school graduates as the key metric. Most of these data are sourced from the Comprehensive Statistical Yearbooks of China. When the yearbook data are unavailable, we supplement them with reported values from local media outlets. Data points from around 63 cities in 195 city-year cells are obtained from this latter source. Figure 4 presents the distribution of the academic streaming ratio during the period 2018–2022, which shows that the mean ratio remains stable but becomes a little less dispersed in 2021 and 2022.

4 Model Specification and Identification Strategy

Our purpose is to examine the impact of the implementation of the DR policy on household behaviours, specifically in relation to children's participation into private tutoring, spending on private tutoring, children's academic performance, mothers' labour market responses, and parental time spent assisting their children with homework. In a standard DID setting, the two-way-fixed-effects (TWFE) model typically requires only the city and year fixed effects. However, since we have a panel dataset, we estimate a more restrictive model using *individual* rather than *city* fixed effects. This approach can improve our identification, particularly when policy impacts vary across individuals, and enhance the precision of our estimates. In the case of children's academic performance, which is measured by

[14]To construct our variables, we first matched city names in the Covid-19 data with a list of prefectural cities in our dataset. For each year from 2020 to 2022, we calculated new cases by summing daily new case numbers over the year to generate the annual average of the daily number, the standard deviation (SD) of the daily number, as well as the maximum daily number.

within-class ranking, adding individual fixed effects also resolves the potential issue of comparability of within-class ranking across different schools in a city. The model is specified as follows:

$$Y_{ijt} = \alpha_0 + \alpha_1 DRP_{jt} + \alpha_2^{'} X_{ijt}^{c} + \alpha_3^{'} W_{ijt}^{p} + \alpha_4^{'} C_{jt} + \eta_i + \delta_t + \epsilon_{ijt}, \tag{1}$$

where Y_{ijt} is a vector of outcome variables for child/mother i in city j at year t. DRP is the DR policy intensity variable, which measures the frequency of the appearance of the five DR implementation-intensity-related keywords in the cities' official documents or news articles for each of the three years after the implementation of the policy. X_{ijt}^{c} is a vector of the child's control variables (age, gender). W_{ijt}^{p} is a vector of parental controls (marital status, father's education, log of household income (log of father's income in the case of mother's labour market responses), and parenting style. C_{jt} is a vector of city-level time-varying variables capturing the pandemic situation (average daily number of cases and the standard deviation of the daily cases for the year), as well as the Education Streaming policy changes for city j in year t. η_i and δ_t are individual and time fixed effects, while ϵ_{ijt} is the random error term.

Note that in Equation (1), DRP is a continuous variable that ranges from 0 to 1200, while α_1 is the estimated average causal effect of the DR policy. However, the magnitude of α_1 is hard to interpret and the assumption that it measures the average effect is also very strong, suggesting that in such a wide range of policy intensities the effect is linear. To enable an easy interpretation of the magnitude of the policy effect and also to capture the potential nonlinearity of the policy impact, we divide DRP into six equally distanced bins (G), and the lowest frequency is used as the omitted category. Thus, Equation (1) becomes the following:

$$Y_{ijt} = \alpha_0 + \sum_{g=2}^{6} \gamma_g GDRP_{gjt} + \alpha_2^{'} X_{ijt}^{c} + \alpha_3^{'} W_{ijt}^{p} + \alpha_4^{'} C_{jt} + \eta_i + \delta_t + \epsilon_{ijt}, \tag{2}$$

where $GDRP$ is five dummy variables that equal one if the city's policy intensity frequency falls into the g group, zero otherwise.

The α_1 and γ_g estimated from the above models should capture the causal effect of the DR policy, under the assumption that cities with and without intensive policy implementation would have behaved similarly in the absence of the DR policy. This is a strong assumption that requires a pre-trend analysis. To test this, a counterfactual group is required. In our case, however, as the policy was implemented nationwide in China at around the same time, there is no ideal counterfactual group available.

Instead, we adopt two less ideal alternatives. First, we define households from cities that had the

lowest level of policy enforcement as our counterfactual group (frequency = 1 to 200). Figure 5 shows the density distribution of the DR policy-related keywords. The two vertical dotted lines represent the median (137) and the mean (233) frequencies in the distribution. Our choice of 200 as the cutoff is between the median and mean values. Later in the robustness section, we will test the sensitivities of our results to the choice of the this cutoff.

Our second alternative is defined based on the design of the DR policy. As discussed in Section 2, the DR policy primarily targeted junior high and llower students, with no restrictions on either homework or private tutoring services for senior high school students. For this reason, senior high school students would serve as a good counterfactual. Unfortunately, our survey covers children enrolled in grade 1–12 in 2023 and only a limited number of the students in the sample were in senior high school in the pre-DR policy period (around 85 observations). Thus, it is also not perfect. However, if both of these imperfect alternative counterfactuals yield consistent findings, our conclusions will be more robust and credible.

To test the parallel pre-trend, we estimate the following model:

$$Y_{ijt} = \alpha_0 + \sum_{t=2020}^{2023} \beta_t T_t * P^{treated} + \alpha_2^{'} X_{ijt}^{c} + \alpha_3^{'} W_{ijt}^{p} + \alpha_4^{'} C_{jt} + \eta_i + \delta_t + \epsilon_{ijt}, \tag{3}$$

where T is a vector of year dummy variables with 2019 being the omitted category, and $P^{treated}$ is the dummy variable for the treated group (either cities with a high density of policy frequency or those enroled in the primary and junior high schools). We estimate Equation (2) using the primary and junior high school sample when the low policy density is used as the control group and using the full sample when the senior high school students are the control group. We test the pre-trend using three of our main outcome variables, namely, whether the individual participated in private tutoring, whether the tutoring was conducted in an institution or individually manner, and spending on private tutoring. As 2019 and 2020 are the pre-DR policy years, we expect $\beta_{2020} = 0$ while for other years $\beta \neq 0$.

Figures 6 and 7 present the coefficients β when using the low policy density and the senior high school students as the counterfactuals, respectively. In the first instance (Figure 6), for all three outcome variables, we observe that individuals from both high and low policy density cities seem to behave similarly during the two pre-DR years (2019 and 2020). Changes began to emerge from 2021 as the policy was introduced in the second half of the year. By 2022 and 2023, households in cities with higher policy density exhibited significantly different behaviours compared to those in cities with low policy density. Figure 7 shows similar patterns for the tutoring participation and spending outcome variables, but not for the type of tutoring received.

5 Results

5.1 Effects on children's outcomes

Table 4 presents the results from estimating Equations (1) and (2) with private tutoring outcomes. Panel A of Table 4 shows the average impact using the continuous policy variable. The results from this panel indicate that students from cities that have more-intense policy enforcement are more likely to participate in after-school private tutoring, and, conditional on participation, the increase in private tutoring is mainly driven by a rise in individualised rather than institutionalised or school-conducted tutoring.[15] These results are quite intuitive. As shown in Figure 1, the introduction of the DR policy significantly heightened parental anxiety, leading to a spike in searches for individualised tutoring, while search activities for institutional or school-conducted tutoring show only a slightly reduction.

To understand the magnitudes of the effects on participation and on engaging in individualised tutoring, we move to Panel B of Table 4. Here, the variable "policy" is measured using dummy variables for six bins with equal frequency distances, with the first bin (1–200) serving as the omitted category. The coefficients for the remaining five bins indicate the size of the DR policy impact relative to the first bin. It is important to note that if the omitted bin relative to the pre-treatment period also has a positive effect, the estimated effects relative to the omitted bin would be underestimates of the actual effects.

The results shown in Panel B indicate that the coefficients for all the bins are positive and largely statistically significant, suggesting that, relative to households in cities with the lowest DR policy enforcement efforts, households in cities with higher enforcement efforts are more likely to participate in private tutoring. The magnitudes of the effects, ranging from 2% to 6.6%, initially increase with the intensity of the policy implementation, and then, as the intensity further increases, the effect reduces to 3%. This pattern suggests a possible strategic interaction among households, tutoring providers, and the government. As policy enforcement intensifies, households may become increasingly anxious about their children's education, leading to higher enrolment in private tutoring. However, if government enforcement becomes too stringent, participation in private tutoring might be constrained by supply-side limitations.

The effect on participation in the individualised tutoring exhibit a similar nonlinear pattern. The strength of the policy enforcement increases individualised tutoring by between 1.4% and 5.6%. In this case though, the supply-side constraints are less significant due to the difficulty of monitoring

[15] A question naturally arises as to why there is a near zero impact of policy enforcement on institutionalised private tutoring. After all, the policy targeted the institutional providers and should have significantly reduced the supply of the institutions. Our data, however, are unable to answer this question. Nevertheless, using the Places of Interests (POI) data from Gaode map (one of the most popular Chinese map apps) we summarised the number of private tutoring institutions across different years. The results are presented in Figure A3 in Appendix A. The trend presented in the figure does not show much of a reduction in the number of institutions during the DR period.

individual behaviour. This might explain why the reduction in the size of the effect is less pronounced when policy enforcement intensifies.

As discussed in the Section 2, the DR policy mainly targets academic-related private tutoring. In Table 5, we examine the size of the effect of the policy intensity on academic-related versus Art/PE tutoring. The results from Equation (1) (left two columns) indicate that both types of tutoring are positively affected by the policy, but the magnitude of the effect is about twice as large for the academic-related tutoring compared to Art/PE tutoring. Columns (3) and (4) of Table 5 further suggest that the effect of the policy implementation intensity on academic tutoring follows a similar pattern to the overall private tutoring participation, while the effect on Art/PE tutoring considerably smaller.

Finally, we examine the impact of the DR policy on household spending on private tutoring and on children's educational outcomes. The measure of educational outcomes is derived from parental reports. In the survey, parents were asked to report their children's academic ranking within their own class for each of the five years from 2019 to 2023. Note that because our estimation uses individual FE, this within-class ranking does not suffer from across region/school/class comparability problems. Table 6 presents the estimated results. We find that, on average, there is no impact of the DR policy on children's educational ranking. However, the policy does have a positive and significant effect on spending. Households in cities with higher levels of policy enforcement spend between 18% and 62% more on private tutoring compared to those in cities with the lowest policy enforcement. This pattern mirrors the effects observed in private tutoring participation.

5.2 Effect on parental outcomes

The DR policy not only affects children's outcomes but can also influence parental behaviour through its effects on children. For example, as schools are required to reduce homework, parents may compensate by spending more time assisting their children with schoolwork. In addition, as the demand for private tutoring rises, households, in anticipation of increased spending on private tutoring, may adjust their labour supply accordingly, which typically occurs on the mother's side, as the majority of fathers in China are already participate full-time in the labour market.

Table 7 presents the results of estimated Equations (1) (top panel) and (2) (bottom panel). As shown in the top panel, on average, parents spend more time on their children's school-related work at home after the DR policy. In addition, mothers are more likely to work full time and to participate in the labour market. The bottom panel highlights that, relative to parents in cities with the lowest policy enforcement, parents in other cities spend 2% to 5.5% more time helping their children with schoolwork. However, the magnitude of the effects on mothers' labour market involvement is quite

small. For full-time job participation, the effects range from 0.3% to 1.6%, while for labour market participation, they range from 1% to 2.3%.

5.3 Inequality of the DR policy impacts

The above analyses show the DR policy affected average households in cities with varying levels of policy enforcement. However, these average impacts are not equally experienced by all households. In this subsection, we examine how the DR policy affects children from households with different income levels. To do so, we rank household income into four or ten quantiles, generating dummy variables to indicate these income groups, and then interact these dummy variables with the variable DRP_{jt} in Equation (1).

$$Y_{ijt} = \alpha_0 + \alpha_1 DRP_{jt} + \sum_{q=1}^{n} \lambda_q Q_q * DRP_{jt} + \alpha_3^{'} W_{ijt}^{p} + \alpha_4^{'} C_{jt} + \eta_i + \delta_t + \epsilon_{ijt}, \tag{4}$$

where Q_q is a group of the dummy variables for the different income levels, with the highest income group as the omitted category.

The coefficients on these interaction terms (λ_q) indicate the differential impacts of DR policy for households in the respective quantiles relative to the omitted top quantile households. The actual impact for each quantile is the sum of α_1 and λ_q. Tables 8 and 9 report the results of estimating Equation (4) for children and parental outcomes, respectively. For simplicity, we report three key variables for children's outcomes: the probability of participating in private tutoring, the log of spending on private tutoring, and the parent-reported ranking of children's achievement. The results in Table 8 show that while households in the second to the fourth quartiles all increased their private tutoring participation and tutoring spending, households in the bottom quartile neither increased private tutoring participation nor the relevant spending (see the bottom panel of Table 8). As a result, the DR policy has an adverse impact on the educational achievement of children from households in the bottom income quartile, even though the policy did not affect children's educational achievement on average. We also present Equation (4) using income deciles instead of quartiles: the results for children's outcomes are shown in Figure 8. The figure clearly shows that the DR policy negatively affected both participation in private tutoring and spending on private tutoring for households in the bottom two income deciles. These groups also experienced the main adverse impact on children's educational achievement. It is possible that as the DR policy increased the overall demand for private tutoring and reduced its supply, tutoring prices rose significantly, making it much harder for low-income households to afford these services.

Table 9 and Figure 9 further explore the impact of the DR policy on parental responses for

households with varying income levels. It is important to note here that when examining the mother's labour market responses, the income rank is based on the father's income alone rather than the household's income. The most interesting finding from these analyses is that low-income households spent significantly more time helping with their children's schoolwork to compensate for their inability to afford private tutoring. In addition, mothers from low-income households increased their labour supply (both labour force participation and full-time work), presumably to prepare for future need to increase their children's education spending, such as private tutoring, even though they were currently unable to afford it. The fact that these parents sacrifice more of their leisure time to support their children's education and these mothers are prepared to work harder in the marketplace highlights their determination. They strive to give their children a better future, despite being at the lower end of the socioeconomic ladder.

Recall that one of the most important motivations for implementing the DR policy was to reduce potential intergenerational inequality. However, our results suggest that the policy may have had the opposite effect. It is the children from the lowest income households who suffered the most academically from the DR policy due to their parents' inability to afford private tutoring. If children's current educational performance can affect their future income levels, the DR policy may exacerbate income inequality for the next generation, undermining the government's goal of reducing future income inequality. This finding is concerning and serves as a critical reminder for policymakers: effective policy-making is a gaming process that requires policymakers to anticipate the behavioural reactions of the society towards proposed policies. In a society where being educated and ensuring one's children receive a good education are highly valued, blunt policies such as bans to school homework or after-school tutoring can trigger significant reactions. As it happened, the ban on school homework caused anxiety among parents, who have long been taught to prioritise their children's education. Such anxiety led parents to seek alternative options. The additional ban on private tutoring institutions did not, and cannot, alleviate this anxiety. Naturally, less efficient and more expensive forms of individualised private tutoring dominated the market. This shift increased the price cost of private tutoring, placing a greater burden on those who could not afford it and exacerbated the adverse effects of the DR policy.

6 Sensitivity tests

In this section, we examine the sensitivity of our results against a series assumptions we made in our estimation.

Our identification strategy relies heavily on the assumption that our variable that captures the intensity of DR policy implementation does not correlate with other omitted variables that also affect

our outcome variables of interest. This is why we assume that in the pre-policy period there was a parallel trend. Given that our policy variable is continuous, in Section 4 we defined two imperfect alternative control groups to facilitate our pre-trend test. In this section, we conduct several other alternative tests to verify whether the pre-parallel trend assumption is indeed satisfied.

The first test is a placebo test. It involves using the policy variable in the years when the policy was in effect to replace the year before the implementation of the policy. If the policy-enforcement variable in the post-policy years does not relate to the outcomes in the pre-policy year, it will lend support to our assumption that the DR policy-enforcement intensity is indeed capturing the DR policy, not some omitted pattern that is correlated with our outcome variables even when the policy was not introduced. We adapt the test from Acemoglu and Finkelstein (2008) and Clemens and Gottlieb (2017) by interacting the post-DR policy treatment levels for each year with a dummy variable for 2020, one year at a time. If the parallel trends assumption is valid, the coefficient of the interaction term between the 2020 year dummy and any post-DR treatment policy level should be close to zero and statistically insignificant. Table 10 reports the results for several key children's outcomes. The results confirm that neither 2022 nor 2023 policy intensity is related to outcomes in 2020.

The second test examines whether our choice of definining the least intense policy as the control group is sensitive to the level of the policy intensity we chose. In our previous analysis, we used the frequency of 200 as a cutoff to define the control group. Figure 10 presents the results using alternative thresholds of 150 and 250 to define the control and treated groups. The graph demonstrates that in both cases, the parallel trends assumption holds, suggesting that the results are not sensitive to the decision on the cutoff levels used to define the control and treated groups.

Next, we investigate potential omitted variable biases. Here we include provincial-specific time trends to account for localised policies or conditions that could affect the outcome variables. Table 11 reports the results, comparing the results from the first panel (based on the original Equation (1) results) with those in the second panels (which includes provincial-specific time trend), it is clear that our results are not sensitive to such an inclusion.

7 Conclusions

China's Double Reduction policy has been in place since 2021. The policy aims to reduce students' excessive homework and decrease demand for private tutoring, with the goals of fostering balanced student development, controlling household education expenses, and relieving parents from additional time spending on their children's education. The DR policy was intended to ultimately reduce inter-generational educational and income inequality.

Our results, however, show that the policy has induced higher private tutoring participation,

increased the cost of private tutoring, increased parental time invested in their children's school-related work. More importantly, as private tutoring costs rose, low-income households were unable to afford private tutoring, leading to adverse impacts on their children's educational achievement. All our results seem to suggest that the introduction of the DR policy has brought about the opposite of what the policy intended to achieve.

An important lesson from our study is that policy-making needs to account for potential societal reactions. In a society where education is highly valued and market competition is fierce, any attempt to reduce the level of educational burdens and competition will inevitably lead to strong reactions from parents. Thus, effective policy-making requires a much more nuanced understanding of how to induce behavioural changes in the society. Blunt policy instruments, such as administratively reducing students' homework or forbidding private tutoring institutions, may not result in desired outcome.

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Table 1: Policy Summary Comparison: Compulsory Education Ages v.s. Senior High Ages

Key policy	Compulsory education ages	Senior high ages
Homework burden reduction	Yes	Not applicable
On-campus activities and hours	Expand	Not applicable
Allowing for-profit institutions	No	Yes
New licenses for institutions	Not allowed	Not allowed

Note: This table summarizes the policy differences between two age groups: compulsory education ages (grade 1 to grade 9) and senior high (grade 10 to grade 12).

Table 2: Summary Statistics of Parental Variables

Panel A:	Parental Characteristics in 2023			
	Grades 1–9		Grades 10–12	
	Mother	Father	Mother	Father
Mother's age	35.76	36.90	42.26	43.51
Education distribution:				
Junior high and below	0.05	0.05	0.10	0.10
Senior high	0.58	0.40	0.52	0.42
Uni/College	0.35	0.51	0.36	0.44
Masters	0.02	0.03	0.01	0.03
PhD	0.002	0.005	0.004	0.005
Marital status:				
First marriage	0.96		0.91	
Remarried	0.02		0.06	
Divorced	0.02		0.03	
Parenting style based on the 10-attribute question:				
Authoritarian	0.26		0.25	
Authoritative	0.54		0.57	
Permissive	0.20		0.18	
Observations	8,841	8,841	931	931

Panel B:	Parental information changes over time				
Grades 1–9	2019	2020	2021	2022	2023
Mother with full-time job	0.70	0.70	0.73	0.77	0.77
Mother LFP rate	0.84	0.84	0.88	0.91	0.92
Mother income (Yuan)	61,999	62,934	67,940	73,824	82,027
Father income (Yuan)	90,124	91,374	95,896	101,371	153,995
Parents' time spent helping homework:					
Zero hours	0.04	0.04	0.03	0.03	0.01
1 – 5 hours	0.32	0.29	0.28	0.27	0.28
5 –10 hours	0.33	0.35	0.35	0.36	0.34
10 – 20 hours	0.20	0.23	0.25	0.25	0.24
$>$ 20 hours	0.10	0.10	0.09	0.09	0.14
Observations	5,708	6,471	7,275	8,388	8,841
Grades 10–12	2019	2020	2021	2022	2023
Mother with full-time job	0.60	0.64	0.72	0.69	0.68
Mother LFP rate	0.89	0.88	0.89	0.89	0.88
Mother income (Yuan)	75,002	57,496	65,661	66,104	73,244
Father income (Yuan)	74,167	77,237	82,504	83,048	118,819
Parents' time spent helping homework:					
Zero hours	0.16	0.03	0.05	0.04	0.04
1 – 5 hours	0.64	0.33	0.34	0.31	0.39
5 –10 hours	0.07	0.28	0.30	0.35	0.29
10 – 20 hours	0.13	0.22	0.20	0.22	0.15
$>$ 20 hours	0.00	0.12	0.12	0.08	0.13
Observations	8	79	288	648	931

Table 3: Summary Statistics of Children's Variables

	Grades 1–9				
	2019	2020	2021	2022	2023
Tutoring participation	0.38	0.36	0.41	0.53	0.66
Where received tutoring (Conditional on participation):					
Tutoring:individual	0.26	0.27	0.25	0.24	0.24
Tutoring:institution.	0.83	0.84	0.84	0.85	0.87
Tutoring:school	0.12	0.13	0.15	0.15	0.17
Tutoring spending	3,856	4,253	4,967	6,552	8,357
Education ranking	70.08	70.63	71.05	71.80	73.38
No. of observations	5,708	6,471	7,275	8,388	8,841
	Grades 10–12				
Tutoring participation	0.45	0.46	0.47	0.47	0.55
Where received tutoring (Conditional on participation):					
Tutoring:individual	0.00	0.37	0.29	0.28	0.35
Tutoring:institution	1.00	0.69	0.80	0.80	0.79
Tutoring:school	0.67	0.25	0.22	0.15	0.21
Tutoring spending	8,994	6,045	6,263	7,041	7,950
Education ranking	75.02	60.86	66.71	65.45	67.56
No. of observations	8	79	288	648	931

	Grades 1–9		Grades 10-12	
	Mean	SD	Mean	SD
Age in 2023	10.17	2.88	16.84	0.76
Share of boys in 2023	0.61		0.60	

Table 4: DR Impact on Children's Tutoring (Fixed Effects)

		Type of Tutoring		
Panel A: Eq. (1)	Tutoring	Institution	Individual	School
DRP	0.045**	-0.004	0.052***	-0.004
	(0.020)	(0.015)	(0.018)	(0.014)
Log household inc	0.008***	0.001	0.002	0.005*
	(0.003)	(0.004)	(0.004)	(0.003)
Covid-19 controls	Yes	Yes	Yes	Yes
Education streaming control	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Child fixed effects	Yes	Yes	Yes	Yes
No. of observations	35,886	17,550	17,550	17,550
No. of clusters	313	311	311	311
		Type of Tutoring		
Panel B: Eq. (2)	Tutoring	Institution	Individual	School
DRP range 200–400	0.019	0.000	0.014	0.001
	(0.016)	(0.010)	(0.011)	(0.010)
DRP range 400–600	0.027*	-0.020*	0.036***	0.001
	(0.016)	(0.011)	(0.014)	(0.012)
DRP range 600–800	0.066***	-0.021	0.056***	0.001
	(0.019)	(0.014)	(0.014)	(0.012)
DRP range 800–1000	0.045**	-0.009	0.031*	-0.000
	(0.019)	(0.013)	(0.016)	(0.013)
DRP range 1000–1200	0.030	0.003	0.041**	-0.006
	(0.020)	(0.015)	(0.018)	(0.013)
Log household income	0.008***	0.001	0.002	0.005*
	(0.003)	(0.004)	(0.004)	(0.003)
No. of observations	35,886	17,550	17,550	17,550
No. of clusters	313	311	311	311

Notes: Robust standard errors in parentheses, which are clustered at the prefectural level. Significance codes: *** p<0.01, ** p<0.05, * p<0.1.

Table 5: DR Impact on Types of Tutoring

	Equation 1		Equation 2	
	Academic	Arts&PE	Academic	Arts&PE
DRP	0.055***	0.026*		
	(0.020)	(0.015)		
DRP range 200–400			0.028**	-0.001
			(0.014)	(0.012)
DRP range 400–600			0.040**	0.000
			(0.016)	(0.012)
DRP range 600–800			0.079***	0.033**
			(0.018)	(0.013)
DRP range 800–1000			0.059***	0.028**
			(0.018)	(0.013)
DRP range 1000–1200			0.030	0.009
			(0.021)	(0.017)
Log household income	0.009***	0.001	0.009***	0.001
	(0.003)	(0.002)	(0.003)	(0.002)
Covid-19 controls	Yes	Yes	Yes	Yes
Education streaming control	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Child fixed effects	Yes	Yes	Yes	Yes
No. of observations	35,886	35,886	35,886	35,886
No. of clusters	313	313	313	313

Notes: Robust standard errors in parentheses, which are clustered at the prefectural level. Significance codes: *** p<0.01, ** p<0.05, * p<0.1.

Table 6: DR Impact on Tutoring Spending and Educational Ranking

	Equation 1		Equation 2	
	Edu ranking	log(spending)	Edu ranking	log(spending)
DRP	-0.230	0.435**		
	(0.307)	(0.176)		
DRP range 200–400			0.113	0.183
			(0.263)	(0.145)
DRP range 400–600			-0.029	0.246*
			(0.283)	(0.140)
DRP range 600–800			-0.271	0.621***
			(0.299)	(0.173)
DRP range 800–1000			-0.002	0.396**
			(0.272)	(0.164)
DRP range 1000–1200			-0.063	0.313*
			(0.319)	(0.184)
Log household income	0.222**	0.073***	0.223**	0.072***
	(0.087)	(0.026)	(0.087)	(0.026)
Covid-19 controls	Yes	Yes	Yes	Yes
Education streaming control	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Child fixed effects	Yes	Yes	Yes	Yes
No. of observations	35,885	35,886	35,885	35,886
No. of clusters	313	313	313	313

Notes: Robust standard errors in parentheses, which are clustered at the prefectural level. Significance codes: *** p<0.01, ** p<0.05, * p<0.1.

Table 7: DR Impact on Parents'/Mother's Outcomes (Fixed Effects)

	Time Spent Helping schoolwork	Mother's Labour Market Outcomes Full-time Work	LFP
DRP	0.053*	0.018*	0.018**
	(0.031)	(0.009)	(0.009)
Log household income	-0.008		
	(0.005)		
Log husband's income		0.018***	0.023***
		(0.002)	(0.003)
Covid-19 controls	Yes	Yes	Yes
Education streaming control	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Child fixed effects	Yes	Yes	Yess
No. of observations	35,886	35,886	35,886
No. of clusters	313	313	313
	Time Spend Helping school work	Mother's Labour Market Outcomes Full-time Work	LFP
DRP range 200–400	0.034	0.003	0.013**
	(0.022)	(0.007)	(0.006)
DRP range 400–600	0.017	0.004	0.015**
	(0.027)	(0.008)	(0.007)
DRP range 600–800	0.050*	0.014*	0.023***
	(0.028)	(0.008)	(0.007)
DRP range 800–1000	0.055*	0.016*	0.020**
	(0.030)	(0.009)	(0.008)
DRP range 1000–1200	0.049	0.013	0.010
	(0.030)	(0.010)	(0.010)
Log household income	-0.008		
	(0.005)		
Log husband's income		0.018***	0.023***
		(0.002)	(0.003)
COVID-19 controls	Yes	Yes	Yes
Education streaming control	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Child fixed effects	Yes	Yes	Yess
No. of observations	35,886	35,886	35,886
No. of clusters	313	313	313

Notes: Robust standard errors in parentheses, which are clustered at the prefectural level. Significance codes: *** p<0.01, ** p<0.05, * p<0.1.

Table 8: DR Distributional Impact on Children's Outcomes

	Private Tutoring	Log Spending	Education Ranking
DRP	0.064***	0.654***	0.549
	(0.023)	(0.206)	(0.344)
Quartile 1 × *DRP*	-0.077***	-0.770***	-1.760***
	(0.024)	(0.219)	(0.486)
Quartile 2 × *DRP*	-0.011	-0.189	-1.141***
	(0.019)	(0.185)	(0.361)
Quartile 3 × *DRP*	0.000	-0.031	-0.538
	(0.017)	(0.166)	(0.376)
Log household income	0.007**	0.061**	0.198**
	(0.003)	(0.026)	(0.088)
Covid-19 controls	Yes	Yes	Yes
Education streaming control	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Child fixed effects	Yes	Yes	Yes
DRP+Quartile 1× *DRP*	-0133	-0.116	-1.211***
F-test *p*-value	[0.617]	[0.615]	[0.008]
DRP+Quartile 2× *DRP*	0.053**	0.465**	-0.592
F-test *p*-value	[0.025]	[0.025]	[0.110]
DRP+Quartile 3× *DRP*	0.064***	0.624***	0.011
F-test *p*-value	[0.005]	[0.002]	[0.980]
No. of observations	35,886	35,886	35,285
No. of clusters	313	313	313

Notes: Robust standard errors in parentheses, which are clustered at the prefectural level. The numbers in square brackets are the *p*-vlaues for the F-test statistics. Significance codes: *** p<0.01, ** p<0.05, * p<0.1.

Table 9: DR Distributional Impact on Parental Outcomes

	Parents'	Mother's Labour Market	
	Time-spent	LFP	Full-Time
DRP	0.024	0.004	0.007
	(0.034)	(0.010)	(0.010)
Quartile 1 × *DRP*	0.067	0.037***	0.016
	(0.041)	(0.010)	(0.011)
Quartile 2 × *DRP*	0.014	0.024**	0.015
	(0.029)	(0.010)	(0.011)
Quartile 3 × *DRP*	0.043	0.003	0.013
	(0.035)	(0.006)	(0.008)
Log household income	-0.007	0.023***	0.019***
	(0.005)	(0.003)	(0.002)
Covid-19 controls	Yes	Yes	Yes
Education streaming control	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Child fixed effects	Yes	Yes	Yes
DRP+Quartile 1×DRP	0.091**	0.041***	0.023**
F-test *p*-value	[0.032]	[0.001]	[0.048]
DRP+Quartile 2×DRP	0.038	0.028**	0.022*
F-test *p*-value	[0.274]	[0.012]	[0.052]
DRP+Quartile 3×DRP	0.067*	0.007	0.020**
F-test *p*-value	[0.095]	[0.484]	[0.045]
No. of observations	35,886	35,886	35,886
No. of clusters	313	313	313

Notes: Robust standard errors in parentheses, which are clustered at the prefectural level. The numbers in square brackets are the *p*-vlaues for the F-test statistics. Significance codes: *** p<0.01, ** p<0.05, * p<0.1.

Table 10: Parallel Trends Test: Assigning Pre-period the Post-period Policy, Children's Outcomes

	Tutoring	Individualised T	Log(spending)	Edu Ranking
	Replacing 2020 with 2022 policy-intensity level			
$DRP \times 2020$	-0.014	-0.017	-0.187	-0.076
	(0.030)	(0.036)	(0.262)	(0.524)
$DRP \times 2021$	0.016	0.027	0.156	-0.295
	(0.022)	(0.020)	(0.194)	(0.336)
$DRP \times 2022$	0.087***	0.077***	0.775***	0.328
	(0.032)	(0.029)	(0.285)	(0.536)
$DRP \times 2023$	0.092**	0.108***	0.889***	-0.765
	(0.038)	(0.033)	(0.335)	(0.699)
	Replacing 2020 with 2023 policy-intensity level			
$DRP \times 2020$	-0.033	-0.008	-0.356	0.335
	(0.029)	(0.031)	(0.254)	(0.558)
$DRP \times 2021$	0.010	0.029	0.101	-0.179
	(0.022)	(0.020)	(0.198)	(0.360)
$DRP \times 2022$	0.080**	0.080***	0.710**	0.490
	(0.033)	(0.029)	(0.288)	(0.544)
$DRP \times 2023$	0.083**	0.110***	0.808**	-0.593
	(0.038)	(0.033)	(0.334)	(0.723)
No. of observations	35,886	17,550	35,886	35,285
No. of clusters	313	311	313	313

Notes: Robust standard errors in parentheses, which are clustered at the prefectural level. Significance codes: *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Sensitivity Test Adding Provincial Time Trend

	Tutoring	Individualised T	Log(spending)	Edu Ranking
	Original Results of Eq. 1			
DRP	0.045**	0.052***	0.435**	-0.230
	(0.020)	(0.018)	(0.176)	(0.307)
	Eq. 1 Plus Provincial Time Trend			
DRP	0.046**	0.046**	0.431**	-0.509*
	(0.020)	(0.019)	(0.178)	(0.302)
	Eq. 2 Plus Provincial Time Trend			
DRP range 200–400	0.019	0.013	0.169	0.074
	(0.015)	(0.011)	(0.135)	(0.256)
DRP range 400–600	0.035**	0.034***	0.302**	-0.240
	(0.014)	(0.013)	(0.128)	(0.266)
DRP range 600–800	0.067***	0.053***	0.612***	-0.491
	(0.017)	(0.014)	(0.149)	(0.299)
DRP range 800–1000	0.050***	0.031*	0.431**	-0.283
	(0.019)	(0.018)	(0.168)	(0.289)
DRP range 1000–1200	0.032	0.038**	0.324*	-0.297
	(0.020)	(0.018)	(0.186)	(0.324)
No. of observations	35,886	17,550	35,886	35,285
No. of clusters	313	311	313	313

Notes: Robust standard errors in parentheses, which are clustered at the prefectural level. Significance codes: *** p<0.01, ** p<0.05, * p<0.1.

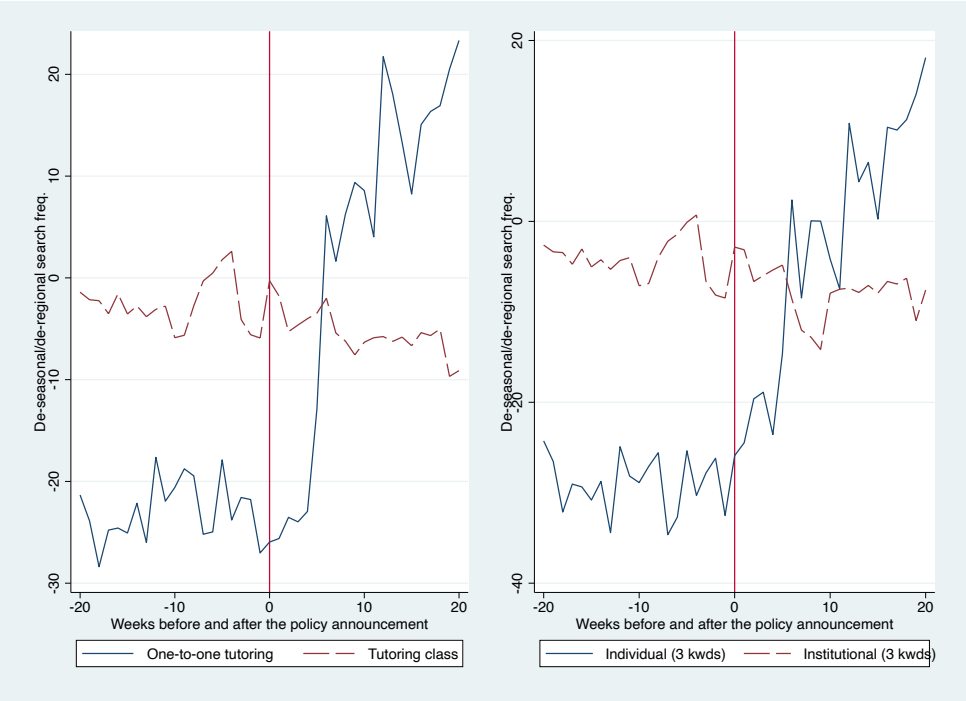


Figure 1: Baidu Search Frequency on Individual and Institutional Tutoring Before and After DR Announcement

Note: The three keywords for individualised tutoring are: one-on-one tutoring, one-on-few, and family tutoring. The three keywords used for institutional tutoring are: training class, after-school training, and after-class training. The variable used is the de-seasoned and de-regionalized residual search frequency.

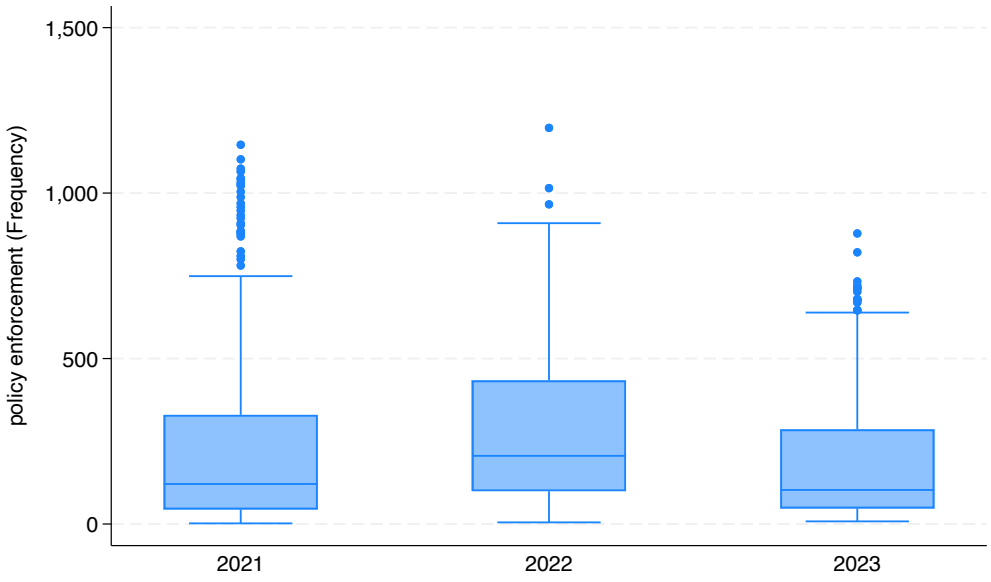


Figure 2: Distribution of the Policy Keywords Appearance by Year

Note: The five keywords are: 1. DR undercover visit; 2. DR Black list; 3. DR Inspection; 4. DR Violations; 5. DR Publicly disclosure.

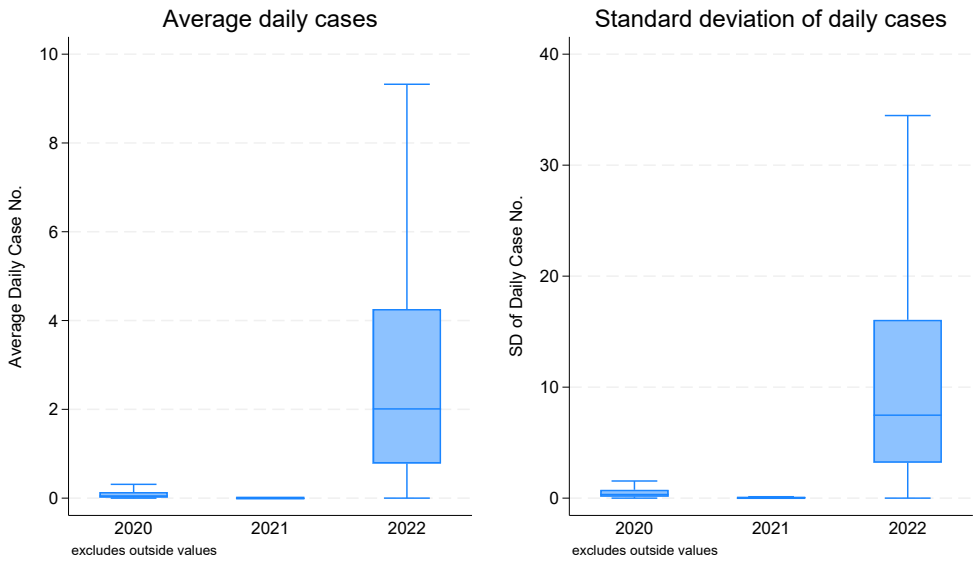


Figure 3: Distribution of the COVID-19 daily cases by year

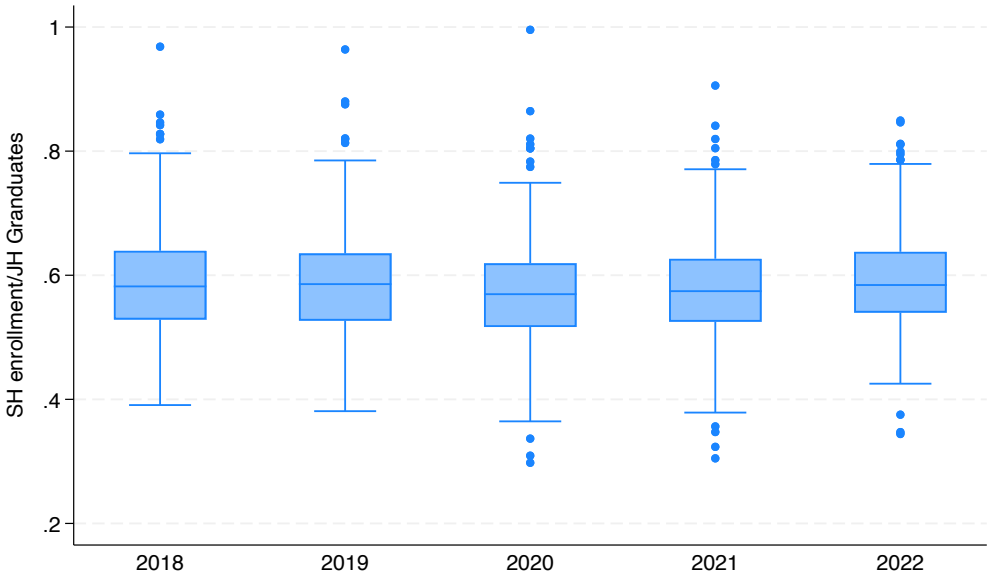


Figure 4: Distribution of the Shares of the Senior High Enrolments Among the Junior High Graduates

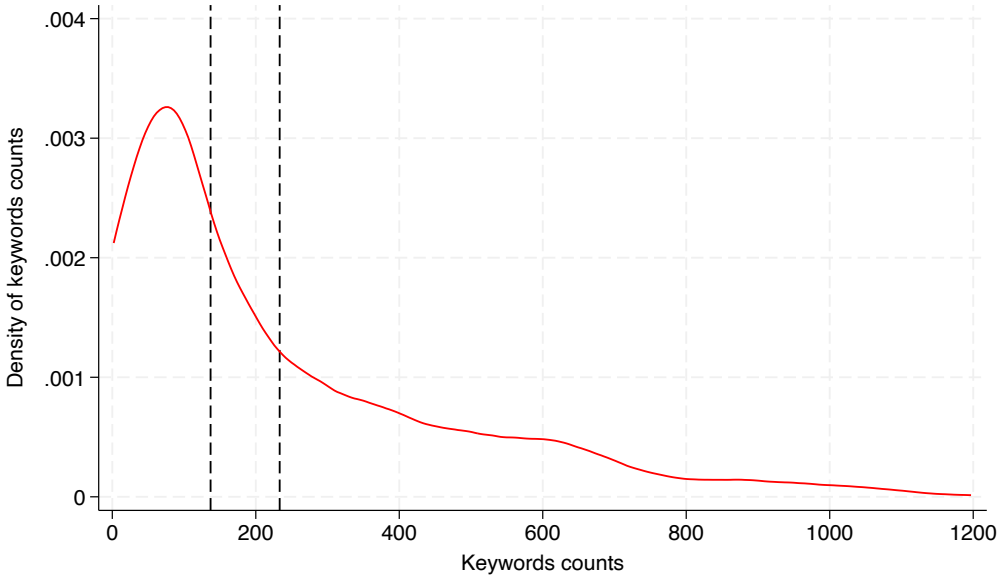
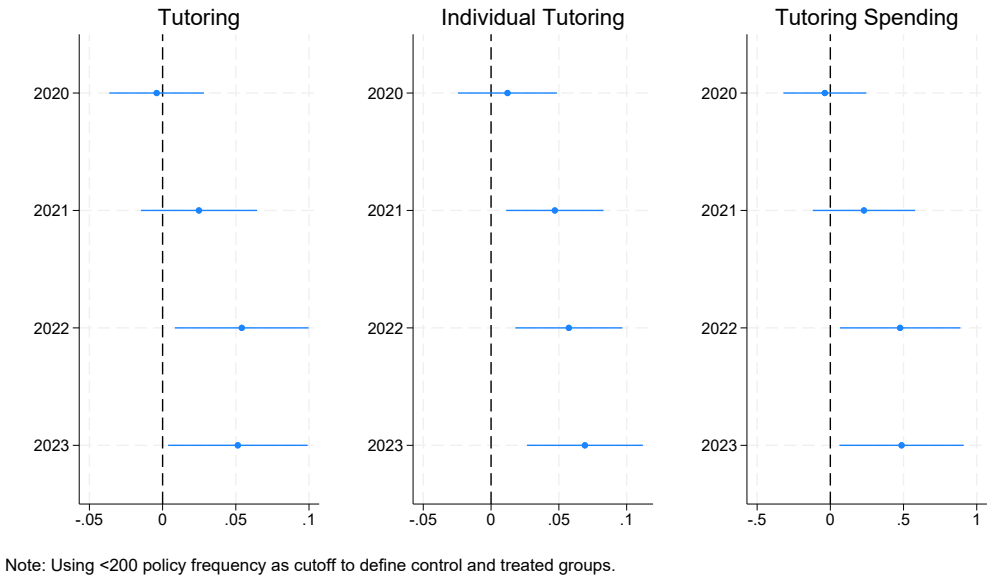


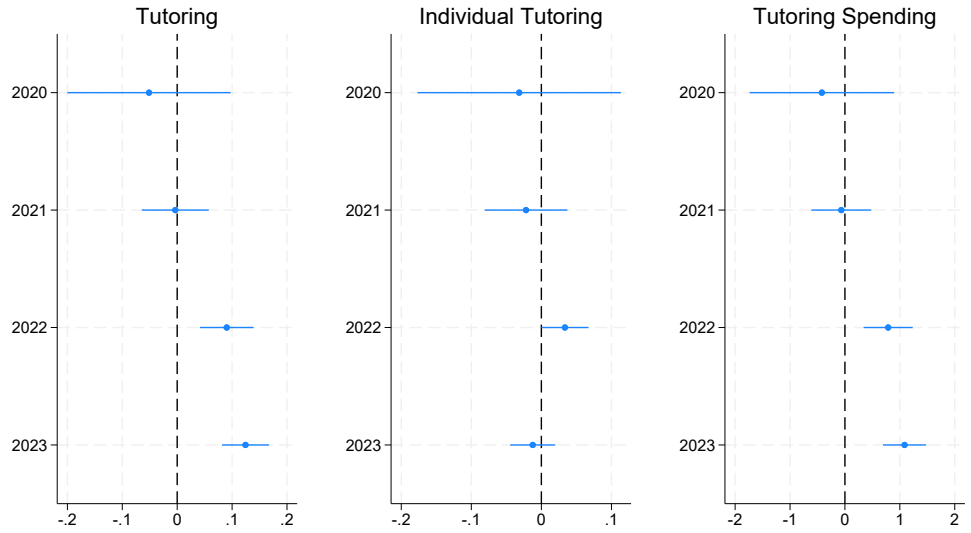
Figure 5: Distribution of the DR Policy Variable

Note: The two vertical lines represent the median and mean levels of the keyword density. The median and mean are 137 and 233, respectively.



Note: Using <200 policy frequency as cutoff to define control and treated groups.

Figure 6: Parallel Trends Test – Low Policy Density as the Control



Note: Using Senior high group as the control.

Figure 7: Parallel Trends Test – Senior High School Students as the Control

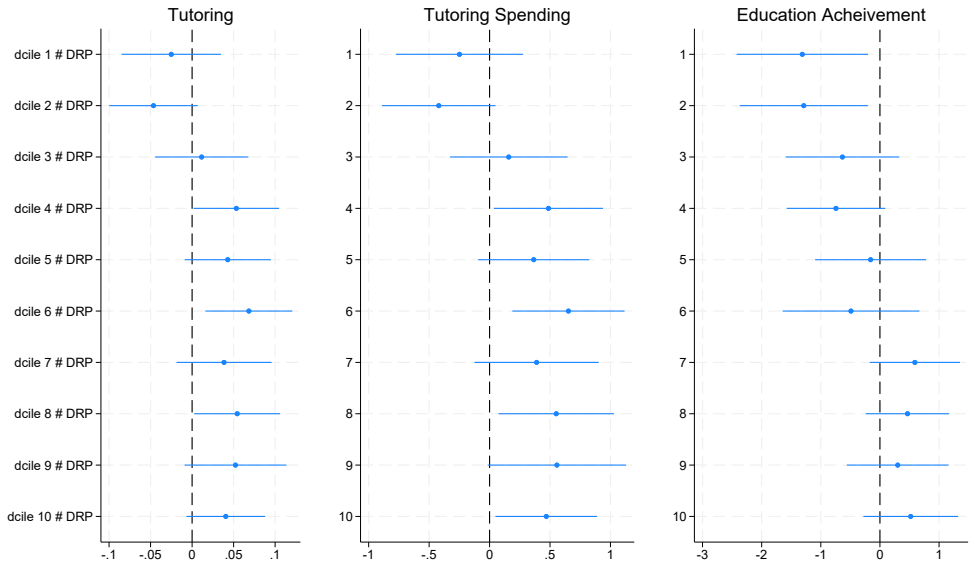


Figure 8: Distributional Impact of the DR Policy on Children's Outcomes

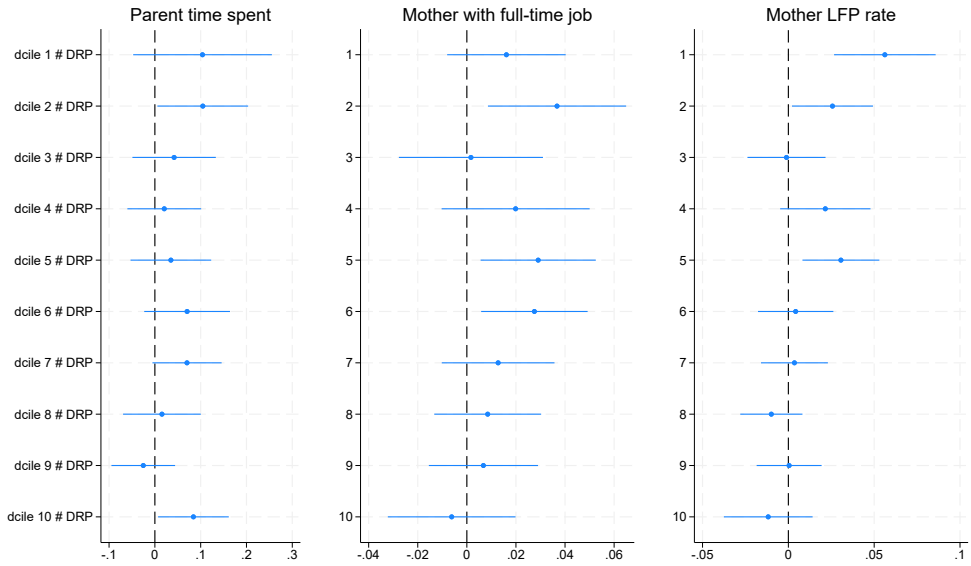


Figure 9: Distributional Impact of the DR Policy on Parents' Outcomes

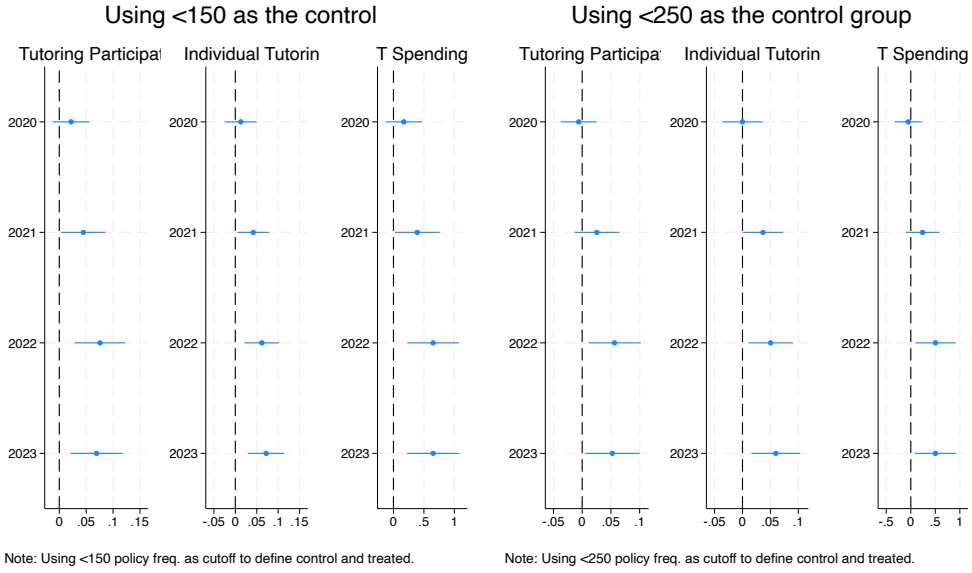


Figure 10: Parallel Trends Test: Using Alternative Definition of Control Group

APPENDIX A Appendix Figures

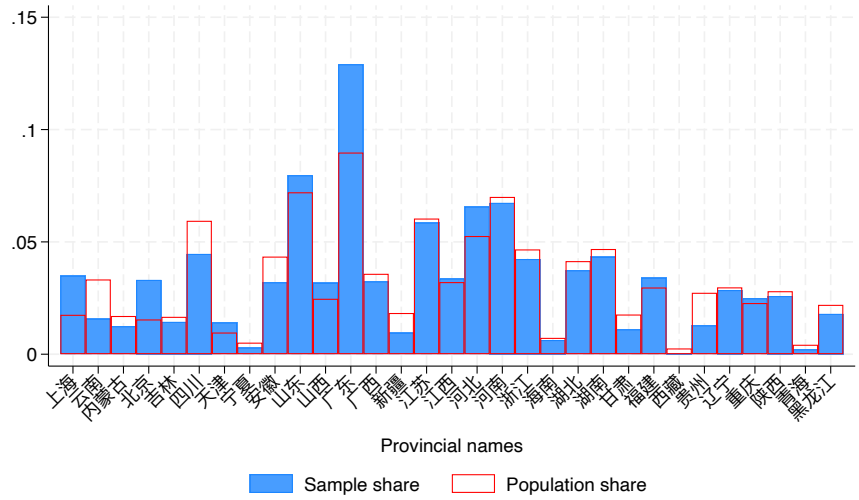


Figure A1: Regional Distribution of the Sample and the Population

Note: The data for the provincial population distribution are from the 2020 Population Census.

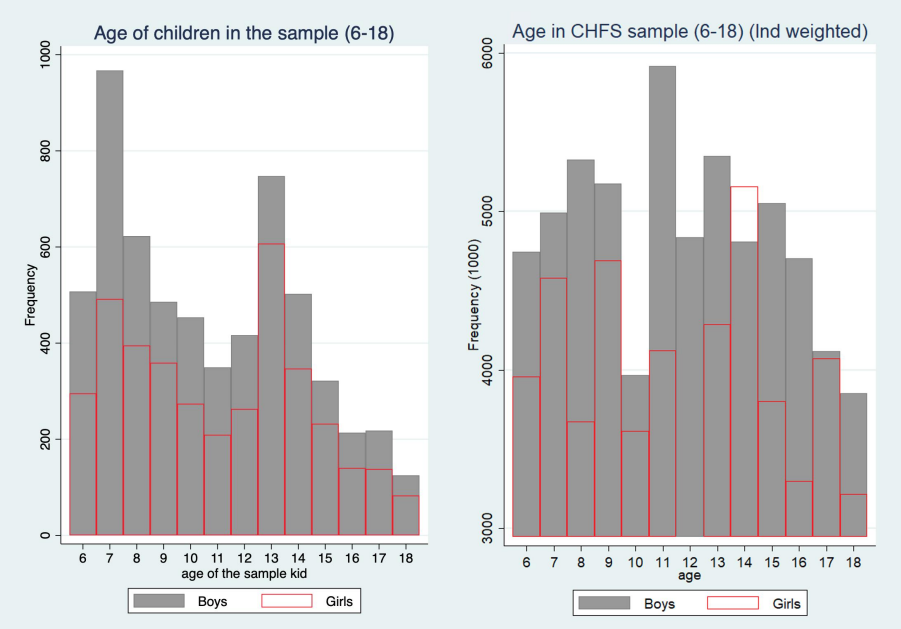


Figure A2: Regional Distribution of the Sample and the Population

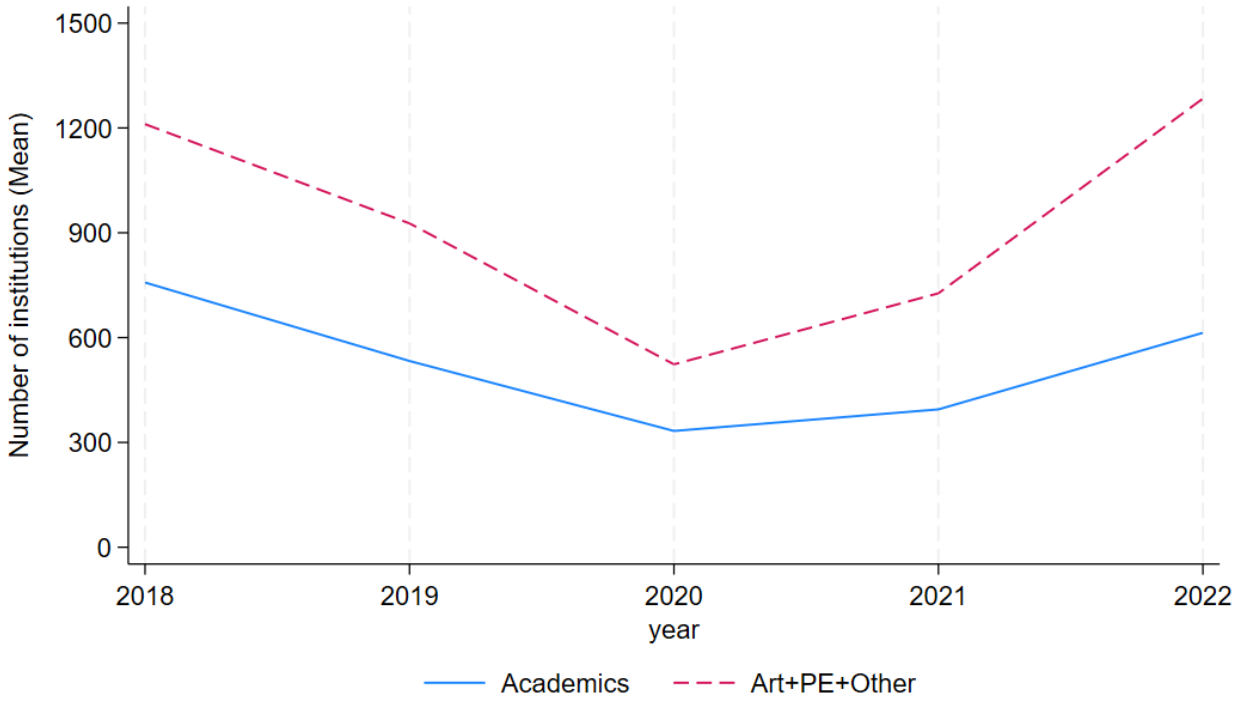


Figure A3: Average Number of Tutoring Institutions at City Level: 2018–2022

APPENDIX B Appendix Tables

Table B1: DR Impact on Children's Tutoring

		Type of Tutoring		
	Tutoring	Institution	Individual	School
Policy	0.042**	-0.018	0.028	-0.006
	(0.021)	(0.017)	(0.023)	(0.016)
Dummy for Boy	0.006	0.014*	-0.004	0.014*
	(0.008)	(0.009)	(0.011)	(0.008)
Age 7	0.035***	0.009	0.008	0.005
	(0.010)	(0.009)	(0.009)	(0.009)
Age 8	0.047***	0.011	-0.001	0.002
	(0.011)	(0.010)	(0.013)	(0.011)
Age 9	0.028**	0.000	0.017	-0.016
	(0.012)	(0.012)	(0.013)	(0.012)
Age 10	0.002	-0.006	0.027**	-0.019
	(0.013)	(0.012)	(0.012)	(0.012)
Age 11	0.009	-0.004	0.043***	-0.026*
	(0.012)	(0.013)	(0.014)	(0.014)
Age 12	0.019*	-0.025*	0.059***	-0.021
	(0.012)	(0.014)	(0.015)	(0.015)
Age 13	0.011	-0.012	0.062***	-0.023
	(0.012)	(0.014)	(0.014)	(0.015)
Age 14	0.025*	-0.027*	0.074***	-0.022
	(0.013)	(0.016)	(0.015)	(0.018)
Age 15	0.003	-0.051***	0.104***	-0.010
	(0.017)	(0.019)	(0.020)	(0.017)
Authoritative	-0.004	0.011	-0.042***	-0.008
	(0.008)	(0.010)	(0.012)	(0.010)
Permissive	-0.007	0.014	-0.051***	-0.011
	(0.010)	(0.011)	(0.015)	(0.013)
Remarried	0.030	-0.033	0.047	0.026
	(0.020)	(0.030)	(0.037)	(0.027)
Divorced/widow	-0.031	-0.084*	0.047	0.011
	(0.027)	(0.045)	(0.049)	(0.047)
Mother Senior High	0.063***	0.072**	0.002	-0.054**
	(0.017)	(0.030)	(0.025)	(0.023)
Mother Uni/College	0.101***	0.094***	0.013	-0.045**
	(0.018)	(0.029)	(0.024)	(0.023)
Mother Master's	0.132***	0.095**	0.055	0.006
	(0.029)	(0.039)	(0.043)	(0.037)
Mother PhD	0.130**	0.099**	0.163**	0.052
	(0.054)	(0.043)	(0.078)	(0.074)
Log household income	0.017***	0.018***	-0.006**	-0.001
	(0.002)	(0.003)	(0.003)	(0.003)
2020	-0.006	0.003	0.007	0.015*
	(0.007)	(0.009)	(0.011)	(0.008)
2021	0.018	0.008	-0.020	0.030**
	(0.016)	(0.013)	(0.015)	(0.014)
2022	0.129***	0.010	-0.035**	0.032**
	(0.016)	(0.013)	(0.015)	(0.013)
2023	0.254***	0.020*	-0.032**	0.049***
	(0.014)	(0.012)	(0.013)	(0.013)
Prefectural fixed effects	Yes	Yes	Yes	Yes
Covid-19 controls	Yes	Yes	Yes	Yes
Edu streaming controls	Yes	Yes	Yes	Yes
No. of observations	35381	17319	17319	17319
Adj. R^2	0.073	0.052	0.046	0.047
No. of clusters	313	311	311	311

Notes: Robust standard errors in parentheses, which are clustered at the prefectural level. Significance codes: *** p<0.01, ** p<0.05, * p<0.1.