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Does the Common Core Have a Common Effect?: An Exploration of Effects on Academically Vulnerable Students

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Does the Common Core Have a Common Effect?: An Exploration of Effects on Academically Vulnerable Students

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Abstract

Policymakers have sought to increase the rigor of content standards since the 1990s. However, the literature examining the effects of reforms to content standards on student outcomes is still developing. This study examines the extent to which the Common Core State Content Standards (CC) affected student achievement and the size of achievement gaps. To identify the effect of CC I compare early implementors of the CC to late implementors of the CC in a Difference-in-Differences framework. I conducted a document analysis to measure preparation for and implementation of the CC standards, which I merge together with the National Assessment of Educational Progress student-level data. I then exploit variation in the timing of state implementation of the CC to identify its effect on students overall and academically vulnerable groups. I find that the CC has a positive effect on math scores in 4^{th} and 8^{th} grade, but not in reading. The CC had a large positive effect on economically advantaged students, but a null effect for economically disadvantaged students. Demanding better results without addressing the structural issues burdening economically disadvantaged students may result in unintended consequences.

In 2010 a national alliance of states moved rapidly to adopt the Common Core content standards (CC) due to concerns about low expectations for students. The popularity of the CC quickly declined because of insufficient support for implementation and the belief that reforms to content standards would harm students. About a quarter of the states that adopted the standards announced substantial revisions or revoked the adoption of the CC. Many modifications to the CC occurred before the standards were implemented in classrooms. This calls into question how state policymakers could have judged that the standards were not benefitting students. Today, questions about whether the standards have benefitted students remain unresolved (Polikoff, 2017) and policymakers continue to debate whether or not to continue using the CC. The CC has received renewed attention because state laws mandate that states consider reform to content standards every 7-10 years. This study provides new evidence about the effects of CC on student outcomes and achievement gaps that will inform decisions about future changes to the CC and content standards more broadly.

Using the student level microdata from the National Assessment of Educational Progress (NAEP) I estimate the effect of CC on student achievement overall and on academically vulnerable populations. I compare student outcomes in states that were early implementors of the CC to late implementors of the CC. I employ a critical quantitative approach to causal inference (Sablan, 2018) where I endeavor to disaggregate effects by race/ethnicity and to use "quantitative intersectionality" to test differences across diverse populations of students. I find that robust to a variety of different estimators that CC increased NAEP scores in math, but not reading. The positive effect is larger among economically advantaged students than their peers who are eligible for Free and Reduced Priced Lunch (FRPL). Differences in state capacity for education reform and other policies adopted during this period of time do not appear to explain these effects.

The pattern of differential effects for academically vulnerable students is consistent with the hypothesis that the CC standards influenced student outcomes through raising teacher expectations. Students that struggle academically due to challenges that are a function of poverty (e.g., housing or food instability, lead exposure) will continue to struggle when educators raise expectations for their performance. But, when economically advantaged students face low expectations due to racist or classist beliefs about their ability to learn, raising expectations through changes to content standards will have a positive effect. States that have implemented the CC standards should refrain from making additional changes. But, without complementary policies meant to address student poverty the CC content standards will not lead to a closure of achievement gaps.

Common Core State Standards

The Common Core State Standards Initiative (CCSSI) was a joint project of the National Governors Association (NGA) and the Council of Chief State School Officers (CCSSO). The CCSSI pursued two standards-based reforms (i.e., content standards, assessments). The CCSSI applied the CC brand to both projects, but there were key differences. The CC content standards were broadly supported by education reformers and stakeholders (e.g., AFT, NEA). Content standards are a list of learning goals that states define for teachers. States also set standards for curriculum and performance on summative assessments, but neither of these reforms were targeted by the CCSSI. CC is also used to described the Common Core testing consortia (i.e., Smarter Balanced, Partnership for Assessment of Readiness for College and Careers (PARCC)). The assessment consortia were groups of states that contracted with test writers to develop assessments that were aligned with the CC content standards. Finally, companies used the CC brand to describe instructional materials (e.g., text books) that were aligned with either the content standards or assessments (Polikoff, 2015).

The CCSSI started writing the standards in 2008. Beginning in 2009 states began adopting the CC content standards in part due to incentives from Race to the Top and the Bill and Melinda Gates Foundation. By 2011, 45 states adopted the CC standards. The CC content standards were first implemented in the 2012 school year, followed by many states in the next year. In 2014, the politics of CC soured and Indiana became the first state to revoke the standards. The CC assessments first came online in 2015 after a year's long development process. After this point I use the term CC to refer to the content standards and not the assessments.

State content standards prior to the CC varied widely in their rigor. A 2011 review gave a D or an F grade to 22 state English Language Arts standards and 15 state math standards (Carmichael et al., 2010). The rigor of state content standards has 3 main components: clarity/specificity, content and skills, coverage (AFT, 2006). In some states content standards were described in a long narrative rather than an organized list. Not all states required the teaching of both content (e.g., literature, real-word examples) and skills (e.g., decoding, numeracy). Finally, in some states content standards did not cover every grade and subject.

Conceptual Framework

Theorized Benefits of Common Core

The CC content standards are more rigorous than previous content standards because they are specific and cover both content and skills for students in grades K through 12. Ravitch argued that, "standards can improve achievement by clearly defining what is to be taught and what kind of performance is expected. They define what teachers and schools should be trying to accomplish. They can raise the quality of education by establishing clear expectations about what students must learn if they are to succeed. If the goals of teaching and learning are spelled out, students understand that their teachers are trying to help them meet externally defined standards and parents know what is expected of their children in school" (2011, pp. 25–26).

The CC also could close achievement gaps by raising expectations for academically vulnerable students. A rich tradition of research has focused on Pygmalion effects or the ways that teacher expectations matter for student achievement (Rosenthal, 1987). Teachers have lower expectations for students who are Black and from low income families (Ferguson, 2003; Gershenson et al., 2016). If the CC raised and equalized teacher expectations for academically vulnerable students to the same level as advantaged students then it could in turn close achievement gaps (Gamoran, 2008).

The CC may also improve student outcomes via other education policies linked to content standards. Contents standards serve as one of three key components in standards-based reform, along with assessments and accountability (Smith & O'Day, 1990). Under this theory, "standards are the foundation upon which almost everything else rests" (Carmichael et al., 2010). From this perspective CC sets learning goals. Content standards determine the skills measured on assessments, which states use to determine which schools receive sanctions under accountability systems. Similarly, content standards influence other school activities (e.g., professional development, teacher evaluation, curricula). The CC could improve student outcomes via its influence on these other school policies.

CC could also improve the effectiveness of education technologies. Variation in standards across states creates barriers to the sharing of educational materials (Bleiberg & West, 2014). For example, if every state had different standards then a website designed for sharing lesson plans would have less value then if every state had the same standards. Universal adoption of standards produce network effects (Swann, 2000). As the number of system users (i.e., teachers) increases the size of the benefit for every network participant also increases. Standards also make it easier for firms to develop new products by decreasing development costs. In this case standardization creates a larger market and necessitates the development of fewer specialized products. This allows firms to increase their investment in developing new education technologies.

Theorized Tradeoffs of Common Core

There are several reasons to remain skeptical that the CC would have a positive effect on students. The committee that developed the CC did not represent the full range of grades and subjects. Although, many educators participated in writing the standards, teachers with expertise in early childhood grades were excluded (Ravitch, 2014). This lack of input may have led to standards that were not developmentally appropriate. For example, critics of the CC argue the standards focused too much on skills and underemphasized imaginative play.

The reading standards are also criticized for being overly prescriptive (Stotsky, 2013). Content standards ought to set goals for student learning while remaining agnostic to how educators achieve that goal. The CC reading standards mandate the type of texts that educators must use (in elementary 50 percent informational text and 50 percent fiction). The specificity of this ratio violates the norm that teachers choose instructional materials in their classrooms. The removal of teacher autonomy negatively influences the quality of instruction.

Educators did not receive sufficient supports to implement the CC (Xu & Cepa, 2018). Superintendents reported challenges related to finding adequate staff and financial resources to support all of the necessary implementation activities (Rentner, 2013). States were also implementing the CC when the Great Recession was causing funding cuts. States were raising their expectations for students but with fewer resources. A further complicating factor is that the schools serving large academically vulnerable populations have less capacity to implement the CC, which could end up disadvantaging the students the policy was intended to help. Staff from high-poverty districts reported less confidence in their capacity to implement the CC (A. B. Brown & Clift, 2010; Finnan

& Domenech, 2014). The CC could have led to a decline in student performance as teachers and schools adjusted to the increased demands of the CC (Schmidt & Houang, 2012).

Teacher support is a critical component of any education reform, but it is particularly important for the CC. Today, teacher support for the CC is quite polarized (Cheng et al., 2018). The lack of confidence in the CC is a particularly salient issue because changes to content standards will only have an effect if teachers change their expectations for students. If teachers believe that the standards are not appropriate for their students then they will not make any changes to their instruction.

Content Standards on Student Outcomes

States began to pursue standards-based reform in the 1990s. These efforts also included implementing more rigorous content standards like the Principles and Standards for School Mathematics. However, there are no known studies from this period that isolate the effect of content standards on student outcomes. Two comprehensive literature reviews on the effects of standards-based reforms on students found no studies that estimated the effect of reforms to content standards on students (Hamilton et al., 2009; Lauer et al., 2005). The reason for this lack of research is the inherent complexity in examining standards-based reform. State changes to content standards virtually always coincided with reforms to assessments, accountability systems, or curricula. For this reason, it is difficult to identify the effect of the content standards on student achievement. The interconnectedness of standards-based reform led Dutro to conclude that, "We may never be able to directly answer the question 'What impact are state content standards having on student learning?'" (2002, p. 6). Fortunately, the CC differs from previous standards-based reform efforts because changes to assessments and accountability lagged behind changes to content-standards.

There are several studies that have examined the effect of the CC on student achievement. Loveless (2014, 2015, 2016) examines whether the similarity of a state's standards to CC is correlated with NAEP outcomes. He finds relatively small positive effect sizes ranging from 0.01 to 0.04 SDs. Overall, the descriptive differences between states that strongly implemented CC to states that did not adopt the standards appears to be small and insignificant. Xu and Cepa (2018) examine the effect of CC on ACT scores in Kentucky. They exploit the variation in exposure to CC across three cohorts. Students in the second two cohorts that received the CC had significantly higher ACT scores (0.03–0.04 SDs) compared to students in the first cohort.

Song, Yang, and Garet (2019) estimate the effect of adopting the College and Career Ready (CCR) content standards on NAEP state average test scores. CCR content standards includes three categories of states: CC implementing states, states that made substantive revisions to the CC, and states that never adopted the CC (i.e., developed their own standards). Content standards for states that made substantive revisions (Korn et al., 2016) and states that never adopted the CC have important differences with states that implemented the CC (Norton et al., 2017). Song, Yang, and Garet (2019) find moderately sized and significant negative effects of CCR on 4th grade average state NAEP scores (0.06 to 0.10 SDs). The analysis suggests that CCR had a significant negative effect on Black and Hispanic students in 4th grade reading and for students with disabilities in 8th grade math. In 4th grade math and 8th grade reading they find statistically insignificant effects.

In this analysis, I isolate the effect of implementing the CC rather than changes to content standards more broadly (CCR content standards). I find CC had positive effects on 4th grade math and no evidence that the CC has negative effects. Each study operationalizes treatment to answer their own research question. Song, Yang, and Garet (2019) compose their treatment and comparison group based on the rigor of the states content standards prior to the CCR. They assign states that had high rigor standards prior to the CCR to the comparison group and low rigor standards to the treatment group. States (Indiana, Oklahoma) that adopted the CC, revoked CC, and implemented their own standards, were assigned to their comparison group. They also include states (New York, North Carolina, and Pennsylvania) in their treatment group that implemented the CC, but with major revisions. The differences in how each study defines treatment explain why we find different results.

Several qualitative studies have examined how the implementation of rigorous content standards can change instruction. Collaborating with other teachers improved the confidence of teachers that were developing CC aligned content materials (Herman et al., 2016). Teachers that do not feel they have authority over the implementation of content standards were less likely to make changes to their instruction (Edgerton & Desimone, 2019). Taken together this suggests that teacher collaboration and autonomy over the content standards are the mechanisms through which instruction changes.

Contribution

I develop a measure of CC content standard implementation for each state in specific grade/subjects (4th grade math, 8th grade math, 4th grade reading, 8th grade reading). State definitions of "full" content standards implementation varied considerably. Some states only considered the standards implemented if the CC standards and assessments were in place. Other states only considered the standards fully implemented when they were required for all grades and subjects. In addition, many states staggered the implementation of the CC across grades and subjects. Using a measure that is specific to states, grades, and subjects allows me to more precisely estimate the effect of CC.

I am able to isolate the effect of the CC and related preparation activities (e.g., PD, curricula). I estimate effects by comparing early implementors of the CC to late implementors of the CC in the period before states began making endogenous changes to their content standards. During the period of study virtually every state makes a change to their content standards, which makes it challenging to identify a defensible comparison group. My approach overcomes this barrier by exploiting variation in the implementation of the CC over time.

Finally, I am also able to estimate the intersectional effects of CC. Previous studies have used the state level NAEP to examine the effects of the CC. State level datasets can test for changes in outcomes between two groups of students (i.e., Black and White). But, a unique advantage of the student level data is that I can estimate effects of CC for students that belong to multiple academically vulnerable groups (i.e., Black and FRPL). The intersectional effects of CC allow greater insight into how the benefits of CC were distributed across diverse groups of students.

Research Questions

Specifically, I ask the following questions:

1. To what extent did Common Core affect student achievement?
2. To what extent did Common Core close or exacerbate achievement gaps?

Data, Measures, and Sample

I use data from four subject/grade NAEP datasets (4th grade math, 8th grade math, 4th grade reading, and 8th grade reading) over six waves (2003, 2005, 2007, 2009, 2011, and 2013). The NAEP study uses a complex three-stage sampling design to allow for valid inferences about student achievement outcomes for the nation as a whole, each state, and certain school districts (Rogers et al., 2014). Two strengths of the NAEP are that the assessment items rarely changed across waves, and that the sample includes students from diverse backgrounds (including students with Individualized Education Plans and those with Limited English Proficiency) (Rogers et al., 2014). Another strength is the low-stakes nature of the NAEP assessment for students and teachers. While performance measures from state accountability exams may be contaminated by cheating or gaming

(D. Koretz, 2017; D. M. Koretz & Barron, 1998), teachers and administrators have no incentive to engage in similar behavior on the NAEP.

I merged into the NAEP, data on pre-CC content standards from the American Federation of Teachers (AFT, 2006) and the Fordham Institute (Carmichael et al., 2010; Finn Jr et al., 2006; Klein et al., 2005). I categorize pre-CC standards as either low or high-rigor. Low-rigor standards are "clearly inferior" to the CC according to Carmichael and colleagues (2010). Standards in the other group were either "indistinguishable from the CC" or were "superior to the CC".[1] I also merged in Adequate Yearly Progress data from 2003 as a measure of baseline school achievement data (Reback et al., 2013). Finally I merge in data on education reforms adopted during the period of studying including teacher evaluation policies (Bleiberg & Harbatkin, 2018), ESEA Waivers (Center on Education Policy, 2018), high-school exit exams, and alternative pathways to teaching (Howell & Magazinnik, 2017).

Dependent Variable

To construct my outcome of interest, student achievement, I rely on test score information from six waves of the NAEP. The NAEP is a matrix-based assessment in which each student completes a sample of test items. From these results, the NAEP provides plausible values that are created through an Item Response Theory (IRT) procedure. NAEP then transforms the plausible values onto a vertically norm-referenced scale. I then standardized the scale scores within grade, subject, and year to have a mean of 0 and a standard deviation of 1. In this analysis I use the first plausible value as my dependent variable.[2]

[1] The two measures of pre-CC standards rigor are strongly correlated. I use the Fordham measure because it is available in multiple years. The AFT variable identifies fewer states with low-rigor standards, which restricts the power in my preferred specification.

[2] The means of the NAEP test scores are different than zero in the analytic sample due to listwise deletion. The results are insensitive to other approaches that use the plausible values. See section on *Multiple Plausible Values* for more details.

Treatment Indicator

To measure changes to state content standards I conducted a document analysis (Bowen, 2009) (See Appendix C). I collected 123 documents from state education agencies (e.g., reports, websites, grant and waiver applications, implementation timelines), surveys, interviews, media reports. All documents were collected from online sources. I made extensive use of the Internet Archive to obtain documents that were taken offline. I define standards implementation as the state mandating the alignment of instruction and curricula with a set of standards for a specific grade/subject (i.e., 4th grade math, 8th grade math, 4th grade reading, and 8th grade reading). My measure of Common Core excludes states that implemented CCR standards that were not CC or made substantive changes to CC (e.g., major revisions, rebranding, revoking the standards) through 2015.

The differences in definitions of standards implementation motivate my use of document analysis, which is particularly valuable for studying dynamic historical events like state policy implementation (Bowen, 2009). Whenever possible I triangulate sources. Ideally multiple sources of different types (i.e., government documents, interview data, media reports) describe the same implementation date. For all states I use multiple sources to corroborate the implementation date of the CC standards. I use these multiple sources to measure when the CC standards were adopted, when implementation was planned, when implementation occurred if at all, and when an alternative set of standards was implemented. Analyzing state specific documents across time increases my confidence that I have observed when implementation occurred. For example, if the data show that a state adopted the CC standards in May 2010, one month later describes plans to implement in 2013, and then reports in December 2014 that implementation occurred in 2013, then it strengthens the claim that my measure of CC standards implementation is valid.

States adopted the CC standards from February 2010 to June 2012 and implemented the standards from the 2012 school year to the 2015 school year. The CC testing consortia (PARCC and Smarter Balanced) conducted field testing of their assessments with states in the 2014 school year and began administering tests in the 2015 school year (Salazar & Christie, 2014). Two states implemented CC in 2012 and ten more followed in 2013 (See Appendix Table A1).

I define two CC treatment indicators. *CC 2011* measures preparation for CC for early implementing states compared to late implementing states. Schools were engaged in a variety of activities to prepare for the CC prior to formal implementation of the standards (e.g., professional development, curriculum). The crux of the CC intervention is raising expectations for student learning. The formal change in state content standards is observable for a precise school year. However, there is also an informal change where educators adjust their own expectations. This switch is not directly measurable and is likely to begin as a consequence of CC preparation activities. CC implementation (*CC 2013*) is the effect of state mandated alignment instruction with the CC for early implementing states compared to late implementing states.

Surveys of state and school leaders support the notion that CC preparation activities were underway prior to formal implementation. States required districts to engage in CC preparation activities. Among a sample of 36 states that had adopted the CC in 2010, 13 states required districts to provide professional development for teachers and principals to support implementation of the CC and 22 reported that districts were expected to do so (Kober & Rentner, 2011a). Among CC adopters, 11 states required districts to align teacher evaluation systems with CC and 10 required the alignment of new curriculum materials and/or instructional practices with CC. 37 states reported providing, guiding or funding professional development on the CC in the 2011 school year (Webber et al., 2014). 66 percent of school districts in states that had adopted the CC reported intentions to develop a comprehensive plan and timeline for implementing the CCSS in either 2011 or 2012

(Kober & Rentner, 2011b). The NAEP teacher survey shows a jump in the emphasis of professional development on content standards in 2011 when compared to 2009. About 1 percent more teachers in 2011 reported that the extent to which they learned about content standards during professional development was large compared to 2009. A national survey (Markow et al., 2013) found that 46 percent of principals and 62 percent of teachers reported that a great deal of teachers in their school were using the CC in the 2012 school year when only 3 states (Nevada, Kentucky, and the District of Columbia) were requiring full implementation the standards. This suggests that many teachers were using the standards in the years in between adoption and implementation of CC. If there is an effect of CC, I ought to be able to detect it in 2011 and would expect its size to increase in 2013.

Covariates

NAEP includes a robust set of student, teacher, and school characteristics. I include student demographic covariates, including gender, Individualized Education Plan (IEP), Limited English Proficiency (LEP), eligibility for Free or Reduced-Price Lunch (FRPL), and race/ethnicity. I also observe whether the student is at, above, or below the modal age for their grade level. These exogenous student characteristics control for observable differences between the students in states that were early and late implementors of the CC that are correlated with student outcomes. I also include a baseline measure of school achievement (AYP status in 2003) and lagged state average NAEP scores.[3] These measures control for pre-treatment differences in student outcomes.

Sample

Table 1 describes the analytic sample, which excludes states that had low rigor standards prior to the CC and states that made other changes to their content standards (See Appendix Table A2). I observe 8 states to implement the CC early in 4th grade math, 7 states to implement the

[3] To create the lagged state average for 2003 I use scores from 2002 for reading and 2000 for math.

standards early in 8th grade math, and 10 states to implement early in reading (4th and 8th grade). Figure 1 visually displays which states implemented the standards early by grade and subject. Early implementing states are spread out through the nation and appear to be diverse politically and demographically (LaVenia et al., 2015). For each grade and subject there are about 24 comparison states that implemented the standards late (2014 or 2015). The complete list of comparison states by grade and subject is available in Appendix Table A2.

<Insert Figure 1 Here>

States were excluded from the analytic sample for three reasons. First only states that had low rigor content standards prior to the CC were included (Carmichael et al., 2010). Ideally, I would use states that had no content standards as a control group, but every state had content standards prior to the CC. States that made major revisions to their content standards during the year 2014 and 2015 were also excluded. Substantive revisions made to the CC standards would likely confound the true effect of the CC. Finally I exclude states that never adopted the CC (i.e., Alaska, Texas). Each grade/subject includes about 2,000 school districts and about 4,000 schools. In total there are about half a million students for each grade subject.

<Insert Table 1 Here>

Table 2 includes descriptive statistics for the analytic sample. The first column contains mean student, school, and locale characteristics for the pre-treatment period (2003-2009). The second and third columns describe means for the CC preparation (2011) and implementation year (2013). Most observable characteristics change very little across time. There was an increase in the number of students eligible for FRPL, likely due to the Great Recession. NAEP scores decline slightly in the pre-treatment period compared to the treatment period, except for 4th grade math.

<Insert Table 2 Here>

Estimation Strategy

I estimate the effect of the CC on student achievement in a Difference-in-Differences (DiD) framework. I compare states that were early implementors of the CC (2011 to 2013) to late implementors (2014 to 2015). I begin by estimating a series of models that assume the following general form:

$$(1)\quad y_{icst} = \beta_1 CC_{\ s} \times 2011_t + \beta_2 CC_{\ s} \times 2013_t + \rho \boldsymbol{F}'_{it} + \tau \boldsymbol{G}'_{ct} + \alpha_s + \pi_t + e_{icst}$$

Where *y* is a NAEP test score (standardized by subject/grade and year) for student *i*, school *c*, state *s*, and in year *t*. *CC ×2011* is a binary variable equal to 1 if a state is preparing to implement for the CC in 2011. *CC ×2013* is a binary variable equal to 1 if a state has mandated alignment of instruction with the CC. β_1 is the effect of preparing for CC on NAEP scores within states. β_2 is the coefficient of interest, the effect of implementing the CC on student outcomes within states. ***F*** and ***G'*** are vectors of time-varying student and school covariates. α_s is a vector of either state or school district fixed effects. π_t is a year fixed effect and *e* is an idiosyncratic error term clustered by school.[4] I estimate each model 4 times using each of the NAEP datasets (4th grade math, 8th grade math, 4th grade reading, 8th grade reading).

I then estimate a non-parametric event-study specification. This approach models pre and post-treatment effects in a fully flexible way:

$$(2)\quad y_{icst} = \tau_1 CC \times 2003_{st} + \tau_2 CC \times 2005_{st} + \tau_3 CC \times 2007_{st} + \tau_4 CC \times 2011_{st} + \tau_5 CC \times 2013_{st} + \rho \boldsymbol{F}'_{it} + \tau \boldsymbol{G}'_{ct} + \alpha_s + \mu_{icst}$$

The coefficients in the event study estimate effects relative to outcomes in 2009, the last year prior to CC. For the pre-treatment years τ_1 , τ_2, and τ_3 model anticipatory effects of CC relative to

[4] Following Abadie, Athey, Imbens, & Wooldridge (2017) I cluster my standard errors at the school level. I use this approach because the errors of students in schools are correlated due to the IRT procedure employed by NAEP. In addition, clustering at the school level is appropriate because there are schools in the population that I do not observe in the sample.

2009. In the two post-treatment years τ_4 and τ_5 estimate the effect of CC relative to 2009. Equation 2 includes state or district fixed effects and the full set of covariates in equation 1.

To answer the second research question I add interactions between the treatment indicators, membership in race/ethnic groups, and eligibility for FRPL. Here I employ a critical quantitative approach (Sablan, 2018). I leverage the detailed information about student race/ethnicity by not aggregating racial subgroups. For example, I test for effects within groups of Hispanic/Latinx student (e.g., Mexican, Cuban, Puerto Rican). I also test whether the effect of CC differed for race/ethnic groups across levels of socio-economic status (i.e. FRPL eligibility).

Threats to Causal Inference

In this analysis the key assumption required for estimating a causal effect is that outcomes for students in treated states (early CC implementors) would have followed the same trajectory as students in comparison states (late CC implementors) in the absence of treatment. If the treatment and comparison groups had systematically different pre-treatment trends then the assumption of parallel trends is likely violated. Figure 2 shows a flat pre-treatment trend for both treatment and comparison states prior to the implementation of CC. For 4th grade math and 8th grade math the mean outcome differs by less than 1.5 percent of a standard deviation. Visually the pre-treatment trends in math appear flat for both the treatment and comparison groups. For 4th and 8th grade reading there is visual evidence that the assumption of parallel trends is violated. The pre-treatment trends for the treatment and comparison groups in reading cross, which implies their trajectory post-treatment may be attributable to something other than implementing the CC.

A salient issue when estimating the effect of CC are changes that states made to standards after the adoption of CC. Starting in 2014, several states made major revisions to the CC and some revoked them entirely. In 2014 and later, teachers will react to announced changes and revisions, which will change how the CC influences student outcomes. For this reason, I restrict the period of study from 2003 to 2013 to avoid this source of endogeneity. This approach also avoids conflating the effect of the CC standards with the CC assessments which were first used in 2015. A remaining issue is the possibility of unobserved state reforms that occurred contemporaneously with the implementation of CC and influence student outcomes. For example, if treated states implemented CC as part of a larger package of education reforms, than the effect of those other policies would bias the effect of CC. The state fixed effects control for any time-invariant confounding state education reforms. Additionally, the district fixed effects control for any time-invariant district level response to treatment that may bias the estimate. For example, some school districts hired consultants to facilitate the implementation of CC or implemented district specific professional development programs.

A final concern is systematic differences between the treated states that chose to implement the CC early and the comparison states that chose to implement the CC late. For example, if the states implemented the standards early because they knew they had high levels of capacity then the high levels of capacity could explain any positive effects. It is also possible that late implementing states waited because they thought they lacked the capacity to implement the CC. This lack of capacity could also explain changes in student outcomes. State capacity could vary based on experience with implementing rigorous content standards. To account for this threat, I restrict the sample in my preferred model to include only states that had low-rigor standards prior to CC. States that had high rigor standards prior to the CC may have also implemented other standards-based reforms that could bias the estimate of interest. Another benefit of this approach is that it improves the contrast between the treatment and comparison groups. There are no significant differences between treatment and comparison states on observable measures of state capacity (i.e., educational resources, political capacity, standards-based reforms, prior content-standards rigor) for education reform (See Appendix Figures A1, A2, A3, A4). Additionally, the state and district fixed effects will also account for any state- and district-level selection bias, respectively, that is not accounted for by the covariates.

Results

Figure 2 depicts the trends in outcomes for the treatment and comparison groups. Each panel describes the trend for a NAEP grade/subject (4th grade math, 8th grade math, 4th grade reading, 8th grade reading). The X axis is the NAEP wave in years and the Y axis is NAEP student outcomes standardized within subject/grade and year. CC (red line) describes average outcomes for students in states that were early implementors of the CC. Comparison (blue line) describes the average outcomes for students in states that were late implementors of the CC. 2009 is the last wave prior to the start of preparation for CC in 2011 and the implementation of standards in 2013. For both math subjects the average outcomes for comparison states is about flat from 2003 to 2013. In 4th grade math, average outcomes increase for states that were preparing for CC and had implemented CC. In 4th grade math, average NAEP scores were about 3 percent of a standard deviation (SDs) higher in 2013 compared to 2009 and about 2 percent of a SD higher in 2013 compared to 2011. In 8th grade math, the outcomes for treatment states increase in 2011 before dipping in 2013. The pattern of results for reading do not suggest any change in scores after the implementation of CC.

<Insert Figure 2 Here>

Descriptive Regressions

Table 3 includes the descriptive regression results from models without any sample restrictions. Models 1 through 4 include math results and models 5 through 8 include reading results. Columns 1 and 3 (models 1, 3, 5, 7) include state fixed effects and columns 2 and 4 (models 2, 4, 6, 8) add covariates. The results are all insignificant except for 4th grade math. The effect of fully implementing the CC is 6 percent of a standard deviation. These estimates likely underestimate the effect of CC because of poor contrast between the treatment and comparison groups.

<Insert Table 3 Here>

Fixed Effects Estimates

Tables 4 and 5 include the estimated effects of CC. Columns 1 and 2 (models 1, 2, 5, 6) include state fixed effects and columns 3 and 4 (models 3, 4, 7, 8) include district fixed effects. In columns 2 and 4 (models, 2, 4, 6, 8) I include covariates. The estimates in Tables 4 and 5 compare students in early implementing states to students in late implementing states, within either states or school districts. Implementing the CC appears to have a positive and significant effect on math scores in Table 4. In column 2, model 1, the effect of preparing for the CC on 4th grade math scores is about 4 percent of a SD and the effect of implementing the CC is about 10 percent of an SD. For 4th grade the effect of implementing the CC is about twice as large as the effect of preparing for the CC. The effects are larger than in Table 4 than in Table 3 due to the sharper contrast from excluding states that had rigorous content standards and removing states that made endogenous changes to content standards.

<Insert Table 4 Here>

Table 5 includes the effects of CC on 4th and 8th grade reading outcomes. Each of the estimates is statistically insignificant and positively signed. The null effect of CC on reading outcomes is consistent throughout these analyses. The descriptive pre-treatment results (Figure 2) suggest these results are biased because they violate the assumption of parallel trends. However, the positive coefficient estimates is encouraging because it implies that the CC did not harm reading outcomes.[5]

<Insert Table 5 Here>

[5] See Appendix Table B1 for regression results that include covariate estimates.

Event Study

Table 6 includes the results from the event study. The 4 columns describe results from each of the NAEP datasets (4th grade math, 8th grade math, 4th grade reading, 8th grade reading). These models include district fixed effects and covariates. The pre-treatment coefficients test for the presence of anticipatory effects. These pre-treatment estimates are both individually and jointly indistinguishable from zero. There is no evidence of trends in student performance prior to the CC. Consistent with the previous models, the effects of CC are significant in math but not reading. For 4th grade math the effect of implementing the CC is about twice as large as the effect of preparing for the standards (9.5 percent of a SD).[6]

<Insert Table 6 Here>

Differential Effects for Academically Vulnerable Students

Table 7 adds interactions between membership in academically vulnerable populations and implementation of the CC. The first row describes the main effect of implementing the CC, which here is interpretable as the effect of implementing the CC for White economically advantaged students (FRPL ineligible). The subsequent rows describe the interaction of CC and membership in academically vulnerable populations (i.e., race/ethnic groups and students eligible for FRPL). Across race/ethnic groups CC has a positive effect on math outcomes. The interaction of CC implementation and being a Hispanic student is about 15 percent of a SD. However, the interaction of FRPL eligibility and implementing CC is negative in math. For 4th grade math, the effect of CC on FRPL eligible students is still significant and positive, but the effect for 8th grade students is insignificant and negative. The pattern of results suggests that the differential effect of CC on academically vulnerable populations on reading outcomes is indistinguishable from zero, which is

[6] See Appendix Table B2 for regression results that include covariate estimates.

consistent with the main results. The benefits of CC were shared across race/ethnic groups, but not across socio-economic status.

<Insert Table 7 Here>

Intersectional Effects

Figure 3 describes the effect of implementing the CC for economically advantaged and disadvantaged students from different race/ethnic groups. To produce these estimates, I add interactions between implementing CC, membership in a race/ethnic group, and a measure of economic advantage (FRPL eligibility). For White and Black students, the effect of CC on math outcomes is significantly better for economically advantaged students when compared to economically disadvantaged students. Similar to previous models the results are insignificant for the reading outcomes. However, the effects for economically advantaged Black students on 4th and 8th grade reading are statistically significant. The overall pattern of results is consistent with Table 7. The positive effect of CC was larger for economically advantaged students than economically disadvantaged students.[7]

<Insert Figure 3>

Mechanisms and Local Contexts

Using the NAEP teacher and school survey I tested several characteristics in a mediation framework. The survey items for these questions were only available in three years (2009, 2011, 2013), which allows for only one year of pre-treatment data. I found that none of these variables mediated the effect of CC on student outcomes. Tables 9 and 10 describe the effect of CC on dimensions of teacher's instruction in math and reading.[8] In these models I use a single CC

[7] The estimates here aggregate Hispanic students into a single group. The effects for Mexican, Puerto Rican, Cuban, and other Hispanic students are qualitatively similar. I present just the Hispanic results here for parsimony.
[8] All of the outcomes are standardized with grade/subject and year. The dimensions of teacher's teacher instruction are all Likert scale measures with different numbers of response categories (i.e, 4, 5) and different possible responses.

treatment indicating either preparation for (2011) or implementation of (2013) the CC. Each of the models include district fixed effects and student covariates.

CC is a significant predictor of several aspects of teacher instruction. CC is negatively correlated with differentiated instruction.[9] Differentiated instruction involves tailoring teaching to the needs of individual students. For example, teachers in treated states were significantly less likely to report that they, "set different achievement standards for some students". This finding is consistent with the idea that the CC content standards equalized teacher expectations for students. I hypothesized that if CC increased the expectations that teachers had for students or teacher's used technology in the classroom more frequently then it could improve student outcomes. However, CC is negatively correlated with teacher's use of computers in their classroom. One concern about the CC was that teachers were not given the proper resources to implement changes to content standards. But, math teachers were significantly more likely to report that their school system provided them with materials and other resources they needed for mathematics instruction. In all subjects, CC is associated with teachers participating in more professional development on content standards. Taken together these results suggest that teachers were given the resources they needed to implement the CC content standards in their classrooms. Several other school characteristics were tested as mediators but none were found to mediate the effect of CC.[10]

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[9] I constructed the Differentiated Instruction factor using 5 items, asking to what extent do teachers: Set different achievement standards for some students, Supplement the regular course curriculum with additional material for some students, Have some students engage in different classroom activities, Use a different set of methods in teaching some students, Pace my teaching differently for some students.

[10] School mediators measured the extent a school's program was structured according to: curriculum standards or frameworks, District curriculum standards or curriculum guides, Results from state/district assessment, In-school curriculum frameworks and standards for learning, Results from school assessments, Recommendations from school reading/language arts department, Discretion of individual teachers, and Commercially designed programs.

Long-Term Outcomes

In Table 10, I estimate the effect of CC after 2013, using the NAEP waves from 2015 and 2017. These estimates are biased for two reasons. First, teachers are reacting to the decline in support for the CC among education reformers and state education officials. Starting in 2014, many states made changes to their standards or announced they were considering changes. In this environment, the effect of CC is decreased because of teacher reactions to the policy churn (Hess, 1998). Teachers in states that implemented the standards before this period will be less sensitive because they received treatment when subsequent changes to the CC seemed exceedingly unlikely. But, for teachers in states that were late implementors they could reasonably assume the content standards wouldn't be strictly enforced or revoked quickly. If true then the CC treatment would have no effect on late implementors and early implementing states would see few additional changes relative to 2011 and 2013. The long-term results are consistent with the hypothesis that teachers are reacting to changes in the CC treatment. Descriptively, average scores across all grade/subjects are flat during this period. The event study results in 2015 and 2017 maintain their size and significance. My conclusion that CC appears to have positive effects in 4th grade math and does no harm in other subjects is consistent with the long-term results.

Robustness Checks

Balance on State Capacity

In this study I construct the treatment and comparison groups based on when states choose to implement the CC. If there were systematic differences in the capacity of early implementing and late implementing states then it would bias the effect of CC. Capacity for state education reform is a multifaceted concept (Manna, 2006). To test whether there were differences between treatment and control sates I collected measures of education resources, political capacity, standards-based reforms, and content standards rigor. Using a state level (N=51) dataset I ran bivariate models, where I regressed an indicator for whether states were early or late implementors of the CC on state capacity characteristics that were measured prior to CC. The results from the models are visualized in Appendix Figures A1-A4. The observable differences in state capacity between early and late implementing states is indistinguishable from zero. The document analysis suggests that the availability of the CC assessments influenced when states chose to implement the CC content standards. Test writers were developing and piloting the assessments from 2010 to 2014 and they were first administered in 2015. 47 percent of states that were early implementors of the CC standards choose to use the CC assessments in 2015. Whereas 73 percent of states that were late implementors of the standards chose implement the standards and assessments in the same year (2015). Unobservable differences in capacity to implement content standards may have biased the results. But, the document analysis suggests that states were influenced by the availability of the assessments, which is exogenous prior to 2015.

Balance on Observable Characteristics

The characteristics of students in treatment and comparison group states could have also motivated when states chose to implement the CC. For example, if early implementors of the CC had more students that were academically vulnerable then they may have pursued other changes that could explain improvements in student outcomes. Appendix Table A3 describes results from bivariate models, where I regressed an indicator for whether states were early or late implementors of the CC on student characteristics measured in 2003. All of the differences are either statistically insignificant, quite small (less than 0.05 standard deviations), or fall within the range (0.05 SDs to 0.25 SDs) where covariate adjustment is an appropriate solution (Institute of Education Sciences, 2017). This is consistent with LaVenia, Cohen-Vogel, and Lang (2015) who investigated the innovation and diffusion of CC. They find that student characteristics (i.e. internal determinants) did not influence the adoption of CC.

Endogenous Time-Varying State Policies

Another barrier to obtaining unbiased estimates of the effect of CC is endogenous state policies. State education policies would bias the estimated effect of CC if they were time-varying, implemented at the same time as CC, and correlated with student outcomes. To test whether the positive effects of CC are robust to controlling for other policies I constructed a database of 23 state education policies that were adopted during the period of study (Howell & Magazinnik, 2017; Jordan & Grossmann, 2018). These state policies cover a wide variety of education reforms and include many of the most popular policies adopted by states during this period. Appendix Tables A5 and A6 contain the results from the district fixed effects model with covariates.[11] If adding a state education reform measure as a control attenuates the effect of CC, then it suggests that policy may have accounted for the results. I estimate three versions of each model. The first using the adoption date of a state policy, the second lagging adoption 1 year, and the third lagging adoption 2 years. Lagging adoption simulates a plausible implementation year for these policies which could also confound the effect of CC. Each row contains a specified state education reform that is added as a control. The first two columns contain the results for implementing CC and the year a policy is adopted. The third and fourth columns include the results from lagging the results 1 year and the fifth and sixth columns lagging 2 years. The effects of implementing CC are quite robust to controlling for state education policies. The sign and size of the effect remain virtually unchanged in each of the models.

State Specific Linear Trends

I follow the robustness check recommended by Angrist and Pischke (2008) for DID by adding state-specific linear time trends to the model. This allows each state that implements CC to have a different trend. If the results are robust to the inclusion of the state trends then it mitigates

[11] The results for the reading remain insignificant and about the same size.

my concern that unobserved confounding variables remain. Appendix Table A4, results with district fixed effects, covariates, and state specific linear trends. The effects of CC remain significant for CC implementation in 2013 for 4th grade math but not 8th grade math. This increases my confidence that the CC had an effect on 4th grade student outcomes. The results in these models are also significant for 8th grade reading.

Assessment Alignment

A potential concern is the alignment between the CC standards with the NAEP assessment frameworks. The most salient issue is that "gaming" (i.e., teaching to the test) of state accountability systems would begin to influence NAEP scores contemporaneous with treatment due to alignment with CC (Figlio & Loeb, 2011). Porter and colleagues (2011) find that the NAEP frameworks have significantly higher alignment with the CC than previous state assessments. Alignment between the CC and the NAEP ELA framework was an explicitly stated goal (Common Core State Standards Initiative, 2010). However, Porter et al. (2011) explains that alignment between the NAEP and CC is inflated, because the NAEP assesses content at and below grade level. In addition, the size of CC effects by subject and grade are not correlated with the change in alignment between content standards and the NAEP framework (see Appendix Table A7). The effect of CC is largest for 4th grade math and insignificantly different from zero for reading subjects. Despite the alignment between the NAEP ELA framework and CC there do not appear to be effects on NAEP reading scores. Taken together this pattern suggests that the increased alignment between NAEP and CC does not explain the results here.

Multiple Plausible Values

The NAEP uses a matrix-based assessment where a portion of the full test is administered to each student. An IRT procedure is then used to estimate plausible values of that student's true outcome. In this analysis the dependent variable is the first plausible value. Another approach is to use the first 5 plausible values in a multiple imputation framework (Little & Rubin, 1989). This strategy would account for the variance in the estimates of student learning. Both strategies for using the plausible values yield similar results (Jerrim et al., 2017). Appendix Table A8 includes the results using multiple imputation procedures, which are qualitatively similar to the main results in Tables 4 and 5.

Discussion

CC had a small positive effect on math scores and no detectable effect on reading scores. The benefits of CC were clearest in 4th grade math. Critically, the effect of CC varies across academically vulnerable students. The CC had a large positive effect on Black economically advantaged students across grades and subjects. Academically vulnerable students whose families equipped them with the benefits of high Socio-Economic Status (SES) in the form of economic capital benefitted when the CC raised expectations. However, for students from economically disadvantaged families that faced other barriers to academic success the CC backfired. Demanding better results without addressing the structural issues burdening economically disadvantaged students will at best maintain the status quo. Higher expectations will only help students when low expectations were the lone barrier to academic success.

The positive effect on math outcomes and null results on reading outcomes is consistent with previous research on content standards. The effects of school interventions are frequently larger in math than in reading. Factors like home environment, other coursework, and extracurricular activities have a greater influence on reading relative to math outcomes (Early et al., 2014). In addition, the Principles and Standards for School Mathematics written by the National Council of Teachers of Mathematics (NCTM) may have prepared math teachers for more rigorous content standards. The NCTM standards described principles for learning core mathematics concepts and were conceptually similar to the CC. Teacher training programs and schools have used the NCTM standards for years prior (since 2000) to the CC on a voluntary basis. There is no analogue to the NCTM standards for reading. The NCTM standards likely eased the transition to the CC math, which could in part explain the null results on reading scores.

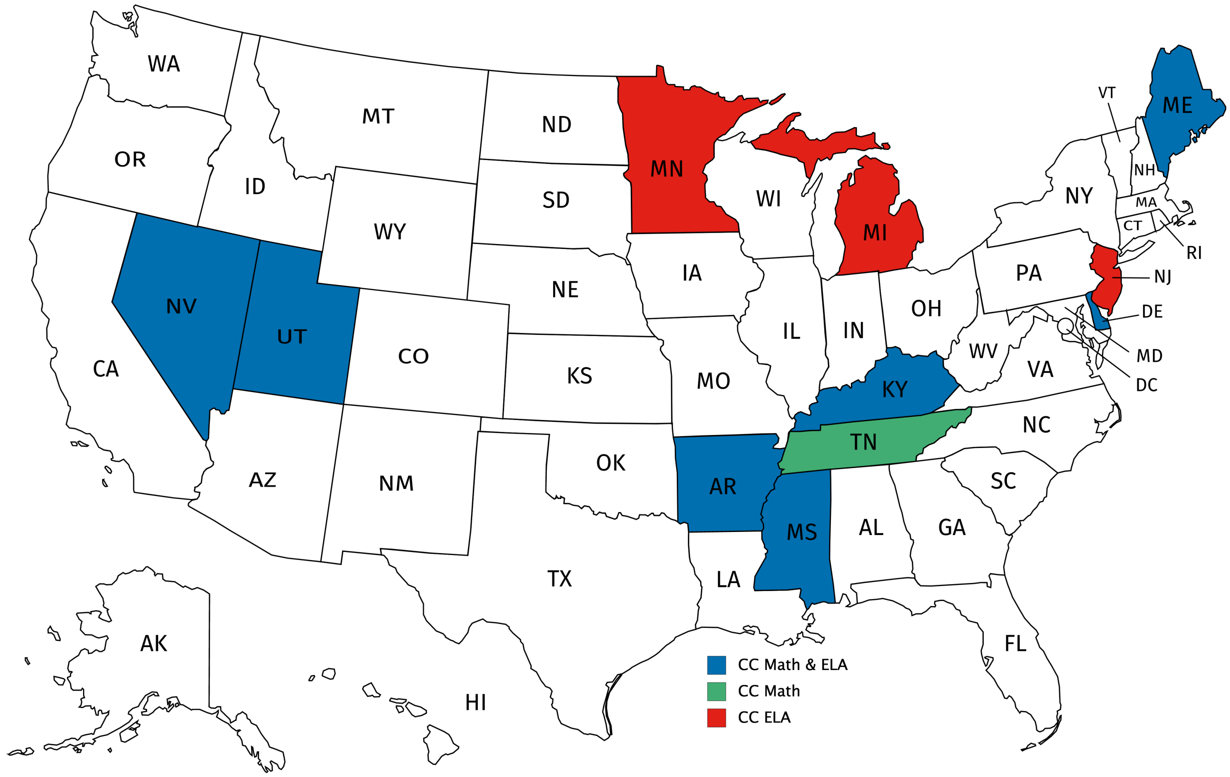
I argued that the CC standards influenced student outcomes through raising teacher expectations for their students. I have a paucity of data to measure teacher expectations. But, the available results do suggest that the implementation of CC is associated with a decrease in differentiated instruction overall and the specific practice of setting different learning goals for students. These results are consistent with the idea that CC causes teachers to raise and equalize their expectations for student learning.

The main implication of these findings is that states that implemented the CC should keep the standards in place. I find no evidence that student outcomes declined due to the implementation of CC. Song, Yang, and Garet (2019) find largely negative effects of the CCR standards, which includes CC implementing states, states that made major revisions, and states that never adopted the CC. The results of both studies are consistent if the negative effects are isolated amongst states that revised or revoked their standards after adopting the CC. Making multiple substantive changes to content standards sends a confusing signal to teachers and schools. States should pick one set of standards and not make additional changes if they encounter implementation challenges. I find the CC increased math outcomes in states that chose to implement the content standards before switching to a new assessment. This suggests that states should focus on implementing one standards-based reform at a time. Conversely, pursuing changes to content standards and assessments at the same time puts too must strain on schools.

There are a few salient limitations of this study. I am unable to estimate long-term effects of the CC on student achievement. It is proper to characterize these results as the initial effects of CC. The generally positive pattern of results persists in 2015 and 2017 for early implementing states. But, the flat outcomes for late implementors suggests that some reaction to treatment biases the estimates. In addition, these effects are attributable to the CC standards and all associated preparation activities (e.g., professional development, coaching, curriculum). This analysis is unable to isolate the effect of just changing the content standards. Finally, it is not possible to rule out that unobservable differences in state capacity to implement content standards account for these outcomes.

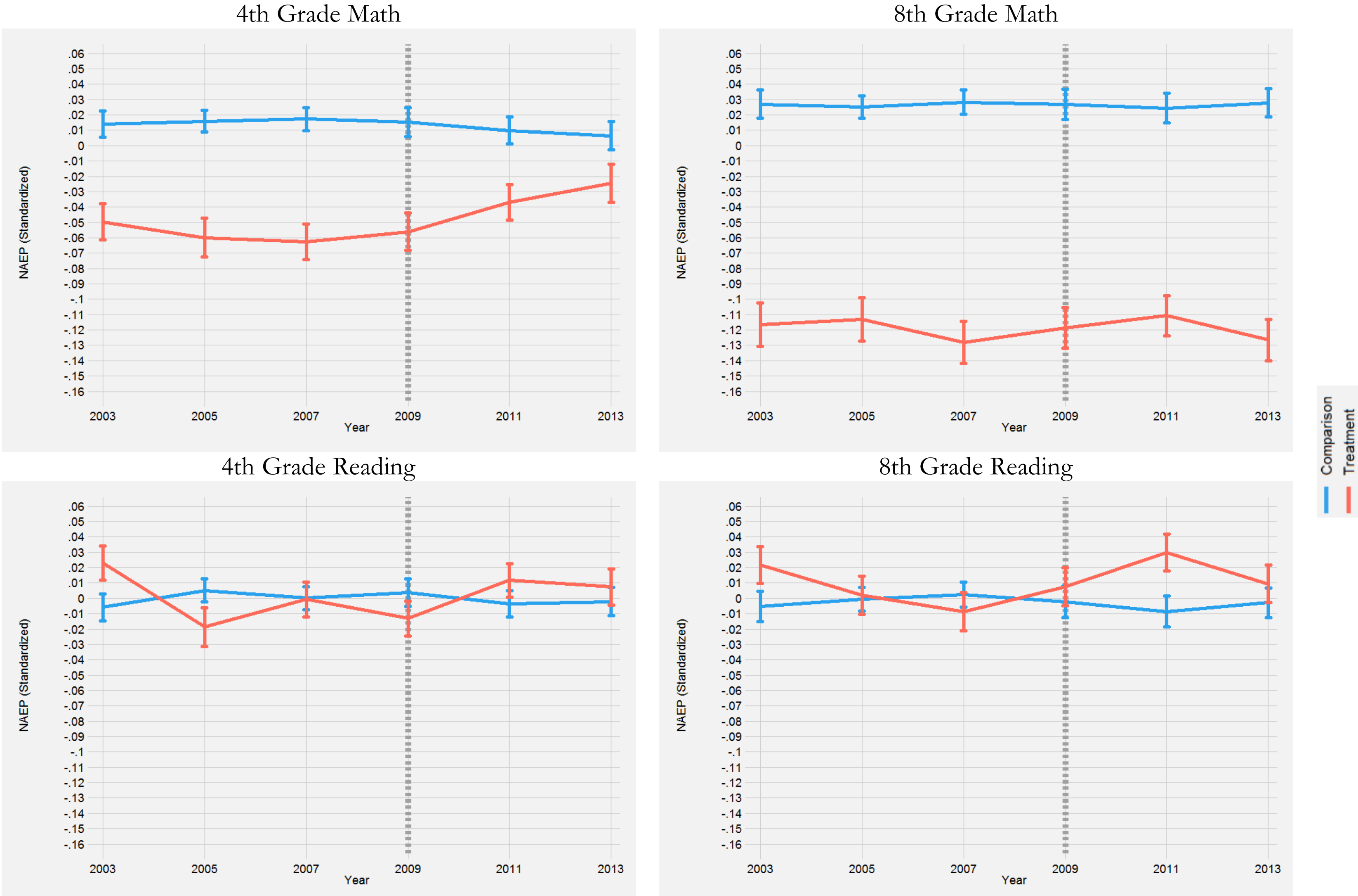
I find that the benefits of CC were isolated amongst economically advantaged students as measured by eligibility for FRPL, which is a noisy measure of Socio-Economic Status. In future research I hope to better understand which forms of economic, social, or cultural capital explain this finding. Another potential line of research would examine how the CC changed teacher instruction via collaboration and autonomy. The CC does not work equally well for all students across schooling contexts. Understanding what causes those differences is key to improving the next generation of content standards.

Figure 1. Implementation of Common Core in English Language Arts and Math by State in 2013



Note: See Appendix Table A2 for the states in the treatment and comparison groups by grade and subject. New Jersey implemented the CC by 2013 in 4th grade math, 4th grade reading, and 8th grade reading, but not 8th grade math.

Figure 2. NAEP Score Trends



Note: The blue line is the comparison group and the red line is the treatment group. Treatment centered on 2009, the last wave prior to adoption of Common Core. Y axis is NAEP student outcomes standardized within subject/grade and year. Estimates adjusted using NAEP student-level probability weights.
Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Figure 3. Common Core Effects by Race/Ethnicity and Economic Disadvantage

Note: Differential effects estimated using the regression model from Table 6 that includes the full set of covariates and district fixed effects. Economically disadvantage defined as student eligible for Free and Reduced-Price Lunch.
Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Table 1. Analytic Sample Characteristics by Year

	2003	**2005**	**2007**	**2009**	**2011**	**2013**	**Total**
States (Treated)							
4th Grade Math	0	0	0	0	8	8	33
8th Grade Math	0	0	0	0	7	7	33
4th Grade Reading	0	0	0	0	10	10	33
8th Grade Reading	0	0	0	0	10	10	33
Districts							
4th Grade Math	1,820	2,480	2,100	2,440	2,090	1,990	12,920
8th Grade Math	1,610	2,200	2,150	2,190	2,130	1,880	12,160
4th Grade Reading	2,200	2,650	2,260	2,650	2,260	2,130	14,150
8th Grade Reading	2,090	2,360	2,360	2,360	2,310	2,040	13,520
Schools							
4th Grade Math	3,360	4,800	4,000	4,910	4,040	3,850	24,960
8th Grade Math	2,510	3,320	3,330	3,410	3,320	2,970	18,860
4th Grade Reading	3,950	4,890	4,090	5,110	4,170	3,920	26,130
8th Grade Reading	3,030	3,410	3,430	3,540	3,470	3,080	19,960
Students							
4th Grade Math	83,040	82,100	95,750	82,330	94,700	84,530	522,450
8th Grade Math	64,720	76,960	74,190	78,640	77,640	78,140	450,290
4th Grade Reading	94,900	81,200	96,040	90,990	100,740	89,030	552,900
8th Grade Reading	78,190	77,860	80,480	81,300	77,410	81,100	476,340

Note: See Appendix Table A2 for the states in the treatment and comparison groups by grade and subject. Appendix Table A2 also describes which states were excluded from the analytic sample. Sample size rounded for the number of districts, schools, and students in accordance with National Center for Education Statistics nondisclosure rules.

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Table 2. Descriptive Statistics

Characteristic	**2003-2009**	**2011**	**2013**
NAEP 4th Grade Math	-0.021	-0.004	0.005
NAEP 8th Grade Math	0.010	0.013	-0.001
NAEP 4th Grade Reading	0.069	0.041	0.040
NAEP 8th Grade Reading	0.094	0.094	0.072
Female	0.495	0.492	0.490
IEP	0.104	0.111	0.122
LEP	0.036	0.045	0.046
FRPL	0.391	0.458	0.477
White	0.617	0.595	0.584
Black	0.148	0.136	0.135
Mexican	0.086	0.100	0.106
Puerto Rican	0.024	0.025	0.024
Cuban	0.012	0.010	0.010
American Indian	0.010	0.010	0.010
Other Race	0.006	0.018	0.023
Modal age for grade; At	0.593	0.593	0.597
Below	0.002	0.002	0.002
Above	0.404	0.406	0.402
School made AYP in 2003	0.632	0.636	0.646
N	1,379,850	355,940	338,080

Note: Sample size rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. NAEP= National Assessment of Educational Progress test score standardized within grade/subject and year, IEP=Individualized Education Plan, LEP=Limited English Proficiency, FRPL=Free and Reduce Price Lunch, PI=Pacific Islander, AYP=Adequate Yearly Progress.

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, “Student and Teacher Survey,” 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Table 3. NAEP Scores Regressed on Common Core, Descriptive Regressions

NAEP Subject/Grade	Math 4	Math 4	Math 8	Math 8
	(1)	(2)	(3)	(4)
CC 2011	0.025	0.026	0.012	0.008
	(0.022)	(0.014)	(0.021)	(0.014)
CC 2013	0.043	0.060***	-0.009	-0.005
	(0.022)	(0.016)	(0.021)	(0.014)
Covariates		X		X
State FE	X	X	X	X
N	1,043,790	891,460	902,140	770,680
Adj R^2	0.032	0.318	0.035	0.351
F	2.10	3287.10	0.33	3984.86

NAEP Grade/Subject	Reading 4	Reading 4	Reading 4	Reading 8
	(5)	(6)	(7)	(8)
CC 2011	0.021	0.012	0.034	0.021
	(0.020)	(0.013)	(0.018)	(0.013)
CC 2013	0.016	0.005	0.007	0.006
	(0.021)	(0.013)	(0.018)	(0.013)
Covariates		X		X
State FE	X	X	X	X
N	1,042,660	917,430	900,490	793,900
Adj R^2	0.029	0.314	0.027	0.324
F	0.74	3776.67	1.84	4160.81

Note: See Appendix Table A2 for the states in the treatment and comparison groups by grade and subject. Covariates includes Female, Individual Education Plan, Limited English Proficiency, race/ethnicity, modal age for grade, school AYP status in 2003, and lagged average state scores. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, Adj=Adjusted FE=Fixed Effect. *p < 0.05, **p<0.01, ***p<0.001.

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Table 4. Effect of Common Core on NAEP Scores, Math

4th Grade Math	(1)	(2)	(3)	(4)
CC 2011	0.031	0.043*	0.033	0.050**
	(0.024)	(0.017)	(0.019)	(0.016)
CC 2013	0.088***	0.106***	0.078***	0.104***
	(0.025)	(0.018)	(0.020)	(0.017)
Covariates		X		X
State FE	X	X		
District FE			X	X
N	592,270	522,500	592,170	522,450
Adj R^2	0.030	0.306	0.172	0.350
F	6.45	2194.78	7.55	2026.47
8th Grade Math	(5)	(6)	(7)	(8)
CC 2011	0.023	0.031	0.037*	0.045**
	(0.021)	(0.016)	(0.017)	(0.015)
CC 2013	0.049*	0.035*	0.060***	0.044**
	(0.021)	(0.016)	(0.018)	(0.015)
Covariates		X		X
State FE	X	X		
District FE			X	X
N	519,860	450,320	519,810	450,280
Adj R^2	0.030	0.329	0.157	0.368
F	2.95	2610.81	6.69	2548.42

Note: Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, Adj=Adjusted FE=Fixed Effect. *p < 0.05, **p<0.01, ***p<0.001.

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Table 5. Effect of Common Core on NAEP Scores, Reading

4th Grade Reading	(1)	(2)	(3)	(4)
CC 2011	0.027	0.012	0.015	0.003
	(0.021)	(0.014)	(0.016)	(0.013)
CC 2013	0.008	0.014	0.003	0.013
	(0.023)	(0.016)	(0.017)	(0.015)
Covariates		X		X
State FE	X	X		
District FE			X	X
N	615,880	552,960	615,770	552,890
Adj R^2	0.018	0.299	0.135	0.332
F	0.86	2599.18	0.46	2447.76
8th Grade Reading	(5)	(6)	(7)	(8)
CC 2011	0.034	0.014	0.026	0.017
	(0.020)	(0.015)	(0.015)	(0.014)
CC 2013	0.029	0.008	0.029	0.016
	(0.021)	(0.015)	(0.016)	(0.014)
Covariates		X		X
State FE	X	X		
District FE			X	X
N	538,550	476,370	538,480	476,330
Adj R^2	0.018	0.299	0.125	0.333
F	1.97	2794.63	2.56	2675.90

Note: Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, Adj=Adjusted FE=Fixed Effect. $^{*}p < 0.05$, $^{**}p<0.01$, $^{***}p<0.001$.

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Table 6. Effect of Common Core on NAEP Scores, Event Study

NAEP Subject/Grade	Math 4	Math 8	Read 4	Read 8
	(1)	(2)	(3)	(4)
Pre-Treatment 2003	-0.035	-0.032	0.007	0.026
	(0.021)	(0.018)	(0.018)	(0.019)
Pre-Treatment 2005	-0.006	0.003	0.020	0.005
	(0.020)	(0.017)	(0.017)	(0.018)
Pre-Treatment 2007	0.001	0.008	0.023	-0.024
	(0.018)	(0.017)	(0.017)	(0.017)
Post-Treatment 2011	0.041*	0.041*	0.015	0.018
	(0.019)	(0.018)	(0.016)	(0.017)
Post-Treatment 2013	0.095***	0.040*	0.025	0.018
	(0.020)	(0.018)	(0.018)	(0.018)
Covariates	X	X	X	X
District FE	X	X	X	X
N	522,450	450,280	552,890	476,330
Adj R^2	0.350	0.368	0.332	0.333
F	1753.72	2204.83	2114.62	2311.99

Note: Reference category is the last wave prior to adoption (2009). Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, Adj=Adjusted FE=Fixed Effect. *p < 0.05, **p<0.01, ***p<0.001.
Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Table 7. Differential Effects of Common Core on NAEP Scores for Academically Vulnerable Students

NAEP Subject/Grade	Math 4	Math 8	Read 4	Read 8
	(1)	(2)	(3)	(4)
CC 2013	0.106***	0.050*	-0.011	0.003
	(0.022)	(0.020)	(0.017)	(0.015)
CC 2013 x Black	0.051*	0.046	0.062**	0.046
	(0.026)	(0.028)	(0.022)	(0.025)
CC 2013 x Hispanic	0.157***	0.164***	0.031	0.084**
	(0.032)	(0.031)	(0.028)	(0.029)
CC 2013 x Asian	0.084	0.188**	0.061	0.037
	(0.047)	(0.057)	(0.037)	(0.041)
CC 2013 x American Indian	0.005	0.326***	-0.051	-0.080
	(0.126)	(0.086)	(0.118)	(0.111)
CC 2013 x FRPL	-0.059**	-0.076***	0.013	-0.017
	(0.020)	(0.019)	(0.016)	(0.016)
Covariates	X	X	X	X
District FE	X	X	X	X
N	522,450	450,280	552,890	476,330
Adj R^2	0.354	0.365	0.333	0.328
F	1782.63	2177.24	2154.13	2275.67

Note: Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, Adj=Adjusted FE=Fixed Effect. $^{*}p < 0.05$, $^{**}p<0.01$, $^{***}p<0.001$.

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Table 8. Effects of CC on Teachers Characteristics, Math

	4th Grade Math				
	(1)	(2)	(3)	(4)	(5)
Outcome	Computer Usage	Subject Emphasis	Differentiated Instruction	Instructional Time	PD Content Standards
CC	-0.0021	0.0352*	-0.033*	0.0199*	0.006*
	(0.0036)	(0.0027)	(0.0036)	(0.0029)	(0.0027)
	(6)	(7)	(8)	(9)	(10)
Outcome	Instructional Resources	Discuss current performance	Set goals	Determine adjustments	Achievement Standards
CC	0.0179*	-0.0023	-0.0056	-0.0069	-0.0334*
	(0.0038)	(0.0036)	(0.0036)	(0.0037)	(0.0037)

	8th Grade Math				
	(11)	(12)	(13)	(14)	(15)
Outcome	Computer Usage	Subject Emphasis	Differentiated Instruction	Instructional Time	PD Content Standards
CC	-0.0254*	-0.0311*	-0.0692*	-0.0159*	0.0153*
	(0.0042)	(0.0044)	(0.0042)	(0.0037)	(0.0031)
	(16)	(17)	(18)	(19)	(20)
Outcome	Instructional Resources	Discuss current performance	Set goals	Determine adjustments	Achievement Standards
CC	0.0197*	-0.0177*	-0.027*	-0.029*	-0.0715*
	(0.0044)	(0.0042)	(0.0044)	(0.0043)	(0.0043)

Note: CC is estimated effect pooled across 2011 and 2013. Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Models 1 through 10 use the 4th grade math sample and Models 11 through 20 use the 8th grade math sample. Standard errors are robust to clustering by school. All regressions include district fixed effects and covariates. Computer Usage, Subject Emphasis, and Differentiated Instruction are factors constructed from several survey questions. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, Adj=Adjusted FE=Fixed Effect. $^{*}p < 0.05$, $^{**}p<0.01$, $^{***}p<0.001$.

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Table 9. Effects of CC on Teachers Characteristics, Reading

4th Grade Reading

	(1)	(2)	(3)	(4)	(5)
Outcome	Computer Usage	Subject Emphasis	Differentiated Instruction	Instructional Time	PD Content Standards
CC	-0.0113*	0.0265*	-0.0285*	0.0119*	0.0008
	(0.0032)	(0.0031)	(0.0031)	(0.0025)	(0.0032)
	(6)	(7)	(8)	(9)	(10)
Outcome	Instructional Resources	Discuss current performance	Set goals	Determine adjustments	Achievement Standards
CC	0.0032	-0.0132*	-0.0133*	-0.0111*	-0.0256*
	(0.0033)	(0.0039)	(0.004)	(0.0038)	(0.0033)

8th Grade Reading

	(11)	(12)	(13)	(14)	(15)
Outcome	Computer Usage	Subject Emphasis	Differentiated Instruction	Instructional Time	PD Content Standards
CC	-0.0268*	0.036*	-0.0285*	-0.0135*	0.0169*
	(0.0036)	(0.0038)	(0.0036)	(0.003)	(0.0037)
	(16)	(17)	(18)	(19)	(20)
Outcome	Instructional Resources	Discuss current performance	Set goals	Determine adjustments	Achievement Standards
CC	-0.0002	-0.0175*	-0.0213*	-0.0157*	-0.0243*
	(0.004)	(0.0046)	(0.0045)	(0.0045)	(0.0037)

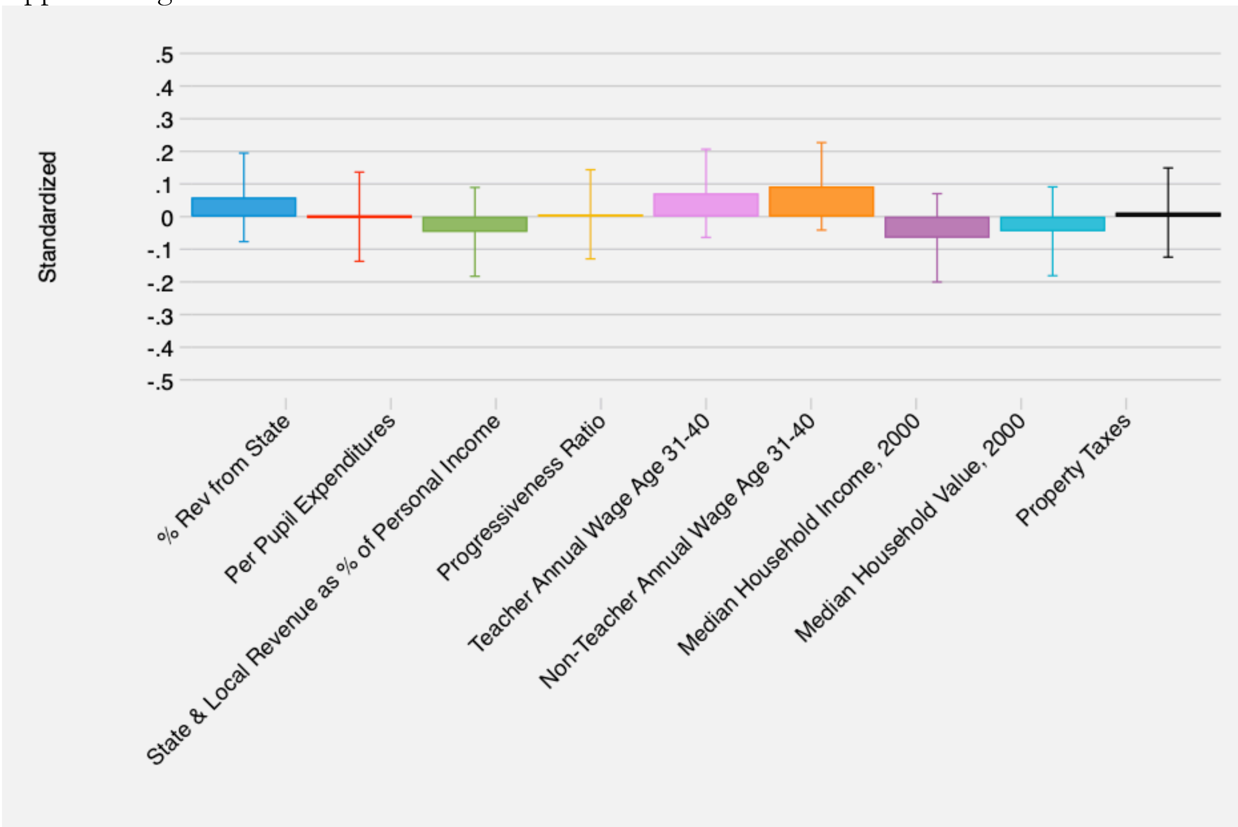
Note: CC is estimated effect pooled across 2011 and 2013. Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Models 1 through 10 use the 4th grade reading sample and Models 11 through 20 use the 8th grade reading sample. Standard errors are robust to clustering by school. All regressions include district fixed effects and covariates. Computer Usage, Subject Emphasis, and Differentiated Instruction are factors constructed from several survey questions. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. *$p < 0.05$, **$p<0.01$, ***$p<0.001$.
Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Table 10. Effect of Common Core on NAEP Scores, Long-Term Outcomes

NAEP Subject/Grade	Math 4	Math 8	Reading 4	Reading 8
	(1)	(2)	(3)	(4)
2003	-0.035	-0.026	0.013	0.029
	(0.021)	(0.018)	(0.018)	(0.018)
2005	-0.005	0.005	0.023	0.007
	(0.019)	(0.017)	(0.017)	(0.017)
2007	0.001	0.009	0.020	-0.018
	(0.018)	(0.017)	(0.017)	(0.017)
2011	0.042*	0.041*	0.014	0.025
	(0.019)	(0.017)	(0.016)	(0.017)
2013	0.097***	0.036*	0.024	0.014
	(0.020)	(0.018)	(0.017)	(0.018)
2015	0.093***	0.045*	-0.003	0.010
	(0.021)	(0.020)	(0.018)	(0.018)
2017	0.070**	0.069***	0.025	0.012
	(0.022)	(0.019)	(0.018)	(0.018)
Covariates	X	X	X	X
District FE	X	X	X	X
N	656,240	584,150	676,840	599,330
Adj R^2	0.351	0.371	0.340	0.338
F	1816.10	2175.84	2449.70	2659.26

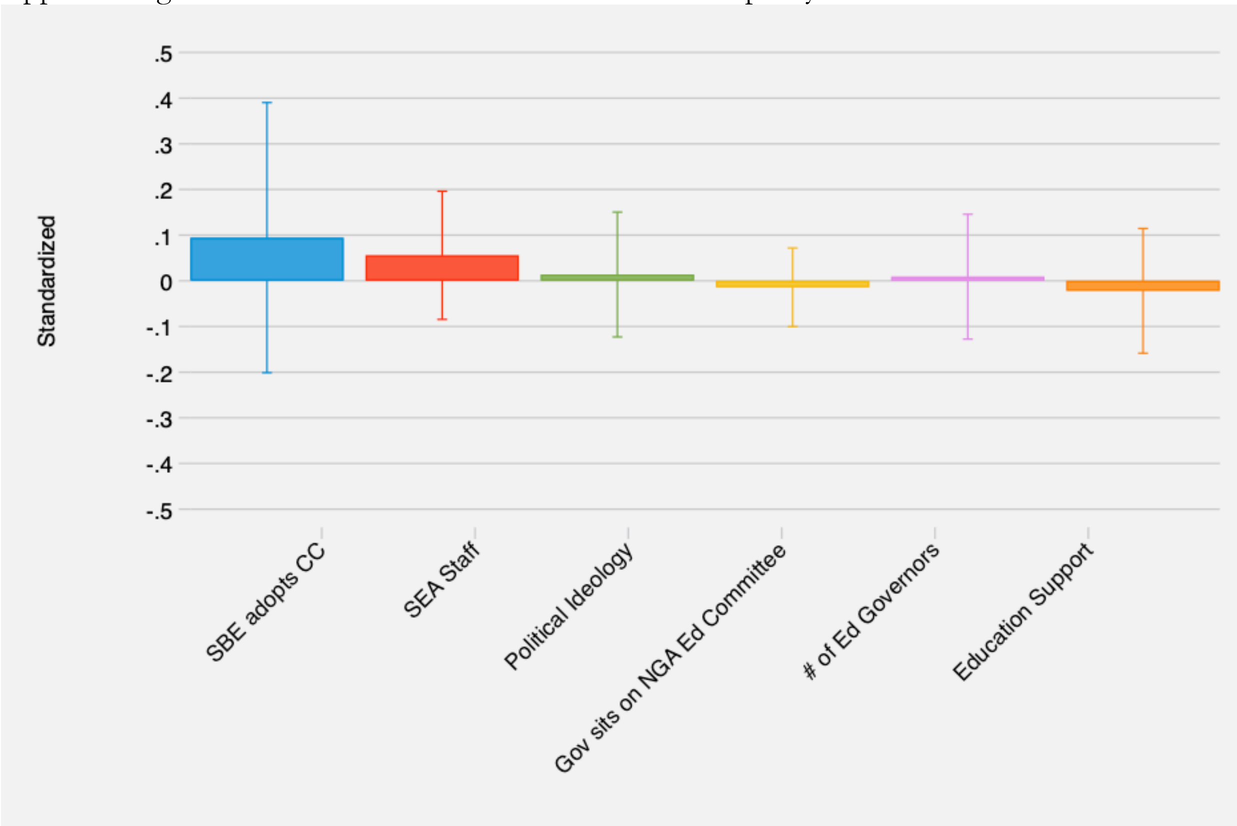
Note: Reference category is the last wave prior to adoption (2009). Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards. See Appendix Table A2 for detailed exclusion criteria. Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, Adj=Adjusted FE=Fixed Effect. *p < 0.05, **p<0.01, ***p<0.001.
Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013, 2014-2015, 2016-2017.

Appendix Figure A1. Pre-Treatment Balance on Educational Resources



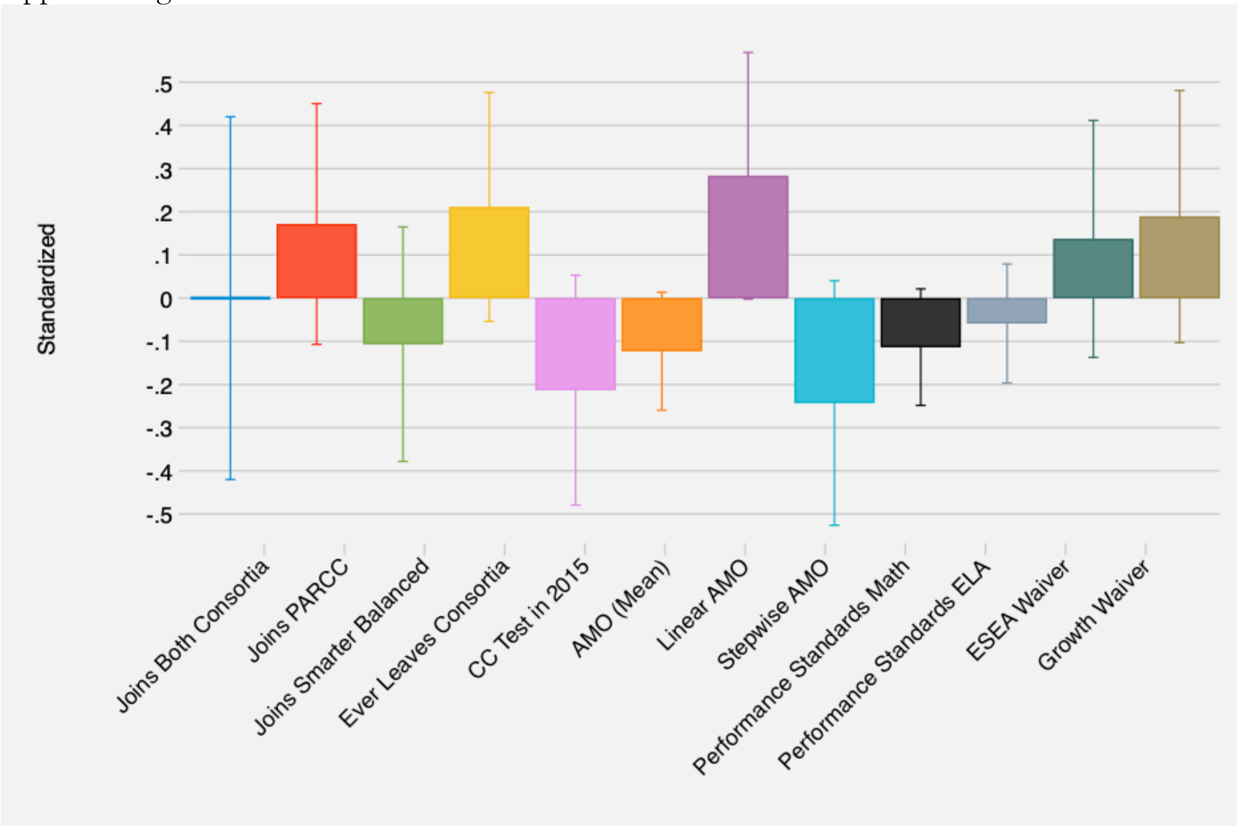
Note: Estimates are from state level models (N=51) where I regress an indicator for whether a state implements CC by 2013 on each state characteristic. Each characteristic is a state average from 2009 except for Median Household Income and Value, which were measured in 2000. Education resource data from School Funding Fairness Data System (Baker et al., 2020).

Appendix Figure A2. Pre-Treatment Balance on Political Capacity



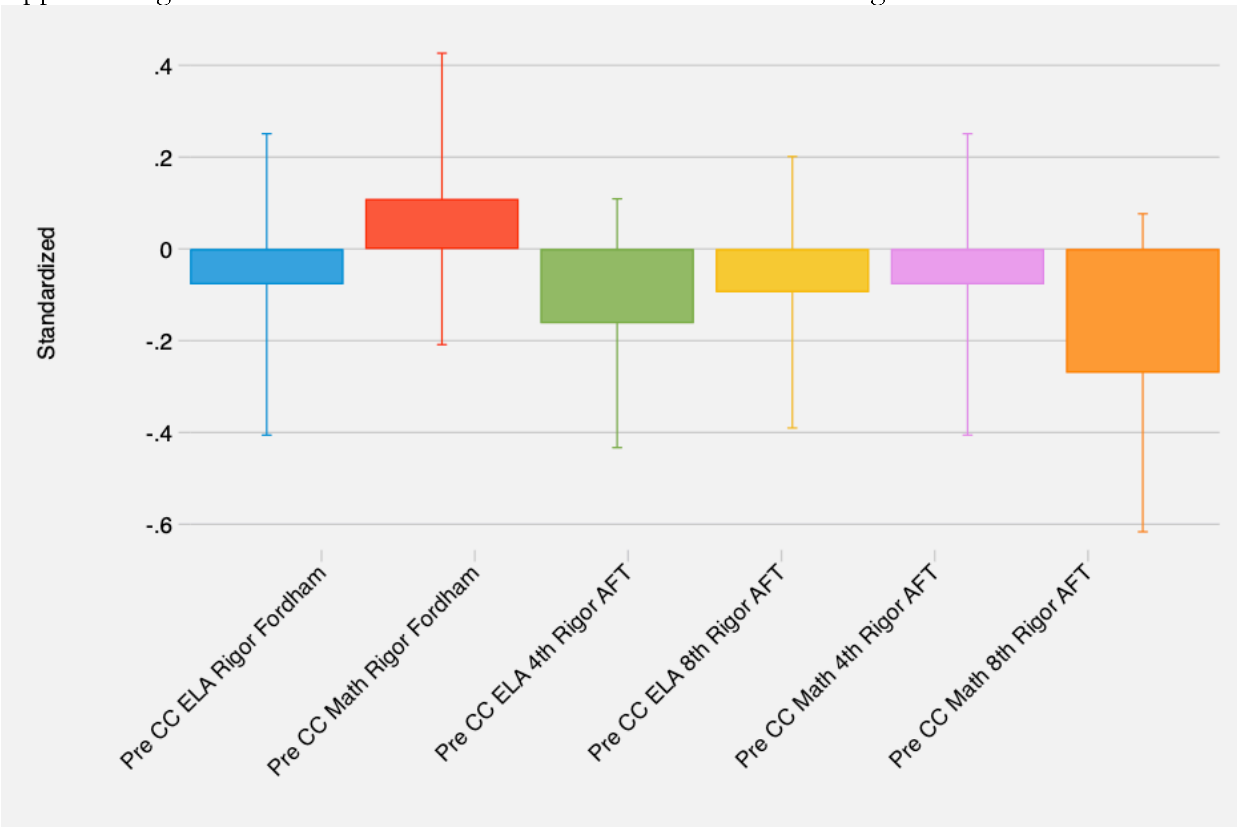
Note: Estimates are from state level models (N=51) where I regress an indicator for whether a state implements CC by 2013 on each state characteristic. Political capacity data were collected from several sources: CC adopting institution (NCSL, 2020), State Education Agency staff in 2011 (C. Brown et al., 2011), support for education spending (American National Election Studies, 2013).

Appendix Figure A3. Pre-Treatment Balance on Standards-Based Reforms



Note: Coefficients are from state level models (N=51). I regressed an indicator for whether a state implements CC by 2013 on each state characteristic. I collected data on CC consortia and assessments collective from state reports on summative assessments (Salazar, 2014; Woods, 2015, 2018) and data on the state accountability systems CSSO and Education Department reports (Erpenbach, 2008, 2008, 2011; Erpenbach et al., 2003; Erpenbach & Forte, 2005, 2007; Fast & Erpenbach, 2004; Forte & Erpenbach, 2006; Hoffer et al., 2011; U.S. Department of Education, 2017, 2020).

Appendix Figure A4. Pre-Treatment Balance on Content Standards Rigor



Note: Coefficients are from state level models (N=51). I regressed an indicator for whether a state implements CC by 2013 on each state characteristic. Data on content standards rigor were collective from studies of content standards (AFT, 2006; Carmichael et al., 2010).

Appendix Table A1. Standards Rigor, Adoption, and Implementation 2003-2017

State	Pre-CC Rigor Math	Pre-CC Rigor ELA	Adoption	CC Math	CC ELA	Withdrawal/Revise
Alabama	B+	B	Nov-10	2013	2014	
Alaska	D	F	Never	Never	Never	
Arizona	B	B	Jun-10	2014	2013	Dec-16
Arkansas	C	D	Jul-10	2013	2013	Apr-16
California	A	A	Aug-10	2015	2015	
Colorado	C	B+	Dec-10	2014	2014	Aug-14
Connecticut	D	D	Jul-10	2014	2014	
Delaware	B	F	Aug-10	2013	2013	
DC	A	A	Jul-10	2013	2012	
Florida	A	B	Jul-10	2015	2015	Jan-19
Georgia	A-	B+	Jul-10	2013	2013	
Hawaii	C	C	Jun-10	2014	2014	
Idaho	B	C	Jan-11	2014	2014	
Illinois	D	D	Jun-10	2014	2014	
Indiana	A	A	Aug-10	Never	Never	Mar-14
Iowa	C	F	Jul-10	2015	2015	
Kansas	F	C	Oct-10	2014	2014	
Kentucky	D	D	Feb-10	2012	2012	
Louisiana	C	B+	Jul-10	2014	2014	Mar-16
Maine	C	C	Apr-11	2013	2013	
Maryland	D	C	Jun-10	2014	2014	
Massachusetts	B+	A-	Jul-10	2014	2014	
Michigan	A-	D	Jun-10	2013	2013	
Minnesota	B	C	Sep-10	Never	2013	
Mississippi	C	D	Jul-10	2013	2013	
Missouri	D	D	Jun-10	2015	2015	Apr-16
Montana	F	F	Nov-11	2014	2014	

Nebraska	C	F	Never	Never	Never	
Nevada	C	C	Jun-10	2012	2012	
New Hampshire	D	C	Jul-10	2014	2014	
New Jersey	C	C	Jun-10	4th-2013;8th-2014	2013	May-16
New Mexico	C	C	Oct-10	2014	2014	
New York	B	C	Jul-10	2013	2013	Dec-15
North Carolina	D	D	Jun-10	2013	2013	Jul-14
North Dakota	C	D	Jun-10	2014	2014	May-16
Ohio	C	C	Jun-10	2014	2014	
Oklahoma	B+	B+	Jun-10	Never	Never	Jun-14
Oregon	B+	C	Oct-10	2015	2015	
Pennsylvania	F	D	Jul-10	2014	2014	Sep-14
Rhode Island	D	D	Jul-10	2014	2014	
South Carolina	C	D	Jul-10	2015	2015	May-14
South Dakota	C	C	Nov-10	2015	2015	Mar-18
Tennessee	C	A-	Jul-10	2013	2014	May-15
Texas	C	A-	Never	Never	Never	
Utah	A-	C	Aug-10	2013	2013	
Vermont	F	D	Aug-10	2014	2014	
Virginia	C	B+	Never	Never	Never	
Washington	A	C	Jun-12	2015	2015	
West Virginia	B	D	May-10	2015	2015	Dec-15
Wisconsin	F	D	Jun-10	2015	2015	
Wyoming	F	D	Jun-12	2015	2015	

Note: Pre-CC Rigor Math/Pre-CC Rigor ELA describes the rigor or state content standards in Math and ELA prior to the adoption of Common Core in 2010 (Carmichael et al., 2010). Adoption is the month and year a state adopted the CC. CC Math/CC ELA is the Spring from the school year that states required teachers to align instruction with the CC in either Math or ELA. Withdrawal/Revise is the date that a state either withdrew from or made major revisions to the CC.

Appendix Table A2. Treatment, Comparison, and Excluded States by State, Grade, and Subject

State	**Math 4th Grade**	**Math 8th Grade**	**Read 4th Grade**	**Read 8th Grade**
Alabama	Excluded †	Excluded †	Excluded †	Excluded †
Alaska	Excluded ±	Excluded ±	Excluded ±	Excluded ±
Arizona	Comparison	Comparison	Excluded †	Excluded †
Arkansas	Treatment	Treatment	Treatment	Treatment
California	Excluded †	Excluded †	Excluded †	Excluded †
Colorado	Excluded ‡	Excluded ‡	Excluded †/‡	Excluded †/‡
Connecticut	Comparison	Comparison	Comparison	Comparison
Delaware	Treatment	Treatment	Treatment	Treatment
DC	Excluded †	Excluded †	Excluded †	Excluded †
Florida	Excluded †	Excluded †	Excluded †	Excluded †
Georgia	Excluded †	Excluded †	Excluded †	Excluded †
Hawaii	Comparison	Comparison	Comparison	Comparison
Idaho	Comparison	Comparison	Comparison	Comparison
Illinois	Comparison	Comparison	Comparison	Comparison
Indiana	Excluded †	Excluded †	Excluded †	Excluded †
Iowa	Comparison	Comparison	Comparison	Comparison
Kansas	Comparison	Comparison	Comparison	Comparison
Kentucky	Treatment	Treatment	Treatment	Treatment
Louisiana	Comparison	Comparison	Excluded †	Excluded †
Maine	Treatment	Treatment	Treatment	Treatment
Maryland	Comparison	Comparison	Comparison	Comparison
Massachusetts	Excluded †	Excluded †	Excluded †	Excluded †
Michigan	Excluded †	Excluded †	Treatment	Treatment
Minnesota	Comparison	Comparison	Treatment	Treatment
Mississippi	Treatment	Treatment	Treatment	Treatment
Missouri	Comparison	Comparison	Comparison	Comparison
Montana	Comparison	Comparison	Comparison	Comparison
Nebraska	Comparison	Comparison	Comparison	Comparison
Nevada	Treatment	Treatment	Treatment	Treatment
New Hampshire	Comparison	Comparison	Comparison	Comparison

New Jersey	Treatment	Comparison	Treatment	Treatment
New Mexico	Comparison	Comparison	Comparison	Comparison
New York	Excluded ‡	Excluded ‡	Excluded ‡	Excluded ‡
North Carolina	Excluded ‡	Excluded ‡	Excluded ‡	Excluded ‡
North Dakota	Comparison	Comparison	Comparison	Comparison
Ohio	Comparison	Comparison	Comparison	Comparison
Oklahoma	Excluded †	Excluded †	Excluded †	Excluded †
Oregon	Excluded †	Excluded †	Comparison	Comparison
Pennsylvania	Excluded ‡	Excluded ‡	Excluded ‡	Excluded ‡
Rhode Island	Comparison	Comparison	Comparison	Comparison
South Carolina	Comparison	Comparison	Comparison	Comparison
South Dakota	Comparison	Comparison	Comparison	Comparison
Tennessee	Treatment	Treatment	Excluded †	Excluded †
Texas	Excluded ±	Excluded ±	Excluded ±	Excluded ±
Utah	Excluded †	Excluded †	Treatment	Treatment
Vermont	Comparison	Comparison	Comparison	Comparison
Virginia	Comparison	Comparison	Excluded †	Excluded †
Washington	Excluded †	Excluded †	Comparison	Comparison
West Virginia	Comparison	Comparison	Comparison	Comparison
Wisconsin	Comparison	Comparison	Comparison	Comparison
Wyoming	Comparison	Comparison	Comparison	Comparison

Note: Treatment indicates that a state implemented CC for a specified subject and grade. Treatment states implemented in 2012 or 2013. Implementing states required teachers to align their instruction with the CC in a specified grade and subject. The specific implementation years are available in Appendix Table A1. The comparison group is all states that implement the treatment after 2013 , did not make major revisions to their standards from 2010-2015, and had low rigor standards. Excluded †=Pre-CC standards high indicates that a state was excluded from either the treatment or comparison group because pre-treatment standards rigor was too high (Carmichael et al., 2010). Excluded ‡=Major Reviser indicates that a state was excluded from either the treatment or comparison group because the state made a major revision the standards (2010-2015). Excluded ±=Alternate CCR indicates that a state was excluded from either the treatment or comparison group because the states implemented another set of College and Career Ready standards that differed substantively from the CC.

Appendix Table A3. Pre-Treatment Balance on Student Characteristics

Characteristic	**4th Grade Math**	**8th Grade Math**	**4th Grade Reading**	**8th Grade Reading**
Female	0.0015	0.0012	0.0022	-0.005
IEP	-0.0222*	-0.012	-0.0497*	-0.0239*
LEP	-0.0857*	-0.0743*	0.013	0.0079
FRPL	0.0538*	0.0573*	0.0058	0.0205
White	0.0167	0.0238*	-0.0091	-0.0257
Black	0.0568*	0.0425*	0.037	0.0583*
Mexican/Chicano	-0.0389*	-0.0646*	-0.037*	-0.0542*
Asian/PI	-0.0689*	-0.0605*	0.0286	0.0581
Puerto Rican	0.0523*	0.0312	0.0399*	0.0498
Cuban	-0.1459*	-0.1491*	-0.1157*	-0.0192
American Indian	-0.0663*	-0.0709*	-0.142*	-0.1759*
Modal age for grade; At	-0.0183*	-0.0188*	0.0251*	0.0302*
Below	-0.0567*	0.0178	-0.0149	0.1008*
Above	0.0189*	0.0186*	-0.025*	-0.0315*
School made AYP in 2003	-0.0766*	-0.0282	-0.0422	0.0078

Note: Estimates from models where I regressed an indicator for whether a state implements CC by 2013 on each student characteristic or school characteristics in 2003. Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. *$p < 0.05$

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Appendix Table A4. Robustness to State Specific Linear Trends

NAEP Subject/Grade	Math 4	Math 8	Read 4	Read 8
CC 2011	0.029	0.021	-0.011	0.048*
	(0.022)	(0.020)	(0.019)	(0.019)
CC 2013	0.069*	0.011	-0.006	0.065**
	(0.027)	(0.025)	(0.024)	(0.024)
Covariates	X	X	X	X
District FE	X	X	X	X
N	522,450	450,280	552,890	476,330
Adj R2	0.351	0.368	0.333	0.334
F	2018.96	2550.42	2437.22	2684.23

Note: Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, Adj=Adjusted FE=Fixed Effect. *$p < 0.05$, **$p<0.01$, ***$p<0.001$.

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Appendix Table A5. Robustness to State Policies, 4th Grade Math

	Adoption		Lagged 1 Year		Lagged 2 Year	
State Policy	**CC 2011**	**CC 2013**	**CC 2011**	**CC 2013**	**CC 2011**	**CC 2013**
Annual Teacher Evaluations	0.0424*	0.0955*	0.0401*	0.0995*	0.0505*	0.0931*
Common Assessments	0.0491*	0.1027*	0.0491*	0.1031*	0.0518*	0.1031*
Statewide Data System	0.0499*	0.1041*	0.0486*	0.1027*	0.0572*	0.1054*
Data System with Identifiers	0.0421*	0.0926*	0.0552*	0.1016*	0.0643*	0.1013*
Evaluation Firing	0.0485*	0.1036*	0.0509*	0.0867*	0.0509*	0.0771*
Eval PD	0.0486*	0.1052*	0.0774*	0.1082*	0.0531*	0.1018*
Eval compensation	0.0465*	0.1017*	0.0321*	0.0991*	0.0516*	0.0989*
Eval Responsibility	0.0495*	0.1024*	0.047*	0.1023*	0.0497*	0.1024*
Eval Grant Tenure	0.0552*	0.1085*	0.0556*	0.1057*	0.0492*	0.1114*
Eval has Multiple Categories	0.0432*	0.1039*	0.0717*	0.1138*	0.0549*	0.0905*
Evaluation Uses Student Growth	0.0499*	0.1059*	0.0511*	0.1135*	0.0521*	0.1038*
Charter Authorizer	0.0497*	0.1149*	0.0483*	0.0976*	0.047*	0.1017*
Charter Building Funds	0.049*	0.1027*	0.0485*	0.1026*	0.0485*	0.1026*
Charter Cap	0.0489*	0.1033*	0.0539*	0.0964*	0.0499*	0.105*
School Turnaround	0.0558*	0.1057*	0.0508*	0.105*	0.0519*	0.0988*
Evaluation Growth Targets	0.0542*	0.1062*	0.052*	0.1126*	0.0505*	0.1085*
Alt Certification Pathways	0.036*	0.0904*	0.0503*	0.0894*	0.0503*	0.0894*
Alt Preparation Programs	0.0506*	0.1046*	0.0474*	0.1016*	0.0474*	0.1016*
Vouchers	0.0498*	0.0972*	0.0499*	0.1015*	0.0497*	0.1039*
High School Exit Exams	0.0476*	0.1017*	0.0484*	0.1025*	0.0369*	0.0901*
Teacher Evaluation	0.05*	0.1058*	NA	NA	NA	NA
School Finance Reform	0.0484*	0.1027*	NA	NA	NA	NA
Full Day Kindergarten	0.0495*	0.104*	NA	NA	NA	NA

Note: Estimates are the effect of CC after a control for a time variant state policy is added as a covariate. NA indicates that a policy was adopted in 2012 or later. Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. $^{*}p < 0.05$.

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Appendix Table A6. Robustness to State Policies, 8th Grade Math

	Adoption		Lagged 1 Year		Lagged 2 Year	
State Policy	**CC 2011**	**CC 2013**	**CC 2011**	**CC 2013**	**CC 2011**	**CC 2013**
Annual Teacher Evaluations	0.0504*	0.0509*	0.0506*	0.0458*	0.0447*	0.0473*
Common Assessments	0.045*	0.0446*	0.0445*	0.0437*	0.0451*	0.0438*
Statewide Data System	0.0434*	0.0424*	0.0444*	0.0437*	0.0471*	0.0446*
Data System with Identifiers	0.0442*	0.0428*	0.044*	0.0447*	0.0437*	0.0445*
Evaluation Firing	0.0421*	0.043*	0.0452*	0.0411*	0.0455*	0.0197
Eval PD	0.0425*	0.0446*	0.058*	0.0463*	0.0479*	0.0395*
Eval compensation	0.0405*	0.0406*	0.0384*	0.0421*	0.0454*	0.0393*
Eval Responsibility	0.0458*	0.0466*	0.0492*	0.0468*	0.0459*	0.0468*
Eval Grant Tenure	0.0365*	0.0367*	0.0497*	0.0451*	0.0457*	0.0404*
Eval has Multiple Categories	0.0401*	0.0436*	0.0485*	0.046*	0.0476*	0.0351*
Evaluation Uses Student Growth	0.0445*	0.0465*	0.0462*	0.048*	0.0474*	0.0439*
Charter Authorizer	0.045*	0.0449*	0.0447*	0.0422*	0.0431*	0.0427*
Charter Building Funds	0.0457*	0.0457*	0.0456*	0.045*	0.0456*	0.045*
Charter Cap	0.0486*	0.0473*	0.0463*	0.0415*	0.0447*	0.0449*
School Turnaround	0.0523*	0.0466*	0.0494*	0.0491*	0.044*	0.0468*
Evaluation Growth Targets	0.0513*	0.0464*	0.0461*	0.0475*	0.0451*	0.0491*
Alt Certification Pathways	0.0503*	0.0492*	0.045*	0.046*	0.045*	0.046*
Alt Preparation Programs	0.0493*	0.0467*	0.0535*	0.0527*	0.0535*	0.0527*
Vouchers	0.0442*	0.032*	0.0447*	0.04*	0.0439*	0.0434*
High School Exit Exams	0.05*	0.0496*	0.0486*	0.0482*	0.0474*	0.0474*
Teacher Evaluation	0.0451*	0.0436*	NA	NA	NA	NA
School Finance Reform	0.0466*	0.0464*	NA	NA	NA	NA
Full Day Kindergarten	0.0427*	0.042*	NA	NA	NA	NA

Note: Estimates are the effect of CC after a control for a time variant state policy is added as a covariate. NA indicates that a policy was adopted in 2012 or later. Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. *$p < 0.05$

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Appendix Table A7. CC Effects by Grade and Subject

NAEP Subject/Grade	Math 4	Math 8	Read 4	Read 8
	(1)	(3)	(5)	(7)
CC 2011	0.050**	0.045**	0.003	0.017
	(0.016)	(0.015)	(0.013)	(0.014)
CC 2013	0.104***	0.044**	0.013	0.016
	(0.017)	(0.015)	(0.015)	(0.014)
Covariates	X	X	X	X
District FE	X	X	X	X
N	522,450	450,280	552,890	476,330
F	0.350	0.368	0.332	0.333
Adjusted R^2	2026.47	2548.42	2447.76	2675.90
State & CC Alignment	0.20	0.20	0.17	0.17
NAEP & CC Alignment	0.28	0.21	0.25	0.24
Alignment Change	0.08	0.10	0.08	0.07

Note: Alignment based on Table 7 from Porter et al. (2011). These cells include an index measuring the alignment between a specified test and CC. Estimates are the effects of CC from Tables 4 and 5. Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, Adj=Adjusted FE=Fixed Effect. *p < 0.05, **p<0.01, ***p<0.001.
Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, “Student and Teacher Survey,” 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Appendix Table A8. CC Effects with Multiply Imputed Plausible Values

NAEP Grade/Subject	Math 4	Math 4	Math 8	Math 8
4th Grade Math	(1)	(2)	(3)	(4)
CC 2011	0.043*	0.049**	0.036*	0.051**
	(0.018)	(0.017)	(0.017)	(0.016)
CC 2013	0.104***	0.103***	0.034*	0.045**
	(0.019)	(0.018)	(0.017)	(0.016)
Covariates	X	X	X	X
State FE	X		X	
District FE		X		X
N	522,500	522,450	450,320	450,280
NAEP Grade/Subject	Reading 4	Reading 4	Reading 8	Reading 8
8th Grade Math	(5)	(6)	(7)	(8)
CC 2011	0.007	-0.003	0.009	0.015
	(0.017)	(0.017)	(0.016)	(0.015)
CC 2013	0.010	0.012	0.005	0.013
	(0.016)	(0.016)	(0.017)	(0.017)
Covariates	X	X	X	X
State FE	X		X	
District FE		X		X
N	552,960	552,890	476,370	476,330

Note: Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, Adj=Adjusted FE=Fixed Effect. *p < 0.05, **p<0.01, ***p<0.001.

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Appendix Table B1. NAEP Scores Regressed on Common Core, Regressions with Covariates

NAEP Subject/Grade	Math 4	Math 8	Read 4	Read 8
	(1)	(2)	(3)	(4)
CC 2011	0.050**	0.045**	0.003	0.017
	(0.016)	(0.015)	(0.013)	(0.014)
CC 2013	0.104***	0.044**	0.013	0.016
	(0.017)	(0.015)	(0.015)	(0.014)
Female	-0.125***	-0.111***	0.130***	0.225***
	(0.003)	(0.003)	(0.003)	(0.003)
IEP	-0.748***	-0.957***	-0.969***	-1.003***
	(0.006)	(0.006)	(0.007)	(0.007)
LEP	-0.494***	-0.621***	-0.658***	-0.749***
	(0.011)	(0.013)	(0.011)	(0.015)
FRPL	-0.378***	-0.318***	-0.372***	-0.295***
	(0.004)	(0.005)	(0.004)	(0.004)
Black	-0.563***	-0.598***	-0.432***	-0.478***
	(0.007)	(0.007)	(0.007)	(0.007)
Asian	0.188***	0.193***	0.074***	0.071***
	(0.012)	(0.015)	(0.010)	(0.011)
American Indian	-0.326***	-0.332***	-0.302***	-0.244***
	(0.018)	(0.018)	(0.018)	(0.019)
Other Race	-0.115***	-0.150***	-0.048**	-0.024
	(0.017)	(0.020)	(0.017)	(0.019)
Mexican	-0.312***	-0.354***	-0.271***	-0.321***
	(0.007)	(0.008)	(0.006)	(0.008)
Puerto Rican	-0.501***	-0.456***	-0.385***	-0.373***
	(0.011)	(0.013)	(0.011)	(0.013)
Cuban	-0.626***	-0.586***	-0.528***	-0.578***
	(0.014)	(0.022)	(0.014)	(0.024)
Other Hispanic	-0.206***	-0.343***	-0.157***	-0.310***
	(0.007)	(0.008)	(0.006)	(0.008)
Modal age for grade; Below	0.302***	0.363***	0.253***	0.195***
	(0.038)	(0.035)	(0.034)	(0.035)
Modal age for grade; Above	-0.051***	-0.142***	-0.027***	-0.091***
	(0.003)	(0.004)	(0.003)	(0.004)
School Made AYP	0.156***	0.150***	0.139***	0.174***
	(0.010)	(0.012)	(0.010)	(0.013)
Safe Harbor	0.095**	0.080*	0.084**	0.010
	(0.035)	(0.032)	(0.026)	(0.042)
Lagged State Score	0.370***	0.203***	0.273***	0.178***
	(0.043)	(0.043)	(0.040)	(0.042)
Covariates	X	X	X	X
District FE	X	X	X	X
N	522,450	450,280	552,890	476,330
Adj R^2	0.350	0.368	0.332	0.333
F	2026.47	2548.42	2447.76	2675.90

Note: Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, Adj=Adjusted FE=Fixed Effect. *$p < 0.05$, **$p<0.01$, ***$p<0.001$.
Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, "Student and Teacher Survey," 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Appendix Table B2. Event Study Estimate of CC with Covariates

NAEP Subject/Grade	Math 4	Math 8	Read 4	Read 8
	(1)	(2)	(3)	(4)
Pre-Treatment 2003	-0.035	-0.032	0.007	0.026
	(0.021)	(0.018)	(0.018)	(0.019)
Pre-Treatment 2005	-0.006	0.003	0.020	0.005
	(0.020)	(0.017)	(0.017)	(0.018)
Pre-Treatment 2007	0.001	0.008	0.023	-0.024
	(0.018)	(0.017)	(0.017)	(0.017)
Post-Treatment 2011	0.041*	0.041*	0.015	0.018
	(0.019)	(0.018)	(0.016)	(0.017)
Post-Treatment 2013	0.095***	0.040*	0.025	0.018
	(0.020)	(0.018)	(0.018)	(0.018)
Female	-0.125***	-0.111***	0.130***	0.225***
	(0.003)	(0.003)	(0.003)	(0.003)
IEP	-0.748***	-0.957***	-0.969***	-1.003***
	(0.006)	(0.006)	(0.007)	(0.007)
LEP	-0.494***	-0.621***	-0.658***	-0.749***
	(0.011)	(0.013)	(0.011)	(0.015)
FRPL	-0.378***	-0.318***	-0.372***	-0.295***
	(0.004)	(0.005)	(0.004)	(0.004)
Black	-0.563***	-0.598***	-0.432***	-0.478***
	(0.007)	(0.007)	(0.007)	(0.007)
Asian	0.188***	0.193***	0.074***	0.071***
	(0.012)	(0.015)	(0.010)	(0.011)
American Indian	-0.326***	-0.332***	-0.303***	-0.244***
	(0.018)	(0.018)	(0.018)	(0.019)
Other Race	-0.115***	-0.150***	-0.048**	-0.025
	(0.017)	(0.020)	(0.017)	(0.019)
Mexican	-0.312***	-0.354***	-0.271***	-0.321***
	(0.007)	(0.008)	(0.006)	(0.008)
Puerto Rican	-0.501***	-0.456***	-0.385***	-0.373***
	(0.011)	(0.013)	(0.011)	(0.013)
Cuban	-0.626***	-0.586***	-0.528***	-0.578***
	(0.014)	(0.022)	(0.014)	(0.024)
Other Hispanic	-0.206***	-0.343***	-0.157***	-0.310***
	(0.007)	(0.008)	(0.006)	(0.008)
Modal age for grade; Below	0.301***	0.363***	0.253***	0.194***
	(0.038)	(0.035)	(0.034)	(0.035)
Modal age for grade; Above	-0.051***	-0.142***	-0.027***	-0.091***

	(0.003)	(0.004)	(0.003)	(0.004)
School Made AYP	0.156***	0.150***	0.139***	0.174***
	(0.010)	(0.012)	(0.010)	(0.013)
Safe Harbor	0.095**	0.080*	0.085**	0.011
	(0.035)	(0.032)	(0.026)	(0.042)
Lagged State Score	0.364***	0.194***	0.272***	0.176***
	(0.044)	(0.043)	(0.041)	(0.042)
Covariates	X	X	X	X
District FE	X	X	X	X
N	522,450	450,280	552,890	476,330
Adjusted R-squared	0.350	0.368	0.332	0.333
F	1753.72	2204.83	2114.62	2311.99

Note: Reference category is the last wave prior to adoption (2009). Sample excludes states with high rigor pre-CC standards and states that made substantive changes to their standards (See Appendix Table A2 for detailed exclusion criteria). Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, FE=Fixed Effect. NAEP= National Assessment of Educational Progress test score standardized within grade/subject and year, IEP=Individualized Education Plan, LEP=Limited English Proficiency, FRPL=Free and Reduce Price Lunch, AYP=Adequate Yearly Progress $^{*}p < 0.05$, $^{**}p<0.01$, $^{***}p<0.001$

Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, “Student and Teacher Survey,” 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

Appendix Table B3. Differential Effects of Common Core on NAEP Scores by Race/Ethnicity and Economic Disadvantage

NAEP Subject/Grade	Math 4	Math 8	Read 4	Read 8
	(1)	(2)	(3)	(4)
CC 2013	0.107***	0.055**	-0.017	0.005
	(0.022)	(0.020)	(0.017)	(0.015)
CC 2013 x FRPL	-0.057**	-0.072***	0.015	-0.015
	(0.022)	(0.021)	(0.018)	(0.017)
CC 2013 x Black	0.125*	0.011	0.160***	0.092*
	(0.056)	(0.049)	(0.037)	(0.039)
FRPL X Black	0.016	0.052***	0.009	-0.000
	(0.012)	(0.012)	(0.012)	(0.012)
CC 2013 x Black x FRPL	-0.089	0.028	-0.116**	-0.065
	(0.059)	(0.052)	(0.043)	(0.051)
CC 2013 x Hispanic	0.005	0.140*	0.012	0.004
	(0.051)	(0.060)	(0.047)	(0.049)
FRPL X Hispanic	0.137***	0.145***	0.110***	0.077***
	(0.013)	(0.013)	(0.013)	(0.014)
CC 2013 x Hispanic x FRPL	0.157*	0.000	0.020	0.097
	(0.063)	(0.061)	(0.053)	(0.055)
CC 2013 x Asian	0.069	0.172*	0.035	0.054
	(0.060)	(0.076)	(0.041)	(0.045)
FRPL X Asian	-0.124***	-0.097***	-0.115***	-0.087***
	(0.020)	(0.024)	(0.017)	(0.019)
CC 2013 x Asian x FRPL	0.058	0.043	0.097	-0.042
	(0.091)	(0.114)	(0.085)	(0.097)
Covariates	X	X	X	X
District FE	X	X	X	X
N	531,120	452,900	560,080	478,840
Adj R^2	0.354	0.366	0.334	0.329
F	1528.93	1870.58	1840.23	1930.37

Note: Sample excludes states with rigorous pre-CC standards and states that implemented the CC, but made major revisions. Standard errors are robust to clustering by school. See Table 3 for a full list of covariates. Sample sizes rounded in accordance with NCES nondisclosure rules. Estimates adjusted using NAEP student-level probability weights. CC=Common Core, FE=Fixed Effect. FRPL=Free and Reduced-Price Lunch. *p < 0.05, **p<0.01, ***p<0.001.
Source: U.S. Department of Education, National Center for Education, Statistics, NAEP, “Student and Teacher Survey,” 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013.

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Appendix C. Common Core Adoption, Implementation, Revision, & Withdrawal

This appendix describes states changes (i.e., adoption, implementation, revision, and withdrawal) to content standards (hereinafter standards) and summative assessments. I collected all documents from March 2017 to 2019. All years refer to the spring of the school year.

Alabama
Alabama adopted the CC standards in November 2010 (CCSSI, 2013). The state joined both PARCC and Smarter Balanced testing consortia in 2010 (Salazar, 2014). Alabama reported in January 2012 that the full implementation of the Math standards will occur in 2013 for Math and 2014 for ELA (Anderson et al., 2012). A local advocacy group reported that Alabama "begins implementing the College and Career Ready Standards…in grades K-12" in August 2012 for ELA and August 2013 for Math (A+ Education Partnership, 2014). This corroborates the interview data from Achieve (2013). Alabama dropped out of both consortia entirely and used ACT Aspire as its summative assessment in 2015 (Woods, 2015).

Alaska
Alaska never adopts the CC standards (CCSSI, 2013; Certica Solutions, 2017; Ujifusa, 2016). The state also never participated in the CC consortia or used their assessments (Salazar, 2014; Woods, 2015). Alaska adopts their College and Career Ready Standards in June 2012 (WestEd, 2018) with full implementation by 2015 (Achieve, 2013).

Arizona
Arizona adopted the CC standards in June 2010 (CCSSI, 2013; Certica Solutions, 2017). Arizona initially joined PARCC in 2010 (Woods, 2015). The state's Round II Race to the Top application submitted in June 2010 (Arizona Governor's Office of Economic Recovery, 2010) describes an incremental approach to implementation that finishes in 2014. An October 2013 state document describes the timeline targeting CC standards implementation for 4th grade ELA and full implementation for 8th grade ELA in 2013 (AZ DOE, 2013). The state defines targeted implementation as, "instructional shifts, specific content emphasis by strand, and an intentional increase of rigor in the classroom" and full implementation as "complete transition to standards with fidelity" (AZ DOE, 2013). Arizona fully implemented Math in 2014 (AZ DOE, 2013). Data from Achieve (2013) and Certica (2017) corroborate these dates. In 2014 Arizona left both testing consortia and used an assessment developed by AIR (Creno, 2014). Arizona voted to rebrand the CC standards in October 2015 and then replace the standards in December 2016. The rebranded standards remain in place through the 2017 school year (National Council of State Legislators, 2017).

Arkansas
Arkansas adopted the CC standards in July 2010 (CCSSI, 2013; Certica Solutions, 2017). They joined PARCC in 2010 (Salazar, 2014). Later the state dropped out of PARCC and used ACT Aspire as its summative assessment in 2015 (Woods, 2015). State documents from April 2011 describe the implementation of CC standards in 4th/8th grade and Math/ELA in 2013 (Arkansas Department of Education, 2011). This implementation timeline is consistent with the state's ESEA Waiver applications from February 2012 (Arkansas Department of Education, 2012). Subsequently

Arkansas implements the CC standards in 2013 (Achieve, 2013; Certica Solutions, 2017). The Arkansas Board of Education revokes the CC standards in April 2016 and created new standards that were implemented in 2018 (C. Howell, 2016).

California

California adopted the CC standards in August 2010 (CCSSI, 2013; Certica Solutions, 2017). California joined the Smarter Balanced consortia in 2010 (Salazar, 2014). The initial plan was for full adoption of the standards in 2014 (Best & Cohen, 2013; California Department of Education, 2012). The state delayed implementation of the standards until 2014 (California Department of Education, 2014; Griffith, 2012). By 2015 most but not all California school districts had implemented the CC standards (Harrington, 2017). The process of implementation is California is unique in part due to the CORE districts. This group of large California districts received an ESEA waiver in August 2013 and these districts implemented the CC standards from 2013 to 2015 (Knudson & Garibaldi, 2015). California began using the Smarter Balanced test as their summative assessment in 2015 (Woods, 2015).

Colorado

Colorado joined the PARCC consortia in 2010 (Salazar, 2014). Colorado technically adopts the CC standards in August 2010 (CCSSI, 2013; Certica Solutions, 2017). The state engaged in this adoption, "with the expectation that the Colorado Department of Education would honor the work and values of the Colorado Academic Standards previously written by Colorado educators and adopted by the board to create the best mathematics and reading, writing, and communicating standards for the State of Colorado" (Colorado Department of Education, 2019). In December 2010, Colorado adopts a set of College and Career Ready standards that melds elements of the CC standards and Colorado Academic Standards. Official state documents describe the Colorado Academic Standards rather than the CC standards as implemented as of 2014 (Colsman, 2017). An independent analysis of state standards describes the Colorado Academic Standards as a "major" modification of the CC standards (Korn et al., 2016). The difference is substantive enough that in this analysis I classify Colorado as "major reviser" and do not consider them to have implemented the CC standards. They began using the PARCC assessment in 2015 (Woods, 2015) and developed a new test in 2017 (Garcia, 2017).

Connecticut

Connecticut adopted the CC standards in July 2010 (CCSSI, 2013; Certica Solutions, 2017). The state joined the Smarter Balanced consortia in 2010 (Salazar, 2014). 2012 documents from the Connecticut Department of Education describe plans for full implementation in 2014 (Connecticut State Department of Education, 2013). The state met that implementation timeline and has kept the standards (Achieve, 2013; AFT Connecticut, 2019). They began using the Smarter Balanced assessment in 2015 (Woods, 2015).

Delaware

Delaware adopts the CC standards in August 2010 (CCSSI, 2013; Certica Solutions, 2017). Delaware initially joined PARCC using their assessment in 2015 and then switches to joining Smarter Balanced (Salazar, 2014; Woods, 2015). Delaware's ESEA Waiver from February 2012 describes plans for full implementation of the standards in 2013 (Delaware Department of Education, 2012). A survey of state education officials (Achieve, 2013) and a news article (Albright, 2014) corroborate full implementation in 2013. Delaware began using the Smarter Balanced assessment in 2015 (Woods, 2015).

District of Columbia
The District of Columbia adopted the CC standards in July 2010 (CCSSI, 2013; Certica Solutions, 2017). They initially joined Smarter Balanced and then switched to PARCC (Salazar, 2014; Woods, 2015). According to their May 2010 Race to the Top Proposal the District of Columbia planned to implement the ELA standards in 2012 and the Math standards in 2013 (Government of the District of Columbia, 2010). The District of Columbia implemented the ELA standards in 2012 and the Math standards in 2013 (Achieve, 2013; Certica Solutions, 2017). They began using the PARCC assessment in 2015 (Woods, 2015).

Florida
Florida adopted the CC standards in July 2010 (Certica Solutions, 2017). A January 2012 document review indicates the state plans to implement the standards for grades 4 and 8 in 2015 (Anderson et al., 2012). Initially Florida joined PARCC, but in September 2013 they leave the consortia (Hatter, 2013). The state never uses a CC developed assessment instead using an assessment from AIR (Woods, 2015). State documents confirm the 2015 implementation of the CC standards (Certica Solutions, 2017; Florida Department of Education, 2014). Florida revokes the CC standards in January 2019 (Gore, 2019).

Georgia
Georgia adopted the CC standards in July 2010 (CCSSI, 2013; Certica Solutions, 2017). Georgia initially joins PARCC but leaves the consortia (Salazar, 2014). The state never implements a CC test (Woods, 2015). A January 2012 document review indicates the state plans to implement the standards in 2013 (Anderson et al., 2012) which is consistent with a report from the Council of Chief State School officers (Griffith, 2012). 2013 implementation date corroborated by a presentation from state superintendent (Barge, 2014) and interview data (Achieve, 2013).

Hawaii
Hawaii adopted the CC standards in June 2010 (CCSSI, 2013; Certica Solutions, 2017). California joined the Smarter Balanced consortia in 2010 (Salazar, 2014). Hawaii planned to implement the standards by 2014 (Best & Cohen, 2013; Hawaii Department of Education, 2019). The state website corroborates that implementation of standards for 4th and 8th grade occurred in 2014 (Hawaii Department of Education, 2019), which is consistent with another document analysis (EdGate Correlation Services, 2019a). Hawaii began using the Smarter Balanced assessment in 2015 (Woods, 2015).

Idaho
Idaho adopted the CC standards in January 2011 (CCSSI, 2013; Certica Solutions, 2017). Idaho joined the Smarter Balanced consortia in 2010 (Salazar, 2014). State documents from 2012 describe plans for implementation in 2014 (Best & Cohen, 2013; Idaho State Department of Education, 2012). Implementation did occur in 2014 (Boise State Public Radio, 2014; Certica Solutions, 2017). They began using the Smarter Balanced assessment in 2015 (Woods, 2015).

Illinois
Illinois adopted the CC standards in June 2010 (CCSSI, 2013; Certica Solutions, 2017). Illinois joined the PARCC consortia in 2010 (Salazar, 2014). The state's ESEA Waiver request from February 2012 describes planned implementation of the standards in 2014 (Illinois State Board of

Education, 2012). State documents from 2015 are consistent with implementation in 2014 (Illinois State Board of Education, 2015). They began using the PARCC assessment in 2015 (Woods, 2015).

Indiana
Indiana adopts the standards in August 2010 (Certica Solutions, 2017). Indiana initially joined PARCC, but dropped out in July 2013 (Nelson, 2013; Salazar, 2014). The state never used a CC assessment. Indiana planned to implement the standards in 2014, but "paused" implementation prior to the start of the 2014 school year (Salazar & Christie, 2014). In March 2014, the state legislature passes a law to repeal the standards (Elliott, 2014).

Iowa
Iowa adopts the standards in July 2010 (CCSSI, 2013; Certica Solutions, 2017). Iowa joined Smarter Balanced (Salazar, 2014; Woods, 2015). A January 2011 report from the Iowa Department of Education describes the planned implementation of the CC standards in 2015 (Iowa Department of Education, 2011). A subsequent report from January 2015 corroborates the implementation of the standards in 2015 (Iowa Department of Education, 2015). In August 2014 the state left Smarter Balanced and uses a test from the University of Iowa (Hart, 2014; Woods, 2015).

Kansas
Kansas adopts the standards in July 2010 (CCSSI, 2013; Certica Solutions, 2017). Kansas joined Smarter Balanced in 2010 (Salazar, 2014; Woods, 2015). The state's July 2012 ESEA flexibility request describes the state's plan to implement the CC standards in 2014 (Kansas Department of Education, 2012). An advocacy group blog post corroborates 2014 (Get It Right, 2015) as the year of implementation which is consistent with other sources (Achieve, 2013; Certica Solutions, 2017). In December 2013, Kansas leaves PARCC and announces plans to develop its own assessment (Gewertz, 2013).

Kentucky
Kentucky adopted the CC standards in February 2010 (CCSSI, 2013; Certica Solutions, 2017). They joined both consortia in 2010, but were never a governing member and develop their own test (Salazar, 2014; Woods, 2015). The state's May 2010 Race to the Top Application describes the plans to implement the standards in 2012 (Kentucky Department of Education, 2010). Kentucky's ESEA Waiver application from August 2014 confirms full implementation in 2012 (Kentucky Department of Education, 2014), which is corroborated by interview data from Achieve (2013).

Louisiana
Louisiana adopted the CC standards in July 2010 (CCSSI, 2013; Certica Solutions, 2017). The state initially joined PARCC in 2010 and uses that assessment in 2015 (Woods, 2015). The state's May 2010 Race to the Top Phase 2 application states that the state will fully "roll out" the CC standards by 2014 (Louisiana Department of Education, 2010). A Louisiana Department of Education press release in March 2014 describes the active implementation of the CC standards in that year (Louisiana Department of Education, 2014). In March 2016, Louisiana "technically" revokes the CC standards and new standards were used in the 2017 school year (Guidry, 2016). Independent analyses are not in agreement about whether the new standards were substantively different from the CC (Korn et al., 2016; Ujifusa, 2016). In 2016, Louisiana used a modified PARCC assessment (Schaffhauser, 2015).

Maine

Maine adopted the CC standards in April 2011 (CCSSI, 2013; Certica Solutions, 2017). The state joined Smarter Balanced and uses their test through 2015 (Salazar, 2014). In June 2015, Maine leaves the consortia and adopts a new assessment (Ujifusa, 2015). The state's May 2010 Race to the Top application describes plans for a 2013 implementation date for the CC standards (Maine Department of Education, 2010). The state describes actively implementing the standards in a September 2012 ESEA Waiver Request (Maine Department of Education, 2012).

Maryland

Maryland adopted the CC standards in June 2010 (CCSSI, 2013; Certica Solutions, 2017). Maryland joined the PARCC consortia in 2010 (Salazar, 2014) and began using its assessment in 2015 (Woods, 2015). Maryland's June 2010 Race to the Top application describes a plan to implement the standards in 2014 (Maryland Department of Education, 2010). The state Department of Education website explains that the standards were implemented in 2014 (Maryland Department of Education, 2019), which is corroborated by interview data from Achieve (2013).

Massachusetts

Massachusetts adopted the CC standards in July 2010 (CCSSI, 2013; Certica Solutions, 2017). The state initially joined PARCC and used that assessment through 2015 (Salazar, 2014; Woods, 2015). In November 2015 they left PARCC and began developing their own test (Zernike, 2015). In 2012, a state document review finds that the state plans to implement the CC standards in 2014 (Best & Cohen, 2013). In June 2015, the state's ESEA Waiver application corroborates that the state implemented the CC standards in 2014 (Massachusetts Elementary and Secondary Education, 2015).

Michigan

Michigan adopted the CC standards in June 2010 (CCSSI, 2013; Certica Solutions, 2017). The state initially joined Smarter Balanced, but never used their assessment (Salazar, 2014; Woods, 2015). A document from the state department of education from August 2010 describes the states plan to implement the CC standards in 2013. Michigan's ESEA flexibility request from July 2014 describes the state implementing the CC standards in 2013 (Michigan Department of Education, 2014), which is corroborated by interview data from Achieve (2013).

Minnesota

In September 2010, Minnesota adopts the CC English Language Arts standards, but the state does not implement the CC standards in Math (CCSSI, 2013; Certica Solutions, 2017). Minnesota never joined either consortia and developed their own assessment (Salazar, 2014; Woods, 2015). In their November 2011 ESEA Waiver Application, Minnesota's Department of Education describes its plans for implementing the CC standards in ELA, but not Math in 2013 (Minnesota Department of Education, 2011). The Minnesota Department of Education says that the CC English Language Arts standards were implemented in 2013 (Minnesota Department of Education, 2019b) and the state also implement their College and Career Ready Math Standards in 2013 (Minnesota Department of Education, 2019a).

Mississippi

Mississippi adopted the CC standards in July 2010 (CCSSI, 2013). The state belonged to the PARCC consortia in 2010 (Salazar, 2014). Mississippi planned for the first year of teaching students in grades 3 through 8 with the CC standards to be 2013 according to interviews with state education officials from January 2012 (Anderson et al., 2012), which is corroborated a review by CCSSO (Griffith, 2012). State documents from May 2013 confirm that the standards were used in the prior school year (Mississippi Department of Education, 2013), which is corroborated by other sources (Achieve, 2013; Certica Solutions, 2017). Mississippi used the PARCC test in 2015, but in January of that year chooses to use a new test in 2016 (Le Coz, 2015).

Missouri
Missouri adopted the CC standards in June 2010 (CCSSI, 2013). The state belonged to the Smarter Balanced consortia in 2010 (Salazar, 2014). A review of state records from 2012 (Griffith, 2012) and a blog post from September 2013 (Reischman, 2013) both indicate the state planned to implement the standards in 2015. They implement the CC standards in 2015 according to state records (Missouri Department of Elementary and Secondary Education, 2015). Missouri used the Smarter Balanced assessment for some but not all grades in 2015 and then use a new test the next year (Salazar, 2014; Woods, 2015). Missouri officially replaced the CC standards in April 2016 (Ballentine, 2016). Schools could use the new standards in 2017 on a voluntary basis and are required to use the new standards in 2018 (Ballentine, 2016).

Montana
Montana adopted the CC standards in November 2011 (CCSSI, 2013). The state belonged to the Smarter Balanced consortia in 2010 and still uses their assessment (Salazar, 2014; Woods, 2015). A state document from November 2011 describes the planned CC standards implementation date as 2014 (Montana Office of Public Instruction, 2011). The implementation of the CC standards occurred in 2014 according to multiple sources (ABC Montana, 2014; Achieve, 2013; Certica Solutions, 2017).

Nebraska
Nebraska never adopts the CC standards (CCSSI, 2013; Korn et al., 2016; Ujifusa, 2015). The state also never participates in the CC consortia and never uses a CC branded assessment (Salazar, 2014; Woods, 2015). The state implemented their College and Career Ready standards for ELA in 2014 and Math in 2015 (Achieve, 2013).

Nevada
Nevada adopted the CC standards in June 2010 (CCSSI, 2013). The state belonged to the Smarter Balanced consortia in 2010 and still uses their assessment (Salazar, 2014; Woods, 2015). State documents from March 2011 describe implementation of the standards for grades 3 through 8 as 2012 for ELA and Math (Nevada Department of Education, 2011). Multiple sources report that the state implemented the CC standards in 2012 (Achieve, 2013; Bennett, 2015; Certica Solutions, 2017).

New Hampshire
New Hampshire adopted the CC standards in July 2010 (CCSSI, 2013). The state belonged to the Smarter Balanced consortia in 2010 and continues to use their assessment through 2017 (NH Department of Education, 2019; Salazar, 2014; Woods, 2015). The New Hampshire Department of Education ESEA Waiver request from September 2012 describes a planned implementation date of 2014 (New Hampshire Department of Education, 2012, p. 3). The state completed the instructional transition to CC standards for all grades/subject in 2014 (New Hampshire Department of Education, 2015).

New Jersey
New Jersey adopted the CC standards in June 2010 (CCSSI, 2013). The state belonged to the PARCC consortia in 2010 and continues to use their assessment (Salazar, 2014; Woods, 2015). New

Jersey's ESEA waiver application from 2011 describes a staggered implementation process were full implementation will occur no later than 2014 (New Jersey Department of Education, 2011). In August 2014, state documents show that the CC standards were implemented in 2013 for grades K-12 for ELA and some grades for math (grades 3-5; 9-12) (New Jersey Department of Education, 2014). The CC standards were implemented for Math grades 6-8 in 2014 (New Jersey Department of Education, 2014). New Jersey makes a major revision (Ujifusa, 2016) to their standards in May 2016 which goes into place in 2018 (Clark, 2016).

New Mexico
New Mexico adopted the CC standards in November 2010 (CCSSI, 2013). The state belonged to the PARCC consortia in 2010 and still uses their assessment (Salazar, 2014; Woods, 2015). State documents from March 2012 describe plans for CC standards implementation by 2014 for ELA and Math (New Mexico Public Education Department, 2012). Interviews with state officials indicate that grades 4 through 12 implemented the standards in 2014 (Achieve, 2013; EdGate Correlation Services, 2019b).

New York
New York adopted the CC standards in July 2010 (CCSSI, 2013). The state belonged to the PARCC consortia in 2010 (Salazar, 2014). New York planned to align instruction for Math and ELA in 2013 according to state documents from July 2011 (Engage NY, 2011). In 2013, instruction in grades K-8 is aligned with the CC standards (Engage NY, 2019). In December 2015 (Darville et al., 2015), as commission appointed by Governor Cuomo recommends a major revision to the CC standards in 2016 (DiSare, 2016; Ujifusa, 2016). New York remained an advisory board member of PARCC from 2010 through 2015, but never used the consortia's assessment (Salazar, 2014; Woods, 2015).

North Carolina
North Carolina adopted the CC standards in June 2010 (CCSSI, 2013). The state was initially an advisory board member in the PARCC consortia, but left the consortia and never used their assessment (Salazar, 2014; Woods, 2015). Documents (dated July 2011) from the North Carolina Department of Instruction describe plans for full implementation of the CC standards in 2013 (North Carolina Department of Public Instruction, 2011). A July 2014 law directs the state to rewrite the CC standards (Salazar & Christie, 2014). The new standards do not go into place until after 2017 (WestEd, 2018).

North Dakota
North Dakota adopted the CC standards in June 2011 (CCSSI, 2013). The state originally belonged to both CC consortia, but left PARCC and stayed in Smarter Balanced (Salazar, 2014). State documents from February 2012 describe plans for full implementation of the CC standards by 2014 (North Dakota Department of Instruction, 2012). The first year of implementation was 2014 according to interview data with state education officials (Achieve, 2013). The state used the Smarter Balanced test in 2015, but then left Smarter Balanced and switched to a non CC assessment (Burnette II, 2016). The state announced a major revision to the standards in May 2016 that takes effect in 2018 (Nowatzki, 2016).

Ohio
Ohio adopted the CC standards in June 2010 (CCSSI, 2013) The state originally belonged to the PARCC consortia (Salazar, 2014). As of 2012, state plans were to implement the standards in 2014 according to their ESEA waiver request (Ohio Department of Education, 2012). The state

implemented the standards in 2014 for grades K-12 (Achieve, 2013; Ohio Department of Education, 2015). Ohio uses the PARCC assessment in 2015 (Woods, 2015) but then switches to an AIR assessment for 2016 (O'Donnell, 2015).

Oklahoma

Oklahoma adopted the CC standards in June 2010 (CCSSI, 2013). The state originally belonged to the PARCC consortia as an advisory board member (Salazar, 2014). The state had planned to implement the standards in 2015 (Griffith, 2012). But in June 2014, Oklahoma became to second state to revoke the standards (Oklahoma Governor's Office, 2014).

Oregon

Oregon adopted the CC standards in October 2010 (CCSSI, 2013). The state originally belonged to the Smarter Balanced consortia and uses their assessment from 2015 to 2017 (Salazar, 2014; Woods, 2015, 2018). The state planned for full implementation of the standards by 2015 as of their 2012 ESEA waiver request (Oregon Department of Education, 2011). They implement the standards in 2015 according to multiple sources (Achieve, 2013; Oregon Department of Education, 2015).

Pennsylvania

Pennsylvania adopted the CC standards in July 2010 (CCSSI, 2013). Pennsylvania initially belonged to both testing consortia, but left both prior to 2015 and never used a CC assessment (Salazar, 2014; Woods, 2015, 2018). The state planned to implement the CC standards in 2014 (Griffith, 2012) and did use the standards for that one year (Achieve, 2013). The State Board of Education replaced the CC standards in March 2014 (Kraft, 2014) with standards that were substantially different (Achieve, 2017; Korn et al., 2016).

Rhode Island

Rhode Island adopted the CC standards in July 2010 (CCSSI, 2013). The state planned to implement the standards in 2014 according to their waiver application from May 2012 (RIDE, 2012) and met that timeline according to their July 2015 waiver renewal application (RIDE, 2015). Rhode Island used the PARCC assessment from 2015 through 2017 (Salazar, 2014; Woods, 2015, 2018).

South Carolina

South Carolina adopted the CC standards in July 2010 (CCSSI, 2013). They joined both consortia as an advisory board member (Salazar, 2014; Woods, 2015). South Carolina planned to implement the CC standards in 2015 (Griffith, 2012) and used the CC standards in 2015 before the legislature voted in May 2014 to create new standards for use in 2016 (Salazar & Christie, 2014). The state left both consortia and never used their respective assessments (Salazar, 2014; Woods, 2015, 2018).

South Dakota

South Dakota adopted the CC standards in November 2010 (CCSSI, 2013). The state originally belonged to the Smarter Balanced consortia and used their assessment from 2015 to 2017 (Salazar, 2014; Woods, 2015, 2018). The standards were fully implemented in 2015 (CSSO, 2016). In March 2018 the state board replaced the CC with substantially different standards (Raposa, 2018).

Tennessee

Tennessee adopted the CC standards in July 2010 (CCSSI, 2013). The state originally belonged to the PARCC consortia (Salazar, 2014; Woods, 2015, 2018). Tennessee planned to implement the Math standards in 2013 and ELA in 2014 (Pepper et al., 2013; TN Core, 2012). In April 2014, the state legislature voted to delay the use of the PARCC tests (Zubrycki, 2014) and ultimately never uses a CC branded assessment (Salazar, 2014; Woods, 2015, 2018). In May 2015, Governor Haslem signed a law requiring the state to implement new standards by 2018 (Tatter, 2015).

Texas

Texas never adopts the CC standards (CCSSI, 2013). They also never join a CC consortia or use a CC branded assessment (Salazar, 2014; Woods, 2015, 2018). Texas' College and Career Readiness Standards were implemented in 2012 (Achieve, 2013).

Utah

Utah adopted the CC standards in August 2010 (CCSSI, 2013). Utah was originally a member of the Smarter Balanced consortia, but left and never used a CC branded assessment (Salazar, 2014; Woods, 2015, 2018). In their May 2010, Race to the Top application the state describe their plan to implement standards by 2013 (Utah State Office of Education, 2010). Utah chose a staggered implementation approach. Their 2015 ESEA flexibility document explains that by 2013 all school districts had aligned curricula and instruction with the CC standards (Utah State Office of Education, 2015).

Vermont

Vermont adopted the CC standards in August 2010 (CCSSI, 2013). The state originally belonged to the Smarter Balanced consortia and uses their assessment from 2015 to 2017 (Salazar, 2014; Woods, 2015, 2018). Vermont planned to implement the standards according to 2012 survey data (Griffith, 2012) and implemented the CC standards in 2014 (Achieve, 2013; Certica Solutions, 2017; EdGate Correlation Services, 2019c).

Virginia

Virginia never adopts the CC standards (CCSSI, 2013). They also never join a CC consortia or use a CC branded assessment (Salazar, 2014; Woods, 2015, 2018). Virginia implements their College and Career Ready standards for Math in 2012 and ELA in 2013 (Achieve, 2013).

Washington

Washington adopted the CC standards in July 2011 (CCSSI, 2013). The state originally belonged to the Smarter Balanced consortia and uses their assessment from 2015 to 2017 (Salazar, 2014; Woods, 2015, 2018). The state planned to implement the CC standards by 2015 according to a state document from January 2012 (OSPI, 2012) and does implement the standards in that year according to multiple interviews and document reviews (Achieve, 2013; Certica Solutions, 2017; EdGate Correlation Services, 2019d).

West Virginia

West Virginia adopted the CC standards in June 2010 (CCSSI, 2013). The state initially joined Smarter Balanced and uses their assessment through 2017 (Salazar, 2014; Woods, 2015, 2018). West Virginia planned to use the CC standards in 2015 (Achieve, 2013; Griffith, 2012). The state used the standards in 2015 according to their ESEA waiver application (West Virginia Department of Education, 2015), but in December 2015 the West Virginia Board of Education announced that new standards would be used in 2017 (Associated Press, 2015). In February 2017 they decided to leave the consortia an use a different assessment in the next year (West Virginia Board of Education, 2017).

Wisconsin
Wisconsin adopted the CC standards in June 2010 (CCSSI, 2013). The state initially joined Smarter Balanced (Salazar, 2014). Wisconsin planned to implement the CC standards in phases with full implementation in 2015 (Achieve, 2013). The state's ESEA Waiver from July 2015 (Wisconsin Department of Public Instruction, 2015a) and news articles detailing Governor Walker's opposition to the standards in April 2015 and 2019 corroborate this timeline (Beck, 2015; Zettel, 2019). The state uses the Smarter Balanced assessment in 2015 and then switches to a new assessment for 2016 (Wisconsin Department of Public Instruction, 2015b).

Wyoming
Wyoming adopted the CC standards in June 2012 (CCSSI, 2013). The state originally belonged to both test consortia, but left PARCC and stayed in Smarter Balanced (Salazar, 2014). They planned to implement the standards in 2015 (Achieve, 2013). Official state documents show that the state used the Common Core standards starting in 2015 and kept them through 2017 when a regular standards review cycle began (Wyoming Department of Education, 2015, 2018). The state used the Smarter Balanced test in 2015, but then left Smarter Balanced and switched to a non CC assessment (Burnette II, 2016).

Appendix C Reference List

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