WHY DO DIFFERENCES BETWEEN STATE-MEASURED ACHIEVEMENT GAPS AND NATIONALLY-MEASURED ACHIEVEMENT GAPS EXIST?

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ABSTRACT

This dissertation addresses two research questions:

1. To what degree do states differ in measuring the achievement gap?
2. Are there predictors to suggest why this differential occurs?

The first research question requires that the degree of difference, the differential quotient, is determined. For the purposes of this dissertation, I calculated the reported achievement gaps between white and black fourth graders for the years 2005, 2007, and 2009 on the individual state reading and math assessments and the reading and math portions of the National Assessment of Educational Progress, NAEP, by percentage. For example, if whites scored 90% proficient on the state-developed measure and blacks scored 70%, the state-based achievement gap was recorded as 20. If the white proficiency percentage on the NAEP was reported at 40% and the black percentage was reported at 10%, the NAEP-based achievement gap was recorded as 30. The state-established achievement gap percentage was then subtracted from the NAEP-based achievement gap percentage to create an assessment differential quotient. In the previously explained example, the differential quotient would be 10. These calculations were also completed for the differences between fourth grade white achievement and Hispanic achievement on these assessments. The larger the differential quotient, the further the state assessment achievement gap was from the NAEP achievement gap. The differential quotient was calculated for the reading and math assessments at the fourth grade level creating six individual differential quotients for each state or 300 observations for analysis.

The findings of this dissertation evidence that states vary in measuring the achievement gap locally from the national exam (NAEP) at differing degrees. These disparities fluctuate by content, by year, and from state to state. For example, the number of states reporting a positive differential quotient on the white/black achievement gap for the fourth grade reading assessment over the years studied remained relatively stable at an average of 49%. This means that 49% of states reported a smaller achievement gap between whites and blacks in fourth grade reading than was reported by the NAEP. In comparison, the percentage of states reporting a positive differential quotient for the white/black achievement gap on fourth grade math reached 78% in 2009. More state reports differed from the national reports in math than in reading with more states showing growth in math as compared to the NAEP.

This dissertation also found that differential quotients increased over the three years studied in all areas except white/black reading. As reporting for No Child Left Behind was not required until 2006, it logically follows that states became more interested in reporting narrowed achievement gaps in 2007 and 2009. States struggled to reach 100% proficiency by the year 2014 and adjustments to test content, format, and procedures were made to construct an illusion of better results at the local level thus causing larger differential quotients.

Finally, these findings show that some states such as Nebraska, Texas, and Virginia are consistently found to have the highest disparity between state reports and the national reports. This output leads to the second research question: are there predictors to suggest why this differential occurs more frequently in some states versus others? The answer to this question is yes. The level of black and the level of Hispanic within a state were statistically significant in both math models. The coefficients of these predictors indicate that states with higher black and Hispanic populations show a greater disparity between state-based achievement reports and national-based reports.

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"Focus on the journey, not the destination.
Joy is found not in finishing an activity but in doing it."
–Greg Anderson

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DEDICATION

This dissertation and degree are dedicated to my present and future family. To my parents who helped me realize my capabilities; to my sister who helped me see light at the end of every tunnel; and to my future husband and children who motivated me to be the best version of myself: this is for you.

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Chapter One

Introduction

1.1 Purpose for this Study

John Dewey asserted in 1916 that "it is the aim of progressive education to take part in correcting unfair privilege and unfair deprivation, not to perpetuate them." As evidenced by Dewey's assertions, the achievement gap, or the inequalities in academic achievement based on race/ethnicity and income, is not a new concept in public education (Reynolds, 2002). While the American public education system has made some gains over the past six decades in educational de-segregation and concerted effort has been devoted to closing the privileged/underprivileged achievement gap, closing this gap on standardized assessments is still viewed as the most significant challenge facing American society in the 21st century (Kim & Sunderman, 2005).

The gaps in successes between majority and minority students sparked President Lyndon Johnson's "War on Poverty" in 1965 – the impetus for the Elementary and Secondary Education Act (ESEA). This was the first legislation establishing federal funding available to all schools, providing additional funds to schools with higher percentages of students determined to be at-risk of failing school; ESEA was later reauthorized in 2001 as the most politically contentious education legislation to date: No Child Left Behind (NCLB).

No Child Left Behind provides "title" funds to schools in need provided that those schools meet specific government mandates and achieve quantitative gains on state-developed achievement measures. One of these required quantitative gains is the narrowing of the achievement gap. Progress on the quantitative measures established by NCLB is public – adding pressure on schools and states to make gains in order to maintain organizational legitimacy. Faced with the pressure of performance, states have made adjustments to their state-developed standards and processes to enable more students to achieve. These practices have allowed higher

standardized assessment scores and have evidenced a closing of the white/black and white/Hispanic achievement gaps.

President Johnson's "War on Poverty" also established the National Assessment of Educational Progress – a low-stakes assessment developed to evaluate the effectiveness of the government distributed "title" funds. The NAEP assessment has become a type of grade card for national academic success. When it comes to grading the white/black and white/Hispanic achievement gaps, the NAEP shows minimal (if any) progress.

In this dissertation, I will examine the differences between the achievement gaps as evidenced by the state-based measures and the NAEP assessment. For example, while one state may show that the white/black achievement gap is narrowing, the NAEP assessment may show that the gap is stable. The difference between the gaps will be determined and reported as a differential quotient.

The aim of this study is to provide some predictors for why some states may evidence larger gap differentials than others using state characteristics obtained through the Integrated Public Use Microdata Series (IPUMS). Other studies have examined the history (Nisbett, 2011; Hanushek & Rivkin, 2009; Harris & Herrington, 2006), causes (Fryer & Levitt, 2004; Fryer & Levitt, 2006; Jencks & Phillips, 1998), size (Rippeyoung, 2009; Clotfelter et al., 2009; Fryer & Levitt, 2004), trajectory (Fryer & Levitt, 2004; Harris & Herrington, 2006) and solutions (Singham, 2003; Cohen et al., 2006; Evans, 2005) to the achievement gap. There have also been studies that investigate the contrasts between NAEP scores and state assessment results in an effort to evaluate the rigor of state-based standards (McLaughlin et al., 2008) and recent studies comparing the achievement gaps reported by the two (Lee and Reeves, 2012). There have not been any studies, though, that have looked at the potential reasons why some states evidence

greater gap closure when likened to the NAEP results in comparison to other states. State reporting of closing achievement gaps – meant to maintain legitimacy and protect resources – creates an illusion of progress and could hinder true academic growth. Publically reported achievement data influences the decisions made by policymakers meant to improve the quality of education in the United States and provides feedback on the No Child Left Behind legislation. When honest feedback is lacking and data is not reflective of current educational progress, it potentially creates a false sense of accomplishment and encourages futile processes.

1.2 Research Questions

This dissertation aims to answer two research questions:

1. To what degree do states differ in measuring the achievement gap?
2. Are there predictors to suggest why this differential occurs?

The first research question requires that the degree of difference, the differential quotient, is determined. For the purposes of this dissertation, I calculated the reported achievement gaps between white and black fourth graders for the years 2005, 2007, and 2009 on the individual state reading and math assessments and the reading and math portions of the National Assessment of Educational Progress, NAEP, by percentage. For example, if whites scored 90% proficient on the state-developed measure and blacks scored 70%, the state-based achievement gap was recorded as 20. If the white proficiency percentage on the NAEP was reported at 40% and the black percentage was reported at 10%, the NAEP-based achievement gap was recorded as 30. The state-established achievement gap percentage was then subtracted from the NAEP-based achievement gap percentage to create an assessment differential quotient. In the previously explained example, the differential quotient would be 10. These calculations were also completed for the differences between fourth grade white achievement and Hispanic achievement on these assessments. The larger the differential quotient, the further the state

assessment achievement gap was from the NAEP achievement gap. The differential quotient was calculated for the reading and math assessments at the fourth grade level creating six individual differential quotients for each state or 300 observations for analysis.

The second research question in this dissertation explores some predictors to postulate why these differences in achievement gap reporting occur from state to state. Using state-level data from IPUMS, a fixed-effects panel regression model was generated to examine if any of the following seven variables were statistically significant when compared to the differential quotient: differential quotient location, percentage black, percentage Hispanic, percentage of mom-only households, parent occupation levels, percentage living below the poverty line, percentage of adults who dropped out of high school.

This dissertation will examine differential quotients for fourth grade reading and math assessments in the years 2005, 2007, and 2009 and answer the two research questions. The extent of the difference between the achievement gaps reported on each test and the predictors that prove to be statistically significant will be studied.

1.3 Significance of the Study

This study is important because it studies the achievement gap in a new way. There have been many studies that have studied history (Nisbett, 2011; Hanushek & Rivkin, 2009; Harris & Herrington, 2006), causes (Fryer & Levitt, 2004; Fryer & Levitt, 2006; Jencks & Phillips, 1998), size (Rippeyoung, 2009; Clotfelter et al., 2009; Fryer & Levitt, 2004), trajectory (Fryer & Levitt, 2004; Harris & Herrington, 2006) and solutions (Singham, 2003; Cohen et al., 2006; Evans, 2005) to the achievement gap. There have also been studies that investigate the contrasts between state assessments and the NAEP (McLaughlin et al., 2008) and recent studies comparing the achievement gaps reported by the two (Lee and Reeves, 2012). There have been

few studies, though, that focus on how states represent the achievement gap and research on why some states show a narrowing achievement gap while national assessments do not is absent. This study seeks to evaluate which states report the greatest achievement gap gains versus the NAEP as well as to explain why these states reflect larger gains than others.

The sentiment of the No Child Left Behind legislation is that no student should be left behind academically – all children should learn and achieve equally. If states are adjusting content, practices, and/or procedures to allow for quantitative gains on state-based assessments and the reported narrowing of the achievement gap is a result of these adjustments, the purpose of NCLB has been lost in practical translation rendering the legislation futile. The reasons why some states manipulate the assessment to allow for achievement gap closure and other states do not are not rooted in education but in society. Examining the reasons as to why some states report a greater narrowing of the achievement gaps than others highlights the social factors that drive education and could, potentially, assist decision-makers in understanding how to make meaningful policy decisions moving forward.

Chapter Two

Literature Review

2.1 Research Question

1. To what degree do states differ in measuring the achievement gap?
2. Are there predictors to suggest why this differential occurs?

The purpose of this chapter is to provide a review of the literature that supports the study of the discrepancies in achievement gap reporting as evidenced by the state-based standardized assessments and the National Assessment of Educational Progress. This dissertation compares the achievement gaps reported between whites and blacks and whites and Hispanics on each state's individual state assessment to the same achievement gaps as reported by the National Assessment of Educational Progress to determine a differential quotient. Then, census data will be used to explore various state characteristics to suggest possible predictors of these differential quotients. To this end, this dissertation relies on key literature related to the achievement gap and standardized assessment. The theoretical concept of legitimacy provides a framework to review the applicable research and understand why states would report that the achievement gap is closing when other national sources report that it is not. This literature provides a disciplinary framework to address the discrepancies in the achievement gap explored in this dissertation.

The fundamental contribution of this study is to education policy literature on the potential downside of No Child Left Behind as it impacts the achievement gap. Although the literature on this topic is expansive, the concept of achievement gap differentials has not been explored at length.

This review of literature will (a) describe the nature of the achievement gap and why it is important; (b) provide an overview of the current policy related to the achievement gap as well

as legitimacy issues related to this current policy; (c) explore both the state-based measures and the national measure presently used to measure the achievement gap; (d) explore discrepancies in the American white/black and white/Hispanic achievement gaps as shown by these two measures; and (e) introduce potential reasons why these two measures evidence different trends in the achievement gap.

2.2 The Nature of the Achievement Gap

2.2a Establishing the Importance of the Achievement Gap

John Dewey asserted in 1916 that "it is the aim of progressive education to take part in correcting unfair privilege and unfair deprivation, not to perpetuate them." As evidenced by Dewey's assertions, the achievement gap, or the inequalities in academic achievement based on race/ethnicity and income, is not a new concept in public education. While the American public education system has made some gains over the past six decades in educational de-segregation and concerted effort has been devoted to closing the privileged/underprivileged achievement gap, closing this gap on standardized assessments is still viewed as the most significant challenge facing American society in the 21st century (Kim & Sunderman, 2005).

The 1954 United States Supreme Court ruling of Brown v. Board of Education found educationally based racial segregation unconstitutional and marked the first national movement towards equality in education and the closing of the achievement gap. This Court decision influenced school districts to end de jure segregation. De facto segregation, though, has been much slower to decline as access to appropriate education still has not proven successful for the majority of African American and Hispanic students (Noguera, 2003). The achievement gaps still present between white achievement and the achievement of their black and Hispanic peers evidence this slow moving progress.

The gaps in successes between majority and minority students sparked President Lyndon Johnson's "War on Poverty" – the impetus for the Elementary and Secondary Education Act, ESEA. This was the first legislation establishing federal funding available to all schools, providing additional funds to schools with higher percentages of students determined to be at-risk of failing school. Schools with higher numbers of low-performing students received title funds, monies provided to schools for instructional supplies, professional development, resources to support educational programs, and to promote parental involvement. This legislation must be revisited and renewed every five years.

A Nation at Risk, a study completed in 1983 by the National Commission of Excellence in Education, heightened the achievement gap awareness of the United States public and redefined it as an American problem rather than a poverty problem. Stressing that educational success has become increasingly important in determining both income and class status, the achievement gap shifted from being seen as an indicator of educational inequality to being a direct cause of socioeconomic inequality (Harris & Herrington, 2006). Due to the report's impact on public concern, A Nation at Risk influenced the establishment of the Improving America's Schools Act – a legislation that increased federal influence on education and gave rise to federally imposed guidelines for accountability (Guthrie & Springer, 2004). These guidelines put pressure on the local state departments of education, requiring that all states develop state-based content and performance standards, create standards-based assessments, and formulate an accountability system to identify schools that were not helping all students – especially those at risk of failure – perform as expected on those assessments (Jorgenson & Hoffman, 2003). This was the first reauthorization of the Elementary and Secondary Education Act specifically focused

on closing the achievement gap between privileged and under-privileged students and served as a catalyst for standards-based reform legislation (Hewitt, 2008).

2.2b Current Policy and the Achievement Gap

In 2001, President George Bush signed arguably the most contentious reauthorization of the Elementary and Secondary Education Act: No Child Left Behind (NCLB). The purpose of this reform was to provide quality education for all students and accomplish uniform achievement levels according to state standards, with the specific focus on closing the gap between the advantaged and disadvantaged student populations (Borowski & Sneed, 2006; Haycock, 2006). In order to measure state progress towards the attainment of these goals, each state set an initial trajectory for "Adequate Yearly Progress" (AYP) with the understanding that the progress toward proficiency will be incremental until 100 percent of American students achieve proficiency by the year 2014 (Office of the Under Secretary, 2002).

As with the Improving America's Schools Act, NCLB states that student proficiency and the achievement gap continue to be measured and monitored at the state-level. Expanding upon the IASA, NCLB requires that all schools are not only internally accountable for achievement on their state-developed assessments but also publically accountable. In addition, student achievement data is no longer looked at solely as an aggregate whole. In an effort to focus on narrowing the achievement gap, NCLB stipulates that data be disaggregated based upon specific subgroups. If schools or school districts do not reach the targeted proficiency levels as a whole or in a specific subgroup, the school or district will be labeled as struggling or failing (USDOE, 2002).

In 2010, the U.S. Department of Education invited each state educational agency to request flexibility regarding specific requirements of the No Child Left Behind Act of 2001

(NCLB) in exchange for rigorous and comprehensive State-developed plans designed to improve educational outcomes for all students, close achievement gaps, increase equity, and improve the quality of instruction. These government waivers allow the state to opt out of the original 2014 deadline so long as the state is showing that it is making progress towards these goals. As of April 2014, 42 of the continental United States are approved for ESEA flexibility.

Due to the tying of achievement outcomes to federal funding and the establishment of publicly shared school report cards, states are under enormous pressure to produce results and close the gap between the advantaged and disadvantaged; with complete autonomy over their standards, assessments, and proficiency cut scores, it would make sense that states would do whatever it took in order to achieve legitimacy.

2.2c Legitimacy, Current Policy, and the Achievement Gap

The number one purpose of an organization is to exist – sustain and survive. In order to do so, organizations must maintain legitimacy. Because of this, schools and schooling systems must appeal to public opinion and look like other schools and systems (Pfeffer & Salancik, 1978). States face legitimacy concerns under the NCLB mandate because, in order to be like all other schools and systems, they must make progress towards the NCLB goals and narrow the achievement gap. Otherwise, states may face public scrutiny or federal withdrawal of funds making them stand out from the others and thus lose organizational legitimacy.

In the era of NCLB, schools failing to achieve AYP are publically labeled as "needing improvement" and receive immediate assistance such as supplemental services from outside agencies (USDOE, 2002; Peterson & West, 2003). After a school fails to meet AYP in the fourth consecutive year, the school faces sanctions such as replacement of staff. State takeover and the restructuring of the school are mandated after the fifth consecutive year of failure

(Peterson & West, 2003). Furthermore, at the federal level, the government has the option to reduce funds to states that fail to make progress towards the stated goals and outcomes. While states do have the choice of opting out of No Child Left Behind, in making that choice, states forfeit their federal Title I funding and – arguably more importantly – declare themselves different from neighboring states.

Meyer and Rowan (1977) postulate that if an organization needs to distort or massage data to achieve legitimacy, that organization will cut corners in order to help the bottom line. States have instituted practices that evidence adequate yearly progress on standardized measures without actually maintaining the sentiment of NCLB. For example, states water-down their assessments so that most students can pass, thus causing an unrealistic picture of progress (Haney et al, 2003). States may also narrow their curriculum to facilitate higher scores (Harris, 2007) or adjust their cut scores allowing more students to appear proficient (Haney et al, 2003).

State reports of achievement gap results are suspect to these legitimacy concerns and may be inaccurate. This dissertation will examine if state reports on the achievement gap are different from national reports and, should a difference surface, the magnitude of this difference.

It is important to note that while these assessments are often used as measures of achievement, this dissertation uses the state-based assessment and the NAEP purely as competing measures of legitimacy. The NAEP, while nationally known to be a rigorous and challenging exam, is used in this case as a low-stakes measure to compare with the state assessments which are high-stakes. It would stand to reason that in a system where achieving legitimacy on state assessments is the yardstick for measuring success, state-assessment proficiency will be the outcome. It could be argued that, in this case, actual achievement is displaced as a secondary result. This dissertation, though, does not examine achievement

through these tests; rather, it examines the gaps that are used by the public to make quality judgments regarding education. It also analyzes possible predictors as to why there is a greater discrepancy between these two legitimacy measures in some states versus others.

Under the current legislation, state departments of education are held accountable for the performance of the schools in their state. The state writes the assessments, sets the cut scores necessary for proficiency, and defines how to report the level of growth to the federal government in order to receive the title funds. As a result, some states have demonstrated impressive growth on closing the achievement gap as evidenced by the state assessment, but have shown little or no growth on a national measure. Legitimacy pressures imposed by No Child Left Behind explain these differences and in this dissertation, I will suggest factors to help understand why these differences have occurred.

2.3 Measures of the Achievement Gap

2.3a State-Based Assessments and Achievement Gap Reporting

While it is obvious that NCLB has increased focus on the student populations that have customarily been identified as low-performing (Borowski & Sneed, 2006; Haycock, 2006; Hess, 2006; Hess & Petrilli, 2006), the efficacy of this mandate as a useful tool in measuring the achievement gap is questionable. Under the current regime, states are allowed to design different tests locally intended to measure a common national outcome. Individual autonomy allows states to set their own standards, choose or develop tests to measure student performance against those standards, and independently hold schools accountable for the results. States are responsible for their own rigor, proficiency cut scores, exclusion rates, administration procedures, and statistical interpretation of results (Harris, 2007; Lee, 2008; Porter et al. 2005).

Cronin, Dahlin, Adkins, and Kingsbury (2007) reported that fifty different standards for measuring educational outcomes are implemented across the United States. Because of this, a student meeting proficiency standards on the state assessment in one state may fail to meet AYP standards if tested in a second state with the same educational results.

After studying the alignment of state assessments to the state-developed standards, Polikoff, Porter, and Smithson (2011) found that roughly half of the test content that they studied on state assessments corresponded to the state-derived standards and between 17% and 27% of content on a typical test covered topics not mentioned in the corresponding standards. Furthermore, this study found that a moderate proportion of test content was at the wrong level of cognitive demand as compared to the corresponding standards, or vice versa.

State-derived assessments may take any structure or form deemed most adequate by the individual state. These assessment systems consist of a variety of formats including (but not limited to) multiple-choice, constructed-responses, performance events, portfolios, alternative assessments, and computer-based assessments (NCES). Most formal test-based accountability systems are structured as multiple-choice exams designed to test basic facts and procedures (National Research Council, 2001). These tests are most often machine-scored with one correct answer. States utilizing performance-based measures or portfolios for assessment, though, are requiring students to construct/supply answers, perform, or produce something for evaluation (Madaus & O'Dwyer, 1999). Measurement tools differ from state to state and within the same state from year to year.

Borowski and Sneed (2006) find that progress in the current system is arbitrary in nature. States are able to lower standards and control statistical measures that could potentially end in a lack of improvement in student achievement and the gap between the advantaged and

disadvantaged. Borowski and Sneed highlight that the sanctions were established at an ideological or political level meant to impact public opinion rather than at a scientific level meant to improve schools or school districts. This study concludes that the current system only benefits the public relations appearance that improvements have been made.

Porter et al. (2005) discovered that state flexibility in creating their own achievement measure has an impact on whether or not schools or districts narrow the achievement gap and, thus, achieve AYP. This study analyzed how the state of Kentucky implemented data based on subgroup size, confidence intervals, and the line of trajectory. Researchers found that, in combination, state manipulation of these statistical measures can have a large impact on the number of schools that made AYP and showed a narrowing of the achievement gap. Using the Kentucky measurement procedures, Kentucky had 90% of their schools meet the AYP requirements in 2003 and, in 2004, 94% of the schools met the AYP requirements. When researchers modified the minimal number of students for subgroups from 60 to 30, used the straight line of trajectory, and eliminated the confidence interval, they determined that 31% of schools would have made AYP in 2003 and 44% in 2004.

Acting independently, each individual state develops its own standards, assessment, and measurement structure. Campbell's Law states that "the more any quantitative social indicator is used for social decision making, the more subject it will be to corruption pressures and the more apt it will be to distort and corrupt the social processes it was intended to monitor" (Nichols & Berliner, 2007). Achievement gap results as reported by state assessment results are subject to these "corruption pressures" as states strive to maintain organizational legitimacy and qualify for federal title funds.

2.3b NAEP and Achievement Gap Reporting

In 1963, the U.S. Commissioner of Education, Francis Keppel, selected a committee with the purpose of investigating options for assessing the condition of American education. A national assessment was proposed by Keppel and Ralph Tyler, the committee's chair, in 1966. This purpose of this assessment would be to provide information about student achievement across the nation. This was the beginning of the National Assessment of Educational Progress (NAEP) – developed in 1969 and now popularly denoted to as the "nation's report card" and the "gold standard" in educational evaluation in the United States (Koretz, 2008). This low-stakes assessment, currently required by NCLB to evaluate national performance in reading and mathematics every two years, was developed by the National Assessment Governing Board (NAGB), an organization of nationally recognized experts acting independently of any state affiliation.

NAEP began reporting results for student performance of public schools at the state level in 1990. Because the purpose of the NAEP is to provide long-term evaluation of student progress, the NAEP standards and assessments remain relatively stable over time as compared to state-derived standards and assessments. The NAEP is identical in content from state to state, aligned with defined educational goals, and administered to pre-selected representative samples of students in each participating state (Beaton & Zwick, 1992). This allows for states to monitor their progress over time and compare student achievement with other state results and the national average.

States receiving title funds are required to administer the NAEP as its initial purpose was to determine if those funds had an impact on educational outcomes. However, the performance on the NAEP is not reported at the school level and there are no resources tied to the results of

this test. Although it is arguable that schools and states always want to do well on achievement measures, the absence of resource dependence minimizes the need for preparation, modification, or structural practices at the school level to improve scores.

While results derived from assessments that are subject to state control may be deceiving based on the standards chosen, the proficiency cut scores identified, and/or the quality of assessment at each state, the NAEP is a consistent measure over time, resistant to state influence, utilizing the same standards and measure from state to state (Sunderman et al, 2005). For this reason, the NAEP data provides a more consistent and arguably clearer picture of the achievement gap between the advantaged and disadvantaged student populations than individual state measures.

2.3c Conflicting Reports on the White/Black and White/Hispanic Achievement Gaps

The achievement gap has been defined by several researchers as the measured disparity in academic achievement between whites and their racial and ethnic peers demonstrated by test scores as evidenced by state or national achievement tests (Lee, 2002). While no state boasts the lack of an achievement gap, according to the 2006 Center on Educational Policy Report, many states do report that – based on their own assessments – state test scores for disadvantaged students are increasing and the achievement gaps between whites and blacks and whites and Hispanics are closing. These results conflict, though, with reports that the gap remains virtually unchanged from the National Assessment of Educational Progress (NAEP) making it difficult to determine achievement growth (CEP, 2006). Due to concerns with the state assessments such as varying standards and test formats, as well as measurement issues related to confidence intervals, subgroup size, cut score manipulation, and a lack of consistent implementation of AYP across the country, achievement gap measures as evidenced by the state-driven assessments are

arguably inaccurate. Adequately assessing the achievement gap necessitates something other than high-stakes state assessment results from an individual state; the data gathered from a low-stakes national assessment such at the NAEP arguably provides a clearer picture of the gap (Lee, 2008).

The Alabama Department of Education (2013) boasts noticeable progress in closing the achievement gap based on its state-developed assessment. In 2003, 45% of black fourth graders scored proficient in reading as compared to 76% of white students. In 2011, the percentage of black fourth graders reading proficiently was up to 80% with white students reading at 92% proficient. The gap in 2003 between these two groups was 31 percentage points as compared to 12 percentage points in 2011. Based on the differences reported by the state test from 2003 to 2011, Alabama seems to have reduced the achievement gap between black and white students by 19 percentage points. In contrast, the NAEP results show a 21 point percentage difference the gap between white students and black students in 2003 and a 27 point gap in 2011 – a gain of six percentage points. While the state test evidences an impressive narrowing of the gap between blacks and whites, the NAEP evidences a growth in the disparity.

Similarly, the Colorado Department of Education reports in 2013 that the gap between whites and minority students is closing at about one percentage point per year. The Denver Post states that "more Hispanic children are reaching proficiency on statewide exams, an important measure of progress since they now make up about 32 percent of Colorado's student population." This is in stark contrast to the NAEP assessment data showing that from 1992-2009, Colorado was the only state that recorded a growth in the grade four reading achievement gap. Colorado was also one of six states that the reported larger reading achievement gaps in 2009 between Hispanic and White students than the national gap at grade 4 (NCES, 2011a).

The gap between white and black fourth graders in math seems to be closing based on the California state assessment. This achievement gap, as evidenced by the state report card found on the California Department of Education website, shows that the gap falls from 31 points in 2005 to 29 points in 2007 and ends at 26.5 points in 2009. In contrast, the NAEP assessment shows a steady growth of this achievement gap. The white/black gap as reported by the NAEP was at 34 points in 2005, 37 points in 2007, and 38 points in 2009.

As previously discussed, it is unclear as to whether the state measures used to evaluate proficiency provide an adequate picture of the achievement gap. Concerns expressed by researchers seem to be in line with data derived from the NAEP – highlighting potential validity and reliability issues related to using state assessment data to determine the achievement gap. It is important to note that both the state assessments and the NAEP are viewed in this study as legitimacy measures rather than measures of learning. This dissertation does not assume that the NAEP is a more virtuous assessment but rather a low-stakes measure of legitimacy. Because the United States adopted a national policy requiring all students regardless of race to achieve academic proficiency by the year 2014, it is possible that the results of the high-stakes state-developed assessments are being misrepresented in order to fulfill national expectations and maintain legitimacy. This dissertation will examine differences between state achievement gap results and NAEP achievement gap results and propose state characteristics that may contribute to this gap differential.

2.4 Potential Causes for Assessment Differentials in the Achievement Gap

In the current climate, it is no surprise that states would desire to evidence a narrowing of the academic achievement gap on the high-stakes state assessments. With public accountability and dependence on federal Title I funds, states must show results in order to maintain legitimacy.

The low-stakes NAEP assessment provides a more stable picture of achievement gap trends absent of state influence or federal pressures.

This study aims to analyze beyond the comparability of the state assessment achievement gap data to the NAEP gap data. It looks at the differences between state-reported achievement gaps and NAEP-reported achievement gaps and why these differences between the two legitimacy measures may be larger in one state than in another. The differential quotient is a means to explore between-state differences in assessment and how those differences are related to important state characteristics. These state characteristics include the state's economic, demographic, and social features. While this chapter separates these characteristics into definable categories, it is important to note that all of these factors are inextricably linked. Lee and Burkam (2002) find that there are substantial differences in children's test scores as they begin kindergarten by demographics – race and ethnicity; demographics are associated with socio-economic status (SES) as are social family structures. These factors also have important associations with test scores. Socio-economic factors strongly relate to cognitive skills in young children and children from low-SES backgrounds begin school in systematically lower-quality elementary schools than their more advantaged cohort members. For the purpose of this study, these factors will be examined in isolation.

2.4a Economic features

Because federal funding is tied to closing the achievement gap, the economic features of a state may contribute to the state's desire to report a narrowing. It would logically follow that states with higher poverty rates and/or a lower strength of economy would need the federal Title funds more than those in less need. States with higher poverty rates require the funds and thus may be under more pressure to show improvement.

It is also possible that economic aspects of a state would impact testing procedures and decisions as children from families with less income have lower achievement gains in schools (Brooks-Gunn et al., 1997). With lower-achieving students, a state would be under more pressure to adapt testing procedures and practices to show more student improvement. In a meta-analysis of the effects of socio-economic status on children's academic achievement, White (1982) found that even when controlling for other variables often associated with income (paternal occupation, maternal education level, family income, and home atmosphere), income directly contributed to a child's development. Later research confirmed that the less income families have, the worse children's developmental outcomes are, academically and socially (Duncan & Brooks-Gunn, 2000). Based on this research, states with higher poverty rates would report lower achievement scores and would have a much more difficult time achieving the requirements of No Child Left Behind. These states would still need to find ways to maintain legitimacy and evidence a narrowing of the achievement gap – thus making them susceptible to developing assessments and procedures that evidence an illusion of gap closure.

2.4b Demographic features

A clear link exists between school and teacher characteristics, student demographics, and student achievement (Okpala et al., 2002). Steinberg, Dornbusch, and Bradford (1992) found that white children benefit from specific parenting styles and peer support for academics, whereas the parental advantages that Hispanic and African-American children gain are outweighed by an absence of peer support for achievement. It would follow that states with higher percentages of blacks and Hispanics in the total population have proportionally more of these minority students within the schools. In order to show overall growth, these states must show more gains in minority scores than states that have a higher white population. These states

with higher minority populations face an arguably lower-motivated student population (Steinberg et al., 1992) potentially creating a testing environment requiring modified testing content and/or practices and increasing the state/NAEP academic achievement gap differential.

Given the public accountability aspect of NCLB, it stands to reason that states with higher percentages of black and Hispanic populations would be more motivated to show improvements in minority attainment and a closing of the achievement gap. Because the public funds the schools and public perception is reality in education, it arguably becomes important for states with higher sub-group populations to show greater gains in minority education.

2.4c Social features

State social features such as mom-only households, adult occupational levels, and percentage of adult high school dropouts may have an impact on differences between the state-reported achievement gap figure and the NAEP reported figure. These social factors have an impact on student achievement (Sewell & Shah, 1968; Keith & Finlay, 1988) and thus, may have an impact on a state versus NAEP achievement gap discrepancy.

Because parent socioeconomic status is associated with parental participation, quality of instruction, school peers, teachers, and other influences (Sewell & Shah 1968; Sewell et al. 1969; Bankston & Caldas 1998), parent social class is seen to have a considerable influence on a child's educational outcomes. Class differences are exhibited through differing parental practices and schooling opportunities putting these students at a disadvantage. Furthermore, Caldas and Bankston (1997) find that peer family social status has a significant effect on student academic achievement. This effect is only slightly smaller than the effect of a student's own family social status. Family social status is impacted by single-parent households, parent occupation and education – three indicators considered in this study.

In his study over the effects of parental involvement and family structure on the academic achievement of adolescents, Jeynes (2005) found that family structure was the single greatest predictor of academic achievement when gender, race, and SES are controlled for. The extent which parents attended school functions and discussed school matters with their child was also found to have a positive bearing on adolescent academic success. A single parent with low educational attainment and a low-paying job is more likely to have an inflexible work schedule allowing for less time engaged in a child's school work or activities, thus impacting a student's motivation and educational outcomes.

States high in single-mom households and adult high school dropouts, and low in parent occupational attainment have a statistically more difficult population to educate. Because of this, it is possible that these states would adopt testing practices and/or components that would exacerbate the state/NAEP achievement gap differential.

2.5 Conclusion

There is a gap in achievement between the advantaged and disadvantaged populations in America. Manipulation of testing content, policies, and practices at the state level as a result of the No Child Left Behind legislation is a rational response in a high-stakes culture. Under the pressure to produce results in closing achievement gap, states have followed Campbell's law which states: "the more a quantitative social indicator is used for social decision making, the more subject it will be to corruption pressures and the more apt it will be to distort and corrupt the social process it was intended to monitor" (Nichols & Berliner, 2007). The history of No Child Left Behind illustrates how a well-meaning policy can produce inaccurate results and, arguably, negligible outcomes.

Because of its consistency and exclusion from state control, the baseline assessment for achievement gap measurement in the United States is the National Assessment of Educational Progress. The NAEP's exemption from state funding and sanctions enables for schools and students to be measured without fear of retribution or loss of resources. The NAEP is a low-stakes assessment that allows policymakers to determine the progress of their state in a way that is less threatening to each state's legitimacy. While NAEP results are reported by state, they are not disaggregated to the individual school level, thus creating a low-stakes environment for specific schools within the state.

Some states report impressive progress on the rates of achievement gap narrowing on their own state assessment, but very little or no progress on their NAEP assessment. These states have modified their state-controlled measures to allow for higher assessment scores and better reported results. The differential quotient in this dissertation is the discrepancy of a state's reported achievement gap and the NAEP's reported achievement gap between whites and blacks and whites and Hispanics. States that show large closure of the achievement gap based on their state assessment but little or no gain on their NAEP assessment have probably aligned their curriculum, set low cut scores, or manipulated their statistical interpretations so that students could attain proficiency. These responses to the pressure to maintain legitimacy are rational.

Although both state assessments and the NAEP are frequently used as measures of student achievement, this study uses the state-based assessment and the NAEP as measures of legitimacy. The achievement gaps evidenced by the NAEP, a low-stakes measure, will be compared with the achievement gaps shown by the high-stakes state assessments. It would stand to reason that in a system where achieving legitimacy on state assessments is the yardstick for measuring success, state-assessment proficiency will be the outcome. It could be argued that, in

this case, actual achievement is displaced as a secondary result. This dissertation, though, does not examine achievement through these tests; rather, it examines the gaps that are used by the public to make quality judgments of education. It also analyzes possible predictors as to why there is a greater discrepancy between these two legitimacy measures in some states versus others.

The differential quotient, once determined, will allow me to quantify the level of difference that is occurring between the state reported achievement gap and the NAEP reported gap. Once quantified, I will access census data using the Integrated Public Use Micro-data Series, IPUMS, in an effort to suggest possible predictors to better understand why this difference has occurred. This dissertation will supplement current research that has focused on evaluating state practices and/or comparing these two assessments to evaluate state assessments. This dissertation will attempt to suggest possible predictors of the difference that occurs between reported achievement gaps and could potentially add to the discussion of the role of assessments in public policy.

Chapter Three

Methods

3.1 Goals of this Dissertation

The goal of this dissertation is to examine the discrepancies in achievement gap reporting as evidenced by the state-based standardized assessments and the National Assessment of Educational Progress and suggest possible predictors to explain why these discrepancies occur. In order to accomplish this, I will analyze the fourth-grade white-black and white-Hispanic achievement gaps as reported by each state based on the state-based assessment in reading and math when compared to the similar achievement gaps evidenced by the NAEP assessment over the same period of time. This difference between state-reported achievement gaps and NAEP reported achievement gaps, the differential quotient, will then be examined using Integrated Public Use Micro-data Series, IPUMS, to determine which state-level demographic characteristics correlate with greater state/NAEP discrepancies.

The differential quotient will be determined by the disparity between the state-reported minority/white achievement gap and the NAEP-reported gap. States that show greater narrowing of the achievement gap on their own state assessment but very little or no narrowing on the NAEP will have a larger differential quotient. In conjunction, states that show a similar gap narrowing pattern will have a smaller differential quotient.

Based on the state assessment data and NAEP reports available, this study will focus on fourth grade reading and math scores over the years 2005, 2007, and 2009.

3.2 Data Sources

There will be three primary sources of data for this dissertation: the US Department of Education Consolidated State Performance Reports, the National Assessment of Educational Progress (NAEP) Data Explorer, and the Integrated Public Use Micro-data Series.

3.2a Outcome Variables

The US Department of Education Consolidated State Performance Reports are used to obtain the percentage of white, black, and Hispanic students the state has reported as proficient in reading and math. This report is customizable, so data were pulled for specific years and specific grades. As the NAEP is reported at the state-level by fourth and eighth grade, I chose to focus on fourth grade data and these were the primary focus of state assessment reports drawn. All of the reported levels of proficiency in reading and math on the state assessment came from this national database which compiles information from each individual state's department of education. The percentage of students in each subgroup scoring proficient or higher was used to determine the achievement gap for each state each year.

Another variable determined using this data was the state achievement gap low-boundary. This variable shows the low boundary of each state's achievement gap. For example, in Kansas in 2005, 82% of white fourth-grade students were reported as proficient in reading and 61% of black eighth-grade students were reported proficient on the same test. The achievement gap between whites and blacks on this assessment is 21 points. The low boundary for this gap is 61. This variable was determined in order to evaluate whether the location of the gap was important. The location of this 21 point gap (range: 61-82) may be statistically significant in comparison to a 21 point gap with a low boundary of 30 (range: 30-51).

The related variables and descriptions are listed in Table 3.1 of Appendix A.

The second source of data is the NAEP Data Explorer. As referenced earlier and shown in Table 3.1 (Appendix A), my study focuses on data from fourth-grade students. The percentage of students in each subgroup scoring proficient or higher was used to determine the achievement gap for each state each year.

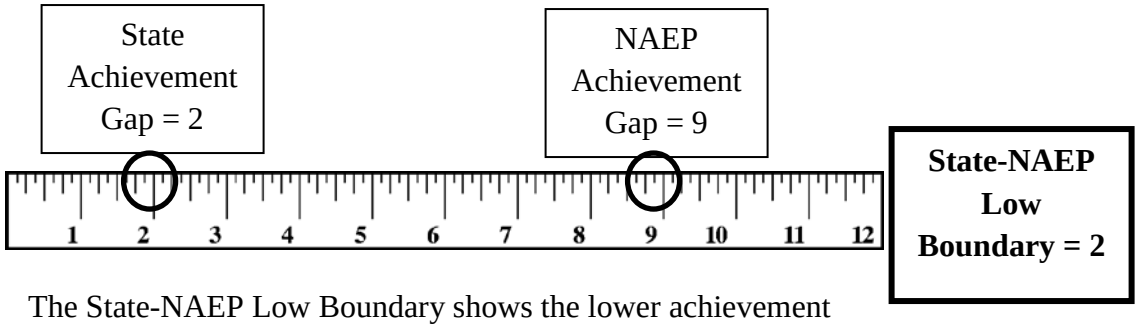
Another variable determined using data from the NAEP Data Explorer was the NAEP achievement gap low-boundary. This variable shows the low boundary of each state's achievement gap as reported by the NAEP. For example, in Kansas in 2005, 37% of white fourth-grade students were reported as proficient in reading and 10% of black fourth-grade students were reported proficient on the same test. The achievement gap between whites and blacks on this assessment is 27 points. The low boundary for this gap is 10. This variable was determined in order to evaluate whether the location of the gap was important. The location of this 27 point gap (range: 10-37) may be statistically significant in comparison to a 27 point gap with a low boundary of 40 (range: 40-67).

The related variables and descriptions are listed in Table 3.2 of Appendix A.

The combination of state and NAEP data were used to derive the differential quotient and the low boundary of each state's reported gap. The differential quotient was determined by subtracting the state-reported achievement gap (SAG) from the NAEP-reported achievement gap (NAG). States with positive differential quotients had a larger NAEP-reported achievement gap and states with negative differential quotients reported a larger state achievement gap. The larger the differential quotient, the greater the difference between the state reported gap and the NAEP reported gap.

Another variable derived from the combination of this data was the State-NAEP low boundary. This variable lists the low boundary for the gap differential. Where the previous low-

boundary variables focused on one particular test (state assessment or NAEP assessment), this variable looks at the low boundary of the differential quotient.



The State-NAEP Low Boundary shows the lower achievement gap between the state-reported figure and the NAEP-reported figure.

Because this is study focuses on the differences of the differences, the differential quotient, rather than the isolated achievement gaps, this variable was determined. In Kansas in 2005, the state reported white/black achievement gap for fourth-graders on the reading assessment was 21 points and the NAEP reported gap was 27. The differential quotient in Kansas for this year is 6 units and the low boundary of the differences is 21. The location of this 6 point gap (range: 21-27) may be statistically significant in comparison to a 6 point gap with a low boundary of 50 (range: 50-56).

The related variables and descriptions are listed in Table 3.3 of Appendix A.

3.2b Predictor Variables

The final source of data for this study is the Annual American Community Survey as reported by the Integrated Public Use Micro-data Series, IPUMS. Individual and household-level data were aggregated to establish state-level social, economic and family variables tied to success in school. Data pulled by state code was averaged and collapsed to obtain each state-level variable listed below.

Listed in table 3.4 is a summary of the IPUMS variables collected as well as the code used in STATA for this study.

Table 3.4: Summary of IPUMS Variables

Source	Code	Description
IPUMS	Black_m	State's level of citizens reporting black
IPUMS	Hispanic_m	State's level of citizens reporting Hispanic origin
IPUMS	Pov_m	State's level of citizens in poverty
IPUMS	Momonly	State's level of mom-only homes
IPUMS	Occscore_m	State's level of occupation attainment
IPUMS	Dropout	State's level of high school dropouts

The key predictors used in this study are measures of basic state demographics. These include race/ethnicity (percent of state reporting black, percent of state reporting Hispanic), poverty rate (percent of state below the poverty level), family structure (percent of children in single-mom households), occupational status (average occupational score of adults[1]), and adult educational attainment (percent of high school dropouts). All measures are based on the 30-50 year-old population and are drawn from the Annual American Community Survey (IPUMS).

3.3 Data Collection

There will be three primary sources of data for this dissertation: the US Department of Education Consolidated State Performance Reports, the National Assessment of Educational Progress (NAEP) Data Explorer, and the Integrated Public Use Micro-data Series. This data was collected using the resources available for each entity.

To obtain each state's levels of reported proficiency on state reading and math assessments, I used the U.S. Department of Education Consolidated State Performance Reports for 2004-05, 2006-07 and 2008-09. These reports provided the state-reported percentage of fourth grade students, by subgroup, who scored proficient or above on the state assessments in

[1] OCCSCORE is a constructed variable that assigns occupational income scores to each occupation. In essence, OCCSCORE assigns each occupation in all years a value representing the median total income (in hundreds of 1950 dollars) of all persons with that particular occupation in 1950. OCCSCORE thus provides a continuous measure of occupations, according to the economic rewards enjoyed by people working at them in 1950 (IPUMS).

reading and math. In an attempt to obtain consistent data, I tried to collect fourth grade levels of proficiency in reading and math for the years 2005, 2007, and 2009. While I had originally attempted to find data for 2003 as well, states were not required to report subgroups and sparse data collection made this year impossible to include within this study.

Even after the elimination of 2003, some states were still missing data in the year 2005 as NCLB did not require states to report scores until 2006. When possible, I used state data at similar grade levels. For example, Illinois tested elementary school students at the third grade level in 2005 for reading and Kentucky tested students at the fifth grade level in 2005 for math. When similar comparisons such as these could be made, I substituted this like data. This data was not available through the Consolidated State Performance Reports, so I found this data through individual state report cards as listed on the state department of education websites. There were some states, though, that did not disaggregate data into the subgroups needed for this study. These states, including Minnesota, Missouri, and New Hampshire, do not have data recorded for 2005 in this study. Although it would be possible to replicate the achievement gap from 2009 as this would show no progress in either direction, this study is not meant to focus on the widening or narrowing of the gap; rather, it is focused on the discrepancy between the differences. Arbitrary numbers would not provide an accurate representation of these differences.

To obtain the NAEP data, I used the Nation's Report Card documents for 2005, 2007, and 2009. The NAEP uses stratified, random sampling and does not provide student or school-level data. The smallest measure for the NAEP is at the state level. This measure is ideal for this study as the goal is to evaluate the narrowing of the achievement gaps at the state level comparing the gaps evidenced by the high-stakes state assessment to the low-stakes NAEP.

The Nation's Report Card provided the average scores and achievement-level results in NAEP reading and math for fourth grade public school students by race/ethnicity and state/jurisdiction. Using these reports, I was able to determine the percentage of white, black, and Hispanic students scoring at or above proficient on the NAEP assessment each year.

To acquire census data, I used the Integrated Public Use Micro-data Series, IPUMS, data explorer. This database allowed me to build reports and charts on the individual and household-level variables that were relevant to this specific study. Using this tool, I was able to create the six variables outlined above for the years 2005, 2007, and 2009.

3.4 Analysis Strategy

The goal of this study is to suggest predictors for why some states show greater narrowing on their own assessment than the NAEP assessment in comparison to other states. This required the development of a differential quotient to quantify the differences between the state and NAEP achievement gaps. The data measuring the state's reported subgroup proficiency level is measured in percentage of the subgroup testing sample scoring proficient or higher on their state assessment. The NAEP score for the corresponding grade level and year is also measured in percentage of the subgroup testing sample scoring proficient or higher. The achievement gap is determined for both measures by subtracting the minority percentage (black or Hispanic) from the white percentage.

$$\text{Achievement Gap} = PP_{White} - PP_{Minority}$$

The differential quotient, the dependent variable in this study, is measured by subtracting the state gap from the NAEP gap.

$$\text{Differential Quotient} = AG_{NAEP} - AG_{State}$$

The purpose for calculating the differential quotient in this way allows the difference to remain positive when the NAEP gap is greater than the state gap. It is anticipated that most states will reflect a narrower achievement gap on their own assessment than the NAEP. The greater the positive number, the greater the narrowing shown on the state assessment versus the NAEP.

Appendix B includes visual representations of the differential quotients for black and Hispanic fourth grade math and reading gaps by year.

The database includes 150 observations on 50 subjects with each subject, or state, being observed three times – in 2005, 2007, and 2009. Because of this, I will use a panel regression model to analyze this data. I am interested in exploring the relationship between the predictor and outcome variables within each state. In order to remove time-invariant characteristics from the predictor variables and assess the predictor's net effect, I will be using a fixed-effect model.

Chapter Four

Results of Research

In this chapter, I will describe the findings of the two research questions explored in this dissertation:

1. To what degree do states differ in measuring the achievement gap?
2. Are there predictors to suggest why this differential occurs?

4.1 Research Question One: To what degree do states differ in measuring the achievement gap?

In order to determine the degree of difference between states and their measurement of the achievement gap, I started by calculating the white/black and white/Hispanic state-reported achievement gaps in reading and math for fourth grade students as determined by state-administered assessments and the NAEP-reported achievement gap as reported on the national low-stakes assessment for three years: 2005, 2007, and 2009. The formula listed below was used to determine the achievement gap and is explained in chapter three of this dissertation:

$$\text{Achievement Gap} = PP_{White} - PP_{Minority}$$

Once the state and NAEP achievement gaps were determined, I calculated the differential quotient (DQ) between the state-reported achievement gap and the NAEP-reported achievement gap. The formula listed below was used to determine the differential quotient and is explained in chapter three of this dissertation:

$$\text{Differential Quotient} = AG_{NAEP} - AG_{State}$$

A positive differential quotient indicates that the state is reporting a smaller achievement gap on the state-based assessment than the NAEP is reporting on the national low-stakes assessment. This would mean that the state is reporting greater success in closing the achievement gap than

the NAEP results support. A negative differential quotient indicates that the state is reporting a larger achievement gap on the state-based assessment than the NAEP. The differential quotients seen visually in Appendix B are further analyzed in the following tables as well as in tables 4.3, 4.6 and 4.9 in Appendix C.

4.1a Fourth Grade Reading and Math: 2005

Table 4.1 Fourth Grade Reading: 2005

	White/Black Number of States	White/Black Percentage of States	White/Hispanic Number of States	White/Hispanic Percentage of States
NAEP Gap is Larger than State Gap	23	46%	18	36%
State Gap is Larger than NAEP Gap	11	22%	15	30%
NAEP Gap = State Gap	2	4%	1	2%
DQ Not Applicable	14	28%	16	32%

Table 4.2 Fourth Grade Math: 2005

	White/Black Number of States	White/Black Percentage of States	White/Hispanic Number of States	White/Hispanic Percentage of States
NAEP Gap is Larger than State Gap	31	62%	30	60%
State Gap is Larger than NAEP Gap	5	10%	3	6%
NAEP Gap = State Gap	1	2%	2	4%
DQ Not Applicable	13	26%	15	30%

Tables 4.1 and 4.2 provide a summary of the state assessment and NAEP differential quotient (DQ) calculations in the year 2005 on the fourth grade reading and math assessments. Table 4.3 in Appendix C includes data collected from all fifty states. Appendix D includes bar charts for each differential quotient broken down by content, race, and year.

In reading, twenty-three states, or 46% of states, show a positive differential quotient on the white/black achievement gap meaning that these states are reporting greater success in

closing the achievement gap between blacks and whites than the national assessment. The four states with the highest differential quotients in this year were Virginia (15), Georgia (15), Nebraska (14), and Delaware (14). Eighteen states, or 36%, show a positive differential quotient on the white/Hispanic achievement gap. The four states with the highest differential quotients in 2005 were Nebraska (17), Illinois (16), Colorado (12), and Delaware (12).

In math, 31 states (62%) showed show a positive differential quotient on the white/black achievement gap meaning that these states are reporting greater success in closing the achievement gap between blacks and whites than the national assessment. The five states with the highest differential quotients in this year were Nebraska (26), North Carolina (25), Texas (21), Virginia (18), and Oregon (18). Thirty states, or 60%, show a positive differential quotient on the white/Hispanic achievement gap. The four states with the highest differential quotients in 2005 were Nebraska (26), North Carolina (19), Texas (18), and Colorado (18).

4.1b Fourth Grade Reading and Math: 2007

Table 4.4 Fourth Grade Reading: 2007

	White/Black Number of States	White/Black Percentage of States	White/Hispanic Number of States	White/Hispanic Percentage of States
NAEP Gap is Larger than State Gap	28	56%	26	52%
State Gap is Larger than NAEP Gap	11	22%	16	32%
NAEP Gap = State Gap	3	6%	2	4%
DQ Not Applicable	6	12%	6	12%

Table 4.5 Fourth Grade Math: 2007

	White/Black Number of States	White/Black Percentage of States	White/Hispanic Number of States	White/Hispanic Percentage of States
NAEP Gap is Larger than State Gap	38	76%	41	82%
State Gap is Larger than NAEP Gap	3	6%	4	8%
NAEP Gap = State Gap	3	6%	1	2%
DQ Not Applicable	6	12%	5	10%

Tables 4.4 and 4.5 provide a summary of the state assessment and NAEP differential quotient (DQ) calculations in the year 2007 on the fourth grade reading and math assessments. Table 4.6 in Appendix C includes data collected from all fifty states. Appendix D includes bar charts for each differential quotient broken down by content, race, and year.

Fifty-six percent of states, or twenty-eight states, show a positive differential quotient on the white/black achievement gap in reading, meaning that these states are reporting a greater narrowing in the achievement gap between blacks and whites than the NAEP assessment. The four states with the highest differential quotients in this year were Nebraska (20), Maryland (17), Virginia (16), and Mississippi (14). Fifty-two percent of states (26) show a positive differential quotient on the white/Hispanic achievement gap. The five states with the highest differential quotients in 2007 were Nebraska (17), Maryland (16), Connecticut (12), Texas (10), and Illinois (10).

Thirty-eight states (76%) showed show a positive differential quotient on the white/black achievement gap in math. These states reporting a greater narrowing in the achievement gap between blacks and whites than the NAEP assessment. The four states with the highest differential quotients in this year were Nebraska (27), Maryland (22), Connecticut (20), and Texas (19). Eighty-two percent of states (41) show a positive differential quotient on the

white/Hispanic achievement gap in math. The five states with the highest differential quotients in 2007 were Nebraska (27), Connecticut (23), Texas (18), New Jersey (17), and Illinois (17).

4.1c Fourth Grade Reading and Math: 2009

Table 4.7 Fourth Grade Reading: 2009

	White/Black Number of States	White/Black Percentage of States	White/Hispanic Number of States	White/Hispanic Percentage of States
NAEP Gap is Larger than State Gap	23	46%	28	56%
State Gap is Larger than NAEP Gap	18	36%	16	32%
NAEP Gap = State Gap	4	8%	2	4%
DQ Not Applicable	5	10%	4	8%

Table 4.8 Fourth Grade Math: 2009

	White/Black Number of States	White/Black Percentage of States	White/Hispanic Number of States	White/Hispanic Percentage of States
NAEP Gap is Larger than State Gap	39	78%	40	80%
State Gap is Larger than NAEP Gap	3	6%	2	4%
NAEP Gap = State Gap	2	4%	3	6%
DQ Not Applicable	6	12%	5	10%

Tables 4.7 and 4.8 provide a summary of the state assessment and NAEP differential quotient (DQ) calculations in the year 2009 on the fourth grade reading and math assessments. Table 4.9 in Appendix C includes data collected from all fifty states. Appendix D includes bar charts for each differential quotient broken down by content, race, and year.

In reading, twenty-three states, or 46% of states, show a positive differential quotient on the white/black achievement gap. These state results report a smaller achievement gap between blacks and whites than the national assessment. The five states reporting the largest difference between their state results and the NAEP in this year were Virginia (19), Delaware (19),

Maryland (17), Georgia (14), and Alabama (14). Twenty-eight states, or 56%, show a positive differential quotient on the white/Hispanic achievement gap. The four states with the highest differential quotients in 2009 were Nebraska (15), Virginia (14), Texas (13), and Georgia (12).

In math, 39 states (78%) showed show a positive differential quotient on the white/black achievement gap. The four states showing the greatest closure of the white/black achievement gap in comparison to the NAEP were Texas (31), Montana (30), Maryland (27) and Nebraska (26). Forty states, or 80%, show a positive differential quotient on the white/Hispanic achievement gap. The four states evidencing the largest difference between state and NAEP results in 2009 were Nebraska (26), Texas (26), Connecticut (22), and North Carolina (20).

4.1d Fourth Grade Reading and Math: Summary

There is no question that there is a discrepancy between the two legitimacy measures when quantifying the achievement gap. Looking at the white/black achievement gap on the fourth grade reading assessment over the years studied, the amount of states reporting a smaller achievement gap than the NAEP remained relatively stable with twenty-three states reporting a positive differential quotient in 2005, twenty-eight states reporting a positive differential quotient in 2007, and twenty-three states reporting a positive differential quotient in 2009. This means that an average of 49% of states reported a smaller achievement gap between whites and blacks in fourth grade reading than the NAEP. The amount of states with a positive differential quotient on the white/Hispanic achievement gap increased over the three-year period from 36% in 2005 to 56% in 2009. In 2009, 56% of states reported that the white/Hispanic achievement gap was lower than the gap reported by the NAEP.

The amount of states reporting a smaller achievement gap than the NAEP for the white/black achievement gap on fourth grade math grew over the three years studied from 31

states in 2005 to 39 states in 2009 meaning that 62% of states reported a smaller achievement gap between whites and blacks in math in 2005 than on the NAEP and 78% of states reported a smaller achievement gap than the NAEP in 2009. States reporting a positive differential quotient on the white/Hispanic achievement gap also grew over the three year period from 30 states in 2005, to 41 states in 2007, and 40 states in 2009. In 2009, 80% of states reported a smaller achievement gap between whites and Hispanics than was reported by the NAEP.

The first research question of this dissertation was to determine to what degree states differ from the National Assessment of Educational Progress in measuring the achievement gap. This research suggests that states evidence smaller achievement gaps than the NAEP in math more frequently than in reading. This research also suggests that the two legitimacy measures are increasingly discrepant; states have increased the magnitude of difference between state and national assessments from 2005-2009. Finally, these findings show that some states such as Nebraska, Texas, and Virginia are consistently found to have the highest disparity between state reports and the national reports. This output leads to the second research question: are there predictors to suggest why this differential occurs more frequently in some states versus others?

4.2 Research Question Two: Are there any predictors to suggest why this differential occurs?

Before analyzing the state-based predictors, I first wanted to determine if the location of the differential was statistically significant and if this variable would be included in my regression model. In order to conclude significance, I ran a basic regression where the State-NAEP Low Boundary, explained in chapter three, was compared to the differential quotients for white/black reading, white/Hispanic reading, white/black math, and white/Hispanic math. All low boundaries proved to be statistically significant and, thus, are included in my panel

regressions. The negative coefficients found in these regressions mean that for each unit of increase in the State-NAEP Low Boundary, the differential quotient decreases. The results of these determining regressions are outlined in Table 4.10 and explained further in sections 4.2a and 4.2b.

Table 4.10: State-NAEP Low Boundary Regressions

Fourth Grade Assessments	Black Reading			Hispanic Reading			Black Math			Hispanic Math		
	Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.	
Low Boundary 4BR	-0.49	0.09	***									
Low Boundary 4HR				-0.27	0.08	***						
Low Boundary 4BM							-0.57	0.09	***			
Low Boundary 4HM										-0.39	0.09	***
Constant	13.17	1.86	***	6.62	1.59	***	21.84	2.13	***	15.46	1.62	***
***Significant at 0.001 **Significant at 0.05 *Significant at 0.01												

In order to analyze the state-based predictors, I used a fixed-effects time variant panel regression model. This model allowed me to explore the relationship between the predictor and outcome variables within each state with time-invariant characteristics from the predictor variables removed. In STATA, this approach mean-centers the data for each of the six predictors used in the model and creates a dummy code to calculate the error for each data point.

Appendix E shows the variables used in this study as well as their mean, maximum, minimum, and standard deviation.

In order to create a stepwise approach, I developed six models for each analysis. Models one through five compared a state predictor and the low boundary variable to the differential quotient created by subtracting the state-reported achievement gap from the NAEP-reported achievement gap. This allowed me to interpret how each variable impacted the differential quotient independently. The final model, model six, included the low boundary variable as well as the state variables included in models one through five. This model was constructed to determine which state-effects maintain significance when the other variables are also taken into

account. At the conclusion of running all models, a Hausman test was conducted in STATA; this test supported the fixed-effects model over a random effects model.

4.2a Fourth Grade Reading Differential Quotient Regression Models

White/Black Differential Quotient

Model one is designed to measure the impact of the State-NAEP Low Boundary and the proportion of the state reporting black in comparison to the white/black achievement gap differential quotient for fourth grade reading. Model two examines the State-NAEP Low Boundary and the proportion of the state in poverty in comparison to the same differential quotient. Models three, four, and five measure the impact of the State-NAEP Low Boundary and the proportion of mom-only homes, level of adult occupation, and proportion of high school dropouts respectively in comparison to the differential quotient for the white/black reading achievement gap. Finally, model six includes all of the variables included in models one through five in order to determine which variables maintain significance when the others are introduced into the model.

In all six models, the State-NAEP Low Boundary is a statistically significant variable. The coefficient of -0.30 in Model Six indicates that for each unit increase in the Low Boundary, the differential quotient decreases. A smaller Low Boundary figure equates a lower reported achievement gap between whites and blacks by either the NAEP or the state; as seen by the results of research question one, this lower figure is usually reported by the state. A state with a small Low Boundary has a larger differential quotient as it is unlikely that the achievement gap is truly low. For example, the 2009 white/black reading Low Boundary in Nebraska is nine with the NAEP reporting an achievement gap of 21 and the state reporting an achievement gap of nine. Because it is unlikely that the achievement gap is truly as low as nine points, it is logical

that the differential quotient is higher (12). In contrast, the 2009 white/black reading Low Boundary in Ohio is 26 with the NAEP reporting an achievement gap of 29 points and the state reporting an achievement gap of 26. The differential quotient is lower (3) which is logical as the achievement gaps are likely more accurate.

Adult occupation level is the only other statistically significant variable when determining the difference between NAEP and state white/black achievement gaps in fourth grade reading. The coefficient of -7.36 in Model Six indicates that for each unit increase in occupational attainment at the state-level, the difference between the achievement gap reported by the NAEP and the achievement gap reported by the state decreases. A higher occupation score indicates that the NAEP achievement gap and the state achievement gap will be more similar. A student's family social status has a significant effect on student academic achievement (Caldas and Bankston, 1997); this study also found that the social status of a student's peers has a significant effect. Family social status is directly impacted by the adult's occupation. In states where the adult occupation level is higher, the overall family social status would also be higher. Students in these states would benefit from both their own family occupational attainment as well as the occupational attainment of their neighbors. In these states, students benefit from family and neighbor social status and fewer modifications need to be made to the assessments in order to evidence growth. Research by Byrk et al (1993) and Carbonaro (1998) insinuates that reading is more of a home-dependent skill than mathematics. This would explain why occupational attainment is a statistically significant finding in reading and not in math. It logically follows that in states where there is more social support, the difference between what is nationally reported and what is locally reported is smaller.

STATA printouts of differential quotient regression models can be found in Appendix F and predictive scatter plots of statistically significant variables are included in Appendix G.

Table 4.11: Regression Models for Fourth Grade White/Black Reading

State Level Predictors	Model One			Model Two			Model Three			Model Four			Model Five			Model Six		
	Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.	
Low Boundary	-0.38	0.15	**	-0.39	0.15	**	-0.38	0.15	**	-0.29	0.15	*	-0.38	0.15	*	-0.3	0.15	*
Level Black	-37.1	89.71														-57.5	92.71	
Level of Poverty				-49.6	43.04											-64.59	44.57	
Level Mom-Only							11.6	52.69								-18.39	58.62	
Occupation Score										-6.14	2.94	**				-7.36	3.23	**
Level of Dropout													-33.74	97.16		-69.68	103.73	
Constant	14.1	8.49		17.35	6.42	***	7.98	13.15		185.5	83.83	**	7.57	9.76		245.05	103.73	**
R-Squared	0.09			0.1			0.08			0.14			0.09			0.17		
F	3.34		**	3.97		**	3.27		**	5.62		***	3.31		**	2.26		**

***** Significant at 0.010**

****Significant at 0.050**

***Significant at 0.100**

White/Hispanic Differential Quotient

Models one through six were once again regressed to determine if the state-based variables are statistically significant in the determination of the differential quotient for white/Hispanic fourth grade students on the reading assessment. Because the model is meant to analyze the white/Hispanic differential quotient rather than the white/black differential in these models, the State-NAEP Low Boundary for white/Hispanic reading was substituted from the State-NAEP Low Boundary for white/black. The proportion of the state reporting as Hispanic was also used rather than the proportion of the state reporting black. No predictor variables were statistically significant in determining the differential quotient outcome variable.

Table 4.12: Regression Models for Fourth Grade White/Hispanic Reading

State Level Predictors	Model One		Model Two		Model Three		Model Four		Model Five		Model Six	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Low Boundary	0.03	0.15	0.02	0.15	0.06	0.15	0.02	0.15	0.02	0.15	0.05	0.15
Level Hispanic	44.52	53.54									14.36	60.3
Level of Poverty			-5	39.31							-13.26	43.27
Level Mom-Only					49.41	44.59					43.21	48.89
Occupation Score							-3.47	3.52			-3.13	4
Level of Dropout									4.11	89.59	14.94	96.47
Constant	-2.88	5.49	1.73	5.65	-11.17	11.39	100.64	100.98	0.73	8.58	79.35	120.88
R-Squared	0.01		0.00		0.02		0.01		0.00		0.03	
F	0.36		0.02		0.63		0.50		0.01		0.36	

***** Significant at 0.010**

****Significant at 0.050**

***Significant at 0.100**

4.2b Fourth Grade Math Differential Quotient Regression Models

White/Black Differential Quotient

Similar to the models developed to analyze the reading differential quotients, six models were developed to analyze the differential quotients for math. In model one, the impact of the State-NAEP Low Boundary and the proportion of the state reporting black was studied in comparison to the white/black achievement gap differential quotient for fourth grade math. Model two examines the State-NAEP Low Boundary and the proportion of the state in poverty in comparison to the same differential quotient. Models three, four, and five measure the State-NAEP Low Boundary and the proportion of mom-only homes, level of adult occupation, and proportion of high school dropouts respectively in comparison to the differential quotient for the white/black math achievement gap. Finally, model six includes all of the variables included in models one through five in order to determine which variables maintain significance when the others are introduced into the model.

In all models except for model five, the State-NAEP Low Boundary is a statistically significant variable. The coefficient of -0.53 in model six indicates, similar to the white/black reading models, that for each unit increase in the Low Boundary, the differential quotient decreases. Other than in model five where this variable is not significant, the State-NAEP Low Boundary is significant at the 0.001 level.

The only other statistically significant variable in model six is the proportion of the state reporting black. The coefficient of 146.71 indicates that with each unit increase in the black status of the state, the difference between the state-reported achievement gap and the NAEP-reported achievement gap also increases. This conclusion can be rationalized by the Fryer and Levitt (2006) research referenced earlier finding that black students score lower on standardized assessments than their white colleagues requiring a state to make modifications to the test content, process, and/or procedures in order to maintain legitimacy and resources. States with a higher black population overall will enroll a higher black population in the schools and, thus, will house a higher population of students scoring lower on the standardized assessments. This fact coupled with the pressures of No Child Left Behind results in the state's need to generate the same proficiency outcomes as other states that have a higher proportion of students who perform at a higher level on the standardized assessments.

STATA printouts of differential quotient regression models can be found in Appendix F and predictive scatter plots of statistically significant variables are included in Appendix G.

Table 4.13 Regression Models for Fourth Grade White/Black Math

State Level Predictors	Model One			Model Two			Model Three			Model Four			Model Five			Model Six		
	Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.	
Low Boundary	-0.52	0.11	***	-0.59	0.11	***	-0.58	0.11	***	-0.58	0.12	***	-0.6	0.11		-0.53	0.12	***
Level Black	164.4	66	**													146.71	70.82	**
Level of Poverty				12.9	31.83											2.57	33.1	
Level Mom-Only							39.49	40.03								6.26	44.01	
Occupation Score										-1.05	2.96					0.35	3.08	
Level of Dropout													-131.2	81.5		-84.69	91.28	
Constant	5.56	7.14		20.46	5.05	***	12.23	10.45		52.03	84.13		34.78	8.2	***	3.5	94.54	
R-Squared	0.35			0.29			0.30			0.29			0.32			0.36		
F	18.61		***	14.35		***	14.92		***	14.32		***	16.07		***	6.15		***

***** Significant at 0.01**

****Significant at 0.05**

***Significant at 0.10**

White/Hispanic Differential Quotient

The same six models were once again regressed to determine if the state-based variables are statistically significant in the determination of the differential quotient for white/Hispanic fourth grade students on the math assessment. Because the model is meant to analyze the white/Hispanic differential quotient rather than the white/black differential in these models, the State-NAEP Low Boundary for white/Hispanic math was substituted from the State-NAEP Low Boundary for white/black. The proportion of the state reporting as Hispanic was also used rather than the proportion of the state reporting black.

Again, the State-NAEP Low Boundary is a statistically significant predictor variable. The coefficient of -0.44 in model six indicates, similar to the white/black reading and math models, that for each unit increase in the Low Boundary, the differential quotient decreases. This variable is statistically significant at the 0.001 level in all six models.

Another statistically significant variable in model six is the proportion of the state reporting Hispanic. The coefficient of 113.36 indicates that as the Hispanic status of the state increases, so does the difference between the state-reported achievement gap and the NAEP-reported achievement gap. Although this variable becomes less statistically significant from model one (significant at the 0.001 level) to model six (significant at the 0.05 level), the variable is still a predictor for higher differential quotients. A similar rationalization to the white/black math differential quotient findings can be offered. Research that Hispanic students score lower on standardized assessments than their white counterparts (Lee, 2002) partnered with the stresses of reaching proficiency on state assessments for No Child Left Behind cause states to adapt the test content, process, and/or procedures in order to achieve comparable proficiency outcomes as other states that have a lower proportion of statistically under-performing students.

A third significant predictor variable within these models is the level of mom-only homes within the state. With significance at the 0.001 level, the coefficient of 108.98 means that with each unit increase in mom-only households in the state, the differential quotient between state-based achievement gap results and NAEP-reported results also increases. This is logical as research over the effects of parental involvement and family structure on the academic achievement of adolescents determined that family structure was the single greatest predictor of academic achievement when gender, race, and SES are controlled (Jeynes, 2005). The extent which parents are able to attend school functions and discuss school matters with their child was found to have a positive bearing on adolescent academic success. A mom-only household is more likely to have an inflexible work schedule allowing for less time engaged in a child's school work or activities, thus impacting a student's motivation and educational outcomes. According to the Center for Disease Control and Prevention, in 2012, Hispanic females had the

highest teenage birth-rate index as compared to non-Hispanic blacks, American Indians, whites, and Asians. While the data used in this study focused on 30-50 year olds within the state, teenage pregnancy figures could account for more mom-only households in states with high levels of Hispanic populations. States with higher percentages of mom-only households would need to accommodate for a higher percentage of students who statistically score lower on standardized assessments. In order to fulfill the requirements of No Child Left Behind, these states would need to find ways to evidence academic achievement and could potentially alter elements of the state test in order to do so causing a larger differential quotient between nationally reported achievement gaps and those reported locally.

STATA printouts of differential quotient regression models can be found in Appendix F and predictive scatter plots of statistically significant variables are included in Appendix G.

Table 4.14 Regression Models for Fourth Grade White/Hispanic Math

State Level Predictors	Model One			Model Two			Model Three			Model Four			Model Five			Model Six		
	Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.		Coeff.	Std. Err.	
Low Boundary	-0.51	0.14	***	-0.6	0.14	***	-0.48	0.14	***	-0.58	0.14	***	-0.58	0.14	***	-0.44	0.14	***
Level Hispanic	143.3	47.51	***													113.36	48.99	**
Level of Poverty				13.66	36.8											13.16	35.65	
Level Mom-Only							136.46	38.14	***							108.98	40.16	***
Occupation Score										-1.9	3.28					1.36	3.22	
Level of Dropout													-111.8	84.48		-55.31	81.63	
Constant	5.15	5.16		17.12	5.52	***	-15.51	9.91		73.2	93.58		29.1	8.08	***	-55.04	96.01	
R-Squared	0.28			0.19			0.31			0.20			0.21			0.37		
F	14.34		***	8.79		***	16.64		***	8.92		***	9.79		***	6.69		***

***** Significant at 0.010**

****Significant at 0.050**

***Significant at 0.100**

4.3 Discussion of Results

The differential between state-reported achievement gaps and those reported on the NAEP varies based on the subject tested. To explain the differential quotient on the white/black reading assessment, the State-NAEP Low Boundary and the adult occupation level were significant. There were no statistically significant predictor variables for the white/Hispanic reading differential quotient.

Conversely, the explanation of the white/black and white/Hispanic math differential quotient can be tied to both the State-NAEP Low Boundary as well as the proportion of the state reporting black or Hispanic respectively. This second variable suggests a strong finding that maintained as additional predictors were added to the model. The black and Hispanic status indicator establishes a potential bias in both state-based standardized assessment and practices used to administer these assessments to students. The research showing that these minority populations score statistically lower on standardized assessments is abundant. The higher differential quotient insinuates that these populations are not truly closing the achievement gaps, but rather, the states are compensating for known inefficiencies and manufacturing favorable results.

In the case of white/black reading and white/Hispanic mathematics, social factors were also significant in determining the difference between the nationally and locally-reported achievement gaps. When examining why differences in gap reporting occur in white/black reading, adult occupational attainment was found to be a significant variable. Student and peer family social status has a significant effect on student academic achievement (Caldas and Bankston, 1997). When the occupational attainment in the state is higher, students benefit from their own home status as well as the social status of the surrounding area. States higher in

occupational attainment evidence a smaller difference between the NAEP-reported achievement gap and the state-reported gap.

Differential quotients in white/Hispanic math were impacted by the level of mom-only households at a statistically significant level. With each unit increase in mom-only households in the state, the difference between the state-based achievement gap and the NAEP-reported gap also increases; when there are more mom-only households in a state, the state is reporting results that are further from the NAEP. Parental involvement and family structure have been determined as the single greatest predictor of the academic achievement of adolescents when gender, race, and SES are controlled (Jeynes, 2005). According to the Center for Disease Control and Prevention, in 2012, Hispanic females had the highest teenage birth-rate index as compared to other races. While the data used in this study focused on 30-50 year olds within the state, teenage pregnancy figures could account for more mom-only households in states with high levels of Hispanic populations. States with higher percentages of mom-only households would need to accommodate for a higher percentage of students who, based on Jeynes' research, statistically score lower on standardized assessments. In order to fulfill the requirements of No Child Left Behind, these states would need to find ways to evidence academic achievement and could potentially alter elements of the state test in order to do so causing a larger differential quotient between nationally reported achievement gaps and those reported locally.

The predictive variables had a greater impact on differential quotients in math than they did in reading. Byrk et al (1993) argue that academic achievement in mathematics is more dependent on schooling than achievement in other subjects such as reading. This finding, consistent with the work of Carbonaro (1998), is also consistent with the findings within this study. It could be argued that parents are more comfortable with reading than math and, thus,

spend more time in the home focusing on reading skills than mathematics. It could also be argued that reading is more of a social pastime than mathematics and, thus, children are more exposed to reading than math at home. Either way, it is logical to postulate that schools and states have a greater impact on mathematics scores and, in turn, have more of an impact on the differential quotients associated with math.

Chapter Five

Conclusion

In this chapter, I will review the conclusions of this dissertation, speak to potential concerns with the data and selected predictors, as well as suggest possible avenues for future research.

5.1 Summary of Findings

This dissertation addresses two research questions:

1. To what degree do states differ in measuring the achievement gap?
2. Are there predictors to suggest why this differential occurs?

The first research question requires that the degree of difference, the differential quotient, is determined. For the purposes of this dissertation, I calculated the reported achievement gaps between white and black fourth graders for the years 2005, 2007, and 2009 on the individual state reading and math assessments and the reading and math portions of the National Assessment of Educational Progress, NAEP, by percentage. For example, if whites scored 90% proficient on the state-developed measure and blacks scored 70%, the state-based achievement gap was recorded as 20. If the white proficiency percentage on the NAEP was reported at 40% and the black percentage was reported at 10%, the NAEP-based achievement gap was recorded as 30. The state-established achievement gap percentage was then subtracted from the NAEP-based achievement gap percentage to create an assessment differential quotient. In the previously explained example, the differential quotient would be 10. These calculations were also completed for the differences between fourth grade white achievement and Hispanic achievement on these assessments. The larger the differential quotient, the further the state assessment achievement gap was from the NAEP achievement gap. The differential quotient

was calculated for the reading and math assessments at the fourth grade level creating six individual differential quotients for each state or 300 observations for analysis.

The findings of this dissertation evidence that states vary in measuring the achievement gap locally from the national exam (NAEP) at differing degrees. These disparities between these two legitimacy measures fluctuate by content, by year, and from state to state. For example, the number of states reporting a positive differential quotient on the white/black achievement gap for the fourth grade reading assessment over the years studied remained relatively stable at an average of 49%. This means that 49% of states reported a smaller achievement gap between whites and blacks in fourth grade reading than was reported by the NAEP. In comparison, the percentage of states reporting a positive differential quotient for the white/black achievement gap on fourth grade math reached 78% in 2009. More state reports differed from the national reports in math than in reading with more states showing growth in math as compared to the NAEP. The works of Byrk et al (1993) and Carbonaro (1998) support this finding as their studies argue that academic achievement in mathematics is more dependent on schooling than achievement in other subjects such as reading.

This dissertation also found that differential quotients reported by these two legitimacy measures increased over the three years studied in all areas except white/black reading. As reporting for No Child Left Behind was not required until 2006, it logically follows that states became more interested in reporting narrowed achievement gaps in 2007 and 2009. States struggled to reach 100% proficiency by the year 2014 and adjustments to test content, format, and procedures were made to construct an illusion of better results at the local level thus causing larger differential quotients.

Finally, these findings show that some states such as Nebraska, Texas, and Virginia are consistently found to have the highest disparity between state reports and the national reports. This output leads to the second research question: are there predictors to suggest why this differential occurs more frequently in some states versus others? The answer to this question is yes. The level of black and the level of Hispanic within a state were statistically significant in both math models. The coefficients of these predictors indicate that states with higher black and Hispanic populations show a greater disparity between state-based achievement reports and national-based reports. Acknowledging that schools may have a greater impact on math achievement than reading achievement in elementary school children (Byrk et al, 1993; Carbonaro, 1998), the black and Hispanic status indicator establishes a potential bias in both state-based standardized assessment as well as practices used to administer these assessments. Recognizing the research that these minority populations score statistically lower on standardized assessments, one could conclude that the higher differential quotient insinuates that these populations are not truly closing the achievement gaps, but rather, that states are compensating for known inefficiencies and manufacturing favorable results.

In the case of white/black reading and white/Hispanic mathematics, social factors were also significant in determining the difference between the nationally and locally-reported achievement gaps. When examining why differences in gap reporting occur in white/black reading, adult occupational attainment was found to be a significant variable. The work of Caldas and Bankston (1997) shows that student and peer family social status has a significant effect on student academic achievement. When the occupational attainment in the state is higher, students benefit from their own home status as well as the social status of the surrounding area. Considering the work by Byrk (1993) and Carbonaro (1998), reading is a more home-supported

skill than mathematics; thus, social status effects would have more of an impact on reading achievement than mathematics. States higher in occupational attainment evidence a smaller difference between the NAEP-reported achievement gap and the state-reported gap. This is likely due to the fact that this population of students is easier to educate and fewer adjustments need to be made in order to reach NCLB goals. With more social support in place, states do not need to support through the assessment itself.

Differential quotients in white/Hispanic math were impacted by the level of mom-only households at a statistically significant level. With each unit increase in mom-only households in the state, the difference between the state-based achievement gap and the NAEP-reported gap also increases; when there are more mom-only households in a state, the state is reporting results that are further from the NAEP. Research over the effects of parental involvement and family structure on the academic achievement of adolescents determined that family structure was the single greatest predictor of academic achievement when gender, race, and SES are controlled (Jeynes, 2005). According to the Center for Disease Control and Prevention, in 2012, Hispanic females had the highest teenage birth-rate index as compared to other races. While the data used in this study focused on 30-50 year olds within the state, teenage pregnancy figures could account for more mom-only households in states with high levels of Hispanic populations. States with higher percentages of mom-only households would need to accommodate for a higher percentage of students who statistically score lower on standardized assessments. In order to fulfill the requirements of No Child Left Behind, these states would need to find ways to evidence academic achievement and could potentially alter elements of the state test in order to do so causing a larger differential quotient between nationally reported achievement gaps and those reported locally.

The answers to the two research questions support the legitimacy theory outlined in the literature review. In an effort to appeal to public opinion and look like other schools and systems, states have made necessary changes to local testing in order to evidence progress on NCLB goals. Meyer and Rowan (1977) postulated that if an organization needs to massage or distort data in order to achieve legitimacy, that organization will cut corners in order to benefit the bottom line. In this case, states have instituted practices that evidence the narrowing of the achievement gap on local measures when, as shown by the national assessment, these gaps are not truly narrowing. Because closing the achievement gap on state assessments has been defined as the measure of educational success, this has been the outcome of the current legislation. The degree of disparity in the differential quotient as well as the state-based factors that correspond with that disparity provide a strong example of each state's inclination to do what is needed to sustain legitimacy and survive.

5.2 Theory Explaining the Existence of Differential Quotients

Due to the implementation of No Child Left Behind, at least two plausible theories exist as to why the differential quotients occur between state-based achievement gaps and nationally-reported gaps. Both theories involve the state and national governments; the first theory implies that these two organizations are working in tandem to ceremonially adopt changes that fabricate progress while the second theory implies that these two agencies are working against one another.

In 2001, President George Bush passed No Child Left Behind in response to growing concern over the quality of public education due to the Nation at Risk report in 1983. The purpose of this reform was to provide quality education for all students and accomplish uniform achievement levels according to state standards, with the specific focus on closing the gap

between the advantaged and disadvantaged student populations by the year 2014 (Borowski & Sneed, 2006; Haycock, 2006). The state and federal government goals in the first theory are the same: reinstate faith in America's public schools. The national government releases a series of strict regulations on education requiring that all states meet these new standards or face sanctions. These sanctions, though, are loosely implemented and rarely, if ever, followed through. The state government, in turn, develops assessments allowing for manufactured narrowing of the white/black and white/Hispanic achievement gaps and restoration of faith in American education. The federal government is not concerned with the rigor of state measures in this theory as restoring confidence was the overall outcome.

Theory two, on the other hand, pits the state and federal governments against one another. In this theory, No Child Left Behind is seen as a right-winged attack to ruin public education and states have modified their local assessments in order to survive. As a piece of one of the federal sanctions, a student attending a school that does not achieve adequate yearly progress is allowed to choose to attend another school that did with the failing school paying the cost. This introduces the market concept into American public education with the hope that competition will increase educational outcomes. As schools fail to reach the 100% proficiency requirement in 2014, more and more students would have the opportunity to choose a charter or private school leading to, in effect, the death of public education. Facing this grim reality, states made necessary changes in order to manufacture the results necessitated by NCLB to safeguard the survival of public education in America. The federal government, in this theory, would be interested in the rigor and consistency of individual state standards as the cutting of corners impedes with the federal goal. In conjunction with this theory, it is important to note that the

Common Core Readiness Standards have now been adopted in all but six states in the continental U.S. and a uniform national measure is to become available in the 2014-15 school year.

5.3 Addressing Concerns

5.3a Data Concerns

There were three primary sources of data for this dissertation: The US Department of Education Consolidated State Performance Reports, the National Assessment of Educational Progress (NAEP) Data Explorer, and the Integrated Public Use Micro-data Series.

To obtain each state's level of reported proficiency on state reading and math assessments, I used the U.S. Department of Education Consolidated State Performance reports for 2004-2005, 2006-2007, and 2008-2009. These outputs provided the state-reported percentage of fourth grade students, by subgroup, who scored proficient or above on the state assessments in reading and math. In an attempt to obtain consistent data, I tried to collect fourth grade levels of proficiency in reading and math for the years 2005, 2007, and 2009. Some states were missing data in the year 2005 as NCLB did not require states to report scores until 2006. When possible, I used state data at similar grade levels. For example, Illinois tested elementary school students at the third grade level in 2005 for reading and Kentucky tested students at the fifth grade level in 2005 for math. When similar comparisons such as these could be made, I substituted this like data. This data was not available through the Consolidated State Performance Reports, so I found this data through individual state report cards as listed on the state department of education websites. There were some states, though, that did not disaggregate data into the subgroups needed for this study. These states, including Minnesota, Missouri, and New Hampshire, do not have data recorded for 2005 in this study. Table 5.1 describes the number of states missing data on the state assessment each year.

Table 5.1: States Missing State-Level Data by Year

	White/Black Reading	White/Hispanic Reading	White/Black Math	White/Hispanic Math
States Missing 2005	8	7	6	6
States Missing 2007	1	0	0	0
States Missing 2009	1	0	0	0

Although it would be possible to replicate the achievement gap from 2009 as this would show no progress in either direction, this study is not meant to focus on the widening or narrowing of the gap; rather, it is focused on the discrepancy between the differences. Arbitrary numbers would not provide an accurate representation of these differences.

To obtain the NAEP data, I used the Nation's Report Card documents for 2005, 2007, and 2009. The Nation's Report Card provided the average scores and achievement-level results in NAEP reading and math for fourth grade public school students by race/ethnicity and state/jurisdiction. Using these reports, I was able to determine the percentage of white, black, and Hispanic students scoring at or above proficient on the NAEP assessment each year. Some states did not have results to report on the NAEP. Table 5.2 describes the number of states missing data on the NAEP assessment each year.

Table 5.2: States Missing NAEP-Level Data by Year

	White/Black Reading	White/Hispanic Reading	White/Black Math	White/Hispanic Math
States Missing 2005	9	11	9	10
States Missing 2007	8	6	6	5
States Missing 2009	5	4	6	5

In an ideal study, all data points would be filled. Due to the nature of this study, I did not substitute previous or following year scores for missing values. It is my hope that this missing data does not diminish the value or worth of this study.

5.4 Limitations and Future Research

The foundation of this study creates several different possibilities for future research. Those areas include: measuring student learning; analyzing performance-level outcome measures; examining what adaptations are made by states in order to maintain legitimacy; extending the research to an older grade-level to determine if the predictors change as schooling continues; comparing state-developed results to results on the Common Core Readiness Standard exams to be released in 2014-2015; and adjusting predictors to explain the differentials outlined in this study.

5.4a Measuring Student Learning

One key finding of this dissertation is that the two legitimacy measures are increasingly discrepant. Could this growing differential mean that there is a growing differential in learning gaps? While this study did not have a foolproof audit of actual learning, it does beg the question: Are students truly learning? Student performance on the NAEP has remained relatively stable over the past ten years. One would assume that if learning were occurring, it would be evident on the NAEP no matter how rigorous or complex the exam might be. This dissertation is evidence that state-based legitimacy measures indicate a narrower achievement gap than the national measure. Future research could examine whether or not learning is occurring and how that learning manifests itself in state and national reports.

5.4b Performance-Level Outcome Measures

The current study does not include outcome measures with distinct characteristics. This dissertation examined the state mean; it is not disaggregated by performance levels. For example, the current study does not show the gap between mid-achieving whites and high-achieving blacks. It is not possible to compare low-achieving whites to low-achieving Hispanics. It is conceivable that the mean used in this study was impacted by outliers – both high and low. It is also feasible that much of the progress evidenced by the states was generated by focusing more attention on the "bubble kids" – students believed to be on the threshold of passing the assessments (Booher-Jennings, 2005). By focusing more attention on these students, schools and states can produce quick progress. It cannot be determined whether or not this is the case using the current study. Future research would need to recalculate the outcome measures by performance level in order to examine this hypothesis.

5.4c State-Based Measure Adaptations

Under the current regime, states are allowed to design different tests locally intended to measure a common national outcome. Individual autonomy allows states to set their own standards, choose or develop tests to measure student performance against those standards, and independently hold schools accountable for the results. States are responsible for their own rigor, proficiency cut scores, exclusion rates, administration procedures, and statistical interpretation of results (Harris, 2007; Lee, 2008; Porter et al. 2005).

The state-level data acquired for this study was determined by the percentage of students who had scored proficient or higher on the elementary state assessment for reading or math. To this end, each state regulates its own standard or cut score for proficiency. For example, a student must score a 68% to be considered proficient in reading in Kansas but only need score a

50% to be considered proficient in mathematics. One extension of this dissertation could be to examine states with larger differential quotients and their proficiency cut scores. It is possible that states are modifying the proficiency cut scores as an arbitrary way to narrow the achievement gap. Further research could examine if lower cut scores are a predictor of higher differential quotients.

State assessments also differ in their rigor. Many studies have been completed to evaluate the rigor of state assessments and the state standards (Bandira de Mello et al, 2009; McLaughlin, 2009; Schneider, 2009; Stoneberg, 2007); an extension of this dissertation could examine the rigor of the state standards and the state-based measure to determine if the rigor is a predictor for a higher or lower differential quotient. Further research could examine if states with more rigorous standards evidence achievement gaps more similar to the nationally-based measure.

5.4d Eighth Grade Reading and Math

This study focused solely on reading and math achievement gaps between whites, blacks, and Hispanics in fourth grade. Another extension of this research could be to study the achievement gaps at the eighth-grade level in reading and math to deduce if the same predictor variables remain constant as schooling progresses. Do social factors become more or less impactful as students spend more time in schools? Are states reporting similar differential quotients at the eighth-grade level as they are at the fourth grade level? A longitudinal study could be conducted to determine if the state-based measures and the nationally-based measures became closer or further apart as students grow older. These topics could be the basis of future study as a result of this research.

5.4e National Measure: Common Core Readiness Standards

Those interested in exploring theory two could study the achievement gaps as they relate to the nationally aligned Common Core Readiness Standard exams in 2014-2015. While the differential quotient between the state and the NAEP will become irrelevant once states are all implementing the same assessments, the achievement gap data could be used to make comparisons between state-based results and achievement gaps on the new CCRS assessment. Assuming that the federal government was truly interested in the rigor and consistency of state-based results, the achievement gaps on the CCRS measure should closely align with the achievement gaps evidenced by the NAEP. A study of how this impacts market control on public education is another extension of the research and theory developed for this dissertation.

5.4f Adjusting Predictor Variables

The findings in this study suggest that the variables chosen are stronger predictors for differential quotients on the math achievement gap than the reading achievement gap. Future research could examine the differential quotient using additional state-level and family-level predictors.

This study used a fixed-effect regression model. Additional variables such as region and the political landscape could be included if a random effects model were used. This would be a worthwhile study as it is not states that are responding to legitimacy pressures, but people. The political landscape may play a large part in why the two legitimacy measures are disparate and governance variables could provide this insight.

The predictor variables for this study were not broken down by ethnicity. Another way to examine this data would be with race-specific predictor variables. In the case of the mom-only predictor variable which was statistically significant in regards to the white/Hispanic math gap

differential, race-specific variables would allow the researcher to examine the proportion of Hispanic mom-only population to the total mom-only population. This would also allow the researcher to interact the low boundary figure with the race-specific variable in order to determine how the Hispanic effect changes given the low boundary.

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Appendix A

STATA codes generated by the US Department of Education Consolidated State Performance Reports and the National Assessment of Educational Progress Data Explorer

Table 3.1

Source	Code	Description
US Department of Education	STATE_4M_W	State's reported percentage of white fourth-graders scoring proficient on the state math assessment
US Department of Education	STATE_4M_B	State's reported percentage of black fourth-graders scoring proficient on the state math assessment
US Department of Education	STATE_4M_H	State's reported percentage of Hispanic fourth-graders scoring proficient on the state math assessment
US Department of Education	STATE_4R_W	State's reported percentage of white fourth-graders scoring proficient on the state reading assessment
US Department of Education	STATE_4R_B	State's reported percentage of black fourth-graders scoring proficient on the state reading assessment
US Department of Education	STATE_4R_H	State's reported percentage of Hispanic fourth-graders scoring proficient on the state reading assessment
US Department of Education	SAG_4M_WB	State reported achievement gap between white and black fourth-graders on the math assessment
US Department of Education	SAG_4M_WH	State reported achievement gap between white and Hispanic fourth-graders on the math assessment
US Department of Education	SAG_4R_WB	State reported achievement gap between white and black fourth-graders on the reading assessment
US Department of Education	SAG_4R_WH	State reported achievement gap between white and Hispanic fourth-graders on the reading assessment
US Department of Education	SLwBnd_4BM	Low boundary of black-white achievement gap for fourth-graders on the math assessment
US Department of Education	SLwBnd_4HM	Low boundary of Hispanic-white achievement gap for fourth-graders on the math assessment
US Department of Education	SLwBnd_4BR	Low boundary of black-white achievement gap for fourth-graders on the reading assessment
US Department of Education	SLwBnd_4HR	Low boundary of Hispanic-white achievement gap for fourth-graders on the reading assessment

Table 3.2

Source	Code	Description
National Assessment of Educational Progress	NAEP_4M_W	NAEP's reported percentage of white fourth-graders scoring proficient on the math assessment
National Assessment of Educational Progress	NAEP_4M_B	NAEP's reported percentage of black fourth-graders scoring proficient on the math assessment
National Assessment of Educational Progress	NAEP_4M_H	NAEP's reported percentage of Hispanic fourth-graders scoring proficient on the math assessment
National Assessment of Educational Progress	NAEP _4R_W	NAEP's reported percentage of white fourth-graders scoring proficient on the reading assessment
National Assessment of Educational Progress	NAEP _4R_B	NAEP's reported percentage of black fourth-graders scoring proficient on the reading assessment
National Assessment of Educational Progress	NAEP _4R_H	NAEP's reported percentage of Hispanic fourth-graders scoring proficient on the reading assessment
National Assessment of Educational Progress	NAG_4M_WB	NAEP reported achievement gap between white and black fourth-graders on the math assessment
National Assessment of Educational Progress	NAG _4M_WH	NAEP reported achievement gap between white and Hispanic fourth-graders on the math assessment
National Assessment of Educational Progress	NAG _4R_WB	NAEP reported achievement gap between white and black fourth-graders on the reading assessment
National Assessment of Educational Progress	NAG _4R_WH	NAEP reported achievement gap between white and Hispanic fourth-graders on the reading assessment
National Assessment of Educational Progress	NLwBnd_4BM	Low boundary of black-white achievement gap for fourth-graders on the math assessment
National Assessment of Educational Progress	NLwBnd_4HM	Low boundary of Hispanic-white achievement gap for fourth-graders on the math assessment
National Assessment of Educational Progress	NLwBnd_4BR	Low boundary of black-white achievement gap for fourth-graders on the reading assessment
National Assessment of Educational Progress	NLwBnd_4HR	Low boundary of Hispanic-white achievement gap for fourth-graders on the reading assessment

Table 3.3

Source	Code	Description
U.S. Dept. of Ed./NAEP	DiffQuot_4BM	Difference between white/black NAEP reported achievement gap (NAG) and state reported achievement gap (SAG) on fourth-grade math assessments
U.S. Dept. of Ed./NAEP	DiffQuot_4HM	Difference between White/Hispanic NAEP reported achievement gap (NAG) and state reported achievement gap (SAG) on fourth-grade math assessments
U.S. Dept. of Ed./NAEP	DiffQuot_4BR	Difference between white/black NAEP reported achievement gap (NAG) and state reported achievement gap (SAG) on fourth-grade reading assessments
U.S. Dept. of Ed./NAEP	DiffQuot_4HR	Difference between White/Hispanic NAEP reported achievement gap (NAG) and state reported achievement gap (SAG) on fourth-grade reading assessments
U.S. Dept. of Ed./NAEP	SNLwBnd_4BM	Low boundary of state/NAEP black-white differential quotient for fourth-graders on the math assessment
U.S. Dept. of Ed./NAEP	SNLwBnd_4HM	Low boundary of state/NAEP Hispanic-white differential quotient for fourth-graders on the math assessment
U.S. Dept. of Ed./NAEP	SNLwBnd_4BR	Low boundary of state/NAEP black-white differential quotient for fourth-graders on the reading assessment
U.S. Dept. of Ed./NAEP	SNLwBnd_4HR	Low boundary of state/NAEP Hispanic-white differential quotient for fourth-graders on the reading assessment

Appendix B

Differential quotients for black and Hispanic fourth grade math and reading gaps by year

Table 3.5: Differential quotients in fourth grade math for black students

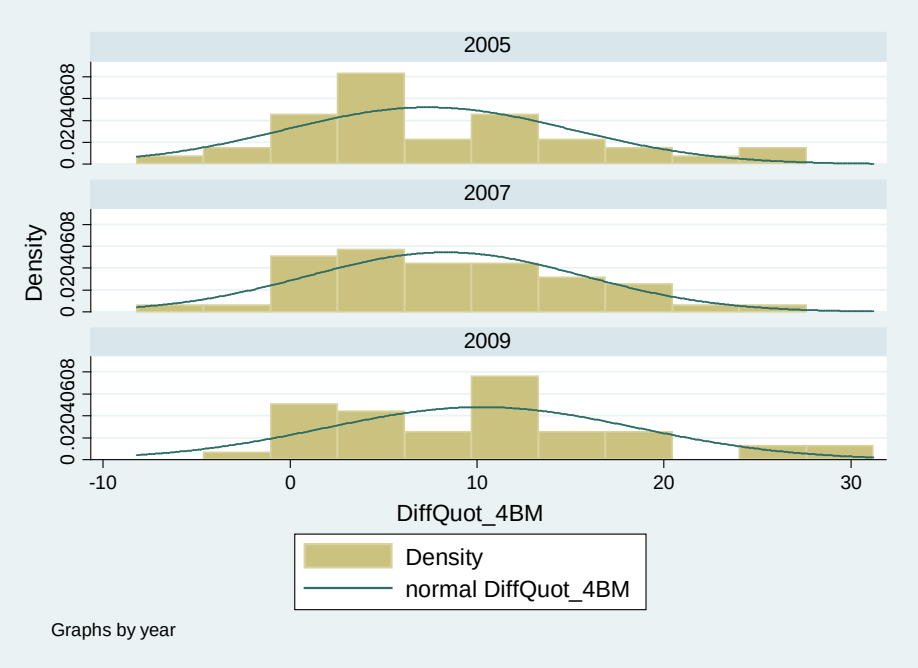


Table 3.6: Differential quotients in fourth grade math for Hispanic students

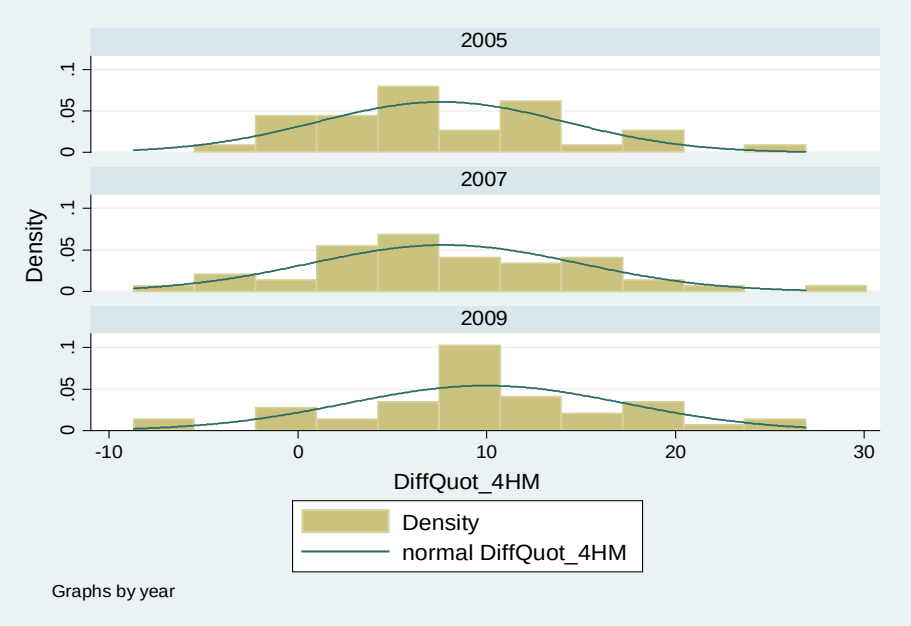


Table 3.7: Differential quotients in fourth grade reading for black students

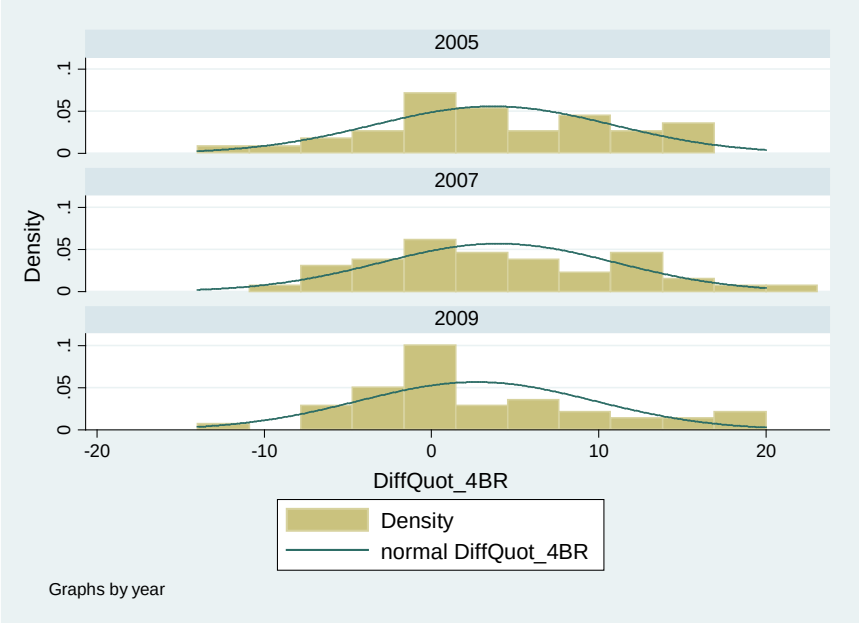
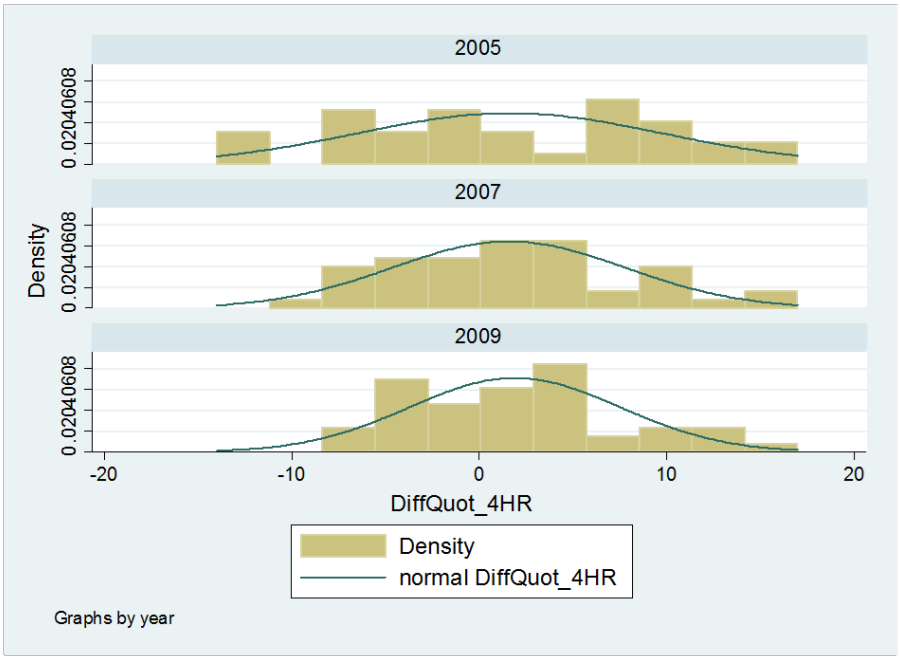


Table 3.8: Differential quotients in fourth grade reading for Hispanic students



Appendix C

NAEP achievement gaps, state achievement gaps, and differential quotients by state

Table 4.3

	Fourth Grade Reading 2005							Fourth Grade Math 2005						
	NAG W/B	SAG W/B	DQ W/B	NAG W/H	SAG W/H	DQ W/H			NAG W/B	SAG W/B	DQ W/B	NAG W/H	SAG W/H	DQ W/H
AK	12	13	-1	17	11	6		AK	24	20	4	21	16	5
AL	24	14	10	*	16	N/A		AL	23	19	4	*	20	N/A
AR	27	30	-3	16	18	-2		AR	32	30	2	17	16	1
AZ	25	26	-1	26	32	-6		AZ	30	26	4	29	26	3
CA	26	32	-6	27	35	-8		CA	34	31	3	32	25	7
CO	28	15	13	29	17	12		CO	31	16	15	31	13	18
CT	35	32	3	32	34	-2		CT	42	32	10	38	28	10
DE	31	17	14	24	12	12		DE	35	22	13	32	26	6
FL	26	25	1	14	15	-1		FL	33	30	3	21	15	6
GA	25	10	15	23	14	9		GA	31	20	11	21	18	4
HI	16	21	-5	10	15	-5		HI	26	20	6	21	17	5
IA	24	24	0	21	23	-2		IA	25	25	0	23	21	3
ID	*	*	N/A	26	19	7		ID	*	10	N/A	27	15	12
IL	33	27	6	28	12	16		IL	35	34	1	30	14	16
IN	23	25	-2	24	22	2		IN	32	25	7	24	16	8
KS	27	21	6	23	16	7		KS	28	21	8	22	18	4
KY	18	21	-3	*	9	N/A		KY	20	21	-1	*	11	N/A
LA	23	24	-1	*	9	N/A		LA	29	30	-1	*	9	N/A
MA	31	29	2	40	34	6		MA	39	29	10	43	30	13
MD	33	20	13	24	17	7		MD	39	25	14	27	18	9
ME	*	15	N/A	*	6	N/A		ME	*	20	N/A	*	8	N/A
MI	28	24	4	*	17	N/A		MI	38	27	11	*	18	N/A
MN	33	*	N/A	25	*	N/A		MN	39	*	N/A	39	*	N/A
MO	24	*	N/A	17	*	N/A		MO	28	23	5	27	16	11
MS	24	11	13	*	11	N/A		MS	25	20	5	*	9	N/A
MT	*	-1	N/A	3	16	-13		MT	*	15	N/A	11	11	0
NC	26	17	9	22	17	5		NC	35	10	25	26	7	19
ND	*	15	N/A	*	13	N/A		ND	*	27	N/A	*	13	N/A
NE	30	16	14	28	11	17		NE	37	11	26	34	8	26
NH	*	*	N/A	*	*	N/A		NH	*	*	N/A	31	*	N/A
NJ	31	23	8	27	18	9		NJ	38	28	10	30	18	12
NM	12	26	-14	22	25	-3		NM	28	27	2	21	24	-3
NV	18	19	-1	16	22	-6		NV	28	*	N/A	25	*	N/A
NY	26	*	N/A	26	*	N/A		NY	35	*	N/A	31	*	N/A
OH	31	*	N/A	17	*	N/A		OH	35	30	5	30	19	11
OK	20	18	2	13	16	-3		OK	25	27	-2	20	15	5
OR	19	13	6	24	23	1		OR	30	12	18	28	17	11
PA	27	36	-9	23	35	-12		PA	37	33	4	34	28	6
RI	21	*	N/A	25	*	N/A		RI	28	*	N/A	28	*	N/A
SC	25	25	0	7	21	-14		SC	40	31	9	23	23	0
SD	*	17	N/A	*	15	N/A		SD	*	29	N/A	*	26	N/A
TN	22	14	8	20	20	0		TN	26	15	11	9	11	-2
TX	29	19	10	25	15	10		TX	42	21	21	32	14	18
UT	*	22	N/A	24	30	-6		UT	*	23	N/A	28	25	3
VA	30	15	15	19	9	10		VA	36	18	18	28	16	12
VT	*	*	N/A	*	*	N/A		VT	*	*	N/A	*	*	N/A
WA	20	16	4	26	24	2		WA	22	30	-8	31	32	-1
WI	28	27	1	18	24	-6		WI	41	37	4	32	28	4
WV	11	9	2	*	8	N/A		WV	8	10	-2	*	2	N/A
WY	*	14	N/A	22	15	7		WY	*	8	N/A	14	10	5

Table 4.6

	Fourth Grade Reading 2007							Fourth Grade Math 2007						
	NAG W/B	SAG W/B	DQ W/B	NAG W/H	SAG W/H	DQ W/H		NAG W/B	SAG W/B	DQ W/B	NAG W/H	SAG W/H	DQ W/H
AK	20	13	7	23	14	9	**AK**	28	16	12	24	12	12
AL	26	14	12	22	17	5	**AL**	26	18	8	19	16	3
AR	27	30	-3	20	23	-3	**AR**	34	32	2	24	20	5
AZ	16	24	-8	23	28	-5	**AZ**	32	23	9	33	22	11
CA	27	32	-5	29	33	-4	**CA**	37	29	8	37	23	14
CO	37	37	0	36	42	-6	**CO**	42	31	11	39	30	9
CT	29	17	12	32	20	12	**CT**	34	14	20	35	12	23
DE	26	20.4	5.6	20	19.4	0.6	**DE**	33	24	9	28	19	9
FL	28	29	-1	16	18	-2	**FL**	39	27	12	21	13	8
GA	26	15	11	19	16	3	**GA**	33	18	15	26	13	13
HI	17	19	-2	19	27	-8	**HI**	22	22	0	27	27	0
IA	22	26	-4	20	21	-1	**IA**	29	26	3	21	20	1
ID	*	*	N/A	24	23	1	**ID**	*	12	N/A	27	20	7
IL	28	32	-4	24	14	10	**IL**	41	25	16	31	14	17
IN	25	22	3	20	22	-2	**IN**	38	25	13	26	19	7
KS	23	22	1	22	20	2	**KS**	37	19	18	29	14	15
KY	22	21	1	*	7	N/A	**KY**	22	21	1	19	13	6
LA	22	21	1	5	9	-4	**LA**	26	31	-5	6	12	-6
MA	37	32	5	38	35	3	**MA**	39	32	7	42	31	12
MD	32	15	17	28	12	16	**MD**	38	16	22	27	12	15
ME	*	23	N/A	*	17	N/A	**ME**	26	26	0	*	15	N/A
MI	27	20	7	20	16	4	**MI**	32	21	11	18	17	1
MN	30	35	-5	26	36	-10	**MN**	42	37	5	36	32	4
MO	25	25	0	15	18	-3	**MO**	33	29	4	19	17	2
MS	23	9	14	*	8	N/A	**MS**	25	18	7	*	7	N/A
MT	*	4	N/A	12	11	1	**MT**	*	16	N/A	9	13	-4
NC	27	16	11	21	15	6	**NC**	41	31	10	28	20	8
ND	*	13	N/A	*	13	N/A	**ND**	*	21	N/A	*	12	N/A
NE	30	10	20	24	7	17	**NE**	36	9	27	30	3	27
NH	17	20	-3	22	24	-2	**NH**	28	29	-1	26	22	4
NJ	30	25	5	29	20	9	**NJ**	38	23	15	34	17	17
NM	25	23.1	1.9	24	22	2	**NM**	25	25	1	27	22	5
NV	19	26	-7	21	27	-6	**NV**	27	27	0	25	20	5
NY	30	27	3	29	28	1	**NY**	38	22	16	31	17	14
OH	28	28	0	21	17	4	**OH**	35	32	3	28	20	8
OK	20	12	8	16	12	4	**OK**	29	19	11	17	11	6
OR	24	15	9	24	24	0	**OR**	24	20	4	28	25	3
PA	34	31	3	32	32	0	**PA**	35	30	5	25	27	-2
RI	29	28	1	27	34	-7	**RI**	25	32	-7	26	30	-4
SC	23	29	-6	18	26	-8	**SC**	36	34	2	29	25	4
SD	*	13	N/A	22	13	9	**SD**	31	25	6	25	24	1
TN	26	13	13	14	13	1	**TN**	27	12	15	21	6	15
TX	27	16	11	23	13	10	**TX**	35	16	19	29	11	18
UT	*	22	N/A	23	26	-3	**UT**	*	25	N/A	29	24	5
VA	27	11	16	20	14	6	**VA**	35	18	17	25	16	9
VT	*	9	N/A	*	8	N/A	**VT**	*	26	N/A	*	13	N/A
WA	20	16	4	23	20	3	**WA**	34	30	4	32	30	2
WI	30	26	4	24	23	1	**WI**	44	38	7	27	22	5
WV	15	6	9	*	9	N/A	**WV**	14	9	5	*	6	N/A
WY	*	9	N/A	18	14	4	**WY**	*	8	N/A	25	9	16

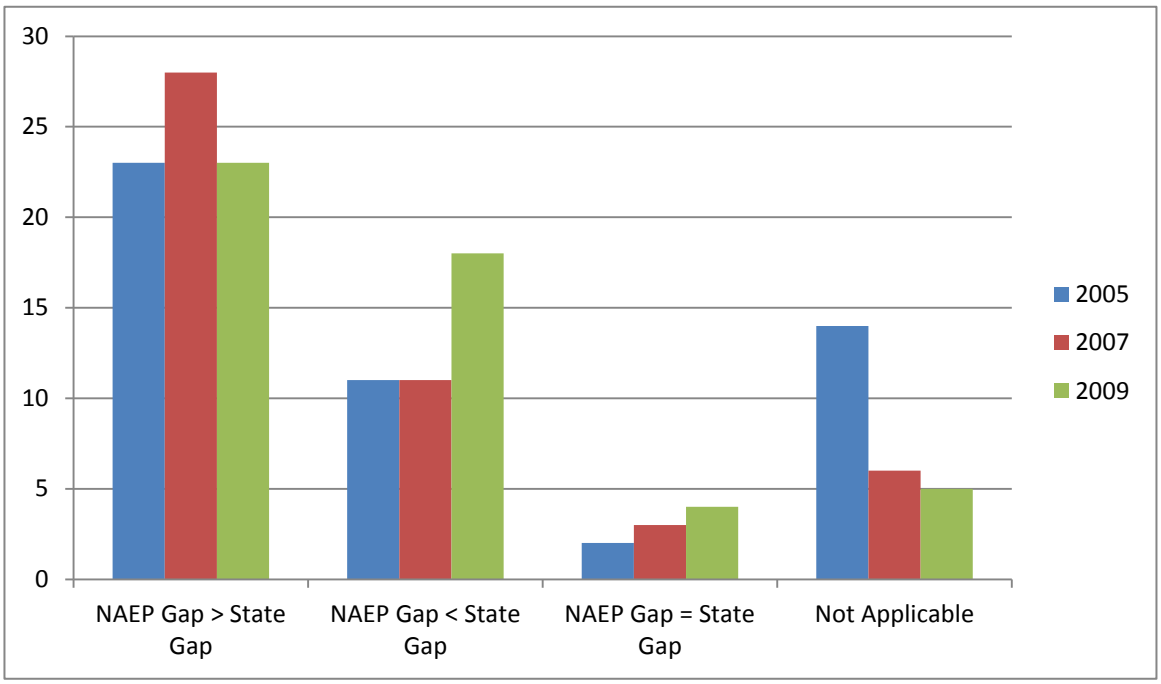
Table 4.9

	Fourth Grade Reading 2009							Fourth Grade Math 2009						
	NAG W/B	SAG W/B	DQ W/B	NAG W/H	SAG W/H	DQ W/H		NAG W/B	SAG W/B	DQ W/B	NAG W/H	SAG W/H	DQ W/H
AK	23	16	7	9	11	-2	AK	35	21	14	25	10	15
AL	28	14	14	23	13	10	AL	27	17	10	23	13	10
AR	23	26	-3	21	19	2	AR	34	24	11	20	11	9
AZ	18	22	-4	24	23	1	AZ	25	22	3	29	19	10
CA	21	28	-7	24	29	-5	CA	38	27	12	37	21	16
CO	29	34	-5	36	39	-3	CO	44	29	15	40	28	13
CT	12	15	-3	21	17	4	CT	34	16	18	33	11	22
DE	41	22	19	28	19	9	DE	33	25	8	28	20	9
FL	27	25	2	14	15	-1	FL	33	22	11	20	11	9
GA	25	11	14	20	8	12	GA	33	23	10	22	14	8
HI	24	14	10	15	18	-3	HI	18	19	-1	23	18	5
IA	14	26	-12	16	19	-3	IA	28	28	1	28	20	8
ID	*	*	N/A	22	17	5	ID	*	22	N/A	26	13	13
IL	33	28	5	28	24	4	IL	41	22	19	32	13	19
IN	23	22	1	23	19	4	IN	35	22	13	25	14	11
KS	20	21	-1	20	16	4	KS	37	21	16	31	13	18
KY	26	21	5	17	10	7	KY	25	21	5	17	9	8
LA	19	20	-1	12	13	-1	LA	29	29	0	14	13	1
MA	33	32	1	36	33	3	MA	37	30	7	42	29	14
MD	31	14	17	20	12	8	MD	39	12	27	28	10	19
ME	18	19	-1	*	6	N/A	ME	18	21	-3	*	6	N/A
MI	27	26	1	19	19	0	MI	34	18	16	23	11	12
MN	31	33	-2	30	33	-3	MN	36	35	1	32	32	0
MO	24	24	0	14	18	-4	MO	29	30	-1	9	18	-9
MS	25	27	-2	16	11	5	MS	29	25	4	*	6	N/A
MT	*	10	N/A	11	10	1	MT	39	9	30	8	14	-6
NC	30	30	0	27	27	0	NC	*	23	N/A	32	12	20
ND	*	20	N/A	*	19	N/A	ND	35	25	10	*	20	N/A
NE	21	9	12	20	5	15	NE	33	7	26	29	3	26
NH	14	19	-5	12	19	-7	NH	38	26	12	26	23	3
NJ	33	34	-1	32	29	3	NJ	44	31	13	38	20	18
NM	22	23	-1	21	22	-1	NM	28	26	2	29	24	5
NV	20	26	-6	21	25	-4	NV	*	24	N/A	27	17	10
NY	27	20	7	23	20	3	NY	32	14	18	25	10	16
OH	29	26	3	12	18	-6	OH	40	32	8	29	20	9
OK	22	22	0	16	21	-5	OK	22	22	0	20	16	4
OR	18	14	4	22	19	3	OR	26	21	6	27	21	6
PA	27	29	-2	28	27	1	PA	38	25	13	30	21	9
RI	27	21	6	30	28	2	RI	36	28	8	36	29	7
SC	27	15	12	21	18	3	SC	29	17	12	18	9	9
SD	*	24	N/A	8	16	-8	SD	40	27	13	20	20	0
TN	22	12	10	18	9	9	TN	13	9	4	17	4	13
TX	23	15	8	25	12	13	TX	46	15	31	35	9	26
UT	22	22	0	26	25	1	UT	*	27	N/A	32	28	4
VA	29	10	19	21	7	14	VA	30	13	17	26	14	12
VT	13	14	-1	*	13	N/A	VT	35	30	5	*	13	N/A
WA	19	21	-2	26	25	1	WA	31	30	1	31	31	0
WI	29	28	1	22	20	2	WI	*	32	N/A	31	20	11
WV	10	8	2	*	2	N/A	WV	17	11	6	*	5	N/A
WY	*	14	N/A	12	17	-5	WY	*	10	N/A	22	14	8

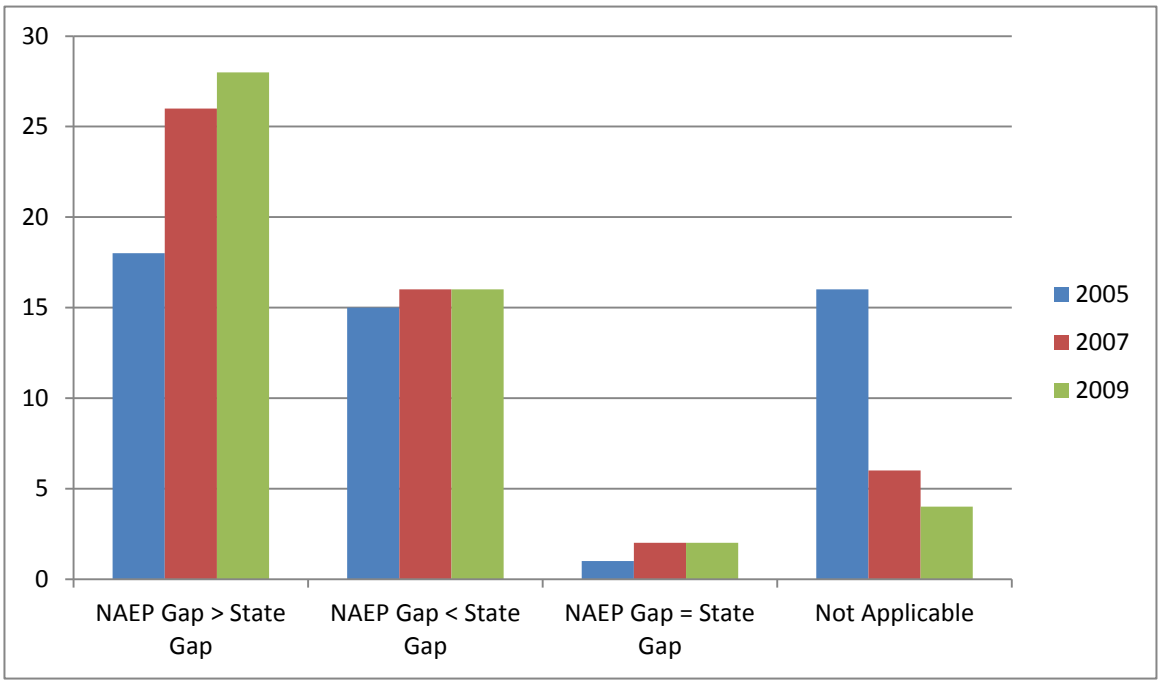
Appendix D

Differential quotients broken down by content, race, and year

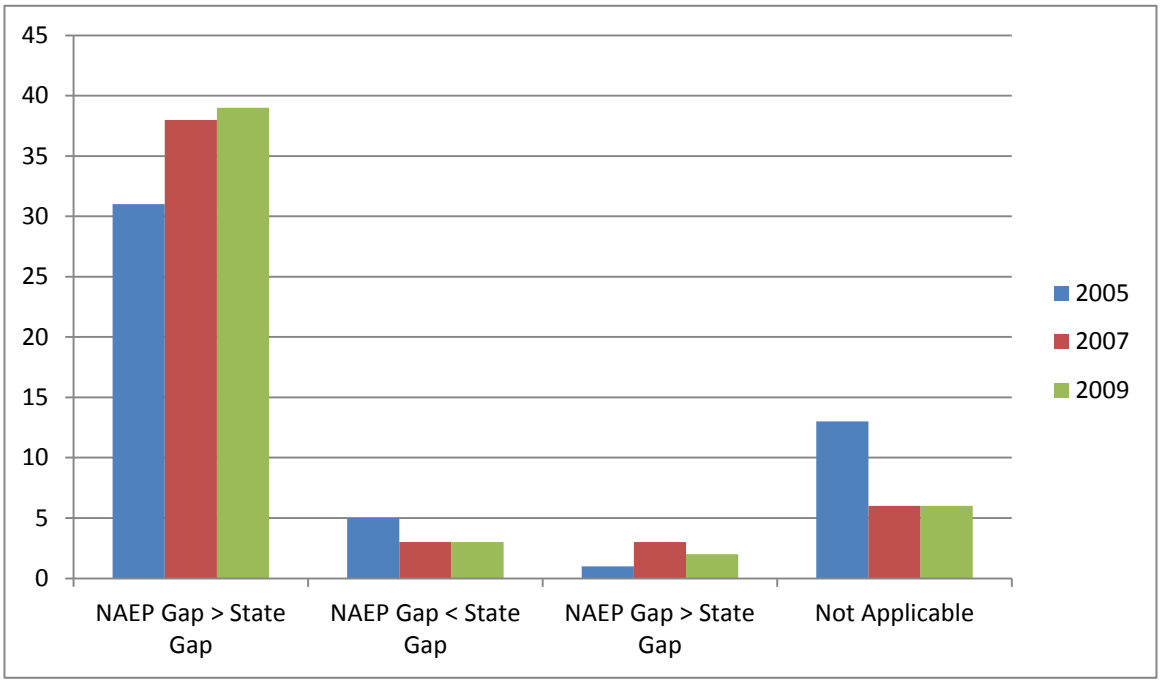
Fourth Grade White/Black Reading



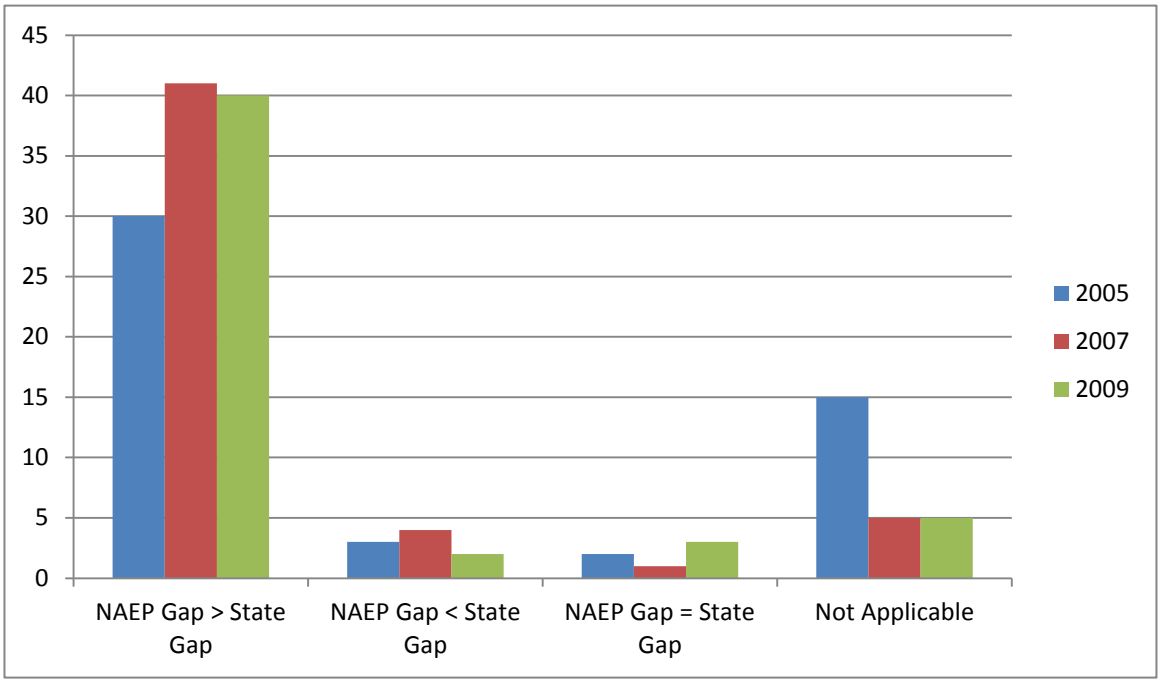
Fourth Grade White/Hispanic Reading



Fourth Grade White/Black Math



Fourth Grade White/Hispanic Math



Appendix E

Description of outcome and predictor variables used in this study.

	Variable	STATA Code	Mean	Min	Max	SD	Predicted Impact
Outcome Variables	Differential Quotient: White/Black Reading	DiffQuot_4BR	3.43	-14	20	7.04	
	Differential Quotient: White/Hispanic Reading	DiffQuot_4HR	1.72	-14	17	6.54	
	Differential Quotient: White/Black Math	DiffQuot_4BM	8.73	-8.2	31.2	7.82	
	Differential Quotient: White/Hispanic Math	DiffQuot_4HM	8.5	-8.7	26.9	7.09	
Predictor Variables	Low Boundary: White/Black Reading	SNLwBnd_4BR	20.01	6	37	6.52	Increased low boundary could decrease the differential.
	Low Boundary: White/Hispanic Reading	SNLwBnd_4HR	18.19	3	36	6.92	Increased low boundary could decrease the differential.
	Low Boundary: White/Black Math	SNLwBnd_4BM	23.08	6.9	37.5	6.88	Increased low boundary could decrease the differential.
	Low Boundary: White/Hispanic Math	SNLwBnd_4HM	17.61	2.6	31.7	6.87	Increased low boundary could decrease the differential.
	Citizens reporting black	Black_m	.08	.001	.33	.33	Increased African American population could increase differential.
	Citizens reporting Hispanic	Hispanic_m	.08	.004	.44	.09	Increased Hispanic population could increase differential.
	Citizens in poverty	Pov_m	.13	.05	.22	.03	Increased poverty could increase differential.
	Mom-only homes	Momonly	.24	.12	.38	.04	Increased mom-only households could increase differential.
	Occupation attainment	Occscore_m	28.72	26.94	30.76	.91	Increased occupation attainment could decrease differential.
	High school dropouts	Dropout	.09	.04	.16	.03	Increased high school dropouts could increase differential.

Appendix F

STATA Printouts of Differential Quotient Regression Models

Fourth Grade White/Black Reading

```
 xtreg DiffQuot_4BR SNLwBnd_4BR black_m, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.0860                         Obs per group: min =         1
       between = 0.0107                                        avg =       2.6
       overall = 0.0161                                        max =         4

                                                F(2,71)            =      3.34
corr(u_i, Xb)  = -0.4125                        Prob > F           =    0.0411

------------------------------------------------------------------------------
DiffQuot_4BR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BR |  -.3812735   .1486936    -2.56   0.012    -.6777603   -.0847868
     black_m |   -37.1493   89.71336    -0.41   0.680    -216.0327    141.7341
       _cons |   14.08247   8.488634     1.66   0.102    -2.843381    31.00833
-------------+----------------------------------------------------------------
     sigma_u |  6.4764876
     sigma_e |  4.6899794
         rho |  .65599575   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 71) =     3.00                 Prob > F = 0.0000

. xtreg DiffQuot_4BR SNLwBnd_4BR pov_m , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.1006                         Obs per group: min =         1
       between = 0.1926                                        avg =       2.6
       overall = 0.1925                                        max =         4

                                                F(2,71)            =      3.97
corr(u_i, Xb)  = 0.0096                         Prob > F           =    0.0232

------------------------------------------------------------------------------
DiffQuot_4BR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BR |   -.391415   .1477958    -2.65   0.010    -.6861115   -.0967185
       pov_m |  -49.60437    43.0358    -1.15   0.253    -135.4153    36.20657
       _cons |   17.34533   6.420283     2.70   0.009     4.543651    30.14701
-------------+----------------------------------------------------------------
     sigma_u |   5.256155
     sigma_e |  4.6523138
         rho |  .56071643   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 71) =     3.12                 Prob > F = 0.0000
```

```
. xtreg DiffQuot_4BR SNLwBnd_4BR momonly , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.0844                         Obs per group: min =         1
       between = 0.2424                                        avg =       2.6
       overall = 0.2094                                        max =         4

                                                F(2,71)            =      3.27
corr(u_i, Xb)  = 0.1299                         Prob > F           =    0.0437

------------------------------------------------------------------------------
DiffQuot_4BR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BR |  -.3783212   .1487869    -2.54   0.013    -.6749938   -.0816487
    momonly  |   11.59833   52.69133     0.22   0.826    -93.46519    116.6618
       _cons |   7.979944   13.14618     0.61   0.546     -18.2328    34.19269
-------------+----------------------------------------------------------------
     sigma_u |  5.1135626
     sigma_e |  4.6940379
         rho |  .54269734   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 71) =     3.06                 Prob > F = 0.0000

. xtreg DiffQuot_4BR SNLwBnd_4BR occscore_m , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.1367                         Obs per group: min =         1
       between = 0.0000                                        avg =       2.6
       overall = 0.0006                                        max =         4

                                                F(2,71)            =      5.62
corr(u_i, Xb)  = -0.6844                        Prob > F           =    0.0054

------------------------------------------------------------------------------
DiffQuot_4BR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BR |  -.2917786   .1503916    -1.94   0.056    -.5916509    .0080938
  occscore_m |  -6.136318   2.943217    -2.08   0.041    -12.00493    -.267711
       _cons |   185.4708   83.83179     2.21   0.030     18.31494    352.6266
-------------+----------------------------------------------------------------
     sigma_u |  8.1311347
     sigma_e |  4.5581798
         rho |  .76088802   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 71) =     3.24                 Prob > F = 0.0000

. xtreg DiffQuot_4BR SNLwBnd_4BR dropout , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.0854                         Obs per group: min =         1
       between = 0.1962                                        avg =       2.6
       overall = 0.1705                                        max =         4

                                                F(2,71)            =      3.31
corr(u_i, Xb)  = 0.0367                         Prob > F           =    0.0421

------------------------------------------------------------------------------
DiffQuot_4BR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BR |  -.3784926   .1486737    -2.55   0.013    -.6749394   -.0820457
     dropout |   33.7396   97.16199     0.35   0.729    -159.9959    227.4751
       _cons |    7.57281   9.760642     0.78   0.440    -11.88936    27.03498
-------------+----------------------------------------------------------------
     sigma_u |  5.2372947
     sigma_e |  4.6916569
         rho |  .55478876   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 71) =     3.12                 Prob > F = 0.0000
```

```
. xtreg DiffQuot_4BR SNLwBnd_4BR black_m pov_m momonly occscore_m dropout, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.1683                         Obs per group: min =         1
       between = 0.0166                                        avg =       2.6
       overall = 0.0081                                        max =         4

                                                F(6,67)            =      2.26
corr(u_i, Xb)  = -0.8669                        Prob > F           =    0.0479

------------------------------------------------------------------------------
DiffQuot_4BR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BR |   -.2962973   .1523341    -1.95   0.056    -.6003574    .0077628
    black_m |   -57.49939   92.71725    -0.62   0.537    -242.5638     127.565
      pov_m |   -64.58528   44.57451    -1.45   0.152    -153.5564     24.3858
    momonly |   -18.39285   58.62372    -0.31   0.755    -135.4063    98.62059
  occscore_m |   -7.360156   3.225477    -2.28   0.026    -13.79823   -.9220769
    dropout |   -69.67687   112.5299    -0.62   0.538    -294.2875    154.9337
      _cons |    245.0446   103.7288     2.36   0.021     38.00104    452.0882
-------------+----------------------------------------------------------------
     sigma_u |  11.934099
     sigma_e |  4.6054022
         rho |  .87038188   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 67) =     2.91                 Prob > F = 0.0000
```

Fourth Grade White/Hispanic Reading

```
 xtreg DiffQuot_4HR SNLwBnd_4HR hispanic_m, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        46

R-sq:  within  = 0.0101                         Obs per group: min =         1
       between = 0.0000                                        avg =       2.6
       overall = 0.0004                                        max =         3

                                                F(2,70)            =      0.36
corr(u_i, Xb)  = -0.5932                        Prob > F           =    0.7001

------------------------------------------------------------------------------
DiffQuot_4HR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HR |   .0308346   .1455795     0.21   0.833    -.2595146    .3211838
  hispanic_m |   44.52399   53.54073     0.83   0.408    -62.25962    151.3076
       _cons |  -2.883941   5.493144    -0.53   0.601    -13.83967    8.071789
-------------+----------------------------------------------------------------
     sigma_u |  6.6756014
     sigma_e |   4.275088
         rho |  .70916027   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(45, 70) =     3.74                 Prob > F = 0.0000

. xtreg DiffQuot_4HR SNLwBnd_4HR pov_m , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        46

R-sq:  within  = 0.0006                         Obs per group: min =         1
       between = 0.0211                                        avg =       2.6
       overall = 0.0124                                        max =         3

                                                F(2,70)            =      0.02
corr(u_i, Xb)  = -0.1774                        Prob > F           =    0.9796

------------------------------------------------------------------------------
DiffQuot_4HR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HR |   .0229505   .1459833     0.16   0.876     -.268204     .314105
       pov_m |  -5.003367   39.31234    -0.13   0.899    -83.40936    73.40262
       _cons |   1.730893   5.649335     0.31   0.760    -9.536351    12.99814
-------------+----------------------------------------------------------------
     sigma_u |   5.329591
     sigma_e |  4.2956563
         rho |  .60619367   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(45, 70) =     3.60                 Prob > F = 0.0000
```

```
. xtreg DiffQuot_4HR SNLwBnd_4HR momonly , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        46

R-sq:  within  = 0.0176                         Obs per group: min =         1
       between = 0.0040                                        avg =       2.6
       overall = 0.0001                                        max =         3

                                                F(2,70)            =      0.63
corr(u_i, Xb)  = -0.3838                        Prob > F           =    0.5373

------------------------------------------------------------------------------
DiffQuot_4HR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HR |   .0564094   .1478237     0.38   0.704    -.2384157    .3512345
     momonly |   49.41609   44.59014     1.11   0.272    -39.51615    138.3483
       _cons |  -11.17377   11.39397    -0.98   0.330    -33.89833    11.55078
-------------+----------------------------------------------------------------
     sigma_u |  5.8413626
     sigma_e |  4.2589535
         rho |  .65291591   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(45, 70) =     3.80                 Prob > F = 0.0000

. xtreg DiffQuot_4HR SNLwBnd_4HR occscore_m , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        46

R-sq:  within  = 0.0141                         Obs per group: min =         1
       between = 0.0684                                        avg =       2.6
       overall = 0.0545                                        max =         3

                                                F(2,70)            =      0.50
corr(u_i, Xb)  = -0.6610                        Prob > F           =    0.6094

------------------------------------------------------------------------------
DiffQuot_4HR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HR |   .0178018   .1450917     0.12   0.903    -.2715745    .3071782
  occscore_m |  -3.466643   3.515451    -0.99   0.327    -10.47799    3.544703
       _cons |   100.6411   100.9788     1.00   0.322    -100.7547    302.0369
-------------+----------------------------------------------------------------
     sigma_u |   6.691426
     sigma_e |  4.2666201
         rho |  .71095158   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(45, 70) =     3.33                 Prob > F = 0.0000

. xtreg DiffQuot_4HR SNLwBnd_4HR dropout , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        46

R-sq:  within  = 0.0004                         Obs per group: min =         1
       between = 0.0601                                        avg =       2.6
       overall = 0.0310                                        max =         3

                                                F(2,70)            =      0.01
corr(u_i, Xb)  = -0.2404                        Prob > F           =    0.9865

------------------------------------------------------------------------------
DiffQuot_4HR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HR |    .022783   .1461395     0.16   0.877     -.268683     .314249
     dropout |   4.107952   89.58662     0.05   0.964    -174.5669    182.7828
       _cons |   .7260713   8.579187     0.08   0.933    -16.38458    17.83672
-------------+----------------------------------------------------------------
     sigma_u |  5.3335354
     sigma_e |  4.2960888
         rho |  .60649879   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(45, 70) =     3.72                 Prob > F = 0.0000
```

```
. xtreg DiffQuot_4HR SNLwBnd_4HR hispanic_m pov_m momonly occscore_m dropout, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       118
Group variable: statenum                        Number of groups   =        46

R-sq:  within  = 0.0317                         Obs per group: min =         1
       between = 0.0431                                        avg =       2.6
       overall = 0.0258                                        max =         3

                                                F(6,66)            =      0.36
corr(u_i, Xb)  = -0.6403                        Prob > F           =    0.9016

------------------------------------------------------------------------------
DiffQuot_4HR |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HR |   .0485197   .1514988     0.32   0.750    -.2539574    .3509968
  hispanic_m |   14.36184   60.30363     0.24   0.812    -106.0382    134.7619
       pov_m |  -13.26005   43.27287    -0.31   0.760    -99.65711    73.13701
     momonly |   43.20896   48.88792     0.88   0.380    -54.39892    140.8168
  occscore_m |  -3.132724   4.000728    -0.78   0.436    -11.12044    4.854988
     dropout |   14.93618   96.46684     0.15   0.877    -177.6661    207.5385
       _cons |   79.35232    120.878     0.66   0.514    -161.9883     320.693
-------------+----------------------------------------------------------------
     sigma_u |  6.7977301
     sigma_e |  4.3545503
         rho |  .70904179   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(45, 66) =     3.14                 Prob > F = 0.0000
```

Fourth Grade White/Black Math

```
. xtreg DiffQuot_4BM SNLwBnd_4BM black_m, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       115
Group variable: statenum                        Number of groups   =        44

R-sq:  within  = 0.3504                         Obs per group: min =         1
       between = 0.0575                                        avg =       2.6
       overall = 0.0561                                        max =         3

                                                F(2,69)            =     18.61
corr(u_i, Xb)  = -0.8698                        Prob > F           =    0.0000

------------------------------------------------------------------------------
DiffQuot_4BM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BM |  -.5182976   .1109052    -4.67   0.000    -.7395475   -.2970478
     black_m |   164.3841   66.04688     2.49   0.015      32.6242     296.144
       _cons |   5.563997   7.137968     0.78   0.438    -8.675859    19.80385
-------------+----------------------------------------------------------------
     sigma_u |  14.268315
     sigma_e |  3.3311628
         rho |  .94831111   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(43, 69) =     9.30                 Prob > F = 0.0000

. xtreg DiffQuot_4BM SNLwBnd_4BM pov_m, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       115
Group variable: statenum                        Number of groups   =        44

R-sq:  within  = 0.2938                         Obs per group: min =         1
       between = 0.2405                                        avg =       2.6
       overall = 0.2403                                        max =         3

                                                F(2,69)            =     14.35
corr(u_i, Xb)  = -0.0302                        Prob > F           =    0.0000

------------------------------------------------------------------------------
DiffQuot_4BM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BM |  -.5895173   .1117584    -5.27   0.000    -.8124693   -.3665653
       pov_m |    12.8969   31.83188     0.41   0.687    -50.60596    76.39975
       _cons |    20.4626   5.051965     4.05   0.000      10.3842    30.54099
-------------+----------------------------------------------------------------
     sigma_u |  6.3273111
     sigma_e |  3.4733515
         rho |  .76843774   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(43, 69) =     8.48                 Prob > F = 0.0000
```

```
. xtreg DiffQuot_4BM SNLwBnd_4BM momonly, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       115
Group variable: statenum                        Number of groups   =        44

R-sq:  within  = 0.3019                         Obs per group: min =         1
       between = 0.1883                                        avg =       2.6
       overall = 0.1925                                        max =         3

                                                F(2,69)            =     14.92
corr(u_i, Xb)  = -0.1272                        Prob > F           =    0.0000

------------------------------------------------------------------------------
DiffQuot_4BM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BM |  -.5807297   .1113767    -5.21   0.000    -.8029201   -.3585393
     momonly |   39.48788    40.0368     0.99   0.327    -40.38335    119.3591
       _cons |   12.22643   10.45454     1.17   0.246    -8.629812    33.08267
-------------+----------------------------------------------------------------
     sigma_u |   6.593305
     sigma_e |  3.4532239
         rho |  .78473783   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(43, 69) =     8.60                 Prob > F = 0.0000

. xtreg DiffQuot_4BM SNLwBnd_4BM occscore_m, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       115
Group variable: statenum                        Number of groups   =        44

R-sq:  within  = 0.2934                         Obs per group: min =         1
       between = 0.1935                                        avg =       2.6
       overall = 0.1948                                        max =         3

                                                F(2,69)            =     14.32
corr(u_i, Xb)  = -0.0893                        Prob > F           =    0.0000

------------------------------------------------------------------------------
DiffQuot_4BM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BM |  -.5783691   .1196891    -4.83   0.000    -.8171424   -.3395958
  occscore_m |  -1.048749   2.958826    -0.35   0.724    -6.951445    4.853947
       _cons |   52.02556   84.12931     0.62   0.538    -115.8078    219.8589
-------------+----------------------------------------------------------------
     sigma_u |  6.5332572
     sigma_e |  3.4743191
         rho |  .77954456   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(43, 69) =     8.01                 Prob > F = 0.0000

. xtreg DiffQuot_4BM SNLwBnd_4BM dropout, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       115
Group variable: statenum                        Number of groups   =        44

R-sq:  within  = 0.3177                         Obs per group: min =         1
       between = 0.0351                                        avg =       2.6
       overall = 0.0776                                        max =         3

                                                F(2,69)            =     16.07
corr(u_i, Xb)  = -0.4314                        Prob > F           =    0.0000

------------------------------------------------------------------------------
DiffQuot_4BM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BM |  -.5980943   .1093283    -5.47   0.000    -.8161983   -.3799902
     dropout |  -131.2252   81.50024    -1.61   0.112    -293.8138    31.36331
       _cons |   34.77588   8.202621     4.24   0.000      18.4121    51.13966
-------------+----------------------------------------------------------------
     sigma_u |   8.097154
     sigma_e |  3.4139372
         rho |  .84906581   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(43, 69) =     8.75                 Prob > F = 0.0000
```

```
. xtreg DiffQuot_4BM SNLwBnd_4BM black_m pov_m momonly occscore_m dropout, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       115
Group variable: statenum                        Number of groups   =        44

R-sq:  within  = 0.3621                         Obs per group: min =         1
       between = 0.0517                                        avg =       2.6
       overall = 0.0598                                        max =         3

                                                F(6,65)            =      6.15
corr(u_i, Xb)  = -0.8255                        Prob > F           =    0.0000

------------------------------------------------------------------------------
DiffQuot_4BM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4BM |  -.5313237   .1202054    -4.42   0.000    -.7713904   -.2912569
    black_m |   146.7095   70.82468     2.07   0.042     5.262844    288.1561
      pov_m |    2.56979    33.1016     0.08   0.938    -63.53867    68.67825
    momonly |   6.258689   44.01033     0.14   0.887    -81.63601    94.15339
  occscore_m |   .3528418   3.077774     0.11   0.909    -5.793898    6.499581
    dropout |  -84.68908   91.27651    -0.93   0.357    -266.9809    97.60269
      _cons |   3.496007   94.53904     0.04   0.971    -185.3115    192.3035
-------------+----------------------------------------------------------------
     sigma_u |  12.552031
     sigma_e |   3.400987
         rho |  .93160656   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(43, 65) =     7.62                 Prob > F = 0.0000
```

Fourth Grade White/Hispanic Math

```
 xtreg DiffQuot_4HM SNLwBnd_4HM hispanic_m, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       120
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.2821                         Obs per group: min =         2
       between = 0.1726                                        avg =       2.7
       overall = 0.1459                                        max =         3

                                                F(2,73)            =     14.34
corr(u_i, Xb)  = -0.8806                        Prob > F           =    0.0000

------------------------------------------------------------------------------
DiffQuot_4HM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HM |  -.5111651   .1387685    -3.68   0.000    -.7877303   -.2345998
  hispanic_m |    143.283   47.51024     3.02   0.004     48.59522    237.9708
       _cons |   5.149329   5.163762     1.00   0.322    -5.142034    15.44069
-------------+----------------------------------------------------------------
     sigma_u |  12.705368
     sigma_e |  3.7715317
         rho |  .91901859   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 73) =     6.05                 Prob > F = 0.0000

. xtreg DiffQuot_4HM SNLwBnd_4HM pov_m , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       120
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.1941                         Obs per group: min =         2
       between = 0.1216                                        avg =       2.7
       overall = 0.1280                                        max =         3

                                                F(2,73)            =      8.79
corr(u_i, Xb)  = -0.2766                        Prob > F           =    0.0004

------------------------------------------------------------------------------
DiffQuot_4HM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HM |  -.5950725   .1443018    -4.12   0.000    -.8826655   -.3074795
       pov_m |   13.65631   36.79896     0.37   0.712    -59.68391    86.99654
       _cons |   17.12144   5.522796     3.10   0.003     6.114522    28.12835
-------------+----------------------------------------------------------------
     sigma_u |  6.1460744
     sigma_e |  3.9958215
         rho |  .70289643   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 73) =     5.50                 Prob > F = 0.0000
```

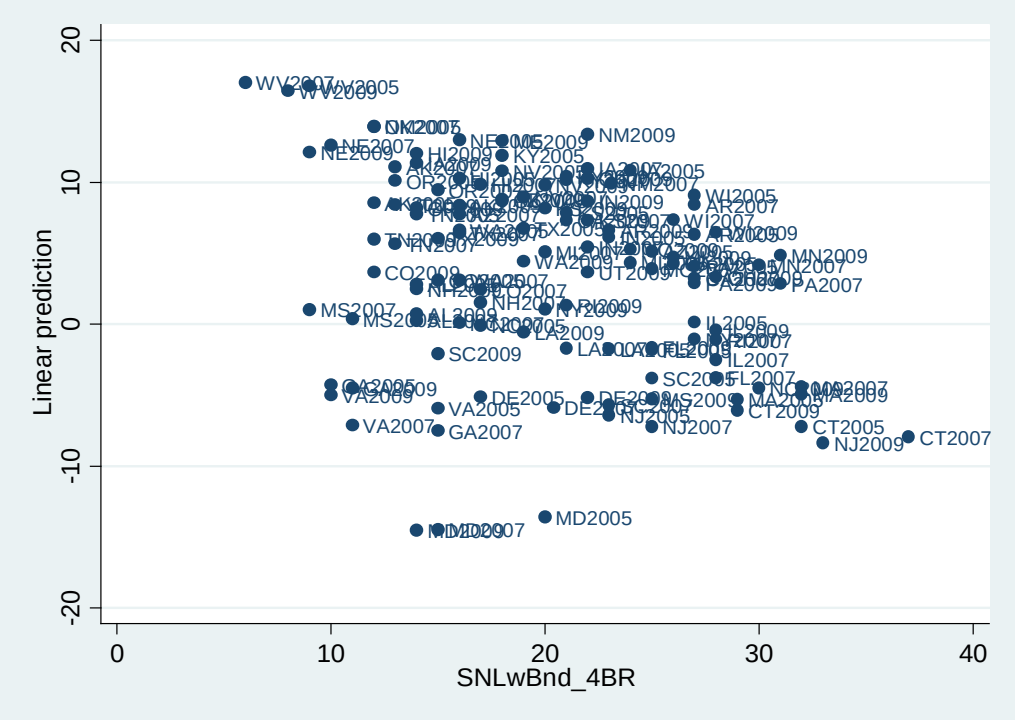
```
. xtreg DiffQuot_4HM SNLwBnd_4HM momonly , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       120
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.3131                         Obs per group: min =         2
       between = 0.0033                                        avg =       2.7
       overall = 0.0167                                        max =         3

                                                F(2,73)            =     16.64
corr(u_i, Xb)  = -0.7331                        Prob > F           =    0.0000

------------------------------------------------------------------------------
DiffQuot_4HM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HM |  -.4839855   .1365509    -3.54   0.001     -.756131   -.2118401
    momonly |   136.4581    38.1395     3.58   0.001     60.44619     212.47
      _cons |  -15.51128   9.910926    -1.57   0.122    -35.26373    4.241162
-------------+----------------------------------------------------------------
     sigma_u |  9.6825792
     sigma_e |  3.6891835
         rho |  .87323241   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 73) =     6.90                 Prob > F = 0.0000

. xtreg DiffQuot_4HM SNLwBnd_4HM occscore_m , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       120
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.1963                         Obs per group: min =         2
       between = 0.0547                                        avg =       2.7
       overall = 0.0667                                        max =         3

                                                F(2,73)            =      8.92
corr(u_i, Xb)  = -0.4036                        Prob > F           =    0.0003

------------------------------------------------------------------------------
DiffQuot_4HM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HM |  -.5824234   .1466717    -3.97   0.000    -.8747396   -.2901072
  occscore_m |  -1.902127   3.279371    -0.58   0.564    -8.437904    4.63365
       _cons |   73.20086   93.58096     0.78   0.437    -113.3057    259.7074
-------------+----------------------------------------------------------------
     sigma_u |  6.7242533
     sigma_e |  3.9904043
         rho |  .73955495   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 73) =     5.25                 Prob > F = 0.0000


. xtreg DiffQuot_4HM SNLwBnd_4HM dropout , fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       120
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.2115                         Obs per group: min =         2
       between = 0.0340                                        avg =       2.7
       overall = 0.0520                                        max =         3

                                                F(2,73)            =      9.79
corr(u_i, Xb)  = -0.4117                        Prob > F           =    0.0002

------------------------------------------------------------------------------
DiffQuot_4HM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HM |   -.587252   .1424361    -4.12   0.000    -.8711266   -.3033773
     dropout |  -111.7639   84.47742    -1.32   0.190    -280.1271    56.59939
       _cons |    29.0987   8.078423     3.60   0.001     12.99842    45.19897
-------------+----------------------------------------------------------------
     sigma_u |  6.8212015
     sigma_e |  3.9524848
         rho |  .74864194   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 73) =     5.99                 Prob > F = 0.0000
```

```
. xtreg DiffQuot_4HM SNLwBnd_4HM hispanic_m pov_m momonly occscore_m dropout, fe i(statenum)

Fixed-effects (within) regression               Number of obs      =       120
Group variable: statenum                        Number of groups   =        45

R-sq:  within  = 0.3678                         Obs per group: min =         2
       between = 0.1139                                        avg =       2.7
       overall = 0.1175                                        max =         3

                                                F(6,69)            =      6.69
corr(u_i, Xb)  = -0.8340                        Prob > F           =    0.0000

------------------------------------------------------------------------------
DiffQuot_4HM |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 SNLwBnd_4HM |  -.4384438   .1380482    -3.18   0.002    -.7138424   -.1630453
  hispanic_m |    113.358   48.98995     2.31   0.024     15.62572    211.0903
       pov_m |   13.16468   35.65091     0.37   0.713    -57.95694    84.28631
     momonly |   108.9761   40.16038     2.71   0.008     28.85832    189.0939
  occscore_m |   1.361312   3.224784     0.42   0.674    -5.071957     7.79458
     dropout |  -55.31441   81.62666    -0.68   0.500    -218.1551    107.5263
       _cons |  -55.04373   96.01318    -0.57   0.568    -246.5848    136.4973
-------------+----------------------------------------------------------------
     sigma_u |  11.425841
     sigma_e |  3.6404527
         rho |  .90783976   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(44, 69) =     5.94                 Prob > F = 0.0000
```

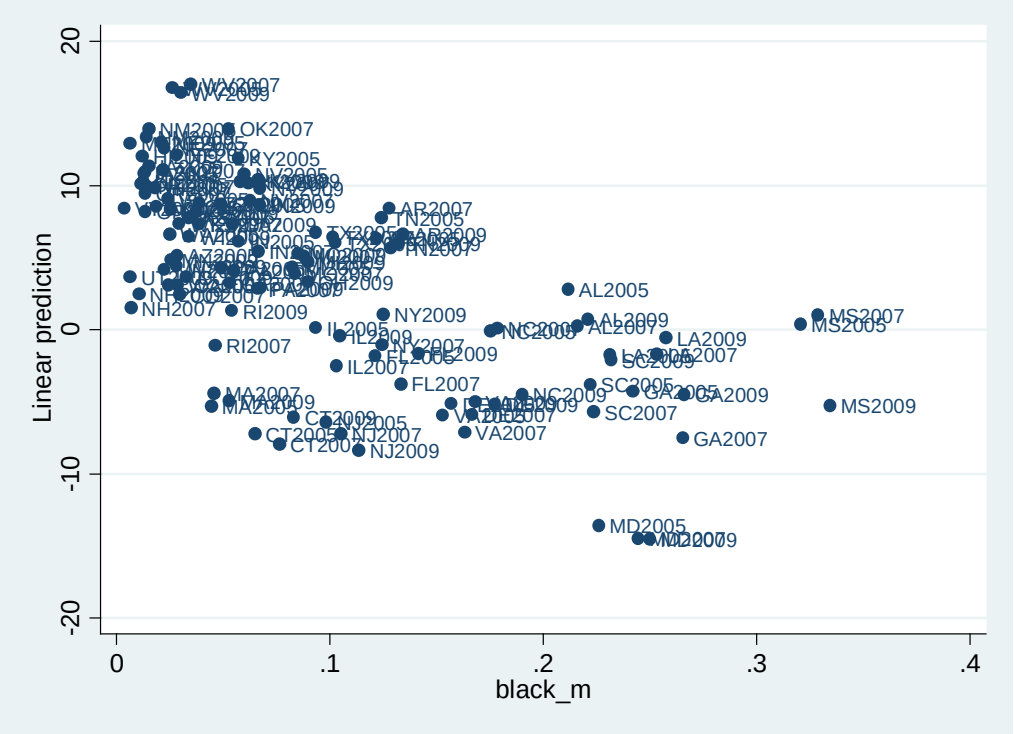
Appendix G

Predictive scatter plots of statistically significant variables

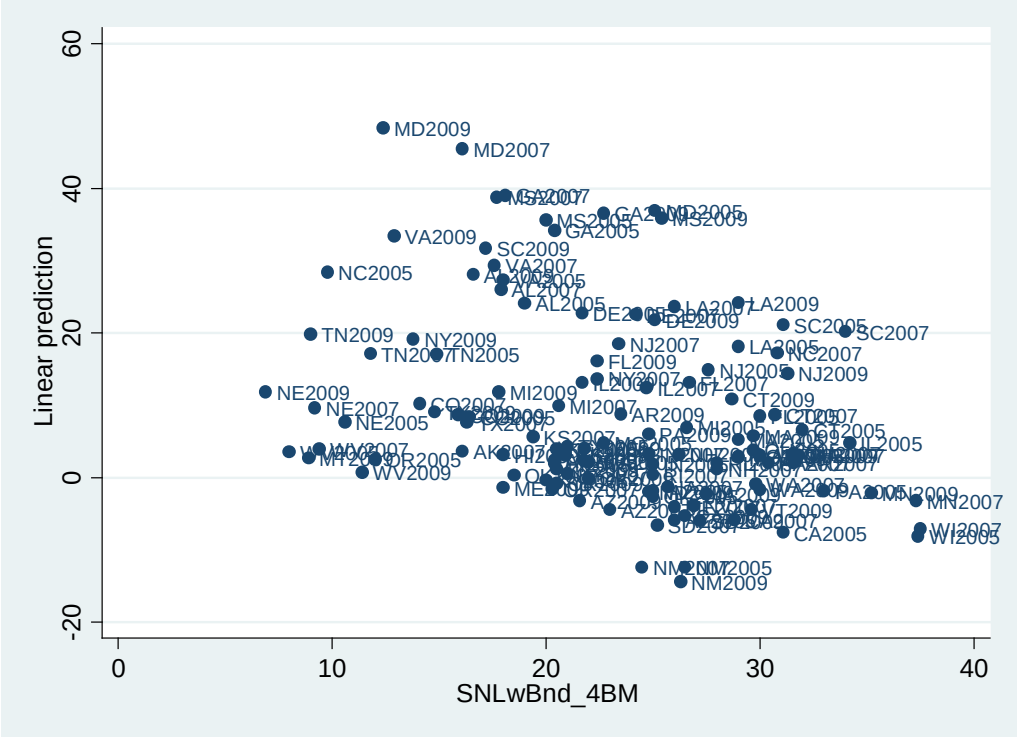
Fourth Grade White/Black Reading Differential Quotient Predictive Regression: State-NAEP Low Boundary



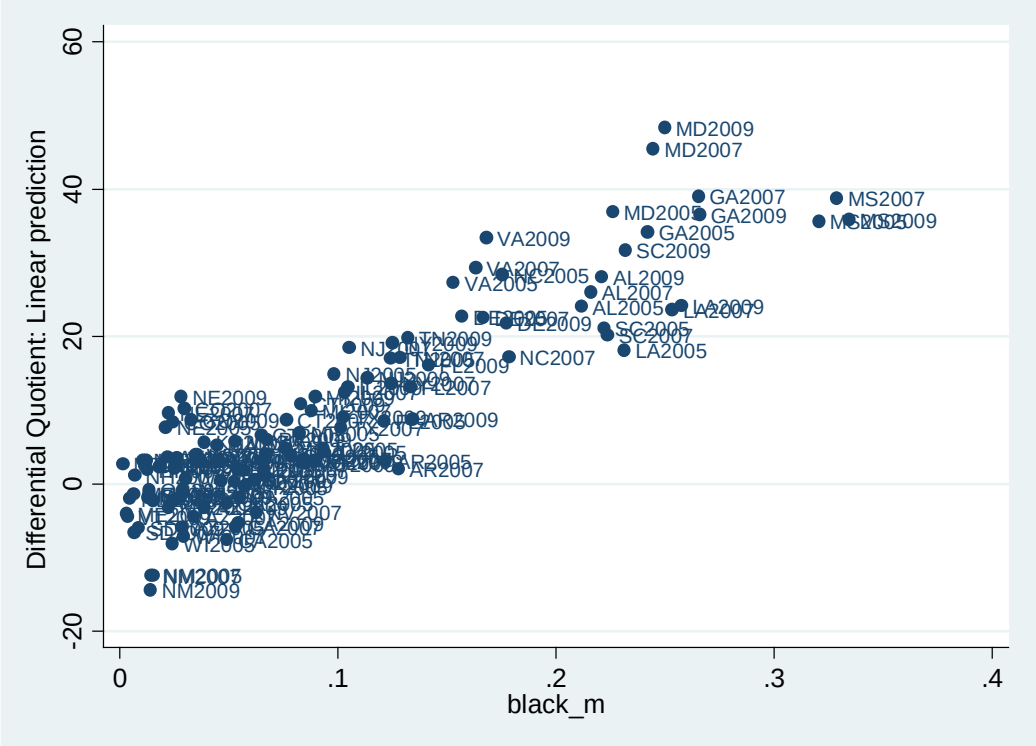
Fourth Grade White/Black Reading Differential Quotient Predictive Regression: Occupation Score



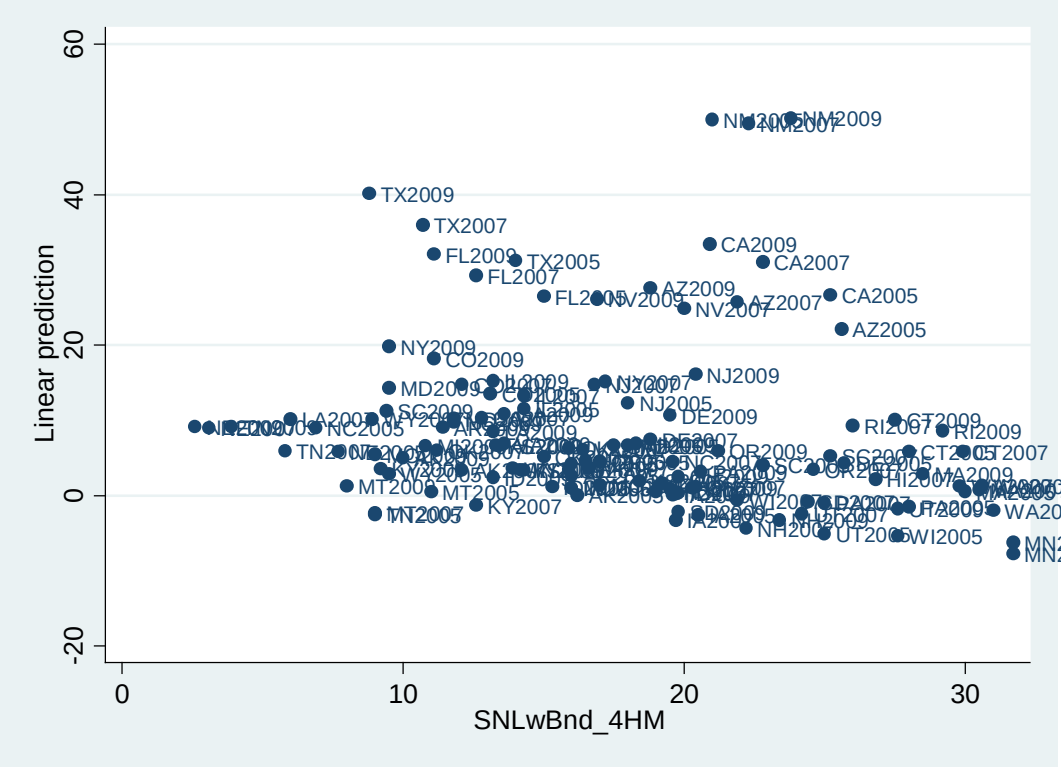
Fourth Grade White/Black Math Differential Quotient Predictive Regression: State-NAEP Low Boundary



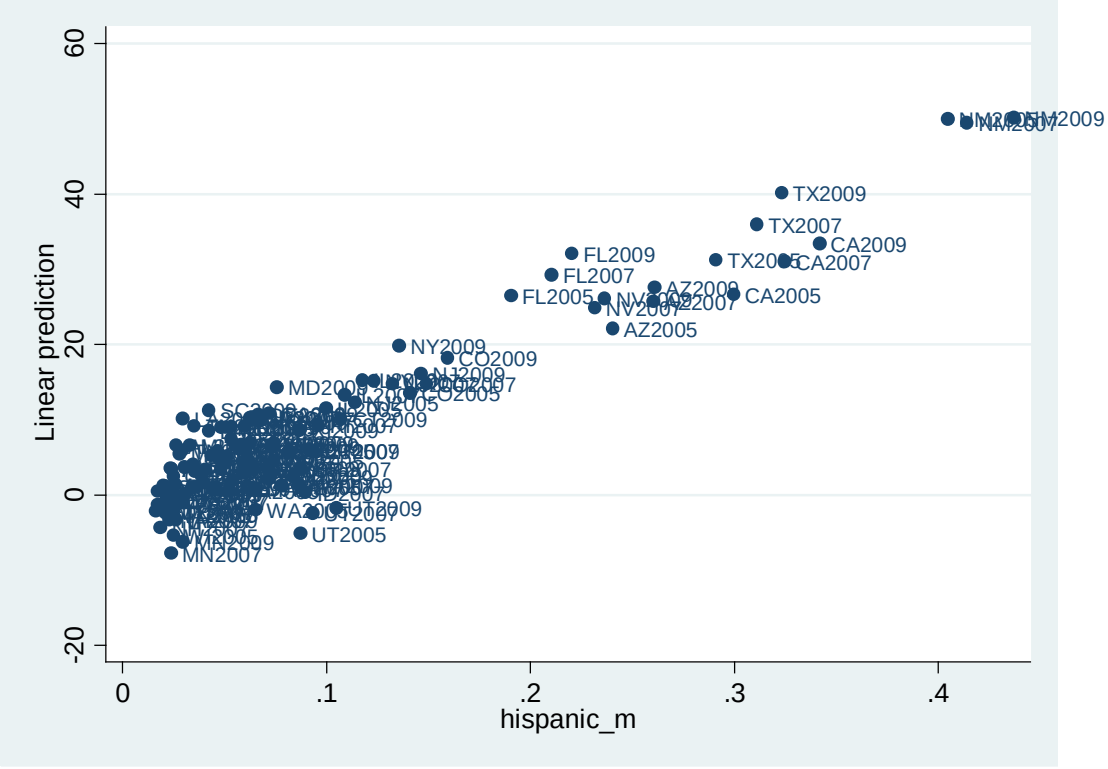
Fourth Grade White/Black Math Differential Quotient Predictive Regression: Level of Black



Fourth Grade White/Hispanic Math Differential Quotient Predictive Regression: State-NAEP Low Boundary



Fourth Grade White/Hispanic Math Differential Quotient Predictive Regression: Level of Hispanic



Fourth Grade White/Hispanic Math Differential Quotient Predictive Regression: Level of Mom-Only Households