The Unintended Effects of the Common Core State Standards on Non-Targeted Subjects *

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Abstract

From 2010 onwards, most US states have aligned their education standards by adopting the Common Core State Standards (CCSS) for math and English Language Arts. The CCSS did not target other subjects such as science and social studies. We estimate spillovers of the CCSS on student achievement in non-targeted subjects in models with state and year fixed effects. Using student achievement data from the NAEP, we show that the CCSS had a negative effect on student achievement in non-targeted subjects. This negative effect is largest for underprivileged students, exacerbating racial and socioeconomic student achievement gaps. Using teacher surveys, we show that the CCSS caused a reduction in instructional focus on non-targeted subjects.

JEL-Codes: H75; I21; I24; I28; J24
Keywords: Common Core, Education Standards, Student Achievement, Education Policy

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effects as long as the pattern of effects is the same for all treatment cohorts. To explicitly explore the issue of time-varying treatment effects, we create a sample in which already-treated students never act as controls. Creating this sample is relatively straightforward in our setting as most states adopted the CCSS in 2010 or did not adopt the CCSS at all. By excluding the six states which adopted the CCSS in 2011 and 2012 from the sample, we transform our staggered setting into a non-staggered setting that is immune to negative weights. As shown in column 1 of Table A.10, the negative significant effect of the CCSS on student achievement in non-targeted subjects remains in this modified sample. This finding demonstrates that the main result is not driven by time-varying treatment effects and negative weights.

6.3 Robustness Tests on Treatment Definition

A different type of concern is that CCSS adoption and CCSS implementation could diverge. In our preferred treatment coding, we count all years as causing CCSS exposure for a student in a given state, in which the state had permanently adopted the CCSS before that year or at most in the same year. However, states that have adopted the CCSS permanently may not have implemented the CCSS comprehensively and thus may not be creating actual exposure. Conversely, states that have not adopted the CCSS permanently may have adopted and/or implemented the CCSS temporarily or partially.

To test whether our results hold if we define treatment based on CCSS implementation, we re-run our main regression using five different treatment variables, each capturing different information about the implementation of the CCSS. Under these treatment definitions, a school year in a given state is defined as a school year with CCSS exposure if that state (i) expects teachers to fully incorporate the CCSS in their classroom instruction, (ii) followed at least two out of three CCSS implementation strategies (professional development, new instructional materials, joined testing consortium), (iii) observed an effective change in state standard content due to the adoption of the CCSS, which we define to mean that no state standard existed that closely resembles the CCSS before the

adoption of the CCSS, (iv) adopted and/or implemented the CCSS at least temporarily, or (v) mandated standardized tests aligned to the CCSS. Further information on each treatment definition, its construction, data sources, including a table containing state-specific coding information for all treatment definitions are provided in Appendix C.

We present the results for each treatment definition (including our main result to facilitate comparison) for the entire sample and the subset of students in grade 4, for which we have observed the largest subgroup effects in the main analysis. As shown in Table 4, we find a negative point estimate in all specifications, ranging from -0.088 to -0.035 units of a standard deviation for the overall sample and ranging from -0.177 to -0.098 units of a standard deviation for the subsample of students in grade 4. For the latter subgroup, all effects are statistically significant. Taken together, these findings suggest that results using treatment definitions based on CCSS implementation rather than CCSS adoption lead to the same overall conclusion as the main results in Section 5.

6.4 Further Specification Checks

In addition, we want to assess whether our results are robust to a number of modifications of our main regression. As indicated before, we set missing values of controls to zero and add separate explanatory binary variables to account for these missing values in our main regressions. The shares of missing values for the student control variables are below 10 percent for all variables except for parental education. For the latter approximately 40 percent of the values are missing, which can be mostly explained by the fact that this question was not asked in grade 4. To test whether the parental education control and its imputation affect the results, we run our main regression without controlling for parental education. As shown in column 2 of Table A.10, the effects do not differ meaningfully. As an additional robustness check, we do not impute missing values of any control variables (in addition to leaving parental education out of the set of control variables). As can be seen in column 3, the results are robust.

Moreover, we test the robustness of our main regression by modifying the definition of

the treatment variable that captures the dosage of a student's exposure to the CCSS. So far, we have defined this variable as the share of schooling years a student was exposed to the CCSS (at the time of the survey). Alternatively, we now define exposure to the CCSS as the number of schooling years a student was exposed to the CCSS (at the time of the survey). As shown in column 4 of Table A.10, the negative effect is now insignificant and much smaller, but has a similar interpretation. In particular, we find that a one-year increase in CCSS exposure reduces student achievement in non-targeted subjects by 0.006 units of a standard deviation. Assuming 12 years of schooling, the total effect of CCSS exposure throughout the entire school career, as opposed to no exposure, equals 0.072 units of a standard deviation (0.006*12). This is close to the result of our main regression (0.079 units of a standard deviation) in which we define the treatment variable as a share of years. In addition, we show that our results are robust to excluding charter schools from the sample of public schools, or omitting population weights, respectively, see columns 5 and 6.

7 MECHANISMS

To study what gave rise to the observed effect on student achievement in non-targeted subjects, we examine what changed in students' classrooms in these subjects due to the CCSS. To this end, we draw on teacher survey data, provided by the NAEP for a subset of waves and classrooms. This data is suitable for our analysis for several reasons. First, it contains a rich set of subject-specific questions on instructional focus in the classroom comprising instruction time, instructional resources, five measures of differentiated instruction, and four measures of the quality of teacher-student interactions. We note that the instructional focus outcomes could be endogenous to the reform and hence should be interpreted as changes in teachers' perceptions of classroom instruction rather than evidence based on administrative data (which is not available for these outcomes at the subject-state-year-level).

Second, the NAEP includes teacher background characteristics which we can use as

control variables and for subgroup analyses. Third, the NAEP teacher surveys are linked to the NAEP student achievement tests and student surveys. This link allows us to examine how instructional practices changed in non-targeted subjects according to the teachers who taught precisely the tested students from our main analysis. Fourth, the teacher surveys are standardized in the same way as the student surveys and achievement tests, making them comparable across states and years and thus suitable for a two-way fixed effects difference-in-differences approach. In fact, we can keep the empirical framework from the previous sections largely unchanged, but we use instructional focus outcomes instead of student outcomes and add teacher controls, thus ensuring methodological consistency with the previous sections.

Table 5 presents the results of CCSS exposure for instructional focus in non-targeted subjects. Overall, we find that the CCSS caused a reduction in instructional focus on the non-targeted subjects. Specifically, we observe negative significant effects of the CCSS on weekly instruction time, provision of instructional materials and resources, and two dimensions of the quality of teacher-student interactions. These two dimensions are setting and discussing goals with students. The extent of differentiated instruction did not change meaningfully. To illustrate the interpretation of the reported point estimates, we note that teachers of students who are fully exposed to the CCSS are 17 percentage points less likely to teach these students more than five hours per week in non-targeted subjects than teachers of students with no CCSS exposure, conditional on teacher characteristics, student characteristics as well as state, year, grade and subject fixed effects.[17]

The reduction in instructional focus on non-targeted subjects does not have to be evenly distributed across teacher subgroups. Understanding which subgroups of teachers drive the effects is interesting in itself and can be useful for tailoring policy advice to specific groups of teachers. We perform subgroup analyses for the four instructional focus outcome variables which were most affected by the CCSS, namely instruction time,

[17]The answer categories of the instructional outcome variables were coded differently in different survey waves of the NAEP. Hence, we code the variables as reported in the footnote of Table 5 to ensure consistency across waves.

instructional resources, and teacher-student interactions (setting and discussing goals). We conduct subgroup analyses by teacher characteristics which include teacher race/ethnicity, teacher education, teacher certification, and teacher experience. The subgroup pattern is not evenly distributed across instructional focus outcomes, but in general we find the largest reductions in instructional focus on non-targeted subjects for White teachers and teachers without a certification, see Tables A.11, A.12, A.13 and A.14, respectively for the four instructional focus outcomes.

Altogether, these results show that the adoption of the CCSS has shifted the instructional focus away from the non-targeted subjects. This finding is in line with the results from Section 5, which show a decline in student achievement in these subjects. It is also consistent with previous literature showing that instructional inputs affect student achievement. Increases in instruction time (Taylor, 2014), instructional resources (Holden, 2016), and the quality of teacher-student interactions (Allen et al., 2011) have all been shown to positively affect student achievement. These instructional inputs can also interact. For example, the effect of instruction time on student achievement depends on student-teacher interactions (Rivkin and Schiman, 2015).

8 CONCLUSION

Since 2010, the majority of US states have aligned their math and ELA education standards by adopting the CCSS. This paper estimates the effect of CCSS adoption on student achievement in non-targeted subjects. We find that the CCSS decreased student achievement in non-targeted subjects, particularly for underprivileged students. This is not only harmful to long-term individual and economic development (Hanushek and Woessmann, 2008, 2012), but also implies that the CCSS increased racial/ethnic and socioeconomic student achievement gaps in non-targeted subjects, with potentially long-lasting consequences. For example, racial/ethnic student achievement gaps account for relevant portions of adulthood racial/ethnic gaps with respect to income, unemployment, incarceration, health, and other important social and economic outcomes (Fryer, 2011).

With respect to mechanisms, we find that the negative spillover of the CCSS on student achievement in non-targeted subjects was accompanied by a reduction of instructional focus on these subjects. This result mirrors previous findings on the effects of NCLB, which also only focused on math and ELA and caused a reduction in instruction time in non-targeted science (Reback et al., 2014). In sum, our results allow to evaluate the CCSS more comprehensively, with, at best, modest positive effects on student achievement in targeted subjects (also previously documented in Bleiberg (2021)) at the expense of student achievement in non-targeted subjects.

In terms of education policy, our results suggest that the CCSS might have been more beneficial if it had been adopted for all school subjects. Such a policy might have prevented the negative spillover of the CCSS on non-targeted subjects, arguably by avoiding the perception that these subjects are less relevant and receive less instructional attention. At the same time, such a policy might also have reduced any positive effects on student achievement in the targeted subjects. Adopting a centralized education standard which covers all subjects requires that the participating states agree on the educational content for each subject. To achieve this goal, political challenges need to be overcome as exemplified by the controversies around the history curriculum (Cohen, 2020) or around the treatment of evolution theory in US State Science Education Standards (Lerner, 2000; Arold, 2021).

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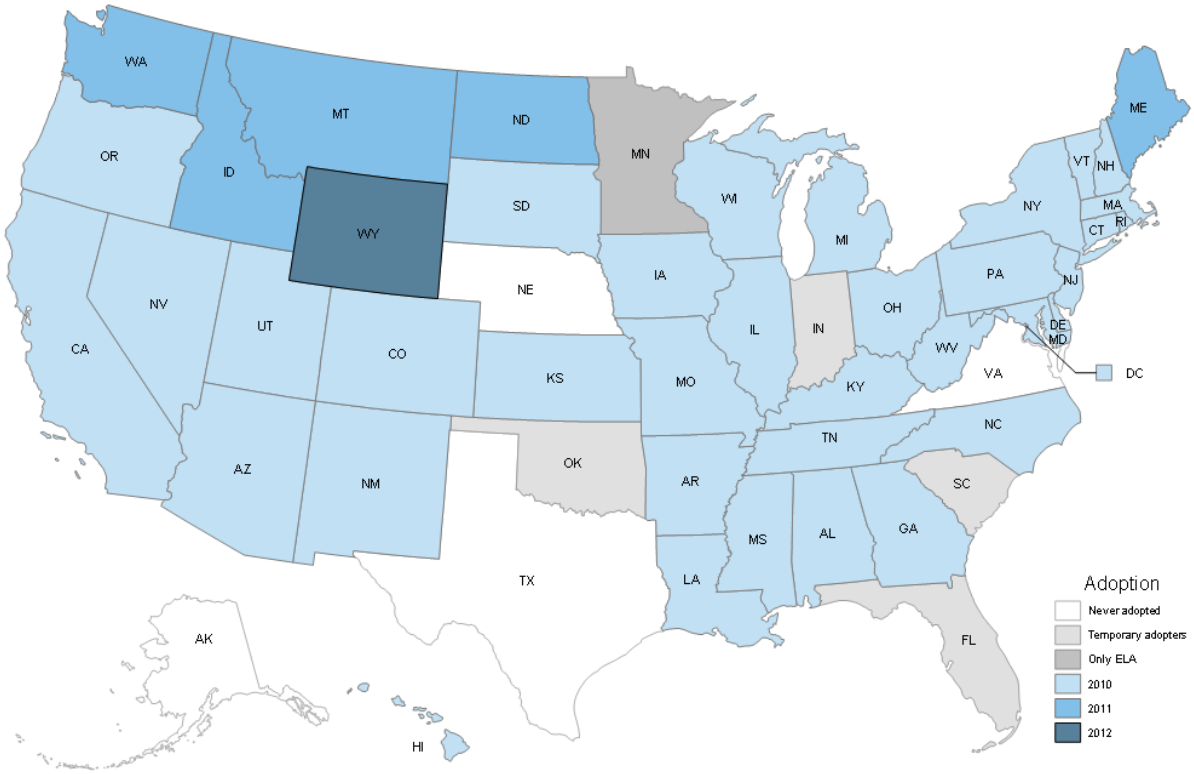
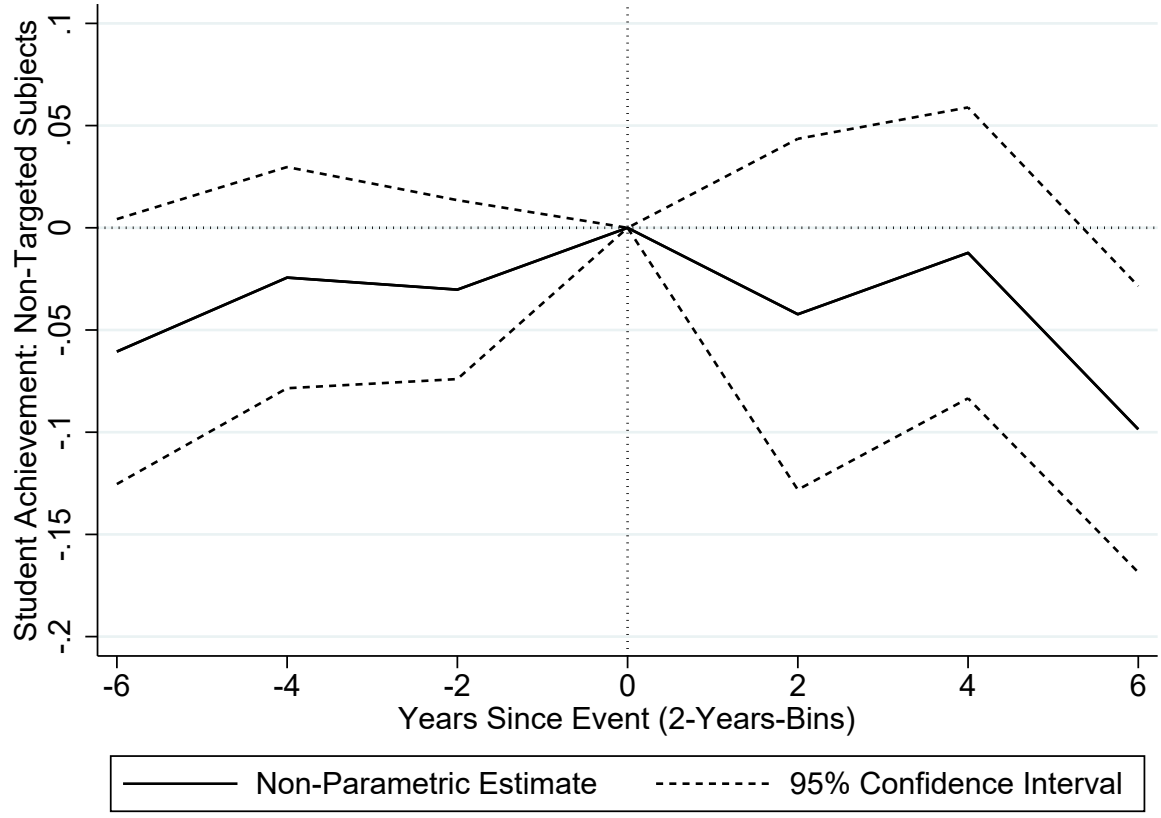
MAIN FIGURES AND TABLES

Figure 1 – CCSS Adoption Map



Note: Map depicts state-level adoption of CCSS. Data sources: Achieve Inc. (2013), Bleiberg (2021), and CCSSI (2021)

Figure 2 – Event-study graph: Non-targeted subjects



Note: Coefficients from non-parametric event-study regressions and their 95% confidence intervals. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as state, test year, grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Numbers on horizontal axis refer to respective two-year bins; i.e. 2 = first two years of treatment (year 0 = excluded category). The p values of omnibus hypothesis tests of zero pre- and post-event effects are 0.312 and 0.001, respectively. Data source: U.S. Department of Education, National Center for Education Statistics, National Assessment of Educational Progress

Table 1 – Effect of CCSS exposure on student achievement in non-targeted subjects

	(1)	(2)	(3)
CCSS Exposure	0.105***	0.117***	-0.079**
	(0.036)	(0.043)	(0.036)
State and Year FEs	NO	NO	YES
Controls	NO	YES	YES
Adj. R-squared	0.001	0.379	0.390
Observations	1,103,630	1,103,630	1,103,630

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table 2 – Effect of CCSS exposure on student achievement in non-targeted subjects, subgroups by student characteristics

	Gender		Race/Ethnicity					Subsidized Lunch Status		English Languange Lerner Status		Disability Status	
	(1) Female	(2) Male	(3) White	(4) Black	(5) Hispanic	(6) Asian	(7) Other	(8) Yes	(9) No	(10) Yes	(11) No	(12) Yes	(13) No
CCSS Exposure	-0.079**	-0.080**	-0.016	-0.111***	-0.181***	-0.012	0.016	-0.096***	-0.041	-0.201***	-0.065*	-0.176***	-0.068*
	(0.037)	(0.036)	(0.039)	(0.037)	(0.041)	(0.061)	(0.071)	(0.031)	(0.044)	(0.073)	(0.035)	(0.049)	(0.037)
State and Year FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.395	0.390	0.272	0.241	0.331	0.392	0.362	0.303	0.301	0.182	0.348	0.308	0.353
Observations	544,410	559,210	631,640	184,680	194,250	55,130	37,930	513,910	589,710	69,190	1,034,440	128,590	975,030

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table 3 – Effect of CCSS exposure on student achievement in non-targeted subjects, econometric robustness

	(1) DD	(2) (1) + linear state trends	(3) (2) + quadratic state trends	(4) (3) + cubic state trends	(5) DDD	(6) DD with private schools
CCSS Exposure	-0.079**	-0.117**	-0.100**	-0.095**	-0.090**	-0.074**
	(0.036)	(0.044)	(0.047)	(0.045)	(0.044)	(0.033)
State and Year FEs	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.390	0.391	0.392	0.393	0.394	0.390
Observations	1,103,630	1,103,630	1,103,630	1,103,630	1,135,960	1,135,960

Note: Each entry is from a separate two-way fixed effects regression model, where Model (1) is the baseline model, Models (2), (3), (4) subsequently add linear, quadratic, and cubic state-specific time trends, and Model (5) presents a triple-difference model where school type (public vs. private school students), school type*state, school type*year, and state*year fixed effects replace all state-specific time trends. Model (6) estimates the basic two-way fixed effects model on a sample of public and private school students. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table 4 – Effect of CCSS exposure on student achievement in non-targeted subjects, robustness using different definitions of treatment implementation

	CCSS adoption		CCSS implementation requirement		CCSS implementation strategies		Effective CCSS implementation		Include temporary CCSS adopters and implementers		CCSS-aligned testing	
	(1) All grades	(2) Only grade 4	(3) All grades	(4) Only grade 4	(5) All grades	(6) Only grade 4	(7) All grades	(8) Only grade 4	(9) All grades	(10) Only grade 4	(11) All grades	(12) Only grade 4
CCSS Exposure	-0.079**	-0.134***	-0.088	-0.177**	-0.042	-0.098*	-0.075**	-0.107***	-0.035	-0.111**	-0.085	-0.118**
	(0.036)	(0.036)	(0.079)	(0.076)	(0.041)	(0.050)	(0.035)	(0.039)	(0.045)	(0.055)	(0.057)	(0.054)
State and Year FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.390	0.376	0.390	0.376	0.390	0.376	0.390	0.376	0.390	0.376	0.390	0.376
Observations	1,103,630	434,440	1,103,630	434,440	1,103,630	434,440	1,103,630	434,440	1,103,630	434,440	1,103,630	434,440

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Explanatory variables: Share of schooling years a student was exposed to CCSS (at the time of testing), where in Models 1 and 2 (CCSS adoption, baseline model) each schooling year counts as exposed in a given state in which the state adopted the CCSS permanently before that year or in the same year according to Achieve Inc. (2013) and CCSSI (2021), where Models 3 and 4 (CCSS implementation requirement) each schooling year counts as exposed in a given state in which the state expects teachers to fully incorporate CCSS into classroom instruction in grades K-12 in English language arts and mathematics according to Achieve Inc. (2013) and CCSSI (2021), where in Models 5 and 6 (CCSS implementation strategies) each schooling year counts as exposed in a given state if state education agency officials report that their state pursued at least two out of three CCSS implementation strategies (professional development, new instructional materials, joined testing consortium) as reported in Webber et al. (2014), where in Models 7 and 8 (Effective CCSS implementation) each schooling year counts as exposed in a given state in which the state implemented an effective change in state standard content through the adoption of CCSS which we define as not having had a state standard in place before the adoption of CCSS whose academic rigor is "too close to call" in comparison with CCSS (Carmichael et al., 2010) for the set of states adopting CCSS according to Achieve Inc. (2013) and CCSSI (2021), where in Models 9 and 10 (Include temporary CCSS adopters) each schooling year counts as exposed in a given state in which a state adopted and/or implemented CCSS at least temporarily according to Bleiberg (2021); and where in Models 11 and 12 (CCSS-aligned testing) each schooling year counts as exposed in a given state in which the state adopted CCSS-aligned standardized testing including field and transitional tests according to our own research (see Table C.17 for state-specific details of CCSS-aligned testing). Table C.18 provides state-specific coding information on all treatment definitions. Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table 5 – Effect of CCSS exposure on instructional focus in non-targeted subjects

	Instruction Time	Instructional Resources	Differentiated Instruction					Teacher-Student Interactions			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
			Standards	Material	Activities	Methods	Pace	Discuss Students' Performance	Set goals	Discuss goals	Adjust teaching
CCSS Exposure	-0.171***	-0.116***	-0.027*	0.021	-0.022	-0.015	0.006	-0.017	-0.035*	-0.047**	-0.020
	(0.055)	(0.030)	(0.015)	(0.016)	(0.013)	(0.022)	(0.016)	(0.035)	(0.019)	(0.023)	(0.023)
State and Year FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.090	0.043	0.053	0.073	0.064	0.167	0.122	0.109	0.091	0.089	0.058
Observations	847,830	785,660	555,490	556,350	556,070	556,440	556,110	554,820	554,490	554,360	554,250

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variables, by columns: Probability that students' teachers report about subject in question (Model 1) that students receive more than five hours of weekly instruction, (Model 2) that their school system provides them with all or most materials and other resources they need for the instruction, (Model 3) that they set differentiated standards for some students at least to a moderate extent, (Model 4) that they use differentiated materials for some students at least to a moderate extent, (Model 5) engage some students in differentiated activities at least to a moderate extent, (Model 6) that they use differentiated methods for some students at least to a moderate extent, (Model 7) change pace for some students at least to a moderate extent, (Model 8) that they discuss the student's current level of performance at least once a month, (Model 9) that they set goals for specific progress the student would like to make at least once a month, (Model 10) that they discuss progress the student has made toward goals previously set at least once a month, (Model 11) that they determine how to adjust their teaching strategies to meet the student's current learning needs and to reflect the student's future goals at least once a month. Explanatory variable: Share of schooling years teacher's students were exposed to CCSS (at the time of testing). Controls: Indicator variables for teacher race/ethnicity, teacher education, teacher certification (separate indicator variables for certification of National Board for Professional Teaching Standards, and for alternative certification), and teacher experience, as well as student controls for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

A SUPPLEMENTARY FIGURES AND TABLES

Table A.1 – List of grades of NAEP tests for non-targeted subjects

	Non-targeted Subjects				
Year	Science	Civics	Economics	Geography	History
2005	4, 8				
2006		4, 8, 12	12		4, 8, 12
2007					
2008					
2009	4, 8, 12				
2010		4, 8, 12		4, 8, 12	4, 8, 12
2011	8				
2012			12		
2013					
2014		8		8	8
2015	4, 8, 12				

Note: NAEP student achievement data in non-targeted subjects at the subject-by-year-by-grade level. Data source: See Figure 2

Table A.2 – Descriptive statistics

	Mean	Std. Dev.	Min.	Max.
Student Achievement Outcomes:				
Science	0.08	1.03	-4.76	4.51
Civics	0.03	0.98	-4.49	3.16
Economics	0.02	0.97	-4.33	3.70
Geography	0.00	1.00	-5.15	3.90
History	0.04	0.98	-4.64	3.32
Student Controls:				
Female	0.49	0.50	0.00	1.00
Race/Ethnicity: White	0.57	0.49	0.00	1.00
Race/Ethnicity: Black	0.15	0.36	0.00	1.00
Race/Ethnicity: Hispanic	0.20	0.40	0.00	1.00
Race/Ethnicity: Asian	0.05	0.22	0.00	1.00
Race/Ethnicity: Other	0.03	0.16	0.00	1.00
English Language Learner	0.06	0.24	0.00	1.00
Disabled	0.11	0.31	0.00	1.00
Subsidized Lunch	0.43	0.50	0.00	1.00
Parental Education: Did not finish High School	0.08	0.28	0.00	1.00
Parental Education: Graduated High School	0.18	0.39	0.00	1.00
Parental Education: Some education after High School	0.20	0.40	0.00	1.00
Parental Education: Graduated College	0.53	0.50	0.00	1.00
Computer at Home	0.90	0.30	0.00	1.00
Books at Home: 0-10	0.13	0.34	0.00	1.00
Books at Home: 11-25	0.22	0.41	0.00	1.00
Books at Home: 26-100	0.35	0.48	0.00	1.00
Books at Home: >100	0.30	0.46	0.00	1.00

Note: Continuation on next page

Descriptive statistics (continued)

	Mean	Std. Dev.	Min.	Max.
Instructional Focus Outcomes:				
Instruction Time	0.41	0.49	0.00	1.00
Instructional Resources	0.60	0.49	0.00	1.00
Differentiated Instruction: Standards	0.44	0.50	0.00	1.00
Differentiated Instruction: Material	0.65	0.48	0.00	1.00
Differentiated Instruction: Activities	0.41	0.49	0.00	1.00
Differentiated Instruction: Methods	0.62	0.49	0.00	1.00
Differentiated Instruction: Pace	0.59	0.49	0.00	1.00
Teacher dedication: Discuss students' performance	0.56	0.50	0.00	1.00
Teacher dedication: Set goals	0.40	0.49	0.00	1.00
Teacher dedication: Discuss goals	0.41	0.49	0.00	1.00
Teacher dedication: Adjust teaching	0.64	0.48	0.00	1.00
Teacher Controls:				
Teacher Race/Ethnicity: White	0.83	0.38	0.00	1.00
Teacher Race/Ethnicity: Black	0.07	0.25	0.00	1.00
Teacher Race/Ethnicity: Hispanic	0.06	0.24	0.00	1.00
Teacher Race/Ethnicity: Asian	0.02	0.15	0.00	1.00
Teacher Race/Ethnicity: Other	0.01	0.11	0.00	1.00
Teacher Education: Bachelor or less	0.50	0.50	0.00	1.00
Teacher Education: Master or more	0.50	0.50	0.00	1.00
NBPTS Teacher Certificate: Yes	0.13	0.34	0.00	1.00
NBPTS Teacher Certificate: Working towards	0.02	0.15	0.00	1.00
NBPTS Teacher Certificate: No	0.85	0.36	0.00	1.00
Alternative Teacher Certificate: Yes	0.13	0.33	0.00	1.00
Alternative Teacher Certificate: No	0.87	0.33	0.00	1.00
Teacher Experience: 2 years or less	0.09	0.28	0.00	1.00
Teacher Experience: 3-5 years	0.14	0.34	0.00	1.00
Teacher Experience: 6-10 years	0.22	0.42	0.00	1.00
Teacher Experience: 11-20 years	0.27	0.44	0.00	1.00
Teacher Experience: 21 years or more	0.28	0.45	0.00	1.00

Note: Descriptive statistics (mean, standard deviation, minimum, maximum) for main treatment, outcome, and control variables. Data source: See Figure 2

Table A.3 – Effect of CCSS exposure on student achievement in non-targeted subjects, subgroups by subjects

	(1) Science	(2) Civics	(3) Economics	(4) Geography	(5) History
CCSS Exposure	-0.096**	0.010	-0.052	-0.036	-0.004
	(0.042)	(0.087)	(0.307)	(0.079)	(0.097)
State and Year FEs	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES
Adj. R-squared	0.402	0.391	0.381	0.429	0.380
Observations	931,600	55,150	19,930	32,130	64,810

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Standardized student achievement in subject indicated in the column header. Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table A.4 – Effect of CCSS exposure on student achievement in non-targeted subjects, subgroups by grades

	(1) Grade 4	(2) Grade 8	(3) Grade 12
CCSS Exposure	-0.134***	-0.007	-0.005
	(0.036)	(0.062)	(0.072)
State and Year FEs	YES	YES	YES
Controls	YES	YES	YES
Adj. R-squared	0.376	0.433	0.370
Observations	434,440	582,590	86,600

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table A.5 – Effect of CCSS exposure on student achievement in non-targeted subjects, subgroups by quartiles of states' student achievement before 2010

	(1) Quartile 1 (lowest)	(2) Quartile 2	(3) Quartile 3	(4) Quartile 4 (highest)
CCSS Exposure	0.004	-0.097*	-0.061	-0.041
	(0.046)	(0.048)	(0.051)	(0.029)
State and Year FEs	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Adj. R-squared	0.413	0.365	0.353	0.380
Observations	315,160	334,740	233,430	220,300

Note: Each entry is from a separate two-way fixed effects regression model. Sample of Quartile 1 subgroup includes students from states in the lowest quartile with respect to average student achievement in years before 2010. Sample of Quartile 2 subgroup includes students from states in the second lowest quartile with respect to average student achievement in years before 2010. Quartile 3 and 4 defined accordingly. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table A.6 – Effect of CCSS exposure on student achievement in non-targeted subjects, robustness with additional controls for public schooling policies

	Control for:						
	(1) Expenditures	(2) NGSS Adoption	(3) Teacher Policies	(4) School Choice	(5) Evolution	(6) Charter Schools	(7) NCLB/ESSA Waivers
CCSS Exposure	-0.077**	-0.066*	-0.098**	-0.075**	-0.079**	-0.080**	-0.074**
	(0.035)	(0.034)	(0.037)	(0.037)	(0.036)	(0.036)	(0.035)
State and Year FEs	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.391	0.390	0.397	0.390	0.390	0.390	0.390
Observations	1,103,620	1,103,630	769,410	1,099,880	1,099,880	1,099,880	1,103,630

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Additional policy controls (state-by-year level, unless otherwise stated): Model 1 controls for district-by-year-level per-pupil education expenditures in logalithmized dollars; Model 2 controls for adoption of Next Generation Science Standards or of standards based on Next Generation Science Standards framework; Model 3 controls for index of teacher quality policies; Model 4 controls for public school choice laws; Model 5 controls for laws permitting public school teachers to teach 'weaknesses of evolution'; Model 6 controls for charter school laws; Model 7 controls for NCLB/ESSA requirements waiver. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: National Center for Education Statistics (Local Education Agency (School District) Finance Survey F-33); Ross et al. (2017); Sorens et al. (2008); Jordan and Grossmann (2020); See Figure 2

Table A.7 – Effect of CCSS exposure on student achievement in non-targeted subjects, robustness with additional controls for private schooling policies

	Control for:					
	(1) State Approval	(2) Licensure of Teachers	(3) Registration	(4) Curriculum	(5) Tax Credits	(6) Vouchers
CCSS Exposure	-0.079**	-0.080**	-0.075**	-0.080**	-0.088***	-0.064*
	(0.036)	(0.036)	(0.036)	(0.036)	(0.028)	(0.035)
State and Year FEs	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.390	0.390	0.390	0.390	0.390	0.390
Observations	1,099,880	1,099,880	1,099,880	1,099,880	1,099,880	1,099,880

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Additional policy controls (state-by-year level, unless otherwise stated): Model 1 controls for mandatory state approval, where state has discretion, licensing, or accreditation of private schools; Model 2 controls for mandatory state licensure of private school teachers; Model 3 controls for mandatory registration or licensing of private schools (note: if approval is required, registration is also coded as being required); Model 4 controls for extent of private school curriculum control; Model 5 controls for tax credit/deduction law for scholarship contributions or educational expenses of parents; Model 6 controls for publicly funded voucher laws. Standard errors clustered at the state level. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: Sorens et al. (2008); Jordan and Grossmann (2020); See Figure 2

Table A.8 – Effect of CCSS exposure on student achievement in non-targeted subjects, robustness with additional controls for homeschooling policies

	Control for:							
	(1) Curriculum	(2) Statute	(3) Notice Extent	(4) Notice Frequency	(5) Notice Index	(6) Recordkeeping	(7) Testing	(8) Teachers
CCSS Exposure	-0.082**	-0.080**	-0.079**	-0.086**	-0.089**	-0.080**	-0.079**	-0.080**
	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.035)
State and Year FEs	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.390	0.390	0.390	0.390	0.391	0.390	0.390	0.390
Observations	1,099,880	1,099,880	1,099,880	1,099,880	1,099,880	1,099,880	1,099,880	1,099,880

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Additional policy controls (state-by-year level, unless otherwise stated): Model 1 controls for subjects/curriculum requirement for homeschoolers; Model 2 controls for whether homeschooling is explicitly permitted by statute; Model 3 controls for extent of homeschooling notice requirement; Model 4 controls for frequency of homeschooling notice requirement; Model 5 controls for homeschooling notification index (Extent of homeschooling notice requirement * Frequency of homeschooling notice requirement); Model 6 controls for extent of homeschool recordkeeping requirements; Model 7 controls for standardized testing or other official evaluation requirement of homeschooling; Model 8 controls for homeschooling teacher qualifications requirement. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: Sorens et al. (2008); Jordan and Grossmann (2020); See Figure 2

Table A.9 – Effect of CCSS exposure on student achievement in non-targeted subjects, robustness with additional controls for compulsory schooling policies

	Control for:			
	(1) Compulsory school age, lower bound	(2) Compulsory school age, upper bound	(3) Compulsory school years	(4) Kindergarten attendance
CCSS Exposure	-0.079**	-0.079**	-0.081**	-0.082**
	(0.037)	(0.035)	(0.036)	(0.036)
State and Year FEs	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Adj. R-squared	0.390	0.390	0.390	0.390
Observations	1,099,880	1,099,880	1,099,880	1,099,880

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Additional policy controls (state-by-year level, unless otherwise stated): Model 1 controls for compulsory school age, lower bound (minimum standard if set by local school district; age at which parental waivers not permitted); Model 2 controls for compulsory school age, upper bound (minimum standard if set by local school district; age at which parental waivers not permitted); Model 3 controls for compulsory school years (Compulsory school age, upper bound – Compulsory school age, lower bound); Model 4 controls for kindergarten attendance requirement. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: Sorens et al. (2008); Jordan and Grossmann (2020); See Figure 2

Table A.10 – Effect of CCSS exposure on student achievement in non-targeted subjects, further robustness checks

	(1) Exclude already-treated states from controls	(2) Controls: No parental education	(3) Controls: No parental education & No imputation of missings	(4) Treatment: Number of years of CCSS Exposure	(5) Sample: No Charter Schools	(6) No weights
CCSS Exposure	-0.082**	-0.079**	-0.090**	-0.006	-0.079**	-0.093***
	(0.036)	(0.036)	(0.036)	(0.007)	(0.036)	(0.025)
State and Year FEs	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.392	0.380	0.381	0.390	0.390	0.399
Observations	996,390	1,103,630	1,067,950	1,103,630	1,077,420	1,103,630

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Standardized student achievement in subjects not targeted by the CCSS (Pool of science, civics, economics, geography, and history). Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Model 1 excludes states which adopted the CCSS in 2011 and 2012 from the sample which implies that no students from already-treated states act as controls; Model 2 excludes parental education from set of control variables; Model 3 excludes parental education from set of control variables and does not impute other missing control variables; Model 4 defines the explanatory variable as the number of schooling years a student was exposed to CCSS (at the time of testing); Model 5 excludes charter schools from the sample of public schools; Model 6 does not use population weights. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table A.11 – Effect of CCSS exposure on instruction time in non-targeted subjects, subgroups by teacher characteristics

	Teacher Race/Ethnicity					Teacher education		Teacher certification (NBPTS)			Teacher experience in years				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	White	Black	Hispanic	Asian	Other	Bachelor or less	Master or more	Yes	Working towards	No	2 or less	3-5	6-10	11-20	21 or more
CCSS Exposure	-0.201***	-0.050	0.033	-0.081	0.049	-0.145**	-0.226***	-0.147**	0.120	-0.202***	-0.170*	-0.074	-0.207***	-0.004	-0.351***
	(0.048)	(0.083)	(0.052)	(0.169)	(0.182)	(0.055)	(0.064)	(0.067)	(0.124)	(0.061)	(0.088)	(0.057)	(0.067)	(0.075)	(0.088)
State and Year FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.093	0.164	0.134	0.288	0.365	0.089	0.120	0.153	0.310	0.106	0.146	0.138	0.127	0.123	0.132
Observations	696,350	63,680	39,040	24,130	15,010	404,030	443,810	77,450	16,460	502,330	88,620	128,950	190,000	247,230	192,820

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Probability that students' teacher reports about subject in question that students receive more than five hours of weekly instruction. Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for teacher race/ethnicity, teacher education, teacher certification (separate indicator variables for certification of National Board for Professional Teaching Standards, and for alternative certification), and teacher experience, as well as student controls for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table A.12 – Effect of CCSS exposure on instructional resources in non-targeted subjects, subgroups by teacher characteristics

	Teacher Race/Ethnicity					Teacher education		Teacher certification (NBPTS)			Teacher experience in years				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	White	Black	Hispanic	Asian	Other	Bachelor or less	Master or more	Yes	Working towards	No	2 or less	3-5	6-10	11-20	21 or more
CCSS Exposure	-0.121***	-0.038	-0.220***	-0.071	0.177***	-0.121***	-0.103***	-0.132***	-0.163*	-0.122***	-0.127**	-0.054**	-0.148***	-0.110**	-0.115***
	(0.028)	(0.047)	(0.028)	(0.091)	(0.061)	(0.030)	(0.031)	(0.033)	(0.096)	(0.039)	(0.056)	(0.026)	(0.029)	(0.045)	(0.028)
State and Year FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.044	0.051	0.046	0.078	0.095	0.038	0.050	0.056	0.080	0.039	0.049	0.038	0.047	0.049	0.058
Observations	647,100	58,340	34,910	23,110	13,460	373,640	412,020	71,420	15,520	464,110	82,790	120,210	174,310	229,130	179,120

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Probability that students' teacher reports about subject in question that their school system provides them with all or most materials and other resources they need for the instruction. Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for teacher race/ethnicity, teacher education, teacher certification (separate indicator variables for certification of National Board for Professional Teaching Standards, and for alternative certification), and teacher experience, as well as student controls for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table A.13 – Effect of CCSS exposure on the quality of teacher-student interactions (setting goals) in non-targeted subjects, subgroups by teacher characteristics

	Teacher Race/Ethnicity					Teacher education		Teacher certification (NBPTS)			Teacher experience in years				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	White	Black	Hispanic	Asian	Other	Bachelor or less	Master or more	Yes	Working towards	No	2 or less	3-5	6-10	11-20	21 or more
CCSS Exposure	-0.029*	-0.064	-0.026	0.009	-0.195	-0.030	-0.046**	0.010	-0.079	-0.047**	-0.054	-0.012	-0.050	-0.022	-0.024
	(0.016)	(0.048)	(0.038)	(0.170)	(0.210)	(0.022)	(0.023)	(0.037)	(0.085)	(0.020)	(0.052)	(0.028)	(0.044)	(0.017)	(0.038)
State and Year FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.059	0.071	0.149	0.106	0.101	0.099	0.086	0.117	0.140	0.078	0.102	0.101	0.094	0.083	0.095
Observations	458,530	39,930	24,280	16,870	10,040	250,090	304,390	71,120	15,490	462,530	57,820	81,750	123,090	170,430	121,310

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Probability that students' teacher reports about subject in question that she sets goals for specific progress the student would like to make at least once a month. Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for teacher race/ethnicity, teacher education, teacher certification (separate indicator variables for certification of National Board for Professional Teaching Standards, and for alternative certification), and teacher experience, as well as student controls for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table A.14 – Effect of CCSS exposure on the quality of teacher-student interactions (discussing goals) in non-targeted subjects, subgroups by teacher characteristics

	Teacher Race/Ethnicity					Teacher education		Teacher certification (NBPTS)			Teacher experience in years				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	White	Black	Hispanic	Asian	Other	Bachelor or less	Master or more	Yes	Working towards	No	2 or less	3-5	6-10	11-20	21 or more
CCSS Exposure	-0.033	-0.086	-0.054	-0.042	-0.251	-0.053	-0.042**	0.007	-0.123	-0.059**	-0.070	-0.052	-0.029	-0.046**	-0.038
	(0.020)	(0.052)	(0.036)	(0.167)	(0.200)	(0.033)	(0.017)	(0.034)	(0.079)	(0.027)	(0.069)	(0.043)	(0.030)	(0.022)	(0.040)
State and Year FEs	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.060	0.076	0.127	0.116	0.116	0.094	0.086	0.113	0.140	0.077	0.094	0.104	0.094	0.080	0.096
Observations	458,460	39,940	24,270	16,870	10,020	250,020	304,350	71,120	15,480	462,400	57,780	81,770	123,080	170,360	121,290

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Probability that students' teacher reports about subject in question that she discusses progress her student has made toward goals previously set at least once a month. Explanatory variable: Share of schooling years a student was exposed to CCSS (at the time of testing). Controls: Indicator variables for teacher race/ethnicity, teacher education, teacher certification (separate indicator variables for certification of National Board for Professional Teaching Standards, and for alternative certification), and teacher experience, as well as student controls for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

B ANALYSIS OF THE EFFECTS OF THE CCSS ON TARGETED SUBJECTS

We show evidence that the CCSS had, at best, modestly positive effects on student achievement in the targeted subjects math and ELA. This analysis largely confirms the conclusions Bleiberg (2021) has drawn on this question, although our findings (using more data, among other conceptual differences) suggest that Bleiberg (2021) rather overestimates than underestimates the positive effects of the CCSS on student achievement in targeted subjects.

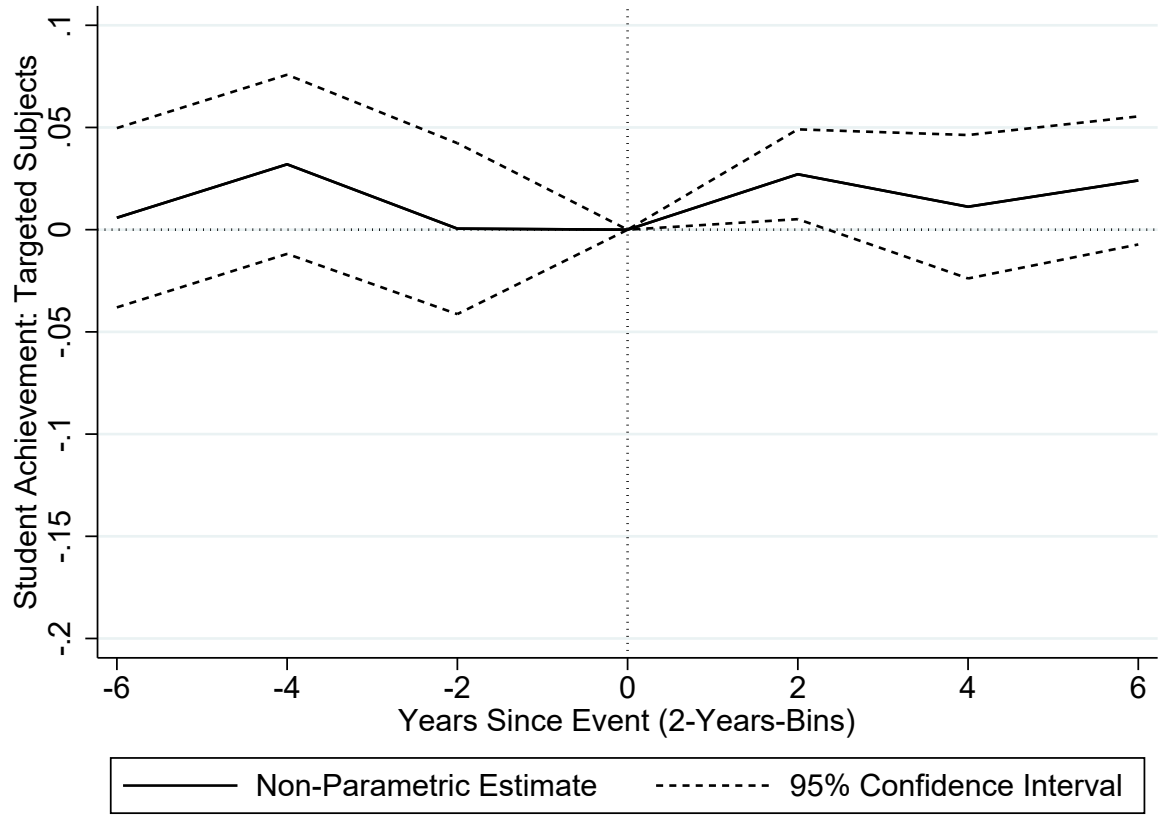
First, we visualize the modest positive effects in an event-study graph depicted in Figure B.1. The estimation equation follows Equation 2 presented in Section 3, with T_{istuv} now pooling standardized student achievement in all subjects that are targeted by the CCSS, across all available grades.[18] The event-study graph shows a modest increase in student achievement after the adoption of the CCSS that is marginally significant directly after adoption and insignificantly different from zero thereafter. Using a second dataset on student achievement from the Stanford Education Data Archive SEDA 4.0 (Reardon et al., 2021) with a shorter pre- but longer post-period relative to the NAEP, we find basically null effects, see Figure B.2. SEDA does not contain data on non-targeted subjects which is why we cannot use it for the main analysis.

Second, we also show parametric two-way fixed effects DD results for our preferred treatment indicator and the set of further treatment indicators described in Section 6 and Appendix C. The estimation equation follows Equation 1 presented in Section 3, with T_{istuv} pooling standardized student achievement in all subjects that are targeted by the CCSS, across all available grades (as above). As shown in Table B.15, we find zero to modestly positive effects across specifications.[19]

[18] Table B.16 provides the list of grades in which the NAEP tests were administered for each of the four targeted subjects math, reading, writing, and vocabulary (and for which state identifiers of students are available). We use the student-level data from all these subject-year-grade combinations in our analysis.

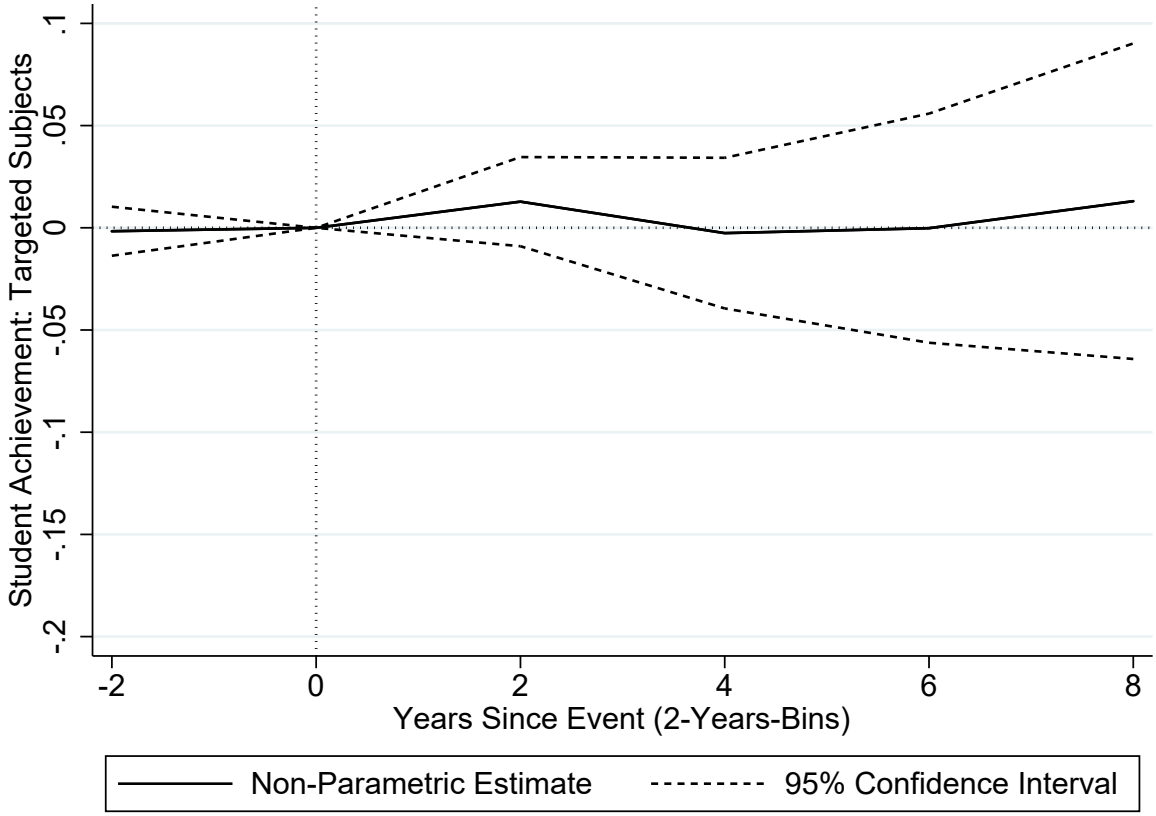
[19] Further estimations including specifications with state-specific trends and triple-difference models yield similar results (available on request).

Figure B.1 – Event-study graph: Targeted subjects (NAEP)



Note: Coefficients from non-parametric event-study regressions and their 95% confidence intervals. Dependent variable: Standardized student achievement in subjects targeted by the CCSS (Pool of math, reading, vocabulary and writing). Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as state, test year, grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Numbers on horizontal axis refer to respective two-year bins; i.e. 2 = first two years of treatment (year 0 = excluded category). The p values of omnibus hypothesis tests of zero pre- and post-event effects are 0.003 and 0.075, respectively. Data source: See Figure 2

Figure B.2 – Event-study graph: Targeted subjects (SEDA)



Note: Coefficients from non-parametric event-study regressions and their 95% confidence intervals. Dependent variable: Standardized student achievement in subjects targeted by the CCSS (Pool of math and ELA). Controls: District shares of races/ethnicities, English language learner status, disability status, subsidized lunch status, economic disadvantage, rural location, as well as state, test year, grade and subject fixed effects. Regressions use precision weights (the inverse of the standard error of average student achievement in math and ELA squared) and standard errors clustered at the state level. Numbers on horizontal axis refer to respective two-year bins; i.e. 2 = first two years of treatment (year 0 = excluded category). The p values of omnibus hypothesis tests of zero pre- and post-event effects are 0.782 and 0.190, respectively. Data source: Reardon et al. (2021)

Table B.15 – Effect of CCSS exposure on student achievement in targeted subjects using different definitions of treatment implementation

	(1) CCSS adoption	(2) CCSS implementation requirement	(3) CCSS implementation strategies	(4) Effective CCSS implementation	(5) Include temporary CCSS adopters and implementers	(6) CCSS-aligned testing
CCSS Exposure	0.010	-0.002	0.019	-0.001	0.046***	-0.007
	(0.023)	(0.027)	(0.019)	(0.021)	(0.017)	(0.032)
State and Year FEs	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.352	0.352	0.352	0.352	0.352	0.352
Observations	6,392,940	6,392,940	6,392,940	6,392,940	6,392,940	6,392,940

Note: Each entry is from a separate two-way fixed effects regression model. Dependent variable: Standardized student achievement in subjects targeted by the CCSS (Pool of math, reading, vocabulary and writing). Explanatory variables: Share of schooling years a student was exposed to CCSS (at the time of testing), where in Models 1 (CCSS adoption, baseline model) each schooling year counts as exposed in a given state in which the state adopted the CCSS permanently before that year or in the same year according to Achieve Inc. (2013) and CCSSI (2021), where Model 2 (CCSS implementation requirement) each schooling year counts as exposed in a given state in which the state expects teachers to fully incorporate CCSS into classroom instruction in grades K-12 in English language arts and mathematics according to Achieve Inc. (2013) and CCSSI (2021), where in Models 3 (CCSS implementation strategies) each schooling year counts as exposed in a given state if state education agency officials report that their state pursued at least two out of three CCSS implementation strategies (professional development, new instructional materials, joined testing consortium) as reported in Webber et al. (2014), where in Models 4 (Effective CCSS implementation) each schooling year counts as exposed in a given state in which the state implemented an effective change in state standard content through the adoption of CCSS which we define as not having had a state standard in place before the adoption of CCSS whose academic rigor is "too close to call" in comparison with CCSS (Carmichael et al., 2010) for the set of states adopting CCSS according to Achieve Inc. (2013) and CCSSI (2021), where in Models 5 (Include temporary CCSS adopters) each schooling year counts as exposed in a given state in which a state adopted and/or implemented CCSS at least temporarily according to Bleiberg (2021); and where in Models 6 (CCSS-aligned testing) each schooling year counts as exposed in a given state in which the state adopted CCSS-aligned standardized testing including field and transitional tests according to our own research (see Table C.17 for state-specific details of CCSS-aligned testing). Table C.18 provides state-specific coding information on all treatment definitions. Controls: Indicator variables for gender, races/ethnicities, English language learner status, disability status, subsidized lunch status, parental education, home possessions (separate indicator variables for computer and books) as well as grade and subject fixed effects. Regressions use population weights and standard errors clustered at the state level. Single, double, and triple asterisks indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Data source: See Figure 2

Table B.16 – List of grades of NAEP tests for targeted subjects

	Targeted Subjects			
Year	Math	Reading	Vocabulary	Writing
2002		4, 8, 12		8, 12
2003	4, 8	4, 8		
2004				
2005	4, 8, 12	4, 8, 12		4, 8, 12
2006				
2007	4, 8	4, 8		8, 12
2008				
2009	4, 8, 12	4, 8, 12	4, 8, 12	
2010				
2011	4, 8	4, 8	4, 8	8, 12
2012				
2013	4, 8	4, 8		
2014				
2015	4, 8, 12	4, 8, 12		
2016				
2017	4, 8,	4, 8		

Note: NAEP student achievement data in targeted subjects at the subject-by-year-by-grade level. Data source: See Figure 2

C BACKGROUND INFORMATION ON TREATMENT DEFINITION ROBUSTNESS

To test whether our results hold if we define treatment based on CCSS implementation, we re-run our main regression using five different treatment variables each capturing different information about CCSS implementation in Section 6. This appendix provides background information about the construction and data sources of these five alternative treatment definitions.

First, we collect information on CCSS implementation requirements, from Achieve Inc. (2013) and CCSSI (2021). Here, the year of full implementation of CCSS is defined as the school year the respective state expects teachers in grades K-12 in math and ELA to incorporate the standards into classroom instruction. The time between adoption and full implementation varies between 1 to 4 years across adopting states, with an average of about 3 years.

Second, we note that state expectations about teachers implementing the CCSS into classroom instruction do not necessarily have to be aligned with actual state efforts to implement the CCSS. However, the latter might be more relevant for ultimate exposure of students to the CCSS and potential effects on student achievement than formal state expectations. To incorporate this idea into our analysis, we make use of a survey of state education agency officials provided by Webber et al. (2014). They conducted a survey of state education agency officials which collects information on actual state efforts towards CCSS implementation. Specifically, the survey respondents answer questions about whether the state has provided, guided or funded professional development on the CCSS, whether it has provided curriculum or instructional materials for the CCSS, and whether it has worked with a federally funded consortium to develop assessments aligned with the CCSS. In this treatment coding, we count a schooling year in a given state as being exposed to the CCSS if this state has adopted the CCSS according to Achieve Inc. (2013) and CCSSI (2021) and pursued at least two out of three CCSS implementation

strategies as reported by the state education agency officials.

Third, we calculate a treatment indicator capturing effective CCSS implementation. Here, we build on the idea that effective change of the state standard can only be induced by the CCSS if the state standard in place prior to the adoption of the CCSS in the state in question is sufficiently different from the CCSS. To this end, we make use of a comparison of academic rigor of the CCSS with the respective state standards in place prior to the CCSS provided by Carmichael et al. (2010). We code students from states as being in the control group at all years if their pre-CCSS state standards are "too close to call" in both math and ELA in a comparison with the CCSS (in addition to coding students from states that did not adopt the CCSS according to Achieve Inc. (2013) and CCSSI (2021) as being in the control group at all years).

Fourth, we account for the fact that some states may have adopted and/or implemented some elements of the CCSS temporarily, even when they are listed as non-adopters and non-implementers in Achieve Inc. (2013) and CCSSI (2021). According to Bleiberg (2021), four of the eight non-permanent adopters of the CCSS in the coding based on Achieve Inc. (2013) and CCSSI (2021) have implemented at least some elements of the CCSS temporarily. The map presented in Figure 1 depicts them as temporary adopters. In this treatment coding, we count a schooling year as being exposed to the CCSS if the state in question adopted the CCSS temporarily or permanently.

Fifth, we argue that the relevant criterion for actual CCSS implementation might be the alignment of the content of state-mandated standardized testing with the CCSS. To assess this hypothesis, we did own background research to find out which state mandated what type of standardized test for each grade group and year. State-specific details on which tests (including field and transitional tests) are mandated when and for which grade are reported in Table C.17. Subsequently, we assessed which of these tests are aligned with the CCSS. This analysis allowed us to infer the year in which CCSS-aligned standardized testing was mandated in a given state. In the corresponding treatment coding, we count a schooling year in a given state as being exposed to the CCSS if this state has mandated

CCSS-aligned standardized testing in any group grade in that year.

Table C.18 presents the treatment status for each state for the baseline definition of CCSS adoption and the five definitions of CCSS implementation. In particular, it shows whether schooling years in a given state never count as being exposed to the CCSS ("always control"), or, if they do, from which year onwards.

Table C.17 – State-mandated tests, by state and grade group from 2010 onwards (based on own research)

State	3-8 grades	High school
Alabama	**2010**: Alabama Reading and Math Test (ARMT+) **2014**: ACT Aspire	**2010**: Alabama High School Graduation Exam (AHSGE) **2014**: ACT End of course
Alaska	**2010**: Standards-Based Assessments (SBAs) **2015**: Alaska Measures of Progress (AMP) **2017**: Performance Evaluation for Alaska's Schools (PEAKS)	**2010**: SBAs **2015**: AMP; ACT, SAT, or WorkKeys **2017**: PEAKS; ACT, SAT, or WorkKeys
Arizona	**2010**: Arizona Instrument to Measure Standards (AIMS) **2014**: Field test PARCC **2015**: AzMerit	**2010**: AIMS **2014**: Field test PARCC **2015**: AzMerit
Arkansas	**2010**: Arkansas Comprehensive Testing, Assessment, and Accountability Program (ACTAAP) **2013**: Arkansas Benchmark **2014**: Field test PARCC **2015**: PARCC **2016**: ACT Aspire	**2010**: Arkansas Comprehensive Testing, Assessment, and Accountability Program (ACTAAP) **2013**: Arkansas Benchmark **2014**: Field test PARCC **2015**: PARCC **2016**: ACT Aspire
California	**2010**: Standardized Testing and Reporting (STAR) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2010**: Standardized Testing and Reporting (STAR) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced

Table C.17 - Aligned Testing Details (continued)

State	3-8 grades	High school
Colorado	**2010**: Colorado Student Assessment Program (CSAP) **2012**: Transitional Colorado Assessment Program (TCAP) **2014**: Field test PARCC **2015**: PARCC	**2010**: Colorado Student Assessment Program (CSAP) **2012**: Transitional Colorado Assessment Program (TCAP) **2014**: Field test PARCC **2015**: PARCC **2016**: PSAT, ACT **2017**: SAT
Connecticut	**2010**: Connecticut Mastery Test (CMT) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2010**: Connecticut Academic Performance Test (CAPT) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced **2016**: SAT
Delaware	**2010**: Delaware Comprehensive Assessment System (DCAS) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2010**: Delaware Comprehensive Assessment System (DCAS) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced **2016**: SAT
District of Columbia	**2010**: District of Columbia Comprehensive Assessment System (DC CAS) **2012**: DC CAS revised (transitional test) **2013**: DC CAS revised **2014**: Field test PARCC **2015**: PARCC	**2010**: District of Columbia Comprehensive Assessment System (DC CAS) **2012**: DC CAS revised (transitional test) **2013**: DC CAS revised **2014**: Field test PARCC **2015**: PARCC
Florida	**2010**: Florida Comprehensive Assessment Test (FCAT) **2011**: FCAT 2.0 **2014**: Florida Standards Assessment (FSA)	**2010**: FCAT **2011**: Florida End-of-Course (EOC) Assessments **2014**: FSA or Next Generation Sunshine State Standards (NGSSS) **2016**: FSA

Table C.17 - Aligned Testing Details (continued)

State	3-8 grades	High school
Georgia	**2010**: Criterion-Referenced Competency Tests (CRCT) **2015**: Georgia Milestones Assessment System (GMAS)	**2010**: End of Course Test (EOCT) **2015**: GMAS
Hawaii	**2010**: Hawaii State Assessment (HSA) **2014**: Part-HAS Part-Smarter Balanced (transition test) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2010**: Hawaii State Assessment (HSA) **2014**: Part-HAS Part-Smarter Balanced (transition test) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced
Idaho	**2010**: Idaho Standards Achievement Test (ISAT) **2013**-14: Field test Smarter Balanced **2015**: Smarter Balanced	**2010**: Idaho Standards Achievement Test (ISAT) **2013**-14: Field test Smarter Balanced **2015**: Smarter Balanced in 10th grade; Choice of ACT, SAT or ACT Compass for 11th grade.
Illinois	**2010**: Illinois Standards Achievement Tests (ISAT) **2014**: Field test PARCC **2015**: PARCC	**2014**: Field test PARCC **2015**: PARCC **2016**: SAT
Indiana	**2010**: Indiana Statewide Testing for Educational Progress Plus (ISTEP+)	**2010**: ISTEP+, end-of-course tests
Iowa	**2010**: Iowa Test of Basic Skills (ITBS) **2011**: Iowa Assessments **2014**: Field test Smarter Balanced	**2010**: Iowa Test of Educational Development (ITED) **2011**: Iowa Assessments **2014**: Field test Smarter Balanced
Kansas	**2014**: No test **2015**: Field test Kansas State Assessment (KSA) **2016**: KSA	**2014**: No test **2015**: Field test Kansas State Assessment (KSA) **2016**: KSA
Kentucky	**2010**: Kentucky Performance Rating for Educational Progress (K-PREP)	**2010**: K-PREP, ACT QualityCore, ACT

Table C.17 - Aligned Testing Details (continued)

State	3-8 grades	High school
Louisiana	**2006**: Louisiana Educational Assessment Program (LEAP) and iLEAP **2013**: LEAP and iLEAP revised (transitional test) **2014**: Field test PARCC **2015**: PARCC **2016**: Mix of PARCC and LEAP	**2010**: End-of-course tests, ACT, ACT Plan **2013**-14: End-of-course revised (transitional test) **2015**: End-of-course revised
Maine	**2010**: New England Common Assessment Program (NECAP) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced **2016**: Maine Educational Assessments (MEA)	**2010**: SAT **2014**: Field test Smarter Balanced **2015**: Smarter Balanced **2015**: SAT
Maryland	**2010**: Maryland State Assessment (MSA) **2014**: Field test PARCC **2015**: PARCC	**2010**: Maryland High School Assessment (HSA) **2014**: Field test PARCC **2015**: PARCC
Massachusetts	**2010**: Massachusetts Comprehensive Assessment System (MCAS) **2014**: Field test PARCC **2014**: Districts choose between PARCC or MCAS **2016**: Mix of PARCC and Next Generation MCAS **2017**: Next Generation MCAS	**2010**: Massachusetts Comprehensive Assessment System (MCAS) **2014**: Field test PARCC **2014**: Districts choose between PARCC or MCAS **2015**: MCAS
Michigan	**2010**: Michigan Educational Assessment Program (MEAP) **2014**: Field test Smarter Balanced **2015**: Michigan Student Test of Educational Progress (M-STEP)	**2010**: Michigan Merit Exam (MME: includes SAT, WorkKeys) **2015**: MME, PSAT

Table C.17 - Aligned Testing Details (continued)

State	3-8 grades	High school
Minnesota	**2010**: Minnesota Comprehensive Assessments (MCA)	**2010**: MCA
Mississippi	**2010**: Mississippi Curriculum Test (MCT) **2014**: Field test PARCC **2015**: PARCC **2016**: Mississippi Academic Assessment Program (MAAP)	**2010**: Subject Area Testing Program (SATP) **2014**: Field test PARCC **2015**: PARCC **2016**: ACT
Missouri	**2010**: Missouri Assessment Program (MAP) **2014**: MAP revised (transitional test) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced **2016**: MAP	**2010**: Missouri End-of-Course Assessments **2014**: End of Course (EOC) revised (transitional test) **2015**: EOC revised, ACT
Montana	**2010**: Montana's Criterion Reference Test (Montana's CRT) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2010**: Montana's CRT **2014**: Field test Smarter Balanced **2015**: Smarter Balanced **2016**: ACT
Nebraska	**2010**: Nebraska State Accountability Tests (NeSA)	**2010**: NeSA **2017**: ACT
Nevada	**2010**: Nevada's Criterion Reference Test (Nevada's CRT) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2010**: High School Proficiency Examination (HSPE) **2015**: ACT
New Hampshire	**2010**: New England Common Assessment Program (NECAP) **2013**: NECAP revised (transitional test) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2010**: NECAP **2013**: NECAP revised (transitional test) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced **2016**: PACE, SAT

Table C.17 - Aligned Testing Details (continued)

State	3-8 grades	High school
New Jersey	**2010**: New Jersey Assessment of Skills and Knowledge (NJASK) **2014**: NJASK revised (transitional test) **2014**: Field test PARCC **2015**: PARCC	**2010**: High School Proficiency Assessment **2014**: Field test PARCC **2015**: PARCC
New Mexico	**2010**: New Mexico Standards-based Assessment (NMSBA) **2014**: Field test PARCC **2015**: PARCC	**2010**: NMSBA **2014**: Field test PARCC **2015**: PARCC
New York	**2012**: Field test **2013**: New York State English Language Arts and Mathematics Tests **2014**: Field test PARCC **2016**: New York State Assessments	**2013**: Regents Exams **2014**: Regents revised **2014**: Field test PARCC
North Carolina	**2012**: Field test **2013**: End-of-grade tests **2014**: Field test Smarter Balanced	**2012**: Field test **2013**: End-of-course tests, ACT PLAN, ACT, WorkKeys **2014**: Field test Smarter Balanced
North Dakota	**2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2014**: Field test Smarter Balanced **2015**: Smarter Balanced
Ohio	**2014**: Ohio Achievement Assessments **2014**: Field Test PARCC **2015**: PARCC **2016**: Ohio State Tests (OST)	**2014**: Ohio Graduation Tests **2014**: Field Test PARCC **2015**: PARCC **2016**: OST, Ohio Graduation Test **2017**: End-of-course tests, SAT/ACT
Oklahoma	**2010**: Oklahoma Core Curriculum Test (OCCT) **2017**: Oklahoma School Testing Program (OSTP)	**2010**: End-of-course tests **2017**: OSTP

Table C.17 - Aligned Testing Details (continued)

State	3-8 grades	High school
Oregon	**2010**: Oregon Assessment of Knowledge and Skills **2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2010**: Oregon Assessment of Knowledge and Skills **2014**: Field test Smarter Balanced **2015**: Smarter Balanced
Pennsylvania	**2010**: Pennsylvania System of School Assessment (PSSA) **2013**: Field test PSSA revised **2015**: PSSA revised	**2010**: Pennsylvania System of School Assessment (PSSA) **2013**: Keystone Exams
Rhode Island	**2010**: New England Common Assessment Program (NECAP) **2014**: Field test PARCC **2015**: PARCC	**2010**: New England Common Assessment Program (NECAP) **2014**: Field test PARCC **2015**: PARCC
South Carolina	**2010**: South Carolina Palmetto Assessment of State Standards (SCPASS) **2015**: ACT Aspire **2016**: SC Ready	**2014**: ACT Plus Writing, ACT WorkKeys **2015**: End-of-course tests, ACT
South Dakota	**2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2014**: Field test Smarter Balanced **2015**: Smarter Balanced
Tennessee	**2014**: Tennessee Comprehensive Assessment Program (TCAP) **2014**: Field test PARCC **2015**: TNReady	**2014**: Tennessee Comprehensive Assessment Program (TCAP) **2014**: Field test PARCC **2015**: TNReady
Texas	**2015**: State of Texas Assessments of Academic Readiness (STAAR)	**2015**: STARR
Utah	**2014**: Field test Student Assessment of Growth and Excellence (SAGE) **2015**: SAGE	**2014**: Field test Student Assessment of Growth and Excellence (SAGE) **2015**: SAGE, ACT
Vermont	**2010**: New England Common Assessment Program (NECAP) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2010**: New England Common Assessment Program (NECAP) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced

Table C.17 - Aligned Testing Details (continued)

State	3-8 grades	High school
Virginia	**2010**: Standards of Learning (SOL)	**2010**: SOL
Washington	**2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2010**: High School Proficiency Exam **2014**: Field test Smarter Balanced **2015**: Smarter Balanced
West Virginia	**2014**: Field test Smarter Balanced **2015**: Smarter Balanced	**2014**: Field test Smarter Balanced **2015**: Smarter Balanced
Wisconsin	**2010**: Wisconsin Knowledge and Concepts Exam (WKCE) **2014**: Field test Smarter Balanced **2015**: Smarter Balanced **2016**: Wisconsin Forward	**2015**: ACT, ACT Aspire
Wyoming	**2010**: Proficiency Assessments for Wyoming Students (PAWS), Student Assessment of Writing Skills (SAWS) **2013**: Field test PAWS revised **2014**: PAWS revised, Field test Smarter Balanced **2017**: Wyoming Test of Proficiency and Progress (WY-TOPP)	**2016**: ACT Aspire (9-10), ACT (11) **2017**: Wyoming Test of Proficiency and Progress (WY-TOPP), ACT

Table C.18 – Treatment codings by state

State	Main treatment: CCSS Adoption	CCSS implementation requirement	CCSS implementation strategies	Effective CCSS implementation	Include temporary CCSS adopters and implementers	CC-aligned testing
Alabama	2010	2013	2010	Always Control	2010	2014
Alaska	Always Control	Always Control	Always Control	Always Control	Always Control	Always Control
Arizona	2010	2013	2010	2010	2010	2014
Arkansas	2010	2013	2010	2010	2010	2014
California	2010	2014	2010	2010	2010	2014
Colorado	2010	2013	2010	2010	2010	2012
Connecticut	2010	2013	2010	2010	2010	2014
Delaware	2010	2012	2010	2010	2010	2014
D.C.	2010	2012	Always Control	2010	2010	2012
Florida	Always Control	Always Control	2010	Always Control	2010	Always Control
Georgia	2010	2014	2010	Always Control	2010	2015
Hawaii	2010	2013	2010	2010	2010	2014
Idaho	2011	2013	2010	2011	2011	2013
Illinois	2010	2013	2010	2010	2010	2014
Indiana	Always Control	Always Control	2010	Always Control	2010	Always Control
Iowa	2010	2012	2010	2010	2010	2011
Kansas	2010	2013	2010	2010	2010	2015
Kentucky	2010	2011	2010	2010	2010	2010
Louisiana	2010	2013	Always Control	2010	2010	2013
Maine	2011	2012	2010	2011	2011	2010
Maryland	2010	2013	2010	2010	2010	2014
Massachusetts	2010	2013	2010	Always Control	2010	2010
Michigan	2010	2012	2010	2010	2010	2010
Minnesota	2010	2012	Always Control	2010	2010	Always Control
Mississippi	2010	2013	2010	2010	2010	2014
Missouri	2010	2014	2010	2010	2010	2014
Montana	2011	2013	Always Control	2011	2011	2014

Treatment codings by state (continued)

State	Main treatment: CCSS Adoption	CCSS implementation requirement	CCSS implementation strategies	Effective CCSS implementation	Include temporary CCSS adopters and implementers	CC-aligned testing
Nebraska	Always Control	Always Control	Always Control	Always Control	Always Control	Always Control
Nevada	2010	2013	2010	2010	2010	2014
New Hampshire	2010	2014	2010	2010	2010	2013
New Jersey	2010	2013	2010	2010	2010	2014
New Mexico	2010	2013	2010	2010	2010	2014
New York	2010	2013	2010	2010	2010	2012
North Carolina	2010	2012	2010	2010	2010	2012
North Dakota	2011	2013	2010	2011	2010	2015
Ohio	2010	2013	2010	2010	2010	2014
Oklahoma	Always Control	Always Control	2010	Always Control	2010	Always Control
Oregon	2010	2014	2010	2010	2010	2014
Pennsylvania	2010	2013	2010	2010	2010	2013
Rhode Island	2010	2013	2010	2010	2010	2014
South Carolina	Always Control	Always Control	2010	Always Control	2010	Always Control
South Dakota	2010	2014	Always Control	2010	2010	2014
Tennessee	2010	2013	2010	2010	2010	2014
Texas	Always Control	Always Control	Always Control	Always Control	Always Control	Always Control
Utah	2010	2013	2010	2010	2010	2014
Vermont	2010	2013	2010	2010	2010	2014
Virginia	Always Control	Always Control	Always Control	Always Control	Always Control	Always Control
Washington	2011	2014	Always Control	2011	2012	2014
West Virginia	2010	2014	2010	2010	2010	2014
Wisconsin	2010	2014	2010	2010	2010	2014
Wyoming	2012	2014	Always Control	2012	2012	2013

Note: Table shows whether schooling years in a given state are never coded as exposed to CCSS ("always control"), or, if they are, from which year onwards, for different treatment definitions. Data sources: Achieve Inc. (2013) and CCSSI (2021) (CCSS Adoption and CCSS implementation requirements); Webber et al. (2014) (CCSS implementation strategies); Carmichael et al. (2010) (Effective CCSS implementation); Bleiberg (2021) (Include temporary CCSS adopters and implementers); Own research, see also C.17 (CCSS-aligned testing)