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The Common Core State Standards Initiative: An Event History Analysis of State Adoption of Common K-12 Academic Standards

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THE COMMON CORE STATE STANDARDS INITIATIVE: AN EVENT HISTORY ANALYSIS OF STATE ADOPTION OF COMMON K-12 ACADEMIC STANDARDS

By

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I dedicate this thesis to my loving wife, Kristina, and beautiful stepchildren, David and Sophie, whose patience, confidence, and encouragement through this process has provided me the foundation of support and peace of mind I needed to do my best work. Having you in my life is a blessing beyond compare.

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ABSTRACT

During the summer of 2010, states across the U.S. adopted in quick succession the Common Core State Standards in English language arts and mathematics. States vying for Race to the Top (RTTT) funds were compelled by the U.S. Department of Education to adopt the standards by August 2, 2010 in order to compete more favorably. Whereas analysts from organizations such as the Brookings Institute, Cato Institute, and Heartland Institute have brought attention to an overexertion of federal influence on the Common Core State Standards Initiative (CCSSI), the National Governors Association, Council of Chief State School Officers, and U.S. Secretary of Education Arne Duncan have downplayed the role of federal incentivization, instead, underscoring the unprecedented state leadership employed in the development and adoption of the Common Core State Standards.

The purpose of this study was to explore reasons behind states' adoption behaviors as they relate to the Common Core State Standards. I used an innovation diffusion framework in this investigation, positing that, in addition to the vertical influence from the U.S. Department of Education, other factors might account for variation in adoption activity. Alternative models investigated to explain common standards adoption patterns were guided by the policy diffusion literature and included the states' own internal conditions ("determinants"), national interaction among states, and the regional diffusion of policy ideas between states (Berry & Berry, 2007).

The dependent variable, timing of adoption, was measured as the date on which the state board, state chief, or state legislature in each state voted or decided to adopt the common standards. Data on the dates of state adoption were generated from the CCSSI (2010e) map of adoption in the states, *Education Week* Web log postings (e.g., Gewertz, 2010d), National Conference of State Legislatures (2010) *Education Bill Tracking Database*, and primary source documents (Alabama Department of Education, 2010; Idaho State Board of Education, 2010; Oregon School Boards Association, 2010). The independent variables, representing the various explanations for policy adoption, were drawn from a comprehensive assembly of recent reports from national organizations (e.g., Editorial Projects in Education, 2010c) as well as from other publically available data sources (e.g., U.S. Census Bureau, 2010).

Like many recent studies in comparative state policy, I used event history analysis, a longitudinal logistic regression modeling approach for investigating the probability that an event will occur as a function of one or more independent variables. The model fitting procedure taken

in the current study included, first, fitting single explanation models (for each innovation diffusion model of internal determinants, national interaction, regional diffusion, and vertical influence) and, second, fitting a full model containing all models of innovation diffusion.

The full model suggested that, in addition to the vertical influence of federal incentivization predicting whether and when states adopted common standards, effects for variables indicating internal determinants, national interaction, and regional diffusion were evident. Specifically, holding all other variables constant and controlling for the main effect of time, the estimated odds of adopting common standards were more than 50% lower for states to adopt if they had a republican governor, 40% higher for each additional national consortia in which a state was a member, more than 40% lower for each additional neighbor state to have adopted prior to the reference state's adoption, and five and one-fifth times higher for states vying for RTTT funds compared to states that were not.

Although RTTT fund aspiration was estimated to have had the largest effect among the predictor variables modeled, it is notable that RTTT fund aspiration was not the sole predictor to contribute toward explaining variation in state adoption activity. Of particular note, was that the estimated odds ratio for adopting common standards associated with RTTT fund competition reduced from 9.37 (in the single explanation model) to 5.20 (in the full model), indicating that the odds of adopting common standards appeared nearly twice as large when only considering the states' aspiration to compete for RTTT funds. Moreover, the influence of RTTT fund aspiration was large across all models; however, its effect was inflated when not also considering other explanations for adoption.

Notwithstanding the need for further investigation, taken as a whole, the final model revealed that state adoption activity was not solely driven by states' aspiration to compete for RTTT funds, but also was associated with internal determinants indicative of political orientation, national networking through consortia, and the adoption activity of neighbor states.

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CHAPTER ONE

INTRODUCTION

Given the strong push for educational standards and accountability that continues to be underway nearly three decades after its dramatic invocation in the 1983 report, *A Nation at Risk* (National Commission on Excellence in Education, 1983), and the far-reaching systemic reforms instituted by the No Child Left Behind Act of 2001 (2002), the movement toward national standards has been interpreted by many as the logical next step in the effort to promote excellence and equity in the American school system (National Research Council, 2008). Various groups, such as The Commission on No Child Left Behind, the Education Trust, the Fordham Foundation, and the American Federation of Teachers, have been vocal proponents for the development and adoption of national standards. In spite of the substantial support for doing so, the motivation behind states' decisions to adopt the Common Core State Standards (Common Core State Standards Initiative, 2010a) has been brought into question (e.g., Gewertz, 2010b). That is, some observers of the process have interpreted the prompt development and rapid adoption of the Common Core State Standards as primarily driven by the desire of states to be competitive for federal aid made available through the Race to the Top (U.S. Department of Education, 2009) state incentive grant. Others, however, have downplayed the role of federal incentivization on the Common Core State Standards Initiative, instead, underscoring the unprecedented leadership taken by states to fully prepare students for the future and better position communities to compete in the global economy. The current study attempted to sort out this tension by modeling the adoption patterns of states and analyzing whether alternative explanations for state adoption were demonstrated and to what extent those alternative explanations accounted for variance in state adoption above and beyond what was accounted for by state aspiration to be competitive for Race to the Top funds.

Background

Standards-based Education Reform

The call for high standards in education articulated in *A Nation at Risk* (National Commission on Excellence in Education, 1983) prompted a vigorous response from states across the nation and ushered in the standards-based reform movement (National Research Council

(NRC), 2008). California's mathematics content frameworks developed in the 1980s along with the National Council of Teachers of Mathematics (1989) *Curriculum and Evaluation Standards for School Mathematics* constituted the earliest responses and were used by the U.S. Department of Education (USDOE) as "implicit models for national content standards" (Wixson, Dutro, & Athan, 2003, p. 74). Reports to Congress by groups representative of educators (e.g., National Council on Education Standards and Testing, 1992) and the business sector (e.g., Business Round Table, 1990) indicated that substantial support existed among stakeholders for systemic reform based on high standards. Late responses to content standards development occurred, for example, in North Dakota, where Massell (2008) concluded, unlike in other states, "initiatives did not stem from any significant internal political impetus or demand" (p. 5). Rather, Massell noted, North Dakota's decision to adopt standards was a forced response to the requirements set out in the federal Improving America's Schools Act of 1994 (1994; reauthorization of the Elementary and Secondary Education Act (ESEA) of 1965). Moreover, variability among the states, in terms of their receptivity to using standards as a means to improving education, has existed from the outset of the standards-based reform movement.

With the added requirement for annual testing of reading and mathematics proficiency in Grades 3-8 mandated in the 2001 reauthorization of ESEA (No Child Left Behind Act of 2001 (NCLB): State Plans, 2002), marked variation in state proficiency standards has become apparent. The National Center for Education Statistics (NCES; 2005) report, *Mapping 2005 state proficiency standards onto the NAEP scale*, revealed that states varied widely in what level of mastery was deemed to indicate proficiency. Authors of the NCES report offered that one explanation for this heterogeneity could be "largely due to differences in the stringency of the standards adopted by the states" (p. 1). Proponents of national standards in education have drawn from findings such as these to make the case for voluntary national standards, noting the proposed benefit of improving both achievement and equity (Goertz, 2007; Massell, 2008). Opponents of national standards have argued against them on the grounds that they would restrict the flexibility needed by states, school districts, and teachers, to their detriment; and further (setting aside their position that national standards would not be good for schools), opponents have balked at the feasibility of even reaching a sensible consensus among the states on what content should be included and what form the standards should take (NRC, 2008).

Whichever direction the movement towards national standards was going to take, the provision in NCLB (Prohibitions on Federal Government and Use of Federal Funds, 2002) that "no State shall be required to have academic content or student academic achievement standards approved or certified by the Federal Government, in order to receive assistance under this Act" ((b)(1)), assured states that any strides taken toward common standards would need to be voluntary and state-determined.

The Common Core State Standards Initiative

The Common Core State Standards Initiative (CCSSI) was a collaborative effort of the National Governors Association Center for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO) to develop quality academic standards in the core subject areas that could be used in common by states across the nation. The Mission Statement for the initiative was as follows:

> The Common Core State Standards provide a consistent, clear understanding of what students are expected to learn, so teachers and parents know what they need to do to help them. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our young people need for success in college and careers. With American students fully prepared for the future, our communities will be best positioned to compete successfully in the global economy. (CCSSI, 2010a)

Early 2009, the NGA Center and CCSSO proposed the CCSSI project, and by summer, it was fully launched with the signing of a memorandum of agreement by forty-eight states, two U.S. territories, and the District of Columbia, to work jointly on developing the common core standards. Development work utilized the effort of "a wide range of educators, content experts, researchers, national organizations, and community groups" (CCSSI, 2010b). Initial objectives were to develop standards for English language arts and mathematics, with plans for developing standards for science and history to follow.

Considerations maintained by work groups, feedback groups, and the validation committee were that they (a) produce a set of "fewer, clearer, higher" standards, (b) use evidence to guide decisions about what to include, (c) benchmark the standards against the "content, rigor, and organization" of standards of high-performing countries and states, (4) select language that is accessible to special populations, (d) remain cognizant that the standards will ultimately be the basis for curriculum and assessment, and (e) when possible, incorporate skills students will need to be successful in the 21st Century (CCSSI, 2010c, p. 1). An advisory group, including experts from Achieve, Inc., ACT, the College Board, the National Association of State Boards of Education (NASBE) and the State Higher Education Executive Officers, provided advice and guidance to shape the initiative (CCSSI, 2010d).

Draft college- and career-ready graduation standards were released to states in June 2009, followed by release for public comment in September 2009. Draft K-12 standards were released to states in January 2010, followed by release for public comment in March 2010. Nearly 10,000 comments were received from various stakeholders, including “teachers, parents, school administrators and other citizens concerned with education policy” (CCSSI, 2010d). The final version of the standards was further shaped by many of these comments, incorporated the college- and career-readiness standards into the K-12 standards, and was released June 2, 2010.

As early as February 2010, and with the standards still in draft form, state boards of education began voting with unanimous ascent to approve the adoption of the Common Core State Standards: Kentucky, February 10 (Kentucky Department of Education, 2010); West Virginia, May 12 (West Virginia Board of Education, 2010); Hawaii, May 20, and Maryland, May 25 (Gewertz, 2010a). Furthermore, in states where adopting common standards required action from the legislature in addition to an affirmative vote by the state board, bills authorizing their adoption were passed while the standards were still in draft form: Washington, March 29 (S. 6696, 2010) and Maine, May 12 (Pub. L. No. 2009, 2010). Following the June 2 release of the final standards was a ground swell of adoption activity by state boards and chiefs across the nation: June, July, and August witnessed the adoption of common standards by 13, 14, and 6 states, respectively (Gewertz, 2010d; Idaho State Board of Education, 2010). In total, from February to October, 41 states and the District of Columbia had adopted (or taken formal steps toward adopting) the Common Core State Standards and two more states were projected to adopt by the end of December 2010.

Race to the Top Funds

The American Recovery and Reinvestment Act of 2009 signed into law by President Barack Obama on February 17, 2009, provided $4.35 billion for the Race to the Top (RTTT) Fund, “a competitive grant program designed to encourage and reward States that are creating the conditions for education innovation and reform” (USDOE, 2009, p. 2). Among other reform areas, RTTT funds were intended to assist states with implementing plans for “adopting standards and assessments that prepare students to succeed in college and the workplace and to compete in the global economy" (USDOE, p. 2). Of the total 500 competitive RTTT points possible across all categories, 55 points could have been earned for developing, adopting, and supporting the transition toward common standards (USDOE, 2009).

The federal tying of RTTT application scores to the adoption of common standards has been characterized by some as federal coercion. For example, Representative Glenn Thompson (R-PA) noted at a hearing of the House education committee that the USDOE decision to allow states to earn points for taking part in the CCSSI has "transformed [the common-core effort] from a voluntary, state-based initiative to a set of federal academic standards with corresponding federal tests" (Klein, 2009, ¶ 5). Similarly, Texas Education Commissioner Robert Scott remarked that the push for national education standards should be seen as "a step toward a federal takeover of the nation's public schools" (Toppo, 2010, ¶ 8). These perspectives echoed the conclusions of the bipartisan organization, National Conference of State Legislatures (2009): "Adoption of national standards is the first step down a slippery slope toward a national curriculum, national tests and, ultimately, to a national system of public education" (p. 27).

Exacerbating concerns over federal intrusion, in an address to the nation's governors, President Obama (Washington Post, 2010) stated that receipt of Title 1 funds should also be tied to the adoption of common standards. The President declared as follows:

> As a condition of receiving access to Title 1 funds, we will ask all states to put in place a plan to adopt and certify standards that are college- and career-ready in reading and math. Once you've got those standards in place, you will be able to better compete for funds to improve teaching and upgrade curriculum. (¶ 28)

Thus, concerned observers and analysts, critical of federal overreach (e.g., Holland, 2010; McCluskey, 2010; Whitehurst, 2010), have interpreted states' involvement in the CCSSI process as less the actions of states serving their self-determined interests, and more the actions of states acquiescing to coercive federalism. Kincaid's (2010) analysis of state-federal relations, in light of the economic recession, concluded that the current situation between the President and Congress is one marked by red-ink federalism (leveraging of favored reforms of the administration through federal grants-in-aid), and noted that "During the first quarter of 2009, federal aid became, for the first time in U.S. history, the single largest source of state and local revenue" (p. 23). Kincaid characterized the leveraging of federal policy priorities with federal aid, such as the RTTT program, as federal "cooperative coercion" (p. 21).

The CCSSI (2010d) contended that the process of developing common standards was a "state-led effort" (¶ 1) launched by governors and commissioners of education. U.S. Secretary of Education Arne Duncan underscored this perspective in his statement following the June 2 release of the Common Core State Standards:

> The nation's governors and chief state school officers are to be commended for their leadership. These English language arts and mathematics standards have been developed by the states, for the states, based on research and best practices. They have benefited from extensive input from teachers, school leaders, parents, business and civic leaders, civil rights leaders, higher education and the public. (USDOE, 2010c, ¶ 3)

In short, there are some who view the CCSSI as surrendering state sovereignty and others who view it as enabling unprecedented state leadership.

Given the August 2, 2010 deadline for states to adopt common K-12 standards in order to receive points in the Standards and Assessment category of the RTTT state incentive grant application, it is reasonable to interpret the summer rush of adoptions as being a response to federal incentivization. Instantiating this point, a bill passed by the State of Oklahoma Legislature (S. 2033, 2010) was explicit in its perception that a timely adoption of the Common Core State Standards was necessary to be competitive on its RTTT application. The legislation read as follows:

> By August 1, 2010, the State Board of Education shall adopt revisions to the subject matter curriculum adopted by the State Board for English Language Arts and Mathematics as is necessary to align the curriculum with the K-12 Common Core State Standards developed by the Common Core State Standards Initiative. (§ 291-15(B))

Adding, "the Legislature finds that all of the provisions of this act are necessary to support Oklahoma's application for the second round of federal Race to the Top funding" (§ 291-1). Moreover, state behavior, in terms of whether and when they adopted common standards, appeared to be in part influenced by concerns over the competitiveness of their RTTT application.

A cursory inspection of state adoption in response to the RTTT timeline revealed a pattern of adoption that does suggest that states' decisions to adopt were likely influenced by an aspiration to compete for RTTT funds. That is, of the 19 states (including the District of Columbia) named on June 27, 2010 as RTTT Phase 2 finalists, 17 (90%) had already adopted Common Core State Standards by that point, and the remaining 2 (cumulative 100%) went on to adopt by the August 2, 2010 RTTT standards adoption deadline. Also, of the 17 states that submitted RTTT Phase 2 applications, but were not named as finalists, 12 (71%) had already adopted by that point. Thus, most states appeared to be responsive to the RTTT invoked urgency for adoption. However, there were states that did not conform to this pattern. That is, of the 5 states that submitted RTTT Phase 2 applications, were not named on June 27, 2010 as finalists, and had not adopted by that point, 2 (40%) went on to adopt anyway and 1 more (cumulative 60%) was projected (Alabama Department of Education, 2010) to adopt before the end of the year. Also, of the 13 states that did not submit RTTT Phase 2 applications (excluding the two states that were winners in Phase 1), 7 (54%) adopted anyway and 1 more (cumulative 62%) was projected (Oregon School Boards Association, 2010) to adopt before the end of the year. Thus, there were states that decided to adopt common standards for reasons that appear to be unrelated to RTTT funds competition. See Table 1.1 for a cross tabulation of RTTT Phase 2 application and finalist status by date of Common Core State Standards adoption.

Purpose of the Study

Study Aims

Study aim 1. Examine if competition for RTTT funds predicted whether and when states adopted common standards.

Study aim 2. Examine if internal determinants of states, national interaction among states, and influences upon states from other states predicted whether and when states adopted common standards.

Study aim 3. Determine if any of these alternative models (i.e., internal determinants of states, national interaction among states, and influences upon states from other states) continued to predict whether and when states adopted common standards, controlling for RTTT fund competition.

Overview of the Study

Innovation diffusion. The current study was structured within an innovation diffusion framework. Innovation diffusion theory pertains to a framework for explaining how and why innovations are adopted. The core of innovation diffusion theory is that there are determinants of diffusion that can be modeled to reveal the pace and pattern of adoption. Berry and Berry (1990, 2007) have established a typology of models for policy innovation diffusion. The first is an internal determinants model that attempts to explain whether an entity will adopt an innovation by taking into consideration political, economic and social characteristics endemic to the entity. The second is a class of models on how innovations diffuse across entities; namely, the models of national interaction, regional diffusion, leader-laggard, isomorphism and vertical influence, of which, reasons for diffusion are primarily policy learning, competition, user demands, and vertical influence from higher levels of authority.

Constructs of interest. The dependent variable of interest was whether and when states adopted Common Core State Standards. Adoption was operationalized as the date of first formal ascent toward adoption. That is, passing votes held by state boards of education prior to June 2, 2010 to provisionally adopt the common standards were considered the dates of adoption, irrespective of passing votes by state boards to formally adopt that may have followed. (Provisional adoption indicated a vote to adopt, providing the final version of the standards did not take any great departure from what was conveyed in the draft version.) For states where the legislature shared authority to adopt, the date of legislation passage authorizing adoption, a passing vote by the board, or a decision by the chief (whichever came first) was considered the date of adoption. Thus, the current study did not conceptualize the date of adoption as the date when the process for doing so was finalized, but rather as the date when formal steps toward doing so first commenced. Accordingly, when it was not too cumbersome, I have attempted to make this point clear by referring to the outcome of interest as a state's movement toward adoption. In addition, the NASBE (2010) projected dates of adoption for states that have yet to adopt were used. Projected adoption dates were verified for each state (Alabama Department of Education, 2010; Oregon School Boards Association, 2010) projected to adopt by the end of 2010. Using these projections, adoption data were extrapolated to the end of the year, allowing analysis of state adoption activity January 2010 to December of 2010.

Following Berry and Berry's (1990, 2007) framework for explaining the adoption of new programs by states, independent variables of interest were categorized into the four models of internal determinant, national interaction, regional diffusion, and vertical influence.

***Internal determinants*.** Potential predictor variables identified to be internal determinants were organized under the four sub-dimensions of economic, political, education system characteristics, and educational performance.

***National interaction*.** National interaction was operationalized by the number of relevant national consortia in which states were members as of January 2010.

Regional diffusion. Regional diffusion was defined as the influence of a state's neighbors' adoption prevalence on its own decision to adopt, and operationalized it as the number of neighbor states to have adopted common standards prior to the reference state's adoption controlling for the total number of neighbor states.

Vertical influence. Vertical influence was operationalized as a state's aspiration to compete for RTTT funds. In this way, a time-variant variable was coded, indicating a state's aspiration pattern, with regard to whether the state intended to submit an application, did submit an application, was moved out of the running by not being a finalist, or moved out of the running by not being a winner.

Discrete-time event history analysis. The analytic strategy for the current study was to employ an event history analysis. Also called survival analysis in the biological sciences and failure time analysis in the manufacturing industry, event history analysis is a statistical modeling approach that uses longitudinal logistic regression to investigate the probability that an event will occur as a linear function of one or more independent variables. By modeling the length of time it takes for the occurrence of a target event, this approach is well suited for investigating what explains whether and when an event of interest occurred. In the current study, the event of interest was state movement toward adoption of common standards. Although adoption data were collected on a continuous (day to day) metric, state boards of education typically met on a monthly basis, and therefore, it was more appropriate to conceptualize time for this analysis in discrete units (month to month intervals). Accordingly, rather than continuous-time, the current study employed a discrete-time event history analysis.

Overview of Data Sources

Dependent variable. Movement toward adopting Common Core State Standards was assembled through various sources, including the CCSSI (2010e) map of states and adoption dates, *Education Week* (e.g., Gewertz, 2010d) Web log postings, and various primary source documents (e.g., Idaho State Board of Education, 2010). In addition, the National Conference of

State Legislatures' (2010) *Education Bill Tracking Database* was referenced for identifying state legislation approving common standards adoption. Lastly, the NASBE (2010) *Common Core State Standards Adoption Time Frame* informed my investigation of states that were projected to adopt by the end of the year, with corroboration through official state sites (Alabama Department of Education, 2010; Oregon School Boards Association, 2010).

Independent variables. To compile a comprehensive assembly of variables indicating education relevant dimensions of each state, recent reports from national organizations were referenced (e.g., Editorial Projects in Education, 2010c, 2010d). Collectively, this body of reports provided a broad array of state economic, education system characteristics, and educational performance indicators. U.S. Census Bureau (2010) data were used in combination with a few of the aforementioned data sources to put variables in a common metric to facilitate state-to-state comparisons.

U.S. Census Bureau data were also used for indicators of state economic conditions. The Council of State Governments' (2010) *The book of the states* and the Education Commission of the States' (2010) *StateNotes* on governors provided indicators of state political characteristics.

To indicate the degree of national interaction, I summed the number of relevant consortia within which each state was a member, as of January 2010. Inclusion/exclusion criteria are discussed in the Methodology section.

To model regional diffusion, neighbors among the 48 contiguous states were designated using Berry and Berry's (1990) coding scheme. To include all 50 states and the District of Columbia within the analytic sample, Alaska and Hawaii were coded as having one neighbor each: Washington and California, respectively, and D.C. was coded as having Maryland and Virginia as neighbors.

To model federal vertical influence, the following RTTT data were assembled: states that submitted letters of intent and the status of applicants, in terms of being finalists and winners at phase 1 and phase 2 of the program. Data were obtained at various links on the USDOE Website (e.g., http://www2.ed.gov/programs/racetothetop/phase1-applications/index.html).

Appendix A lists all variables used in the current analysis, organized by construct, with columns providing variable description and citation for data source.

Significance

The current study contributes to the literature on innovation diffusion in relation to policy adoption by states. The unprecedented actions of states to jointly develop common academic standards followed by a sweeping movement toward their adoption created a unique opportunity to investigate the diffusion of education reform policies related to academic content standards. This study provides empirical findings that can inform the dialogue within political science on the use of federal aid to leverage federal policy priorities, in particular, relating to state initiatives and motivations for adopting common standards. Moreover, there has been much gainsaying of the CCSSI as truly an example of states taking the lead on their own reform, and instead, characterizing state adoption activity as succumbing to federal coercion made palatable by federal funds. The findings from the current study do demonstrate the vertical influence of federal incentivization on state adoption activity; however, findings also suggest that, controlling for this vertical influence, state adoption activity was influenced by internal determinants indicative of political orientation, national networking through inter-state consortia, and the adoption activity of neighbor states.

The current study is unique among investigations of state policy adoption, in terms of the intervals of time under investigation. That is, the adoption of policy in extant literature has looked at the adoption of policy by state legislatures, thus, using a metric of time based on year to year or legislative session to legislative session increments. The current study investigated a policy adoption phenomenon that transpired in a sweeping fashion, made partly possible by the authority for adoption residing in deliberative bodies (in most cases, state boards of education) that are typically more facile than legislatures (particularly when the state board is primarily an appointed body). Thus, the adoption of common standards provided a unique context that permitted a conceptualization of time based on a metric of monthly increments.

Lastly, the current analysis was limited to adoption of English language arts and mathematics common standards. With common standards in science and history forthcoming, findings from the current study can be used as a foundation from which to interpret the adoption activity of standards in those and other subject areas.

Organization of Study

This study is organized into five chapters. Tables and figures appear at the end of their respective chapters. Chapter 1 presents the background and purpose of the study, including an overview of constructs of interest and analytic strategy employed. Chapter 1 concludes with a statement of significance regarding this investigation, followed by these brief remarks orienting the reader to the organization of the study. Chapter 2 presents the tenets and premises of the innovation diffusion framework, followed by a review of literature related to its historical application across disciplines, as well as, its use in policy related analyses. Chapter 3 presents the conceptual framework for the current study, which uses the predominant features uncovered in my review of literature to organize my investigation and postulate a theory of action related to indicators for each of the respective models of internal determinants, national interaction, regional diffusion, and vertical influence. Chapter 3 continues with a description of the analytic strategy and procedure used in the current study, followed by an explication of data sources and the sample and context. Chapter 4 presents findings organized by the procedural steps taken in the study: (1) modeling the main effect of time, (2) screening independent variables, (3) selecting among alternative independent variable representations, (4) fitting single explanation models, and (5) fitting the full model. Chapter 5 presents a summary of findings, an interpretation of findings in relation to what was hypothesized, limitations to the data, proposed next steps to address limitations, and conclusions.

Table 1.1: Cross Tabulation of Race to the Top Phase 2 Application and Finalist Status by Date of Common Core State Standards Adoption (n = 49)

	Submitted a RTTT Phase 2 application	Did not a submit a RTTT Phase 2 application	Total
	n (%)	*n* (%)	*n* (%)
		RTTT Phase 2 Finalist	
Adopted by the July 27, 2010 announcement of RTTT Phase 2 finalists	17 (89.5%)	—	17 (89.5%)
Adopted by August 2, 2010 RTTT standards adoption deadline	2 (10.5%)	—	2 (10.5%)
Adopted after August 2, 2010	0 (0%)	—	0 (0%)
Projected to adopt by end of December 2010	0 (0%)	—	0 (0%)
Not projected to adopt before January 2011	0 (0%)	—	0 (0%)
Total	19 (100%)	—	19 (100%)
		Not a RTTT Phase 2 Finalist	
Adopted by the July 27, 2010 announcement of RTTT Phase 2 finalists	12 (70.6%)	2 (15.4%)	14 (46.7%)
Adopted by August 2, 2010 RTTT standards adoption deadline	1 (5.9%)	0 (0%)	1 (3.3%)
Adopted after August 2, 2010	1 (5.9%)	5 (38.5%)	6 (20%)
Projected to adopt by end of December 2010	1 (5.9%)	1 (7.7%)	2 (6.7%)
Not projected to adopt before January 2011	2 (11.8%)	5 (38.5%)	7 (23.3%)
Total	17 (100%)	13 (100%)	30 (100%)

Note. RTTT = Race to the Top. Race to the Top Phase 1 winners (Delaware and Tennessee) were excluded from the sample for this cross tabulation.

CHAPTER TWO

LITERATURE REVIEW

Innovation Diffusion

Framework

General tenets. The core of innovation diffusion theory is that there are determinants of diffusion that can be modeled to reveal the pace and pattern of adoption. Rogers (2003) has defined diffusion as "the process through which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). An innovation is defined as anything (an idea, a practice, or an object) that is new to an entity even if it is not new to other entities. Berry and Berry (1990, 2007) have established a typology of models for policy innovation diffusion. The first is an internal determinants model that attempts to explain whether an entity (e.g., state) will adopt an innovation (e.g., a policy or program) by taking into consideration political, economic, and social characteristics endemic to the entity. The second is a class of models on how innovations diffuse across entities; namely, the models of national interaction, regional diffusion, leader-laggard, isomorphism, and vertical influence, of which, channels of diffusion are primarily policy learning, competition, user demands, and vertical influence from higher levels of authority.

With regard to the first channel, policy learning, one entity learns from or copies another. Policy leaders take cues from one another and will adopt innovations based on where policies have been already passed—and thus are inclined to adopt policies in accordance with the diminished political risk associated with them having been tested elsewhere. The second channel, competition, pertains to the adoption of policies in effort to gain economic advantage or avoid economic disadvantage. The third channel, user demand (or public pressure), pertains to constituent-driven reasons for policy adoption. The fourth channel, vertical influence from higher levels of authority, pertains to possible federal pressure for states to adopt policy.

The national interaction model is principally denoted by policy learning. The regional diffusion model is principally denoted by competition. The leader-laggard model can be thought of as a regional interaction model, principally denoted by learning from regional-leaders. Isomorphic models, depending on whether it is principled on a normative, mimetic, or coercive mechanism (Dimaggio & Powell, 1983), will typically have combinations of channels that undergird its structure: normative isomorphism is denoted by a combination of learning and competition; mimetic isomorphism is denoted by a variant of learning premised more on emulation than rationalization, similar to laggard-oriented policy adoption; and coercive isomorphism is denoted by user demand and/or vertical influence from higher levels of authority. The vertical influence is principally denoted by a vertical influence from higher levels of authority; however, the influence need not be coercive and can follow a channel more similar to policy learning.

Central premise. The premises for the internal determinants model are that the policymaking process for each entity is independent of one another; and thus, one entity's policy adoption does not influence another's. Rather, an entity's unique characteristics (e.g., size, wealth, and politics) are the determining factors as to whether it will adopt a policy.

The five models of national interaction, regional diffusion, leader-laggard, isomorphism, and vertical influence are underpinned by the following respective premises. The premises for the national interaction model are that entities are connected through a non-proximity-bound network that facilitates the adoption of policies by connecting entities not yet having adopted a policy with entities that have. The premises for the regional diffusion model are similar to the national interaction model, except the inter-entity connections within the regional diffusion model are proximity dependent. The premises for the isomorphism model stipulate that policies are adopted either due to normative, mimetic, or coercive mechanisms, and are influenced by learning and competition, emulation-oriented learning, and vertical pressure (from above or below), respectively. The premises for the leader-laggard model are similar to the regional diffusion, except in a leader-laggard model the decision to adopt a policy is not so much influenced by the adoption patterns in the entity's proximity, but rather the adoption-status of the regional leader. Thus, in a leader-laggard model, some entities will be more innovative than others (possibly for reasons denoted in an internal determinants model), and thus will have an inordinate influence on the region, superseding the influence of contiguous entities denoted in the regional diffusion model. The premises for the vertical influence model are similar to those for isomorphic models (allowing for normative, mimetic, or coercive mechanisms), except, as the name implies, is restricted to vertical policy transference. In addition, the vertical influence model is similar to the leader-laggard model, except, in the vertical influence model, states take their cues from the national government, rather than regional leaders. Clearly, many of these policy diffusion models are not mutually exclusive, but rather are varied conceptualizations of policy diffusion that emphasize different aspects of the process.

Few researchers would argue that any one of these models fully explains the innovation diffusion process; rather, it is more likely some combination at work. Berry (1994) tested the predictive accuracy of the three most dominant explanations in state policy analysis (i.e., internal determinants, regional diffusion, and national interaction) and concluded that single explanation methodologies are inadequate and can often lead the researcher to draw wrong conclusions. She remarked,

> It seems unrealistic to believe that any pure diffusion model can account fully for state policy innovation, and to think that state policy officials are not influenced by the special socioeconomic and political environments of their own states. Even if state leaders look to other states as referents when they face policy problems, internal state conditions are probably a major factor in stimulating a search for innovations to emulate. Thus, an appropriate explanation of state policy innovation needs to integrate both internal determinants and effects by other states. (p. 453)

Theoretic origins and applications across fields. Innovation diffusion theory is rooted in the discipline of anthropology, where the use of archaeological data and studies of indigenous peoples were used to hypothesize the diffusion of culture across populations (e.g., Linton, 1936; Wissler, 1923). Early sociologists applied similar diffusion analyses to industrialized societies, to study, for example, the spread of attitudes of political radicalism (Rice, 1928) and the spread of artifacts such as the radio (Willey & Rice, 1933). Subsequent applications included an analysis of patterns of agricultural and commercial innovation diffusion: for example, industrial innovation (Mansfield, 1961), Tetracycline (Coleman, Katz, & Menzel, 1966), and educational innovations (Lawton & Lawton, 1979). Furthermore, as Rogers (2004) noted, “New applications of the diffusion model are constantly occurring, with yet newer innovations becoming available to study” (p. 19).

History of application to policy. McVoy (1940) employed one of the first applications of diffusion analysis to policy-oriented phenomena. Interested in studying the spread of social innovation/progressivism, he coded several laws and practices adopted by various states to compute indices of progressivism for each state. Investigation of the rank-order correlations of progressivism, and comparisons against other quantitative indices, brought McVoy to conclude that “many of the principles of diffusion developed by anthropologists . . . apply to present-day United States” and “certain points within the United States serve as centers of innovation, and that these innovations tend to radiate, other things being equal, in concentric gradients around the centers” (p. 219).

Another landmark study on policy diffusion was Walker’s (1969) analysis of 88 different programs (e.g., Automobile Registration, Minimum Wage Law, Teacher Certification) enacted by state legislatures. His study conceptualized the complex network of communication that connects the pioneering states with the parochial states (viz., leaders and laggards). Walker’s analysis sought to reveal why some states over others are early adopters of policy and how those policies spread among the states. Furthermore, his factor analysis demonstrated the relative speed and the spatial patterns of adoption; from which he concluded that “States like New York, Massachusetts, California, and Michigan should be seen as regional pace setters, each of which has a group of followers, usually within their own region of the country, that tend to adopt programs only after the pioneers have led the way” (p. 893).

The conclusions of McVoy (1940) and Walker (1969) point to features of innovation diffusion models that were present from the earliest application of diffusion analysis; namely, policy innovations typically take hold first in urban centers followed by gradient patterns of diffusion into surrounding areas (e.g., Pemberton, 1936). Gray (1973b), however, asserted that it would be flawed to infer the existence of a general proclivity for innovativeness as a trait that is held more strongly by some states than others. Gray’s (1973a) analysis of state adoption of education, Welfare, and civil-rights laws found, “not only is the adoption of education laws unrelated to adoption of laws in welfare and civil rights, but adoption of one education law is only slightly related to adoption of another education law” (p. 1184), concluding that "’innovativeness’ is not a pervasive factor; rather, it is issue- and time-specific at best (p. 1185). Similarly, early findings that innovativeness was highest for states that were more wealthy was challenged by Allard (2004), who posited that, with regard to the adoption of Mother’s Aid programs, “economic recession increases demand and need for assistance” (p. 529), leading to a positive association between revenue shortfall and program adoption. Furthermore, the issue-specific nature of innovativeness, whereby the designation of a leader would need to be determined ex-post-facto (Berry & Berry, 2007) has brought leader-laggard models to receive little attention in recent diffusion scholarship.

Diffusion of education policy. Mintrom's (1997) and Mintrom and Vergari's (1998) investigation of school choice policy diffusion included the analysis of policy entrepreneurs; concluding that, controlling for internal determinants and regional diffusion, policy entrepreneurs operating within interstate policy networks play a key role in the diffusion of policy ideas. Manna (2006) added to the innovation diffusion framework the perspective that policy entrepreneurs undertake a process of "borrowing strength," whereby they leverage the justifications and capabilities possessed elsewhere in the federal system to push their own agendas (p. 5). For example, policy learning that occurs within interstate policy networks provides governors, as policy entrepreneurs, the impetus to move forward on an issue, based on its promise or success elsewhere.

Cohen-Vogel, Ingle, Albee, and Spence's (2008) investigation of the role of policy entrepreneurs in relation to the diffusion of merit-based college aid policies in the Southeast noted the central role played by professional organizations and associations in the diffusion of broad-based merit aid programs; finding that national and regional organizations, namely the National Governors Association, the Southern Governors Association, and the Southern Regional Education Board "provided venues for policy makers and their aides to discuss shared problems as well as the policy ideas (and their associated political benefits and costs) that might solve them" (p. 353).

In addition to this kind of lateral mechanism of borrowing strength that follows a national interaction model of diffusion, according to Manna (2006), policy entrepreneurs might borrow strength from sources of license and capacity vertical to them. For example,

> A governor might possess low license to justify a particular school reform agenda, which may prevent her from persuading constituents and other state officials to endorse her idea. However, the governor can attempt to leverage license from federal officials who may be considering a similar course of action for the entire nation. Presidents or members of congress investing political capital like this become valuable resources for an enterprising governor seeking license to expand her own agenda. (p. 36)

Moreover, it may be difficult to distinguish the surface features of coercive isomorphism (denoted by vertical influence from higher levels of authority) from vertical mechanisms of borrowing strength; whereby, in the former case, the innovation is imposed upon the agent, and in the latter case, the innovation is agent invoked.

CHAPTER THREE

METHODOLOGY

Conceptual Framework

Movement toward Adopting Common Core State Standards

The current study's event of interest was a state's first instance of official movement toward adopting the Common Core State Standards; this included passing votes (in the case of state boards) or decisions (in the case of state chiefs) to formally adopt common standards, as well as, passing votes by state boards to adopt provisionally (as occurred prior to the June 2, 2010 release of the final standards), passage of legislation approving the state board or state chief to adopt, and projected dates of adoption for two states that have not yet adopted common standards, but are expected to by the end of the year. The timeframe of interest for state movement toward adopting common standards was January 2010 to December 2010. By modeling the length of time it took for the commencement of adoption-indicative state action, analyses revealed the probability that the adoption of common standards occurred as a linear function of one or more independent variables.

Figure 3.1 is a graphical display of the distribution of number of months up to and including the month of adoption, for the 50 states plus District of Columbia. The bar graph in Figure 3.1 is organized by censored status; censoring refers to those cases that have not experienced the target event by the end of the last observation interval. The life table shown in Table 3.1 displays the number of months without adopting common standards, where the last two columns convey the estimated hazard function and survival function, respectively. Hazard is the probability that a state will adopt common standards given that the state has not adopted before. This means that, as states adopted common standards, they were removed from the data set; so, from one month to the next, hazard was calculated only for those states that were still at risk of adopting (i.e., remained after removing those that already have adopted). Thus, the risk set decreased in size from month to month as more states adopted common standards.

Graphical displays of the hazard function and the survival function are shown in Figures 3.2 and 3.3, respectively. Note on the hazard function, the peak of risk immediately following the June release of the final standards. The cumulative distribution of this hazard function produces the well-known S-shaped growth pattern frequently observed in innovation diffusion data, as shown in Figure 3.4 with a fitted curve to the Common Core State Standards data. The curvature of the survivor function has this S-shaped pattern as well, where the steepening of the slope between the month of May and August conveys the rapid decline of survival followed by a leveling off.

Race to the Top Fund Aspiration

The current study's independent variable of central interest was a state's aspiration to compete for Race to the Top (RTTT) funds. One coding used to indicate RTTT fund aspiration was a time-variant variable, coded to indicate a state's aspiration pattern, with regard to whether it intended to submit an application, did submit an application, was moved out of the running by not being a finalist, and moved out of the running by not being a winner. Appendix B displays the coding rule followed for the time-variant indicator for aspiration to compete for Race to the Top funds. RTTT fund aspiration was conceptualized as an indicator of vertical influence, representing the degree to which a state's adoption of common standards was influenced by its aspiration to be competitive for RTTT funds. The presumptive mechanism for this variable was that states undertook timely adoptions in response to the leveraging of favored reforms of the administration through federal grants-in-aid.

Three variables representing state aspiration to compete for RTTT funds were posited: (a) submitted a RTTT Phase 1 application, (b) submitted a RTTT Phase 2 application, and (c) a time-variant variable indicating the change in state aspiration to compete, as reflected by the submission of letters of intent, submission of Phase 1 and Phase 2 applications, and cessation of aspiration following failure to attain finalist or winner status. It could be suggested that submission of a Phase 2 application would be an invalid predictor variable, as the deadline for Phase 2 applications was June 1, and to use that action to predict state behavior in February, for example, would violate assumptions of temporal precedence. Although this would be a reasonable assertion, the submission of an application was the end result of a process that was likely underway before January. Given the extensive intra-state coalition building with LEAs and teachers' unions needing to be undertaken and documented in the RTTT application, the estimated 681 hours that the USDOE speculated it would take to complete the grant application (Kincaid, 2010), and the hundreds to 1,000+ pages present in state applications and appendices, I posit that submission of a Phase 2 application is a valid independent variable for which assumptions of temporal precedence hold.

Variables of Exploratory Interest

Following on what the innovation diffusion literature has suggested to be important variables in predicting policy adoption, I assembled a comprehensive array of variables to collectively represent the dominant models of policy diffusion. The analysis was exploratory in nature, and sought to determine if there were alternative explanations that predicted the odds that a state would adopt common standards, above and beyond, what was explained by an aspiration to compete for RTTT funds.

Internal determinants. The dimension of internal determinants was divided into four sub-dimensions: (a) Economic, (b) Political, (c) Education system characteristics, and (d) Educational performance.

Economic. The presumptive mechanism for economic internal determinants was that states in worse fiscal condition would be more motivated to adopt common standards, with the rationale that the reform would produce improved education outcomes and translate into greater economic prosperity. Of course, implementing new standards will be costly, and therefore, fiscal health and adoption might be inversely related as a result of states unwilling to undertake the required investment. This issue is further complicated by the likelihood that fiscal health was confounded by RTTT fund aspiration; that is, if a state was in worse fiscal condition, and, I postulate, resultantly have been more likely to aspire for RTTT funds, then collinearity between the two variables may produce erroneous model results. Thus, this issue may require further inspection depending on the final model.

Political. Political internal determinants included a handful of governor-relevant variables, under the presumption that governors were key policy entrepreneurs in the Common Core State Standards Initiative (CCSSI).Within this set of variables were the governor’s political party, if it was a gubernatorial election year, and if the governor appointed more than half the voting members of the state board of education. Presumptive mechanisms for these variables were as follows. States were presumed to be less likely to adopt common standards if the governor was republican, as a result of the core republican value of state sovereignty. States, for whom it was an election year, were presumed to be more likely to adopt, so that governors can list adoption of the standards among their accomplishments of the prior term. (Of course, if both party and election year were found to be viable predictors, the inclusion of an interaction variable would have been warranted, given the mechanism as postulated.) The probability of adoption was presumed to be greater for state where the governor appointed more than half the voting members of the board, following the rationale that boards in these states would have wished to act on the governors' will.

Education system characteristics. Internal determinants of education system characteristics was a dimension comprised of a diverse set of variables, including indicators of support and investment from the state for education, rigor of expectations for instructional personnel, and quality of standards and accountability systems. I presumed that these variables will covary positively with the movement toward adopting common standards. This presumption was based on the idea that the same motivating factors that brought the state to establish high values on these indicators were the same factors that would motivate a state to have adopted common standards.

Educational performance. Educational performance internal determinants included variables on academic achievement, improvement, and poverty-gaps, as measured by the National Assessment of Educational Progress. Other indicators of educational performance included high school graduation, college readiness, and higher education participation and completion. The presumptive mechanism for these variables was that states that performed lower on these indicators would have had a higher probability of adopting standards, following the rationale that an implementation of high quality standards would lead to their improved standing on these outcomes.

National interaction. National interaction was operationalized by the number of relevant national consortia in which states were members as of January 2010. The presumptive mechanism for this variable was that states that were members of more consortia would have had a higher probability of adopting common standards, following the rationale, that the number of consortia in which the state was a member was an indication of its interest in collaborating with and learning from other states to coordinate common efforts toward educational improvement.

Regional diffusion. Regional diffusion was defined as the influence of a state's neighbors' adoption prevalence on its own decision to adopt, and operationalized it as the number of neighbor states to have adopted common standards controlling for the total number of neighbor states. The presumptive mechanism was that a state's probability of adopting common standards would have increased as the ratio of neighbor states that had adopted increased, although there have been findings to the contrary that have suggested that regional effects are not always present and sometimes operate in the opposite direction (Mooney, 2001). The current analysis, nevertheless, followed the conceptualization most prominent in the policy diffusion literature that state adoption has a positive effect on its neighbor states' odds of also adopting. The rationale for this mechanism was that states were competitive in their relative standing and would have adopted common standards to avoid disadvantage.

Descriptive statistics for all independent variables considered for modeling are listed in Table 3.2. Appendix A lists all variables organized by construct, with columns providing variable description and citation for data source.

Study Aims

Study Aim 1

Examine if competition for RTTT funds predicted whether and when states adopted common standards.

Hypothesis for study aim 1: RTTT fund aspiration would be a statistically significant and substantively important explanatory variable when modeling the adoption pattern of states.

Study Aim 2

Examine if internal determinants of states, national interaction among states, and influences upon states from other states predicted whether and when states adopted common standards.

Hypothesis for study aim 2: Alternative explanations for the adoption pattern of states would be demonstrated.

Study Aim 3

Determine if any of these alternative models (i.e., internal determinants of states, national interaction among states, and influences upon states from other states) continued to predict whether and when states adopted common standards, controlling for RTTT fund competition.

Hypothesis for study aim 3: Controlling for RTTT fund competition, alternative models would provide statistically significant and substantively important explanations for state adoption patterns.

Analytic Strategy

Modeling Innovation Diffusion

The spread of innovation tends to follow a predictable life cycle marked by slow initial growth, followed by rapid then diminished growth; this S-shaped growth, modeled by Bass (1969), has become a mainstay in quantitative approaches to innovation diffusion analysis. The Bass model belongs to a family of logistic growth modeling approaches referred to as event history analysis in political science, also known as survival analysis in the biological sciences and failure time analysis in the manufacturing industry.

Discrete-Time Event History Analysis

Event history analysis is a statistical modeling approach that uses longitudinal logistic regression to investigate the probability that an event will occur as a linear function of one or more independent variables. By modeling the length of time it takes for the occurrence of a target event, this approach is well suited for investigating what explains whether and when an event of interest occurred. The event of interest in the current study was state movement toward adoption of common standards. The actual dependent variable of an event history analysis is the hazard rate (the probability that a case will experience the target event given that it has not experienced it before); itself, an unobserved value. In order to model a binary outcome (event occurrence, event nonoccurrence) as a linear function of a predictor, the metric must be transformed into log odds (or logits). Log odds coefficients can then be transformed into odds ratios for ease of interpretability. Odds ratios are symmetrical around 1, with values equal to 1 indicating equal odds, values below 1 indicating lower odds, and values above 1 indicating higher odds associated with a given independent variable. For example, an odds ratio of 0.33 would indicate two-third (or 64%) lower odds, and an odds ratio of 2.33 would indicate two and one-third (or 233%) higher odds. Conversion from log odds to odds ratios involves an inverse transformation of taking the antilogarithm of the log odds coefficient (i.e., odds ratio = $e^{\text{log odds}}$). All data modeling was conducted using SAS® Version 9.2 (SAS Institute, Inc., 2008).

Conceptualizing time. Although adoption data were collected on a continuous (day to day) metric, state boards of education typically met on a monthly basis, and therefore, it was more appropriate to conceptualize time for this analysis in discrete units (month to month intervals). Accordingly, rather than continuous-time, the current study employed a discrete-time event history analysis through the fitting of discrete-time hazard models (Singer & Willett, 2003).

Censoring. As was required by this technique, all cases that did not experience the target event (adoption of common standards) by the last observed period were censored; in this case, censored at the last month (December 2010). This is termed non-informative right-censoring: non-informative because the end of time was researcher-determined, not indicating any particular state characteristic; right-censored because the censoring was at the end of time, not the beginning of time.

Person-period dataset. To conduct an event history analysis, the data must be restructured into what is termed a person-period dataset; in this case, however, it was structured into a state-month dataset. The state-month structure had a row for each month up until and including having adopted common standards. For states that did not (or were not projected to) adopt common standards by the end of observed time, they had 12 rows (one for each month of observed time). Person-period data structures allow variables to be time-variant (i.e., may take on different values from period to period).

Procedure

Step 1: Modeling the Main Effect of Time

Before investigating the relation between the dependent variable and potential explanatory variables, I determined the best representation for the main effect of time in a baseline discrete-time hazard model. A general model (where each interval of time was modeled with its own variable) was compared against a series of constrained models with increasing polynomial complexity. The objective was to identify the most parsimonious model that provided the best relative fit to the data. Because these models were nested, I was able to conduct a likelihood ratio test, which tests the difference in the deviance statistic (-2Log-likelihood) relative to the difference in number of parameters between models. Nesting exists when one model can be specified by placing constraints on the parameters of another.

Step 2: Screening Independent Variables

My next step of modeling was to cull the variables that demonstrated no promise of explaining variability in whether and when states adopted common standards. To do this, I fit a separate model for each independent variable, controlling only for the main effect of time. My exclusion criterion was to remove independent variables that had a *p*-value of .20 or greater from the set of potential predictors to be used in subsequent modeling. Since this was only the first phase of screening before testing a full model, a liberal screening criterion such as this was justified (Allison, 2010).

Step 3: Selecting among Alternative Independent Variable Representations

Several variables that passed the screening criterion of $p < .20$ were alternative representations of a similar variable. Model comparison, where each alternative variable was only present in its respective model, did not result in a nested model structure. The consequence of having non-nested models was that a likelihood ratio test was not an option in identifying the variable that produced the model with a superior fit to the data. However, Akaike Information Criterion (AIC; Akaike, 1973) and Bayesian Information Criterion (BIC; Schwarz, 1978) values can be compared between models, with the model producing the lowest values on these indices being considered the model of superior fit. The AIC and BIC are ad-hoc criteria based on the log-likelihood that penalize for the number of parameters (in the case of the AIC) and for the number of parameters and sample size (in the case of the BIC). Thus, AIC and BIC values were able to be used to compare the relative fit of models, even though the models were not nested.

Step 4: Fitting Single Explanation Models

Variables remaining in the set of potential predictors (after the screening and selection procedures of steps 2 and 3) were grouped according to their respective model: internal determinants, national interaction, regional diffusion, and vertical influence. Due to a potentially large number of independent variables eligible for subsequent modeling, determining the best model by direct comparison could have been an intractable task; for example, with even just 10 possible predictor variables, $2^{10} = 1{,}024$ model comparisons would be required. Accordingly I decided on using a stepwise sequence for fitting models. Furthermore, I decided that a backward elimination procedure (where variables were successively removed) would be preferred to a forward selection procedure (where variables were successively added), based on Hamilton’s (1987) conclusions that the contribution of some predictor variables is only detectable when modeled alongside other variables. Thus, not wanting to miss any potential contributory variables, I decided to use a backward elimination stepwise sequence as the procedure to take for fitting models.

The model fitting procedure taken for each variable grouping (internal determinants, national interaction, regional diffusion, or vertical influence) resulted in a series of nested models. Thus, upon calculating the difference in deviance statistics and number of parameters between two models being compared, the critical value of a chi-square distribution indicated whether the constraint resulted in a non-negligible depreciation of model fit (indicating that the constraint was unwarranted) or whether the constraint resulted in a negligible difference in model fit (suggesting that the constraint was warranted).

In terms of my model fitting procedure, the initial model contained all potential variables. The variable in the current model with the highest *p*-value was constrained to zero (variable was removed from the model), and the difference in model fit (as indicated by the difference in deviance relative to the difference in number of parameters) between the current and constrained model was compared. If the difference in model fit was statistically significant, it suggested that that variable made a substantive contribution to the model and that dropping it resulted in a worsened model fit. If the difference in model fit was not statistically significant, then I failed to reject the null hypothesis (that the variable's coefficient was zero), and therefore, elected to remove the variable from the model for the benefit of gaining a more parsimonious model that fit the data as well. Moreover, my model fitting procedure consisted of successively removing the variable with the highest *p*-value (re-evaluating the *p*-values with each successive model), stopping at the model where the last failure to reject (non-significant change in model fit) was observed. Because of the exploratory nature of my model fitting procedure, a liberal *p*-value ($p < .10$) was used to indicate statistical significance; thus, variables were eliminated successively, stopping at the last model to produce a non-significant ($p \geq .10$) deviance-based hypothesis test of whether the respective beta coefficient was equal to zero.

Study aim 1. To undertake study aim 1 (Examine if competition for RTTT funds predicted whether and when states adopted common standards), a discrete-time hazard model was fit using the variable indicating aspiration to compete for RTTT funds, controlling for the main effect of time.

Study aim 2. To undertake study aim 2 (Examine if internal determinants of states, national interaction among states, and influences upon states from other states predicted whether and when states adopted common standards), a series of discrete-time hazard models were fit. For the internal determinants model, two-stages were involved: first, fit models for each of the four sub-dimensions (economic, political, education system characteristics, and educational performance); second, fit a combined internal determinants model that used only those variables that remained after the backward elimination stepwise sequence conducted on each sub-dimension.

Step 5: Fitting the Full Model

Study aim 3. To undertake study aim 3 (Determine if any of these alternative models continued to predict whether and when states adopted common standards, controlling for RTTT fund competition), following the same procedure undertaken in Step 4 with the fitting of single explanation models, I fit a series of discrete-time hazard models, also using a backward elimination stepwise sequence.

Data Sources

Dependent Variable

Movement toward adopting Common Core State Standards. Movement toward adopting Common Core State Standards was assembled through various sources, including the CCSSI (2010e) map of states and adoption dates, *Education Week* (e.g., Gewertz, 2010d) Web log postings, and various primary source documents (e.g., Idaho State Board of Education, 2010). In addition, the National Conference of State Legislatures' (2010) *Education Bill Tracking Database* was referenced for identifying state legislation approving common standards adoption. Lastly, the National Association of State Boards of Education (2010) *Common Core State Standards Adoption Time Frame* informed my investigation of states that were projected to adopt by the end of the year, with corroboration through official state sites (Alabama Department of Education, 2010; Oregon School Boards Association, 2010).

Independent Variables

Internal determinants. Various reports from national organizations were referenced to compile a comprehensive assembly of variables indicating education relevant dimensions of each state:

- Achieve's (2010) *Closing the expectations gap: Fifth annual 50-state progress report on alignment of high school policies with demands of college and careers*

- The Alliance for Excellent Education's (2010) *The case to adopt common college- and career-ready standards (state cards)*
- Carmichael, Martino, Porter-Magee, and Wilson's (2010) Thomas B. Fordham Institute report, *The state of state standards—and the Common Core—in 2010*
- *T*he Editorial Projects in Education's (2010c, 2010d) *Quality counts 2010: State report cards*
- The National Center for Public Policy and Higher Education's (2010) *Measuring up: The national report card on higher education*

Collectively, this body of reports provided a broad array of state economic, education system characteristic, and educational performance indicators.

U.S. Census Bureau (2010) data were used in combination with a couple of the aforementioned data sources to put variables in a common metric to facilitate state-to-state comparisons. U.S. Census Bureau data were also used for indicators of state economic conditions. The Council of State Governments' (2010) *The book of the states* and the Education Commission of the States' (2010) *StateNotes* on governors provided indicators of state political characteristics.

National interaction. To indicate the degree of national interaction, I summed the number of relevant inter-state consortia in which each state was a member, as of January 2010. Inclusion and exclusion criteria for selecting consortia to be included in the sum score were as follows: (a) the consortia in question had to be open to membership from across the nation, not restricted to a particular region; (b) the foci of the consortia in question could not specialized in such a way that membership would be biased toward certain states; (c) the function of the consortia must have been to provide a network through which collaborative effort among states could be undertaken toward making improvements in K-12 education; and (d) the consortia in question must not have been so closely linked to the dependent variable that its exogeneity could be in question. Consortia that were considered, yet excluded for one or more of these criteria were as follows:

Excluded due to membership being regionally restricted. Although the New England Common Assessment Program (NECAP) had appropriate foci for consideration to be included in the sum variable, its restriction to New England states required its exclusion.

Excluded due to the foci biasing membership. The World-Class Instructional Design and Assessment Consortium (WIDA) was a consortium that focused on large-scale assessments for English language learners (ELL). Although, all states must confront issues of assessing ELLs, the WIDA consortium was excluded to avoid creating a bias toward those states for which ELL challenges were greatest. Likewise, Math Achievement = Success (MAS) and Migrant Literacy Net (MLN) were consortia focused on addressing issues of achievement for migrant populations; the highly specialized foci of these consortia warranted their exclusion.

Excluded due to not being network oriented. The Consortium for Entrepreneurship Education (CEE) appeared to provide a hub resource to states, but was limited in the degree to which it facilitated networking among the states, thus, warranting its exclusion.

Excluded due to its exogeneity being in question. The CCSSI consortia to develop the common standards represents a collaboration of states that was so highly linked to the subsequent adoption of those standards by the states, that a claim challenging its exogeneity could be made. In addition, because 49 of the 51 states (including D.C.) in the current analysis were members of the CCSSI consortium, its inclusion in the sum variable would amount to adding a constant, resulting in doing little to explain variation in adoption activity.

The consortia names for those that met inclusion criteria, number of member states, and citations for the sources listing member states were as follows:

- Achieve (*n* = 27; http://www.isbe.net/racetothetop/PDF/appendix_vol_2_pt4.pdf);
- American Diploma Project (ADP) Algebra I end-of-course exam (*n* = 8; Achieve, 2009);
- ADP Algebra II end-of-course exam (*n* = 15; Achieve, 2009);
- Balanced Assessment Consortium (*n* = 35; Florida Department of Education, 2010);
- Career and Technical Education Consortium of States (CTECS; *n* = 11; http://ctecs.org/memberreps.htm);
- College and Career Ready Policy Institute (CCRPI; *n* = 8; Southeastern Comprehensive Center at SEDL, n.d.);
- Florida Consortium (*n* = 17; Florida Department of Education, 2010);
- Multiple Options for Student Assessment and Instruction Consortium (MOSAIC; *n* = 27; Florida Department of Education, 2010);
- Partnership for 21st Century Skills (P21; *n* = 14; http://64.130.44.78/documents/assess21/assess21/newsletters/P21-

winter2008/newsletters/fall2008/route21/index.php?option=com_content&task=view&id =746&Itemid=18)

- State Consortium on Board Examination Systems (SCOBES; $n = 8$; National Center on Education and the Economy, 2010); and
- Summative Multi-state Assessment Resources for Teachers and Educational Researchers (SMARTER; $n = 22$; Florida Department of Education, 2010).

Race to the Top Assessment Consortia. Of the 11 consortia that met inclusion criteria, 6 (55%) were consortia that formed in response to the RTTT call for development of high-quality assessments. For states competing for a share of the $4.35 billion RTTT state incentive fund, 24 (out of the 500 total) competitive points could have been earned for developing, implementing, and supporting the transition to common, high-quality assessments (USDOE, 2009). Membership in consortia devoted to these aims was an indication of state eligibility for receipt of these points. Consortia that formed in response to the call high-quality assessments were as follows: Achieve, BALANCED, Florida Consortium, MOSAIC, SCOBES, and SMARTER. After some reorganization and consolidation during the spring of 2010, consortia submitted applications for the Race to the Top Assessment Program, a competitive grant totaling $350 million, in addition to the billions being competed for under the RTTT general fund. Thus, it might be argued that membership in any of the six RTTT assessment consortia was more an indication of federal vertical influence than national interaction, or at a minimum, best conceptualized as vertically influenced national interaction.

Although I concede that the national interaction among states via the consortia in question was likely complicated by some level of vertical influence, I argue, for the following reasons, that I was justified in using a simpler (national interaction only) conceptualization in the current analyses. Irrespective of whether the consortia were induced by RTTT or were formed independently of RTTT, the positive relation between consortia membership and adoption held. Disaggregating the sum variable by RTTT inducement yielded comparable correlations between month of adoption and consortium membership: $r = -.48$ ($p < .01$) and $r = -.36$ ($p < .05$) for consortia induced by RTTT and those not induced by RTTT, respectively. Furthermore, the aggregated correlation between month of adoption and consortium membership ($r = -.52$, $p < .01$) was greater than either of the disaggregated correlations. Moreover, notwithstanding the need for a refined conceptualization that considers vertical influences on national interaction, these data suggested that some principle beyond RTTT inducement was required to explain the association between consortia membership and adoption of common standards. Thus, the current analysis deferred to a national-interaction-only conceptualization of consortia membership, acknowledging its possible limitation. See Table 3.3 for intercorrelations and descriptive statistics for month of adoption and membership in consortia (in aggregate and disaggregated by RTTT inducement). See Table 3.4 for state membership of consortia, comparing those consortia that were RTTT induced to those that were formed independent of RTTT inducement.

Regional diffusion. With regard to regional diffusion, Berry and Berry's (1990) coding scheme was used for the 48 contiguous states, which denoted that states that share borders were coded as neighbors; in addition, the pairs New Jersey and Maryland, and Massachusetts and Maine were coded as neighbors. In order to avoid dropping Alaska and Hawaii from analyses as a result of missing data (especially since Alaska, being one of the two states to decline participating in the CCSSI consortium, was of substantive importance), Alaska and Hawaii were coded as having one neighbor each: Washington and California, respectively. In addition, District of Columbia was coded as having Maryland and Virginia as neighbors.

Vertical influence. To represent the vertical influence of federal incentivization, the following RTTT data were assembled: states that submitted letters of intent and the status of applicants, in terms of being finalists and winners at phase 1 and phase 2 of the program. Data were obtained at various links on the USDOE Website:

- http://www2.ed.gov/programs/racetothetop/intent-to-apply.html
- http://www2.ed.gov/programs/racetothetop/phase1-applications/index.html
- http://www2.ed.gov/programs/racetothetop/phase2-intent-to-apply.html
- http://www2.ed.gov/programs/racetothetop/phase2-applications/index.html

Sample and Context

Although two U.S. territories were members of the CCSSI consortium to develop the common standards, I did not include U.S. territories in my analytic sample; a lack of comparable data for the U.S. territories made their inclusion impractical. Although D.C. was missing data on a few variables of interest, special efforts were made to derive comparable values when possible to minimize the chances that it would be dropped from analyses. For example, for variables relevant to governors, comparable values were imputed based on characteristics of the mayor.

Thus, nearly all analyses were based on a sample consisting of the 50 states and District of Columbia.

The context of this analysis was the policy adoption environment following the January 2010 release of the draft Common Core State Standards to the states. The duration of time under study was the year of 2010, January through December.

Table 3.1: Life Table Describing the Number of Months without Adopting Common Standards for the 50 States and District of Columbia

		Number			Proportion of	
Month	Time interval	Not having adopted at the beginning of the month	That adopted during the month	Censored at the end of the month	States at the beginning of the month that adopted during the month (Hazard function)	All states still not having adopted at the end of the month (Survivor function)
1	[1, 2)	51	—	—	—	1.00
2	[2, 3)	51	1	0	0.02	0.98
3	[3, 4)	50	1	0	0.02	0.96
4	[4, 5)	49	1	0	0.02	0.94
5	[5, 6)	48	3	0	0.06	0.88
6	[6, 7)	45	13	0	0.29	0.63
7	[7, 8)	32	14	0	0.44	0.35
8	[8, 9)	18	6	0	0.33	0.24
9	[9, 10)	12	1	0	0.08	0.22
10	[10, 11)	11	2	0	0.18	0.18
11	[11, 12)	9	1	0	0.11	0.16
12	[12, 13)	8	1	8	0.13	0.14

Note. Numerated months 1-12 were representative of January-December 2010. Under the Time interval column: brackets indicate including that month and parentheses indicate up until that month; thus, for example, time interval [1, 2) indicates, including month 1, up until month 2.

Table 3.2: Descriptive Statistics of Independent Variables

	n	Min	Max	*Mdn*	*M*	*SD*
Internal Determinants:						
Economic						
FISCAL	50	.01	.40	.14	.14	.07
ENROLLMNT	51	72	6407	676	966.65	1147.98
MOVETO	50	18.28	126.68	39.55	47.58	24.30
MOVEFROM	50	9.96	78.35	42.14	44.46	15.35
INCOME	51	29569	64991	37730	39106.47	6945.22
Internal Determinants:						
Political						
APPOINT	51	0	1	—	.66	.48
REPUBLICN	51	0	1	—	.46	.51
ELECTION	51	0	1	—	.44	.50
Internal Determinants:						
System Characteristics						
HSSTANDRDS	51	0	1	—	.61	.49
HSREQMNTS	51	0	1	—	.41	.50
ASSMTSYST	51	0	1	—	.27	.45
DATASYST	51	0	1	—	.31	.47
ACCNTSYST	51	0	1	—	.02	.14
ELASTANDS	51	1	10	5	5.43	2.30
MTHSTANDS	51	1	10	5	5.69	2.44
ELACOMPAR	51	-1	1	-1	-.67	.59
MTHCOMPAR	51	-1	0	-1	-.76	.43
OVERALL	51	68.3	87.5	76.1	75.88	4.22
FINANCE	49	63.0	89.6	73.8	75.02	7.06
SFEQUITY	49	74.5	91.6	85.9	85.21	4.00
SPENDING	51	39.9	96.3	61.4	65.92	15.75
STDASSACC	51	61.9	98.3	83.0	84.22	9.01
STANDARDS	51	50.0	100.0	89.3	84.10	15.53
ASSESSMNT	51	65.0	95.0	85.0	84.25	5.87
ACCNTBLTY	51	60.0	100.0	90.0	84.31	13.89
TRANSALGN	51	57.1	96.4	75.0	75.21	9.07
EARLYED	51	70.0	100.0	80.0	81.77	11.26
COLLEGRDY	51	50.0	90.0	60.0	59.80	11.04
ECONWKFC	51	50.0	100.0	87.5	86.28	15.05
TEACHPROF	51	56.3	95.8	72.7	73.26	8.01
TCHQUALTY	51	58.8	94.1	73.5	75.49	8.13
INCENTIVS	51	50.0	96.2	69.2	70.82	9.56
CAPACITY	51	56.7	100.0	70.0	73.47	10.87
AFFORDABL	50	39	71	51.5	52.10	7.61
EDUCSPEND	51	1158	2303	1709	1708.86	303.37

Table 3.2 – continued

	n	Min	Max	*Mdn*	*M*	*SD*
Internal Determinants:						
Educational Performance						
PREPARATN	50	56	100	80	78.64	9.91
PARTICIPN	50	66	100	82.5	83.40	9.80
COMPLETN	50	49	100	85.5	85.12	9.80
BENEFITS	50	46	100	83.0	83.62	10.24
MPI	51	51.6	78.2	65.7	65.00	5.68
MPIPERFRM	51	12.2	28.2	21.5	20.81	3.64
MPIIMPROV	51	20.0	28.3	24.0	23.83	2.03
MPIOPPORT	51	15.8	24.1	20.3	20.35	1.94
CHNCSCSS	51	67.0	93.3	78.6	78.63	6.24
EARLYFNDN	51	72.3	98.1	84.0	83.56	6.45
SCHOOLYRS	51	58.1	94.8	74.9	74.77	7.47
OUTCOMES	51	68.0	98.5	78.6	79.77	6.62
ACHIEVMNT	51	55.9	85.2	69.9	69.03	6.32
STATUS	51	27.8	92.8	64.2	61.56	13.09
CHANGE	51	58.1	86.1	70.1	70.74	5.88
EQUITY	51	53.4	90.1	79.4	79.16	6.96
HSGRADUAT	51	78.5	91.2	87.0	86.00	3.63
BACHDGREE	51	17.3	47.5	25.8	27.15	5.48
ADVCDGREE	51	6.4	26.0	9.2	9.95	3.31
Policy Diffusion						
National Interaction						
CONSORTIA	51	0	9	4	3.76	2.06
Policy Diffusion						
Regional Diffusion						
CENTRAL	51	0	1	—	.24	.43
NORTHEAST	51	0	1	—	.22	.42
WESTERN	51	0	1	—	.25	.44
NEIGHBORS	51	1	8	4	4.53	1.75
NEIGHADPT	51	0	6	2	2.16	1.69
NEIGHPRPN	51	0.00	1.00	0.50	0.46	0.34
NEIGHN_LG[a]	51	0	6	—	—	—
NEIGHN_CN[a]	51	0	6	—	—	—
NEIGHP_CN[a]	51	0	1.00	—	—	—
NEIGHP_CN[a]	51	0	1.00	—	—	—
Policy Diffusion						
Vertical Influence						
RT3PHASE1	51	0	1	—	.80	.40
RT3PHASE2	51	0	1	—	.75	.44
RT3CMPETE[a]	51	0	1	—	—	—

Table 3.2 – continued

Note. Appendix A lists all variable descriptions. Medians are not reported for dichotomous variables.
[a]Time-variant variable: means and standard devations are not reported.

Table 3.3: Intercorrelations and Descriptive Statistics for Month of Common Core State Standards Adoption and Membership of Consortia Induced and Not Induced by Race to the Top (n = 51)

	1[a]	2[b]	3[c]	4
1. Month of CCSS adoption[a]	—	—	—	—
2. Membership of consortia induced by RTTT[b]	-.48**	—	—	—
3. Membership of consortia not induced by RTTT[c]	-.36*	.28	—	—
4. Membership of combined consortia (RTTT induced and not induced)	-.52**	.82**	.78**	—
Minimum	—	0	0	0
Maximum	—	6	4	9
M	—	2.67	1.10	3.76
SD	—	1.35	1.22	2.06

Note. CCSS = Common Core State Standards. RTTT = Race to the Top. Correlation coefficients were based on a cross-sectional data format, not data structured within the person-period data format used for fitting the hazard models. Consortia membership sums were based on state status as of January 2010. [a]Month of CCSS adoption was coded January 2010 = 1, February 2010 = 2, etc. In order to retain states that have yet to adopt, states yet to adopt and not projected to adopt by the end of December 2010 were coded 13 (indicating adoption in January 2011). Because this imputation is not likely to be tenable, these correlations should be interpreted as estimates only. Furthermore, note that low values for Month of adoption indicate early adoption and high values indicate late adoption. Thus, the sign for each correlation coefficient will need to be reversed to be interpreted as the association with adoption risk; at present the sign indicates the association with adoption survival. [b]Consortia designated as RTTT induced: Achieve, BALANCED, Florida Consortium, MOSAIC, SCOBES, and SMARTER. [c]Consortia designated as not RTTT induced: ADP Algebra I, ADP Algebra II, CTECS, CCRPI, and P21.
*$p < .05$. **$p < .01$.

Table 3.4: State Membership for Consortia Induced by RTTT and Not Induced by RTTT, out of the 11 Consortia that met Inclusion Criteria (*n* = 51)

State	Month of CCSS Adoption	Number of consortia state in which state was a member		
		Induced by RTTT	Not induced by RTTT	Total
Kentucky	February	6	3	9
Washington	March	2	1	3
Maine	April	2	2	4
Hawaii	May	3	2	5
Maryland	May	4	3	7
West Virginia	May	1	1	2
Arizona	June	3	4	7
Illinois	June	5	1	6
Michigan	June	4	0	4
Mississippi	June	4	0	4
Missouri	June	2	0	2
Nevada	June	0	1	1
New Jersey	June	3	3	6
North Carolina	June	4	3	7
Ohio	June	3	4	7
Oklahoma	June	3	0	3
Utah	June	4	0	4
Wisconsin	June	4	1	5
Wyoming	June	3	0	3
Arkansas	July	2	2	4
Connecticut	July	2	0	2
District of Columbia	July	4	0	4
Florida	July	2	1	3
Georgia	July	3	1	4
Iowa	July	2	1	3
Louisiana	July	2	3	5
Massachusetts	July	3	2	5
New Hampshire	July	3	0	3
New York	July	2	0	2
Pennsylvania	July	5	3	8
Rhode Island	July	3	1	4
South Carolina	July	3	1	4
Tennessee	July	5	1	6

Table 3.4 – continued

State	Month of CCSS Adoption	Number of consortia state was a member		
		Induced by RTTT[b]	Not induced by RTTT[c]	Total
California	August	3	0	3
Delaware	August	4	0	4
Idaho	August	2	1	3
Indiana	August	3	1	4
Vermont	August	1	0	1
Minnesota	September	3	4	7
Kansas	October	3	1	4
New Mexico	October	3	1	4
Alabama	November[a]	2	1	3
Oregon	December[a]	1	0	1
Alaska	NAiF	0	0	0
Montana	TBD	3	0	3
Nebraska	TBD	3	0	3
North Dakota	TBD	2	0	2
South Dakota	TBD	1	1	2
Texas	NAiF	0	0	0
Virginia	NAiF	0	1	1

Note. CCSS = Common Core State Standards. RTTT = Race to the Top. NAiF = Not adopting in immediate future. TBD = Month of adoption is to be determined. States are listed alphabetically within their respective month of adoption. Membership sums were based on state status as of January 2010. [a]Month of adoption was based on projections reported on official state Web sites. [b]Consortia designated as RTTT induced: Achieve, BALANCED, Florida Consortium, MOSAIC, SCOBES, and SMARTER. [b]Consortia designated as not RTTT induced: ADP Algebra I, ADP Algebra II, CTECS, CCRPI, and P21.

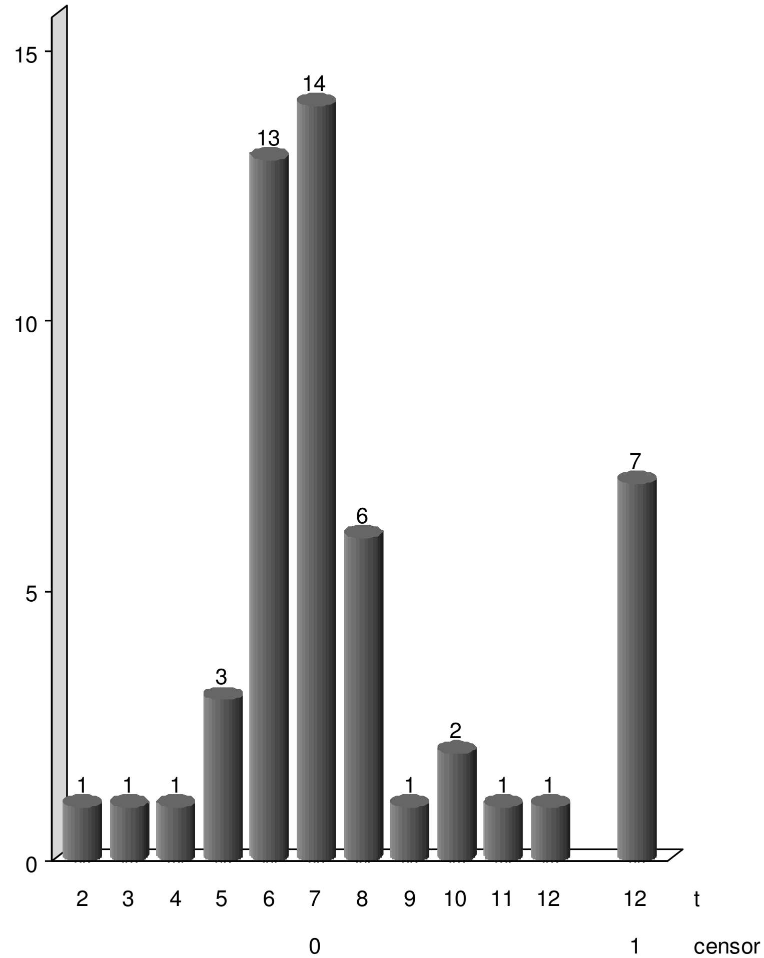

Figure 3.1: Distribution of number of months up until and including the month of adoption by censoring status, for the 50 states plus D.C.

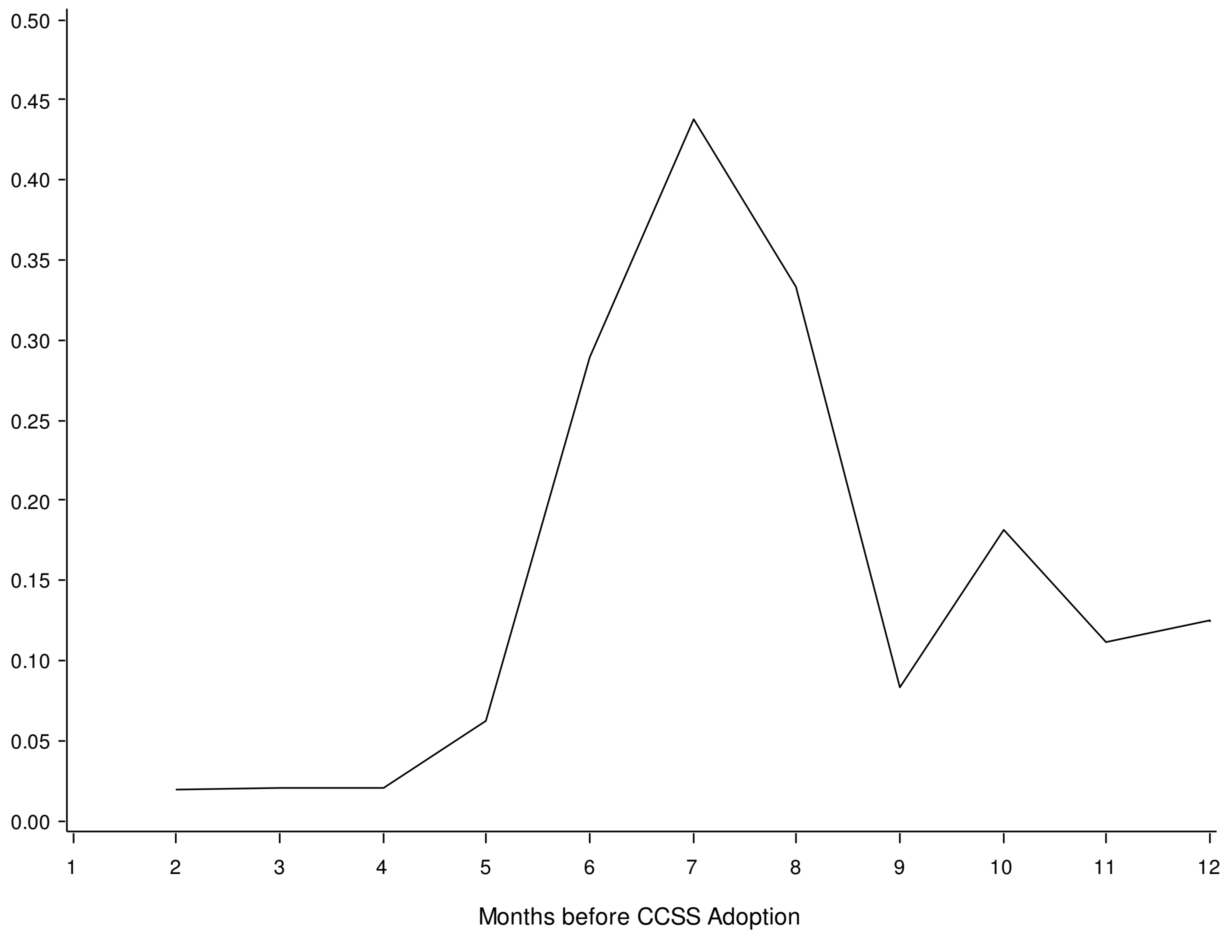

Figure 3.2: Estimated hazard function, for the 50 states plus D.C.: Months to adoption of common standards.

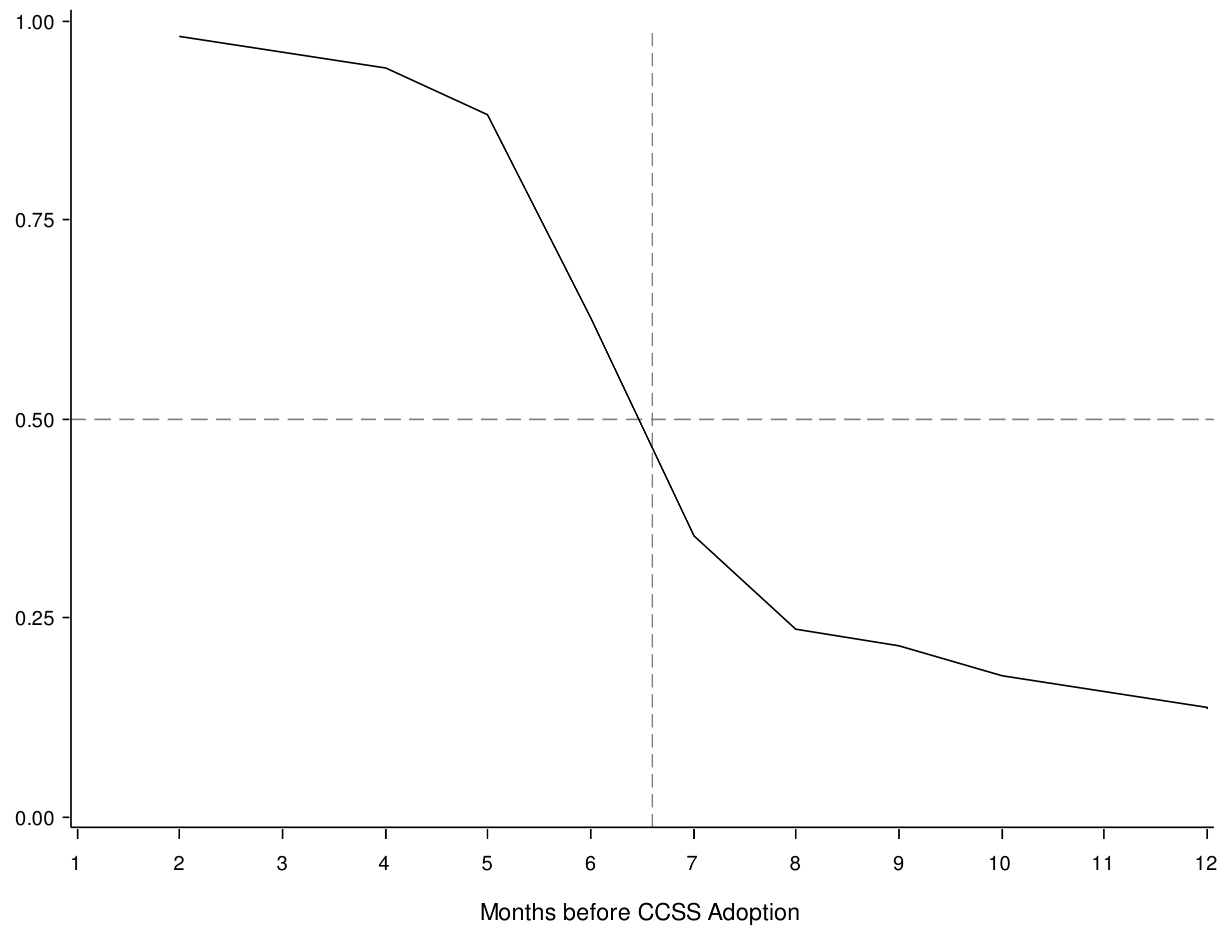

Figure 3.3: Estimated survival function, for the 50 states plus D.C.: Months to adoption of common standards.

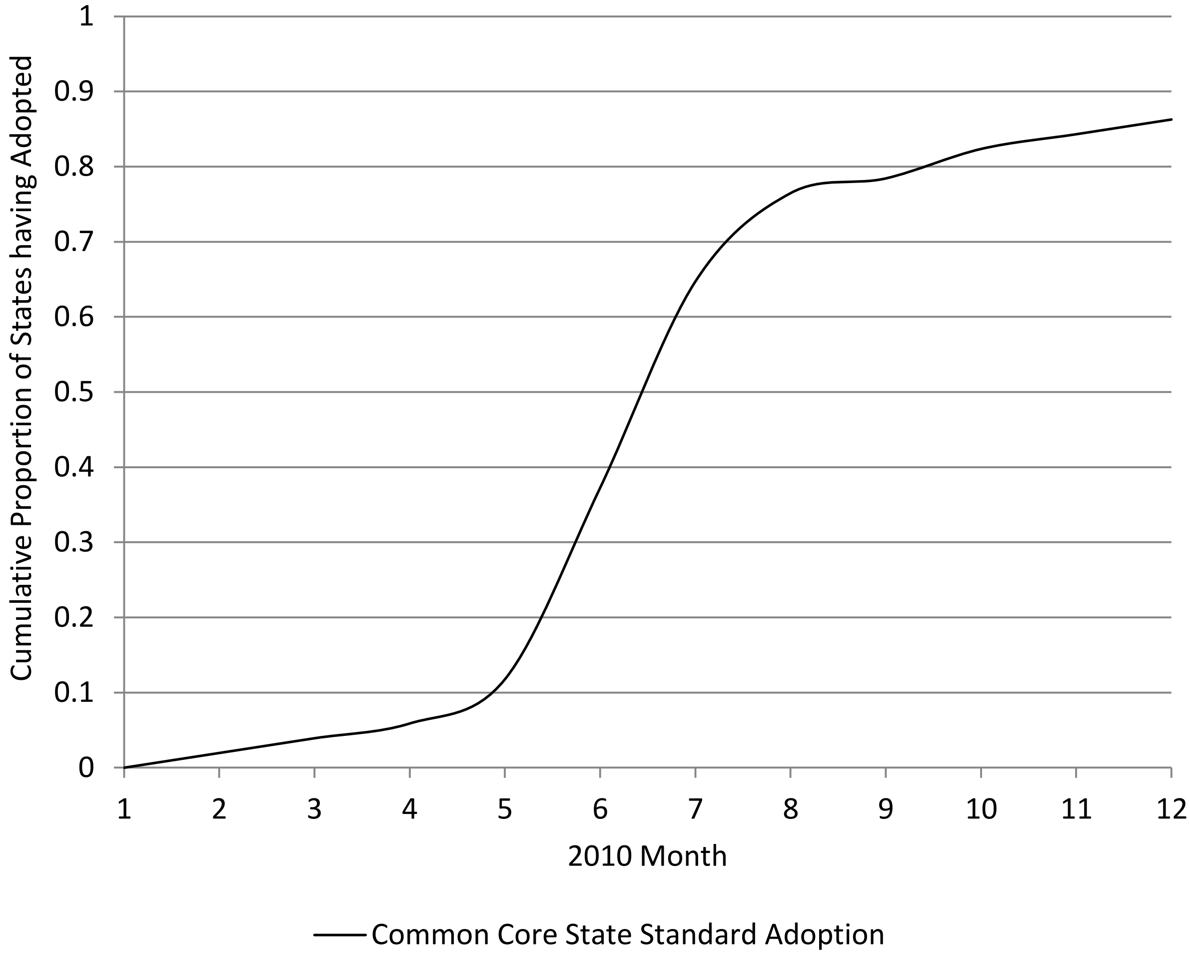

Figure 3.4: Cumulative proportion of states having adopted, for the 50 states plus D.C.

CHAPTER FOUR

RESULTS

Step 1: Modeling the Main Effect of Time

Before investigating the relation between the dependent variable and potential explanatory variables, I determined the best representation for the main effect of time in a baseline discrete-time hazard model. Fitting a function of time to the data controlled for maturation effects associated with the odds of adoption over time. For example, a positive linear function of time would account for states having had steadily increased odds of adoption (merely as a result of them having had more time to do so); a quadratic function would account for that rate having had a nonlinear relation to time, possibly rising steadily until peaking followed by a steady decline—as appeared to be the case in these data, as demonstrated graphically with the estimated hazard function in Figure 3.2. A general model (where each interval of time was modeled with its own variable) was compared against a series of constrained models with increasing polynomial complexity. The objective was to identify the most parsimonious model that provided the best relative fit to the data. Table 4.1 compares the general model and the alternative smooth polynomial representation.

Because these models were nested, I was able to conduct a likelihood ratio test on the difference in the deviance statistic relative to the difference in parameters between models. This test showed the quadratic model to be the lowest order polynomial for which no higher one fit better (i.e., the last test that rejects). Furthermore, compared to the general model, the quadratic fit just as well. According to the likelihood ratio test (devianceΔ = 13.07, $df\Delta = 9$, $p = .16$), the general model (with 12 parameters) did not fit better than the quadratic (with 3 parameters), suggesting that the improvement in fit obtained through the general model was not worth the additional parameters. Thus, these analyses indicated that the quadratic model fit these data best. Maximum likelihood estimates for the baseline model are shown in Table 4.2.

Step 2: Screening Independent Variables

My next step of modeling was to cull the variables that demonstrated no promise of explaining variability in whether and when states adopted common standards. To do this, I fit a separate model for each independent variable, controlling only for the main effect of time. My exclusion criterion was to remove independent variables that had a *p*-value of .20 or greater from the set of plausible predictors to be used in subsequent modeling. Eighteen of the original 66 variables passed the screening criterion. Table 4.3 displays the maximum likelihood estimates for all variables screened and chi-square statistics presented in boldface for all variables that passed the screening criterion.

Variables that passed the screen criteria, organized by construct, were as follows:

Internal Determinants – Economic

FISCAL (Fiscal health).

Internal Determinants – Political

REPUBLICN (Governor's political party; or mayor's political party in the case of D.C.).

Internal Determinants – Education System Characteristics

OVERALL (Overall rating), SFEQUITY (School finance equity), TRANSALGN (Transition and Alignment), COLLEGRDY (College Readiness), ECONWKFC (Economy and Workforce), TEACHPROF (teaching profession), INCENTIVS (incentives and allocation), and CAPACITY (building and supporting capacity).

Internal Determinants – Educational Performance

COMPLETN (Completion of higher education) and BENEFITS (Benefits of higher education).

National Interaction

CONSORTIA (Number of consortia in which each state was a member).

Regional Diffusion

NEIGHBORS (number of neighbor states to have adopted prior to reference state adoption controlling for the number of neighbor states) and NEIGHPRPN (proportion of neighbor states to have adopted prior to reference state adoption).

Vertical Influence

RT3PHASE1 (submitted an RTTT Phase 1 application), RT3PHASE2 (submitted an RTTT Phase 2 application), and RT3CMPETE (aspiration to compete for RTTT funds).

Step 3: Selecting among Alternative Independent Variable Representations

Editorial Projects in Education (2010) Overall State Score

The variable, OVERALL (overall score according to *Quality Counts 2010* (Editorial Projects in Education (EPE), 2010)), passed the screening criterion however, OVERALL was a second-order composite score comprising six first-order composite scales. Only two (TRANSALGN and TEACHPROF) of the six first-order composite scales passed the screening, and only five (SFEQUITY, COLLEGRDY, ECONWKFC, INCENTIVS, CAPACITY) of the 17 total EPE indicator variables passed the screening. Accordingly, a subsequent effect found for OVERALL would be difficult to interpret, not knowing to what exactly an effect could be attributed. Moreover, with regard to variables from the EPE report, I decided to forego testing OVERALL against competing explanatory variables, and to move forward on modeling composite and indicator variables only.

Transition and Alignment

The variable TRANSALGN (Transition and Alignment) was a composite scale comprising the following three indicator variables: EARLYED (Early Childhood Education), COLLEGRDY (College Readiness), and ECONWKFC (Economy and Workforce). Considering that the composite scale and the latter two indicator variables passed the screening criterion, a decision needed be made as to whether to use the composite variable or one or both of the indicators.

As indicated by AIC and BIC values, the indicator variable, ECONWKFC, had a superior fit to the data than any of the other comparable variables modeled. As shown in Table 4.4, Model A (containing TRANSALGN) had an AIC and BIC of 220.63 and 236.44, respectively; Model B (containing COLLEGRDY and ECONWKFC) had an AIC and BIC of 221.24 and 241.00, respectively; Model C (containing COLLEGRDY) had an AIC and BIC of 221.52 and 237.33, respectively; and Model D (containing ECONWKFC) had an AIC and BIC of 219.87 and 235.68, respectively. Thus, the lowest values were found for Model D; accordingly, Model D was selected for subsequent modeling.

The Teaching Profession

The variable TEACHPROF (teaching profession) was a composite scale comprising the following three indicator variables: TCHQUALTY (accountability for quality), INCENTIVS (incentives and allocation), and CAPACITY (building and supporting capacity). Considering that the composite scale and the latter two indicator variables passed the screening criterion, a decision needed to be made as to whether to use the composite variable or one or both of the indicators.

As indicated by AIC and BIC values, the indicator variable, CAPACITY, had a superior fit to the data than any of the other comparable variables modeled. As shown in Table 4.5, Model A (containing TEACHPROF) had an AIC and BIC of 219.28 and 235.09, respectively; Model B (containing INCENTIVS and CAPACITY) had an AIC and BIC of 220.10 and 239.85, respectively; Model C (containing INCENTIVS) had an AIC and BIC of 220.90 and 236.70, respectively; and Model D (containing CAPACITY) had an AIC and BIC of 218.15 and 233.96, respectively. Thus, Model D was selected for subsequent modeling.

Adoption of Common Standards by Neighbor States

Variables representing the regional diffusion influence of neighbor state adoption activity were coded several different ways. Of them, the screening criterion was passed by only two: NEIGHADPT controlling for NEIGHBORS (number of neighbor states to have adopted prior to reference state adoption controlling for the number of neighbor states) and NEIGHPRPN (proportion of neighbor states to have adopted prior to reference state adoption). Accordingly, AIC and BIC values were compared between models with each respective variable; lower values were indicative of superior fit.

As indicated by AIC and BIC values, NEIGHADPT controlling for NEIGHBORS had a superior fit to the data than NEIGHPRPN. As shown in Table 4.6, Model A (containing NEIGHBORS and NEIGHADPT) had an AIC and BIC of 209.06 and 228.81, respectively; whereas, Model B (containing NEIGHPRPN) had an AIC and BIC of 214.38 and 230.18, respectively. Thus, Model A was selected for subsequent modeling.

Aspiration to Compete for RTTT Funds

The variable, RT3CMPETE (aspiration to compete for RTTT funds), was a time-variant coding of RT3PHASE1 (submitted an RTTT Phase 1 application) and RT3PHASE2 (submitted an RTTT Phase 2 application) that also accounted for initiation of aspiration to compete through submitting letters of intent, and cessation of aspiration following failure to attain finalist or winner status. Considering that RT3PHASE1, RT3PHASE2, and RT3CMPETE all passed the screening criterion, a decision needed to be made as to which one to proceed with for subsequent modeling.

As indicated by AIC and BIC values, RT3CMPETE (aspiration to compete for RTTT funds) had a superior fit to the data than any of the other comparable variables modeled. As shown in Table 4.7, Model A (containing RT3PHASE1) had an AIC and BIC of 221.17 and 222.36, respectively; Model B (containing RT3PHASE2) had an AIC and BIC of 209.55 and 225.35, respectively; Model C (containing RT3PHASE1 and RT3PHASE2) had an AIC and BIC of 211.18 and 230.93, respectively; and Model D (containing RT3CMPETE) had an AIC and BIC of 204.23 and 220.03, respectively. Thus, Model D was selected for subsequent modeling.

Step 4: Fitting Single Explanation Models

Study Aim 1

Vertical influence. Results for Study Aim 1, to examine if competition for RTTT funds predicted whether and when states adopted common standards, suggested that aspiration to compete for RTTT fund was a significant predictor CCSS adoption. As shown in Table 4.8, removal of RT3CMPETE from the model controlling only for the main effect of time, resulted in significant change in the deviance statistic relative to the change in number of parameters: devianceΔ = 19.20 and $df\Delta = 1$ ($p < .001$). This model comparison suggested that the inclusion of RT3CMPETE in the model made a significant improvement in goodness-of-fit. Conversion of the RT3CMPETE log odds coefficient to an odds ratio ($2.34 = e^{2.34} = 9.37$) indicated that, controlling for the main effect of time, the odds of adopting common standards were more than nine and one-third higher for states with an aspiration for RTTT funds compared to states that did not demonstrate such aspirations.

Study Aim 2

Results for Study Aim 2, to examine if internal determinants of states, national interaction among states, and regional diffusion among neighbor states predicted whether and when states adopted common standards, suggested that a model could be fit for each of the postulated alternate explanations for CCSS adoption.

Internal determinants. Separate model were fit for each of the respective sub-dimensions (economic, political, education system characteristics, and educational performance), followed by the fitting of a combined internal determinants model that used only those variables that remained after the backward elimination stepwise sequence was conducted for each sub-dimension.

Economic. Fiscal health was found to be significant predictor of CCSS adoption. As shown in Table 4.9, removal of FISCAL from the model, controlling only for the main effect of time, resulted in significant change in the deviance statistic relative to the change in number of parameters: devianceΔ = 4.95 and $df\Delta = 1$ ($p < .05$). This model comparison suggested that the inclusion of FISCAL in the model made a significant improvement in goodness-of-fit. Conversion of the FISCAL log odds coefficient to an odds ratio ($-6.11 = e^{-6.11} = 0.002$) indicated that, controlling for the main effect of time, the odds of adopting common standards were nearly 1000% lower for a one unit increase on the fiscal health scale. However, the observed range on the FISCAL scale was .01 to .04; thus, this coefficient suggested that the odds of adopting common standards were nearly 30% lower for the most fiscally healthy state compared to the least fiscally healthy state. FISCAL was missing an observation for D.C., resulting in an analytic sample size of 50 for these model comparisons.

Political. The governor's political party was found to be a significant predictor of CCSS adoption. As shown in Table 4.10, removal of REPUBLICN from the model, controlling only for the main effect of time, resulted in significant change in the deviance statistic relative to the change in number of parameters: devianceΔ = 6.15 and $df\Delta = 1$ ($p < .05$). This model comparison suggested that the inclusion of REPUBLICN in the model made a significant improvement in goodness-of-fit. Conversion of the REPUBLICN log odds coefficient to an odds ratio ($-0.88 = e^{-0.88} = 0.42$) indicated that, controlling for the main effect of time, the odds of adopting common standards were nearly 60% lower for states with a republican governor.

Education system characteristics. As shown in Table 4.11, the last model to fail to reject suggested a significant coefficient for the building and supporting capacity, controlling only for the main effect of time. This model comparison suggested that the inclusion of CAPACITY in the model made a significant improvement in goodness-of-fit, whereas, the variables that were eliminated (SFEQUITY and ECONWKFC) made no detectable contribution toward improving model fit accounting for model parsimony. Conversion of the CAPACITY log odds coefficient to an odds ratio ($0.04 = e^{0.04} = 1.04$) indicated that, controlling for the main effect of time, the odds of adopting common standards were 4% higher for each unit on the teaching profession scale. SFEQUITY (one of the variables eliminated through the model fitting process) was missing observations for Hawaii and D.C., resulting in an analytic sample size of 49 for these model comparisons.

Educational performance. As shown in Table 4.12, the last model to fail to reject (according to the liberal $p < .10$ criteria for change in the deviance statistic), suggested that, controlling only for the main effect of time, completion of higher education should be retained in the model,. This model comparison suggested that the inclusion of COMPLETN in the model made a marginally significant improvement in goodness-of-fit (although it did not produce a statistically significant beta coefficient, $p = .103$), whereas, the variable that was eliminated (BENEFITS) made no appreciable contribution toward improving model fit accounting for model parsimony. Notwithstanding that the beta coefficient for COMPLETN did not meet even criteria for marginal statistical significance, conversion of the COMPLETN log odds coefficient to an odds ratio ($0.03 = e^{0.03} = 1.03$) indicated that, controlling for the main effect of time, the odds of adopting common standards were 3% higher for each unit on the completion of higher education scale. COMPLETN and BENEFITS were missing an observation for D.C., resulting in an analytic sample size of 50 for these model comparisons.

Combined internal determinants. As shown in Table 4.13, the last model to fail to reject suggested a significant coefficient for fiscal health and the governor's party, controlling only for the main effect of time. This model comparison suggested that the inclusion of FISCAL and REPUBLICN in the model made a significant improvement in goodness-of-fit, whereas, the variables that were eliminated (CAPACITY and COMPLETN) made no appreciable contribution toward improving model fit accounting for model parsimony. Conversion of the FISCAL log odds coefficient to an odds ratio ($-6.03 = e^{-6.03} = 0.002$) indicate that, controlling for the main effect of time and governor's political party, the odds of adopting common standards were nearly 1000% lower for a one unit increase on the fiscal health scale. Taking into consideration the observed range of .01 to .04 on the FISCAL scale, the odds of adopting common standards were nearly 30% lower for the most fiscally healthy state compared to the least fiscally healthy state. Conversion of the REPUBLICN log odds coefficient to an odds ratio ($-0.87 = e^{-0.87} = 0.42$) indicated that, controlling for the main effect of time and fiscal health, the odds of adopting common standards were nearly 60% lower for states with a republican governor. FISCAL and COMPLETN were missing an observation for D.C., resulting in an analytic sample size of 50 for these model comparisons.

National interaction. The number of consortia in which each state was a member was found to be a significant predictor of CCSS adoption. As shown in Table 4.14, removal of CONSORTIA from the model controlling only for the main effect of time, resulted in significant change in the deviance statistic relative to the change in number of parameters: devianceΔ = 16.28 and $df\Delta = 1$ ($p < .001$). This model comparison suggested that the inclusion of CONSORTIA in the model made a significant improvement in goodness-of-fit. Conversion of the CONSORTIA log odds coefficient to an odds ratio ($0.39 = e^{0.39} = 1.48$) indicated that, controlling for the main effect of time, the odds of adopting common standards were nearly 50% higher for each additional consortia that a state was a member.

Regional diffusion. The number of neighbor states to have adopted common standards prior to the reference state and the total number of neighbor states, controlling for one another and the main effect of time, were found to be significant predictors of CCSS adoption. As shown in Table 4.14, removal of NEIGHBORS and NEIGHADPT from the model controlling for the main effect of time, resulted in significant change in deviance relative to the change in number of parameters: devianceΔ = 16.38 and $df\Delta = 2$ ($p < .001$). This model comparison suggested that the inclusion of NEIGHADPT controlling for NEIGHBORS in the model made a significant improvement in goodness-of-fit. Conversion of the NEIGHBORS log odds coefficient to an odds ratio ($0.37 = e^{0.37} = 1.45$) indicated that, controlling for the main effect of time and the number of neighbor states to have adopted common standards prior to the reference state, the odds of adopting common standards were more than 45% higher for each additional neighbor state. Conversion of the NEIGHADPT log odds coefficient to an odds ratio ($-0.50 = e^{-0.50} = 0.61$) indicates that, controlling for the main effect of time and the number of neighbor, the odds of adopting common standards were nearly 40% lower for each additional neighbor state to have adopted common standards prior to the reference state.

Step 5: Fitting the Full Model

Study Aim 3

Results for Study Aim 3, to determine if any of the alternative models continued to predict whether and when states adopted common standards after controlling for RTTT fund competition, suggested that each model of internal determinants, national interaction, and regional diffusion were significantly predictive of CCSS adoption, even after controlling for the vertical influence of RTTT fund competition. As shown in Table 4.16, the last model to fail to reject (according to the liberal $p < .10$ criteria for change in the deviance statistic) suggested a marginally significant coefficient for the governor's political party and statistically significant coefficients for number of consortia, number of neighbor states to have adopted prior to the reference state's adoption, and aspiration to compete for RTTT funds, controlling for the main effect of time and number of neighbor states. This model comparison suggested that the inclusion of REPUBLICN, CONSORTIA, NEIGHADPT (controlling for NEIGHBORS), and RT3CMPETE in the model made a significant improvement in goodness-of-fit, whereas, the variable that was eliminated (FISCAL) made no appreciable contribution toward improving model fit accounting for model parsimony. FISCAL was missing an observation for D.C., resulting in an analytic sample size of 50 for these model comparisons.

Internal determinants within the full model. Notwithstanding that the beta coefficient for REPUBLICN was only marginal significant ($p = .09$), conversion of the REPUBLICN log odds coefficient to an odds ratio ($-0.72 = e^{-0.72} = 0.49$) indicated that, holding all other variables constant (CONSORTIA, NEIGHADPT, NEIGHBORS, RT3CMPETE, and the main effect of time), the odds of adopting common standards were more than 50% lower for states with a republican governor.

National interaction within the full model. Conversion of the CONSORTIA log odds coefficient to an odds ratio ($0.33 = e^{0.33} = 1.39$) indicated that, holding all other variables constant (REPUBLICN, NEIGHADPT, NEIGHBORS, RT3CMPETE, and the main effect of time), the odds of adopting common standards were nearly 40% higher for each additional consortia in which a state was a member.

Regional diffusion within the full model. Conversion of the NEIGHADPT log odds coefficient to an odds ratio ($-0.55 = e^{-0.55} = 0.58$) indicated that, holding all other variables constant (REPUBLICN, CONSORTIA, NEIGHBORS, RT3CMPETE, and the main effect of time), the odds of adopting common standards were more than 40% lower for each additional neighbor state to have adopted common standards prior to the reference state.

Vertical influence within the full model. Conversion of the RT3CMPETE log odds coefficient to an odds ratio ($1.65 = e^{1.65} = 5.20$) indicated that, holding all other variables constant (REPUBLICN, CONSORTIA, NEIGHADPT, NEIGHBORS, and the main effect of time), the odds of adopting common standards were five and one-fifth times higher for those states with an aspiration for RTTT funds compared to those states that did not demonstrate such aspirations.

See Table 4.17 for intercorrelations for all variables tested in the full model (i.e., including FISCAL). See Table 4.18 for maximum likelihood estimates for the final full model (i.e., after eliminating FISCAL) using the complete sample ($n = 51$) of 50 states and D.C.

Table 4.1: Comparison of Alternative Smooth Polynomial Representation for the Main Effect of Time in Baseline Discrete-Time Hazard Model for CCSSI Data (n = 51).

Representation for time	*n* parameters	Deviance	Difference in deviance in comparison to . . . Previous model	General model	AIC
Constant	1	273.40	—	71.05***	275.40
Linear	2	246.03	27.38***	43.67***	250.03
Quadratic	3	215.44	30.59***	13.08	221.44
Cubic	4	215.43	0.00	13.08	223.43
General	12	202.36	—	—	226.36

Note. AIC = Akaike Information Criterion.
*p < .05. **p < .01. ***p < .001.

Table 4.2: Maximum Likelihood Estimates of Discrete-Time Hazard Model for CCSSI Data with the Linear and Quadratic Variables of Time as the only Covariates (*n* = 51).

Parameter	Log odds (*SE*)	Wald χ^2	Odds ratio	95% Wald CI
Intercept	-1.19 (.20)	33.85***	—	—
MONTH	.56 (.12)	21.94***	1.75	[1.39, 2.21]
MONTH*MONTH	-0.15 (.04)	17.40***	0.87	[0.81, 0.93]

Note. CI = Confidence Interval. Month was centered at month 6.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.3: Compilation of Individual Tests: Each Independent Variable's Relation to Month of Adoption, after Controlling for the Main Effect of Time (n = 49[a], 50[b], 51[c]).

	Log odds (*SE*)	Wald χ^2	Odds ratio	95% Wald CI
Internal Determinants:				
Economic				
FISCAL[b]	-6.11 (2.85)	**4.61***	0.00	[0.00, 0.59]
ENROLLMNT[c]	-0.00 (0.00)	0.00	1.00	[1.00, 1.00]
MOVETO[b]	0.01 (0.01)	0.90	1.01	[0.99, 1.02]
MOVEFROM[b]	0.01 (0.01)	0.68	1.58	[0.99, 1.04]
INCOME[c]	-0.00 (0.00)	0.00	1.00	[1.00, 1.00]
Internal Determinants:				
Political				
APPOINT[c]	0.05 (0.36)	0.02	1.05	[0.52, 2.13]
REPUBLICN[c]	-0.88 (0.36)	**5.98***	0.42	[0.21, 0.84]
ELECTION[c]	0.29 (0.35)	0.68	1.33	[0.67, 2.65]
Internal Determinants:				
Education System Characteristics				
HSSTANDRDS[c]	0.28 (0.36)	0.61	1.32	[0.66, 2.66]
HSREQMNTS[c]	-0.08 (0.35)	0.05	0.92	[0.46, 1.84]
ASSMTSYST[c]	0.47 (0.39)	1.46	1.60	[0.75, 3.44]
DATASYST[c]	-0.06 (0.37)	0.02	0.94	[0.46, 1.95]
ACCNTSYST[c]	-13.38 (498.50)	0.00	0.00	[0.00, 999.99]
ELASTANDS[c]	0.03 (0.07)	0.15	1.03	[0.90, 1.18]
MTHSTANDS[c]	0.05 (0.07)	0.42	1.05	[0.91, 1.21]
ELACOMPAR[c]	-0.16 (0.30)	0.29	0.85	[0.48, 1.53]
MTHCOMPAR[c]	0.32 (0.40)	0.66	1.38	[0.64, 3.00]
OVERALL[c]	0.08 (0.04)	**3.08**†	1.08	[0.99, 1.17]
FINANCE[a]	0.03 (0.03)	1.32	1.03	[0.98, 1.09]
SFEQUITY[a]	0.07 (0.05)	**2.57**	1.08	[0.98, 1.17]
SPENDING[c]	0.01 (0.01)	0.75	1.01	[0.99, 1.04]
STDASSACC[c]	0.02 (0.02)	1.45	1.02	[0.99, 1.06]
STANDARDS[c]	0.01 (0.01)	0.45	1.01	[0.99, 1.03]
ASSESSMNT[c]	0.04 (0.03)	1.55	1.04	[0.98, 1.10]
ACCNTBLTY[c]	0.01 (0.01)	1.19	1.01	[0.99, 1.04]
TRANSALGN[c]	0.03 (0.02)	**2.77**†	1.03	[1.00, 1.07]
EARLYED[c]	0.01 (0.02)	0.18	1.01	[0.98, 1.04]
COLLEGRDY[c]	0.02 (0.02)	**1.97**	1.02	[0.99, 1.05]
ECONWKFC[c]	0.02 (0.01)	**3.32**†	1.02	[1.00, 1.04]
TEACHPROF[c]	0.04 (0.02)	**4.08***	1.05	[1.00, 1.09]
TCHQUALTY[c]	0.02 (0.02)	1.49	1.03	[0.99, 1.07]
INCENTIVS[c]	0.03 (0.02)	**2.53**	1.03	[0.99, 1.08]
CAPACITY[c]	0.04 (0.02)	**5.19***	1.04	[1.01, 1.08]
AFFORDABL[b]	0.02 (0.02)	0.84	1.02	[0.98, 1.07]
EDUCSPEND[c]	0.00 (0.00)	0.08	1.00	[0.99, 1.00]

Table 4.3 – continued

	Log odds (*SE*)	Wald χ^2	Odds ratio	95% Wald CI
Internal Determinants:				
Educational Performance				
PREPARATN[b]	-0.01 (0.02)	0.46	0.99	[0.95, 1.02]
PARTICIPN[b]	-0.02 (0.02)	0.89	0.98	[0.95, 1.02]
COMPLETN[b]	0.03 (0.02)	**2.65**	1.03	[0.99, 1.08]
BENEFITS[b]	0.02 (0.02)	**1.96**	1.03	[0.99, 1.06]
MPI[c]	-0.02 (0.03)	0.26	0.98	[0.92, 1.05]
MPIPERFRM[c]	-0.03 (0.05)	0.36	0.97	[0.88, 1.07]
MPIIMPROV[c]	0.06 (0.10)	0.40	1.07	[0.88, 1.29]
MPIOPPORT[c]	-0.08 (0.09)	0.81	0.92	[0.77, 1.10]
CHNCSCSS[c]	-0.01 (0.03)	0.26	0.99	[0.93, 1.04]
SCHOOLYRS[c]	-0.01 (0.02)	0.05	1.00	[0.95, 1.04]
EARLYFNDN[c]	-0.03 (0.03)	0.94	0.98	[0.93, 1.03]
OUTCOMES[c]	-0.01 (0.03)	0.08	0.99	[0.94, 1.05]
ACHIEVMNT[c]	-0.02 (0.03)	0.61	0.98	[0.92, 1.04]
STATUS[c]	-0.01 (0.01)	0.99	0.99	[0.96, 1.01]
CHANGE[c]	-0.03 (0.04)	0.50	0.98	[0.91, 1.05]
EQUITY[c]	0.02 (0.03)	0.94	1.03	[0.98, 1.08]
HSGRADUAT[c]	-0.05 (0.05)	1.07	0.95	[0.87, 1.04]
BACHDGREE[c]	-0.01 (0.04)	0.15	0.99	[0.92, 1.06]
ADVCDGREE[c]	0.03 (0.05)	0.34	1.03	[0.93, 1.14]
Policy Diffusion:				
National Interaction				
CONSORTIA[c]	0.39 (0.10)	**14.65*****	1.48	[1.21, 1.81]
Policy Diffusion:				
Regional Diffusion				
CENTRAL[cd]	-0.03 (0.49)	0.01	0.97	[0.37, 2.50]
NORTHEAST[cd]	0.57 (0.50)	1.28	1.77	[0.66, 4.72]
WESTERN[cd]	-0.05 (0.47)	0.01	0.95	[0.38, 2.41]
NEIGHBORS[c]	0.07 (0.11)	0.39	1.07	[0.87, 1.33]
NEIGHADPT[ce]	-0.49 (0.13)	**14.74*****	0.61	[0.47, 0.78]
NEIGHPRPN[c]	-1.53 (0.52)	**8.69****	0.22	[0.08, 0.60]
NEIGHN_LG[ce]	-0.04 (0.16)	0.06	0.96	[0.70, 1.32]
NEIGHN_CN[ce]	-0.09 (0.16)	0.37	0.91	[0.67, 1.23]
NEIGHP_LG[c]	-0.38 (0.70)	0.30	0.68	[0.17, 2.67]
NEIGHP_CN[c]	-0.61 (0.68)	0.81	0.55	[0.15, 2.05]]
Policy Diffusion:				
Vertical Influence				
RT3PHASE1[c]	0.70 (0.49)	**2.05**	2.02	[0.77, 5.30]
RT3PHASE2[c]	1.55 (0.45)	**11.66*****	4.71	[1.94, 11.45]
RT3CMPETE[c]	2.34 (0.58)	**14.88*****	9.37	[3.01, 29.22]

Table 4.3 – continued

Note. CI = Confidence Interval. Wald chi-squares meeting screening criterion of $p < .20$ are in boldface. Except variables denoted by superscript [d] and [e], all values listed were estimated controlling for the main effect of time only (using parameters representing a linear and quadratic function as indicated in Table 4.2). For the linear and quadratic functions of time, MONTH was centered at month 6. All dichotomous variables were coded as dummies: 0 or 1. All other variables were centered at their median value.
[a]Data were available for only 49 states (missing observation were for Hawaii and D.C.). [b]Data were available for all 50 states, but not for D.C. [c]Data were available for all 50 states and D.C. [d]Coefficients for variables CENTRAL, NORTHEAST, and WESTERN were estimated simultaneously. [e]Coefficients for variables NEIGHADPT, NEIGHN_LG, and NEIGHN_CN were each estimated controlling for NEIGHBORS.
[†]$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.4: Goodness-of-fit Comparison between the Composite Scale for Transition and Alignment and Two of its Indicator Variables—College Readiness, and Economy and Workforce (n = 51).

	Model A	Model B	Model C	Model D
Parameter estimates and asymptotics standard errors				
Intercept	-1.19***	-1.17***	-1.18***	-1.17***
	(0.21)	(0.21)	(0.21)	(0.21)
MONTH	0.58***	0.59***	0.57***	0.59***
	(0.12)	(0.12)	(0.12)	(0.12)
MONTH*MONTH	-0.15***	-0.14***	-0.14***	-0.14***
	(0.04)	(0.04)	(0.04)	(0.04)
TRANSALGN	0.03†			
	(0.02)			
COLLEGRDY		0.01	0.02	
		(0.02)	(0.02)	
ECONWKFC		0.02		0.02†
		(0.01)		(0.01)
Goodness-of-fit				
AIC	220.63	221.24	221.52	219.87
BIC	236.44	241.00	237.33	235.68

Note. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. All other variables were centered at their median value.

$^{\dagger}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$.

Table 4.5: Goodness-of-fit Comparison between the Composite Scale for Teaching Quality and Two of its Indicator Variables—Incentives and Allocation and Building, and Supporting Capacity (n = 51).

	Model A	Model B	Model C	Model D
Parameter estimates and asymptotics standard errors				
Intercept	-1.22***	-1.32***	-1.24***	-1.33***
	(0.21)	(0.22)	(0.21)	(0.22)
MONTH	0.60***	0.61***	0.59***	0.61***
	(0.12)	(0.13)	(0.12)	(0.12)
MONTH*MONTH	-0.14***	-0.15***	-0.15***	-0.15***
	(0.04)	(0.04)	(0.04)	(0.04)
TEACHPROF	0.04*			
	(0.02)			
INCENTIVS		0.01	0.03	
		(0.03)	(0.02)	
CAPACITY		0.04†		0.04*
		(0.02)		(0.02)
Goodness-of-fit				
AIC	219.28	220.10	220.90	218.15
BIC	235.09	239.85	236.70	233.96

Note. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. All other variables were centered at their median value.

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.6: Goodness-of-fit Comparison between the Number of Neighbor States to have Adopted Prior to Reference State Adoption (Controlling for the Number of Neighbor States) and the Proportion of Neighbor States to have Adopted Prior to Reference State Adoption (n = 51).

	Model A	Model B
Parameter estimates and asymptotics standard errors		
Intercept	-1.19***	-1.15***
	(0.22)	(0.21)
MONTH	0.73***	0.65***
	(0.14)	(0.13)
MONTH*MONTH	-0.17***	-0.16***
	(0.04)	(0.04)
NEIGHBORS	0.37**	
	(0.13)	
NEIGHADPT	-0.50***	
	(0.13)	
NEIGHPRPN		-1.53**
		(0.52)
Goodness-of-fit		
AIC	209.06	214.38
BIC	228.81	230.18

Note. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. All other variables were centered at their median value.

†p < .10. *p < .05. **p < .01. ***p < .001.

Table 4.7: Goodness-of-fit Comparison between Time-Invariant Indicators of whether a State Submitted a Race to the Top Phase 1 or Phase 2 Application and a Time-Variant Indicator of whether a State Aspired to Compete for Race to the Top Funds (*n* = 51).

	Model A	Model B	Model C	Model D
Parameter estimates and asymptotics standard errors				
Intercept	-1.80***	-2.36***	-2.58***	-2.87***
	(0.48)	(0.43)	(0.58)	(0.53)
MONTH	0.57***	0.67***	0.67***	0.89***
	(0.12)	(0.13)	(0.13)	(0.17)
MONTH*MONTH	-0.14***	-0.14***	-0.14***	-0.13***
	(0.04)	(0.04)	(0.04)	(0.04)
RT3PHASE1	0.70		0.31	
	(0.49)		(0.52)	
RT3PHASE2		1.55***	1.49**	
		(0.45)	(0.46)	
RT3CMPETE				2.24***
				(0.58)
Goodness-of-fit				
AIC	221.17	209.55	211.18	204.23
BIC	222.36	225.35	230.93	220.03

Note. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. RT3PHASE 1 and RT3PHASE 2 were dummy variables; submitted a Race to the Top Phase 1 and Phase 2 application, respectively = 1. RT3CMPETE was a time-variant dummy variable; Aspiring to compete for Race to the Top funds = 1.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 4.8: Results of Fitting Two Discrete-Time Hazard Models for the Vertical Influence Model for Common Core State Standards Adoption (n = 51).

	Model A	Model B
Parameter estimates and asymptotics standard errors		
Intercept	-2.87***	-1.19***
	(0.52)	(0.20)
MONTH	0.89***	0.56***
	(0.17)	(0.12)
MONTH*MONTH	-0.13***	-0.15***
	(0.04)	(0.04)
RT3CMPETE	2.24***	
	(0.58)	
Goodness-of-fit		
Deviance	196.23	215.44
n parameters	3	2
AIC	204.23	221.44
BIC	220.03	233.29
Deviance-based Hypothesis Tests		
H_0: $\beta_{RT3COMPETE} = 0$		19.20*** (1)

Note. Deviance = -2Log-likelihood. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. RT3CMPETE was a time-variant dummy variable; Aspiring to compete for RTTT funds = 1.
$^{\dagger}p < .10$ $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 4.9: Results of Fitting Two Discrete-Time Hazard Models for the Internal Determinants – Economic Single Explanation Model (n = 50).

	Model A	Model B
Parameter estimates and asymptotics standard errors		
Intercept	-1.19***	-1.20***
	(0.21)	(0.21)
MONTH	0.58***	0.55***
	(0.12)	(0.12)
MONTH*MONTH	-0.14***	-1.14***
	(0.04)	(0.03)
FISCAL	-6.11*	
	(2.85)	
Goodness-of-fit		
Deviance	207.21	212.15
n parameters	3	2
AIC	215.21	218.15
BIC	230.94	229.95
Deviance-based Hypothesis Tests		
H_0: $\beta_{FISCAL} = 0$		4.95* (1)

Note. Deviance = -2Log-likelihood. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. All other variables were centered at their median value. FISCAL was missing an observation for D.C., resulting in an analytic sample size of 50 for these model comparisons.

$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 4.10: Results of Fitting two Discrete-Time Hazard Models for the Internal Determinants – Political Single Explanation Model (n = 51).

	Model A	Model B
Parameter estimates and asymptotics standard errors		
Intercept	-0.77**	-1.19***
	(0.26)	(0.20)
MONTH	0.60***	0.56***
	(0.12)	(0.12)
MONTH*MONTH	-0.15***	-0.15***
	(0.04)	(0.04)
REPUBLICN	-0.88**	
	(0.36)	
Goodness-of-fit		
Deviance	209.28	215.44
n parameters	3	2
AIC	217.28	221.44
BIC	233.09	233.29
Deviance-based Hypothesis Tests		
H_0: $\beta_{REPUBLICN} = 0$		6.15* (1)

Note. Deviance = -2Log-likelihood. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. REPUBLICN was a dummy variable; Republican governor = 1.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 4.11: Results of Fitting Four Discrete-Time Hazard Models for the Internal Determinants – Education System Characteristics Single Explanation Model (n = 49).

	Model A	Model B	Model C	Model D
Parameter estimates and asymptotics standard errors				
Intercept	-1.29***	-1.34***	-1.39***	-1.24***
	(0.23)	(0.23)	(0.23)	(0.21)
MONTH	0.63***	0.62***	0.61***	0.56***
	(0.13)	(0.13)	(0.13)	(0.12)
MONTH*MONTH	-0.14***	-0.14***	-0.14***	-0.14***
	(0.04)	(0.04)	(0.04)	(0.04)
SFEQUITY	0.07	0.07		
	(0.05)	(0.05)		
ECONWKFC	0.02			
	(0.01)			
CAPACITY	0.03	0.04*	0.04*	
	(0.02)	(0.02)	(0.02)	
Goodness-of-fit				
Deviance	198.66	200.38	202.47	207.91
n parameters	5	4	3	2
AIC	210.66	210.38	210.47	213.91
BIC	234.17	229.97	226.14	225.66
Deviance-based Hypothesis Tests				
H_0: $\beta_{SFEQUITY} = 0$			2.10 (1)	
H_0: $\beta_{ECONWKFC} = 0$		1.72 (1)		
H_0: $\beta_{CAPACITY} = 0$				7.53** (1)

Note. Deviance = -2Log-likelihood. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. All other variables were centered at their median value. SFEQUITY was missing observations for Hawaii and D.C., resulting in an analytic sample size of 49 for these model comparisons.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 4.12: Results of Fitting Three Discrete-Time Hazard Models for the Internal Determinants – Educational Performance Single Explanation Model for Common Core State Standards Adoption (*n* = 50).

	Model A	Model B	Model C
Parameter estimates and asymptotics standard errors			
Intercept	-1.22***	-1.21***	-1.20***
	(0.21)	(0.21)	(0.21)
MONTH	0.57***	0.57***	0.55***
	(0.12)	(0.12)	(0.12)
MONTH*MONTH	-0.14***	-0.14***	-0.14***
	(0.03)	(0.03)	(0.03)
COMPLETN	0.03	0.03	
	(0.02)	(0.02)	
BENEFITS	0.01		
	(0.02)		
Goodness-of-fit			
Deviance	208.94	209.15	212.15
n parameters	4	3	2
AIC	218.94	217.15	218.15
BIC	238.60	232.88	229.95
Deviance-based Hypothesis Tests			
H_0: $\beta_{COMPLETN} = 0$			$3.00^{\dagger}$ (1)
H_0: $\beta_{BENEFITS} = 0$		0.21 (1)	

Note. Deviance = -2Log-likelihood. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. All other variables were centered at their median value. COMPLETN and BENEFITS were missing an observation for D.C., resulting in an analytic sample size of 50 for these model comparisons.
$^{\dagger}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$.

Table 4.13: Results of Fitting Four Discrete-Time Hazard Models for the Combined Internal Determinants Single Explanation Model for Common Core State Standards Adoption (*n* = 50).

	Model A	Model B	Model C	Model D
Parameter estimates and asymptotics standard errors				
Intercept	-0.91**	-0.78**	-0.76**	-0.77**
	(0.30)	(0.27)	(0.27)	(0.26)
MONTH	0.64***	0.62***	0.61***	0.59***
	(0.13)	(0.13)	(0.12)	(0.12)
MONTH*MONTH	-0.14***	-0.13***	-0.14***	-0.14***
	(0.04)	(0.04)	(0.04)	(0.04)
FISCAL	-3.62	-5.23†	-6.03*	
	(3.35)	(2.97)	(2.88)	
REPUBLICN	-0.78*	-0.86*	-0.87*	-0.87*
	(0.38)	(0.39)	(0.37)	(0.36)
CAPACITY	0.02			
	(0.02)			
COMPLETN	0.02	0.02		
	(0.02)	(0.02)		
Goodness-of-fit				
Deviance	199.48	200.49	201.45	206.18
n parameters	6	5	4	3
AIC	213.48	212.49	211.45	214.18
BIC	241.00	236.08	231.11	229.91
Deviance-based Hypothesis Tests				
H_0: $\beta_{FISCAL} = 0$				4.74* (1)
H_0: $\beta_{CAPACITY} = 0$		1.01 (1)		
H_0: $\beta_{COMPLETN} = 0$			0.96 (1)	

Note. Deviance = -2Log-likelihood. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. REPUBLICN was a dummy variable; Republican governor = 1. All other variables were centered at their median value. FISCAL and COMPLETN were missing an observation for D.C, resulting in an analytic sample size of 50 for these model comparisons.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4.14: Results of Fitting Two Discrete-Time Hazard Models for the National Interaction Model for Common Core State Standards Adoption (n = 51).

	Model A	Model B
Parameter estimates and asymptotics standard errors		
Intercept	-1.11***	-1.19***
	(0.21)	(0.20)
MONTH	0.69***	0.56***
	(0.13)	(0.12)
MONTH*MONTH	-0.14***	-0.15***
	(0.04)	(0.04)
CONSORTIA	0.39***	
	(0.10)	
Goodness-of-fit		
Deviance	199.16	215.44
n parameters	3	2
AIC	207.16	221.44
BIC	222.96	233.29
Deviance-based Hypothesis Tests		
H_0: $\beta_{\text{CONSORTIA}} = 0$		16.28*** (1)

Note. Deviance = -2Log-likelihood. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. CONSORTIA was centered at its median value.
$^{\dagger}p$ < .10. *p < .05. **p < .01. ***p < .001.

Table 4.15: Results of Fitting Two Discrete-Time Hazard Models for the Regional Diffusion Model for Common Core State Standards Adoption (*n* = 51).

	Model A	Model B
Parameter estimates and asymptotics standard errors		
Intercept	-1.19***	-1.19***
	(0.22)	(0.20)
MONTH	0.73***	0.56***
	(0.14)	(0.12)
MONTH*MONTH	-0.17***	-0.15***
	(0.04)	(0.04)
NEIGHBORS	0.37**	
	(0.13)	
NEIGHADPT	-0.50***	
	(0.13)	
Goodness-of-fit		
Deviance	199.06	215.44
n parameters	4	2
AIC	209.06	221.44
BIC	228.81	233.29
Deviance-based Hypothesis Tests		
H_0: $\beta_{NEIGHBORS} = 0$; $\beta_{NEIGHADPT} = 0$		16.38*** (2)

Note. Deviance = -2Log-likelihood. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. All other variables were centered at their median value.
$^{\dagger}p < .10$ $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 4.16: Results of Fitting Three Discrete-Time Hazard Models for the Full Innovation Diffusion Model for Common Core State Standards Adoption (*n* = 50).

	Model A	Model B	Model C
Parameter estimates and asymptotics standard errors			
Intercept	-1.92**	-2.00**	-2.50***
	(0.65)	(0.63)	(0.57)
MONTH	1.12***	1.13***	1.11***
	(0.22)	(0.20)	(0.20)
MONTH*MONTH	-0.15***	-0.15***	-0.15***
	(0.04)	(0.04)	(0.04)
FISCAL	-2.20		
	(4.33)		
REPUBLICN	-0.73†	-0.72†	
	(0.43)	(0.43)	
CONSORTIA	0.30*	0.33**	0.34**
	(0.13)	(0.12)	(0.12)
NEIGHBORS	0.31	0.28†	0.32*
	(0.17)	(0.16)	(0.15)
NEIGHADPT	-0.57***	-0.55***	-0.51***
	(0.16)	(0.15)	(0.15)
RT3CMPETE	1.53*	1.65**	1.81**
	(0.68)	(0.63)	(0.63)
Goodness-of-fit			
Deviance	168.65	168.91	171.75
n parameters	8	7	6
AIC	186.65	184.91	185.75
BIC	222.04	216.37	213.27
Deviance-based Hypothesis Tests			
H_0: $\beta_{FISCAL} = 0$		0.26 (1)	
H_0: $\beta_{REPUBLICN} = 0$			2.84† (1)

Note. Deviance = -2Log-likelihood. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. REPUBLICN was a dummy variable; Republican governor = 1. RT3CMPETE was a time-variant dummy variable; Aspiring to compete for RTTT funds = 1. All other variables were centered at their median value. FISCAL was missing an observation for D.C., resulting in an analytic sample size of 50 for these model comparisons.

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 4.17: Intercorrelations for All Variables Tested in the Full Innovation Diffusion Model for Common Core State Standards Adoption (n = 50)

	1[a]	2	3	4	5[b]	6[c]
1. Month of adoption[a]	—	—	—	—	—	—
2. Fiscal health	.30*	—	—	—	—	—
3. Governor's political party	.33*	-.04	—	—	—	—
4. Number of consortia in which each state was a member	-.52**	-.44**	-.23†	—	—	—
5. Number of neighbor states to have adopted prior to the reference state[b]	.59**	-.00	.11	-.26†	—	—
6. Submitted a RTTT Phase 2 application[c]	-.52**	-.50*	-.25†	.42**	-.27†	—

Note. CCSS = Common Core State Standards. RTTT = Race to the Top. Correlation coefficients were based on a cross-sectional data format, not data structured within the person-period data format used for fitting the hazard models. Fiscal health (FISCAL) was missing an observation for D.C.; accordingly, listwise deletion was used for all correlations, resulting in an analytic sample size of 50.
[a]Month of CCSS adoption was coded January 2010 = 1, February 2010 = 2, etc. In order to retain states that have yet to adopt, states yet to adopt and not projected to adopt by the end of December 2010 were coded 13 (indicating adoption in January 2011). Because this imputation is not likely to be tenable, these correlations should be interpreted as estimates only. Furthermore, note that low values for Month of adoption indicate early adoption and high values indicate late adoption. Thus, the sign for each correlation coefficient will need to be reversed to be interpreted as the association with adoption risk; at present the sign indicates the association with adoption survival. [b]Partial correlations controlling for total number of neighbor states. [c]Because the variable used in the full model to represent RTTT fund competition (RT3CMPETE) was time-variant, derived correlations would be difficult to interpret; thus, for the purpose of this table of intercorrelations, I used a time-invariant representation of RTTT fund competition (RT3PHASE2) found to fit the data nearly as well (see Table 4.7 for model comparisons). Moreover, these correlations should be interpreted as only approximations of the actual correlations of interest.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4.18: Maximum Likelihood Estimates of Discrete-Time Hazard Model for the Final Innovational Diffusion Model for Common Core State Standards Adoption (n = 51).

Parameter	Log odds (*SE*)	Wald χ^2	Odds ratio	95% Wald CI
Intercept	-2.05 (0.63)	10.49**	—	—
MONTH	1.15 (0.21)	31.27***	3.16	[2.11, 4.73]
MONTH*MONTH	-0.16 (0.04)	14.45***	0.86	[0.79, 0.93]
REPUBLICN	-0.70 (0.42)	2.71†	0.50	[0.22, 1.14]
CONSORTIA	0.33 (0.12)	7.95**	1.39	[1.11, 1.76]
NEIGHBORS	0.29 (0.15)	3.74†	1.34	[1.00, 1.81]
NEIGHADPT	-0.55 (0.15)	13.18***	0.57	[0.43, 0.78]
RT3CMPETE	1.68 (0.64)	6.96**	5.34	[1.54, 18.55]

Note. Deviance = -2Log-likelihood. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion. For the linear and quadratic functions of time, MONTH was centered at month 6. REPUBLICN was a dichotomous variable; Republican = 1. RT3COMPETE was a time-variant dichotomous variable; Aspiring to compete for Race to the Top funds = 1. All other variables were centered at their median value. All variables in the final full model had complete data on all states and D.C., resulting in an analytic sample size of 51.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

CHAPTER FIVE

DISCUSSION

Summary of Findings

Following on the study's aims, key findings were as follows: (1) state aspiration to be competitive for Race to the Top (RTTT) funds predicted whether and when states adopted common standards, (2) internal determinants of states, national interaction among states, and influences upon states from other states predicted whether and when states adopted common standards, and (3) all alternative models (i.e., internal determinants, national interaction, and regional diffusions) continued to predict whether and when states adopted common standards, controlling for RTTT fund competition. Results from fitting the full model indicated a marginally significant coefficient for the governor's political party and significant coefficients for number of consortia, number of neighbor states to have adopted prior to the reference state's adoption, and aspiration to compete for RTTT funds, controlling for the main effect of time and number of neighbor states. Specifically, holding all other variables constant, the estimated odds of adopting common standards were five and one-fifth times higher for states vying for RTTT funds compared to states that were not; likewise, holding all other variables constant, the estimated odds were more than 50% lower for states to adopt if they had a republican governor, 40% higher for each additional national consortia in which a state was a member, and more than 40% lower for each additional neighbor state to have adopted prior to the reference state's adoption.

Interpreting Effects

Effects found for the governor's political party, number of consortia, and aspiration to compete for RTTT funds were in the direction as would be expected. However, the negative effects found for neighbor state adoption was contrary to what has been commonly found in studies investigating the impact of neighbor state adoption activity.

Governor's political party. In my conceptual framework, the governor was conceived as a policy entrepreneur, advancing agenda items and borrowing strength from national policy networks or federal zeitgeist to do so. Furthermore, the governor's bully pulpit can enable him or her to withstand external influence. Accordingly, given the core republican value of state sovereignty, it is not surprising to find that odds were lower for states to adopt if they had a republican governor. It is worth noting that the beta coefficient for REPUBLICN was only marginally significant, and therefore should be interpreted with some caution.

Membership in national consortia. My conceptual framework explicated that national interaction among states within policy networks was conceived to be an important indicator of whether and when a state adopted given policies, postulating that the number of consortia in which the state was a member was an indication of its interest in collaborating with and learning from other states to coordinate common efforts toward educational improvement. Accordingly, a positive association between the number of consortia in which a state was a member and their odds of adopting common standards was in accordance with what was expected.

Diffusion of policy among neighbor states. The typical channel of influence within a regional diffusion framework is that of competition; that is, states adopt policies in tandem or soon after their neighbor states to avoid economic disadvantage. Mooney (2001) has posited that when modeled properly, the positive regional effect on policy diffusion is found to occur less frequently than commonly believed by policy diffusion scholars. Mooney's exploratory analyses suggested that "the regional effect is neither always positive nor always constant" (p. 104). The negative regional effect found in the current analysis warrants further investigation and conceptualization that brings to bear the kind of complexity of regional effects Mooney asserted to be deserving of serious consideration. One possible explanation for the negative regional effects found in the current study, was the strong effect found concurrently for national interaction. That is, the policy learning and coalition building between non-neighbor states, by way of cross-national consortia, may be at the root of the negative regional effect.

Vertical influence of federal incentivization. The greater than fivefold impact of federal incentivization on a state's odds to adopt common standards is of a compelling enough size that it is difficult to argue against the claim that states adopted common standards because they sought RTTT funding. Nevertheless, the possibility exists that states wanted to adopt common standards, however, the huge implementation costs associated with revising curriculum, developing assessments, and training personnel would be inconceivable to incur without the kind of infusion of funds made available through a RTTT grant. In fact, the memorandum of agreement signed by the CCSSI development consortium stated that RTTT funds might be an available source of revenue for their implementation once developed and adopted. Moreover, to interpret this effect as states' adopting for-the-money may be a mischaracterization of states' motivations. Thus, educational improvement through revised standards might be the motivation, and RTTT funds a means to that end. In sum, states may, in actuality, not be acquiescing to federal incentivization, but rather be borrowing strength from the federal platform to leverage state policy priorities. Further study is needed to understand the true motivations of states and the impact of state-federal relations with regard to the adoption of common standards across the U.S.

Limitations and Next Steps

Several possible limitations exist in terms of construct operationalization.

First, the dependent variable, movement toward adopting common standards, was coded not according to the date of official adoption, but rather to the date of initial formal action toward adoption. Perhaps provisional adoption, the passage of legislation approving adoption, and projected dates of adoption should not be the markers designating the event of interest. Moreover, further investigation is needed to see how model results vary depending on how adoption is operationalized, perhaps by modeling both the consideration and adoption of the policy as has been done in other studies (e.g., Mintrom, 1997); with regard to the adoption of common standards, this might mean fitting one set of models for initial steps taken toward adoption, and fitting a second set of models for formal completion of the adoption process that included an independent variable that accounted for the variability in steps needed to achieve formal adoption. In this way, modeling the completion of the adoption process, controlling for the complexity of the adoption process, might provide an important augmentation to this line of investigation.

Second, with regard to the national consortia variable, an assumption was made that each consortia contributed equally toward the construct of national interaction, allowing for an interpretation of the effect of membership for each additional consortium. However, it is reasonable to suspect that all consortia were not equally influential. Furthermore, some consortia may have centered on values that were at odds with the approach taken by the CCSSI. For example, the issue of instruction based on traditional academic disciplines (English language arts, mathematics, science, etc.) represented a philosophical split between the leadership of the Partnership for 21st Century Skills and proponents of the standards developed by the CCSSI (Finn, 2010; Kay, 2010; cf. Gewertz, 2010c). Thus, perhaps there were classes of consortia, each predicting adoption differentially. Correspondingly, future investigations are called for, possibly fitting latent class models with consortia membership data. In addition, consortia membership was not stagnant; in fact consortia themselves were not stagnant, as was evident from the realigning and merging of consortia that was undertaken to bolster competitiveness for the RTTT Assessment Program grant. Those mergers occurred during spring 2010, and therefore could challenge the validity of my sum score. My primary rationale for coding consortia as time-invariant, was that accounting for the changing membership and consortia mergers in a time-variant variable would have been intractable; therefore, my consortia metric accounts for the initial status of consortia membership as of January 2010, which I argue was a valid metric, recognizing that this does not capture the full complexity of consortia membership and participation.

An additional consideration, however, regarding the validity of the current study's consortia membership variable, concerns my conceptualization of the national interaction construct. In particular, six of the 11 consortia used in the current study's sum variable (CONSORTIA) were induced by the RTTT call for developing common, high-quality assessments. That is, membership in these six consortia might be best conceptualized as vertically influenced national interaction. Perhaps a solution would be to create separate sum variables (for RTTT induced and not induced consortia) and fit models including both variables and an interaction variable, representing their multiplicative effect, to see if states high in both differ from those just high in one, for example. Alternatively, perhaps a latent class analysis, as introduced in the prior paragraph, might ferret out this distinction and help isolate the vertical influence within the national interaction model. With regard to the 2010 Common Core State Standard adoption activity across the nation, further investigation is needed before some clarity on the joint roles of national interaction and vertical influence can be achieved. Such a line of inquiry could also address some of the complexity in regional effects that Mooney (2001) brought to the fore, possibly leading to an understanding of the negative regional effects found in the current study.

Next, it is noteworthy that the governor's political party was the only internal determinant to have met criteria to be retained in the full model. That is, in spite of an extensive effort made in the current study to include all plausible determinants (totaling 54 variables posited as indicators of economic, political, education system characteristics, and educational performance determinants) of adoption, none, save governor's political party, were demonstrated to be viable explanatory variables. The near exception was fiscal health (FISCAL) that fell out only after being fit to the full model. I posited in my conceptual framework the possibility that fiscal health would be confounded by RTTT fund aspiration, whereby, states in worse fiscal condition might be more likely to aspire for RTTT funds. An inspection of intercorrelations among the variables fit to the full model, displayed in Table 4.17, does reveal a statistically significant negative correlation (r = -. 50, $p < .01$) between fiscal health and whether a state submitted a RTTT Phase 2 application. Although the size of the correlation coefficient was not large enough to warrant concerns over collinearity, it does suggest that a more sophisticated modeling procedure might be called for—possibly one that allows for the testing of mediating effects, such that it is tested whether the relation between fiscal health and adoption was mediated by RTTT fund competition. I posit that understanding such complexities in the adoption process will do much to inform policy scholarship on innovation diffusion, in particular, with regard to the vertical influence of federal incentivization on policy adoption.

Finally, the current study may have gaps in its accounting of sources of vertical influence, having analyzed only that of federal incentivization. An example of other sources of vertical influence might be that of advisory organizations such as the National Association of State Boards of Education (NASBE), whose *Common Core State Standards Adoption Time Frame* (NASBE, 2010), replete with projected months of adoption, may have put pressures upon states to uphold their adoption commitments. Although an investigation of such sources of influence could be a promising line of inquiry that would do much to elucidate the complexity of the policy diffusion process, the lack of available data, for example, on how the NASBE had differential levels of influence on given states made it, for the current study, of limited utility for modeling purposes. Furthermore, vertical influences from below, such as from advocacy groups either for or against common standards, representing user demand or user opposition, also stands as a promising area of investigation. The varying positions held by and exerted on state government by teachers unions, for example, could have signaled to state boards, chiefs, and legislatures whether a decision to adopt was in accord or at odds with the will of the teaching profession of that state. Likewise, a lack of available data on such sources of influence was a barrier to their inclusion in the current analyses.

Consideration of the influence of advocacy groups may be particularly important when adoption is operationalized as completion of the adoption process. For example, the state of Washington Office of Superintendent of Public Instruction (OSPI) is to deliver a detailed report to the state legislature in January 2011, synthesizing public input collected through an online survey and forums convened throughout the state (Partnership for Learning, 2010). The legislature is to then compare the common core and current state standards and make the final determination on how to proceed. Accordingly, opposition groups (e.g., Where's the Math?, 2010) are underway making their case to the OSPI and preparing to go before the state legislature. Alternatively, advocacy groups in favor of the legislature moving forward with adoption (Washington Stand for Children, 2010) have undertaken efforts to advocate for their cause. Moreover, the current study may have used an underspecified model of vertical influence. Next steps include a broader conceptualization of vertical influence and an investigation of measured proxies for such sources of influence on states' decisions to adopt.

Conclusions

Although RTTT fund aspiration was estimated to have had the largest effect among the predictor variables modeled, it is notable that RTTT fund aspiration wasn't the sole predictor to contribute toward explaining variation in state adoption activity. Of particular note, was that the estimated odds ratio for adopting common standards associated with RTTT fund competition reduced from 9.37 (in the single explanation model) to 5.20 (in the full model), indicating that the odds of adopting common standards appeared nearly twice as large when only considering the states' aspiration to compete for RTTT funds. Moreover, the influence of RTTT fund aspiration was large across all models; however, its effect was inflated when not also considering other likely motivators for adoption.

Thus, political pundits, critical of the use of federal aid to leverage federal policy priorities, should find their concerns assuaged by these findings, which suggest that state decisions to adopt common standards were at least, in part, indicative of their respective self-determined values and reflective of the degree to which they purposefully engaged in the policy community among the states. Moreover, the movement among the states toward common standards does appear to have been partly the result of state-determined interests, propelling state action beyond the influence of federal incentivization.

APPENDIX A

Table A.1: Variables, Variable Description, and Data Source: Organized by Construct.

Construct and Indicator Variables	Variable Description	Data Source
Movement toward Adoption of Common Core State Standards		
DATEADOPT	The date of designated adoption (January-December 2010). Dates used were commensurate with those reported by The Common Core State Standards Initiative. In addition, Washington and Maine were designated as adopting (moving toward adoption) with legislation passage. Prospective adoption (i.e., October – December) were based on projections reported by the National Association of State Boards of Education	Common Core State Standards Initiative (2010); National Conference of State Legislatures (2010); National Association of State Boards of Education (2010); Washington State Legislature (S. 6696, 2010); Maine State Legislature (Pub. L. No. 2009, 2010); Alabama Department of Education, 2010; Oregon School Boards Association, 2010
MNTHADOPT	The month of adoption as indicated in DATEADOPT. January was coded as 1, February was coded as 2, and so on.	Same as source variable

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
Internal Determinants:		
Economic		
FISCAL	Fiscal health. Ratio of 2006 total-state-revenue-minus-2006-total-state-spending to 2006 total state spending.	U.S. Census Bureau (2010)
ENROLLMNT	Number of students enrolled in grades PreK-12. Values in increment of millions.	U.S. Census Bureau (2010)
MOVETO	Interstate mobility into state. Ratio of 2006-total-P-12-enrollment-minus-2006-school-aged-children-who-moved-to-state to 2006 school-aged children who moved to the state.	U.S. Census Bureau (2010); Alliance for Excellent Education. (2010)
MOVEFROM	Interstate mobility from state. Ratio of 2006-total-P-12-enrollment-minus-2006-school-aged-children-who-from-to-state to 2006 school-aged children who moved from the state.	U.S. Census Bureau (2010); Alliance for Excellent Education. (2010)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
INCOME	2008 Income per capita	U.S. Census Bureau (2010)
Internal Determinants:		
Political		
APPOINT	State executive (Governor for states; Mayor for DC) appoints those with the authority to formally approve common standards (i.e., state board of education and/or state chief). For state boards of education, appoint was only coded yes if more than half the voting members were appointed. Additional authority holding bodies (e.g., legislature) were not considered in the coding of this variable.	Education Commission of the States (2010); Editorial Projects in Education (2010a)
REPUBLICN	State executive's (Governor for states; Mayor for DC) political party. Democrat (0); Republican (1).	The Council of State Governments (2010)
ELECTION	The state executive (Governor for states; Mayor for DC) was up for election in 2010	The Council of State Governments (2010)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
Internal Determinants:		
Education System Characteristics		
HSSTANDRDS	Align high school standards with expectations of college and careers. Yes (1) or No (0).	Achieve (2010)
HSREQMNTS	Align high school graduation requirements with college- and career-ready expectations. Yes (1) or No (0).	Achieve (2010)
ASSMTSYST	Develop college- and career-ready assessment systems. Yes (1) or No (0).	Achieve (2010)
DATASYST	Develop P-20 longitudinal data systems. Yes (1) or No (0).	Achieve (2010)
ACCNTSYST	Develop accountability and reporting systems that promote college and career readiness. Yes (1) or No (0).	Achieve (2010)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
ELASTANDS	Score (out of 10 possible points) assigned to state English Language Arts state standards.	Carmichael, Martino, Porter-Magee, & Wilson (2010)
MTHSTANDS	Score (out of 10 possible points) assigned to state Mathematics state standards.	Carmichael et al. (2010)
ELACOMPAR	English Language Arts state standards score compared score assigned to Common Core State Standards. “Clearly superior” (1), “too close to call” (0), or “clearly inferior” (-1).	Carmichael et al. (2010)
MTHCOMPAR	Mathematics state standards score compared score assigned to Common Core State Standards. “Clearly superior” (1), “too close to call” (0), or “clearly inferior” (-1).	Carmichael et al. (2010)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
OVERALL	Overall rating. Scale score derived from the following indicator variables: CHANCSUCS, ACHIEVEMNT, FINANCE, STDASSACC, TRANSALGN, and TEACHPROF.	Editorial Projects in Education (2010c)
FINANCE	School finance. Scale score derived from the following indicator variables: SFEQUITY and SPENDING.	Editorial Projects in Education (2010b, 2010c)
SFEQUITY	School Finance Equity. Scale score derived from the following factors: Wealth-Neutrality Index, McLoone Index, coefficient of variation, and restricted range.	Editorial Projects in Education (2010b, 2010c)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
SPENDING	Spending. Scale score derived from the following factors: adjusted per-pupil expenditures, percent of students in districts PPE at or above U.S. average, spending index, and percent of total taxable resources spent on education.	Editorial Projects in Education (2010b, 2010c)
STDASSACC	Standards, Assessment, and Accountability. Scale score derived from the following indicator variables: STANDARDS, ASSESSMNT, and ACCNTBLTY.	Editorial Projects in Education (2010c)
STANDARDS	Quality of standards. Scale score derived from the following factors: course- or grade-specific standards and supplementary resources.	Editorial Projects in Education (2010c)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
ASSESSMNT	Quality of assessment. Scale score derived from the following factors: types of test items, assessments aligned to standards, vertically equated assessments, and benchmark assessments.	Editorial Projects in Education (2010c)
ACCNTBLTY	Quality of accountability system. Scale score derived from the following factors: school ratings, statewide student-identification system, rewards for high-performing or improving schools, assistance to low-performing schools, and sanctions for low-performing schools.	Editorial Projects in Education (2010c)
TRANSALGN	Transitions and Alignment. Scale score derived from the following indicator variables: EARLYED, COLLEGRDY, and ECONWKFC.	Editorial Projects in Education (2010b, 2010c)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
EARLYED	Early childhood education. Scale score derived from the following factors: early-learning standards, school-readiness definition, school readiness assessment, readiness interventions, and kindergarten standards.	Editorial Projects in Education (2010b, 2010c)
COLLEGRDY	College readiness. Scale score derived from the following factors: college readiness definition, college prep required, course credits aligned, aligning high school assessments, and postsecondary decisions.	Editorial Projects in Education (2010b, 2010c)
ECONWKFC	Economy and workforce. Scale score derived from the following factors: work-readiness definition, career-tech diploma, industry certification, and portable credits.	Editorial Projects in Education (2010b, 2010c)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
TEACHPROF	The Teaching Profession. Scale score derived from the following indicator variables: ACCNTBLTY, INCENTIVS, and CAPACITY.	Editorial Projects in Education (2010c)
TCHQUALTY	Accountability for quality. Scale score derived from the following factors: coursework requirements for licensure, licensure assessments, clinical experience for licensure, discouraging out-of-field teaching, evaluation of teacher performance, accountability for effectiveness of teacher-education programs, and data systems to monitor quality.	Editorial Projects in Education (2010c)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
INCENTIVS	Incentives and allocation. Scale score derived from the following factors: alternative-route program, license reciprocity or portability, pension portability, teacher-pay parity, reporting teacher salaries, pay for performance, differentiated teacher roles, incentives for teacher leaders, National-Board incentives, incentives for targeted assignments, targeted National Board-Certified teachers, and targeted principal assignments.	Editorial Projects in Education (2010c)
CAPACITY	Building and supporting capacity. Scale score derived from the following factors: Supports for beginning teachers, professional development, school leadership, class-size initiatives, student-teacher ratio, school facilities, and school climate and working conditions.	Editorial Projects in Education (2010c)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
AFFORDABL	Higher education affordability. Scale score derived from the following factors: family ability to pay, strategies for affordability, and reliance on loans.	The National Center For Public Policy and Higher Education (2010)
EDUCSPEND	Per capita spending on education 2006.	U.S. Census Bureau (2010)
Internal Determinants:		
Educational Performance		
PREPARATN	Preparation for higher education. Scale score derived from the following factors: high school completion, K-12 course taking, K-12 student achievement, and teacher quality.	The National Center For Public Policy and Higher Education (2010)
PARTICIPN	Participation in higher education. Scale score derived from the following factors: young adult enrollment and working-age adult enrollment.	The National Center For Public Policy and Higher Education (2010)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
COMPLETN	Completion of higher education. Scale score derived from the following factors: persistence and completion.	The National Center For Public Policy and Higher Education (2010)
BENEFITS	Benefits of higher education. Scale score derived from the following factors: educational attainment, economic benefits, civic benefits, and adult skill levels.	The National Center For Public Policy and Higher Education (2010)
MPI	Math Progress Index. Scale score derived from the following indicator variables: MPIPERFRM, MPIIMPROV, and MPIOPPORT.	Editorial Projects in Education (2010d)
MPIPERFRM	Math Progress Index Performance. Scale score derived from the following indicator variables: NAEP Mathematics 2009 (4^{th} and 8^{th} grades) and math poverty gap (8^{th} grade math), and math advanced placement.	Editorial Projects in Education (2010d)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
MPIIMPROV	Math Progress Index Improvement. Scale score derived from the following indicator variables: NAEP Mathematics change 2003-2009 (4th and 8th grades), math poverty-gap change (8th grade math, and change in math advanced placement.	Editorial Projects in Education (2010d)
MPIOPPORT	Math Progress Index Opportunity. Scale score derived from the following indicator variables: Algebra by 8th grade, subject expertise of math teacher, experience of math teacher, and targeting teacher talent.	Editorial Projects in Education (2010d)
CHNCSCSS	Chance of Success. Scale score derived from the following indicator variables: EARLYFNDN, SCHOOLYRS, and OUTCOMES.	Editorial Projects in Education (2010b)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
EARLYFNDN	Early foundation. Scale score derived from the following factors: family income, parent education, parental employment, linguistic integration.	Editorial Projects in Education (2010c)
SCHOOLYRS	School years outcomes. Scale score derived from the following factors: preschool enrollment, kindergarten enrollment, elementary reading achievement, middle school mathematics achievement, high school graduation rate, young-adult education.	Editorial Projects in Education (2010c)
OUTCOMES	Adult outcomes. Scale score derived from the following factors: adult education attainment, annual income, and steady employment.	Editorial Projects in Education (2010c)
ACHIEVMNT	K12 Achievement. Scale score derived from the following indicator variables: STATUS, CHANGE, and EQUITY.	Editorial Projects in Education (2010c)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
STATUS	Status/achievement level and achieving excellence. Scale score derived from the following factors: NAEP Mathematics 2007 (4^{th} and 8^{th} grade) and NAEP Reading 2007 (4^{th} and 8^{th} grade).	Editorial Projects in Education (2010c)
CHANGE	Change/achievement gains. Scale score derived from the following factors: NAEP Mathematics 2003-2007 (4^{th} and 8^{th} grades) and NAEP Reading 2003-2007 (4^{th} and 8^{th} grades).	Editorial Projects in Education (2010c)
EQUITY	Equity/poverty gap. Scale score derived from the following factors: poverty gap (4^{th} grade reading and 8^{th} grade math), poverty gap change (4^{th} grade reading and 8^{th} grade math).	Editorial Projects in Education (2010c)
HSGRADUAT	Percent who were high school graduates or more in 2007.	U.S. Census Bureau (2010)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
BACHDGREE	Percent with a bachelor's degree or more in 2007.	U.S. Census Bureau (2010)
ADVCDGREE	Percent with an advanced degree or more in 2007.	U.S. Census Bureau (2010)
Policy Diffusion		
National Interaction		
CONSORTIA	Sum of 11 consortia that each state was a member as of January 2010: (1) Achieve; (2) American Diploma Project (ADP) Algebra I end-of-course exam and (3) ADP Algebra II end-of-course exam; (4) Balanced Assessment Consortium; (5) Career and Technical Education Consortium of States (CTECS); (6) College and Career Ready Policy Institute (CCRPI); (7) Florida Consortium; (8) Multiple Options for Student Assessment and Instruction Consortium (MOSAIC); (9) State Consortium on Board Examination Systems	Achieve (http://www.isbe.net/racetothetop/PDF/appendix_vol_2_pt4.pdf); ADP Algebra I (Achieve, 2009); ADP Algebra II (Achieve, 2009); Balanced Assessment Consortium (Florida Department of Education, 2010); CTECS (http://ctecs.org/memberreps.htm); CCRPI (Southeastern Comprehensive Center at SEDL, n.d.); Florida Consortium (Florida Department of Education, 2010); MOSAIC (Florida Department of Education,

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
	(SCOBES); (10) Summative Multi-state Assessment Resources for Teachers and Educational Researchers (SMARTER); (11) Partnership for 21st Century Skills (P21)	2010); SCOBES (National Center on Education and the Economy, 2010); SMARTER (Florida Department of Education, 2010); P21 (http://64.130.44.78/documents/assess21/assess21/newsletters/P21-winter2008/newsletters/fall2008/route21/index.php?option=com_content&task=view&id=746&Itemid=18)
Policy Diffusion		
Regional Diffusion		
CENTRAL	Central region of the U.S. Dummy coded 1; The southern region was excluded to serve as the reference.	As defined by the National Association of State Boards of Education.
NORTHEAST	Northeastern region of the U.S. Dummy coded 1; The southern region was excluded to serve as the reference.	As defined by the National Association of State Boards of Education.

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
WESTERN	Western region of the U.S. Dummy coded 1; The southern region was excluded to serve as the reference.	As defined by the National Association of State Boards of Education.
NEIGHBORS	Number of neighbor states. Alaska and Hawaii were coded as having one neighbor each: Washington and California, respectively. District of Columbia was coded as having Maryland and Virginia as neighbors. For the 48 contiguous states, states that share borders were coded as neighbors; in addition, the pairs New Jersey and Maryland, and Massachusetts and Maine were coded as neighbors.	Neighbors of Alaska and Hawaii were determined by the author; District of Columbia (http://www.digitalgothic.net/Tour/DCMaps/DCMaps.htm); the 48 contiguous states (Berry & Berry, 1990).
NEIGHADPT	Number of neighbor states to have adopted prior to reference state adoption. Calculation used TIME and NEIGHBORS.	Same as source variable

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
NEIGHPRPN	Proportion of neighbor states to have adopted prior to reference state adoption. Calculation divided NEIGHADPT by NEIGHBORS.	Same as source variables
NEIGHN_LG	Time-variant: Number of states to have adopted common standards, lagged by one month.	Common Core State Standards Initiative (2010); National Conference of State Legislatures (2010); National Association of State Boards of Education (2010).
NEIGHN_CN	Time-variant: Number of states to have adopted prior to and contemporaneous with reference state. On the month that a reference state adopted, neighbor states that also adopted that month were only coded as having adopted if it occurred on a day prior to the reference state's adoption.	Common Core State Standards Initiative (2010); National Conference of State Legislatures (2010); National Association of State Boards of Education (2010).

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
NEIGHP_LG	Time-variant: Proportion of neighbor states to have adopted common standards, lagged by one month. Calculation used NEIGHN_LG divided by NEIGHBORS.	Same as source variables
NEIGHP_CN	Time-variant: Proportion of neighbor states to have adopted prior to and contemporaneous with reference state. Calculation used NEIGHN_CN divided by NEIGHBORS.	Same as source variables
Policy Diffusion		
Vertical Influence		
RT3PHASE1	Submitted a Race to the Top Phase 1 application (due January 19, 2010).	U.S. Department of Education (USDOE) Website (http://www2.ed.gov/programs/racetothetop/phase1-applications/index.html)
RT3PHASE2	Submitted a Race to the Top Phase 2 application (due March 4, 2010).	USDOE Website (http://www2.ed.gov/programs/racetothetop/phase2-applications/index.html)

Table A.1 – continued

Construct and Indicator Variables	Variable Description	Data Source
RT3CMPETE	Time-variant: Aspire to compete for Race to the Top funds. Each month was coded 1 or 0, according to indicators of aspiration for receiving Race to the Top funds. See Appendix B for the coding rules followed for each month.	USDOE Website (http://www2.ed.gov/programs/racetothetop/intent-to-apply.html; http://www2.ed.gov/programs/racetothetop/phase1-applications/index.html; http://www2.ed.gov/programs/racetothetop/phase2-intent-to-apply.html; http://www2.ed.gov/programs/racetothetop/phase2-applications/index.html.

APPENDIX B

Table B.1: Rule for Coding the Time-variant Race to the Top Fund Aspiration Variable (RT3CMPETE).

	Phase 1 LOI (December 19, 2009)	Phase 1 Applicant (January 19, 2010)	Phase 1 Finalist (March 4, 2010)	Phase 1 Winner (March 29, 2010)	Phase 2 LOI (May 13, 2010)	Phase 2 Applicant (June 1, 2010)	Phase 2 Finalist (July 27, 2010)	Phase 2 Winner (August 24, 2010)
January	Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1
February		Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1
March			Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1
April				Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1
May				Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1
June				Yes = 1		Yes = 1	Yes = 1	Yes = 1
July				Yes = 1			Yes = 1	Yes = 1
August				Yes = 1				Yes = 1
September				Yes = 1				Yes = 1
October				Yes = 1				Yes = 1
November				Yes = 1				Yes = 1
December				Yes = 1				Yes = 1

Note. LOI = Letter of Intent. If the rule does not indicate that a code of 1 (*Yes*) was required for a given month, then the given month was coded with a 0 (*No*). The resultant variable consisted of a series of 0s and 1s, whereby a 0 indicates that no aspiration for Race to the Top fund competition was demonstrated and a 1 indicates that aspiration for Race to the Top fund competition was demonstrated. This coding scheme allows for a time-variant representation of state Race to the Top fund aspiration, indicating the changing status of states' (e.g., started out the year aspiring and then stopped aspiring at some point in the process) throughout the year during the Race to the Top fund competition.

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BIOGRAPHICAL SKETCH

EDUCATION

currently enrolled	**Doctor of Philosophy**, Florida State University, Tallahassee, FL Major: Educational Leadership/Administration.
currently enrolled	**Master of Science**, Florida State University, Tallahassee, FL Major: Educational Leadership/Administration.
1997	**Bachelor of Science**, University of Central Florida, Orlando, FL Major: Social Sciences. Minor: Multicultural Humanities.

CERTIFICATION

1997/2010	**Professional Educator's Certification**, State of Florida Department of Education. Current Areas of Certification: ▪ Elementary Education – Grades K-6 ▪ Psychology – Grades 6-12 ▪ Reading / Endorsement

EXPERIENCE

August 2006 – present	**IES Predoctoral Interdisciplinary Research Training Fellow**, Florida Center for Reading Research, Florida State University, Tallahassee, FL
October 2004 – July 2006	**District Representative**, Lake County Schools, and **Teacher Consultant**, National Writing Project, University of Central Florida, Orlando, FL
March 2004 – July 2006	**Reading First Regional Developer**, Reading First Professional Development, University of Central Florida, Orlando, FL
August 2002 – July 2006	**Literacy Coach**, Spring Creek Elementary, Paisley, FL
August 1997 – July 2002	**Varying Exceptionalities Teacher**, Spring Creek Elementary, Paisley, FL
August 1995 – May 1997	**Substitute Teacher**, Lake County Schools, Tavares, FL

ACTIVITIES AND PROJECTS

2010 – present	**Conference Organizing Committee Member**, Association of Education Finance and Policy 2011 Conference, Education Policy Center at Learning Systems Institute, Florida State University, Tallahassee, FL
2010	**Mini-Conference Organizer and Facilitator**, Topic area: Adolescent Literacy. Presenters: Dr. Janice Dole, Dr. Donald Deshler, Dr. Catherine Snow, and Dr. Sharon Vaughn. Hosted by the Florida Center for Reading Research, Florida State University, Tallahassee, FL
2009	**Graduate Student Volunteer**, Florida Educational Research Association 2009 Conference, Orlando, FL
2007 – 2009	**Project Manager**, Integrated Math, Science, and Technology in the Middle Grades, Florida Center for Research in Science, Technology, Engineering, and Mathematics, Florida State University, Tallahassee, FL
2008	**Committee Facilitator**, Science Course Description Meeting, Florida Department of Education and Florida Center for Research in Science, Technology, Engineering, and Mathematics, Florida State University, Tallahassee, FL
2007 – 2008	**Subject Matter Expert**, Florida Teacher Certification Examination, Exceptional Student Education Subject Area Exam, Center for Information, Training, and Evaluation Services, Tallahassee, FL
2007 – 2008	**Committee Member**, Progress Monitoring and Reporting Network Coach's Log Survey Development, Florida Department of Education and Florida Center for Reading Research, Tallahassee, FL
2007	**Graduate Assistant**, Teacher Quality Symposium Series, College of Education, Florida State University, Tallahassee, FL
2005	**Contributing Author**, Literacy First Florida Reading Endorsement, Professional Development, Inc., Mill Creek, WA
2005	**Co-Writer**, Reading First Grant Narrative, Lake County Schools, Tavares, FL. Funded: $2,527,700 over five years

1996 — **Undergraduate Research Assistant**, Safe and Drug-Free Schools Set-Aside Allocation Needs Assessment Report, Lake County School District; Principal Investigator: Dr. Alvin Wang, University of Central Florida, Orlando, FL

SPECIALIZED TRAINING

December 2008 — **Reformed Teaching Observation Protocol**, Arizona Collaborative for Excellence in the Preparation of Teachers, Arizona State University

October 2008 — **Learning Mathematics for Teaching**, Instrument Dissemination Workshop, Consortium for Policy Research in Education, University of Michigan

September 2007 — **Hierarchical Data Modeling**, SSI Scientific Software International

ANALYTIC SOFTWARE PROFICIENCY

- HLM 6 - Use regularly and can teach to others
- SPSS Statistics 18 - Use regularly and can teach to others
- Mplus 5 - Use regularly and can teach to others
- SAS 9 - Use regularly
- BILOG-MG 3 - Have used a little
- PARSCALE 4 - Have used a little

FIRST AUTHOR MANUSCRIPTS IN PREPARATION

LaVenia, M., Lang, L. B., Schoen, R., & Moss, C. (in preparation). *Professional development effects on principal-led communities of instructional practice: Results from a randomized field trial.*

LaVenia, M., LaVenia, K. N., & Lang, L. B. (in preparation). *Effects of integrated math, science, and technology in the middle grades.*

LaVenia, M., LaVenia, K. N., & Lang, L. B. *School-based progress monitoring: Addressing the issues of parallel form equating when using anchor items, repeated measures, and small samples.* Unpublished manuscript, Florida State University, Tallahassee, FL.

LaVenia, M., Roehrig, A. D., Brownell, M. T., Lang, L. B., & Petscher, Y. *Coaching along an inter- to intra-active professional development continuum: Deprivatized practice and* *reading achievement in Florida Reading First schools*. Unpublished manuscript, Florida State University, Tallahassee, FL.

PAPER PRESENTATIONS AND SYMPOSIA (REFEREED)

Pineau, K. N., **LaVenia, M.**, & Lang, L. B. (2008, November). *Incorporating CFA, Rasch IRT, and DIF to investigate measurement invariance of a critical thinking disposition questionnaire.* Paper presented at the meeting of the Florida Educational Research Association, Orlando, FL.

Pasisz, D. J., **LaVenia, M.**, Roehrig, A. D., & Lang, L. B. (2008, November). *Latent profile analysis of Florida reading coaches: Categories of coaches based on reported job tasks.* Paper presented at the meeting of the Florida Educational Research Association, Orlando, FL.

Goldwyn, S., Lang, L. B., & **LaVenia, M.** (2007, November). *Perceptions of data use: Relations between data use, skills, and student achievement*. Paper presented at the meeting of the University Council for Educational Administration, Alexandria, VA.

POSTER PRESENTATIONS (REFEREED)

LaVenia, M., Lang, L. B., Schoen, R. C., & Moss, C. (2010, June). *Professional development effects on school-level communities of instructional practice: Results from a randomized field trial*. Poster session presented at the meeting of the Institute of Education Sciences, Washington, D.C.

LaVenia, K. N., **LaVenia, M.**, & Lang, L. B. (2010, April). *Development of a short form of the California Measure of Mental Motivation*. Poster session presented at the meeting of the National Council on Measurement in Education, Denver, CO.

LaVenia, M., Pineau, K. N., & Lang, L. B. (2010, March). *The predictive validity of critical thinking disposition on middle grades math achievement*. Poster session presented at the meeting of the Society for Research on Educational Effectiveness, Washington, DC.

LaVenia, M., Pineau, K. N., & Lang, L. B. (2009, November). *School-based progress monitoring: Addressing the issues of parallel form equating when using anchor items, repeated measures, and small samples.* Poster session presented at the annual meeting of the Florida Educational Research Association, Orlando, FL.

Hauptli, M. V., Pineau, K. N., Schoen, R., **LaVenia, M.**, & Lang, L. B. (2009, November). *The relation between principals' mathematics and science content knowledge and their attitudes towards the implementation of reform-oriented standards*. Poster session presented at the meeting of the University Council for Educational Administration, Anaheim, CA.

Pineau, K. N., **LaVenia, M.**, & Lang, L. B. (2009, June). *Effects of a STEM-based curricular intervention on middle school students' critical thinking disposition.* Poster session presented at the meeting of the Institute of Education Sciences, Washington, D.C.

LaVenia, M., Pineau, K. N., & Lang, L. B. (2009, June). *Effects of a STEM-based curricular intervention on mathematical proficiency*. Poster session presented at the meeting of the Institute of Education Sciences, Washington, D.C.

Hauptli, M. V., Pineau, K. N., **LaVenia, M.**, Schoen, R., & Lang, L. B. (2009, June). *The relation between principals' mathematics content knowledge and their attitudes towards the implementation of reform-oriented mathematics standards*. Poster session presented at the meeting of the Institute of Education Sciences, Washington, D.C.

Pineau, K. N., **LaVenia, M.**, & Lang, L. B. (2009, March). *Curriculum effects on critical thinking disposition.* Poster session presented at the meeting of the Society for Research on Educational Effectiveness, Crystal City, DC.

Pineau, K. N., Hauptli, M., **LaVenia, M.**, Moss, C. & Lang, L. B. (2008, October). *Florida principal PROMiSE project: Prinipal's perceptions of learning communities.* Poster session presented at the meeting of the University Council for Educational Administration, Orlando, FL.

Pasisz, D. J., **LaVenia, M.**, Roehrig, A. D., & Lang, L. B. (2008, October). *The role of reading coaches in Florida.* Poster session presented at the meeting of the University Council for Educational Administration, Orlando, FL.

Hauptli, M. V., **LaVenia, M.**, & Lang, L. B. (2008, October). *Predicting growth in eighth grade FCAT science outcomes*. Poster presented at Florida State University's Assessment for the 21st Century Symposium Series, Tallahassee, FL.

Pineau, K. N., **LaVenia, M.**, Lang, L. H., & Folsom, J. S. (2008, June). *Measurement invariance of the California Measure of Mental Motivation.* Poster session presented at the meeting of the Institute of Education Sciences, Washington, D.C.

LaVenia, M., Roehrig, A. D., Brownell, M. T., Petscher, Y., & Lang, L. B. (2008, June). *Professional community in Florida Reading First schools: Test of Measurement Invariance*. Poster session presented at the meeting of the Institute of Education Sciences, Washington, D.C.

Hauptli, M., **LaVenia, M.**, & Lang, L. B. (2008, June). *Progress monitoring in science: The importance of measuring growth*. Poster session presented at the meeting of the Institute of Education Sciences, Washington, D.C.

Folsom, J. S., Piasta, S. B., **LaVenia, M.**, & Al Otaiba, S. (2008, June). *Is there a predictive role of vocabulary on letter-word reading growth or outcome during kindergarten?* Poster session presented at the meeting of the Institute of Education Sciences, Washington, D.C.

LaVenia, M., Roehrig, A. D., Brownell, M. T., Goldwyn, S., Lang, L. B., & Petscher, Y. (2008, January). *Professional community in Florida Reading First schools: Implications for the intended work between reading coaches and teachers*. Paper presented at the meeting of the Hawaii International Conference on Education, Honolulu, HI.

LaVenia, M., Wilson, S. B., Purpura, D. J., Lonigan, C. J., & Lang, L. B. (2007, June). *Effects of coaching on instructional practice*. Poster session presented at the meeting of the Institute of Education Sciences, Washington, D.C.

PRESENTATIONS AND WORKSHOPS (INVITED)

Lang, L. B., LaVenia, K. N., & **LaVenia, M.** (2010, June). *Research and evidence: Why are they important to you?* Session presented at the Leadership for Mathematics & Science Instruction – Principal and Teacher Leader Training, Melbourne, FL and Lake Mary, FL.

Lang, L. B., Pineau, K. N., & **LaVenia, M.** (2009, October). *Research and evidence: Why are they important to you?* Workshop presented at the Leadership for Mathematics & Science Curriculum, Instruction & Assessment Statewide Conference, Jacksonville, FL.

Lang, L. B., & **LaVenia, M.** (2008, March). *Integrated math, science, and technology in the middle grades*. Presentation at the meeting of the Florida Center for Research in Science Technology, Engineering and Mathematics International Advisory Board, Amelia Island, FL.

LaVenia, M. (2006, January). *Managing assessment data and accountability reporting*, Workshop presented at the Florida Education Association sponsored retreat for Lake County Schools Newly Hired Teachers.

LaVenia, M. (2005, September). *Using questions to drive revision: Increasing metacognition of the writing process*. Workshop presented at the meeting of the National Writing Project at University of Central Florida, Orlando, FL.

AWARDS AND RECOGNITION

2006 – present	Institute of Education Sciences Predoctoral Interdisciplinary Research Training Fellowship (R305B04074), Florida State University and Florida Center for Reading Research

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

- Association of Educational Finance and Policy (AEFP)
- Florida Educational Research Association (FERA)
- National Council on Measurement in Education (NCME)
- Society for Research on Educational Effectiveness (SREE)

GRADUATE TEACHING EXPERIENCE

Co-Instructor, Quantitative Applications for Education Policy Analysis, Department of Educational Leadership and Policy Studies, Florida State University, Spring 2010.

Graduate Teaching Assistant, Designing In-Service Personnel Development, Department of Educational Leadership and Policy Studies, Florida State University, Fall 2008.