The effect of course taking behavior during high school on academic achievement in mathematics and college admission test scores.

Brian McCall*, Alfredo Sosa†

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Abstract

This research analyzes the impact of changes in high school course-taking patterns, some of which are due to changes in curriculum at the state level in the United States, on 12^{th} grade mathematics achievement and college admission test scores. Data from the National Education Longitudinal Study of 1988 (NELS) and the Educational Longitudinal Study of 2002 (ELS) is used along with a variant of the DFL methodology to examine the extent to which the observed increases in the average number of math and science courses completed by recent high-school graduates has influenced mathematics achievement and college admission test scores of those students. In particular, this study examines whether the effects vary by gender, race and socio economic status. Results indicate that, even when on average, increases in course-taking in math and science seem to have negligible effects on academic achievement and admission test scores; I found statistically significant effects on different parts of the distribution of academic ability and/or for different groups. This paper contributes to the literature that analyzes the effect of course-taking during high school on education and labor outcomes because it presents an empirical application of the DFL methodology which allows to gauge the effects of changes in the distributions of course-taking patterns of high school students on the entire distributions of outcomes such as math scores and college admission test scores.

1 Introduction

In order to increase the college readiness and academic preparation of high school graduates, many states have increased their academic requirements for graduation. For example, in 2006 Governor Jennifer M. Granholm of Michigan signed into law a more rigorous set of

*Brian McCall, Professor Economics, Education and Public Policy University of Michigan bpmccall@umich.edu

†Alfredo Sosa, PhD Candidate in Higher Education and Economics - University of Michigan asosa@umich.edu

high school graduation requirements called the Michigan Merit Curriculum. In particular, states have focused on increasing the requirements of mathematics and science coursework in order to receive a high school diploma. Two states (Alabama and South Carolina) currently require all students to complete 4 units of math, 24 states and DC require 3 units of math. In addition, states are moving towards requiring Algebra I, Algebra II and Geometry for graduation: Texas, effective with the class of 2008; Arkansas, Oklahoma and South Dakota in 2010; Indiana and Michigan in 2011 and Kentucky in 2012. In science, 21 states and DC require all students to complete at least 2.5 units, and 4 states; Georgia, Indiana, Tennessee and Virginia require all students to complete at least 3 units of laboratory science (Zinth and Dounay, 2006). Figures 1 through 5 show how states have changed their graduation requirements in mathematics and science over time.

[Figures 1 through 5 about here]

Not surprisingly, the number and type of courses that high school students complete has changed over time. Whereas the graduation class of 1982 earned, on average, 21.58 credits, the class of 2005 earned 26.68 credits; a 24 percent increase. Much of this increase in credits has been concentrated in English, Mathematics and Science courses. On average, whereas the graduation class of 1982 earned 3.93 credits in English, the class of 2005 earned 4.42 credits; a 12 percent increase. In Mathematics, high school graduates increased the average credits earned from 2.63 in 1982 to 3.67 in 2005 (40 percent increase). In addition, students tend to take more advanced courses. From 1982 to 2005 the average amount of credits earned in algebra or higher courses increased from 1.74 to 3.19; an 83 percent increase. Students also increased the average amount of earned credits in science, from 2.2 in 1982 to 3.34 in 2005, and although the average amount of credits earned by high school graduates in physics and chemistry is small, these subjects experienced the highest increase in credits earned (109 and 118 percent points respectively) (NCES, 2010). The bottom line is that, course-taking has increased in the last decades in the US public high schools, in particular in core academic areas (Mathematics, Science, Social sciences and English) (Altonji, Blom & Meghir, 2012).

Have these changes in course taking behavior led to changes in academic achievement and college admission test scores? The research question that guides this study is the following: how the distributions of mathematics achievement in 12^{th} grade and college admission test scores of recent high school graduates in 2004 would have changed if these students took the same distribution of courses, in math and science, as the high school graduates in 1992? How theses changes differ by gender, race and socioeconomic status? The remaining of the paper is organized as follows: a literature review of the effect of course-taking behavior on academic achievement is developed in section 3; in section 4, I depict the methodology which includes the data and the empirical strategy; section 5 includes the results, section 6, I layout some conclusions.

2 Literature Review

Research indicates that there is a strong association between course-taking in high school and academic achievement. Cool and Keith (1991) found that academic coursework measured by the composite number of courses in algebra I and II, geometry, trigonometry, calculus, physics, chemistry and advanced English, has a strong direct effect on achievement of 12^{th} graders. Sebring (1987) concluded that efforts to increase academic coursework, typified by new graduation requirements, led to higher academic performance. By using propensity score matching techniques, Leow, Marcus, Zanutto and Boruch, (2004) investigated whether taking advanced courses in math and science improved scores on basic achievement tests; they found that advanced course taking is consistently associated with higher achievement. Finally, Jones (1987), using the sample of sophomores from the HS&B study demonstrated that senior year mathematics test scores are highly associated with the number of mathematics courses taken.

Welch, Anderson & Harris, (1982) used the NAEP $1977-1978$ study, to calculate the proportion of variance of mathematics achievement attributable to differences in the number of semesters in mathematics. They found that, whereas background variables accounted

for 25 percent of the variance, exposure to mathematics courses explained an additional 34 percent. Additionally, Alexander & Pallas, (1984) using data from the ETS Growth Study, found that completion of the core curriculum has sizable effects on senior year test performance, even when prior levels of test performance are controlled for.

Unlike the previous studies, Teitelbaum, (2003) found no sizable effect of high school graduation requirements on academic achievement. He examined the relationship between three-course requirements in mathematics and science and three outcomes: number of credits earned in mathematics and science, level of mathematics and science classes, and achievement in math and science measured by 8^{th} to 12^{th} grade test score gains. His findings suggest that increasing the number of credits students have to earn in mathematics and science to graduate from high school by itself may not be sufficient to improve student proficiency in these subjects. He argues that high school graduation requirement policy is not associated with student achievement in math or science, as measured by test score gains from 8^{th} to 12^{th} grade.

In addition to student achievement during high school, course-taking behavior has been shown to be linked to college admission test scores. Laing, Engen & Maxey (1987) investigated whether there is a relationship between the number of courses taken in a subject-matter area and the score obtained on the corresponding ACT assessment test. They found that students who took more coursework scored higher in the relevant test. Similarly, Sawyer (2008) explored whether there exist a relationship between coursework and ACT scores. He used ACT EXPLORE in 8^{th} grade, ACT PLAN in 10th grade and ACT in 12th grade. He found that high school coursework is strongly related with ACT scores. Finally, Roth, Crans, Carter, Ariet & Resnick, (2000) conducted a study in the state of Florida aimed to determine how course choice, grades, tenth grade standardized test scores, race and gender affected performance on a computerized placement test (CPT) administered upon entry into one community college. They found that course taking in math and English had significant effects on the probability of passing the CPT.

Furthermore, Alexander & Pallas, (1984) examined the effect of coursework on college admission tests. They concluded that students who completed the foreign-language requirement average about 14 points better on the SAT-V than those who do not; similarly, they demonstrated that Youngsters who took at least three years of high school math score on average almost 40 points higher on the SAT-M than those who took fewer math courses.

Even when there has been a number of studies aimed to examine the relation between course-taking and academic achievement and college admission test scores, the extant literature is limited in the following ways. First, most of the studies measure the degree of association between coursework and academic achievement in only one point of the distribution of outcomes. For instance, all the OLS-based estimates measure the effect of changes in course-taking patterns on the outcome mean. Second, most of the studies do not consider different effects for different groups of the population, (i.e., by gender, race, ses). Finally, almost all the studies include as independent variables the number of courses in math and science as independent variables rather than the number of credits and the level of these courses. This study addresses the aforementioned shortcomings.

3 Methodology

3.1 Data

Most of the variables were drawn from two longitudinal studies sponsored by the National Center for Education Statistics (NCES): the National Education Longitudinal Study of 1988 (NELS) and the Educational Longitudinal Study of 2002 (ELS). The NELS follows a nationally representative sample of 8^{th} graders who were first surveyed during the spring of 1988. A sample of these respondents was resurveyed in four follow-ups in 1990, 1992, 1994 and 2000. We focus only on students included in the first follow up that graduated from high school or obtained a GED diploma. The ELS study also follows a nationally representative sample of high school students who were enrolled in their sophomore year in 2002. There is available

data only for two follow-up interviews: 2004 and 2006; data from the 2012 interview will be made available to the public in 2014.

The first step in the process was to build a pooled dataset that includes information from both studies. This was conducted by examining the codebooks available in the public and restricted versions of these studies. We ensured that the variables included are coded in the same way for both studies by recoding whenever possible and needed. Since our interest lies in the academic achievement in 12^{th} grade and college admission test scores we used the following weights. For the NELS study we used the weight variable that ensured representativeness of recent high school graduates whereas for ELS we used the first follow up weight variable that ensures the representativeness of 12^{th} graders. Even though these are not the same weights, they were the closest weight variables available in the data. In this study, the population of interest is high school graduates that we define as either the students receiving a high school diploma or receiving a GED diploma.

3.2 Variables

In this draft of the paper I included four outcome variables: Standardized Math Scores in 12^{th} grade, SAT, SAT math and SAT verbal scores. Given that these variables are normalized by cohort I did not include summary statistics because they do not reflect differences between NELS and ELS students. As control predictors I included the following sets of variables: demographics (gender, race, socio economic status, family income and family composition), academic ability (Standardized scores in reading and math in 10^{th} grade), time spent doing homework in and out school, and the number of Carnegie units[1] required at the state level in 1992 and 2004. As question predictors I included the number of units in algebra I, algebra II, geometry, trigonometry, pre-calculus, calculus, earth science, biology, chemistry and physics.

Tables 1-3 include the distribution of the demographic variables in both studies (NELS

[1] 1 Carnegie unit = 1 Academic year of coursework

and ELS). Table 1 indicates that, between 1992 and 2004, the race composition of the two samples is different; the white population decreased substantively whereas the Hispanic and Black populations grew; the population of Asian students remained stable. In addition, the highest level of education of the parents also grew between the two studies, especially in the sectors with college education or higher. Table 2 includes the distributions of family composition in both studies in 10^{th} and 12^{th} grades. In 1994 families were more traditional (mother + father) when compared with the 2004 counterparts. Finally, as indicated in table 3, high school graduates in 2004 studied more in and out school than the 1994 high school graduates. Since gender, race, family composition and time spent doing homework could potentially influence course taking decisions, I decided to include these variables in this study.

[Tables 1 - 3 about here]

Table 4 includes the distribution of students who are required to take between 1 to 4 Carnegie units in Math, Science, Social Studies and English in order to graduate for both (NELS and ELS) studies. As shown in this table, Mathematics and Science were the two areas where the changes in requirements were bigger. In fact, 9.59 percent of the sample in 2004 was required to take 4 units of Math whereas no student was required to do so in 1992. In Science, the change was even bigger. Whereas the percentage of students required to take 2 units of science decreased from 73.24 to 40.57 percent between 1992 and 2004, the percentage of students required to take 3 units rose from 15.7 to 50.71 percent.

[Table 4 about here]

The variables of interest in this paper are the course taking differences between NELS and ELS (1992 and 2004). Table 5 through 7 include the distribution of course taking patterns in both NELS and ELS in Mathematics and Science courses. Indeed, there have been major increases in course taking between high school graduates in 1992 and 2004.

Virtually, between 1992 and 2004 students took more of every subject presented here. As mentioned, the research questions this paper addresses is how these increases in course taking between 1992 and 2004 impact the distribution of mathematics achievement in 12^{th} grade and the distribution of college admission test scores.

[Tables 5 - 7 about here]

3.3 Empirical Strategy

The empirical strategy in this paper is based on the work of DiNardo, Lemieux and Fortin (1996) and Firpo, Lemieux and Fortin (2011). The decomposition technique developed by DiNardo, Lemieux and Fortin (DFL) allowed them to gauge the impact of different institutional and labor market factors such as minimum wage and unionization levels on the distribution of wages between 1979 and 1988. The general idea is the construction of counter-factual densities that determine, for example, what the density of wages would have been in 1988 if workers attributes (e.g, their union status), had remained at their 1979 level? The counter-factual densities are based on re-weighting functions that are combined with density functions.

In order to assess the impact of a change in the overall distribution of math and science course-taking over time, holding fixed other predictor variables, we employ the method described in Firpo, Lemieux and Fortin (2011). The idea behind the Firpo, Lemieux and Fortin (2011) or FLF method is to obtain two sets of weights: one set is based on all the predictor variables and another which is based on all variables excluding the course-taking variables. Denote the set of all variables other than the course-taking variables by the vector x_1 and denote the vector of course-taking variables by x_2.

We estimate two logit models on the pooled sample of observations where the dependent variable t is a dichotomous variable of whether the observation is from period 2. In the first logit both x_1 and x_2 are included as predictor variables while in the second logit only

the vector of variables x_1 are included as predictor variables. We then compute the two weighting functions ψ_1 and ψ_2 where

$$\psi_1 = \frac{[1 - Pr(t = 1|x_1, x_2)]Pr(t = 1)}{Pr(t = 1|x_1, x_2)[1 - Pr(t = 1)]} \tag{1}$$

$$\psi_2 = \frac{[1 - Pr(t = 1|x_1)]Pr(t = 1)}{Pr(t = 1|x_1)[1 - Pr(t = 1)]} \tag{2}$$

The counter-factual weighting function ψ_3 is computed as the ratio

$$\psi_3 = \frac{\psi_2}{\psi_1} \tag{3}$$

The counter-factual density function is then estimated with

$$f_2^{x_2}(y) = \sum_{i=1}^{N} \frac{\theta_{2i}\hat{\psi_3}}{h} K\left(\frac{y_i - y}{h}\right) \tag{4}$$

Here, $f_2^{x_2}(y)$ is the estimated counter-factual density of the outcome variable (e.g., math scores in 12^{th} grade), θ_{2i} are the sample weights from the ELS, h is the bandwidth, and K is a kernel density. We apply the Gaussian kernel and use the optimal bandwidth (Silverman, 1988) in our estimations. The actual density is estimated by using the following formula

$$f_2(y) = \sum_{i=1}^{N} \frac{\theta_{2i}}{h} K\left(\frac{y_i - y}{h}\right) \tag{5}$$

Equation (4) estimates how the density of the outcome variable would have looked like if students in 2004 took the same distribution of math and science courses as their 1992 counterparts. Once we estimated the actual and counter-factual densities we used bootstrap methods to measure differences in different moments (mean, variance) and percentiles of the distribution. We repeated the process for all the outcome variables and for different groups of the population (by gender, race and ses).

4 Results

Tables 8 through 51 compare a number of distribution statistics between actual and counter-factual estimated densities for the outcome variables (Standardized Mathematics Scores in 12^{th} grade, SAT composite scores, SAT math scores and SAT verbal scores) for all the aforementioned groups. For example, Table 8 (which includes all the students) indicates that both actual and counter-factual densities are almost equal to each other except for the variance and for the 95^{th} percentile. If students in 2004 took the same distributions of courses as in 1992, the 95^{th} percentile of math scores would have been reduced by 0.89 percentage points; this difference is statistically different from zero.

Table 9 includes only female students. Basically, both actual and counter-factual densities are alike. In the case of males (Table 10) the percentiles 90^{th} and 95^{th} would have been reduced by 0.53 and 0.64 percentage points respectively. Including only white students (Table 11) the upper half of the distribution sifts to the left; the percentiles 50, 75, 90 and 95 would have been decreased. The effect is bigger the bigger the percentile, for instance, the percentiles 90 and 95 would have been reduced by almost one percent point. For Black and Asian students (Tables 12 and 14) both distributions look similar. For Hispanic students (Table 13), the lower part of the distribution (percentiles 5 and 10) would have been even increased by taking less courses.

For students in the lowest SES quartile (Table 15) only the 95th percentile would have been reduced by 2.36 percentage points. Students in the second SES quartile,would have had a similar distribution except for the percentile 25th which would have increased by 0.8 percent points. Students in the 3rd and 4th quartiles (Tables 17 and 18) did not experience any change in their estimated distributions.

In summary for the Standardized Math Scores in 12^{th} grade we concluded that, the more sensitive population was that of white male students, specially the upper side of the distribution of achievement; they would have reduced their performance if they took the

same courses as their 1992 counterparts. On the flip side the Hispanic population seems to benefit taking less courses.

For SAT composite scores and SAT math scores, most of the differences between actual and counter-factual distributions were not statistically different from zero, except for the students in the 2^{nd} SES quartile whose counter-factual density shifted to the left from the 50^{th} percentile on. For the SAT verbal scores the more sensitive group of students was the one including the 1^{st} SES quartile which seems to be affected of taking less coursework.

All these tables can be seen graphically in figures 6 through 21.

5 Conclusions

The main conclusion of this paper is that, the effect of course-taking behavior on academic achievement and college admission test scores can vary across the distribution of the outcome variable. Indeed, when trying to estimate the effect of changes in coursework on different outcomes, it is very important to look at the entire distribution instead of only to one point, usually the mean.

In addition, while for some groups of students the actual and counter-factual distributions looked alike, other groups seem to be more sensitive to changes in course-taking. One interesting result is that white men seem to worsen their distribution of math scores in 12th grade if they took less courses. Is this effect symmetric in the sense that they benefit by taking more courses? we don't know at this point but is something worthwhile to explore. Another interesting result was that Hispanic students seem to benefit by taking less courses. Do they actually do better when exposed to less difficult courses? if so, why? what would be the mechanisms that explain this fact?

Even when this paper enhances the literature in the field by presenting a method widely used in economics but rarely used in education, this study provides more questions than answers. Particularly, why different groups of students react differently to changes in coursework. Why not the whole distribution shifts? only one section of it changes. Indeed, this

method is extremely useful not only because it can detect heterogeneous treatment effects in a correlational sense but because it changes the way of approaching the evaluation of policies from considering only one point of the distribution to considering the whole distribution.

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Table 1: Distribution of Different Predictors

Predictor	NELS	ELS
Gender		
Male	47.92	48.82
Female	52.08	51.18
Total	100	100
Race		
White	75.67	64.92
Black	10.21	12.68
Hispanic	9.03	13.51
Asian	4.24	4.12
Other race	0.85	4.77
Total	100	100
Parental ed		
Didnt̂ finish HS	7.11	4.98
H.S. grad or GED	19.47	19.38
$>$ HS & $<$ 4yr deg	42.61	34.82
College Graduate	16.02	23.37
M.A./equivalent	9.73	11.51
Ph.D., M.D., other	5.06	5.94
Total	100	100

Cross sectional weight at 12^{th} grade.

Table 2: Distribution of Family composition

Family Composition	**NELS**	**ELS**
10^{th} **grade**		
mother + father	71.48	60.81
mother + other male	10.28	12.55
father + other female	2.42	3.05
other fem+mal fams	0.72	1.54
mother/other female	13.85	18.9
father/other male	1.25	3.15
Total	100	100
12^{th} **grade**		
mother + father	66.26	60.77
mother + other male	10.58	12.36
father + other female	2.62	3.04
other fem+mal fams	1.41	1.59
mother/other female	16.46	18.98
father/other male	2.68	3.26
Total	100.01	100

Cross sectional weight at 12^{th} grade.

Table 3: Distribution of time spent doing homework

	In school		**Out of School**	
Time	**NELS**	**ELS**	**NELS**	**ELS**
None	8.1	5.81	5.83	6.38
1 hour or less	36.67	21.48	23.05	15.13
2-3 hours	25.51	28.12	28.22	24.86
4-6 hours	16.7	22.32	17.53	20.77
7-9 hours	5.93	7.08	9.73	8.36
10-12 hours	2.73	6.78	7.75	12.53
13-15 hours	1.42	2.44	4.2	5.12
Over 15 hours	2.94	5.97	3.67	6.86
Total	100	100	100	100

Cross sectional weight at 12^{th} grade.

Table 4: Distribution of Requirements

	Math		**Science**		**Social Studies**		**English**	
Units	**NELS**	**ELS**	**NELS**	**ELS**	**NELS**	**ELS**	**NELS**	**ELS**
1	1.55	0.00	11.06	6.09	2.31	0.00	0.00	0.00
2	57.42	43.10	73.24	40.57	24.95	11.23	0.00	0.00
2.5	0.00	0.23	0.00	0.23	11.93	6.48	0.00	0.00
3	41.02	47.08	15.70	50.71	52.48	60.41	25.60	27.09
3.5	0.00	0.00	0.00	0.00	1.78	10.78	0.00	0.00
4	0.00	9.59	0.00	2.40	6.54	11.09	74.40	72.91

Cross sectional weight at 12^{th} grade.

Table 5: Changes in course-taking: Algebra I, Algebra II and Geometry

	Algebra I		**Algebra II**		**Geometry**	
Units	**NELS**	**ELS**	**NELS**	**ELS**	**NELS**	**ELS**
0	40.63	33.47	53.60	49.03	37.62	29.59
0.5	2.76	5.95	3.77	3.72	3.30	5.27
1	40.65	53.76	38.16	45.22	55.53	61.26
1.5	3.47	3.18	1.53	1.09	2.29	2.010
2	11.61	3.31	2.80	0.89	1.18	1.74
2.5	0.38	0.19	0.07	0.02	0.02	0.07
3	0.49	0.13	0.07	0.01	0.03	0.05
3.5	0.02	0.00	0.00	0.00	0.00	0.01
4	0.00	0.01	0.00	0.01	0.02	0.00

Cross sectional weight at 12^{th} grade.

Table 6: Changes in course-taking: Trigonometry, Pre-Calculus and Calculus

	Trigonometry		**Pre-Calculus**		**Calculus**	
Units	**NELS**	**ELS**	**NELS**	**ELS**	**NELS**	**ELS**
0	82.37	83.79	86.10	76.34	91.26	88.58
0.5	7.45	4.45	3.14	3.16	1.02	0.81
1	9.92	11.36	10.48	19.60	7.31	9.38
1.5	0.18	0.16	0.18	0.32	0.22	0.33
2	0.08	0.22	0.11	0.54	0.18	0.85
2.5	0.00	0.01	0.00	0.03	0.00	0.01
3	0.00	0.00	0.00	0.02	0.00	0.05
3.5	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00

Cross sectional weight at 12^{th} grade.

Table 7: Changes in course-taking: Science

	Earth science		**Biology**		**Chemistry**		**Physics**	
Units	**NELS**	**ELS**	**NELS**	**ELS**	**NELS**	**ELS**	**NELS**	**ELS**
0	79.86	77.82	12.23	17.47	52.55	46.56	78.93	76.91
0.5	3.73	4.24	4.62	5.10	2.45	3.99	1.67	2.07
1	15.67	17.08	62.04	66.70	40.81	44.26	18.03	18.79
1.5	0.16	0.35	4.23	2.44	0.98	1.62	0.29	0.93
2	0.57	0.46	14.86	7.46	2.95	3.25	1.05	1.25
2.5	0.01	0.00	0.82	0.13	0.13	0.07	0.00	0.01
3	0.00	0.05	1.06	0.63	0.13	0.17	0.03	0.04
3.5	0.00	0.00	0.07	0.06	0.01	0.05	0.00	0.00
4	0.00	0.00	0.07	0.01	0.00	0.03	0.00	0.00

Cross sectional weight at 12^{th} grade.

Table 8: Standardized Math Scores 12^{th} Grade

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	50.51399	50.57681	-0.0628128	0.2091689
Standard deviation	9.900481	9.508721	0.3917599	0.110581***
5th Percentile	34.03	34.58	-0.5500031	0.3319154*
10th Percentile	37.19	37.7	-0.5100021	0.3452328
25th Percentile	43.43	43.92	-0.4899979	0.4852343
50th Percentile	50.68	50.86	-0.1800003	0.3057482
75th Percentile	57.77	57.59	0.1800003	0.1903605
90th Percentile	63.43	62.95	0.4799995	0.3326662
95th Percentile	66.48	65.59	0.890007	0.3217205**

*p<0.1, **p<0.05, ***p<0.001

Table 9: Standardized Math Scores 12^{th} Grade: Female

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	49.89542	49.90264	-0.0072174	0.4151899
Standard deviation	9.433255	9.135272	0.2979832	0.2922335
5th Percentile	34.21	34.74	-0.5300026	1.002303
10th Percentile	37.22	37.59	-0.3699989	0.9358895
25th Percentile	42.9	43.19	-0.2899971	0.6544483
50th Percentile	50.1	50.35	-0.25	0.5215748
75th Percentile	56.83	56.82	0.0100021	0.4193204
90th Percentile	62.1	61.66	0.4399986	0.2958346
95th Percentile	65.05	64.49	0.5600052	0.4591243

*p<0.1, **p<0.05, ***p<0.001

Table 10: Standardized Math Scores 12^{th} Grade: Male

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	51.44408	51.33416	0.1099129	0.2383506
Standard deviation	10.28197	9.856356	0.4256144	0.1366549**
5th Percentile	34.07	34.46	-0.3899994	0.421991
10th Percentile	37.47	37.97	-0.5	0.410755
25th Percentile	44.24	44.48	-0.2399979	0.3332406
50th Percentile	51.52	51.37	0.1500015	0.266316
75th Percentile	59.12	58.65	0.4699974	0.3392627
90th Percentile	64.89	64.36	0.5299988	0.2930354*
95th Percentile	67.72	67.08	0.6399994	0.3204927**

*p<0.1, **p<0.05, ***p<0.001

Table 11: Standardized Math Scores 12^{th} Grade: White

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	52.72427	52.19621	0.5280571	0.1685966**
Standard deviation	9.307489	9.082677	0.2248125	0.1030942**
5th Percentile	36.37	35.93	0.4399986	0.3290138
10th Percentile	39.94	39.73	0.2099991	0.3116774
25th Percentile	46.57	46.2	0.3699989	0.2486764
50th Percentile	53.08	52.43	0.6500015	0.2352506**
75th Percentile	59.47	58.9	0.5699997	0.2522254**
90th Percentile	64.68	63.76	0.920002	0.2497796***
95th Percentile	67.38	66.41	0.9699936	0.310844**

*p<0.1, **p<0.05, ***p<0.001

Table 12: Standardized Math Scores 12^{th} Grade: Black

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	44.19662	44.71179	-0.5151711	2.770542
Standard deviation	8.108727	7.882373	0.2263536	1.26803
5th Percentile	30.65	30.46	0.1900005	3.551144
10th Percentile	34.2	34.76	-0.5599976	3.342243
25th Percentile	38.36	39.12	-0.7599983	2.780265
50th Percentile	43.74	44.91	-1.169998	3.393458
75th Percentile	49.76	50.39	-0.6300011	3.898738
90th Percentile	54.87	54.61	0.2599983	3.964983
95th Percentile	58.03	57.12	0.9099998	3.678816

*p<0.1, **p<0.05, ***p<0.001

Table 13: Standardized Math Scores 12^{th} Grade: Hispanic

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	45.88615	46.36158	-0.4754295	0.6165801
Standard deviation	9.289112	8.96543	0.3236818	0.3269029
5th Percentile	31.56	33.18	-1.620001	0.8523558*
10th Percentile	34.11	35.15	-1.040001	0.5678742*
25th Percentile	39.13	39.46	-0.329998	0.9009042
50th Percentile	45.41	45.63	-0.2200012	0.7391772
75th Percentile	52	52.28	-0.2799988	0.8986637
90th Percentile	58.94	58.93	0.0099983	1.179387
95th Percentile	61.62	62.16	-0.5400009	0.8842026

*p<0.1, **p<0.05, ***p<0.001

Table 14: Standardized Math Scores 12^{th} Grade: Asian

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	54.58981	54.41069	0.1791115	0.9626482
Standard deviation	10.62364	10.40058	0.2230597	0.4236462
5th Percentile	35.64	35.83	-0.1900024	1.480463
10th Percentile	40.04	40.45	-0.4099998	1.484354
25th Percentile	46.85	46.77	0.079998	1.585355
50th Percentile	54.79	53.77	1.02	1.488749
75th Percentile	62.91	62.68	0.2299995	1.164148
90th Percentile	68.39	68.51	-0.1200027	1.094929
95th Percentile	71.39	71.37	0.0199966	1.01055

*p<0.1, **p<0.05, ***p<0.001

Table 15: Standardized Math Scores 12^{th} Grade: SES quartile 1

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	45.21548	44.85609	0.3593903	0.4996383
Standard deviation	8.857821	8.24936	0.6084604	0.4309859
5th Percentile	31.34	31.01	0.3299999	1.216938
10th Percentile	34.26	34.35	-0.0900002	0.9723498
25th Percentile	38.76	38.94	-0.1800003	0.7446102
50th Percentile	44.78	44.93	-0.1500015	0.7742237
75th Percentile	51.19	50.62	0.5699997	0.7522455
90th Percentile	57.04	55.97	1.07	0.9950398
95th Percentile	60.89	58.53	2.360001	0.8402296**

*p<0.1, **p<0.05, ***p<0.001

Table 16: Standardized Math Scores 12^{th} Grade: SES quartile 2

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	48.22399	48.44344	-0.2194557	0.3134117
Standard deviation	9.067024	8.588628	0.4783964	0.1683909**
5th Percentile	33.39	34.07	-0.6800003	0.4772618
10th Percentile	36.05	36.66	-0.6100006	0.5543261
25th Percentile	41.86	42.66	-0.7999992	0.4004556**
50th Percentile	48.54	48.71	-0.1699982	0.3909212
75th Percentile	54.49	54.4	0.0900002	0.4821696
90th Percentile	60.28	59.63	0.6499977	0.4178163
95th Percentile	63.14	62.55	0.5900002	0.5905432

*p<0.1, **p<0.05, ***p<0.001

Table 17: Standardized Math Scores 12^{th} Grade: SES quartile 3

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	51.41137	50.81615	0.5952148	0.5002749
Standard deviation	9.005253	8.832564	0.1726885	0.2312042
5th Percentile	35.81	36.13	-0.3199997	0.6542913
10th Percentile	39.03	39.1	-0.0699997	0.3652055
25th Percentile	45.67	45.04	0.6299973	1.14931
50th Percentile	51.52	50.54	0.9799995	0.5993312
75th Percentile	58	57.46	0.5400009	0.6089843
90th Percentile	62.85	62.73	0.1199989	0.5475036
95th Percentile	65.59	65.12	0.4699936	0.3931361

*p<0.1, **p<0.05, ***p<0.001

Table 18: Standardized Math Scores 12^{th} Grade: SES quartile 4

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	56.00084	55.80803	0.1928024	0.2892554
Standard deviation	9.06111	8.998144	0.0629654	0.2087956
5th Percentile	39.58	38.73	0.8500023	0.9075957
10th Percentile	43.9	43.89	0.0100021	0.6947542
25th Percentile	50.12	50.12	0	0.361834
50th Percentile	56.7	56.51	0.1900024	0.3622987
75th Percentile	62.56	62.4	0.1599998	0.2902867
90th Percentile	67.14	66.95	0.1900024	0.3084047
95th Percentile	69.62	69.12	0.5	0.4149548

*p<0.1, **p<0.05, ***p<0.001

Table 19: SAT Scores

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	1028.42	1023.824	4.595581	5.367485
Standard deviation	202.4766	196.3645	6.112137	5.281944
5th Percentile	690	690	0	15.75875
10th Percentile	760	770	-10	16.30466
25th Percentile	890	900	-10	7.584686
50th Percentile	1030	1030	0	11.45417
75th Percentile	1170	1150	20	12.39463
90th Percentile	1300	1280	20	8.691184**
95th Percentile	1370	1360	10	11.52924

*p<0.1, **p<0.05, ***p<0.001

Table 20: SAT Scores: Female

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	1014.523	1006.816	7.70752	14.54479
Standard deviation	198.8213	190.0325	8.788773	8.809877
5th Percentile	690	690	0	31.3437
10th Percentile	750	750	0	29.22713
25th Percentile	880	890	-10	20.51023
50th Percentile	1010	1000	10	18.20256
75th Percentile	1150	1130	20	15.94674
90th Percentile	1280	1250	30	14.12858**
95th Percentile	1340	1320	20	16.84753

*p<0.1, **p<0.05, ***p<0.001

Table 21: SAT Scores: Male

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	1049.458	1044.739	4.718994	9.124953
Standard deviation	200.9225	203.4895	-2.567032	6.288316
5th Percentile	710	690	20	37.15366
10th Percentile	790	780	10	19.59996
25th Percentile	920	910	10	12.02821
50th Percentile	1040	1050	-10	8.621988
75th Percentile	1190	1190	0	10.82556
90th Percentile	1320	1320	0	11.45823
95th Percentile	1380	1380	0	14.36434

*p<0.1, **p<0.05, ***p<0.001

Table 22: SAT Scores: White

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	1070.143	1061.53	8.612915	5.268846
Standard deviation	184.2185	182.2843	1.934174	3.102995
5th Percentile	770	770	0	12.79546
10th Percentile	840	820	20	9.249579**
25th Percentile	950	940	10	8.142026
50th Percentile	1070	1060	10	7.090003
75th Percentile	1200	1190	10	8.589596
90th Percentile	1310	1300	10	8.797431
95th Percentile	1380	1380	0	13.85726

*p<0.1, **p<0.05, ***p<0.001

Table 23: SAT Scores: Black

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	856.2443	864.5981	-8.353821	82.27525
Standard deviation	173.1995	164.0035	9.195999	28.69721
5th Percentile	590	570	20	63.65206
10th Percentile	640	640	0	78.07283
25th Percentile	730	750	-20	92.9181
50th Percentile	860	880	-20	97.49533
75th Percentile	980	970	10	98.99894
90th Percentile	1080	1070	10	114.4793
95th Percentile	1160	1140	20	121.5225

*p<0.1, **p<0.05, ***p<0.001

Table 24: SAT Scores: Hispanic

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	927.4788	901.8085	25.67029	16.06822
Standard deviation	192.9836	181.8154	11.16823	8.978213
5th Percentile	630	640	-10	38.30306
10th Percentile	680	670	10	22.36735
25th Percentile	790	770	20	24.65222
50th Percentile	920	900	20	18.46298
75th Percentile	1050	1010	40	30.26698
90th Percentile	1190	1140	50	26.40291*
95th Percentile	1260	1220	40	29.90296

*p<0.1, **p<0.05, ***p<0.001

Table 25: SAT Scores: Asian

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	1086.425	1104.554	-18.1283	20.61819
Standard deviation	217.2608	227.6143	-10.35345	10.87577
5th Percentile	730	730	0	31.34967
10th Percentile	810	790	20	31.77135
25th Percentile	940	950	-10	25.70138
50th Percentile	1080	1090	-10	38.50656
75th Percentile	1250	1270	-20	32.90564
90th Percentile	1380	1390	-10	40.56401
95th Percentile	1450	1510	-60	29.4455**

*p<0.1, **p<0.05, ***p<0.001

Table 26: SAT Scores: SES quartile 1

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	901.7269	875.5652	26.16162	17.51078
Standard deviation	186.9197	175.7733	11.14641	7.869641
5th Percentile	600	590	10	20.99981
10th Percentile	650	660	-10	19.33412
25th Percentile	760	730	30	19.0341
50th Percentile	910	890	20	32.98763
75th Percentile	1030	1020	10	22.62161
90th Percentile	1150	1110	40	28.55151
95th Percentile	1220	1140	80	26.84554**

*p<0.1, **p<0.05, ***p<0.001

Table 27: SAT Scores: SES quartile 2

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	954.2708	937.6965	16.57428	8.787998*
Standard deviation	182.5283	160.1095	22.41875	7.349183**
5th Percentile	650	680	-30	22.37658
10th Percentile	720	730	-10	21.64698
25th Percentile	830	820	10	18.83909
50th Percentile	960	940	20	11.46398*
75th Percentile	1080	1040	40	16.49174**
90th Percentile	1180	1130	50	22.4398**
95th Percentile	1250	1210	40	26.67776

*p<0.1, **p<0.05, ***p<0.001

Table 28: SAT Scores: SES quartile 3

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	1010.174	979.7926	30.38147	29.23697
Standard deviation	178.8322	196.441	-17.60872	19.2154
5th Percentile	730	570	160	75.82783**
10th Percentile	780	730	50	92.07057
25th Percentile	880	870	10	58.27887
50th Percentile	1000	970	30	25.60482
75th Percentile	1130	1110	20	17.28148
90th Percentile	1250	1230	20	18.69784
95th Percentile	1310	1300	10	16.35067

*p<0.1, **p<0.05, ***p<0.001

Table 29: SAT Scores: SES quartile 4

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	1110.651	1115.49	-4.838745	6.319679
Standard deviation	190.3843	188.5673	1.816971	3.709513
5th Percentile	790	790	0	17.35101
10th Percentile	870	880	-10	12.08062
25th Percentile	990	990	0	9.584787
50th Percentile	1100	1110	-10	9.394046
75th Percentile	1240	1240	0	10.32777
90th Percentile	1360	1370	-10	11.40657
95th Percentile	1430	1430	0	11.17317

*p<0.1, **p<0.05, ***p<0.001

Table 30: SAT Math

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	517.2318	514.267	2.964844	3.188784
Standard deviation	108.4872	104.9539	3.533295	2.533425
5th Percentile	330	330	0	12.36679
10th Percentile	380	380	0	11.48101
25th Percentile	440	440	0	6.12086
50th Percentile	520	520	0	5.585947
75th Percentile	590	590	0	5.729367
90th Percentile	660	650	10	5.124346*
95th Percentile	700	690	10	7.828318

*p<0.1, **p<0.05, ***p<0.001

Table 31: SAT Math: Female

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	503.8151	501.5156	2.299469	5.617052
Standard deviation	104.629	100.4098	4.219139	4.528083
5th Percentile	330	330	0	17.52386
10th Percentile	370	370	0	15.75833
25th Percentile	430	430	0	10.37038
50th Percentile	500	500	0	8.232007
75th Percentile	580	570	10	7.186577
90th Percentile	640	630	10	6.312217
95th Percentile	670	670	0	9.181841

*p<0.1, **p<0.05, ***p<0.001

Table 32: SAT Math: Male

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	534.6522	529.6664	4.985779	5.259277
Standard deviation	108.0977	108.7117	-0.614006	4.695206
5th Percentile	350	340	10	26.35311
10th Percentile	400	400	0	12.71075
25th Percentile	460	460	0	8.168442
50th Percentile	530	530	0	6.395483
75th Percentile	610	600	10	6.377409
90th Percentile	670	670	0	6.446667
95th Percentile	710	710	0	6.473965

*p<0.1, **p<0.05, ***p<0.001

Table 33: SAT Math: White

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	536.5388	532.5265	4.012268	2.623802
Standard deviation	97.91026	95.25016	2.660095	1.63141
5th Percentile	380	370	10	5.851057*
10th Percentile	410	410	0	6.117454
25th Percentile	470	470	0	4.60095
50th Percentile	540	540	0	5.353402
75th Percentile	600	590	10	5.063287**
90th Percentile	660	660	0	5.709887
95th Percentile	700	690	10	6.882466

*p<0.1, **p<0.05, ***p<0.001

Table 34: SAT Math: Black

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	425.76	427.14	-1.381	50.62449
Standard deviation	96.47	96.62	-0.147	19.24415
5th Percentile	270	220	50	44.39186
10th Percentile	300	300	0	53.2641
25th Percentile	350	350	0	62.54425
50th Percentile	430	440	-10	60.50615
75th Percentile	490	490	0	60.35036
90th Percentile	550	540	10	66.56913
95th Percentile	580	580	0	67.96185

*p<0.1, **p<0.05, ***p<0.001

Table 35: SAT Math: Hispanic

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	466.5206	454.5279	11.99277	9.259237
Standard deviation	104.699	99.81572	4.883286	5.520466
5th Percentile	300	310	-10	20.06477
10th Percentile	330	330	0	11.85071
25th Percentile	400	390	10	14.1905
50th Percentile	460	440	20	12.44265
75th Percentile	540	510	30	16.79225*
90th Percentile	620	610	10	20.23132
95th Percentile	650	630	20	12.78677

*p<0.1, **p<0.05, ***p<0.001

Table 36: SAT Math: Asian

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	568.536	579.0436	-10.50763	10.49575
Standard deviation	116.4936	117.3874	-0.8938751	5.148384
5th Percentile	370	370	0	14.60426
10th Percentile	420	420	0	16.68488
25th Percentile	490	500	-10	16.83826
50th Percentile	570	580	-10	15.21126
75th Percentile	660	680	-20	13.95906
90th Percentile	730	730	0	11.72967
95th Percentile	750	760	-10	10.37949

*p<0.1, **p<0.05, ***p<0.001

Table 37: SAT Math: SES quartile 1

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	459.9614	450.1124	9.848969	9.963788
Standard deviation	102.6572	98.35233	4.304909	5.30074
5th Percentile	290	300	-10	9.355504
10th Percentile	320	320	0	11.78326
25th Percentile	390	380	10	12.25932
50th Percentile	460	440	20	15.95508
75th Percentile	530	530	0	16.09764
90th Percentile	600	590	10	23.79332
95th Percentile	630	620	10	14.69508

*p<0.1, **p<0.05, ***p<0.001

Table 38: SAT Math: SES quartile 2

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	480.1658	468.2978	11.86801	4.746662**
Standard deviation	100.7659	86.97128	13.79459	4.047711**
5th Percentile	310	320	-10	12.70595
10th Percentile	350	350	0	12.87988
25th Percentile	420	420	0	6.079764
50th Percentile	480	470	10	7.796613
75th Percentile	550	530	20	10.72902*
90th Percentile	600	580	20	11.27865*
95th Percentile	650	600	50	14.15777***

*p<0.1, **p<0.05, ***p<0.001

Table 39: SAT Math: SES quartile 3

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	507.141	489.5856	17.55536	18.89946
Standard deviation	98.32692	113.7588	-15.43185	15.09369
5th Percentile	340	220	120	59.32782**
10th Percentile	390	340	50	68.19539
25th Percentile	440	430	10	37.72341
50th Percentile	510	500	10	14.25329
75th Percentile	570	570	0	9.300398
90th Percentile	630	630	0	9.23657
95th Percentile	660	660	0	7.921736

*p<0.1, **p<0.05, ***p<0.001

Table 40: SAT Math: SES quartile 4

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	556.7469	559.7693	-3.0224	3.297467
Standard deviation	102.3271	100.2508	2.076279	2.044277
5th Percentile	380	380	0	8.965107
10th Percentile	420	430	-10	7.420926
25th Percentile	490	500	-10	6.609521
50th Percentile	560	560	0	5.857493
75th Percentile	630	630	0	7.641543
90th Percentile	690	700	-10	7.800005
95th Percentile	720	720	0	5.881222

*p<0.1, **p<0.05, ***p<0.001

Table 41: SAT Verbal

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	511.1861	509.5574	1.628693	2.618074
Standard deviation	107.9379	105.5159	2.421944	3.290269
5th Percentile	340	350	-10	6.7975
10th Percentile	370	380	-10	7.469987
25th Percentile	440	440	0	6.496214
50th Percentile	510	510	0	8.911477
75th Percentile	580	580	0	7.452616
90th Percentile	650	650	0	6.395013
95th Percentile	690	690	0	6.701299

*p<0.1, **p<0.05, ***p<0.001

Table 42: SAT Verbal: Female

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	510.7057	505.3004	5.405273	9.221743
Standard deviation	107.1214	103.0718	4.049599	5.438558
5th Percentile	340	340	0	17.60666
10th Percentile	370	370	0	15.58911
25th Percentile	440	440	0	14.10631
50th Percentile	510	500	10	12.37562
75th Percentile	580	570	10	12.08162
90th Percentile	650	640	10	10.00409
95th Percentile	690	680	10	10.56092

*p<0.1, **p<0.05, ***p<0.001

Table 43: SAT Verbal: Male

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	514.8059	515.0726	-0.2667236	4.357073
Standard deviation	107.2209	109.1233	-1.902344	2.489686
5th Percentile	340	350	-10	8.649116
10th Percentile	380	370	10	10.28903
25th Percentile	440	440	0	7.057593
50th Percentile	510	510	0	6.792782
75th Percentile	590	590	0	7.142944
90th Percentile	660	660	0	8.13917
95th Percentile	690	700	-10	10.42063

*p<0.1, **p<0.05, ***p<0.001

Table 44: SAT Verbal: White

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	533.6002	529.004	4.596252	3.049151
Standard deviation	100.9393	101.9332	-0.9938354	1.76701
5th Percentile	370	370	0	6.501888
10th Percentile	410	400	10	5.784923*
25th Percentile	460	460	0	5.985252
50th Percentile	530	530	0	5.767715
75th Percentile	600	600	0	6.461819
90th Percentile	670	660	10	6.123773
95th Percentile	710	710	0	8.524373

*p<0.1, **p<0.05, ***p<0.001

Table 45: SAT Verbal: Black

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	430.4858	437.4586	-6.972748	34.92987
Standard deviation	91.12003	82.46852	8.651512	14.66336
5th Percentile	290	320	-30	35.02997
10th Percentile	320	340	-20	35.14465
25th Percentile	370	380	-10	35.56289
50th Percentile	420	430	-10	42.32047
75th Percentile	480	490	-10	44.43369
90th Percentile	550	540	10	53.97023
95th Percentile	600	580	20	61.89619

*p<0.1, **p<0.05, ***p<0.001

Table 46: SAT Verbal: Hispanic

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	460.9582	447.2806	13.67755	7.786673*
Standard deviation	102.948	96.11331	6.834679	4.86868
5th Percentile	300	290	10	15.26304
10th Percentile	320	320	0	14.16302
25th Percentile	390	380	10	14.90486
50th Percentile	460	450	10	11.69298
75th Percentile	530	510	20	10.34662*
90th Percentile	600	570	30	17.57234*
95th Percentile	640	620	20	16.88698

*p<0.1, **p<0.05, ***p<0.001

Table 47: SAT Verbal: Asian

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	517.8894	525.5101	-7.620667	11.14662
Standard deviation	117.1959	126.745	-9.549103	6.757421
5th Percentile	330	310	20	24.95607
10th Percentile	370	370	0	15.45769
25th Percentile	440	450	-10	14.98776
50th Percentile	510	520	-10	20.10413
75th Percentile	600	620	-20	16.9587
90th Percentile	670	690	-20	21.00459
95th Percentile	720	750	-30	15.53166*

*p<0.1, **p<0.05, ***p<0.001

Table 48: SAT Verbal: SES quartile 1

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	441.7655	425.4528	16.31268	8.407839*
Standard deviation	98.57428	90.90377	7.670509	4.219614*
5th Percentile	280	280	0	10.76095
10th Percentile	310	300	10	12.7643
25th Percentile	370	360	10	9.108476
50th Percentile	440	420	20	20.15626
75th Percentile	510	490	20	10.5233*
90th Percentile	570	530	40	13.67054**
95th Percentile	600	560	40	16.07721**

*p<0.1, **p<0.05, ***p<0.001

Table 49: SAT Verbal: SES quartile 2

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	474.105	469.3987	4.706299	5.113529
Standard deviation	95.54263	89.37262	6.170006	4.118122
5th Percentile	320	330	-10	9.351969
10th Percentile	360	360	0	8.248131
25th Percentile	410	410	0	7.184123
50th Percentile	470	470	0	6.812078
75th Percentile	540	520	20	10.66846*
90th Percentile	590	580	10	14.09154
95th Percentile	640	630	10	16.66749

*p<0.1, **p<0.05, ***p<0.001

Table 50: SAT Verbal: SES quartile 3

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	503.0331	490.207	12.82611	10.78988
Standard deviation	96.23301	97.74289	-1.50988	4.324992
5th Percentile	360	350	10	9.121755
10th Percentile	390	360	30	18.56473
25th Percentile	430	420	10	19.33702
50th Percentile	500	480	20	14.17661
75th Percentile	570	550	20	10.65517*
90th Percentile	630	620	10	11.66149
95th Percentile	670	670	0	9.90504

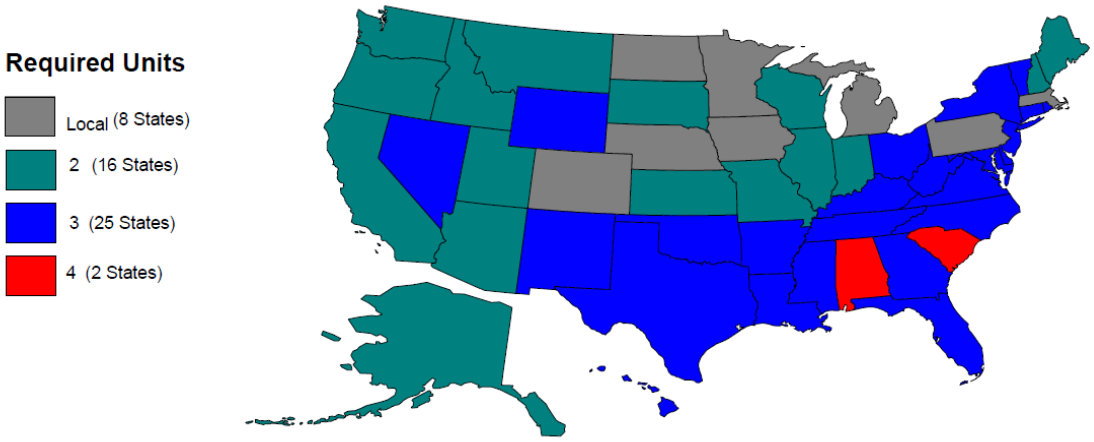
*p<0.1, **p<0.05, ***p<0.001

Table 51: SAT Verbal: SES quartile 4

Statistic	Factual	Counterfactual	Difference	Std. err. Diff.
Mean	553.8951	555.7205	-1.825378	3.406537
Standard deviation	103.1486	102.7613	0.3872452	1.874442
5th Percentile	390	390	0	8.363749
10th Percentile	430	430	0	5.846226
25th Percentile	480	480	0	5.223041
50th Percentile	550	550	0	4.491408
75th Percentile	630	630	0	6.275697
90th Percentile	690	690	0	7.703394
95th Percentile	730	730	0	7.644506

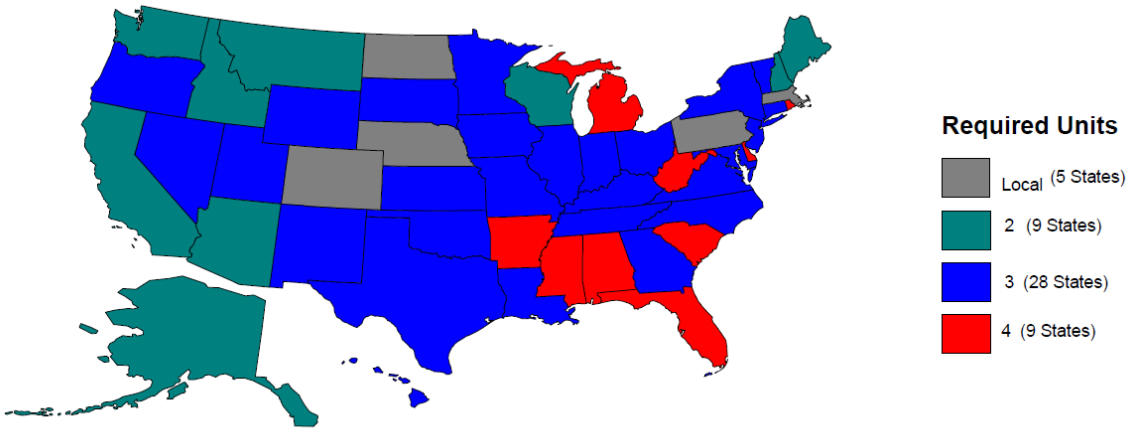
*p<0.1, **p<0.05, ***p<0.001

Figure 1: Mathematics High School Graduation Requirements: 2006



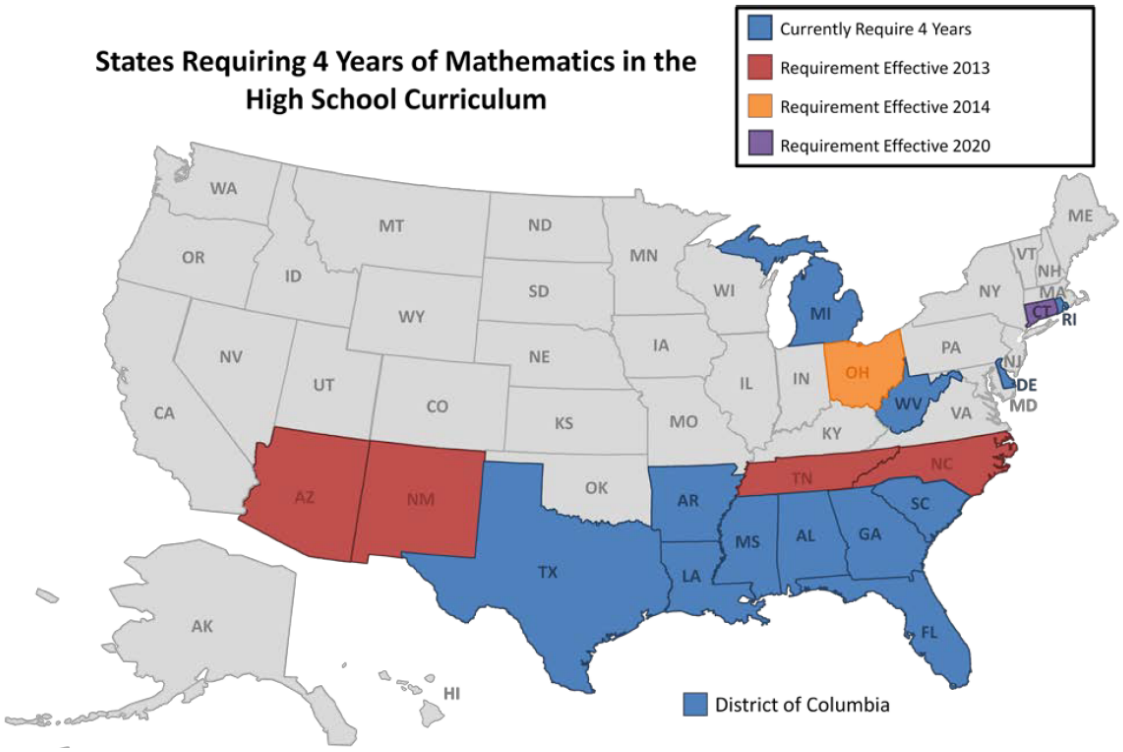
Source: Education Commission of the States, 2006

Figure 2: Mathematics High School Graduation Requirements: 2011



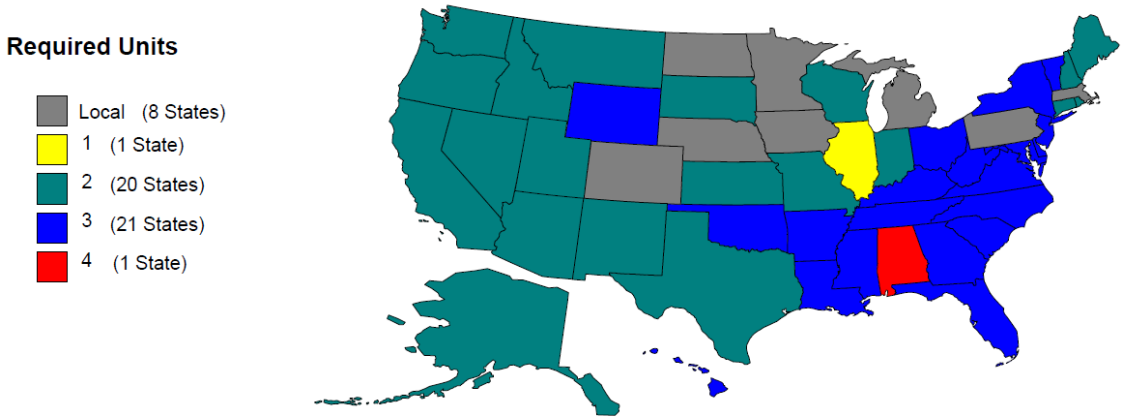
Source: Education Commission of the States, 2006

Figure 3: Mathematics High School Graduation Requirements: 2012



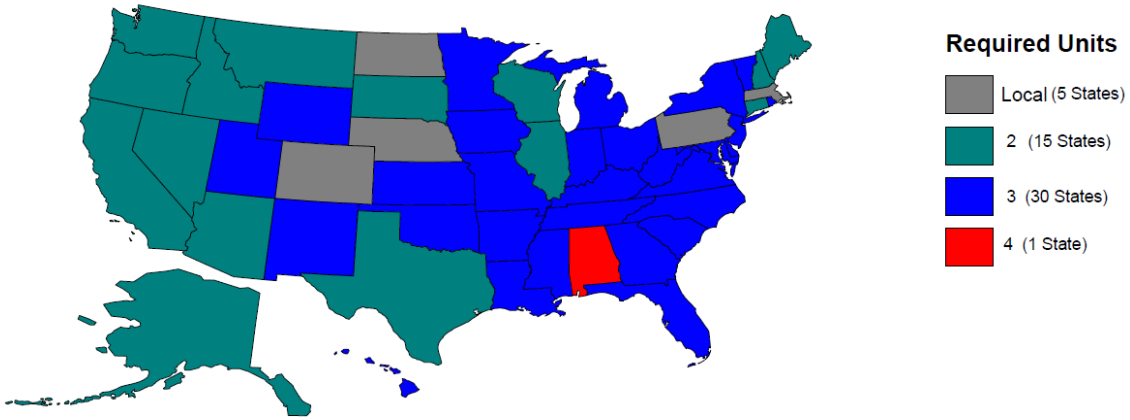
Source: Education Commission of the States, 2012

Figure 4: Science High School Graduation Requirements: 2006



Source: Education Commission of the States, 2006

Figure 5: Science High School Graduation Requirements: 2011



Source: Education Commission of the States, 2006

Figure 6: Factual and Counterfactual densities: Math scores 12^{th} grade

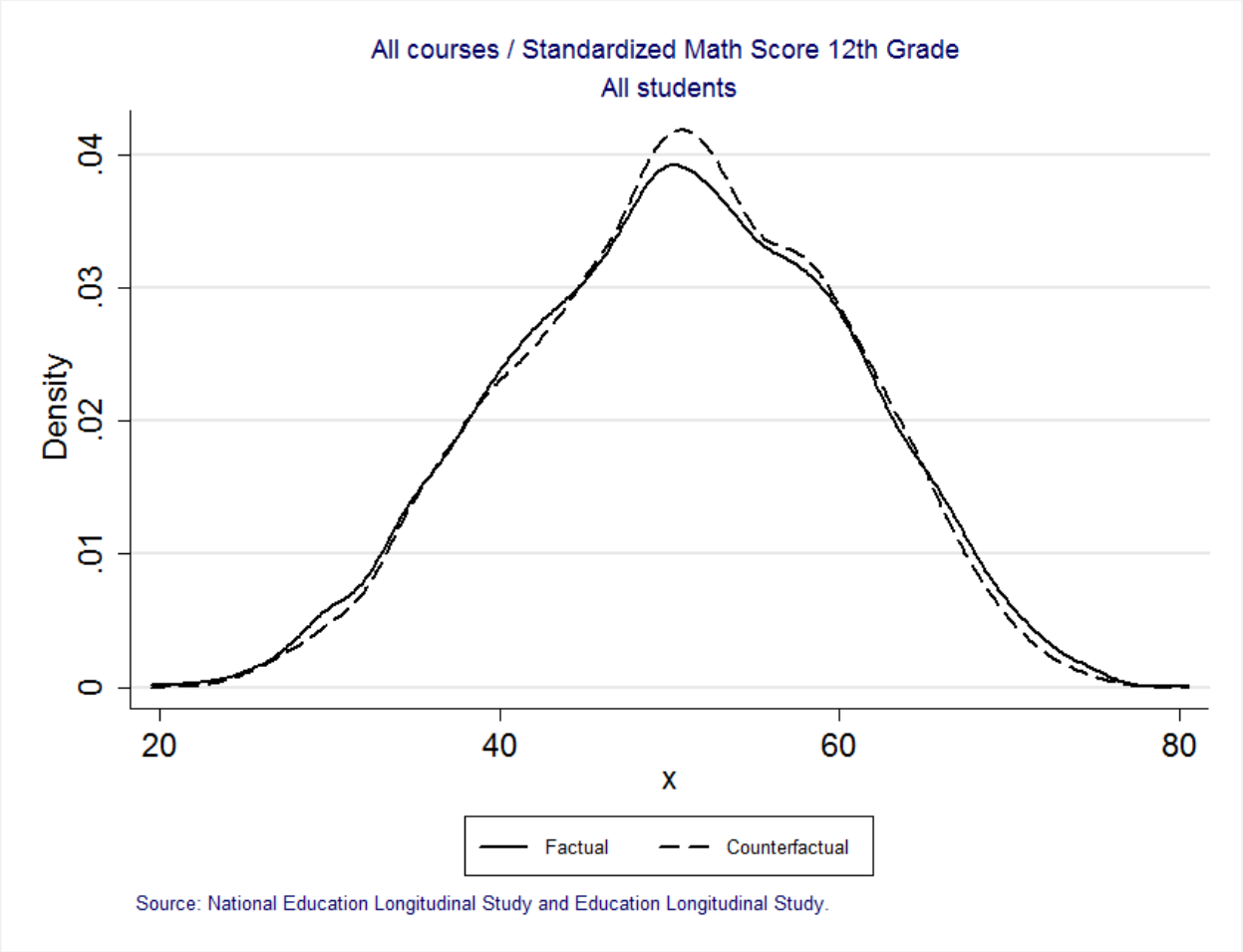


Figure 7: Factual and Counterfactual densities: Math scores 12^{th} grade; By Gender

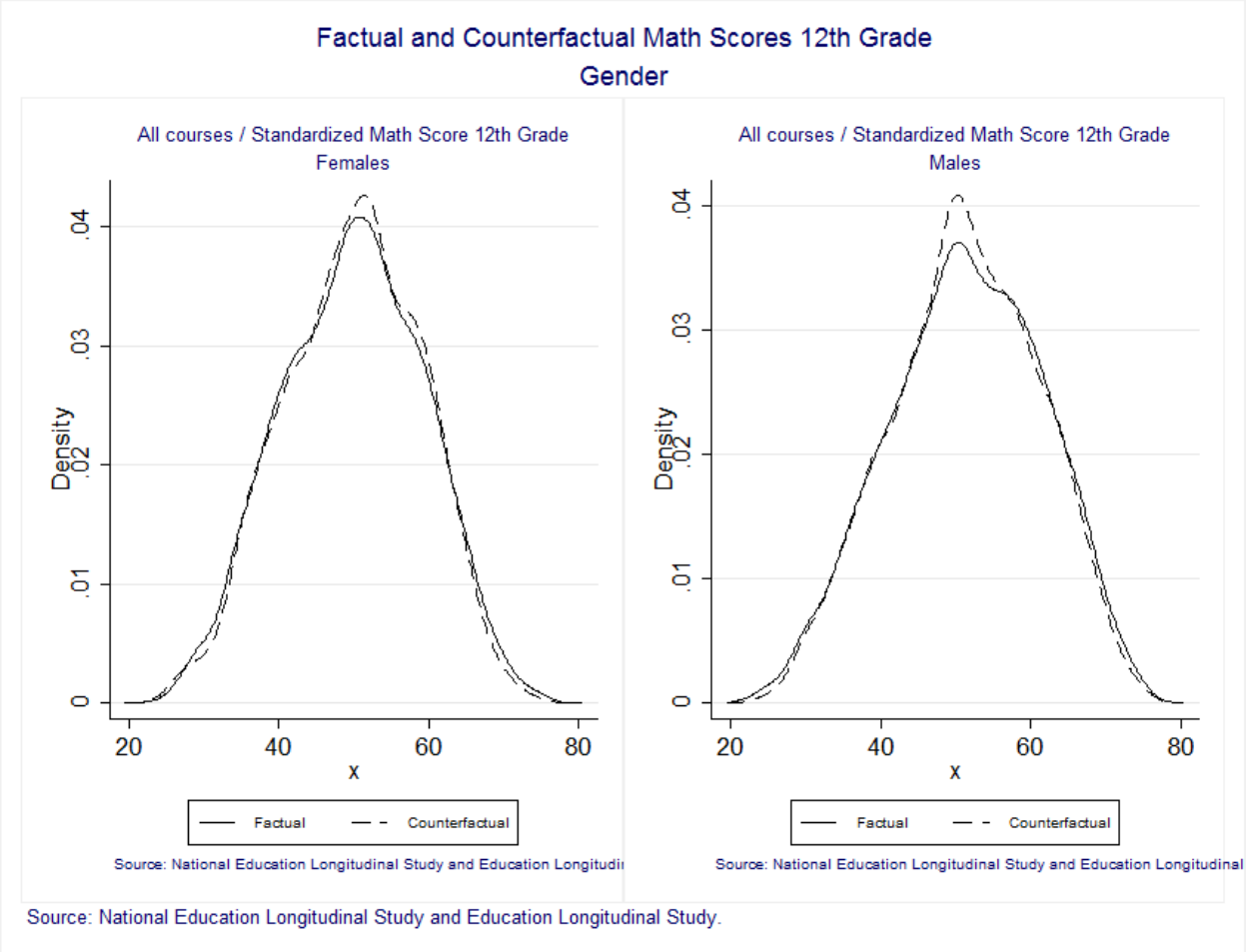


Figure 8: Factual and Counterfactual densities: Math scores 12^{th} grade; By Race

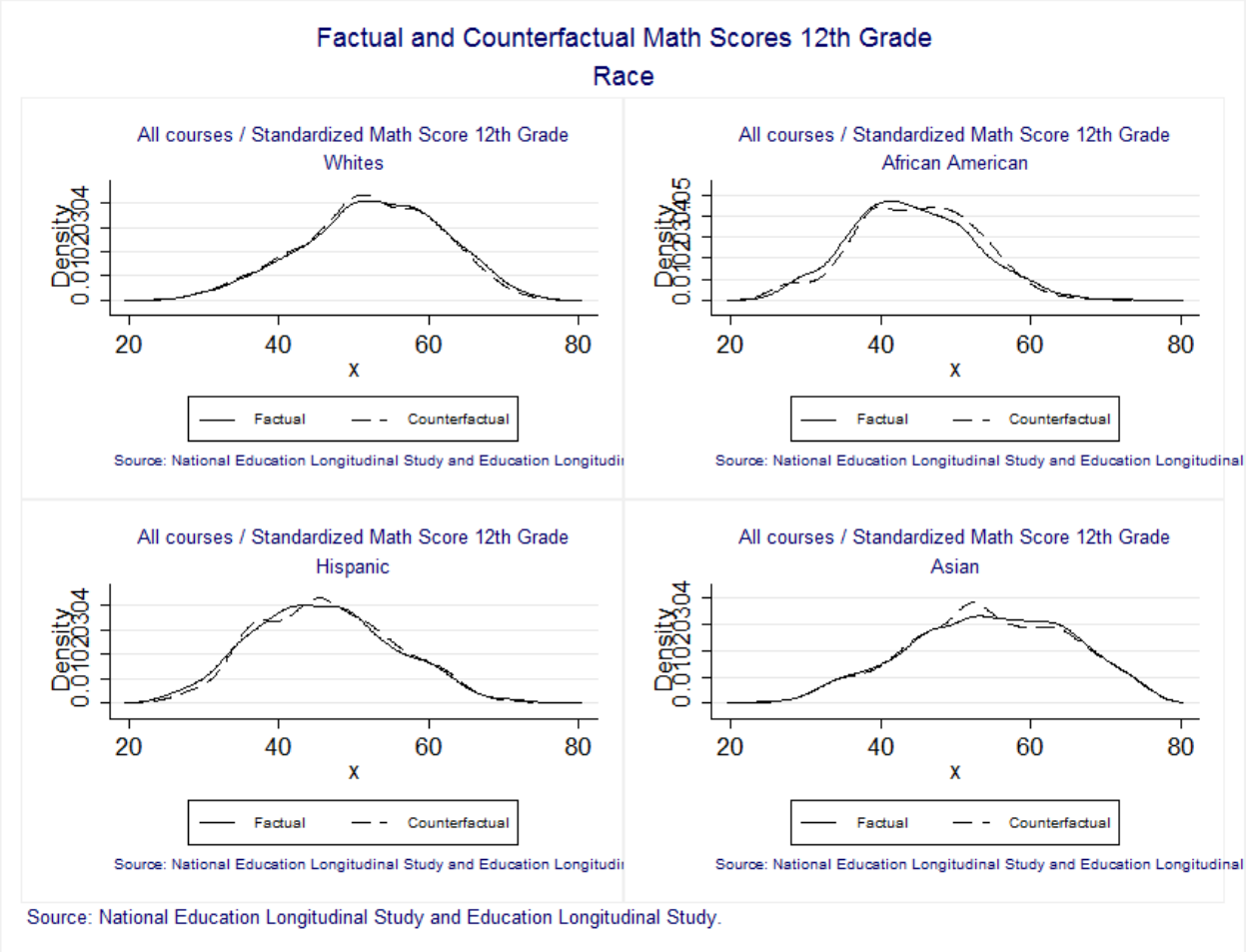


Figure 9: Factual and Counterfactual densities: Math scores 12^{th} grade; By SES

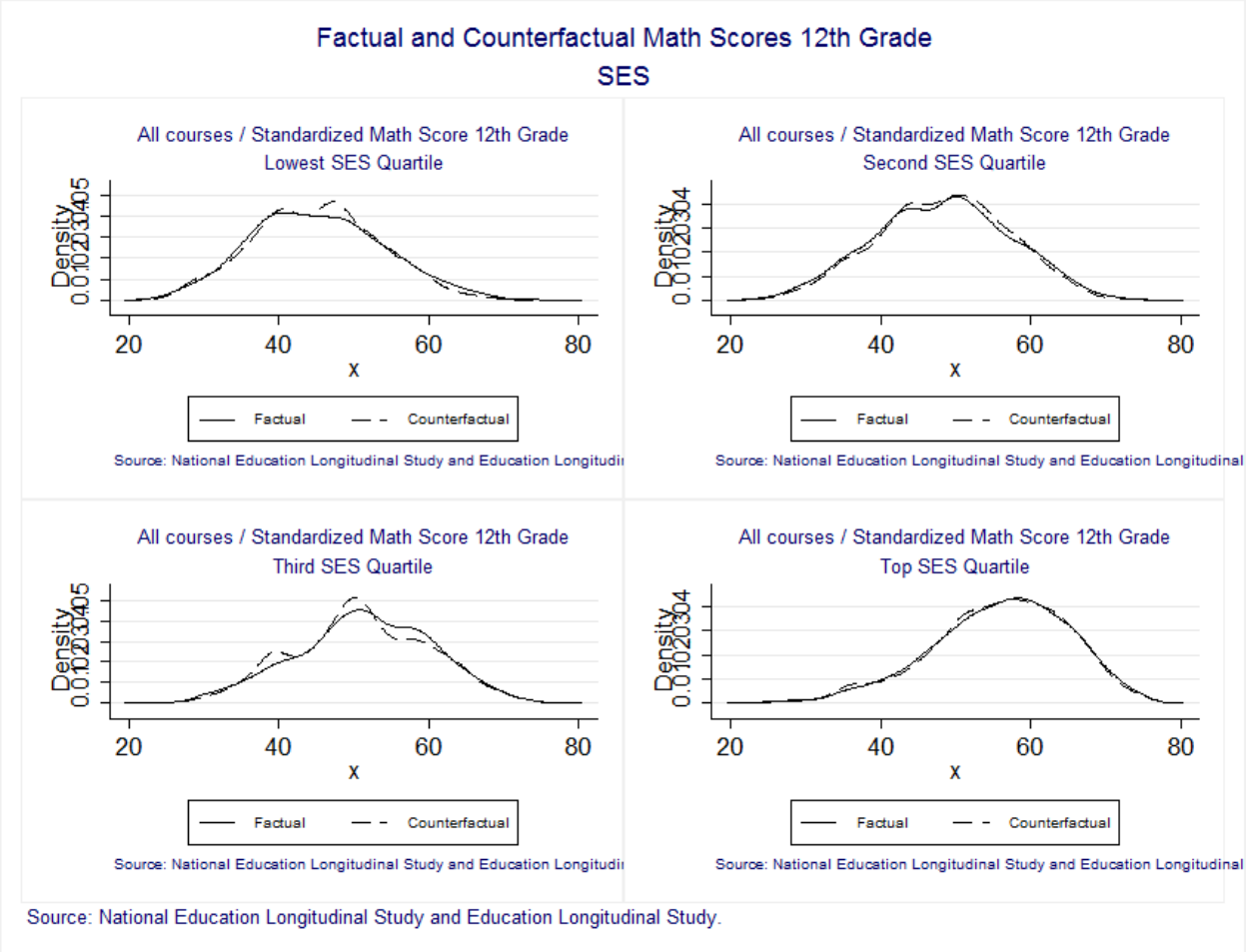


Figure 10: Factual and Counterfactual densities: SAT scores

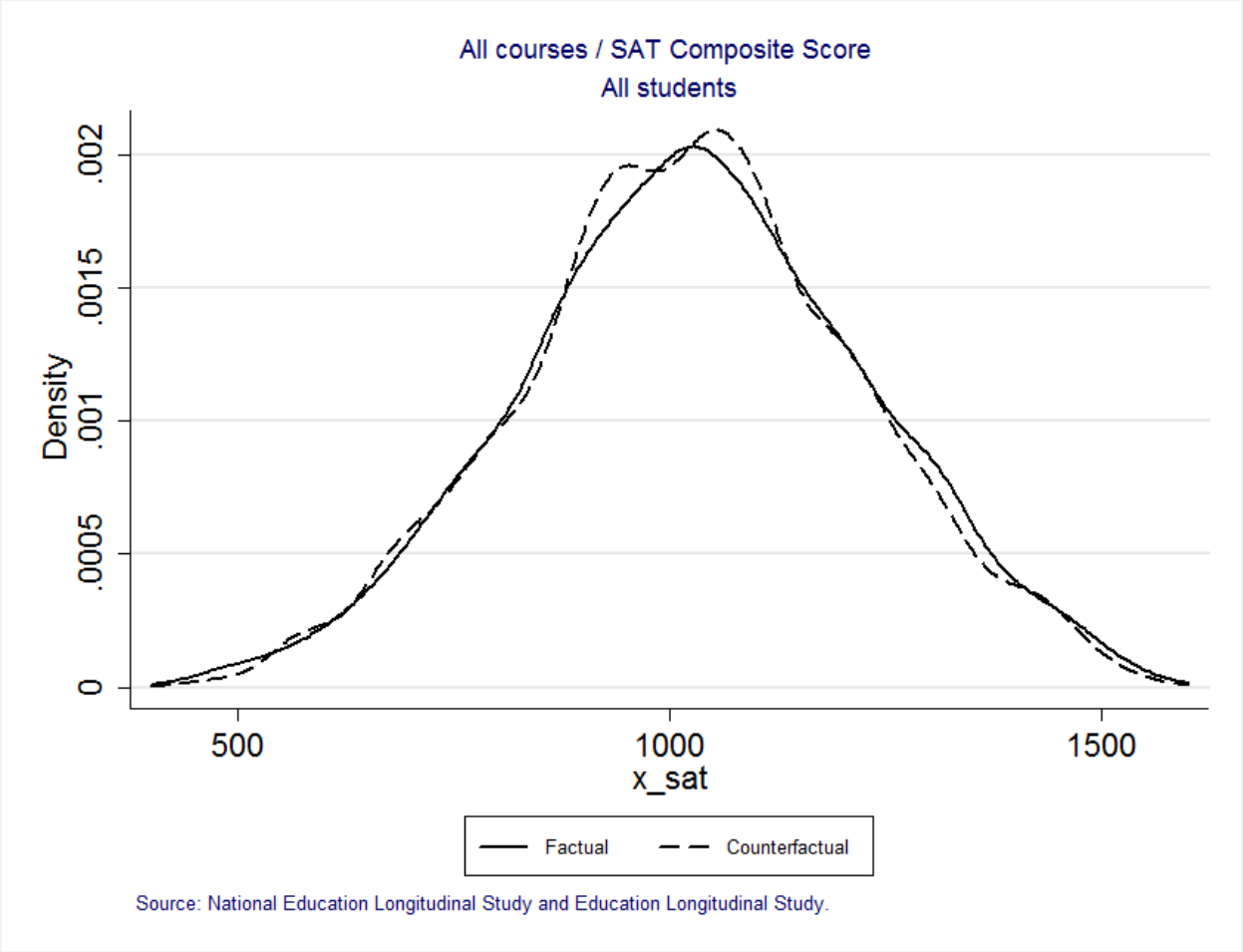


Figure 11: Factual and Counterfactual densities: SAT scores: By Gender

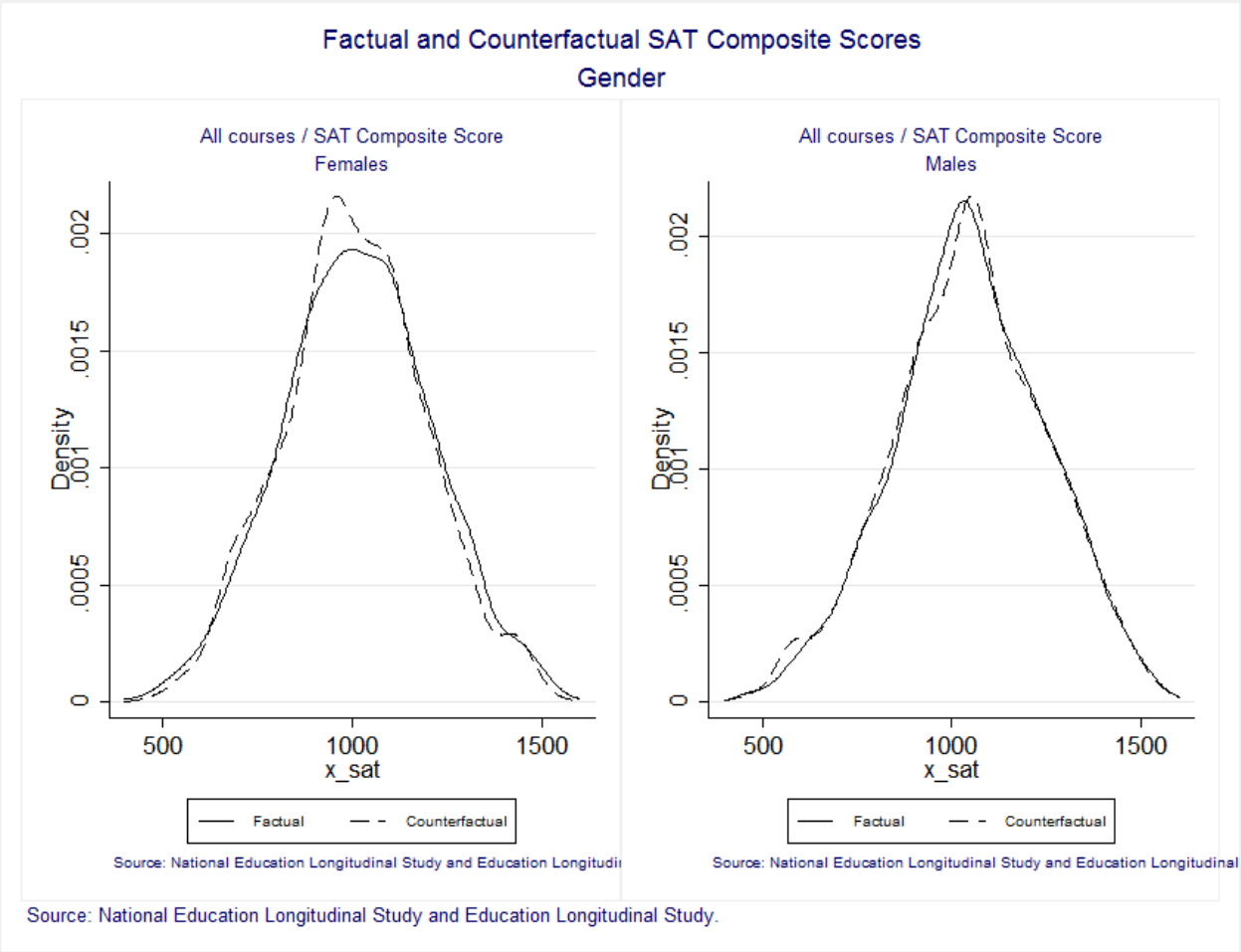


Figure 12: Factual and Counterfactual densities: SAT scores: By Race

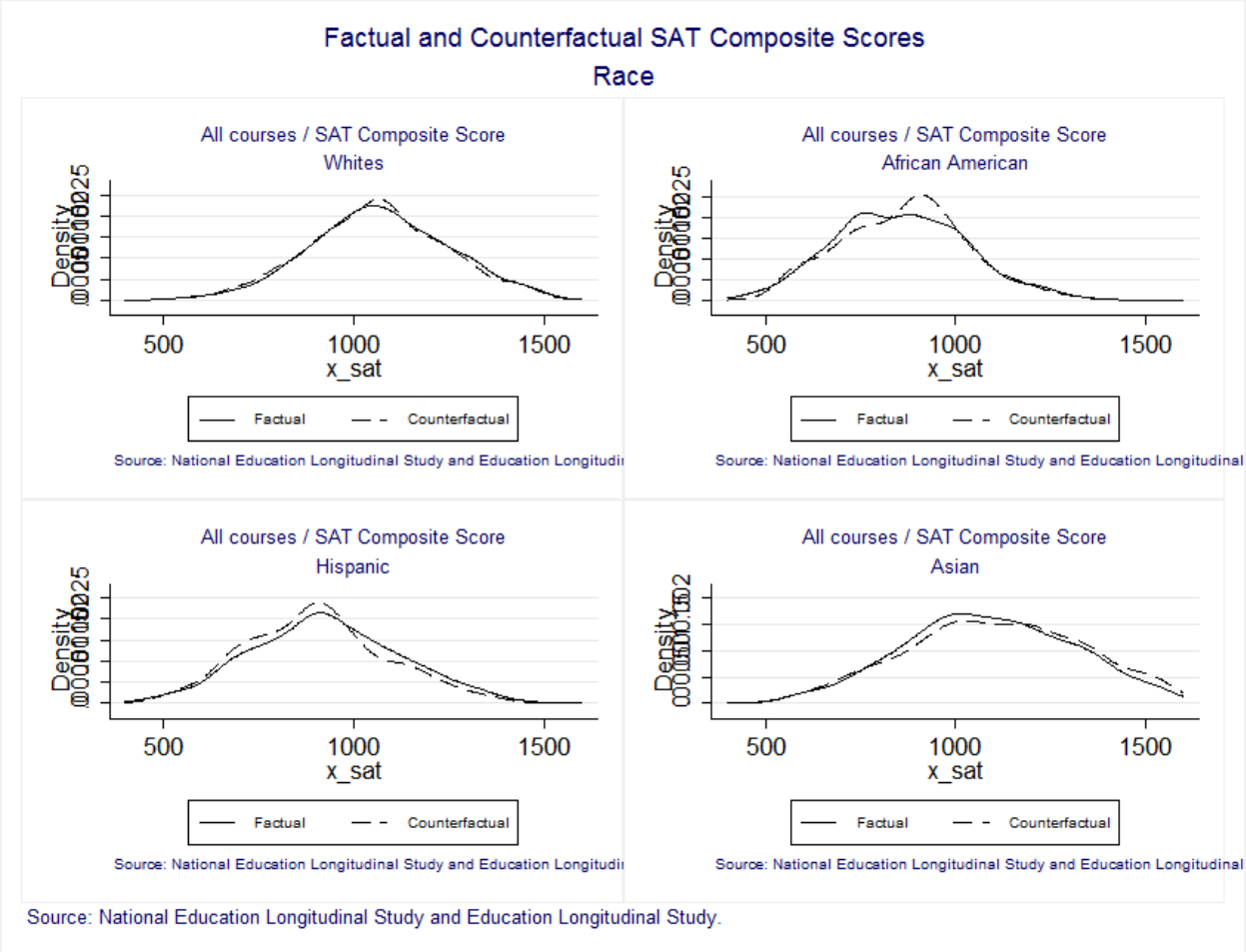


Figure 13: Factual and Counterfactual densities: SAT scores: By SES

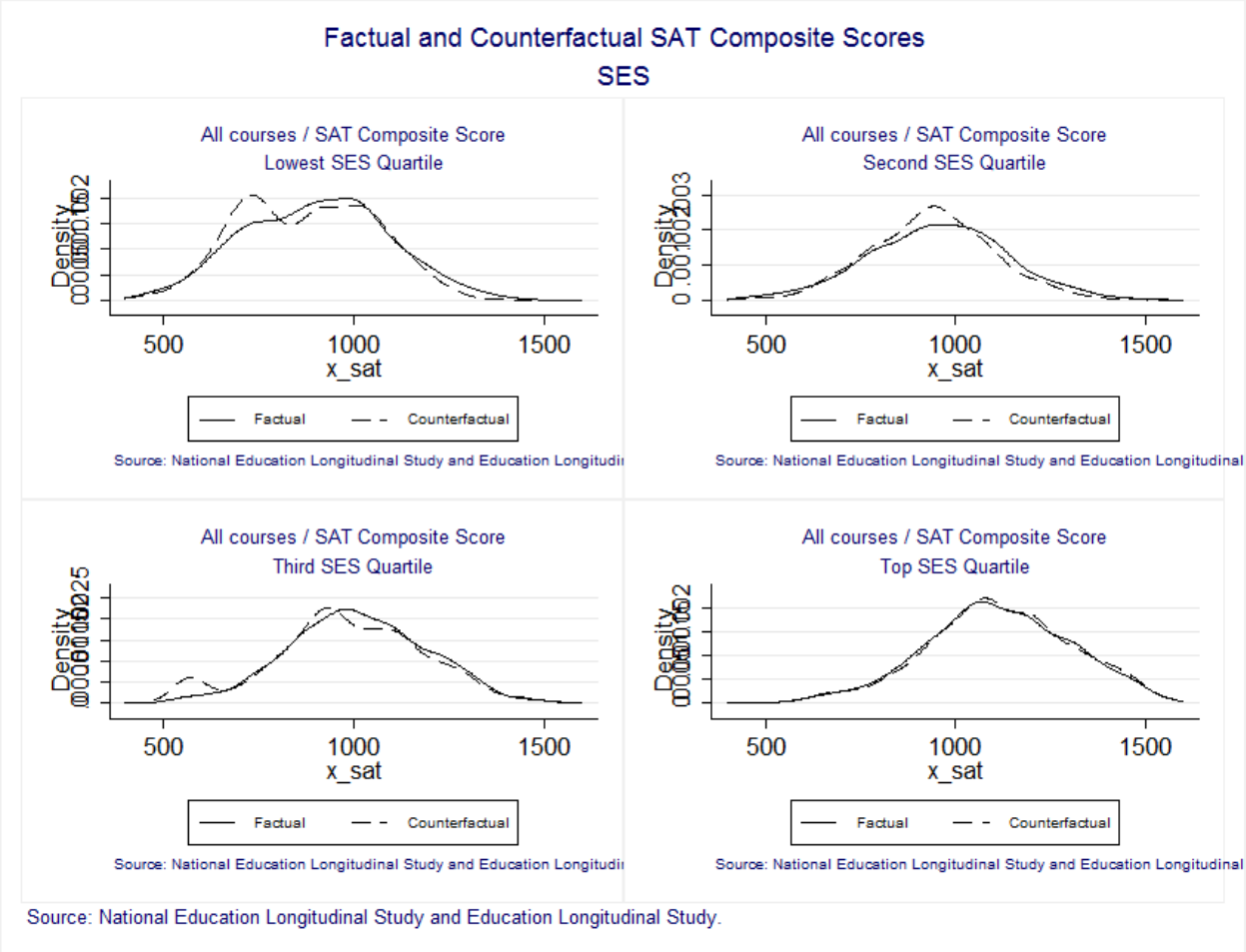


Figure 14: Factual and Counterfactual densities: SAT Math scores

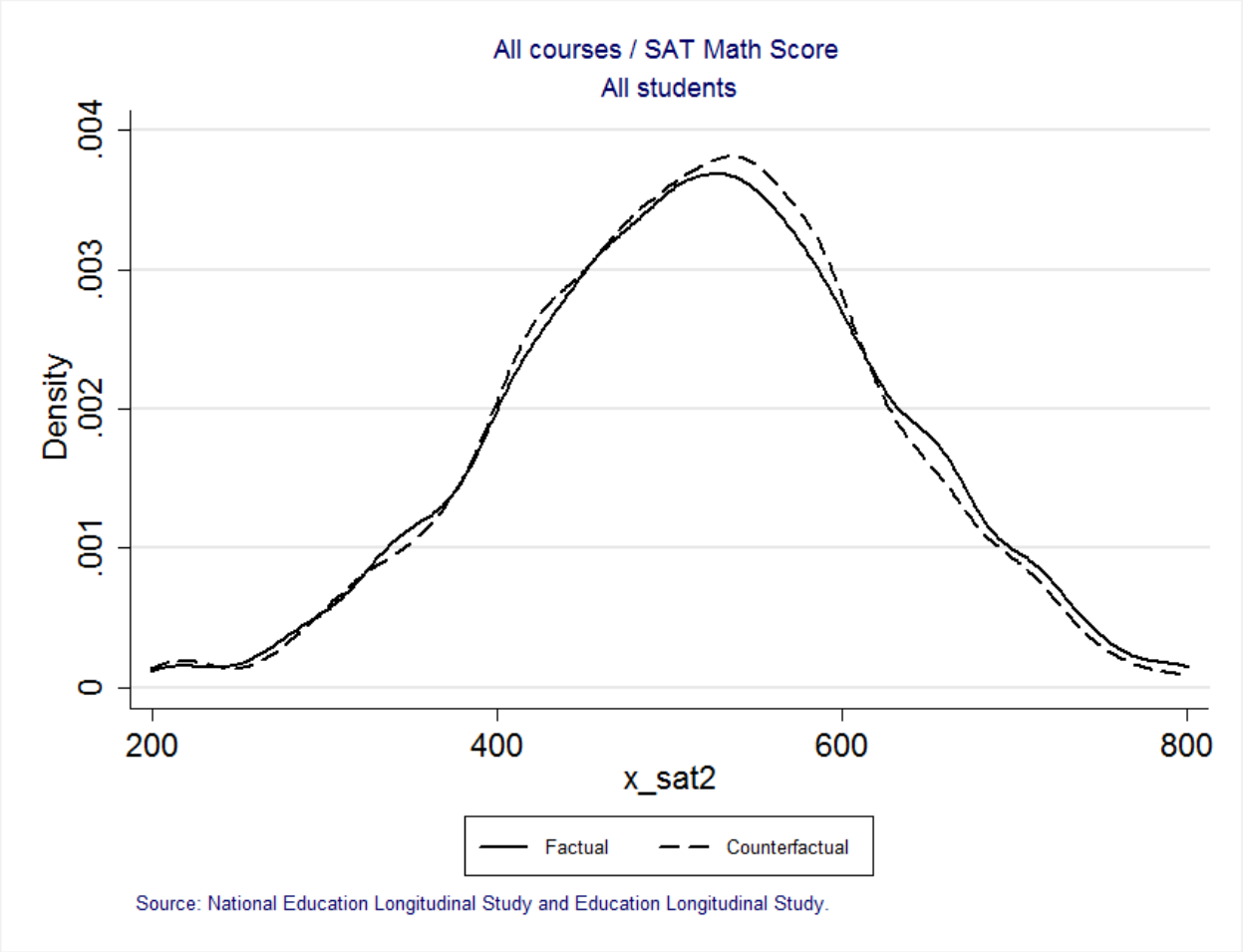


Figure 15: Factual and Counterfactual densities: SAT Math scores: By Gender

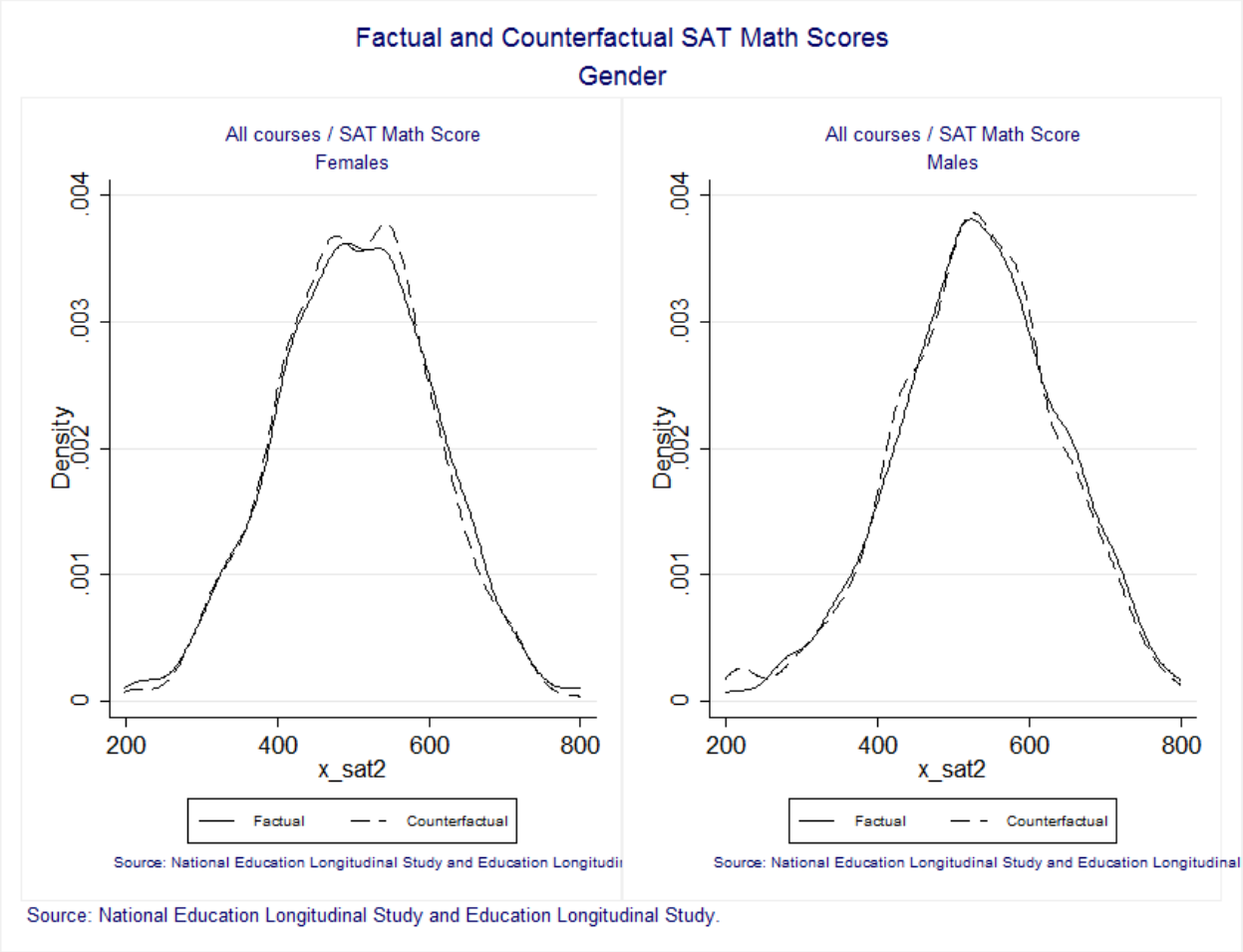


Figure 16: Factual and Counterfactual densities: SAT Math scores: By Race

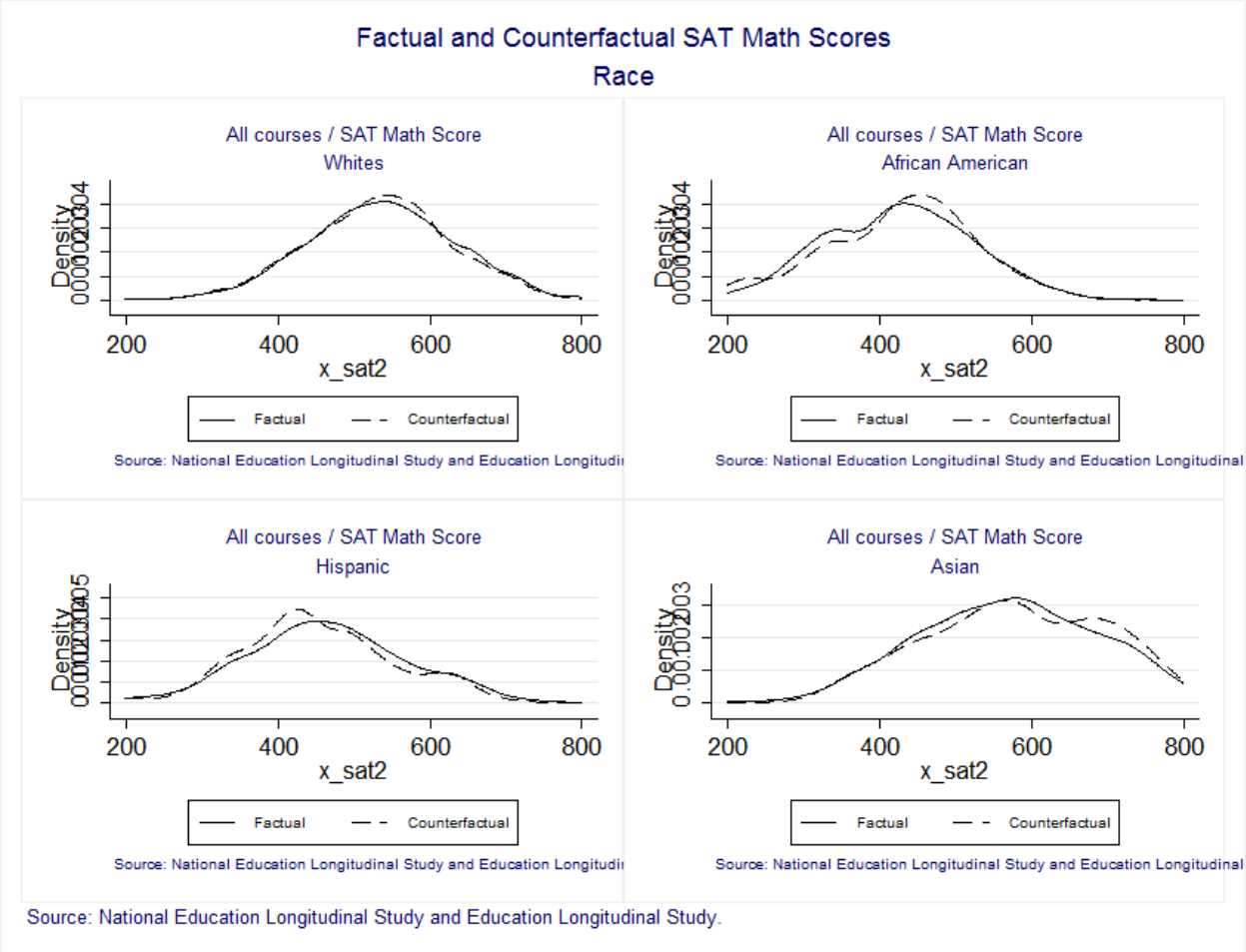


Figure 17: Factual and Counterfactual densities: SAT Math scores: By SES

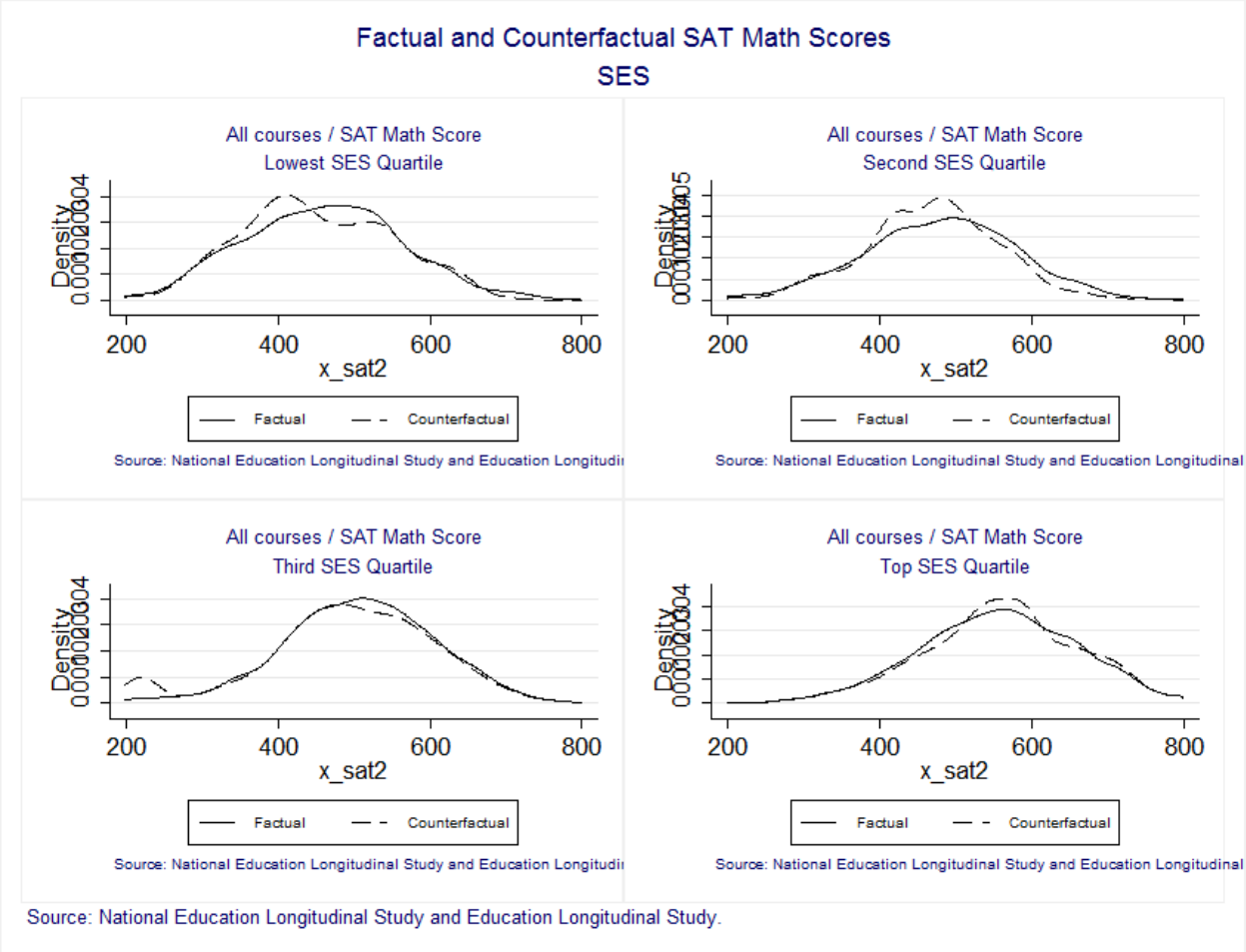


Figure 18: Factual and Counterfactual densities: SAT Verbal scores

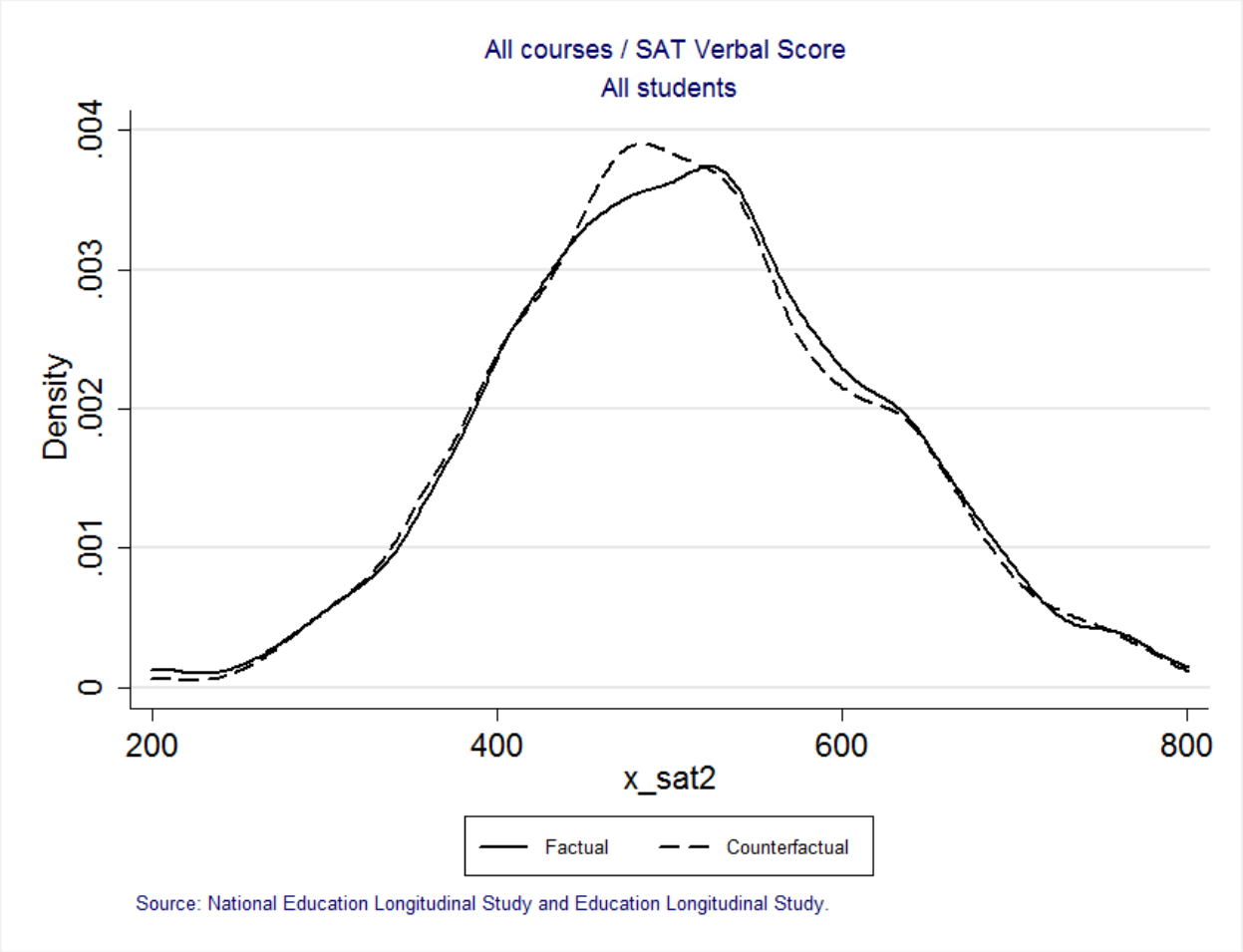


Figure 19: Factual and Counterfactual densities: SAT Verbal scores: By Gender

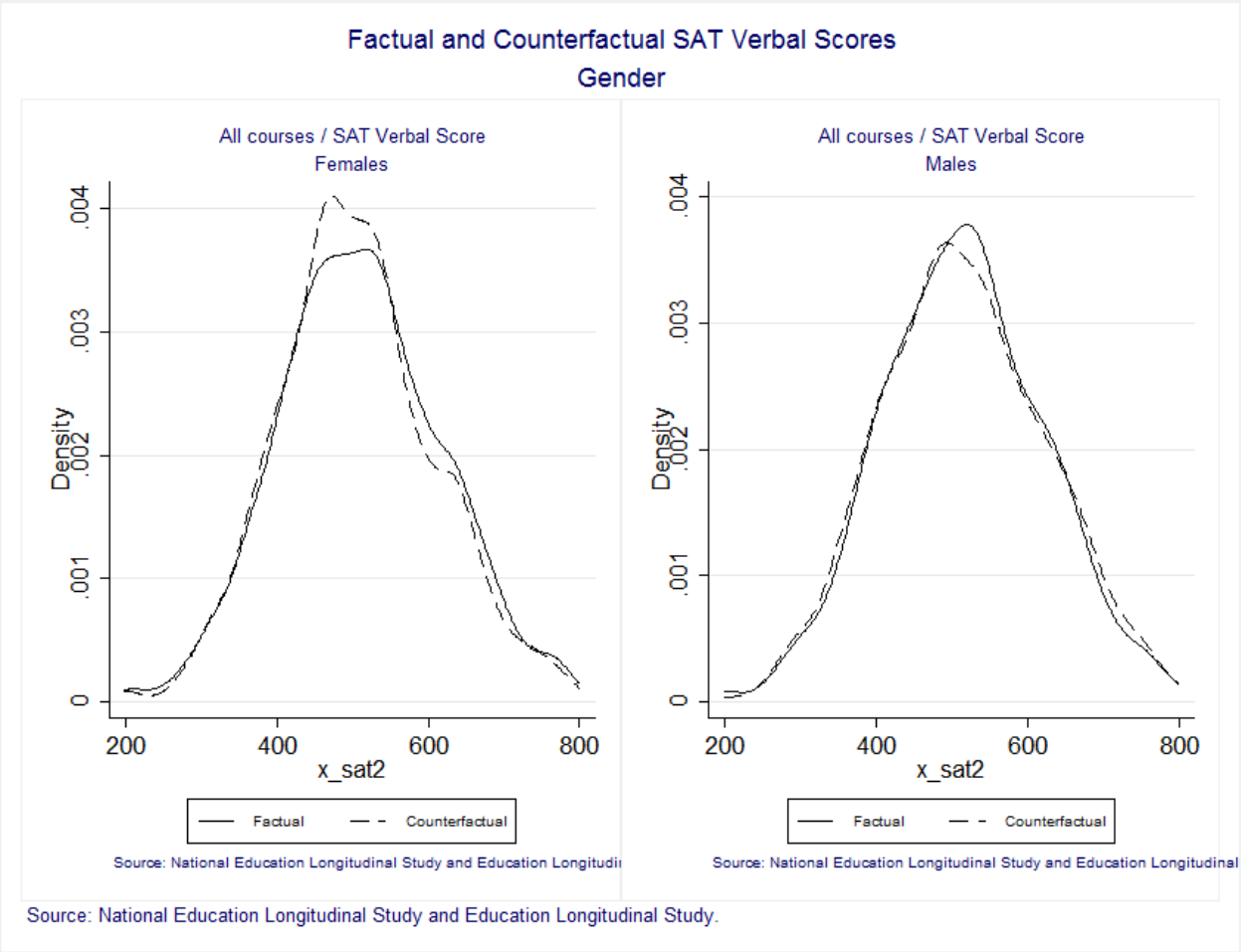


Figure 20: Factual and Counterfactual densities: SAT Verbal scores: By Race

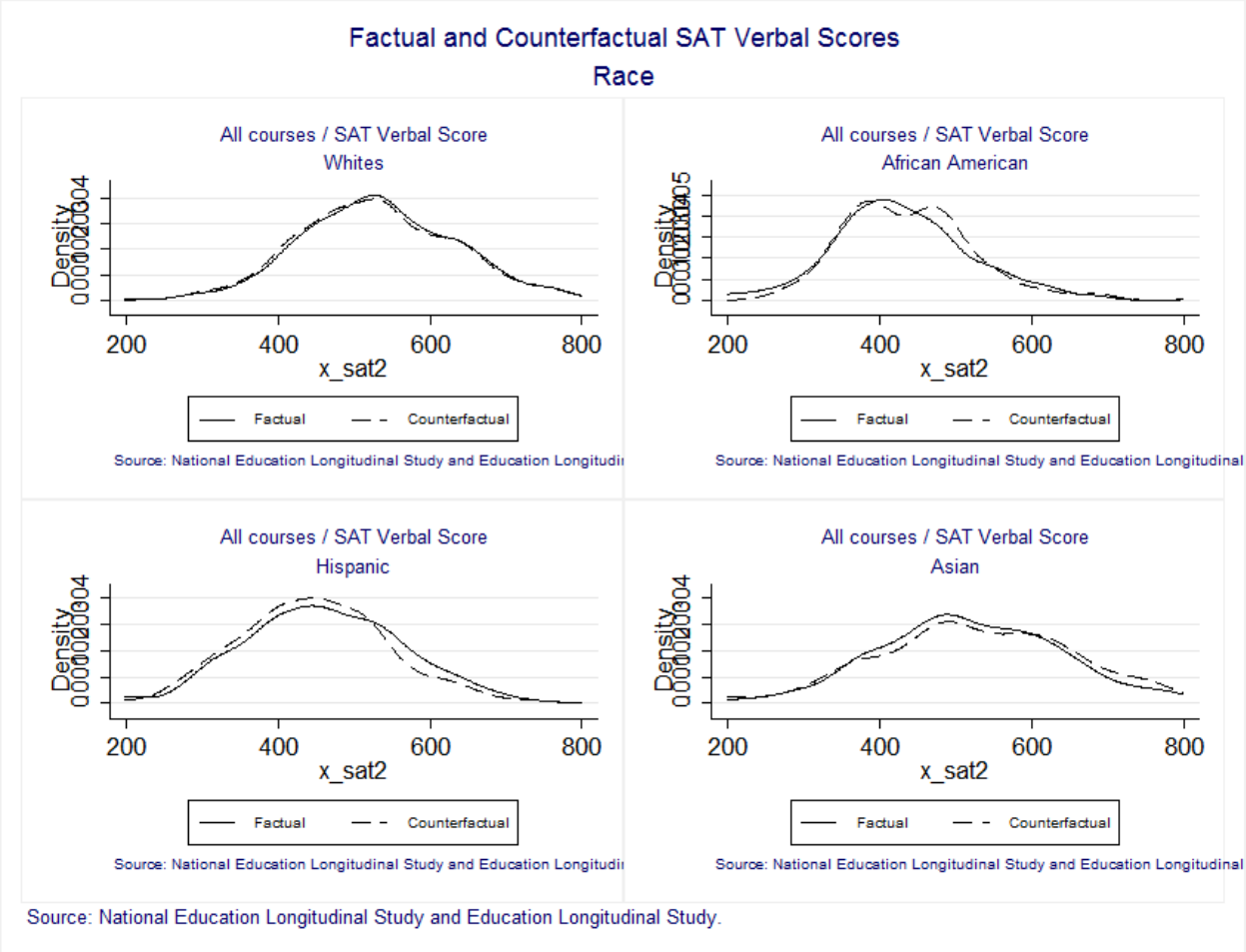


Figure 21: Factual and Counterfactual densities: SAT Verbal scores: By SES