

Evaluation of the Impact of The “Double Reduction” Policy on Off-campus Training Behavior and Education Expenditure of Different Families: Difference-in-Differences Analysis Based on CFPS Data

Yushan Zhang^{1, a}

¹School of Foreign languages, Tianjin University of Commerce, Tianjin, 300133, China

^azhangyushan_hypu@stumail.tjcu.edu.cn

Abstract

As a key education reform in China, the “double reduction” policy aims to ease students’ academic burden and family education expenditure, and promote educational equity. Evaluating its actual effect is crucial for optimizing education governance and improving policy implementation. This work, using 2018 (pre-policy) and 2022 (post-policy) panel data from the China Family Panel Studies (CFPS), applies the difference-in-differences model to assess the policy’s impact on families’ off-campus training participation and education expenditure, with heterogeneity analysis and robustness tests enhancing conclusion reliability. Empirical results show contrary-to-expectation findings: off-campus training participation rate rose abnormally, from 3.0% in 2018 to 30.2% in 2022 (subject training: 2.6% to 22.6%; non-subject training: 1.6% to 20.3%). Family off-campus training expenditure dropped significantly by 94.2% (logarithmic result), but its share in total family education expenditure remained stable. Heterogeneity analysis reveals low-income households saw the largest expenditure decrease ($\approx 99.8\%$), while middle-and high-income households had more significant increases in training participation (44.22%-43.33%); urban-rural gaps persist, with urban families showing higher participation and expenditure. This study highlights the need to strengthen policy implementation consistency, standardize off-campus training supervision, address potential educational inequality from increased participation among middle-and high-income families, and alleviate family anxiety by expanding high-quality public education resources.

Keywords

Off-campus training; education expenditure; difference-in-differences model; CFPS.

1. Introduction

In the process of education development in China, the problem of excessive academic burden of students has existed for a long time and has attracted much attention, which has become a key factor restricting the high-quality development of education and affecting the overall growth of students. Since the founding of the People’s Republic of China, the education burden reduction policy has undergone many rounds of adjustment and improvement, showing a clear development context.

From the founding of the People’s Republic of China to the 1990 s, the policy focused on the single-dimensional governance of students’ school burden. At that time, China ’s educational resources were relatively scarce, and students mainly faced the pressure of schoolwork. In 1951, the government council issued a “decision on improving the health status of students at all levels of schools”, which opened the prelude to reducing the burden. In 1955, the Ministry

of Education's "Instructions on Reducing the Excessive Burden of Primary and Secondary School Students" was further clarified and standardized. The follow-up policies continued to focus on the school elements such as the difficulty of teaching materials, the amount of homework, and the time in school, and strived to improve the quality of school teaching, reduce students' dependence on off-campus learning, and ease the pressure of on-campus learning. However, limited by the supply of educational resources and the level of social development at that time, the effect of burden reduction was not fully demonstrated.

With the diversification of social and economic development and educational needs, from the 1990s to 2015, the policy entered the stage of separate governance of school and off-campus burdens. The off-campus education and training market has gradually emerged, and the burden of students has extended from a single on-campus course to off-campus training. During this period, the governance of the burden on the school continued to deepen, the concept of quality education continued to advance, and the standardization of school-running behavior became the focus. At the same time, the governance of off-campus training has gradually been put on the agenda. In 1987, the "Interim Provisions on Social Forces in Running Schools" opened the preliminary norms for off-campus training. In 2002, the "Private Education Promotion Law" incorporated it into the track of the rule of law. In 2018, special governance actions focused on issues such as over-programme training and charging chaos. However, there is a lack of coordination between internal and external governance, and the burden of students has not been fundamentally alleviated.

Since 2015, education burden reduction has entered a new stage of comprehensive multi-dimensional governance of school and off-campus burden. In 2015, the "Guiding Opinions of the Ministry of Education on Strengthening Family Education" incorporated families into the burden reduction system and emphasized multi-party coordination. In 2021, the "double reduction" policy was introduced. This landmark policy will coordinate the burden of school work and off-campus training for the first time, build a "1 + N" policy system, refine the definition of training classification, charge supervision and other contents, promote the all-round coordination of schools, families and society to reduce the burden, and strive to reshape the educational ecology^[1].

What is the impact of the "double reduction" policy on the participation rate of off-campus training and education expenditure of families with different economic levels? Based on the data of CFPS in 2018 and 2022, this paper makes an in-depth evaluation of the effect of education burden reduction policy. Theoretically, it is helpful to deepen the research on the relationship between education policy and family behavior, and to reveal the interaction mechanism between policy intervention and family decision-making. In practice, by analyzing the expenditure changes of different family groups, we can evaluate the actual effect of the policy on burden reduction and fairness, provide data support for optimizing the "double reduction" policy, help the policy to be implemented accurately, effectively reduce the family economic burden, and promote the healthy development of education ecology.

2. Literature Review

2.1. Research background

In recent years, the academic burden of students in the compulsory education stage is too heavy, and the out-of-school training market is chaotic, resulting in abnormally high expenditure on family education and serious involution of education. In this context, the "double reduction" policy in 2021 (that is, the "Opinions on Further Reducing the Burden of Students' Homework and Off-campus Training in Compulsory Education" issued by the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council in July 2021) came into being, aiming to reduce the burden of students' homework and off-campus

training, reduce the unreasonable expenditure of family education, and promote education equity. After the implementation of the policy, subject training institutions have been reduced on a large scale, but the changes in family education expenditure are complex: some families turn to non-subject training, or maintain subject training investment in a hidden way, and the expenditure structure of families with different incomes, regions and educational backgrounds is significantly different.

2.2. Status quo of overseas research

The exploration of education burden reduction policy and off-campus training (shadow education) in foreign countries has started decades ago. Especially in the practice of East Asian countries, they have accumulated rich experience and lessons, forming a set of research system with both theoretical depth and empirical support. In the 2018 study, Schneider and other scholars keenly pointed out through the analysis of multi-country data that income inequality, like an invisible hand, continues to widen the gap in family education investment among different classes - high-income families can often pave the “fast lane” for their children through intensive off-campus training, and this gap in turn counteracts educational equity^[2]. This finding provides a key perspective for follow-up research to understand the interaction between policy and family behavior.

In the specific research direction, theoretical exploration and practical analysis are intertwined. The “prestige-oriented theory” proposed by Lee and Shouse in 2011 provides a key to analyzing the strong demand for shadow education^[3]. Taking South Korea as an example, they reveal how the family’s pursuit of prestigious schools translates into a rigid demand for off-campus training, which, even with policy restrictions, will find new outlets like water. Walter’s research in 2010 further extended this theory to the whole of East Asia, pointing out that the proliferation of shadow education is essentially a mirror image of the uneven distribution of educational resources, and simply suppressing supply is tantamount to “subduing”^[4].

In terms of applied research, Jae and other scholars have enlightened South Korea’s shadow education policy^[5]. They found that the South Korean government has experienced a cycle of “total prohibition-partial relaxation-norm guidance” over decades, and each policy shift has been accompanied by the deformation of the training market: under the prohibition order, public remedial classes have disappeared, private education and “underground classes” have quietly emerged; after deregulation, the market expanded rapidly and returned to disorderly competition. This kind of “cat-and-mouse game” game vividly shows the dynamic balance between policy and market.

In terms of research methods, foreign scholars are good at capturing the far-reaching impact of policies with long-term tracking data. Through decades of panel data analysis, Schneider’s team clearly outlines the continuous shaping effect of income stratification on family education investment. In 2016, Choi and Cho used the difference-in-difference model to accurately evaluate the net effect of South Korea’s regulatory policies, providing a model for later causal identification^[6].

On the whole, the consensus of foreign research is that the effect of education burden reduction policy is never the result of a single variable. The educational anxiety in cultural tradition, the structural imbalance of resource allocation, and the family’s strategic response together constitute the complex background of policy implementation. As Walter says, over-reliance on administrative controls can lead to “push the screw”, making it difficult not only to truly reduce the burden, but also to make it more difficult for low-income families to access quality training resources, exacerbating the education divide.

2.3. Status quo of domestic research

Although the domestic research on the “double reduction” policy started after the implementation of the policy in 2021, it has sprung up rapidly. Researchers have gradually built a localized research framework from effect evaluation to mechanism analysis with problem awareness. The research published by Pang Xiaodong and other scholars in 2025 revealed an interesting phenomenon for the first time based on national data: after the “double reduction”, the out-of-school training expenditure of families did decline, but the participation rate rose against the trend in some groups^[7]. Behind this contradiction is the differentiated coping strategies of families with different incomes. This finding opens a new perspective for follow-up research.

In terms of theoretical exploration, Xue Eryong and Li Jian’s “Reconstruction Theory of Educational System” proposed in 2024 is influential. They believe that the significance of “double reduction” is far more than reducing off-campus training, but also promoting the redistribution of educational resources - allowing the funds and energy originally flowing to training institutions to return to schools, so that on-campus education can truly become the main position of educating people. On this basis, Zhou Zikun and other scholars further pointed out that the success of the policy depends on whether the on-campus service can meet the needs of off-campus training transfer, such as the quality of after-school counseling and the richness of interest courses, which directly affect the choice of families^[8].

The picture of applied research is more specific. Meng Juanjuan’s team’s survey in 2024 found that parents’ wallets were indeed loosened after the “double reduction”, but their eyebrows were not necessarily stretched - there was less discipline training, and many parents began to tutor in person. Instead, the time cost increased^[9]. This contrast between “expenditure burden reduction” and “energy burden increase” reminded researchers that the policy effect needed multi-dimensional evaluation. Dong Hao and other scholars’ research on Nanjing primary school students’ families shows that the training expenditure of urban families is undergoing a “structural shift”: there are fewer Olympiad classes, more programming classes and equestrian classes^[10]. This change not only reflects the guiding role of policies, but also exposes new educational anxiety.

In terms of research methods, domestic scholars focus on the combination of empirical and local situations. Pang Xiaodong used the difference-in-difference model to accurately measure the impact of policies on different groups based on CFPS data; by tracking the cases of many schools and families, Han Xueying delicately captures the “flexible space” in policy implementation - for example, some training institutions continue to teach mathematics under the name of “interest class,” and some parents find “one-to-one” private education through acquaintance introduction^[11]. These micro-practices make the policy effect complicated.

In general, domestic research has gradually formed a consensus: the “double reduction” policy has indeed put a brake on the off-campus training market in the short term, but the long-term effect remains to be seen. Wei Yi and Kang Le’s research in 2024 pointed out that there are obvious differences in policy effects between urban and rural areas: urban families can quickly find alternative training channels, while rural families may fall into a “training vacuum” due to insufficient resources in schools^[12]. Xue Eryong and Li Jian emphasize that the ultimate goal of the policy is not to eliminate off-campus training, but to return education to its essence, which requires schools to provide better education services and the society to establish a more rational view of talent.

2.4. Literature survey

There are still three shortcomings in the existing research: First, foreign research is mostly based on the experience of Japan and South Korea, and the applicability of its conclusions under China’s education system needs to be further verified, especially the lack of localization analysis

of the regulatory strategy of covert training; secondly, although domestic research focuses on group differences, it is insufficient to explore the interaction between income stratification and urban-rural differences, and fails to fully reveal the complexity of policy effects. Finally, the existing research focuses more on training participation and expenditure, and pays less attention to how policies affect long-term indicators such as students' academic performance, physical and mental health.

In view of the above shortcomings, this paper aims to solve three key problems. First, based on CFPS data, the difference-in-differences model is used to accurately identify the net effect of the "double reduction" policy on family off-campus training participation and expenditure, so as to make up for the lack of refinement in causal identification in existing research. Secondly, it deeply analyzes the heterogeneity of policy effects in income stratification and urban-rural dimensions, and reveals the coping strategies of different groups. The third is to combine descriptive statistics and empirical results to explore the reasons for the deviation between policy effects and expectations (such as sample structure, data quality, etc.), and provide a basis for accurate optimization of policies.

3. Data and Analytical Methods

3.1. Data sources

The China Family Panel Studies (CFPS) is a national and tracking social survey project. It aims to reflect the changes of China's society, economy, population, education and health by tracking and collecting data at the three levels of individual, family and community, and provide data basis for academic research and public policy analysis. The 2018 survey (pre-policy) covered a number of provinces, districts and counties across the country, with a total of 37,354 observation samples, including family and personal information of pre-school to high school students. The coverage of the survey in 2022 (after the policy) is basically the same as that in 2018. The observation sample size is 6228, which also includes the relevant family and personal data of the students in the school.

The dependent variables that this paper focuses on include the participation of primary and secondary school students in the sample in off-campus training (including subject and non-subject training), off-campus training expenditure and the proportion of total expenditure on family education. Among them, off-campus training participation is defined by training type (wt1-wt8 series variables), and education expenditure variables include extracurricular tutoring fees, total education expenditure, etc. According to the research needs, the control variables selected include : students' personal characteristics (age, gender, school section, etc.), family characteristics (family income group, urban and rural attributes, etc.), regional characteristics (province code, regional division, etc.). Through the selection of the above variables, the impact of the "double reduction" policy on family off-campus training behavior and education expenditure is systematically analyzed.

3.2. Analytical method

Based on the data of China Family Panel Studies, this paper proposes and tries to verify the following hypotheses: First, the "double reduction" policy will significantly reduce the participation rate of family off-campus training, and the inhibitory effect on subject training is stronger than that on non-subject training. Secondly, the policy will significantly reduce the absolute level of family out-of-school training expenditure, and reduce its proportion in the total expenditure of family education, so as to achieve the core goal of "reducing the burden of family education". Third, the impact of policies on the participation rate and expenditure of off-campus training varies among families with different incomes and between urban and rural areas.

In order to evaluate the impact of the “double reduction” policy on family off-campus training participation and education expenditure, this paper adopts the Difference-in-Differences (DID) model. The core logic of this model is to accurately separate the net effect of the policy by comparing the time difference before and after the implementation of the policy, and effectively control the fixed characteristics of individuals or regions that do not change with time, such as the difference of educational resource endowment at the provincial level, so as to more reliably identify the causal effect of the policy. Since the “double reduction” policy was implemented nationwide in July 2021, the data in 2018 can be used as a “pre-policy group” and the data in 2022 as a “post-policy group”. Based on the comparison of the two sets of data, the core identification framework of the DID model is constructed.

Specifically, this paper constructs two sets of basic model and whole model, and gradually incorporates control variables to test the robustness of the results. The basic model only includes policy variables and provincial fixed effects, and its formula is :

$$Y_{it} = \alpha + \beta \times Post_policy_t + \sum_p \gamma_p \times Province_p + \varepsilon_{it} \quad (1)$$

The whole model further adds urban and rural control variables to the basic model. The formula is :

$$Y_{it} = \alpha + \beta \times Post_policy_t + \delta \times Urban_i + \sum_p \gamma_p \times Province_p + \varepsilon_{it} \quad (2)$$

In terms of variable setting, the explained variable (Y_{it}) focuses on two core indicators. One is the participation of off-campus training, including overall participation (*outside_tutoring*, participation = 1, otherwise = 0), subject training participation (*outside_tutoring*, participation = 1, otherwise = 0), non-subject training participation (*outside_nonsubject*, participation = 1, otherwise = 0); the second is the relevant indicators of education expenditure, including the logarithm of off-campus training expenditure (*ln_tutoring_exp*) and the proportion of off-campus training expenditure (*tutoring_share*, that is, the ratio of extracurricular tutoring fees to total education expenditure). The core explanatory variable ($Post_policy_t$) is a dummy variable of policy time, with a value of 1 in 2022 (after the implementation of the policy) and 0 in 2018 (before the implementation of the policy). The coefficient β represents the net effect of the policy on the explained variable. The control variables include urban and rural characteristics ($Urban_i$), in which the urban family value is 1, and the rural family value is 0, which is used to control the difference between urban and rural education resources. And the province fixed effect ($\sum_p \gamma_p \times Province_p$), through the province dummy variable to control the characteristics of the regional level does not change with time, such as the level of economic development, education policy basis. ε_{it} is a random disturbance term, which is clustered to the provincial level to deal with intra-group correlation. Through the above model setting, we can systematically test the direction and degree of the impact of the “double reduction” policy on family off-campus training behavior and education expenditure. At the same time, through the comparison between the basic model and the whole model, we can verify the robustness of the policy effect after controlling the urban-rural differences, and provide a powerful analysis tool for comprehensively evaluating the actual effect of the “double reduction” policy.

4. Analysis Result

4.1. The policy effect of out-of-school training participation rate: a growth trend contrary to expectations

When we focus on the actual impact of the “double reduction” policy on the participation rate of off-campus training, we see a picture that is contrary to the original intention of the policy. The training participation rate has not decreased, but has shown a comprehensive and significant growth trend, which is in sharp contrast to the expectation in the first hypothesis of this study that the policy will inhibit the participation rate and have a stronger effect on subject training.

The empirical results show that the training participation rate has shown a comprehensive upward trend after the implementation of the policy. From the perspective of descriptive statistics, from 2018 to 2022, the overall participation rate of off-campus training soared from 3.0 % to 30.2 %, an increase of 27.2 percentage points; among them, the participation rate of subject training increased from 2.6 % to 22.6 % (+ 20.0 percentage points), and that of non-subject training increased from 1.6 % to 20.3 % (+ 18.7 percentage points) (see Table 1). This change is in sharp contrast to the original intention of the policy. In particular, the growth rate of subject training exceeds that of non-subject training, indicating that the policy 's binding effect on subject training is not as expected.

The difference-in-differences model further verifies this trend: the influence coefficient of policy variable (Post $\times$ Policy) on the overall participation rate is 0.2723 ($p < 0.01$), that is, the overall participation rate of off-campus training increases significantly by 27.23 percentage points after the implementation of the policy. The influence coefficients of subject training and non-subject training are 0.2010 and 0.1871 respectively ($p < 0.01$), and the effect of subject training is slightly higher than that of non-subject training (see Table 2). This result completely deviates from the hypothesis, which may be due to two reasons: first, there is “avoidance space” in policy implementation, and some subject training continues to be carried out in the name of “non-subject” or one-to-one tutoring. Second, families’ anxiety about academic competition has not decreased. After the policy compresses the supply of compliance, it stimulates the demand for alternative training channels.

The analysis of urban-rural differences shows that the training participation rate of urban families is significantly higher than that of rural families : the overall gap is 2.99 percentage points ($p < 0.01$), and the urban-rural gap between subject and non-subject is 2.38 and 2.93 percentage points, respectively (see Table 2). This shows that the structural imbalance of urban and rural education resources makes it easier for urban families to gain advantages through off-campus training, and the policy has failed to bridge this gap.

Table 1. Descriptive Statistics: Before and After Double Reduction Policy

	2018		2022	
	mean	sd	mean	sd
Outside tutoring	0.030	0.170	0.302	0.459
Outside subject	0.026	0.159	0.226	0.418
Outside non-subject	0.016	0.126	0.203	0.402
Tutoring expense	30.336	982.879	1629.954	5781.817
Tutoring share	0.104	0.414	0.404	4.990
N	37354		6228	

Table 2. Effects of Double Reduction Policy on Tutoring Participation

	(1) Overall	(2) Subject	(3) Non-subject
Post×Policy	0.2723*** (0.0176)	0.2010*** (0.0157)	0.1871*** (0.0140)
Urban	0.0299*** (0.0030)	0.0238*** (0.0024)	0.0293*** (0.0033)
Cons	0.0159*** (0.0024)	0.0146*** (0.0023)	0.0024 (0.0022)
N	43332	43332	43332

Standard errors in parentheses

Basic models include only post_policy and province fixed effects.

Full models include urban controls only.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.2. The policy effect of education expenditure: the absolute level is declining and the structure is stable.

In the dimension of education expenditure, the impact of the “double reduction” policy presents a seemingly contradictory complex feature, which partially verifies the expectation that the policy will reduce the absolute level of expenditure in the second hypothesis of this study, but the goal of “reducing the proportion of expenditure” has not been achieved.

From the difference-in-differences model, the influence coefficient of policy variables on off-campus training expenditure (logarithm) is -2.7521 ($p < 0.01$), which is equivalent to a 94.2 % reduction in actual expenditure, indicating that the policy has a significant inhibitory effect on expenditure (see Table 3). However, the original data show that the average out-of-school training expenditure in 2022 (1629.9 yuan) increased by 53 times compared with 2018 (30.3 yuan), and the proportion increased from 10.4 % to 40.4 % (see Table 1).

This contradiction stems from the interference of sample structure and extreme values: in 2022, the sample size plummeted by 83.4 % (from 37354 to 6228), which may have missed low-income families, resulting in the average being raised by high-income groups ; at the same time, unprocessed extreme values (such as high expenditures of a few households) distort the original data. After robust processing, the policy effect of the proportion of expenditure is 0.2709 ($p > 0.10$), that is, the proportion of out-of-school training expenditure has increased by 2.71 percentage points but not significantly, indicating that although the policy has reduced the absolute level of expenditure, it has not changed its relative position in the total expenditure of family education, and there is still a gap with the core goal of “burden reduction”.

The difference between urban and rural expenditure is also significant: the out-of-school training expenditure (logarithmic) of urban households is 1.1790 units higher than that of rural households ($p < 0.01$), which is equivalent to 225 % higher than the actual expenditure (see table 3), reflecting the economic advantages of urban households in training investment.

4.3. Heterogeneity of policy effect: Differentiated influence from the perspective of income stratification

When we focus on the response of different income families to the “double reduction” policy, we can find that the impact of the policy is not evenly distributed, but shows distinct differentiation characteristics along the income ladder, which is highly consistent with the expectation of “income difference in policy effect” in the third hypothesis of this study.

Table 3. Effects of Double Reduction Policy on Education Expenditure

	(1) Expenditure	(2) Share
Post×Policy	-2.7521*** (0.4073)	0.2709 (0.2112)
Urban	1.1790*** (0.1064)	0.2536 (0.1927)
Cons	4.4215*** (0.3909)	-0.0031 (0.2426)
N	6298	716

Standard errors in parentheses

Basic models include only post_policy and province fixed effects.

Full models include urban controls only.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

From the perspective of the participation rate of off-campus training, middle-income families (40 % - 60 % quantile) have become the most active group under the policy impact, and their participation rate has increased significantly by 44.22 percentage points compared with that before the implementation of the policy ($p < 0.01$). Followed by the highest income group (more than 80 %), the participation rate increased by 43.33 percentage points ($p < 0.01$). Behind the common choices of these two types of families, similar educational anxiety is reflected: middle-income families try to consolidate their class position by increasing training, while high-income families maintain the inertia of educational investment by virtue of their resource advantages. In stark contrast, the participation rate of the lowest-income families (below 20 %) is almost unaffected by the policy ($\beta = -0.0501$, $p > 0.10$). The hard constraints of economic conditions make it difficult for them to adjust their training decisions, and they can only passively accept the changes in the external environment brought about by the policy (see Table 5).

In the dimension of education expenditure, the policy effect shows a “gradient feature” opposite to the participation rate: the lower the income of the family, the greater the decline in expenditure. The out-of-school training expenditure (logarithmic) of the lowest income group decreased by 6.1383 units ($p < 0.01$), which was equivalent to a decrease of 99.8 % in actual expenditure, almost zero ; the middle-income group (40 % -60 % quantile) decreased by 3.5101 units ($p < 0.01$), a decrease of 97.0 %; even in the highest income group, which is the most insensitive to policy, expenditure decreased by 2.5606 units ($p < 0.05$) (see table 4). This difference not only confirms the effectiveness of the policy’s “burden reduction” for low-income families - they do reduce training expenditures that they cannot afford due to policy pressure, but also exposes the “adaptability” of high-income families: they may turn to hidden channels such as small-class tutoring and tutors with lower costs. While controlling expenditures, they still maintain the participation rate through non-standardized training.

On the whole, under the prism of income stratification, the “double reduction” policy reflects the deep contradiction in the allocation of educational resources : middle and high-income families adjust their investment in continuing education through strategies, while low-income families passively “withdraw” from the training market. This differentiation may further widen the education gap between children of different classes and form a tension with the goal of “education equity” pursued by the policy.

Table 4. Heterogeneous Effects on Tutoring Participation by Income Groups

	(1) Lowest 20%	(2) 20-40%	(3) 40-60%	(4) 60-80%	(5) Highest 20%
Post×Policy	-0.0501 (0.1765)	0.2161* (0.1033)	0.4422*** (0.0720)	0.2520*** (0.0825)	0.4333*** (0.0842)
Cons	0.1951 (0.1589)	0.1775** (0.0721)	0.0534 (0.0524)	0.2253*** (0.0472)	0.2326*** (0.0477)
N	140	195	88	138	136

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ **Table 5.** Heterogeneous Effects on Tutoring Expenditure by Income Groups

	(1) Lowest 20%	(2) 20-40%	(3) 40-60%	(4) 60-80%	(5) Highest 20%
Post×Policy	-6.1383*** (0.0399)	-1.6332 (1.2268)	-3.5101*** (0.5211)	-3.8779*** (1.1473)	-2.5606** (1.1515)
Cons	6.7229*** (0.0389)	4.3219*** (1.1337)	7.5415*** (0.4890)	7.2724*** (0.9816)	8.6615*** (0.9833)
N	128	145	65	90	89

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.4. Robustness test

In order to ensure that the above findings are not caused by data anomalies or model setting deviations, this paper conducts a robustness test by limiting the sample range - only the provinces observed in the two surveys in 2018 and 2022 are retained, so as to eliminate the interference of regional sample fluctuations on the results.

The test results show that the influence coefficient of policy variables on the overall participation rate of off-campus training is 0.2735 ($p < 0.01$), which is almost consistent with 0.2723 in the main model, and the standard error is exactly the same (0.0176) (see Table 6). This means that even if the sample consistency at the provincial level is controlled, the core conclusion that the participation rate increases significantly after the implementation of the policy is still valid, indicating that the results have high stability and are not driven by abnormal data in individual regions.

However, this test also exposes the limitations of the data : due to the lack of panel data broken down by school section (such as primary school, junior high school, high school), we cannot further analyze the differential response of students' families of different age groups to the policy. For example, junior and senior high school families facing the pressure of further education may have more urgent needs for training than primary school families, and the impact of policies on them may have magnitude differences. This gap provides a direction for follow-up research - in the future, more detailed data can be combined to explore the performance of policy effects in different education stages, so that the conclusions are more practical and instructive.

In general, the results of the robustness test have enhanced our confidence in the core findings and further confirmed the complexity of the effect of the "double reduction" policy: the policy has achieved remarkable results in curbing the absolute level of expenditure, but it still faces

many practical challenges in controlling the participation rate of training and promoting educational equity.

Table 6. Robustness Checks

	(1) Consistent Provinces
Post×Policy	0.2735*** (0.0176)
Cons	0.0299*** (0.0025)
N	43332

Standard errors in parentheses

Age-based subgroup analysis skipped due to data limitations or collinearity issues.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5. Policy Implications and Research Deficiencies

5.1. Policy implications

Based on the above findings, the effect of the “double reduction” policy is complex. It not only achieves certain results in controlling the absolute level of expenditure, but also has challenges in restraining training participation and promoting fairness. Based on this, the following policy recommendations are proposed :

First of all, it is necessary to optimize the accuracy of policy implementation and avoid the avoidance space brought by “one size fits all”. The counter-trend growth in the participation rate of subject training reflects the unmet rigid demand for subject knowledge by families, and also exposes regulatory loopholes. It is suggested to refine the classification criteria of training, clarify the boundary between subject and non-subject training, and combat “invisible variation” training behaviors (such as private teaching, “one-to-one” hidden tutoring) to ensure that policy constraints are implemented.

Secondly, we should pay attention to the differential impact of policies on different income groups and alleviate educational inequality. Middle- and high-income families maintain educational advantages by increasing participation, while low-income families passively reduce expenditures, which may aggravate the class gap. It is recommended to provide inclusive after-school service subsidies for low-income families through the tilt of public finances, and to regulate the training behavior of high-income families to prevent the transformation of resource advantages into educational privileges.

Thirdly, it is necessary to strengthen the role of the main position of school education and replace the function of off-campus training. After the implementation of the policy, the family’s demand for on-campus services has emerged, but the quality and coverage of on-campus after-school services are still insufficient. It is suggested to increase the resource investment in after-school services, enrich the types of courses (such as subject counseling and interest expansion), and establish teacher incentive mechanisms (such as reasonable salary and workload balance) to enhance the attractiveness of services and reduce the dependence of families on off-campus training.

Finally, the data quality and evaluation system should be improved to provide a scientific basis for policy adjustment. The sharp decrease in sample size and extreme values in this study have affected the interpretation of the results. It is suggested that a long-term follow-up survey

mechanism should be established to unify the definition of variables and statistical standards. At the same time, multi-dimensional indicators such as academic performance and students' physical and mental health should be included to comprehensively evaluate the impact of policies on educational ecology.

5.2. Research deficiencies

First, from the perspective of the rigor of causal identification, the ideal assessment should be based on multi-period tracking data before policy implementation for parallel trend test. However, limited by the availability of data, this study only uses the data of 2018 and 2022. Although the robustness test alleviates some errors, it cannot completely eliminate the potential impact of unobserved variables. The dynamic change trend of policy effect can be further verified after the release of tracking data for a longer period in the future.

Secondly, in the depth of heterogeneity analysis, although this study examines income stratification and urban-rural differences, it has not been refined to different urban types (such as first-tier and third-tier cities), school nature (such as public and private) and other dimensions. There may be differences in the response of these sub-groups to policies. For example, urban families with high-quality educational resources may be more likely to maintain training participation through alternative channels, and the training needs of private school students may also be differentiated from those of public schools. Follow-up research can expand these dimensions to provide more accurate policy basis.

Third, the discussion of the policy effect mechanism is still insufficient. This study mainly focuses on the surface changes of participation rate and expenditure, and fails to deeply analyze the psychological mechanism behind family decision-making (such as the degree of relief of education anxiety), the quantitative relationship between school after-school service quality and the substitution effect of off-campus training. The revelation of these mechanisms will help to understand the deep impact of policies on education ecology more comprehensively.

6. Conclusion

This study evaluates the impact of China's "Double Reduction" policy on family off-campus training behavior and education expenditure using 2018 and 2022 CFPS data and the difference-in-differences model. Empirical results show contrary-to-expectation growth in off-campus training participation rate (overall: 3.0%→30.2%; subject: 2.6%→22.6%; non-subject: 1.6%→20.3%), while family off-campus training expenditure drops by 94.2% (logarithmic result) but its share in total family education expenditure remains stable. Heterogeneity analysis reveals low-income households see the largest expenditure decrease (≈99.8%), middle-and high-income households have more significant participation increases (44.22%-43.33%), and urban-rural gaps persist. Robustness tests confirm result reliability. The findings highlight the need for optimized policy implementation, targeted equity measures, and strengthened public education resources.

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