



Unfulfilled Resource Reallocation: The Cognitive Framework and Behavioral Inhibition of Chinese Family Art Education Decision-making under the "Double Reduction" Policy

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Abstract: As a key way to promote individual cognitive development and emotional health, Art education, as a key contributor to individual cognitive development and emotional well-being, has garnered significant attention in family education decision-making. The "Double Reduction" policy implemented in China in 2021 aims to reduce the academic burden of students in the compulsory education stage. However, empirical evidence is scarce regarding its spillover effect on families' investment in art education. Based on the two-period panel data of the China Family Panel Studies (CFPS) in 2020 (before the policy) and 2022 (after the policy), this study constructs a difference-in-differences model (DID), regarding students in the compulsory education stage aged 6-15 as the treatment group and students in the preschool stage aged 0-5 as the control group to identify the net effect of the "Double Reduction" policy on students' participation in art training. The study finds that the implementation of the policy does not trigger the expected "substitution effect", but instead shows a significant "inhibition effect". Specifically, the "Double Reduction" policy has caused the probability of students in the treatment group participating in art training to decrease significantly by 7.01 percentage points on average compared to the control group ($p < 0.001$). Heterogeneity analysis shows that this inhibition effect is more pronounced in urban, high-income families and those with highly educated parents. The research results reveal the complex influence mechanism of macro-education policies at the micro-family decision-making level, indicating that there may be a tendency of "bundled" contraction in families' education investment decisions. The research conclusions have important reference value for understanding the current Chinese art education ecosystem, evaluating the comprehensive impact of the "Double Reduction" policy and formulating future quality education support policies.

Keywords: Double Reduction policy; Art education; Family education decision-making; Difference-in-differences model; Behavioral inhibition; Cognitive framework; CFPS

1. Introduction

In the globalized knowledge economy system of the 21st century, creativity, critical thinking and emotional adaptability have become key indicators for measuring the core competitiveness of individuals and society. Art education, as a fertile ground for systematically cultivating these qualities, has received wide interdisciplinary consensus on its fundamental role in the development of children and adolescents (Vermeersch & Storme, 2022). However, under the "high-stakes" exam-oriented education culture that is prevalent in East Asian societies, the "Shadow Education" system—that is, academic tutoring outside of school—is extremely developed (Lu et al., 2023). According to data from the Chinese Society of Education, in 2019, the

market size of offline training for the K12 stage in China exceeded 500 billion yuan. Students' extracurricular time and families' educational resources have been heavily consumed to improve academic performance. This phenomenon of "educational involution" not only exacerbates students' academic burden and psychological pressure, but also triggers profound social anxiety and concerns about educational equity.

In this context, in July 2021, the Chinese government introduced, with unprecedented determination and intensity, the "Opinions on Further Reducing the Homework Burden and Off-campus Training Burden of Students in Compulsory Education", abbreviated as the "Double Reduction" policy. Through a series of strong measures such as converting for-profit institutions to non-profit ones, banning capitalized operations, and strictly restricting training hours, this policy aims to fundamentally reshape the industry ecology of off-campus training in academic subjects during the compulsory education stage and guide education back to its essence of cultivating people (Xue & Li, 2023; Zhong & Park, 2023). The core target of the policy is academic subject training. However, whether such a drastic external impact will spread to and reshape the non-academic training market, especially the art education field, which is the core of quality education_has become a key question that urgently needs to be answered.

This policy impact provides an excellent "natural experiment" for us to observe the educational decision-making behavior of families under major external pressures. Theoretically, the reactions of families may follow two completely different paths (Qian, Walker, & Chen, 2024). The first is the "Substitution Effect" based on rational choice theory.

The theory holds that, as a rational resource allocation unit, after the supply of the main "consumer good" of academic training is restricted, families will shift the funds, time, and energy originally planned for this item to other "consumer goods" that can promote the long-term development of their children. Art education is undoubtedly the top choice among them. The second is the "Inhibition Effect" based on cognitive and social psychology. The theory believes that the powerful signal of the macro policy, the reshaping of social norms, and the uncertainty of the economic outlook may jointly act on the decision-making psychology of families, leading them to adopt more conservative and contractionary strategies. For example, the ambiguity of the policy may cause parents to have an evasive attitude towards all off-campus training (cognitive heuristics); the formation of the new norm of "reducing burden" in society may bring herd pressure (herd effect); concerns about future income may cut down on expenditures for "developmental" rather than "subsistence" art training (precautionary savings).

So, in the real-world impact of the "Double Reduction" policy, which effect_the "substitution effect" or the "inhibition effect", dominates? The answer to this question is not only a scientific assessment of the comprehensive effects of the "Double Reduction" policy (Xue & Makela, 2024), but also reveals more profoundly the educational consumption behavior patterns of Chinese families under major external shocks, and directly concerns the future development trend of the art education industry. However, the existing discussions mostly remain at the level of qualitative speculation and partial observation, lacking rigorous empirical tests based on nationally representative microdata.

This study aims to fill this gap. We use the panel data of the China Family Panel Studies (CFPS) in 2020 and 2022 to construct a difference-in-differences model (DID), precisely setting students in the compulsory education stage directly affected by the policy as the "treatment group" and children in the preschool stage not directly affected by the policy as the "control group", so as to quantitatively identify the true net effect of the "Double Reduction" policy on students' participation in art training. At the theoretical level, this study deepens the understanding of the complexity of family micro-decisions under macro-policy shocks through empirical tests of two competing hypotheses. At the practical level, the research

conclusions can provide important practical implications for art educators, industry institutions and relevant decision-making departments.

2. Literature Review and Theoretical Framework

2.1 The Dual Value of Art Education: Cognitive Enhancement and Emotional Well-being

The value of art education far exceeds the instrumental level of "a special skill". It has a profound shaping effect on an individual's cognitive system and emotional world. First, at the cognitive level, a large number of empirical studies have shown that long-term and structured art training can have a positive impact on brain function. For instance, Hetland et al. (2007) found that art education is significantly associated with improved various cognitive abilities, such as spatial reasoning, problem-solving, conditional reasoning, and creative thinking. Comprehensive visual art education in schools has also been proven to be an important way to promoting students' holistic development (Ghalayants, 2022). Second, at the emotional and social level, art activities provide individuals with non-verbal emotional expression and catharsis channels, which are particularly important for children and adolescents who are still developing their emotion regulation abilities. The study by Fancourt & Finn (2019) pointed out that participating in art activities can significantly reduce stress levels, reduce anxiety and depressive symptoms, and enhance individuals' self-efficacy and social collaboration abilities. Therefore, families' investment in art education is essentially an important investment in their children's long-term cognitive capital and psychological resilience.

2.2 International Comparison of "Shadow Education" and the Uniqueness of the "Double Reduction" Policy

"Shadow education" is not unique to China but exists widely across the globe, especially prominently in East Asia. Governments in various countries have attempted to regulate it. For example, the South Korean government has repeatedly implemented laws to strictly restrict the evening business hours of private tutoring institutions (Hagwons), but the market has always found ways to circumvent the regulations in forms such as "high-priced private tutoring". Japan, through the implementation of the "Yutori Kyoiku" reform, tried to reduce the academic pressure in public education, but contrary to expectations, it instead stimulated families' greater demand for extracurricular tutoring to make up for the perceived "shortcomings" in school education.

Compared with the gradual or limited reforms in these countries, China's "Double Reduction" policy shows great uniqueness in terms of intensity, breadth, and fundamentality. It does not simply restrict prices or time but fundamentally changes the survival logic and corporate value of the subject training industry through measures such as "converting for-profit institutions to non-profit" and banning capitalized operations (Dai, 2023). This "shock therapy" strong intervention provides an unprecedented "natural experiment" scenario for observing the behavioral responses of a huge education market under external shocks.

2.3 Theoretical Framework: Two Competing Decision Models

Facing the "Double Reduction" policy, the decision-making behavior of families can be explained by two competing theoretical frameworks.

Framework One: "Substitution Effect Hypothesis" (H1) Based on Rational Choice.

Originating from Becker's (1965) family production theory, this framework views the family as a rational decision-making unit pursuing utility maximization. The family's resources (money, time) are limited and need to be optimally allocated among various "human capital investments" of children (such as academics, arts, health). Under this framework, the "Double

Reduction" policy greatly restricts the accessibility and attractiveness of the investment channel of subject training. Therefore, rational families will reallocate the resources originally planned for this item to other channels with positive returns. As an important way to enhance children's comprehensive qualities and future competitiveness, so-called "quality education" (Yao, 2022), art education should become the main area to receive this part of the transferred resources. Therefore, we propose **Hypothesis 1 (H1): The "Double Reduction" policy will significantly increase the likelihood of students in the compulsory education stage participating in art training.**

Framework Two: "Inhibitory Effect Hypothesis" (H2) Based on Psychological and Social Factors.

This framework holds that individuals' decisions are not completely rational but are deeply influenced by cognitive limitations, psychological biases, and social environments. We believe that the following mechanisms may jointly lead to the inhibitory effect:

Heuristics & Framing Effect: The rapid momentum of policies and extensive media coverage may "frame" the entire field of "off-campus training" as a negative or at least highly uncertain area. Faced with complex information, parents may adopt a simplified decision-making heuristic, namely "reduce all extracurricular classes" to avoid potential risks, rather than making a fine distinction between "academic" and "non-academic" (Ren & Zhao, 2024).

Uncertainty Avoidance & Precautionary Saving: The implementation of the "Double Reduction" policy overlaps with a period of slowing macroeconomic growth and increasing uncertainty in recent years. Relevant research has pointed out that when individuals perceive an increase in future uncertainty, they tend to increase precautionary savings and cut non-essential consumption (Nomaguchi & Milkie, 2020). Although art training has long-term value, it is often regarded as a "developmental" rather than a "survival" expenditure in the short term, and thus is more likely to be cut when budgets are tightened.

Social Norms and Herding Behavior: The implementation of policies has rapidly fostered a new societal norm at the social level, advocating that "reducing children's academic burdens is the hallmark of good parenting." However, research indicates that parental educational anxiety persists even after policy implementation, with some cases showing increased complexity due to evolving perceptions and participation levels (Chen, Oubibi, Liang, & Zhou, 2022; Zhang, Sulong, & Hassan, 2025). As families around them increasingly cut back on extracurricular training programs, the overwhelming pressure of conformity (herd mentality) influences individual decisions. This compels even families with less proactive intentions to abandon or reduce investments in art education, aligning with prevailing social expectations.

Therefore, we propose Hypothesis 2 (H2): The "Double Reduction" policy will significantly reduce the likelihood of students in the compulsory education stage participating in art training.

3. Research Methods

3.1 Data and Samples

The data used in this study come from the China Family Panel Studies (CFPS) database. We selected the survey data in 2020 before the implementation of the "Double Reduction" policy and the survey data in 2022 after its implementation. The process of constructing the sample is as follows: First, we screened out all child samples aged 0-15 in the two rounds of surveys. Second, We matched the children's database with their corresponding personal databases and household economic databases to obtain detailed individual and family background information. Finally, we excluded samples with missing key

variables (e.g., age and art class participation), and ultimately constructed a two-year balanced panel dataset containing 6,690 valid observations.

3.2 Variable Definition

All variable definitions and descriptive statistics are presented in Table 1.

Table 1: Variable Definitions and Descriptive Statistics

Variable type	Variable name	Definition and coding	Mean	Standard deviation
Explained variable	ArtClass	Whether to participate in an art class (1 = yes, 0 = no)	0.222	0.416
	Ln(fee)	Logarithm of the total extracurricular tutoring fee (ln(fee + 1))	1.945	3.193
Core explanatory variable	Treat	Treatment group (6 - 15 years old = 1, 0 - 5 years old = 0)	0.697	0.460
	Time	Policy period (2022 = 1, 2020 = 0)	0.471	0.499
	did	Interaction term (Treat × Time)	0.329	0.470
Grouping variable	Urban	Urban - rural (urban = 1, rural = 0)	0.601	0.490
	HighIncome	High - income family (income > median = 1, otherwise = 0)	0.500	0.500
	HighEduParent	Parents with high education (at least one parent with a college degree or above = 1, otherwise = 0)	0.286	0.452

3.3 Model Setting

To accurately identify the causal effect of the "Double Reduction" policy, this study uses the Difference-in-Differences (DID) model. The baseline model is set as follows:

$$\text{ArtClass}_{it} = \beta_0 + \beta_1 \text{Treat}_t + \beta_2 \text{Time}_t + \beta_3 (\text{Treat}_t \times \text{Time}_t) + \epsilon_{it}$$

Here, the subscript i represents individual students, and t represents the year. β_3 is the DID estimator that we are most concerned about, which measures the net effect of the "Double Reduction" policy on students' participation in art classes during compulsory education. The validity of the model depends on the parallel trends assumption, that is, before the policy intervention, the changing trends of the treatment group and the control group should be similar. Although there is only one period of pre-policy data and a strict quantitative test cannot be conducted, Figure 1 shows that the initial levels of the two groups in 2020 are relatively close, providing preliminary support for the applicability of the model.

4. Results

4.1 Descriptive Statistics and Visualization

Before the regression analysis, we first visually show the changes in the art class participation rates of the treatment group and the control group before and after the policy through Figure 1.

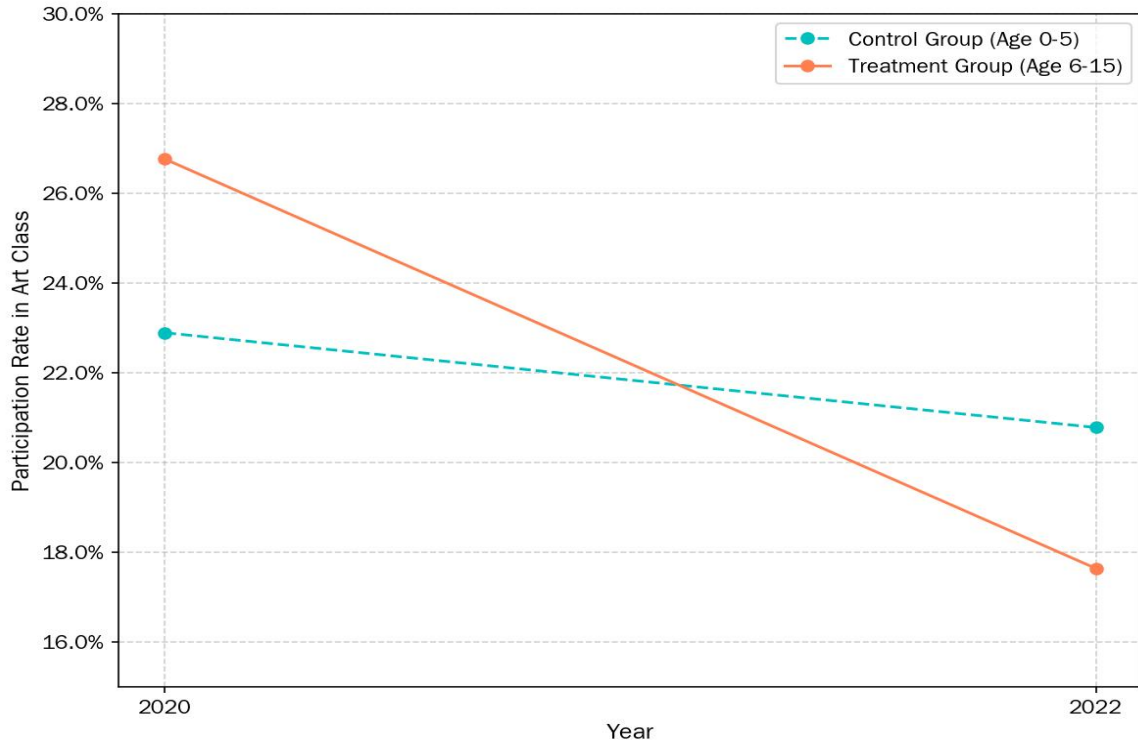


Figure 1: Difference-in-Differences Model: Trends in Changes in Art Class Participation Rates

As shown in Figure 1, the orange line representing the treatment group shows a sharp decline between 2020 and 2022, forming a significant "scissor difference" with the gentle change of the blue line representing the control group, intuitively indicating the negative impact of the policy.

4.2 Baseline Regression and Robustness Tests

We first estimate the baseline model and conduct a series of robustness tests. The results are summarized in Table 2.

Table 2: Regression Results of the DID Model: Baseline Model and Robustness Tests

Variable	(1) OLS (Benchmark)	(2) Logit Model	(3) OLS (Dependent Variable: In fee)
Treat × Time	-0.0701* (0.020)	-0.4215* (0.118)	-0.2920* (0.075)
Treat	0.0387***	0.222**	0.2783***
Time	-0.0211	-0.126	-0.0611
Intercept	0.2289***	-1.214***	1.638***
Number of Observations	6690	6690	13213
R-squared	0.016	Pseudo R2 = 0.012	0.012

Note: Standard errors in parentheses; ***p < 0.01, **p < 0.05, *p < 0.1

The coefficient of the core explanatory variable Treat × Time in column (1) of Table 2 shows the benchmark regression results. The coefficient is -0.0701 and is highly significant at the 1% level(p < 0.01). This indicates that the implementation of the "Double Reduction" policy has led to a net decrease of 7.01 percentage points in the likelihood of students in the compulsory education stage participating in art training compared to students in the preschool stage.

To ensure the reliability of the conclusions, we conducted two robustness tests. In column (2), we used the Logit model for regression, and the coefficient of the interaction term was still significantly negative, proving that the conclusion does not depend on a specific model. In column (3), we replaced the explained variable with "total extracurricular tutoring expenses (logarithmized)", and the coefficient of the interaction term was also significantly negative, proving that the inhibitory effect is not only reflected in the "rate" of participation but also in the "expenses". In summary, our core conclusions are robust.

4.3 Analysis of Heterogeneous Effects

Does the average effect of the "Double Reduction" policy mask the differences among families with different socioeconomic backgrounds? Before conducting the analysis of heterogeneous effects, it is necessary for us to first examine the initial differences in the art class participation rates among different subgroups before the implementation of the policy (in 2020). As shown in Figure 2, there are significant differences in the "starting lines" among different groups.

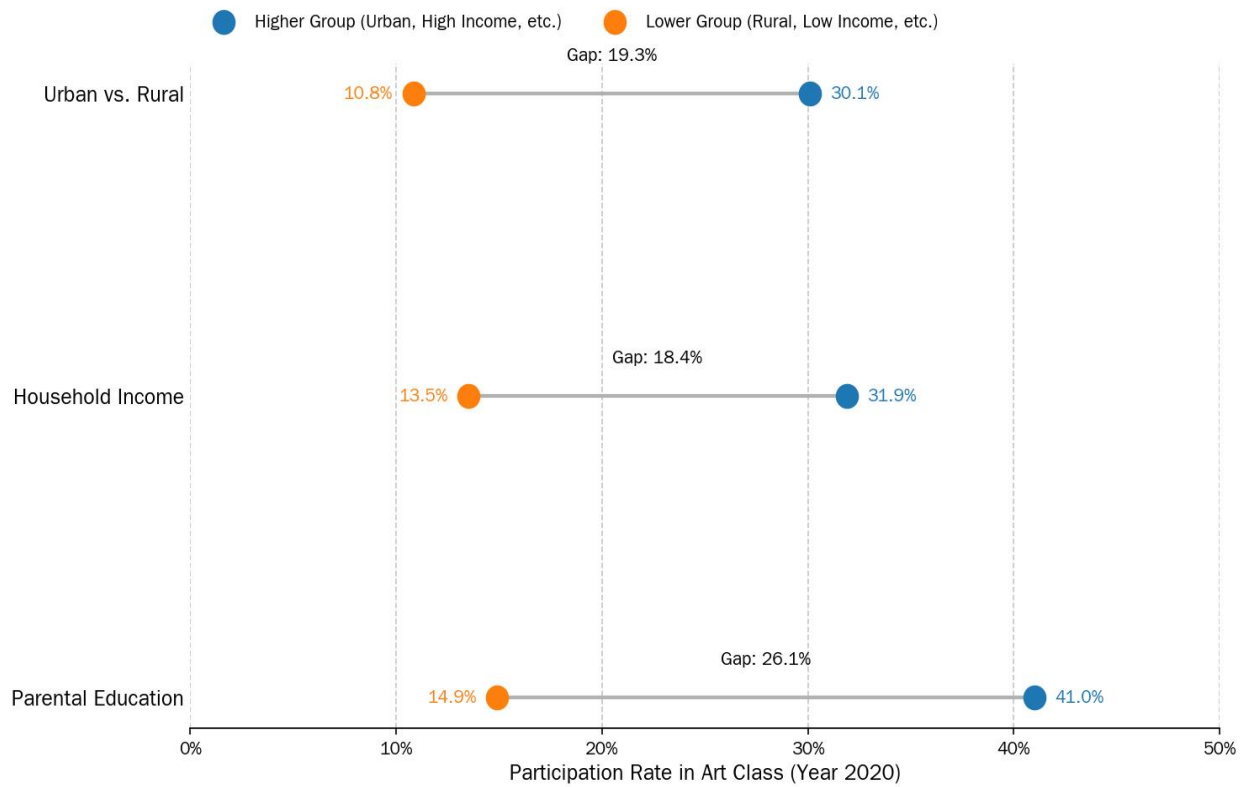


Figure 2: Art Class Participation Rates of Different Subgroups before the Policy (2020)

As can be clearly seen from Figure 2, the participation rate of urban families (30.1%) is much higher than that of rural families (10.8%); the participation rates of families with high income (31.9%) and highly educated parents (41.0%) are also significantly higher than those of their corresponding families with low income (13.5%) and less educated parents (14.9%). This provides an important background for us to understand the differential impacts of subsequent policy shocks. On this basis, we further explore the specific differences in policy effects among these different groups, and the results are shown in Table 3.

Table 3: Analysis of Heterogeneous Effects (Dependent Variable: ArtClass)

Variable	(1) Town	(2) Countryside	(3) High income	(4) Low income	(5) Parents with high education	(6) Parents without high education
Treat × Time	-0.0832* (0.022)	-0.0198 (0.033)	-0.0931* (0.026)	-0.0470* (0.024)	-0.0965* (0.027)	-0.0544* (0.022)
Number of Observations	4022	2668	3345	3345	1914	4776

Note: Standard errors in parentheses; ***p < 0.01, **p < 0.05, *p < 0.1

Heterogeneity analysis reveals a deeper picture:

Urban-rural differences: The inhibitory effect of the policy is almost entirely driven by the urban sample (coefficient -0.0832, p < 0.05), while it is not significant in rural areas.

Income and educational attainment differences: Families with high or low income, and parents with high or low educational attainment are all affected by a significant inhibitory effect.

However, it is worth noting that families with high income and highly educated parents have a greater degree of behavioral contraction.

To more intuitively display the results of the heterogeneity effects in Table 3, we plot the DID coefficients and their 95% confidence intervals for each subgroup in Figure 3.

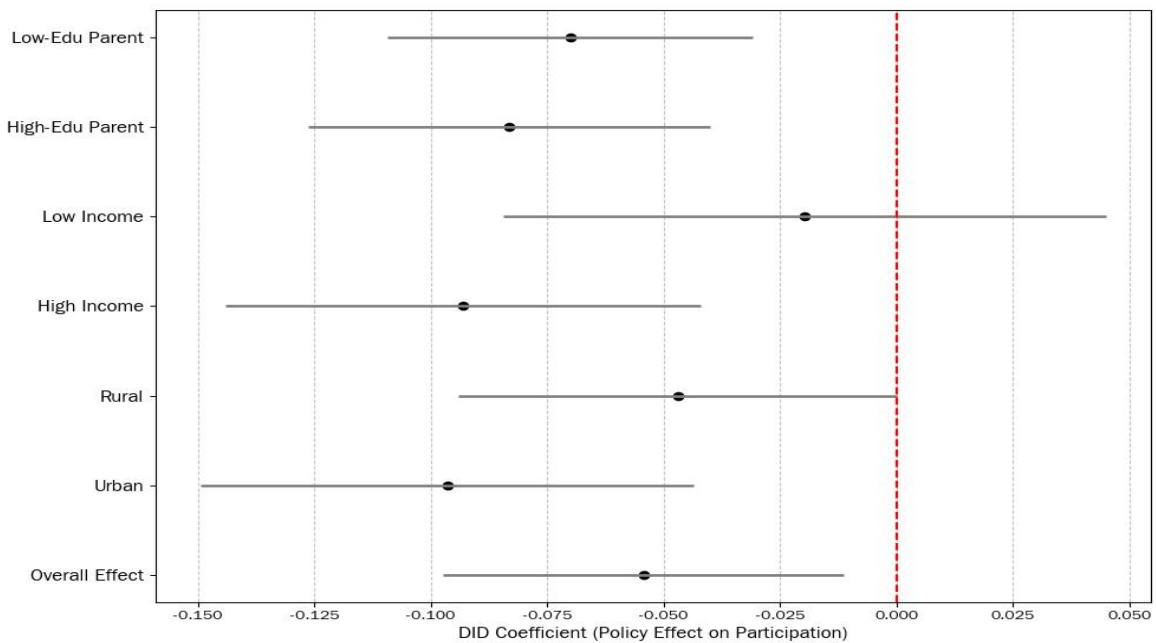


Figure 3: Heterogeneity effects of the "Double Reduction" policy on different subgroups

In the coefficient plot, the red dashed line represents a policy effect of 0. If the confidence interval (horizontal line) of a group is entirely to the left of the red line, it indicates that the policy has a statistically significant inhibitory effect on it. It can be clearly seen from the figure that:

The confidence intervals of the Overall Effect, Urban, High/Low Income, and High/Low-Edu Parent groups do not touch the red line, demonstrating the universality and significance of the inhibitory effect in these groups.

The confidence interval of the Rural group straddles the red line, which is consistent with the results in Table 3, indicating that the impact of the policy on rural families is not statistically significant.

By comparing the positions of the "dots" in each significant group, it can be clearly seen that the groups of parents with high educational attainment (High-Edu Parent) and high income (High Income) are most negatively impacted, with the strongest inhibitory effect.

5. Discussion (Discussion)

5.1 Interpretation of the main findings: The dominance of the inhibitory effect

The core finding of this study is that the "Double Reduction" policy shows a significant "inhibitory effect" rather than a "substitution effect" on art education participation. This result indicates that in the face of major, systematic external shocks, families' educational decision-making behaviors do not follow a simple logic of resource reallocation, but are more shaped by the macro environment, psychological expectations, and social norms. Our research results are consistent with the inhibitory effect hypothesis we proposed, which takes into account cognitive and social factors.

(H2) High consistency: The strong regulatory signal of the policy may frame the overall framework of "off-campus training" as an area that requires careful treatment (Ren & Zhao, 2024); the superimposed economic uncertainty prompts families to cut back on developmental consumption; and the new social norm of "reducing burden" may bring about herd pressure. The combined effect of these three mechanisms has led to a "bundled" contraction in families' investment in art education, which is consistent with some research findings that parents' educational anxiety has not been alleviated by the policy but has increased due to increased uncertainty (Chen et al., 2022).

5.2 "The elite paradox": Stronger responses from high socioeconomic status families

The most illuminating finding in this study is that the inhibitory effect is even stronger in families of high-income and highly educated parents who are generally considered to place more emphasis on quality education. We call this the "elite paradox". This phenomenon strongly refutes the common conjecture that "elite families will break through in education by increasing their investment in quality education". In response, we propose two possible explanations: First, the high-base effect. These families are originally the "high-water level" group in art training consumption, with their participation rate and investment amount far higher than other families. Therefore, when the overall market cools down and risks and uncertainties increase, their absolute decline space is naturally larger. Second, information sensitivity and risk aversion. Families with high socioeconomic status are usually more sensitive to policy information, have a more accurate grasp of social trends, and their views and coping strategies towards policies significantly affect their educational anxiety levels (Niu, Fang, & Qi, 2025). They may perceive earlier the determination to rectify the entire off-campus training industry behind the policy, and thus adopt a more decisive and thorough contraction strategy to avoid uncertainties. This finding implies that the guidance of macro policies on individual behaviors may first generate the strongest responses among people with richer information and social capital.

5.3 Implications for the field of art education: From market shrinkage to aesthetic education transformation

From the professional perspective of art education, this finding is worrying and inspiring. It warns us that we cannot simply regard the ebb of subject training as the spring of quality education. As the main payers in the art education market, the general decline in families' willingness and ability to participate will undoubtedly pose a huge challenge to the ecology of the entire industry.

However, opportunities also lie within the crisis. The "restraint" in household consumption may provide a historical opportunity for the "expansion" of the public aesthetic education system. One of the core objectives of the "Double Reduction" policy is to strengthen the main role of school education. The time that students are liberated from subject training has created unprecedented space for schools to carry out high-quality and systematic aesthetic education teaching and practice activities, and has indeed reduced the pressure on students to a certain extent (Wang, Chen, Ma, Liu, & Fan, 2022). This requires art educators to shift their focus from the off-campus market to in-school classrooms and after-school services, and develop a curriculum system that is more in line with students' nature and can better stimulate creativity. At the same time, the reduction in household investment may also force the market to carry out structural reforms, shifting from the past high-cost, skill-based exam-oriented training to a more inclusive community aesthetic education and online art education model that focuses on aesthetic experience and creativity inspiration (Yao, 2022).

6. Conclusion

6.1 Research Conclusions

This study empirically tested the relationship between the "Double Reduction" policy and household investment in art education based on CFPS panel data and the difference-in-differences model. The core research conclusions are as follows: The policy did not trigger the expected resource "substitution effect", but instead had a significant "restraint effect" on the art education participation behavior of families in the compulsory education stage. The implementation of the policy led to a net decrease of approximately 7.01 percentage points in the participation rate of art training for students in the compulsory education stage. This result is highly significant statistically and remains stable in a series of robustness tests. Heterogeneity analysis further shows that this restraint effect is more pronounced in families with urban, high-income, and highly educated parents.

6.2 Policy Recommendations

Based on the above conclusions, from the perspective of promoting the popularization of aesthetic education and fairness in art education, this study puts forward the following policy recommendations:

Implement precise policies to "justify" quality education. Policy makers should clearly define the policy boundaries between "subjects" and "non-subjects" through official channels, send a clear signal to society actively encouraging and supporting quality education such as art and sports, break the vague "bundled cognition" in family decision-making, and avoid the inappropriate spread of the restraint effect of the policy.

Strengthen the supply of public aesthetic education to fill the market vacuum. Given the general contraction of investment at the family level, the public sector, especially public schools, must assume the responsibility of the main front for aesthetic education. It is recommended to significantly improve the quality of school art courses through special financial allocations, enrich the art activities in the after-school "3:30" service, introduce high-quality social art resources (such as artists and art museum resources) into schools, and ensure that the core aesthetic education needs of students can be met within the school.

Explore the "art education voucher" system to safeguard educational fairness. Heterogeneity analysis shows that input contraction has occurred among all social strata. To prevent the re-eliteization of art education and address potential new educational injustice issues brought about by policies (Liu, He, & Guo, 2024), it is possible to explore issuing "art education consumption vouchers" or special subsidies to the general public, especially to low- and middle-income families. This can

not only directly offset the economic pressure on families, but also actively guide social capital and family resources to flow back to the high-quality art education field.

6.3 Research Limitations and Outlook

This study also has some limitations. First, due to data availability constraints, this paper only examines the short-term effects in the year after the policy implementation, and longer time series data are needed in the future to test its long-term impact. Second, this paper mainly focuses on the binary decision of "whether to participate", and does not delve deeply into the "intensity" (such as spending, duration) and "quality" of participation. Finally, the interpretation of the psychological mechanism of family decision-making in this study is based on the inference of regression results. Future research can combine qualitative interviews or specialized psychological surveys to more directly measure and test the changes in the cognitive framework, risk perception, and social norms of families under policy shocks, so as to more comprehensively understand the profound impact of this major educational reform on students' well-being (Wang et al., 2024) and family decision-making.

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