The Effect of College Entrance Exam Policies on Test Preparation and Tutoring Services

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Abstract

Multiple studies suggest that policies mandating college entrance exams can have positive impacts on college outcomes, especially for students who would otherwise not sit for the exam. Less understood is how families react to this increased competition for college admissions. Our study estimates that such statewide mandatory testing policies cause an additional 16% increase in private tutoring prevalence, with more pronounced effects in high income, highly educated, and high proportion Asian areas. The results were robust to model specification choices and placebo tests using music instruction and martial arts industries. Our findings suggest that interventions to further educational equality may have second order effects that undermine their impact as families adjust their behavior to stay competitive.

SECTION I: INTRODUCTION

State policies mandating college entrance exams, wherein high schools administer the exam at no expense to the student, are often touted as victories for educational equity (Cook & Turner, 2019; Hurwitz et.al, 2015). The exam fee can be a substantial disincentive for low-income students, especially if they are uncertain about whether to enroll in college at all (Klasik, 2013). Administering the exam as part of the school curriculum also avoids the logistical barriers of navigating the registration process, securing transport to and from the exam site, and finding time to sit for the exam (Bulman, 2015). With score in ha

nd, students can better understand their prospects for college and make strategic decisions about where and how to apply (Hyman, 2017; Grodsky & Jones, 2007).

At the same time, research has documented that families of different social classes and income levels differ in how they approach decisions about education and schooling. Increased perceived competition pressures families to find ways to maximize their chances for academic success (Bound, Hershbein, & Long, 2009). And while all families have increased their investment in education over time, wealthier families are doing so at a faster rate (Kornrich, 2016; Kornrich & Furstenberg, 2013). This can take the form of early childcare (Ramey & Ramey, 2009), parental time spent with children (Guryan, Hearst & Kearny, 2008), extracurricular activities (Friedman, 2013), or advocacy for dual enrollment programs, Advanced Placement classes, and International Baccalaureate programs (Davies & Hammack, 2005).

This study sits at the intersection of these two dynamics and analyzes the impact of mandatory college entrance exams on education decision-making through the lens of private tutoring markets. Private tutoring services demand for educational resources beyond what is provided by mainstream schooling, and the private tutoring industry has grown substantially in

the United States over the past few decades, particularly in areas of high socioeconomic status (Kim, Goodman & West, 2025). As an industry which explicitly purports to convert a family's financial capital into academic achievement, private tutoring has potentially large implications for social (in)equality (Dang & Rogers, 2008). On the one hand, if low-income families enroll in private tutoring with money that would have paid for exam fees (until those exams were offered for free), and middle- and high-income families operate as usual, universal testing policies may have second order effects in reducing educational attainment gaps. On the other hand, if middle- and high-income families perceive universal testing as further competition, they may enroll in private tutoring to increase their scores, undermining the chance for other students to compete more equitably.

We find that states mandating college entrance exams for high school students led to a 16% increase in tutoring centers relative to the comparison states that did not introduce these policies. The effects are statistically significant immediately after policy onset, and the results are consistent across various robustness checks. Our heterogeneity analyses show that these effects are driven by areas with relatively high levels of income, education attainment, and proportion of Asians.

Our work contributes to three distinct strands of research literature. First, the impacts of mandatory exam policy. Several studies have examined the policy effect on college enrollment and have found that mandating these exams increases enrollment in college by 2 to 4 percentage points in states adopting such policies (Klasik, 2013; Hurwitz et. al., 2015; Hyman, 2017). One clear mechanism is in the removal of financial and logistical barriers for students, especially low-income students (Klasik, 2013; Bulman, 2015). But an unexplored factor for this dynamic is test-

preparation, which theoretically affects score distributions unevenly across student demographics, possibly undercutting policy effectiveness.

Second, our work contributes to a growing literature about how students and families of different incomes respond to higher education-related policies. Previous research has demonstrated that several higher education related policies have disproportionately benefited students and families with more income (Dynarski, 2000; Dynarski, 2004; Cornwell and Mustard, 2007; Hurwitz and Smith, 2018; Rosinger et al., 2018). We add to this literature by examining the effect of these state-mandated college entrance exams on families of different incomes using geographic and demographic (i.e., income) data down to the county level.

Third, our findings contribute to the growing literature about the private tutoring industry, specifically in the United States. Researchers have studied private tutoring in many national contexts, documenting a global rise (Zhang and Bray, 2020) and overlaps with other educational and societal factors (Kim, 2004; Atalmis, Yilmaz, and Saatcioglu, 2016; Sriprakash, Proctor, and Hu, 2016; Dang and Rogers, 2008; Lee 2005; Bray and Lykins, 2012) but notably little research on the subject has occurred in the U.S. One exception, Kim, Goodman and West (2025), in their survey of national trends, highlight four primary findings. First, private tutoring centers tripled between 1997 and 2022. Second, this growth was concentrated in areas with high levels of parental education and high income. Third, private tutoring centers are located in places with higher numbers of Asian-American and immigrants, even conditional on parental education and income. And fourth, there is little evidence that the prevalence of these centers is related to the structure of the primary and secondary school markets. Our research builds on the work from Kim and his co-authors by looking at the demand for these private tutoring centers in the context of a specific educational policy, mandated college entrance exams.

The remainder of this paper proceeds as follows. In section II we discuss the data used for the study and in our analyses. Section III describes the methods we use to answer our research questions. In section IV we present our results. We discuss our findings in section V and conclude in section VI.

SECTION II: DATA

The data for this study comes from two sources. First, to measure private tutoring center prevalence, we use a proprietary data set compiled by Data Axle. The data collected contain information on businesses in the U.S., including business location and the services provided. The data use Standard Industrial Classification (SIC) code from the U.S. government to classify areas of industry. We focus on businesses registered as either "Tutoring" or "Test Preparation Instruction" according to their SIC Code (829909 and 974868, respectively). This results in us having data on approximately 20,000 unique firms across nearly 35,000 locations in the U.S., spanning between 1997 and 2016. Note that we could not meaningfully distinguish between "Tutoring" and "Test Preparation Instruction" firms (for example, the well-known Kaplan tutoring franchise had multiple firms listed in both categories).

Our second data source comes from the U.S. Census Bureau. Specifically, we use data from the National Historical Geographic Information System (Manson, et. al., 2023). These data contain demographic information (e.g., racial composition, income per capita, etc.) at the county level. We link the demographic data to the business data by geographic location to create the final dataset used in these analyses.

Identifying States

We identify the timing of adopting state-wide mandatory testing policies through the Digest of Education Statistics. Specifically, we use their tables on College Admission Test that describe the percent of students taking either the SAT from the College Board or the ACT from

ACT, Inc.[1] Specifically, we first inspect whether, and if so when, a state changes from not-full participation to full participation on either the SAT or the ACT. We then investigated any ambiguous cases by examining the timing of each state's policy announcements available in public documents and websites. We present the identifications in Figure 1. We excluded any states that experienced policy onset before our analytic timeframe, and those whose policies elapsed during our analytic timeframe. States that switched between mandatory SAT and mandatory ACT exam administration were removed from the main analysis results, as the effect of such switching is not accurately described by non-treatment, first treatment, nor re-treatment (sensitivity analyses categorizing these states while ignoring test switching yielded almost identical results). A table documenting our determinations of whether, and if so when, each state adopted a mandatory college-entrance exam policy is provided in Appendix A.

The available range of tutoring industry data, and the timing of policy adoption by some states (treatment), restricts the observed sample size for some years relative to treatment. For example, though our data contains 724 county level observations 4 years after treatment onset, we only have 322 observations 5 years after treatment onset (i.e., some treated states have fewer observed post-treatment years). This is illustrated in Figure 2. Additionally, to accommodate varying availability across data sources, we focus on the years 2009 - 2019 where all data is available.

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[1] See the current issue of *Digest of Education Statistics Chapter 2 Elementary and Secondary Education, Section 226 College Admission Test* for more detailed information about the data.

SECTION III: METHODS

      To estimate the causal impact of mandatory college entrance exam policies on the prevalence of private tutoring centers, we utilize a modified difference-in-differences (DD) approach. The traditional DD approach examines the outcomes of a treated group in two time periods, before and after treatment, relying on observations of an untreated group across the same periods to serve as a counterfactual (i.e. "parallel trends" assumptions). The corresponding estimator resembles the equation below:

$$Y_i = \beta_1(Post_i) + \beta_2(Treatment_i) + \beta_3(Post * Treatment_i) \qquad (1)$$

      where Y is the outcome, *Post* indicates the time after treatment, *Treatment* indicates whether the entity was treated, and β_3 is the coefficient of interest, representing the average treatment effect. In this study, we aim to compare private tutoring prevalence in states before and after adopting mandatory college entrance exam policies and use private tutoring prevalence in states that never adopted such policies to control for factors unrelated to the treatment. However, due to the staggered adoption of mandatory college entrance exam policies across states we cannot use the traditional DD approach. Though researchers have often addressed the issue of staggered treatment onset via two-way fixed-effects, the validity of this method has been called into question under general conditions (Goodman-Bacon, 2021).

      Instead, we use a strategy recently proposed by Callaway and Sant'Anna (2021), which accounts for staggered treatment onset by subdividing the sample into multiple before-after comparisons according to year of treatment onset. The Callaway and Sant'Anna method calculates individual group-time average treatment effects, i.e. the average treatment effect for a group, *g*, measured at time, *t*. Here, "group" is defined by the time period when units are first

treated. In this context, it would measure the treatment effect in year t of all states that adopted

the policy in year g. This is represented in the following equation:

$$ATT(g,t) = E[Y_t(g) - Y_t(0)|G = g] \qquad (2)$$

This group-time specific average treatment on the treated (ATT)is then aggregated across groups

into a "dynamic" treatment effect (i.e., the effect exactly t years after treatment), and then

aggregated further into an "overall" treatment effect, (i.e., the total effect of receiving treatment).

In our results, we present both the dynamic and the overall treatment effect. The overall

treatment effect is:

$$\theta^O_{sel} = \sum_{g \in G} \theta_{sel}(g)P(G \leq T) \qquad (3)$$

where

$$\theta_{sel}(\tilde{g}) = \frac{1}{T - \tilde{g} + 1}\sum ATT(\tilde{g},t) \qquad (4)$$

with $\theta_{sel}(\tilde{g})$ being the average effect of receiving the treatment among those in group $\tilde{g}$, across

all their post-treatment periods. θ^O_{sel} from equation 3 gives us the average effect of receiving the

treatment by all treated units that ever received in the treatment. The θ^O_{sel} can be viewed as

equivalent to β_3 in the canonical DD above in Equation 1, though rather than directly calculated,

significance is construed by bootstrapped confidence intervals.

SECTION IV: RESULTS

Descriptive Results

Table 1 displays county-level summary statistics aggregated by treatment and comparison group for 2009, the first year of our study's analytic timeframe. Though treated units vary in their pre-treatment period at this point, this approximate comparison of baseline characteristics show that counties in states that eventually implemented mandatory college entrance exams had lower proportions of Asian and Hispanic populations compared to counties in states that never mandated a college entrance exam. Treatment group counties had fewer students in high school and K-12 overall. Treatment group counties in 2009 also had fewer tutoring centers on average, which threatens comparability when comparing absolute counts given industries can often grow proportionally, rather than absolutely. In response, our main outcome variable of interest is the log of tutoring centers, which will model growth proportionally and thereby account for different baselines across counties. Overall, our two groups—counties in states mandating that all students take a college entrance exam and counties in states that do not—appear similar enough, particularly on income and education, to proceed with the Callaway and Sant'Anna model, which will further control for and detect differences on unobservables.

Causal Estimates

We present our main results in Table 2. The model results estimate an overall average treatment effect of 0.149 in log tutoring centers. Put another way, counties in states mandating college entrance exams witnessed 16% industry growth beyond the growth observed in untreated counties. Figure 3 and Table 2 (Panel A) display the dynamic treatment effects, indicating that positive treatment effects begin the year of policy adoption and rise steadily from 0.0185 to

0.167 at four years post treatment on the log scale, or 1.87% and 18.2% respectively on the proportional scale. (All effects are significant except for the first year whose confidence interval is within 0.001 of rejecting at traditional levels.) The effects from year 5 onward are large and significant (see Appendix B for full results) but the pattern is more erratic. This is plausibly due to dramatically fewer observations treated later than 2014 rather than actual changes in treatment effect, and we censor all our figures to reflect this caution. Importantly, we see no evidence of any pretreatment differences between treatment groups.

We ran three alternative specifications to check the robustness of our conclusions. First, we ran a parallel analysis using the number of tutoring centers per 1,000 high school students as the outcome instead of the log of tutoring centers. The results, displayed in Figure 4 and Table 2 (Panel B), are qualitatively similar and support equivalent conclusions, suggesting our main findings are not merely a consequence of our choice of outcome. The overall treatment effect is also positive (0.0182) and statistically significant, with little evidence that the results are driven by pretreatment differences.

For our second robustness check, we attempted to isolate the direct policy effect on the tutoring industry by manually identifying tutoring centers that offer services related to college entrance exams. We created a subset of our tutoring data focused on firms whose names contained specific phrases related to college entrance exams (e.g., those advertising SAT/ACT tutoring)[2], or well-known franchises that overtly offer SAT/ACT tutoring (e.g., Kaplan). Figure 5 shows the prevalence over time for this college-entrance exam prep subset represents about 30% of all tutoring firms. The model results based on this pared down sample, Figure 6 and Table 2 (Panel C), still align with our original findings, with a significant overall estimated treatment

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[2] Note that we do this for relatively large business defined by number of firms.

effect (0.0962), or about 10% relative proportional increase in the number of these college-entrance exam focused tutoring centers. Note that we do not prefer the estimates of this specification versus our original results. Though we are relatively confident the firms we identified for pared down subset offer SAT and/or ACT tutoring services, we are also relatively confident that this subset excludes a substantial portion of the intended category and skews the results to reflect the behavior of large franchises rather than the industry as a whole. Further, the exact mechanisms for the treatment effect of mandatory college entrance exams on tutoring centers are not yet known and may include spillover effects into sectors of the industry ostensibly unrelated to the SAT or ACT. For example, when we use a subset of the data—this time selecting for terms that imply *no* SAT or ACT tutoring—the dynamic treatment effects show a similar trajectory but an insignificant overall result (results not shown).

As a final robustness check, we conduct a placebo test. The rise in tutoring center prevalence following the change in mandatory testing policies could be a direct response, families and/or businesses preparing for greater uptake in college-entrance exams, but they could also be indirectly or obliquely related. For example, mandatory testing policies may be a proxy for certain demographic effects insufficiently addressed by our model, may serve as an alert for families about competition for educational resources broadly, or, more generally, such policies could simply spur wide economic growth. To investigate some of these mechanisms, we ran a parallel analysis with two alternative outcome measures: music instruction centers (SIC code 829915 for vocal instruction, and 829918 for instrumental instruction), and martial arts instruction centers (SIC code 799945). While both industries represent extracurricular activities, the former canonically relates to strengthening college applications (Kaufman and Gabler, 2004) and the latter has connections to Asian communities (Lu, 2008), a demographic with notable

propensity for private tutoring (Kim, Goodman & West, 2025). The results largely validate our original theory: while both industries demonstrate flat pre-treatment differences, neither shows similarly immediate, substantial, or sustained increases as private tutoring. Martial arts instruction, shown in Figure 7, has an insignificant overall effect and one significant, negative post-treatment period in year 5. Music instruction, shown in Figure 8, has no significant post-treatment dynamic effects, though we estimate a small, barely significant, positive aggregate effect (0.0211 with standard error 0.0103).

Altogether, our placebo test shows no substantive evidence for a demographic, broader educational, or broader economic, mechanism of action. Though by design our study cannot conclusively identify the causal mechanism between mandatory testing policies and private tutoring industry prevalence, our results suggest that the effect is localized to educational testing.

Heterogeneous Treatment

We follow up on our main results by identifying possible heterogeneous treatment impacts. Kim, Goodman and West (2025), in their descriptive analysis of school districts, fidentify income, educational attainment, and the proportion Asian as the three demographic variables most predictive of private tutoring prevalence. For each of the demographic variables, we divide counties in each state's sample into top-, middle-, and bottom-terciles based on baseline values in the year 2000.

We find significant, positive overall treatment effects in all terciles across all three demographics except for the lowest tercile of proportion Asian. The effect sizes at least double in magnitude with each higher tercile, as shown in Table 3, and this is reflected in the dynamic treatment effects in Figure 9 as well, where the most dramatic effects are seen in the highest

tercile, though all models trace a similar pattern as our main results. These heterogeneous treatment effects suggest the policy impact was widespread but disproportionately concentrated in areas with high demographic propensity for tutoring. However, our results do *not* suggest that these demographics *cause* treatment effect size to differ, a point we discuss further in the subsequent section.

SECTION V: DISCUSSION

The results of this study have important implications for education policy aimed at addressing inequality in higher education. Mandatory college entrance exam policies are typically seen as a step towards equity, in that some students may otherwise not have sufficient interest, capacity, and/or means to sit for the exam. But less attention has been paid to how such policies impact behaviors surrounding the exam, including the behaviors of those who were already planning to take these exams. If, as our findings suggest, these policies induce more private tutoring in higher income and more educated areas, one possible narrative is that advantaged families are actively responding to attempts at equity to maintain advantages for their children.

Private tutoring is a service more often associated with higher income or more educated families (Buchmann, Condron & Roscigno, 2010; Ochoa, 2013). Specifically, Bound, Hershbein and Long (2009) note in their research that the most competitive students turned to private tutoring to gain advantage over their peers. In the absence of universal testing, relatively privileged students secured their spots at higher education institutions by sitting for the exam at all, given that less privileged (i.e., low-income) students were less likely to take a college entrance exam. Following the introduction of mandatory (universal) testing, they might now seek to maintain the advantage by raising their scores instead.

And higher scores do not necessarily indicate substantive gains in learning. Coaching and preparation for specific tests can increase scores due to increased familiarity with test details, drilling specific question formats, time management strategies, or other skills—none of which apply outside the context of the specific test (Koretz, 2008). Further, the test preparation offered

by private tutoring firms seems particularly prone to such "teaching to the test" pedagogy (Bray, 1999; Briggs, 2009; Guo, et. al., 2020).

Taken together, this study cautions that policies designed to close gaps may need to consider unintended, second order consequences. Previous research examining the effect of mandated college entrance exams on college enrollment shows increases in enrollment at four-year institutions – colleges with better education-related outcomes compared to two-year institutions – and that these increases come from students that were previously less likely to take a college entrance exam, including rural students and students attending the poorest high schools (Hurwitz et al., 2015; Hyman, 2017). But with respect to equity, the policy might have simply relocated the existing inequalities, now with competition for employment and credential inflation (Araki, 2020).

Our investigation is subject to a number of limitations. First, the outcome variable of interest is a relatively coarse *supply-side* measure of the private tutoring industry, which may not fully reflect the amount (in either hours or dollars) of private tutoring in a county. Second, we cannot identify precisely *who* is driving demand. Even our analysis of heterogeneity, which suggested that high income counties experienced the greatest treatment effects, cannot distinguish whether that phenomenon is driven by income in and of itself (e.g., families with greater disposable income spend on extracurricular academics in response to greater competition), or the highly associated educational attainment (e.g., families with higher educational attainment expectations spend on extracurricular academics in response to greater competition) or another, unconsidered quality. Relatedly, we also cannot reject the hypothesis that the greater treatment effects are driven by *lower* income families within the higher income counties (e.g., families who redirect their limited disposable income from exam fees to exam

prep). Further investigation of the mechanisms of these changes would be important to clarify, particularly who is driving demand for private tutoring and how.

SECTION VI: CONCLUSION

To the best of the authors' knowledge, this investigation is the first to empirically investigate the causal relationship between mandatory college entrance exam policies and private tutoring markets. We implement a relatively new innovation in differences-in-differences methodology developed by Callaway and Sant'Anna, using longitudinal data for counties in states that both did and did not implement such policies during our period of observation. Our models suggest that such policies have a positive impact on private tutoring center prevalence, inducing growth in the local tutoring industry, controlling for differences in baseline, time fixed effects, and industry trends independent of treatment. We further find that the treatment effects seem concentrated in counties with particular demographics: higher income, higher educated, and proportionally greater Asian population. While future research should seek to better understand the mechanisms driving demand for private tutoring, these findings suggest that policymakers and researchers should account for, and study, strategic responses by families to policies intended to level the playing field for all students.

FIGURE 1

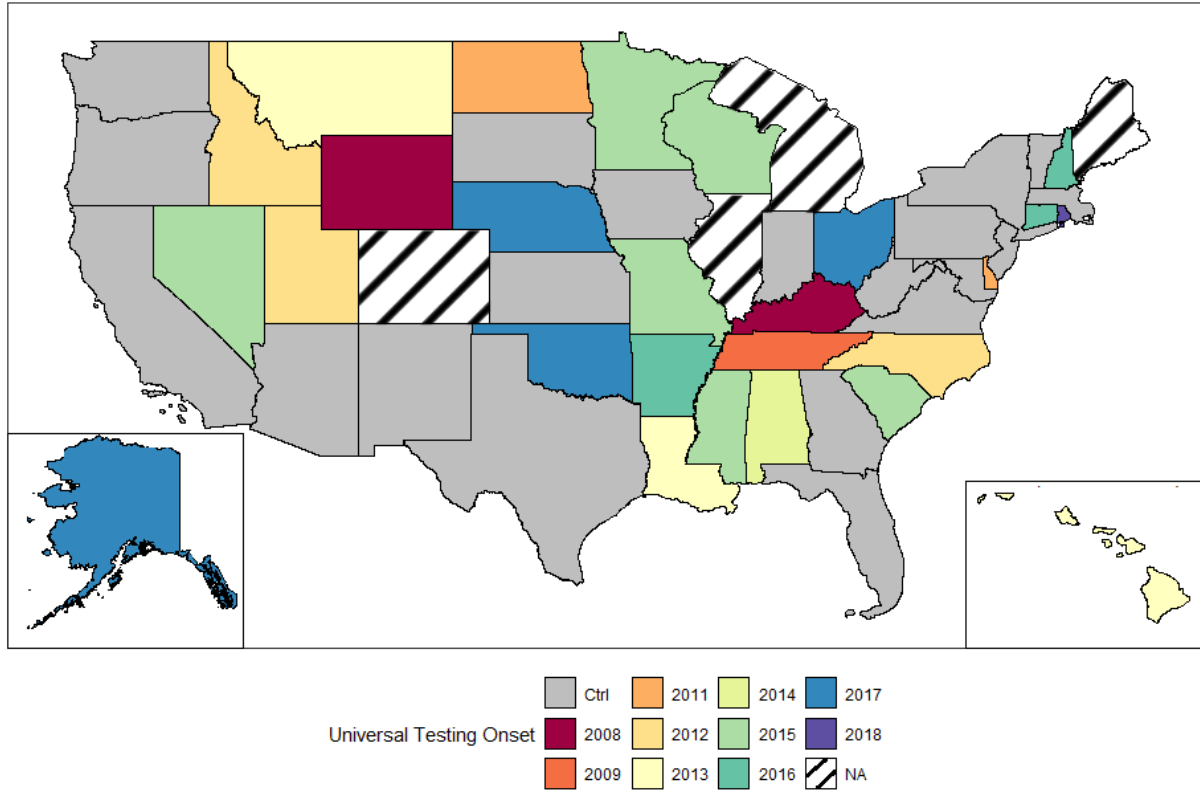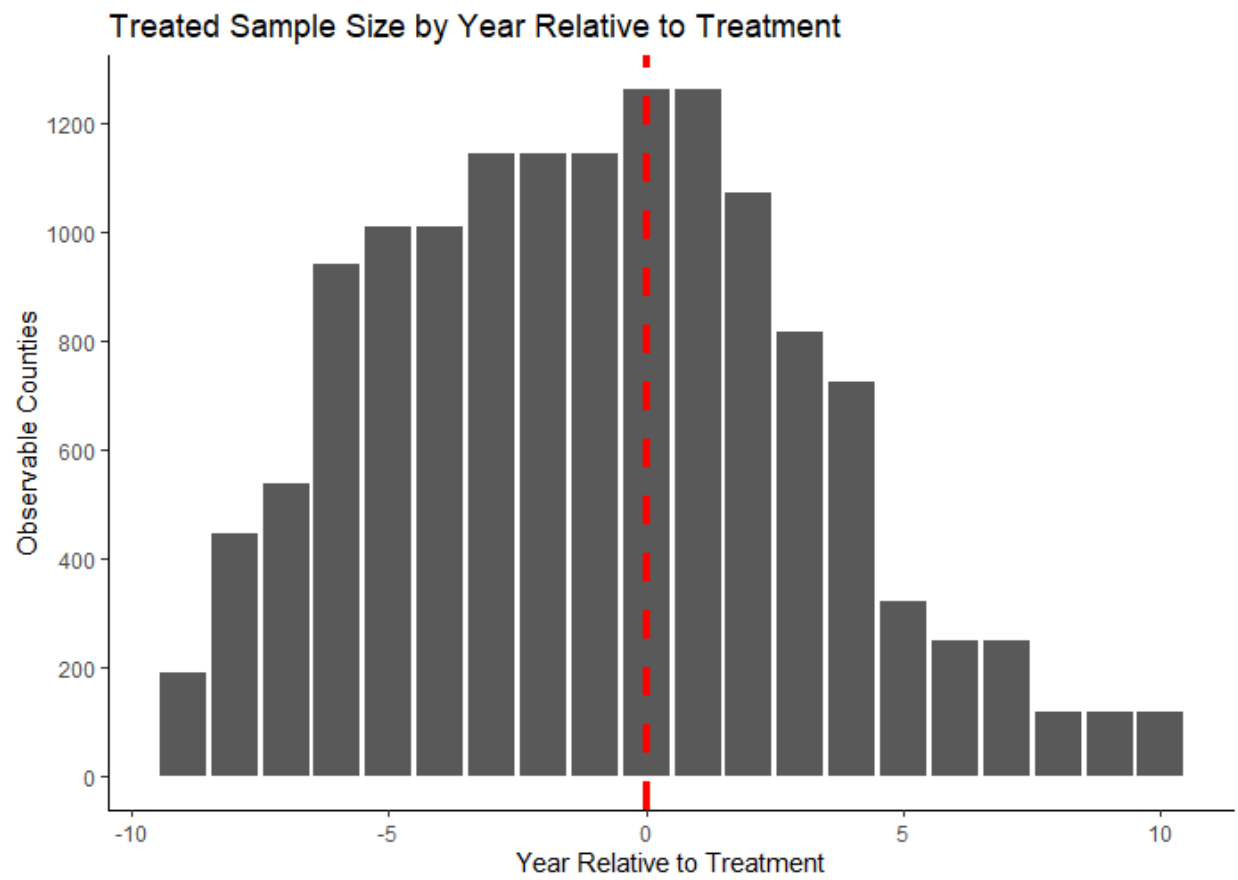Policy Adopting and Comparison States by Policy Adoption Year

FIGURE 2

Treated Sample Size by Year Relative to Treatment

FIGURE 3

Dynamic Effects on Log Centers

FIGURE 4

Dynamic Effects on Centers per Capita

FIGURE 5

Tutoring Firm Counts Over Time

FIGURE 6

Dynamic Effects on Log SAT/ACT Prep Focused Centers

FIGURE 7

Dynamic Effects on Log Martial Arts

FIGURE 8

Dynamic Effects on Log Music Instruction

FIGURE 9

Hetergeneous Treatment Effects
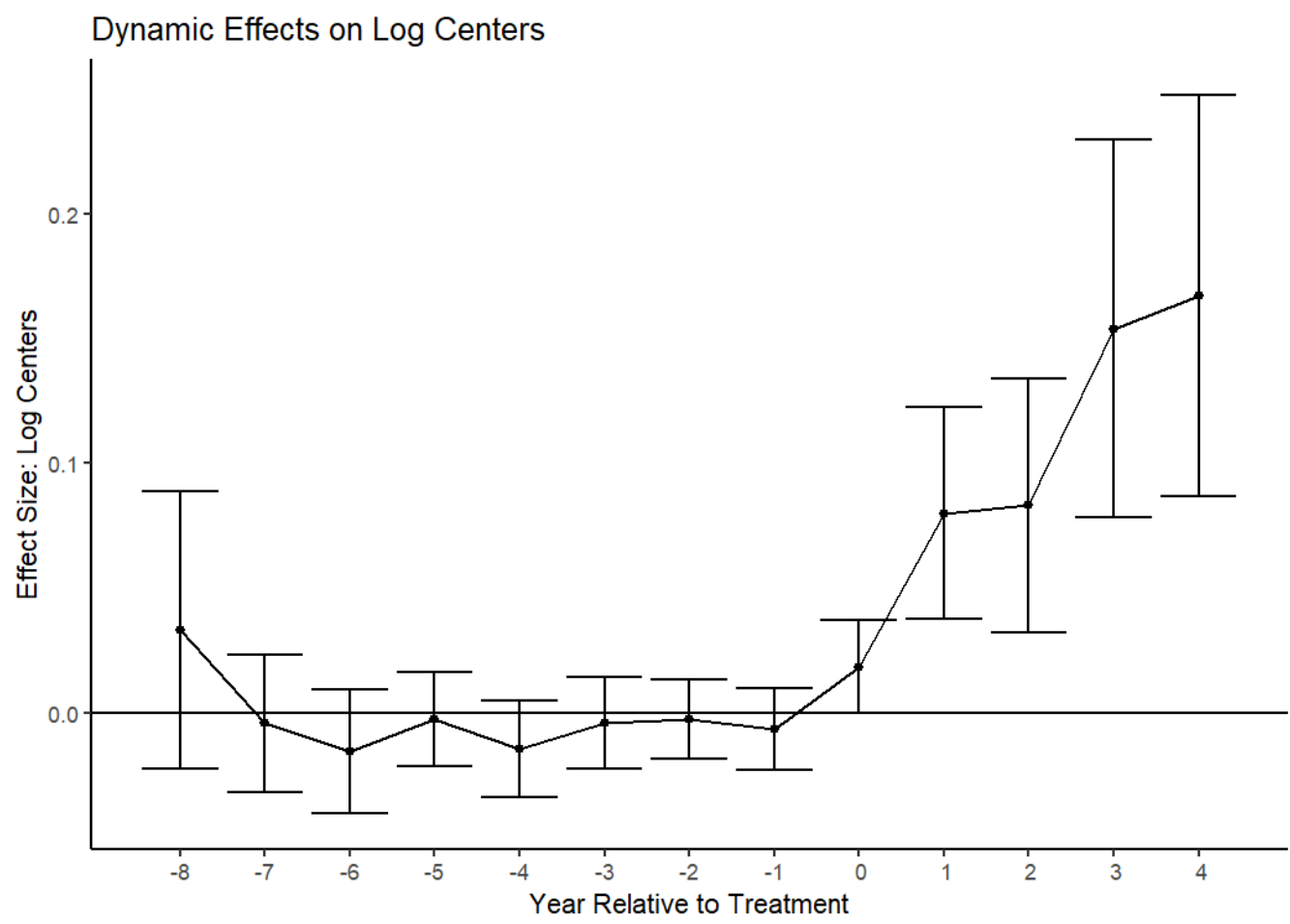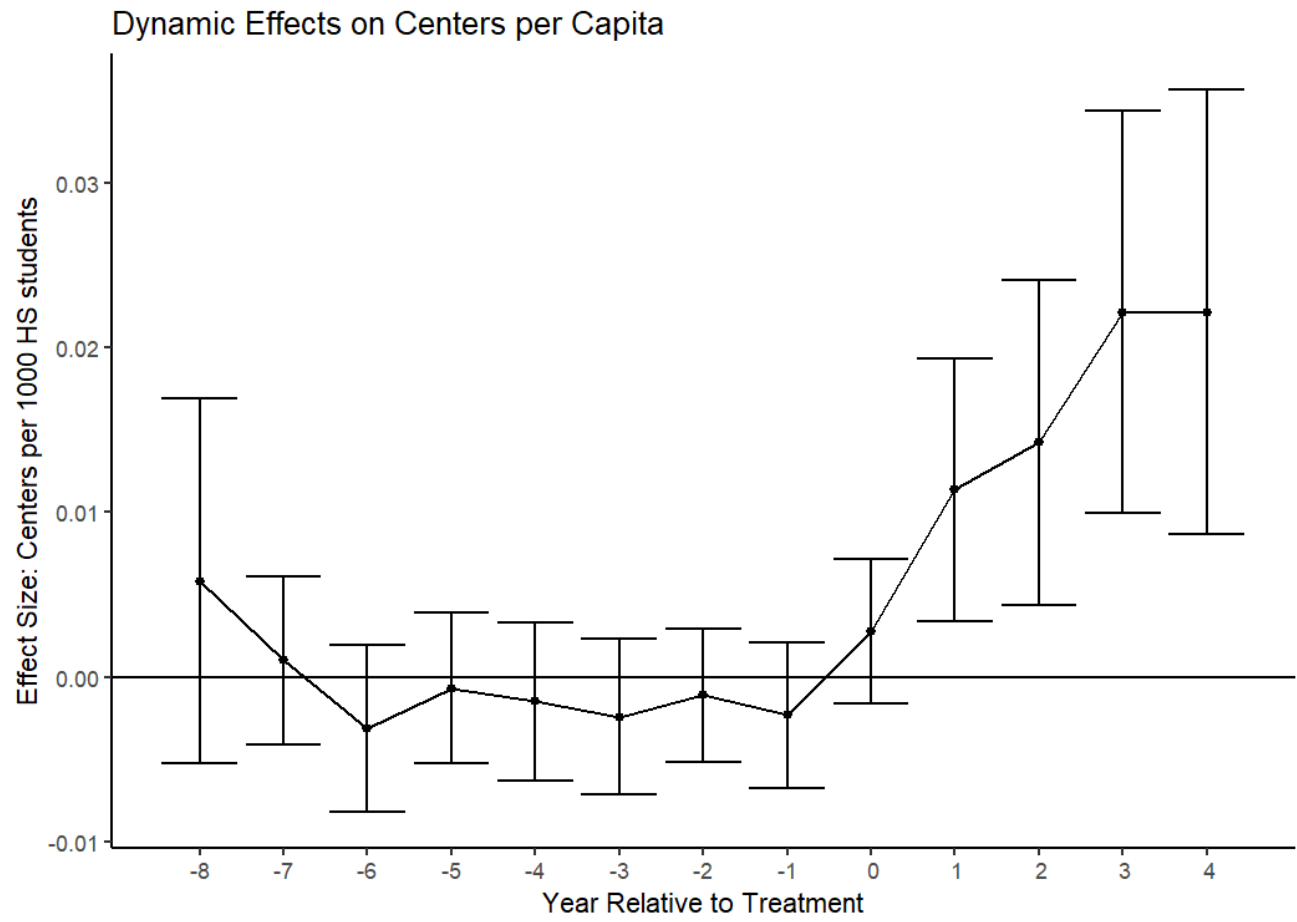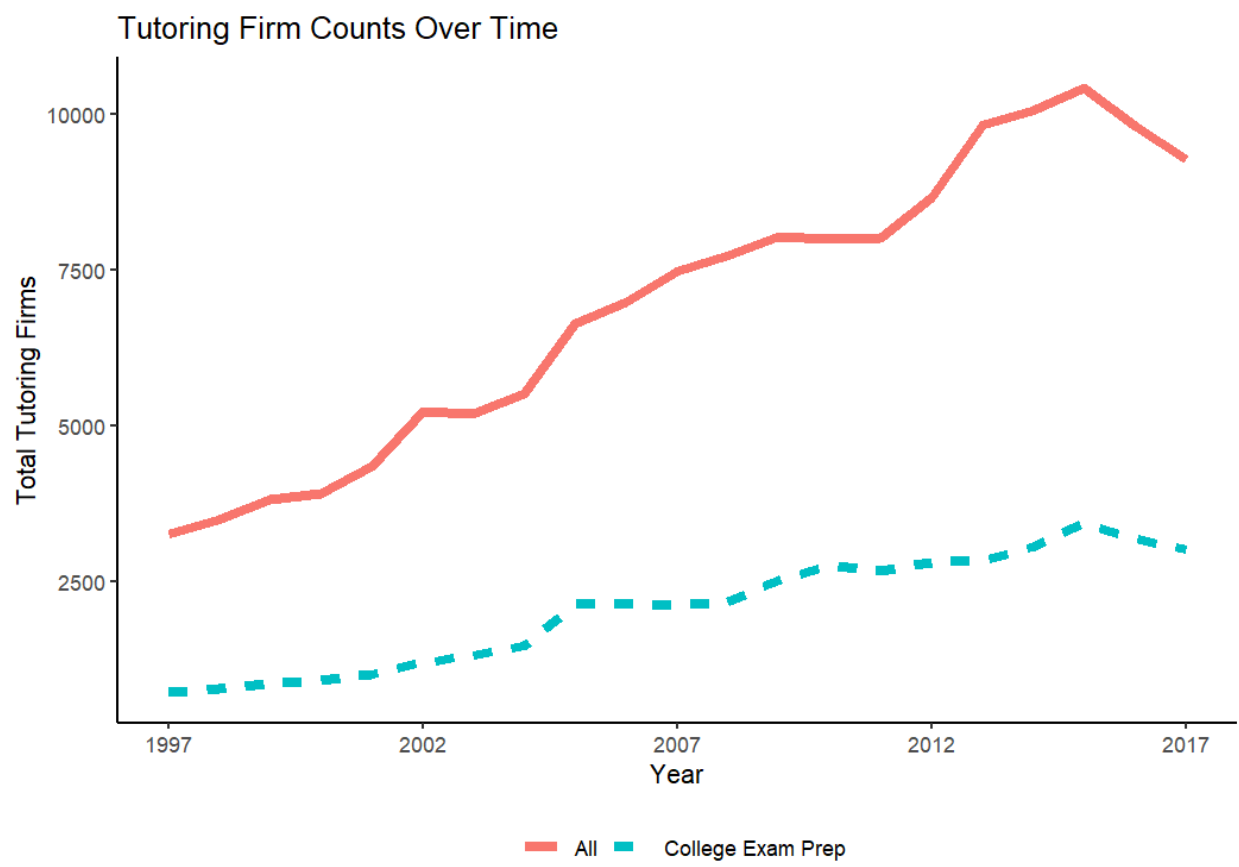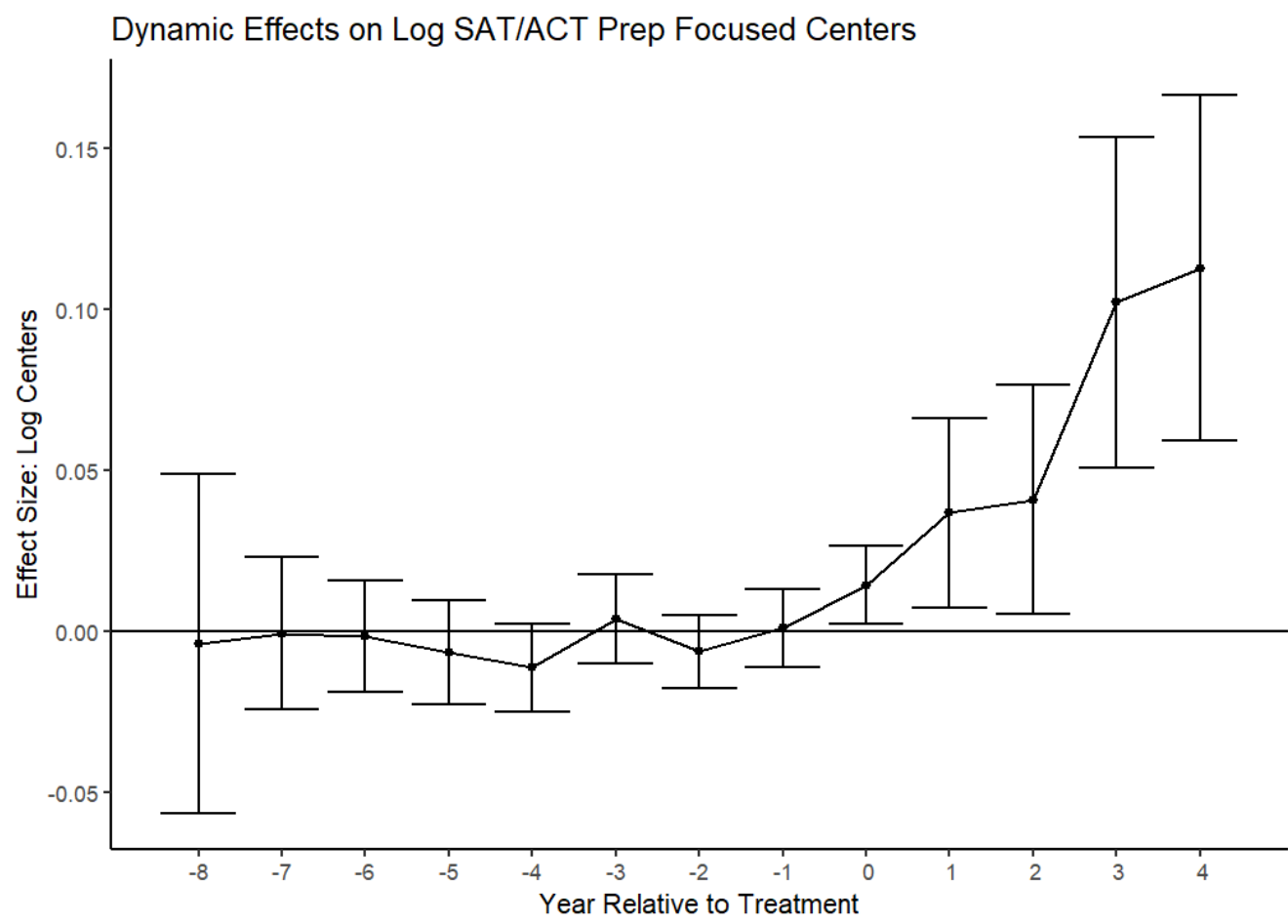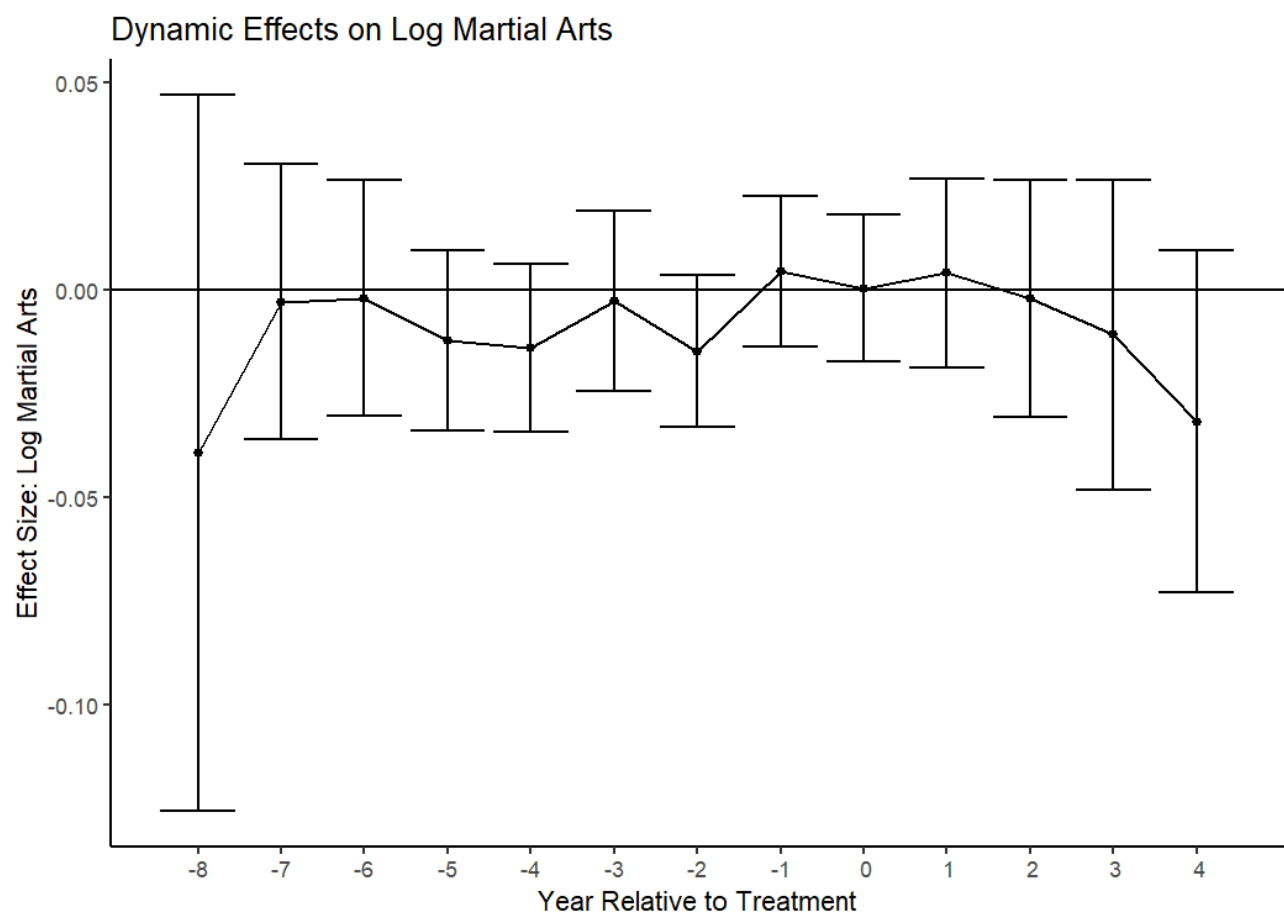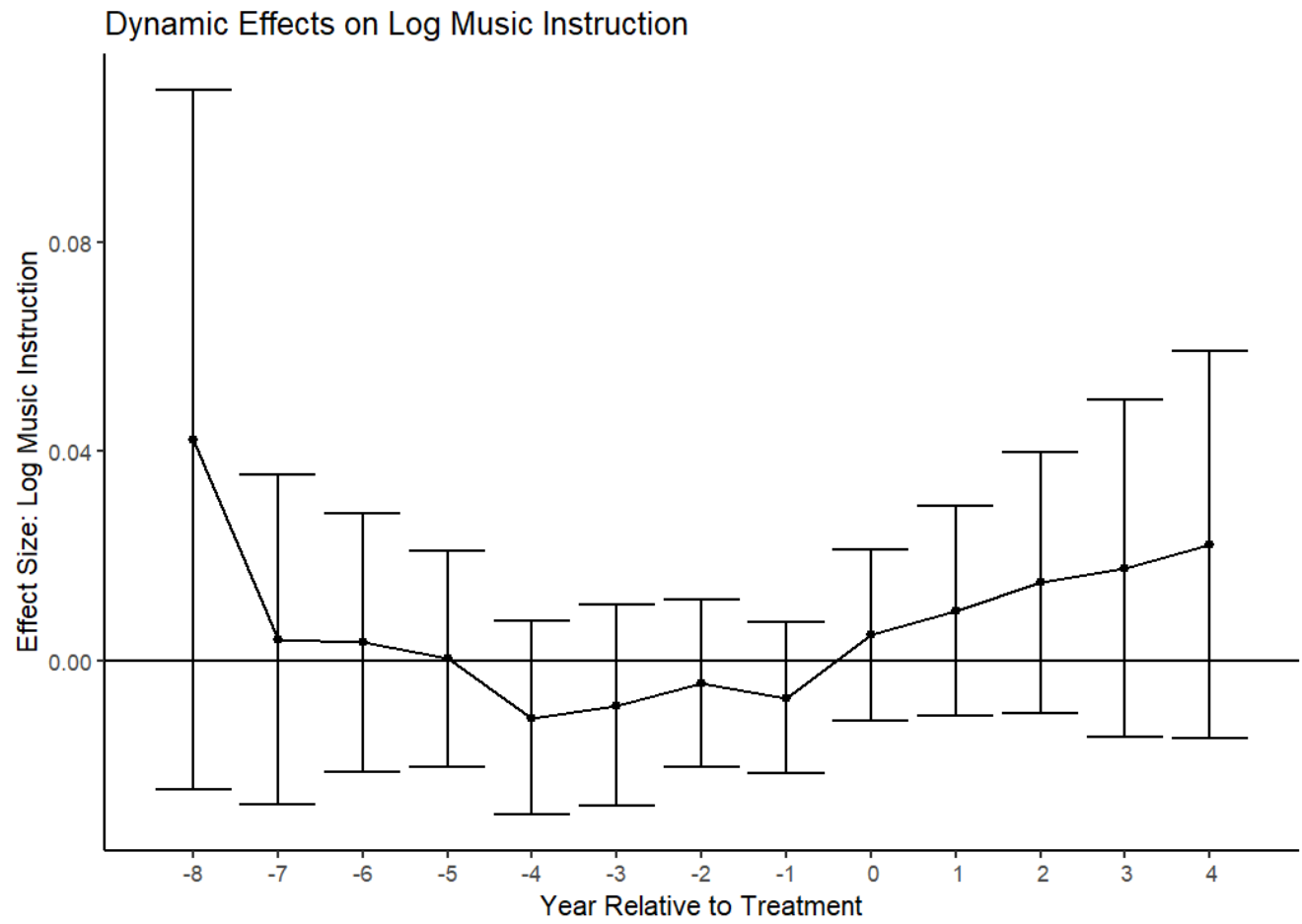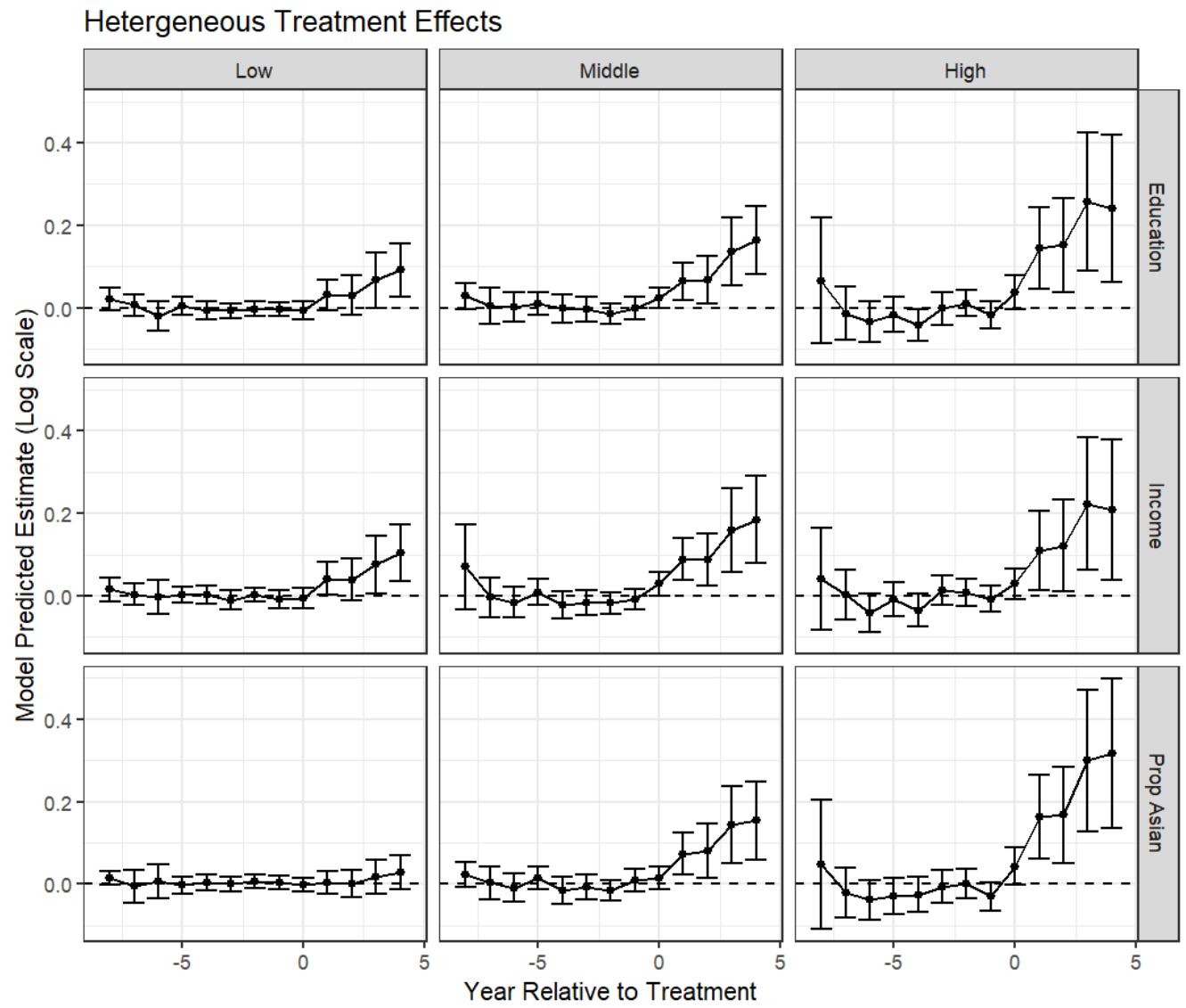
TABLE 1

Summary Statistic of Sample at the County Level, 2009

	Comparison	Treated
Racial Demographics		
Proportion White	0.756	0.815
Proportion Black	0.084	0.101
Proportion Asian	0.014	0.007
Proportion Hispanic	0.117	0.036
Avg. Proportion of BA+	0.085	0.078
Avg. Income Per Capita	22849	21211
Median Income Per Capita	21954	20711
Avg. # of High School Students	7437	3425
Avg. # K-12 Students	23041	10749
Avg. PTC per 1K High school Students	0.064	0.041
Avg. Total PTCs	3.903	1.166
N	1419	1458

TABLE 2

Causal Estimates of Mandatory College Entrance Exams on Tutoring Center Prevalence

Panel A: Log Count	Panel B: Count per 1000 High School Students	Panel C: Log SAT/ACT Focused Count
0.149*	0.0182*	0.0962*
(0.0221)	(0.0039)	(0.0151)

TABLE 3

Causal Estimates of Mandatory College Entrance Exams on Tutoring Center Prevalence by Demographic Tercile

	Per Capita Income	Bachelor's Degree Attainment	Proportion Asian
Tercile 1	0.0665*	0.052*	0.00904
	(0.0223)	(0.0211)	(0.0162)
Tercile 2	0.137*	0.126*	0.110*
	(0.0319)	(0.0264)	(0.0273)
Tercile 3	0.241*	0.269*	0.333*
	(0.0497)	(0.0513)	(0.052)

APPENDIX A

Treatment Onset Year by State

Alabama	2014	Indiana	Never	Montana	2013	Rhode Island	2018
Alaska	2017	Iowa	Never	Nebraska	2017	South Carolina	2015
Arizona	Never	Kansas	Never	Nevada	2016	South Dakota	Never
Arkansas	2016	Kentucky	Predates sample	New Hampshire	2016	Tennessee	2009
California	Never	Louisiana	2013	New Jersey	Never	Texas	Never
Colorado	Switch*	Maine	Predates sample	New Mexico	Never	Utah	2012
Connecticut	2016	Maryland	Never	New York	Never	Vermont	Never
Delaware	2011	Massachusetts	Never	North Carolina	2012	Virginia	Never
Florida	Never	Michigan	Switch*	North Dakota	2011	Washington	Never
Georgia	Never	Minnesota	2015	Ohio	2017	West Virginia	2018
Hawaii	2013	Mississippi	2015	Oklahoma	2017	Wisconsin	2015
Idaho	2012	Missouri	2015	Oregon	Never	Wyoming	2008
Illinois	Switch*			Pennsylvania	Never		

*State switched between mandatory SAT and mandatory ACT during period of observation

APPENDIX B

Detailed Estimates of Mandatory College Entrance Exams on Tutoring Businesses

Dynamic Effect Relative Year to Treatment	Main Results	
Overall	0.149*	
	(0.0221)	
	Pre	**Post**
0		0.0185
		(0.0063)
1	-0.0066	0.0800*
	(0.0055)	(0.0144)
2	-0.0024	0.0831*
	(0.0053)	(0.0171)
3	-0.0041	0.1540*
	(0.0062)	(0.0256)
4	-0.0144	0.1670*
	(0.0066)	(0.0270)
5	-0.0025	0.0978*
	(0.0063)	(0.0319)
6	-0.0153	0.1340*
	(0.0084)	(0.0452)
7	-0.0042	0.1871*
	(0.0093)	(0.0565)
8	0.0333	0.4220
	(0.0187)	(0.0740)

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