

Public Opinion and the Public Schools:
Three Essays on Americans' Education Policy Preferences

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ABSTRACTS

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Learning About Schooling:

The Effects of State Level Student Achievement Data on Public Opinion

There is a growing literature on the effects of student achievement data on public opinion. Prior research suggests that individuals tend to overestimate student achievement in their area. The provision of current achievement levels tends to cause a decrease in confidence in the public schools. In some cases, it appears to increase support for various education reforms. However, previous experimental studies measured outcomes immediately after the provision of information about education performance, making it difficult to distinguish between long-lasting information effects and the more ephemeral consequences of priming. As a result, we do not know how large these effects truly are nor how long they last. I address these concerns by conducting a survey experiment in which I provide state level student achievement data to a randomly assigned treatment group and then measure political attitudes on education issues at three separate times: immediately, after one day, and after ten days. There is evidence that the provision of state level student achievement data temporarily reduces individuals' confidence in their state school systems, but this effect does not persist after ten days.

Schoolhouse Democracy: Education Policy Responsiveness in the States

The link between public opinion and enacted public policy is referred to as policy responsiveness in the political science literature. Using new estimates of state level public opinion, I explore the relationship between support for increased education spending and average per

pupil expenditures at the state level from 1984 to 2013. Within a given year, I find a modest, positive relationship between statewide public opinion on education spending and statewide per pupil expenditures. On average, states with greater support for education spending also tend to spend more per pupil. Within states over time, an increase in support for greater education spending is also associated with an increase in actual spending. However, after controlling for both between-state differences and common trends across states over time, I observe a negative relationship between public opinion and education spending levels. In circumstances in which spending levels are low relative to the state average and low relative to the year average, support for increased education spending tends to be high for that state and year. Additionally, education spending responsiveness tends to be worse in states with weak or non-existent teachers unions.

Polarization and the Politics of Education: What Moves Partisan Opinion?

This study explores the conditions under which partisan polarization and de-polarization occur with respect to public opinion on education issues. To guide this investigation, I pose three general questions. First, does the provision of policy-relevant information cause partisans to converge on the same position? Second, can signals from political elites with ideologically moderate views move partisans closer together? And third, does direct experience with public schools reduce the political abstraction with which one evaluates education policies? I repurpose and extend 17 existing survey experiments to help answer the first two questions, and I conduct a non-experimental data analysis to investigate the third. I find consistent evidence that the provision of education spending information has de-polarizing consequences, but the effects of ideologically moderate elite signals on polarization vary by year. I also find tentative evidence in favor of a link between direct experience with public schools and reduced polarization on education issues.

Contents

- List of Figures iv
- List of Tables v
- Acknowledgements vi
- Preface ix
- 1 Learning About Schooling: The Effects of State Level Student
Achievement Data on Public Opinion 1**
- Literature Review 4
- School Satisfaction and Confidence in Education Institutions 4
- Education Policy Preferences 8
- Differentiating Between Learning and Priming 10
- Information Effect Longevity 12
- Methodology 13
- Research Questions 14
- Data Sources 15
- Analytic Approach 17
- Findings 20
- Representativeness, Balance, and Attrition 20
- Information Effects 22
- Treatment Effect Heterogeneity 26
- Opinion Stability 27
- Conclusions 30

2 Schoolhouse Democracy: Education Policy Responsiveness in the States	32
Literature Review	34
Evidence for Responsiveness	35
Unequal Responsiveness	37
Conditional Responsiveness	39
Methodology	42
Research Questions	42
Data Sources	43
Analytic Approach	47
Findings	49
Nationwide Education Spending Responsiveness	50
Estimating State Level Public Opinion	52
Evidence of State Level Responsiveness	58
Teachers Unions and State Level Responsiveness	63
Conclusions	65
3 Polarization and the Politics of Education: What Moves Partisan Opinion?	68
Literature Review	69
Bipartisanship in Federal Education Policy	70
The Relative Absence of Polarization on Education Issues	71
Mechanisms for Polarization and De-Polarization	76
Methodology	82
Research Questions	83
Data Sources	83
Analytic Approach	86
Findings	87

Policy Information	87
Ideologically Moderate Elite Signaling	90
Direct Experience with Public Schools	92
Conclusions	93
References	97
Preface	97
Learning About Schooling	97
Schoolhouse Democracy	100
Polarization and the Politics of Education	104
Appendix	108
Learning About Schooling: Survey Instruments	108
Schoolhouse Democracy: MRP Validity Checks	119

List of Figures

1.1	Aggregate Opinion Stability	28
2.1	National Public Opinion on Education Spending and Actual Spending	50
2.2	National Public Opinion on Education Spending by Income and Race	51
2.3	State Level Public Opinion on Education Spending	54
2.4	Average State Level Public Opinion by Race	57
2.5	State Level Public Opinion and Race	58
2.6	State Level Responsiveness by Year	59
2.7	Within State Responsiveness Over Time	60
2.8	Teachers Unions, Education Spending, and Public Opinion	63
2.9	Teachers Union Strength and State Level Responsiveness	64
3.1	Polarization and Spending Preferences	74
3.2	Polarization and Policy Preferences	75
A.1	Convergent Validity	119
A.2	Criterion Validity	119
A.3	Discriminant Validity	120

List of Tables

1.1	Balance Between Experimental Groups	21
1.2	Differential Attrition in the Third Survey	22
1.3	Information Effects in the Initial Survey	23
1.4	Information Effects Over Time: Initial Survey and One Day Follow-Up	24
1.5	Information Effects Over Time: All Surveys	25
1.6	Treatment Effect Heterogeneity in the Initial Survey	26
1.7	Individual Opinion Stability	29
2.1	Nationwide Education Spending Responsiveness	51
2.2	Predicting Public Opinion on Education Spending	53
2.3	State Level Support for Increased Education Spending	55
2.4	State Level Responsiveness	61
2.5	Teachers Union Strength and State Level Responsiveness	65
3.1	The Effect of Policy Information on Polarization	88
3.2	The Effect of Policy Information on Polarization (All Years)	89
3.3	The Effect of Ideologically Moderate Elite Signals on Polarization	91
3.4	The Link Between Children in the Household and Polarization	92

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Preface

I know no safe depository of the ultimate powers of the society but the people themselves; and if we think them not enlightened enough to exercise their control with a wholesome discretion, the remedy is not to take it from them, but to inform their discretion by education. This is the true corrective of abuses of constitutional power.

Thomas Jefferson, 1820

Did you, too, O friend, suppose democracy was only for elections, for politics, and for a party name? I say democracy is only of use there that it may pass on and come to its flower and fruit in manners, in the highest forms of interaction between men, and their beliefs—in religion, literature, colleges, and schools—democracy in all public and private life, and in the army and navy.

Walt Whitman, 1871

In the relationship between education and democracy, we often think of schools as the cradle of democratic values: the common meeting ground where social responsibility, civic-mindedness, and tolerance are instilled in the next generation (Dewey 1916; Gutmann 1987). Jefferson's sentiment, quoted above, captures the standard formulation: education develops the knowledge and individual dispositions upon which democracy can thrive and through which threats to democracy can be undermined. But the link between education and democracy goes both ways. Schools do not just cultivate democratic values, they are also the product of democratic pressures. Popularly elected governors, state legislatures,

mayors, city councils, and school boards determine education budgets, set education policy, and appoint top school administrators. Voters themselves often decide the fate of school funding levies directly. Whitman reminds us that democracy is not merely the end to which our collective efforts strive; it is also the means and the method that suffuses our institutions. Like all public endeavors in a democratic society, public schooling is built upon and reflects democratic systems, albeit imperfectly. The public schools are ultimately accountable to the people to whom they belong.

Unfortunately for classical democratic theory, the will of the people with respect to education is far from straightforward. There has never been one agreed upon and uncontested purpose of the public schools. In his final annual report to the Massachusetts Board of Education, Horace Mann ([1848] 1872) contends that the ideal system of public schooling would not only develop individuals' intellects but would also cultivate their physical, political, moral, and religious capacities. The breadth of Mann's vision only begins to capture the many and various objectives of education that Americans have articulated and pursued since the establishment of the first common schools. These goals have shifted over time—from the mission to spread Biblical literacy in the nineteenth century to the emphasis on college and career readiness based on math and reading achievement today—and each era has sown its own dissent and produced its own counter-narratives on the purposes of schooling. Americans have multiple and often conflicting beliefs about education that differ from person to person and from year to year.

This dissertation takes aim at three distinct questions about Americans' views on public education. First, in this age of ubiquitous student achievement data, how do individuals update their political opinions on education issues when they learn new information about education performance? Second, are state school systems responsive to the education policy preferences of their citizens? And third, how can we minimize the partisan polarization that inhibits constructive debate on education issues? Over the course of three article-length essays, my dissertation finds an empirical foothold in each of these large and unwieldy

debates. My objective has been to identify discrete and answerable research questions that can move the scholarly discourse perceptibly forward. Using rigorous and replicable methodological approaches, I seek to contribute to the conversation in a principled and intellectually serious way.

Learning About Schooling: The Effects of State Level Student Achievement Data on Public Opinion

We live in an era of unprecedented access to public elementary and secondary student achievement data. The education reforms prompted by the No Child Left Behind Act of 2001, the Race to the Top competitive grant program of 2009, and the Every Student Succeeds Act of 2015 have produced and maintained extensive district and state systems for administering educational assessments. At the federal level, the U.S. Department of Education conducts the National Assessment of Educational Progress (NAEP) every two years. The education performance data collected from these tests are then disseminated by local, state, and federal departments of education as well as by local and national news outlets. They are also widely available on the web.

How do individuals respond to this influx of data? There is a burgeoning literature on the effects of information about education performance on public opinion. Observational studies indicate, unsurprisingly, that parents and the public as a whole are more satisfied with higher performing schools and school systems (Charbonneau and Van Ryzin 2012; Chingos, Henderson, and West 2012; Favero and Meier 2013; Jacobsen, Saultz, and Snyder 2013). However, individuals tend to overestimate student performance in their area. Accordingly,

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the degree of satisfaction with local and state school systems appears to decline in response to data on student achievement (Clinton and Grissom 2015; Elam 1995; Howell, Peterson, and West 2009; Loveless 1997). Opinions on overall education spending, teacher pay, charter schools, and other education policies may also be affected by the provision of student achievement data and other policy-relevant information such as per pupil expenditures and average teacher salaries. Upon receipt of such information, individuals appear to become more supportive of changes to the current system. Broadly speaking, the existing set of empirical studies on this issue suggests that the provision of information about school expenditures and academic performance generates less support for government spending on education and greater support for education reform policies such as charter schools, private school tuition vouchers, and evaluating teachers based on student performance (Henderson, Howell, and Peterson 2014; Schueler and West 2016; but see Clinton and Grissom 2015 for a counter example in which student achievement data have no effect on support for various education policies).

However, these initial findings conceal a number of unanswered questions. Few studies have attempted to differentiate between the effects of acquiring new information (in which individuals are presumably learning and subsequently altering their stances) and the more ephemeral effects of priming (in which the invocation of an idea temporarily increases its cognitive accessibility at the expense of other potentially relevant considerations). Relatedly, there is an absence of research on the longevity of attitudinal changes on account of new information. Although there is some indirect evidence that such information has lasting and meaningful effects (see Hastings and Weinstein 2008 on school enrollment decisions), to date there have been no attempts to quantify the duration and decay rate of these outcomes.

To address these gaps in the existing literature, I employ a survey experiment in conjunction with a pair of short follow-up surveys on the same experimental subject pool. In the initial survey, a randomly assigned treatment group receives their states' eighth grade math proficiency rates on the 2015 NAEP. Following the provision of treatment, I ask a series

of questions about issues of education policy and state government. Unlike prior studies, I also employ a follow-up survey to measure these political attitudes the next day. Whereas priming effects tend to be short-lived, what remains of an information effect 24 hours later should be distinct from the previous day's prime. Lastly, I also conduct a second follow-up survey after ten days, allowing me to identify whether or not the treatment effect persists and, if so, how the magnitude of that effect changes over time.

The political implications of the current literature are unfavorable for traditional public school systems. If the collection and distribution of student achievement data undermines confidence in the public schools, decreases support for education spending, and increases support for reforms like charters and vouchers that decentralize authority over schools, then local and state education systems may be acting as the agents of their own demise. However, if the effects postulated by the existing research are small and transitory—potentially mere artifacts of the methodological context—then school systems can pursue policies oriented around transparency and accountability without fear of aiding political challenges to their legitimacy.

It is important to note that this experiment explores the effects of a single dose of information at a single point in time. The study of the effects of changes in the broader information environment, in which individuals receive ongoing exposure to new data on student achievement, is more challenging to capture in a survey experimental context. Nevertheless, this methodological approach also offers unique advantages. A survey experiment all but ensures the receipt of the treatment, whereas information delivered through traditional media outlets often fail to reach inattentive eyes and ears. My experiment arguably allows for the estimation of the maximum possible effect of a single dose of information. If treatment effect fade-out occurs quickly in this setting, the case for cumulative effects over time becomes more difficult to make.

Literature Review

This line of research is rooted in the concept of information effects. Among political scientists, there has been a long and distinguished inquiry into the effects of informational cues on individuals' attitudes and behaviors (e.g., Downs 1957; Lupia and McCubbins 1998; Popkin 1991). When these cues take the form of descriptive data with the purpose of informing the public about the nature of government activities, the consequences of these cues are known as information effects (James 2010). The basic justification for the use of such cues is that democratic accountability is enhanced in the presence of simple and accurate data on the workings and performance of government. The extent to which the public responds to such information—specifically with respect to the American public school system—is the central concern that motivates this review of the existing literature.

School Satisfaction and Confidence in Education Institutions

Do measures of school performance alter perceptions of school performance? Much of the evidence marshaled on behalf of this question comes from New York City. During the Bloomberg Mayoral Administration, the New York City Department of Education (NYC DOE) began conducting an annual survey of parents of public school students which included questions on overall school satisfaction. Concurrently, the NYC DOE also launched its system of publicly available “school report cards,” which reported a range of demographic and educational attributes but which are typically remembered for their schoolwide grades of A through F based on student achievement on state standardized assessments. In this case, parental satisfaction presumably reflected, in part, a response to school performance information.

A pair of correlational analyses offer the initial tentative evidence for a relationship between NYC public school performance data and parental satisfaction. Both studies find that average student performance on school report cards is associated with parental

satisfaction, with a standardized effect size of between 0.15 and 0.30 (Charbonneau and Van Ryzin 2012; Favero and Meier 2013). Interestingly, student performance measures for the current academic year (which had not yet been released at the time of the parent survey) were more predictive of parental satisfaction than the previous year's data, indicating that it may not be the published information itself that drives this relationship; rather, parents may be responding to more informal sources of information on school quality (Charbonneau and Van Ryzin 2012).

A third study using the NYC parent survey data takes a longitudinal approach, revealing that parental satisfaction is related to changes in school performance levels (Jacobsen, Saultz, and Snyder 2013). Specifically, after holding a range of school characteristics constant, a one letter drop in school grade (e.g., from A to B) is associated with a three percentage point decline in the probability of expressing satisfaction with the school attended by one's child. Such grade reductions occurred en masse from 2009 to 2010 when the state of New York adopted more rigorous tests. The school report card grades, which were largely a function of proficiency rates on the state tests at the time, registered the change by shifting many schools' grades downward. This situation, in which school performance likely remained fairly constant while indicators of school performance declined, provides a unique opportunity to gauge the effect of performance measures rather than the underlying performance itself.

The three NYC-based articles are convincing insofar as they document that there is indeed a correlational link between school performance information and parental satisfaction in the nation's largest school district. However, they can only hint at the possibility that the provision of such information actually causes changes in reported satisfaction. There are also issues of generalizability: it is not clear from these studies if non-parents respond in similar ways or if such effects also occur in settings that differ substantially from a dense urban center. Chingos, Henderson, and West (2012) expand these findings on both fronts. The school report card system in Florida assigns letter grades based on a continuous metric

in which schools with trivially different scores can receive distinct grades, lending itself to a regression discontinuity design. Because schools that differ by a matter of a few points on either side of a grade threshold are, on average, indistinguishable in terms of quality, any differences in school satisfaction are arguably a result of the letter grades themselves. A positive relationship between school performance information and reported satisfaction persists under this more robust methodological approach: a one letter grade increase on the official school report card from C to B is associated with about half a letter grade increase in respondents' own assessments of their local schools. Furthermore, using a nationally representative Internet-based survey, the researchers utilize respondents' locations to identify their nearest public schools (respondents could then select the most relevant school from a short list). They then use publicly available student achievement data to compare school performance with respondents' school satisfaction in order to replicate the correlational finding from the NYC studies in other geographic contexts and for non-parents as well as parents.

A persistent difficulty with the study of the effects of school performance data on satisfaction is the general inability to randomly assign such information from the outset. Publicly available school performance data is, by definition, available to all. Importantly, the kinds of individuals that acquire this information and the kinds of schools that proudly publicize it undoubtedly differ from their peers on the other end of the spectrum. While some of the non-experimental studies attempt to minimize these concerns by taking advantage of propitious timing or by exploiting threshold effects along continuous measures of school performance, other researchers take a different approach that addresses the issue more directly.

Employing online survey experiments, three groups of researchers test the effect of providing education performance data on confidence in the public schools. Henderson, Howell, and Peterson (2014) demonstrate that the provision of local school district rankings (compared to other districts in the same state or compared to all districts nationwide) causes

respondents to evaluate their local schools less generously: the proportion of respondents who give their local schools a grade of A or B drops by about ten percentage points. In Tennessee, viewing data on statewide student proficiency rates (which are lower than most respondents estimate) diminishes individuals' assessments of the Tennessee public schools, the Tennessee Department of Education, and, to a lesser extent, local public school boards—which is consistent with the provision of state rather than local data (Clinton and Grissom 2015). At the national level, Howell, Peterson, and West (2009) observe a small negative effect on confidence in the nation's schools when they provide the ranking of the math skills of U.S. 15-year-olds on an international assessment: the proportion of respondents who give the nation's public schools a grade of A or B drops by about five percentage points. However, they find no effect of providing current high school graduation rates.

The relationship between school performance data and perceptions of school quality also appears to vary by information format. Jacobsen, Snyder, and Saultz (2014) randomly assign the same school performance data in four different versions (a performance index rating, a letter grade, a ranking, and a percentage of students meeting a designated level of proficiency—calibrated using existing state report cards that employ multiple metrics) to four separate experimental groups. Survey-takers are particularly responsive to letter grades, viewing A rated schools as dramatically better performing than D and F rated schools. The difference in perceived quality of the same schools using other metrics is more muted.

To summarize, there appears to be a causal relationship between the provision of student achievement data and confidence in one's school system. This link occurs at all levels of government: school district, state, and national. The largest effects are associated with the provision of letter grades, but proficiency rates and rankings appear to induce changes as well. Most of the examples in the academic literature on this issue point towards a negative effect, but the Chingos, Henderson, and West (2012) regression discontinuity study also provides evidence of a positive effect when favorable education performance data are available.

Education Policy Preferences

While education leaders and scholars of public administration are interested in the effects of school data on perceptions of the existing system, those engaged in contemporary education reform debates are keen to know how the recent explosion of education data might be used to alter positions and opinions on the contested issues of the day. The literature regarding information effects on education policy preferences partitions into two categories: research on the effects of generally apolitical descriptive data and research on the effects of intentionally politicized (or clearly politicize-able) information. With respect to apolitical data, the findings suggest a link between new information and policy preferences, but the relationship is conditional on the direct relevance of the data to the policy in question. For example, when given data on average per pupil expenditures and average teacher salaries (which tend to be somewhat higher than most people estimate), the proportion of survey respondents who support increased education spending in general drops by about eight percentage points and the proportion of survey respondents who support increased teacher salaries drops by about 16 percentage points (Howell, Peterson, and West 2009; Schueler and West 2016). In this case, the relevance of the information to the policy in question is quite clear.

The effect of school performance data, such as standardized test scores, on education policy preferences is less straightforward. In a nationwide survey, Henderson, Howell, and Peterson (2014) use each respondent's location in combination with publicly available student achievement data to generate an estimated ranking of his or her local school district compared to other districts in that state or compared to all districts nationwide. Because individuals often think quite highly of their local schools, information on their districts' estimated rankings tends to force them to update their beliefs downwards. This new awareness also appears to increase support for school choice policies such as vouchers, charter schools, and parent trigger laws by four to thirteen percentage points. The effect of providing education performance data on support for teachers is conditional on performance levels.

Respondents in relatively low performing school districts tend to become less supportive of teachers unions, but the opposite is true in relatively high performing districts. The link between student achievement data and support for increased teacher salaries is muddled: the effect varies from sharply negative to modestly positive based on current performance levels and whether or not the question includes information on current average salaries. At the state level, the provision of student proficiency rates in Tennessee (which are also considerably lower than most respondents estimate) appears to have no effect on support for vouchers, charter schools, public pre-kindergarten programs, test-based performance pay for teachers, differential teacher pay for working in high-needs schools, or the No Child Left Behind Act (Clinton and Grissom 2015). While these divergent findings may be the result of the differential effects of rankings versus proficiency rates, it may also be possible that underwhelming state level performance data induce less dramatic changes to previously held political attitudes than discouraging district level data. In other words, learning that one's state as a whole suffers from lackluster educational performance may be consistent with the widespread notion that one's local schools are effective while the public school system in general continues to struggle (Loveless 1997).

While descriptive information on school performance and expenditures can undoubtedly become the grist of partisan debate, such data require some level of interpretation before a political narrative can take shape. Other cues, such as the political alignment of the information source or the inclusion of information tailor-made to fit existing ideological perspectives, have a more direct connection to political attitudes. For example, Howell (2008) conducts a simple survey experiment in which he randomizes both the information source ("a [conservative/liberal] research organization in Washington, D.C.") and the content ("students in private schools [do/do not] score higher on tests than comparable students in public schools"). Although he does not ask questions about attitudes towards public and private schooling, the author explores the extent to which the politicization of research affects beliefs about the relative achievement between school sectors. In short, respondents are more

likely to adopt the positions of politically aligned sources, and they are generally resistant to update their beliefs when the new information contrasts their ideological priors and comes from a politically unaligned source (e.g., when self-identified liberals read that private school students outperform their public school peers from a conservative research organization). Similarly, when respondents are provided information that evokes strongly held ideological positions—such as when conservatives are told that charter schools typically hire nonunion teachers—their stated policy preferences shift accordingly (Reckhow, Grossman, and Evans 2015). In this case, upon learning about charter hiring practices, conservatives are considerably more likely to support the expansion of charter schools while liberals’ preferences remain unchanged.

In short, there also appears to be a causal relationship between the provision of student achievement data and education policy preferences, but this link only holds under some conditions. District level rankings appear to cause individuals to become more amenable to contemporary school choice reforms and, in some cases, more critical of teachers. The same does not appear to be true for state level proficiency ratings, although the study that explored this dynamic is limited to Tennessee. It is possible that this relationship is mediated by individuals’ political identities insofar as people are more likely to update their views if the new information is consistent with their political predispositions.

Differentiating Between Learning and Priming

Perhaps the most pervasive threat to the credibility of the existing literature on information effects is the ambiguity over what outcomes are the result of learning new information and what outcomes are merely the momentary effects of priming (Jenkins 2002; Lenz 2009). Priming refers to the process through which individuals become temporarily attuned to different considerations when answering questions, making decisions, or performing actions. Psychologists generally define priming as any “procedure that increases the accessibility of some category or construct in memory” at the expense of other potentially relevant

considerations (Sherman, Mackie, and Driscoll 1990, 405). Priming effects fade quickly as ideas descend to less accessible strata of memory over time. Because many studies of information effects are embedded in survey experiments in which outcomes are measured immediately after the provision of new information, it can be exceedingly difficult to distinguish between information effects (which arguably ought to result in more lasting changes) and priming effects (wherein even the mere mention of an issue may temporarily invoke a range of considerations that alter survey responses).

Two of the studies cited here take this concern seriously and attempt to demonstrate that at least some of the effect of providing new information is not due to priming alone. Clinton and Grissom (2015) include an experiment in which one group is provided new information on the racial achievement gap in Tennessee while the other group is merely asked a question earlier in the survey on the same topic, thereby priming them on the issue of racial equity without actually providing any new information. Respondents who receive data on the achievement gap report lower confidence in Tennessee education institutions than the respondents who are primed but not explicitly informed of the gap, suggesting an information effect above and beyond the effect of priming.

Schueler and West (2016) try to differentiate between learning and priming by exploring the extent to which the information effects they find vary by respondents' pre-existing knowledge about the topic at hand. Schueler and West are investigating whether providing information on per pupil expenditures and average teacher salaries affects respondents' preferences on government spending on education in general and teacher salaries in particular. Because they also ask participants to estimate current spending levels before providing the official amounts, they are able to see if the information effects are larger for those that have more to learn. Their findings conform to this expectation, but they note that there is also an effect for respondents who estimate current spending levels quite accurately. This suggests that priming and information effects may be occurring simultaneously. The inability to differentiate between the two therefore results in an inflated effect size that, even

in the presence of random assignment, cannot be solely attributed to learning as a result of new information.

Perhaps one of the simplest ways to distinguish between information effects and priming effects is to measure outcomes at least one day after the provision of information. Whereas priming effects are typically short-lived (unless an individual is subjected to repeated primes), information effects ought to have at least a slightly longer half-life. What remains of an information effect 24 hours later would almost certainly be distinct from the previous day's prime. Unfortunately, this conceptually simple albeit logistically challenging approach is completely absent from the study of information effects on attitudes towards the public schools.

Information Effect Longevity

The process of forgetting new information may also begin quite rapidly. Information effects undoubtedly fade over time as well, yet there is little research on this dynamic. Survey experiments, the most common methodological approach to the study of information effects and related concepts, rarely include follow-up surveys, inhibiting our understanding of the stability, duration, and decay rate of attitudinal changes that occur as a result of learning new information. If the effects uncovered by survey experiments are fleeting, then the obvious question arises as to their substantive importance. Gaines, Kuklinski, and Quirk (2007, 6), whose overview of the shortcomings of survey experiments for political research has been influential, lay out the challenge succinctly: “The implications of survey-experimental results for politics depend crucially on how long the effects last, with relevant periods measured in weeks, or months, not minutes.” Coppock (2016) responds to Gaines, Kuklinski, and Quirk's critique by documenting persistent and long-lasting, though relatively small, information effects in a number of non-education fields. According to Coppock, survey experimental information effects tend to persist after ten days at about half their original size.

Baden and Lecheler (2012) suggest that treatments that present *new information*—as

opposed to treatments that merely make existing information more *accessible* or *applicable* to a particular context—are more likely to persist over time because of their comparative resilience to subsequent stimuli that activate other considerations. It is not immediately clear whether student achievement data ought to be considered new information or if the provision of such data merely makes existing information more accessible. It seems plausible that many Americans have a general sense of student performance even if few individuals keep updated achievement figures close at hand. If the provision of student achievement data merely reactivates pre-existing knowledge, then we might expect the effects to fade quickly. If, on the other hand, the provision of student achievement data offers genuinely new information, then the effects may persist beyond the initial experiment. There is some evidence that receiving school performance data shapes attitudes for a nontrivial period of time. In Hastings and Weinstein’s (2008) field experiment on the effects of student achievement information in a structured school choice environment, families’ school enrollment decisions were influenced by the information they received, and the decisions occurred two months after the experiment began. Yet we lack a direct measurement of how long the effects of new education-related information last on individuals’ cognition and how the magnitude of those effects diminishes over time.

Methodology

How do individuals update their beliefs and attitudes on issues of education upon receiving information about schools? The most common approach to this question is the use of a single-session survey experiment in which a randomly selected treatment group receives public education performance or administrative data (such as student proficiency rates, graduation rates, per pupil expenditures, average teacher salaries, etc.) while a randomly selected control group does not. After the provision of information, both experimental groups answer a range of questions about their attitudes towards issues of education, such as their confidence in their

local schools or their support for contemporary education reforms like charter schools and vouchers. Multiple studies purport to show effects of these kinds of data on survey-takers' responses. The literature contains strong claims of the influence of education performance data on respondents' attitudes towards public schooling, but the importance of these findings is contingent on the durability of the attitudinal changes. It is my goal to ascertain whether these effects persist under a more rigorous research design and, if so, whether they are large enough to substantively alter our political dialogue on public education.

I administer a survey experiment in which treated individuals receive their state's eighth grade math proficiency rates on the 2015 NAEP, while the control group takes the same survey without the provision of student proficiency rates. I chose these data specifically because they offer a particularly unflattering assessment of education performance. According to this benchmark, fewer than 50 percent of eighth graders were considered proficient in math in every state except Massachusetts, which had a 51 percent proficiency rate. This consistency arguably allows me to produce a relatively uniform impression of student achievement across state lines. Afterwards, I ask subjects about their confidence in the their state school systems and governors as well as their attitudes towards a set of contemporary education policy issues. I also conduct a follow-up survey the next day with the same questions in order to minimize the extent to which priming alters my estimates of the average treatment effects. Lastly, I conduct a second follow-up survey after ten days have elapsed, allowing me to identify whether or not the average treatment effects persist and, if so, how the magnitudes of those effects change over time.

Research Questions

1. What are the average effects of providing individuals with their states' 2015 NAEP eighth grade math proficiency rates on their attitudes towards issues of education policy?
2. Do these effects persist after one day has elapsed? How large are they?

3. Do these effects persist after ten days have elapsed? How large are they?
4. Do these effects differ for various demographic groups?

Data Sources

To recruit subjects for the initial survey, I used Amazon’s Mechanical Turk¹ service. The subject pool for the initial survey consisted of 1,003 U.S. residents over the age of 18. Of these original subjects, 823 also completed the one day follow-up survey. A total of 674 individuals completed the initial survey and both follow-up surveys.

I used the Qualtrics survey platform to administer the experiment and follow-up surveys. In the initial survey, I asked respondents for their primary U.S. state of residence. I then provided a series of statewide data points to all respondents about their respective states: the population size, the unemployment rate, the median household income, and the general election turnout in 2016. In each instance, respondents had to indicate that they read the information by answering a simple question about it. They were unable to continue with the survey until they answered correctly. I employed this method to ensure that respondents received the information and did not merely click through this portion of the survey. All subjects successfully completed this section. Using Qualtrics’ “Randomizer” feature, a randomly assigned treatment group received one additional question in which they were provided their states’ 2015 NAEP eighth grade math proficiency rates:

—% of eighth graders in [state] public schools were considered proficient in math in 2015.
(National Assessment of Educational Progress, U.S. Department of Education)

What percentage of eighth graders were considered proficient in math in [state] public schools in 2015?

¹ Mechanical Turk is an online market in which users complete short tasks (such as online surveys) for a small fee. See Berinsky, Huber, and Lenz (2012) and Follmer, Sperlin, and Suen (2017) on the use of Mechanical Turk for political and educational research.

[four answer choices—only one of which is correct]

Respondents were then asked a series of questions about education issues in their state:

1. How confident are you in the [state] public elementary and secondary school system?
2. Do you support or oppose increasing the amount of money that [state] spends on public elementary and secondary schools?
3. Do you support or oppose increasing public school teacher salaries in [state]?
4. Do you support or oppose evaluating teachers in [state] based on student achievement?
5. Do you support or oppose increasing the number of charter schools in [state]?
6. Do you support or oppose the use of publicly-funded tuition vouchers for low-income families to send their children to private schools in [state]?
7. Do you support or oppose the adoption of the Common Core State Standards in [state]?
8. How confident are you in [governor name], the governor of [state]?

I chose these questions in order to situate my study in the context of prior research on the effects of student achievement data on school confidence and education policy preferences. Question 1 assesses confidence in one’s state school system. Questions 2–7 represent contemporary education reform debates. Some prior research suggests that individuals are more likely to support reform efforts when they become aware of current performance levels (Henderson, Howell, and Peterson 2014), while other research finds no connection between the provision of student achievement data and attitudes towards contemporary political debates on education issues (Clinton and Grissom 2015). Question 8 seeks to understand whether respondents are also willing to hold non-education elected officials accountable for student achievement.

Respondents’ answers were recorded on four-point Likert scales (“Not at all confident” to “Very confident” or “Strongly oppose” to “Strongly support”). Lastly, respondents answered a set of demographic questions about their age, parental status, sex, race/ethnicity,

educational attainment, political party identification, and political ideology. In the follow-up surveys, respondents re-answered the same questions about education in their state. A full list of all questions in all three surveys is provided in the appendix.

I also use data from the American National Election Studies 2016 Time Series Survey (ANES) to explore how the demographic composition of my subject pool compares to the country as a whole. The ANES is a nationally representative survey of Americans' political attitudes conducted before and after every U.S. presidential election.

Analytic Approach

For each of the eight outcomes, I calculate two versions of the average treatment effect:

1. A bivariate ordinary least squares (OLS) regression of the outcome on an indicator of treatment status
2. A multivariate OLS regression of the outcome on an indicator of treatment status, a vector of demographic covariates, and fixed effects for state of residence

I measure my outcomes using a four-point Likert scale. While traditional OLS regression can accommodate Likert scales as continuous variables, it is not clear whether the intervals of the scale are indeed equal in size. Therefore, I also conduct the same analyses using ordered logistic regression. The results are substantively equivalent; therefore, only the OLS results are presented here.

I test five hypotheses drawn from the existing literature on the effects of student achievement data on public opinion:

1. The provision of statewide education performance data will lower reported confidence in state education systems.
2. The provision of statewide education performance data will reduce support for increased state spending on state school systems in general and teacher salaries in particular.

3. The provision of statewide education performance data will increase support for contemporary education reform policies such as charter schools, private school tuition vouchers, evaluating teachers based on student achievement, and the adoption of the Common Core State Standards.
4. The provision of statewide education performance data will also lower reported confidence in non-education state officials, such as the governor.
5. The magnitude of the effects proposed in Hypotheses 1–4 will be reduced in each successive measurement of outcomes.

To assess the statistical significance of these directional hypotheses, I follow the expectations of my pre-analysis plan (available on the Open Science Framework) and employ one-tailed tests with an alpha level of 0.05. For the average treatment effects recovered with OLS regression, I use randomization inference to calculate p -values for one-tailed tests of the sharp null hypothesis that the treatment effect is zero for all subjects. To do this, I calculate the average treatment effect under the sharp null hypothesis for 10,000 possible randomized treatment assignments. The p -value is the proportion of average treatment effect estimates that are at least as large (or small) as the one produced by the actual experiment.

To test for balance between treatment and control groups, I regress treatment status on the demographic covariates and calculate an F -statistic. I determine the statistical significance of that F -statistic by using randomization inference, calculating analogous F -statistics under the null hypothesis that no covariates have any effect on the assigned treatment for 10,000 possible randomized treatment assignments. The p -value is the proportion of test statistics that are at least as large as the one produced by the actual experiment.

There is one instance of missing data in the initial survey.² One respondent chose not

² This level of completeness is typical of respondents recruited via Mechanical Turk. Such respondents are dependent upon approval by the survey administrator in order to be paid for their efforts. I compensated all individuals who took any portion of any survey as long as they subsequently documented their work on Mechanical Turk. Other than the statewide data questions (in which respondents were required to answer

to answer demographic questions. For simplicity, I drop this subject from the analyses of the initial survey. This individual did not complete either follow-up survey.

To test for differential attrition by experimental condition and by demographic characteristics, I conduct two analyses:

1. A bivariate OLS regression of missingness on an indicator of treatment status
2. A multivariate OLS regression of missingness on an indicator of treatment status and a vector of demographic covariates

I perform these analyses two times: after the one day follow-up survey and again after the ten day follow-up survey. In my analysis, the test for differential attrition in the ten day follow-up survey approaches the threshold of statistical significance. Therefore, I also conduct a more thorough investigation, wherein I regress missingness on an indicator of treatment status, a vector of demographic covariates, and a set of interactions between treatment status and each covariate.

I explore treatment effect heterogeneity by parental status, political party identification, and political ideology. I had no prior hypotheses about the directionality of such heterogeneous treatment effects. Therefore, this portion of the analysis is exploratory and is presented as such. Given the number of covariates and outcomes, the potential for Type I errors is high.

Lastly, I conduct a non-experimental analysis of opinion stability both at the aggregate and the individual level. At the aggregate level, I calculate the average response for each political attitude in each survey administration and then graph these preferences over time. At the individual level, I calculate the Pearson correlation coefficients of each political attitude in the initial survey and the same attitude in subsequent survey administrations.

a simple question correctly in order to indicate that they read the information), respondents were free to leave any question blank.

Findings

Representativeness, Balance, and Attrition

Table 1.1 displays the frequency of various demographic characteristics by experimental condition. It also displays the frequency of the same characteristics in the 2016 American National Election Study, a nationally representative survey of political attitudes. The experimental subject pool is somewhat younger, better educated, and more likely to identify as Democrats and liberals than the U.S. as a whole. On other dimensions—sex, race/ethnicity, and parental status—the subject pool roughly approximates the characteristics of the population.

The random assignment of treatment effectively establishes treatment and control groups with similar demographic compositions. This is true among the subjects who took the initial survey ($F = 1.05$, $p = 0.38$), among those who completed both the initial survey and the one day follow-up survey ($F = 0.87$, $p = 0.78$), and among those who completed all three surveys ($F = 0.88$, $p = 0.75$). Although the omnibus F -tests indicate overall balance between experimental conditions across all covariates taken as a whole, it is worth noting that there is a slightly higher proportion of Democrats in the treatment group. This particular difference is statistically significant among subjects who completed the initial survey, and it approaches significance in the subsets of the subject pool that completed subsequent surveys. Because I hypothesize that the provision of state level student achievement data will generally shift subjects towards more politically conservative positions, this minor imbalance could attenuate the magnitude of the treatment effects.

Among the subjects who completed both the initial survey and the one day follow-up survey, there is no relationship between treatment status and attrition after the initial survey ($F = 0.65$, $p = 0.41$). The same is true among those who completed all three surveys ($F = 0.03$, $p = 0.85$). I also explored whether or not certain demographic groups were more

Table 1.1: Balance Between Experimental Groups

%	Initial Survey (<i>n</i> =1003)		Initial Survey + One Day Follow-Up (<i>n</i> =823)		All Surveys (<i>n</i> =674)		ANES 2016 (<i>n</i> =4271)
	Control (<i>n</i> =502)	Treatment (<i>n</i> =501)	Control (<i>n</i> =407)	Treatment (<i>n</i> =416)	Control (<i>n</i> =336)	Treatment (<i>n</i> =338)	
Parent of School-Age Child	38.2	40.5	37.1	39.7	35.1	39.1	33.7
Female	54.4	49.5	52.3	48.6	51.8	48.8	52.9
White	80.0	81.8	79.1	81.5	79.4	80.8	71.7
Black	7.6	7.6	7.9	7.7	7.5	8.0	9.4
Hispanic	4.6	3.8	4.9	3.6	4.8	3.8	10.6
Other Race	7.8	6.8	8.1	7.2	8.4	7.4	8.3
Less Than High School	1.2	0.6	1.0	0.5	0.9	0.6	18.5
High School	11.2	10.8	11.3	10.3	11.0	11.6	19.3
Some College	24.6	27.3	23.4	28.1	24.5	27.8	21.2
Associate's Degree	14.8	15.4	13.8	14.7	12.2	13.9	14.2
Bachelor's or Higher	48.3	45.9	50.5	46.4	51.3	45.9	26.8
Republican	27.7	23.6	25.4	23.6	26.6	23.4	30.4
Democrat	40.5	47.1	41.1	46.6	40.0	46.4	35.8
Independent	31.7	29.3	33.5	29.8	33.4	30.2	33.8
Conservative	30.5	26.3	30.5	27.9	32.1	26.0	41.7
Liberal	47.4	49.3	47.4	48.3	45.5	48.5	31.2
Moderate	22.1	24.4	22.1	23.8	22.3	25.4	27.1
Age (Years)	37.3	36.2	37.1	36.5	37.9	37.2	49.6
F^1		1.05 (<i>p</i> =0.38)		0.87 (<i>p</i> =0.78)		0.88 (<i>p</i> =0.75)	
Attrition After Initial Survey			18.9	17.0	33.1	32.5	
F^2				0.65 (<i>p</i> =0.41)		0.03 (<i>p</i> =0.85)	
F^3				1.19 (<i>p</i> =0.14)		1.27 (<i>p</i> =0.08)	

Notes: F^1 calculated by regressing assignment to treatment on a vector of covariates; F^2 calculated by regressing an indicator of missingness on assignment to treatment; F^3 calculated by regressing an indicator of missingness on assignment to treatment and a vector of covariates; ANES values calculated among respondents who provided answers similar to options in the survey experiment; *p*-values calculated using randomization inference.

likely to attrit than others. Collectively, attrition in the one day follow-up survey is not a function of all of the demographic characteristics taken as a whole ($F = 1.19$, $p = 0.14$). After ten days, however, my test for differential attrition approaches statistical significance ($F = 1.27$, $p = 0.08$).

I explore the potential for unequal levels of attrition by demographic profile and treatment status in greater detail in Table 1.2. All else equal, parents and Republicans

Table 1.2: Differential Attrition in the Third Survey ($n = 1003$)

	Coef	(SE)		Coef	(SE)
Intercept	0.40	(0.08)			
Information (Treatment)	0.12	(0.12)			
Age	0.00	(0.00)	Info \times Age	0.00	(0.00)
Parent	0.08	(0.04)	Info \times Parent	-0.05	(0.06)
Female	0.06	(0.04)	Info \times Female	-0.04	(0.06)
Black	-0.03	(0.08)	Info \times Black	-0.03	(0.12)
Hispanic	-0.05	(0.10)	Info \times Hispanic	0.03	(0.15)
Other Race	-0.06	(0.08)	Info \times Other Race	-0.02	(0.12)
Less Than High School	0.17	(0.20)	Info \times Less Than High School	-0.18	(0.34)
High School	0.06	(0.07)	Info \times High School	-0.11	(0.10)
Some College	0.05	(0.05)	Info \times Some College	-0.06	(0.07)
Associate's Degree	0.14	(0.06)	Info \times Associate's Degree	-0.09	(0.09)
Republican	0.19	(0.08)	Info \times Republican	-0.20	(0.12)
Independent	0.01	(0.06)	Info \times Independent	-0.02	(0.08)
Conservative	-0.21	(0.08)	Info \times Conservative	0.22	(0.11)
Moderate	-0.08	(0.06)	Info \times Moderate	0.04	(0.09)
F	1.32				
R^2	0.04				

Notes: Values are from a single OLS regression in which the dependent variable is an indicator of missingness in the third survey; Parent refers to a parent of a school-aged child; race/ethnicity compared to White; educational attainment compared to Bachelor's Degree or Higher; party identification compared to Democrat; political ideology compared to Liberal.

were more likely to attrit than non-parents and Democrats—although they did so at similar rates in both the treatment and control groups. More problematic is the unequal rate of attrition for self-identified conservatives. Conservatives were more likely to drop out of the experiment if they were in the treatment group. This pattern becomes apparent in the analysis of treatment effect decay from the initial survey to the ten day follow-up survey. When I restrict the subject pool to those individuals who completed all three surveys, the direction of the treatment effect shifts in a more liberal direction across all three survey administrations (more detail in Table 1.5).

Information Effects

Table 1.3 displays the average treatment effects of the provision of student performance data on public opinion in the initial survey ($n = 1003$). There appears to be a small negative effect of student achievement data on confidence in one's state school system: on average,

Table 1.3: Information Effects in the Initial Survey ($n = 1003$)

Outcome	Control		Treatment		Unadjusted		Adjusted	
	Mean	SD	Mean	SD	\widehat{ATE}	(SE)	\widehat{ATE}	(SE)
Confidence in Schools	2.32	0.78	2.23	0.80	-0.09	(0.05)	-0.10	(0.05)
Increased Spending	3.27	0.80	3.31	0.79	0.05	(0.05)	-0.01	(0.05)
Teacher Salaries	3.25	0.83	3.32	0.78	0.07	(0.05)	0.04	(0.05)
Teacher Evaluation	2.75	0.91	2.75	0.91	-0.01	(0.06)	-0.02	(0.06)
Charter Schools	2.58	0.92	2.56	0.90	-0.02	(0.06)	-0.01	(0.05)
Tuition Vouchers	2.54	1.03	2.55	1.05	0.01	(0.07)	0.01	(0.07)
Common Core	2.12	0.96	2.15	1.01	0.03	(0.06)	-0.01	(0.06)
Confidence in Governor	2.15	0.96	2.20	0.96	0.05	(0.06)	0.07	(0.06)

Notes: Values are average responses on four-point scales (“Not at all confident” to “Very confident” or “Strongly oppose” to “Strongly support”); covariates include parental status, sex, race/ethnicity, educational attainment, political party identification, political ideology, age, and state of residence; standard errors calculated using randomization inference.

confidence declines by about a tenth of a point on a four-point scale (a standardized effect size of -0.12 or -0.13, depending on the model). This pattern does not extend to attitudes on other education policies. The provision of student achievement data does not have an effect on attitudes towards state spending on education, teacher salaries, evaluating teachers based on student performance, charter schools, vouchers, the Common Core State Standards, or confidence in one’s governor. In the initial survey, I find modest evidence in favor of Hypothesis 1 (lower confidence in the state school system) and no evidence in favor of Hypotheses 2–4 (less support for spending and greater support for reform policies).

Table 1.4 displays the average treatment effects in both the initial survey and the one day follow-up survey among those subjects who completed both ($n = 823$). The magnitude, direction, and significance of the effect of student achievement data on confidence in one’s state school system in the initial survey remain consistent among this subset of the subject pool. One day after the provision of treatment, the size of the effect diminishes slightly (from -0.09 to either -0.05 or -0.07, depending on the model) and is no longer statistically significant. This provides some tentative evidence in favor of Hypothesis 5, which states that the magnitude of the effects would be reduced over time. This is consistent with the notion that respondents may already be at least somewhat familiar with current math achievement levels. The provision of student proficiency rates may make this knowledge more accessible,

Table 1.4: Information Effects Over Time: Initial Survey and One Day Follow-Up ($n = 823$)

Outcome	Initial Survey	Initial Survey	One Day Follow-Up	One Day Follow-Up
Confidence in Schools	-0.09 (0.05)	-0.09 (0.05)	-0.05 (0.05)	-0.07 (0.05)
Increased Spending	0.03 (0.06)	0.00 (0.05)	0.07 (0.06)	0.04 (0.05)
Teacher Salaries	0.08 (0.06)	0.06 (0.05)	0.10 (0.06)	0.08 (0.06)
Teacher Evaluation	0.00 (0.06)	-0.01 (0.07)	0.00 (0.06)	-0.01 (0.06)
Charter Schools	0.00 (0.06)	0.00 (0.06)	0.03 (0.07)	0.03 (0.06)
Tuition Vouchers	0.03 (0.07)	0.04 (0.07)	-0.02 (0.07)	-0.02 (0.07)
Common Core	0.02 (0.07)	-0.01 (0.07)	0.04 (0.07)	0.01 (0.07)
Confidence in Governor	0.02 (0.07)	0.02 (0.06)	0.01 (0.07)	0.01 (0.06)
Covariates		Yes		Yes

Notes: Values are OLS regression coefficients with standard errors in parentheses; covariates include parental status, sex, race/ethnicity, educational attainment, political party identification, political ideology, age, and state of residence; standard errors calculated using randomization inference.

but only temporarily.

On a longer timeline, there is no link between student achievement data and any of the political attitudes measured in this experiment. Table 1.5 displays the average treatment effects for each outcome in each survey administration among those subjects who completed all three surveys ($n = 674$). In every case, the average treatment effect is statistically indistinguishable from zero. Note that the average treatment effect on confidence in schools is now zero in the initial survey as well. This is likely due to differential attrition by political ideology. Self-identified conservatives in the treatment group were less likely to complete the third survey than their ideological peers in the control group. As a result, when I restrict the subject pool to those respondents who completed all three surveys, the estimate of the average treatment effect shifts slightly in the liberal direction for each survey administration. The estimated effect is now zero in the initial survey and modestly positive in the ten day follow-up survey. This is the same trajectory we would expect if, in the absence of differential attrition, the effect of providing state level student achievement on confidence in the subject's

Table 1.5: Information Effects Over Time: All Surveys ($n = 674$)

Outcome	Initial Survey	Initial Survey	One Day Follow-Up	One Day Follow-Up	Ten Day Follow-Up	Ten Day Follow-Up
Confidence in Schools	0.00 (0.06)	-0.01 (0.06)	0.01 (0.06)	0.00 (0.06)	0.06 (0.06)	0.04 (0.06)
Increased Spending	0.03 (0.06)	-0.03 (0.06)	0.08 (0.06)	0.02 (0.06)	0.10 (0.06)	0.04 (0.06)
Teacher Salaries	0.07 (0.06)	0.02 (0.06)	0.09 (0.06)	0.04 (0.06)	0.12 (0.07)	0.05 (0.06)
Teacher Evaluation	0.01 (0.07)	0.00 (0.07)	0.02 (0.07)	0.00 (0.07)	0.00 (0.07)	-0.03 (0.07)
Charter Schools	-0.02 (0.07)	0.01 (0.07)	0.01 (0.07)	0.05 (0.07)	-0.07 (0.07)	-0.04 (0.07)
Tuition Vouchers	-0.03 (0.08)	-0.01 (0.08)	-0.05 (0.08)	-0.03 (0.08)	-0.04 (0.08)	-0.03 (0.08)
Common Core	0.01 (0.08)	-0.03 (0.08)	0.02 (0.08)	-0.02 (0.08)	-0.01 (0.08)	-0.05 (0.08)
Confidence in Governor	0.00 (0.07)	0.01 (0.07)	0.00 (0.07)	0.01 (0.07)	0.02 (0.07)	0.04 (0.07)
Covariates		Yes		Yes		Yes

Notes: Values are OLS regression coefficients with standard errors in parentheses; covariates include parental status, sex, race/ethnicity, educational attainment, political party identification, political ideology, age, and state of residence; standard errors calculated using randomization inference.

state school system is initially negative and then attenuates towards zero over time. Under this assumption, the results from all three surveys are therefore consistent with Hypothesis 1 and Hypothesis 5. I continue to find no evidence in favor of Hypotheses 2–4.

To summarize, the provision of statewide student achievement data only appears to have an effect on one outcome—confidence in the state school system—but the size of this effect is relatively small: only about one-tenth of a standard deviation. Moreover, this effect essentially disappears after one day has elapsed. There is no trace of it after ten days. I find no evidence of any effects of statewide student achievement data on education policy preferences such as increasing overall spending levels, increasing teacher salaries, evaluating teachers based on student test scores, increasing the number of charter schools, offering private school tuition vouchers to low-income students, or adopting the Common Core State Standards. I also find no evidence of an effect on confidence in a non-education state official (the governor).

Treatment Effect Heterogeneity

Arguably, it may be the case that the appearance of no average effect is the consequence of heterogenous treatment effects that balance out. There is little evidence in favor of this conjecture, and the reader should approach the forthcoming analysis of treatment effect heterogeneity with caution. Table 1.6 displays a series of 24 OLS regression models in which each of the eight outcomes is regressed on three combinations of variables: 1) treatment

Table 1.6: Treatment Effect Heterogeneity in the Initial Survey ($n = 1003$)

	Confidence in Schools	Increased Spending	Teacher Salaries	Teacher Evaluation	Charter Schools	Tuition Vouchers	Common Core	Confidence in Governor
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Information	-0.08 (0.06)	0.02 (0.06)	0.02 (0.07)	0.04 (0.07)	-0.02 (0.07)	-0.02 (0.08)	0.06 (0.08)	0.05 (0.08)
Parent	0.13 (0.07)	0.07 (0.07)	0.04 (0.07)	0.10 (0.08)	0.25 (0.08)	0.09 (0.10)	-0.24 (0.09)	0.13 (0.09)
Info \times Parent	-0.04 (0.10)	0.05 (0.10)	0.14 (0.10)	-0.12 (0.12)	-0.02 (0.12)	0.07 (0.13)	-0.06 (0.13)	0.00 (0.12)
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Information	-0.12 (0.08)	-0.05 (0.07)	-0.01 (0.08)	-0.06 (0.09)	0.06 (0.08)	0.04 (0.10)	0.09 (0.09)	0.06 (0.09)
Republican	-0.05 (0.09)	-0.56 (0.08)	-0.53 (0.09)	0.15 (0.10)	0.69 (0.10)	0.10 (0.11)	-0.45 (0.11)	0.16 (0.10)
Info \times Rep	0.05 (0.12)	0.14 (0.12)	0.20 (0.12)	0.09 (0.14)	-0.10 (0.14)	-0.18 (0.16)	-0.10 (0.15)	0.18 (0.15)
Independent	-0.22 (0.08)	-0.43 (0.08)	-0.33 (0.08)	-0.10 (0.10)	0.31 (0.09)	-0.08 (0.11)	-0.26 (0.10)	0.03 (0.10)
Info \times Ind	0.03 (0.12)	0.10 (0.11)	0.03 (0.12)	0.13 (0.14)	-0.06 (0.13)	0.06 (0.16)	-0.21 (0.14)	-0.11 (0.14)
	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Information	-0.12 (0.07)	-0.04 (0.07)	-0.03 (0.07)	-0.04 (0.08)	0.04 (0.08)	0.10 (0.09)	0.06 (0.09)	0.00 (0.09)
Conservative	-0.04 (0.08)	-0.64 (0.08)	-0.58 (0.08)	0.06 (0.09)	0.73 (0.09)	0.22 (0.11)	-0.47 (0.10)	0.21 (0.10)
Info \times Con	0.01 (0.12)	0.19 (0.11)	0.24 (0.12)	0.24 (0.14)	-0.11 (0.13)	-0.31 (0.15)	0.06 (0.14)	0.21 (0.14)
Moderate	-0.07 (0.09)	-0.30 (0.09)	-0.27 (0.09)	0.19 (0.10)	0.46 (0.10)	0.23 (0.12)	-0.00 (0.11)	0.20 (0.11)
Info \times Mod	0.12 (0.13)	0.08 (0.12)	0.10 (0.12)	-0.12 (0.14)	-0.08 (0.14)	-0.03 (0.17)	-0.28 (0.15)	0.00 (0.15)

Notes: Values are OLS regression coefficients with standard errors in parentheses; Parent refers to a parent of a school-aged child; Republican and Independent compared to Democrat; Conservative and Moderate compared to Liberal.

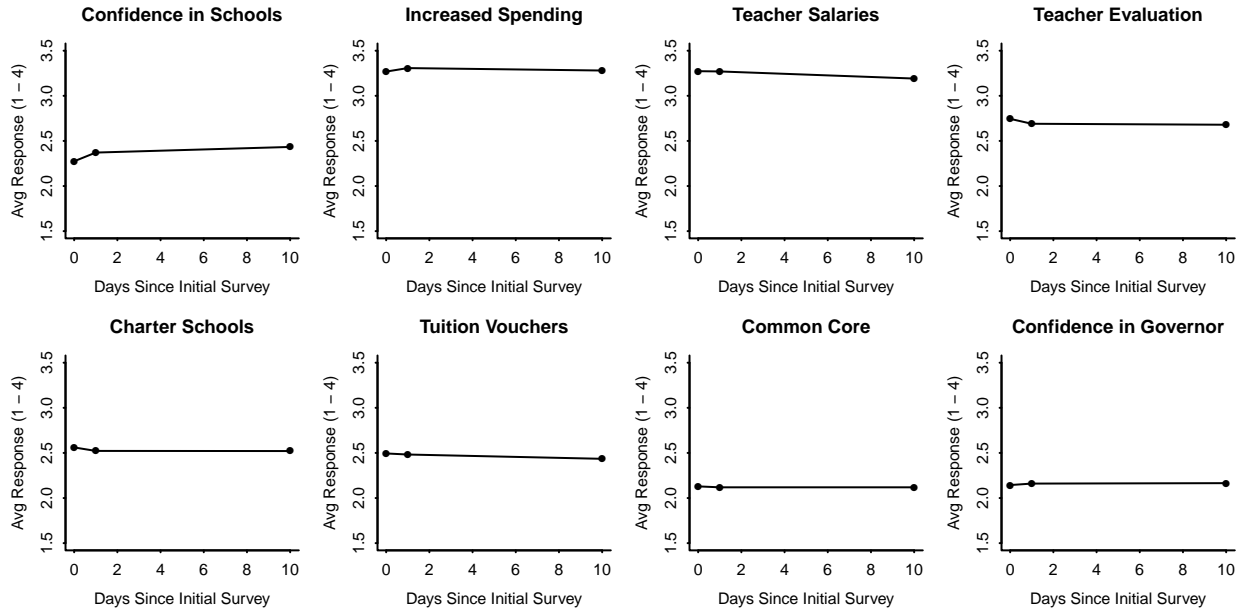
and parental status, 2) treatment and party identification, and 3) treatment and political ideology. The sheer number of combinations makes the potential for Type I errors, or false positives, quite high.

There are two instances in which there is evidence of treatment effect heterogeneity by these demographic characteristics. The provision of student achievement data appears to have a modest, positive effect on support for increased teacher salaries among conservatives (+0.21). In contrast, it appears to have a trivial, negative effect among liberals (-0.03). Alternatively, the provision of student achievement data appears to have a modest, negative effect on support for vouchers among conservatives (-0.21), while it appears to have a small, positive effect among liberals (+0.10). In both cases, the treatment effect heterogeneity appears idiosyncratic rather than part of a larger pattern incorporating ideologically similar education policies. While it may be the case that individuals' parental status, party identification, and political ideology shape their education policy preferences, these aspects of one's identity do not appear to influence the ways in which individuals incorporate new information into their opinions in any systematic way.

Opinion Stability

In the absence of any large and lasting treatment effects, one might wonder whether public opinion on these issues is either generally resistant to change or if attitudes are more or less random. The elements of aggregate public opinion explored in this experiment are relatively stable over time. After ten days, there is almost no change in the levels of support for each policy and the degree of confidence expressed in respondents' state school systems and governors (see Figure 1.1). In most cases, the average responses in the initial survey and the ten day follow-up survey differ by less than a tenth of a point on a four-point scale. While political scientists have long recognized the temporal stability of aggregate public opinion (see Page and Shapiro 1992), it is noteworthy to observe such little movement on a set of relatively specific and esoteric policy positions. It appears that the subject pool as a

Figure 1.1: Aggregate Opinion Stability ($n = 674$)



whole has clear and distinct preferences on a range of education issues. While there is broad support for increased spending on education in general and teacher salaries in particular, there are roughly equal numbers of supporters and detractors on more contentious issues such as tying teacher evaluations to student performance, charter schools, and private school tuition vouchers (the surveys only provided options to support or oppose—there were no neutral or undecided options available). In contrast, a majority of respondents had a lower opinion of the Common Core State Standards. It is important to note that, while the subject pool is demographically similar in many respects to the U.S. population, it is not a nationally representative sample. The reader should not mistake these values for estimates of support among all Americans. Because respondents are more likely to identify as Democrats and liberals than the country as a whole, one might infer that these values overestimate support for increased spending and underestimate support for various teacher evaluation and school choice reform policies.

While aggregate public opinion on many issues tends to move slowly and somewhat predictably, the same is not always true of individual public opinion. Individual survey-takers have acquired a rather poor reputation for ideological coherence and consistency

Table 1.7: Individual Opinion Stability ($n = 674$)

	Confidence in Schools	Increased Spending	Teacher Salaries	Teacher Evaluation	Charter Schools	Tuition Vouchers	Common Core	Confidence in Governor
One Day Follow-Up	0.81	0.82	0.89	0.84	0.86	0.88	0.91	0.93
Ten Day Follow-Up	0.75	0.76	0.84	0.77	0.80	0.85	0.87	0.89

Notes: Values are Pearson correlation coefficients of each political attitude in the initial survey and the same attitude at a later date.

over time (Converse 1964; Kinder and Sears 1985). The conventional wisdom suggests that political opinions held by individuals tend to vary widely from survey to survey. Table 1.7 displays the correlations of each political attitude measured in the initial survey and the same attitude measured in each of the follow-up surveys. The correlations between responses in the initial survey and the one day follow-up survey range from 0.81 to 0.93, and the correlations between responses in the initial survey and the ten day follow-up survey range from 0.75 to 0.89. Individuals were most consistent on the most politically-charged questions (the Common Core and confidence in the governor) and were least consistent in their reported confidence in the state school system. These results are similar to the opinion stability observed by Brown (1970) in his analysis of general political attitudes over the course of two to six weeks. Brown asked respondents to agree or disagree on a 10-point scale with 48 statements on basic political values (e.g., “Just because a man is a human being doesn’t make him smart enough to vote” and “Men are equal—maybe not financially or in influence—but equal to one another as to being a person”) and typically found correlations between 0.60 and 0.90 across survey administrations. It is notable that specific questions about the details of education policy should generate a similar degree of consistency over time. On the other hand, the ten day interval employed here prohibits the estimation of long-term opinion stability. It may still be the case that the consistency observed over a week and a half may begin to degrade after a few months or a few years transpire.

Conclusions

There is some evidence that the provision of statewide student achievement data temporarily reduces individuals' confidence in their state school systems. This effect does not appear to extend to other education policy preferences or to assessments of state officials who do not focus exclusively on education. However, the effect does not persist after the initial experiment. After one day, the effect is reduced in size and is no longer statistically significant. After ten days, there is no evidence of an effect at all. A number of previous studies measured outcomes more or less immediately after the provision of treatment. Research designs that take this approach are liable to produce fleeting effects which may not translate into the political environment. We should be cautious about generalizing the findings of such studies.

This experiment also suggests that education policy preferences are relatively well defined—even on specific issues such as evaluating teachers based on student performance, charter schools, vouchers, and the Common Core State Standards. At least over the short-term, this is true both at the aggregate level and for individuals. Taken as a whole, the subject pool in this experiment appears to have formed clear and distinct political opinions on issues of education, and these opinions are not easily influenced by data on student performance.

These findings have both positive and negative implications for education policymaking. On one hand, it is reassuring to see the consistency with which the subject pool expresses its education policy preferences, suggesting a relatively high degree of coherence with respect to these opinions. On the other hand, the stability of these attitudes in the face of education performance data augurs poorly for a system of democratic accountability. If confidence in the state school system and support for various education policies are unaffected by contemporary measures of student achievement, then the incentives for democratically elected officials to respond to such data may be weak or nonexistent. Without such

constraints, debates over education policy can quickly become untethered to empirical reality.

The question of whether or not there are effects of student achievement data on public opinion is far from settled. This study explores the effects of a snapshot of student achievement on a single subject-grade combination at a single level of government. It would be important to investigate the extent to which the provision of longitudinal achievement data documenting progress (or the lack thereof) affects confidence in the school system, elected officials, and education policy preferences. It is also unclear whether individuals respond in systematic ways to different forms of education performance data (proficiency rates, graduation rates, suspension rates, etc.), to data on different subjects and grades, or to education performance data at different levels of government. Future research should also consider the extent to which subjects' prior beliefs differ on various aspects of education performance and if these prior beliefs influence how subjects incorporate new information into their opinions. Answers to these questions could help us develop a richer theory about how individuals' views on the public school system respond to the dramatic increase in student achievement data available today.

Lastly, additional research is necessary to understand how larger shifts in the broader information environment affect attitudes towards the public schools. Rather than testing the effects of discrete pieces of information delivered once in a survey context, researchers may be interested in exploiting some of the natural variation in the timing with which school districts and states begin collecting and disseminating different kinds of data on student achievement. For example, as school systems unevenly begin to shift their attention from measures of student proficiency to measures of student growth, well-timed surveys could explore the consequences of changes in the types of school performance information available to residents.

Schoolhouse Democracy: Education Policy Responsiveness in the States

Many of the pioneers of public education in the United States sought to insulate schools from the rough-and-tumble of partisan politics and the influence of powerful politicians. This strategy attempted to shield educators from the perils—both real and perceived—of the political machines, cronyism, and corruption of late 19th and early 20th century American democracy (Davies 2007; Gamson 2003; Tyack and Cuban 1997). Today, mayors and governors vary considerably in their degree of direct control over the public schools in their jurisdictions. In most cases, school systems are governed by local and state boards of education chosen in separate and often sparsely attended elections. School district superintendents and chief state school officers are typically appointed by these boards or, in some cases, elected directly. In a few cities and states, mayors and governors have the authority to appoint top school administrators, but this arrangement is the exception rather than the rule. The politics of education face different electoral pressures than those policy domains more directly under the purview of the highest elected public official. This study investigates whether education is subject to the same democratic forces, such as mass public opinion, that influence public endeavors in other policy areas. Specifically, I consider

I would like to thank the staff at NORC at the University of Chicago for providing access to restricted-use General Social Survey data. I would also like to thank Jeffrey Henig, Priscilla Wohlstetter, Justin Phillips, Donald Green, Robert Shapiro, and Robert Erikson for their guidance and thoughtful feedback. This research is supported by the National Academy of Education/Spencer Dissertation Fellowship, the Teachers College Research Dissertation Fellowship, and the Teachers College Department of Education Policy and Social Analysis. The code for this study can be found on the Open Science Framework at <https://osf.io/8d9fe/>.

the extent to which public K–12 education expenditures reflect public opinion on current spending levels.

This analysis focuses on public opinion and education spending in the American states, the units of government responsible for the majority of public school expenditures in the U.S. (Berkman and Plutzer 2005). I explore how the citizens of each state vary in their support for increased spending on public schools, and I compare this to actual statewide per pupil expenditures. I also examine how various social and economic groups in each state differ in their support for increased spending, thus enabling me to investigate whether the spending preferences of historically privileged groups are more predictive of statewide education expenditures than the preferences of their less advantaged peers. Lastly, I analyze the relationship between the strength of state teachers unions—one of the most influential political forces in education policy—and the extent to which state residents are more likely to experience education spending levels that reflect their preferences.

In order to pursue these lines of inquiry about state level democratic responsiveness and education policy, I rely on a relatively novel approach to the estimation of statewide public opinion: multilevel regression and poststratification. The primary obstacle in the pursuit of these research questions is the absence of public opinion survey data that is representative at the state level. In order to generate accurate estimates of statewide support for increased education spending, I model these preferences as a function of both demographic and geographic predictors using national survey data. I then poststratify by weighting the predicted probabilities of support for increased spending among each demographic-geographic category by Census counts of each category in each state and the District of Columbia. The end result is 51 estimated levels of statewide support for increased education spending for each year from 1984 to 2013. With these data in hand, the fundamental question posed by this study—is state education spending reflective of the preferences of the people—becomes empirically tractable.

Literature Review

This study follows from the normative expectation that public policy, including education policy, ought to have at least a passing relationship with public opinion. However, it is not at all obvious why one ought to assume that this connection exists. The American model of government is more than a few steps removed from an idealized classical democracy in which every citizen votes directly on every major issue at hand. In a massive, complex, and hierarchical system, what would be the means through which the preferences captured by public opinion surveys get translated into policy? Luttbeg (1968) proposes five broad mechanisms through which public opinion could plausibly affect the kinds of policies that are actually enacted. First, the *rational-activist model* holds that voters choose candidates whose policy positions are closest to their own. Second, the *sharing model* suggests that politicians come from the same culture as voters and therefore share their preferences, resulting in policies consistent with mass opinion even if there are no direct levers for popular influence. Third, the *political parties model* states that, because the Democratic and Republican parties diverge somewhat cleanly on ideological lines, voters can align themselves with their ideologically preferred party and simply vote for its members who then pursue ideologically consistent policies. Fourth, in the *delegate model*, elected officials are sufficiently fearful of voters at reelection time and, as such, attempt to implement their constituencies' preferences. Lastly, according to the *interest groups model*, when elected officials respond to interest groups, they are also responding to the public's wishes because such groups represent broad sections of the public.

In the context of this particular study, I am agnostic as to the mechanism(s) through which public opinion might affect public policy. Even simpler questions remain unanswered. I seek to identify 1) whether or not statewide education spending levels actually reflect the preferences of state residents, 2) whether the preferences of the white and the wealthy are more predictive of spending levels than the preferences of their historically disadvantaged

peers, and 3) whether these relationships vary based on the relative strength of teachers unions in each state. The first two lines of inquiry are, in a loose sense, indicators of democratic functioning. In a democratic country, we generally expect that states with stronger public support for education spending will tend to spend more on schools and that states with weaker support for education spending will tend to spend somewhat less. Ideally, we also generally expect that education spending levels should not be exclusively responsive to the interests of a single group. Deviations from these expectations would indicate a potential problem in democratic functioning and would invite further investigation. The third line of inquiry offers an initial foray into that work. If there is evidence of unresponsiveness or unequal responsiveness, then it would be useful to know the characteristics of the states where such issues are most severe. Specifically, I seek to know if the strength of a state's teachers union is associated with either heightened or attenuated responsiveness.

In the following literature review, I provide some background on these three primary themes: evidence of policy responsiveness in general, unequal responsiveness, and conditional responsiveness.

Evidence for Responsiveness

While it is difficult to disentangle the relative influence of these mechanisms for policy responsiveness—all or none may be true to some degree—an essential and answerable question remains: does public policy reflect public opinion? Although I apply this question to issues of education, it is rooted in the larger study of policy responsiveness. At the national level, Page and Shapiro (1983) investigate the extent to which changes in federal spending preferences on a number of issues are succeeded by actual changes in federal expenditures, finding corresponding movement roughly two-thirds of the time. Erikson, MacKuen, and Stimson (2002) shift away from studying individual policies and spending levels, suggesting that it might be more useful to analyze the relationship between overall political mood (a

population-level ideology measure) and an ideologically indexed composite of issues. Given Americans' generally low levels of policy knowledge, they believe it makes more sense to look at larger ideological responsiveness. They find that an increase in liberal mood is typically followed by more liberal laws and more public spending, and an increase in conservative mood is typically followed by more conservative laws and less public spending. This is sometimes referred to as the thermostatic model, which has two mutually reinforcing components. First, changes in the ideological tenor of public opinion are met with ideologically consistent changes in public policy. Second, changes in public policy affect public opinion: increasingly liberal policies and spending patterns induce less desire for left-leaning government action, and increasingly conservative policies and spending patterns induce less desire for right-leaning government action (Soroka and Wlezien 2010; Wlezien 1995).

The scholarly community held for decades that state policy, which receives little media coverage and generates low electoral turnout, tends to be less responsive than federal policy. However, by pooling survey responses across multiple years (enough to generate sufficient samples for each state), Erikson, Wright, and McIver (1993) demonstrate that state policies are indeed highly responsive to the ideological preferences of their citizens. More liberal states tend to have more liberal policies/greater public spending and more conservative states tend to have more conservative policies/less public spending. Lax and Phillips (2009a; 2012) employ a statistical procedure known as multilevel regression and poststratification to estimate state level policy preferences at a single point in time. This allows them to analyze not only policy responsiveness (which is identified by any positive correlation between preferences and policy) but also policy congruence (which measures the extent to which policies match the preferences of the majority in a given jurisdiction). Across a range of policy domains, Lax and Phillips find reliable evidence for policy responsiveness, but they also find a "democratic deficit." Actual policy matches majority opinion only about half of the time.

Also using a multilevel model to estimate subnational preferences, Berkman and Plutzer

(2005) make use of the vast number of elementary and secondary school districts in the country—roughly 10,000—to construct a cross-sectional analysis of policy responsiveness at one of the smallest and most familiar levels of government: local public school systems. They find evidence for education spending responsiveness at the school district level. On average, higher rates of districtwide support for increased spending are associated with higher local per pupil expenditures.

Unequal Responsiveness

Most of the existing policy responsiveness literature, in keeping with its empirical interest in democratic principles, focuses on the preferences of the majority. Yet the American style of democracy holds dear two distinct and often competing values: majority rule and minority rights. Both are imperfect ideals. It is not unequivocally desirable that public policy should always reflect the will of the majority, but prominent democratic thinkers have also inveighed against the unfettered power of small factions (Madison 1787; de Tocqueville [1835] 1945). In addition to the normative concerns raised, this underlying conflict presents two empirical questions: 1) to what extent does responsiveness to majority preferences obscure consistent unresponsiveness to minority groups and 2) to what extent is responsiveness being driven by the preferences of a single, small group?

The first question has eluded researchers for some time. Although subgroup analyses reveal small but noteworthy differences in average preferences between groups, preference change tends to occur in parallel (i.e. although blacks generally support higher domestic spending than whites, both groups' preferences tend to rise and fall together over time and across states) (Page and Shapiro 1992). Therefore, policy responsiveness, which is captured with a simple correlation or a regression coefficient between policy support and policy enactment, tends to appear equal across groups—even if one group more frequently sees its preferences enacted into policy.

Consider a hypothetical example. Over the last two years, State X increased per pupil

expenditures while State Y did not. This is consistent with statewide public opinion, in which support for increased education spending is stronger in State X than in State Y. In both states, blacks have higher rates of support for increased spending than whites. In State X, 80 percent of blacks and 60 percent of whites support increased spending. In State Y, 60 percent of blacks and 40 percent of whites support increased spending. In this case, a simple correlation would reveal policy responsiveness at the same level for both groups: increased support is related to increased spending. However, a majority of whites in both states experience policies aligned with their preferences while a majority of blacks only see their preferences enacted into policy in one state. With the ability to estimate levels of subgroup support for specific policies within single jurisdictions, it is now possible to measure the extent to which policies match subgroup preferences.

The second question—is responsiveness being driven by a single group—has seen a recent burst of scholarly activity. In a series of books and articles, researchers have found that Congressional roll call votes align more closely with the preferences of the wealthy than to the preferences of the poor and that enacted policy, both at the state and the national level, displays much higher responsiveness to higher income classes (Gilens 2005, 2012; Bartels 2008; Rigby and Wright 2011). One challenge here is that the preferences of the wealthy and the poor are not always that different, and, as stated above, when they shift they tend to shift in the same direction (Bhatti and Erikson 2011; Stimson 2011). As with most social phenomena, in public opinion there is typically far more variation within groups than between groups. It can be enormously difficult to disentangle the differential influence of policy preferences by income category when there is little between-group variation. One fruitful opportunity for research is to focus on the rare instances in which opinion bifurcates based on income. For example, there are large and noteworthy differences in support for welfare programs. Perhaps unsurprisingly, American public policy tends to conform to the preferences of the wealthy in this area (Gilens 2012).

The question remains as to why the preferences of the rich and the poor overlap so

much. This enters controversial territory, raising issues of preference manipulation and false consciousness. Lukes ([1974] 2005) conceptualizes three different “faces” of power. The first face of power (the ability to get someone to do something that they otherwise would not have done) and the second face of power (the ability to prevent certain issues from appearing on the agenda or certain groups from participating in the political process) fit into our conventional understanding of political power and its uses. The third face of power is the ability to convince an individual or group that their political interests run counter to their underlying true interests. Identifying the third face of power places a considerable burden on the analyst, who must not only argue that people have hidden true interests that he or she can recognize but also that some third party is conspiring to manipulate these people. While it is not impossible or even implausible that some level of such unsavory activity occurs, it may be far more effective and straightforward to assume that, for most people and for most issues, individuals themselves remain the best authority on their own interests. That is the approach I adopt in this paper. My investigation of policy responsiveness—and particularly unequal responsiveness—is conditional on the assumption that the measurement error present in public opinion surveys is not differentially biased by social group. In other words, I assume that public opinion surveys are able to record the policy preferences of both disadvantaged and advantaged groups with roughly the same level of fidelity. The extent to which some groups’ observed preferences are potentially inaccurate representations of their underlying true preferences remains a topic for another study.

Conditional Responsiveness

A crucial subtopic in the study of policy responsiveness is the investigation of the political conditions under which democratic government is more or less responsive to its constituents. A common complaint in American politics is the pernicious influence of special interest groups. This line of attack follows from the premise that organized interest groups have the potential to subvert the link between the preferences of most Americans and enacted policy.

However, lumping all interest groups together is conceptually naïve. In nearly every policy arena, interest groups pursue distinct and often competing ends. The question of interest group influence is better addressed at the scale of a single policy domain or even a single issue. Because this study focuses on education spending, it would be instructive to consider the extent to which one of the primary interest groups in education policy, teachers unions, either facilitate or inhibit policy responsiveness.

Nearly all state and local K–12 public teachers unions are affiliates of one of the two large national unions: the National Education Association (NEA) and the American Federation of Teachers (AFT). These two unions have a combined membership of over four million teachers and education support providers. Together, they spend more than any other public sector union on political lobbying at the federal level (Center for Responsive Politics 2014). However, teacher union political muscle varies tremendously by state. There are limits on unions’ ability to collect membership dues in 25 states, and collective bargaining is prohibited altogether in five states (National Council on Teacher Quality 2014). Moreover, within the context of these formal rights and limitations, there is extensive variation in the perceived political influence of teachers unions by state (Winkler, Scull, and Zeehandelaar 2012).

There is a broad academic literature on the ways in which teachers unions are able to influence education policy. The two major pathways through which this impact occurs are collective bargaining and political organizing (Cowen and Strunk 2014). In their role as collective bargaining agents, unions are able to negotiate with local school districts, school boards, and state departments of education over salaries and working conditions. As political actors, unions can use their size and resources to affect elections, support or oppose proposed education policy changes, and wield influence over local school boards. There is considerable evidence that teachers unions successfully exercise these powers to induce greater public spending on education and shape other personnel policies. Multiple studies suggest that increased unionization is associated with increased spending on education in

general and teachers salaries in particular (Baugh and Stone 1982; Brunner and Squires 2013; Cowen 2009; Duplantis, Chandler, and Geske 1995; Easton 1988; Eberts 1983; Eberts and Stone 1984; Freeman 1986; Hoxby 1996; Kaspar 1970; Kleiner and Petree 1988; Lott and Kenny 2013; Lovenheim 2009; Zigarelli 1996). Other research posits that teachers unions have successfully leveraged collective bargaining agreements to influence teacher evaluation policies, teacher placement, layoffs, and class sizes (Hess and Loup 2008; Moe 2009; Strunk 2012).

Moe (2001) suggests that 1) the interests of teachers are often in conflict with the interests of students and families, and 2) teachers unions benefit from unusual electoral arrangements that allow them to pursue those interests unchecked. For example, he contends that teachers unions fight to maintain personnel and salary policies that minimize the extent to which members are evaluated based on performance, and they actively resist policies that allow for the removal of low-performing teachers. Moreover, the unions have outsize influence on school board elections because they are held during off years (resulting in low turnout among general voters) and because school board elections are often nonpartisan (removing otherwise useful ideological cues to individuals without organized guidance on how to vote). Moe (2011, 8) argues that the two national teachers unions, the NEA and the AFT, are “the most powerful groups in the politics of education . . . No other groups have even been in the same ballpark.” In this view, teachers unions exert unrivaled sway over education policy, minimizing the influence of other political interests.

With respect to policy responsiveness, the influence of powerful groups like teachers unions could cut either way. If the interests of teachers and the interests of the community diverge, then unions’ capacity to pursue teachers’ interests at the expense of other goals could undermine responsiveness. If, on the other hand, there is alignment in these preferences, then stronger unions could be the very medium through which responsiveness is effected. In their analysis of the link between district level education spending preferences and local per pupil expenditures, Berkman and Plutzer (2005) find no variation in this relationship by

the strength of local teachers unions. They agree with the existing academic literature that school districts with large and influential teachers unions tend to spend more per pupil; however, they find no link between teachers union strength and support for increased education spending. District spending preferences align with union priorities about as often as district spending preferences oppose union priorities. The notion that teachers unions systematically subvert the will of the people may not be applicable in this case.

Methodology

Research Questions

There are three sets of questions that guide this study:

1. Is there a relationship between statewide public opinion on support for increased education spending and actual statewide per pupil expenditures? At a given time, do states with greater support for education spending actually spend more per pupil? Within states over time, are increases in support associated with increases in spending? What is the nature of this relationship after controlling for between-state differences and common trends across states over time?
2. Does this relationship differ for historically advantaged and disadvantaged subgroups? Specifically, are individuals from the upper third of the income distribution more likely than individuals from the bottom two-thirds of the income distribution to experience education spending levels consistent with their preferences? Are whites more likely than non-whites to experience education spending levels consistent with their preferences?
3. Does state level education spending responsiveness vary by the size and influence of teachers unions in each state? Are states with stronger-than-average or weaker-than-average teachers unions more likely to have education spending levels that reflect citizens' preferences?

Data Sources

The chief obstacle in the pursuit of these questions is the absence of high quality state level measures of education spending preferences. The increasingly standard approach to estimating subnational public opinion in political science is the use of multilevel regression and poststratification (MRP). MRP employs nationally representative survey data in a multilevel logistic regression model in which individual survey responses are a function of both demographic and geographic predictors (Kastellec, Lax, and Phillips 2016; Lax and Phillips 2009b; Park, Gelman, and Bafumi 2004). This approach allows the researcher to calculate predicted probabilities of policy support among specific demographic-geographic types (e.g., 45–64 year old Hispanic women in Texas with some college education). These predicted probabilities are then multiplied by Census counts of each demographic category in each state, producing an estimate of the number of individuals in each state that support a given policy. The researcher then divides by the total number of applicable individuals statewide to estimate state level support for that policy. To generate an estimate of subgroup support (i.e. among non-white citizens), one divides the estimated number of supporters within the subgroup by the total number of individuals in the subgroup.

In order to fit a multilevel model of state level education spending preferences over an extended time series, I need to use a longitudinal survey that contains individual level demographic variables, state identifiers, and a consistently worded question on attitudes towards education spending. There are two surveys that meet these criteria: the American National Election Study (ANES) and the General Social Survey (GSS).¹

Both surveys contain features that generate challenges for this study. The first concern relates to question wording. The two questions are as follows:

1. *ANES*: Should federal spending on public schools be increased, decreased, or kept about the same? (Increased, Same, Decreased, Don't Know)

¹ The GSS records respondents' state of residence, but these are restricted-use data. NORC at the University of Chicago generously provided access to these data.

2. *GSS*: Are we spending too much, too little, or about the right amount on improving the nation’s education system? (Too Little, About Right, Too Much, Don’t Know)

The GSS question inverts the answer options: asking respondents if we “spend too little” as opposed to asking them if we spending should be “increased.” Minor changes in the structure of survey questions—even if the content is logically equivalent—can have nontrivial effects on the distribution of responses (Schuman and Presser 1981). Moreover, the ANES question on education spending preferences refers to support for increased *federal* spending on education, whereas the GSS question format refers to the *nation’s education system*. Berkman and Plutzer (2005) show that the ANES question format deflates support among high income respondents (likely as a result of greater conservatism among more affluent individuals). Neither survey specifically asks whether respondents support increased education spending *in their state*. However, Berkman and Plutzer also demonstrate that the answers to the ANES and GSS questions largely mimic the answers to more context-specific questions posed by smaller, non-longitudinal surveys. They argue that this consistency indicates that all of the questions are tapping into a broader notion: a general “taste” for education spending. To reduce the idiosyncratic effects of question wording, I pool the data from both surveys for my analyses. I recode responses so that expressing a preference for *increasing* spending on public schools or suggesting that we spend *too little* on the nation’s education system are both coded as 1 (0 otherwise). Therefore, when applying the first stage of MRP, I am estimating the predicted probability of supporting increased spending on education, broadly defined.

The second concern about the GSS and the ANES is related to their sampling designs. Both surveys employ cluster random sampling in order to obtain a nationally representative sample while minimizing some of the logistical challenges of reaching respondents where they live (both the GSS and the ANES conduct in-person interviews). As a result, the respondents selected within each state are not a representative sample of that state. Consider a hypothetical example: in a given survey administration, all of the respondents from New

York State could be located in a single cluster in New York City. As diverse as New York City may be, it is not reflective of the whole state. Therefore, naïve estimates of public opinion in New York State would be dependent on an unusual subset of New Yorkers.

I address this issue in five ways. First, as previously mentioned, I pool data from both the GSS and the ANES, which use different sampling frames in a given year. This approach both increases my subsamples in each state and decreases the likelihood that all respondents from the same state are drawn from the same cluster. Second, to estimate state level public opinion in year t , I employ a simple moving average that pools survey data from five years ($t \pm 2$), which further diversifies my state subsamples. Third, when estimating predicted probabilities of support, the multilevel models I use rely on data from the whole sample while allowing the intercept to shift slightly for each state. This attenuates the influence of an unusual group of respondents from a single state in favor of patterns observed across all of the data. Fourth, my models include a state level predictor (a measure of state political ideology) and a set of U.S. Census region indicators, which shape the magnitude and direction of the relationships between state of residence and support for increased education spending. Fifth, the differences in state level estimates of public opinion are also influenced by differences in the demographic composition of those states, which come into play during the “poststratification” part of MRP and are independent of survey samples. The upshot is that the final state level public opinion estimates are less likely to be skewed by an unusual sample in a given state in a given year (see Stollwerk 2013 for more information on using MRP with cluster-sampled polls).

One final concern about these survey questions relates to their omission of any policy trade-offs. Increases in education spending would typically come at the expense of less spending on other policy domains, higher taxes, or increases in government deficits. Indeed, support for increased education spending declines when these trade-offs are mentioned in the question itself (Schueler and West 2016). I concede that the estimates of public opinion captured by the GSS and ANES survey questions may be somewhat inflated. On the

other hand, the relative support for increased education spending between states ought to be fairly consistent across question wordings. In other words, my estimates of public opinion in California and Kansas using the GSS and ANES questions may both be higher than analogous estimates using questions that identify policy trade-offs, but I would expect California to have a higher level of support than Kansas in both versions. Because my analyses rely primarily on between-state and within-state comparisons, the absolute levels of support for increased education spending are less pertinent.

Because of the GSS' and ANES' use of identical question wording over multiple survey administrations, I can generate statewide population and subgroup estimates of support for increased education spending for each year from 1984 to 2013.² For a dependent variable, I rely on the National Center for Education Statistics Common Core of Data (NCES CCD), which includes statewide per pupil expenditures for K–12 public schools from the 1986–1987 academic year to the 2013–2014 academic year. To assemble Census counts for each demographic-geographic category, I use the U.S. Census Integrated Public Use Microdata Series (IPUMS) from the 1990 Census (one percent sample), the 2000 Census (one percent sample), and the 2010 American Community Survey (five percent sample). For a measure of the power and influence of state teachers unions, I use the Fordham Institute ratings of teachers union strength (Winklery, Scull, and Zeehandelaar 2012). This is a composite index of 37 variables tracking resources, membership, political involvement, scope of bargaining, state policies, and perceived influence. Three of these variables also capture elements of state level education spending.³ Therefore, I recalculate this index for each state after excluding those variables.

² GSS data are available for every even-numbered year. ANES data are available for every presidential election year and some midterm election years. Both GSS and ANES data are available for a longer time series, but equivalent statewide per pupil expenditure data are only available from 1986–2013. To calculate the national public opinion trend (see figure 2.1), I use all available data from 1980 onwards.

³ Sub-Indicator 1.3.1: Annual % of each state's general budget that is spent on K–12 education
Sub-Indicator 1.3.2: Total annual per-pupil expenditures per state
Sub-Indicator 1.3.3: Annual % of the total K-12 expenditures directed to teacher salaries and benefits

Analytic Approach

To increase the number of respondents in each demographic-geographic category and to reduce the influence of unusual state samples in a given survey administration, I employ a simple moving average in which values for year t are drawn from data pooled over a five year period ($t \pm 2$) (Pacheco 2011). All monetary values are inflation-adjusted to 2017 dollars.

The analysis begins with a simple regression of average per pupil expenditures (PPE) on nationwide support for increased spending in a given year using the following equation:

$$AvgPPE_t = \beta_0 + \beta_1 Nat_Support_t + \epsilon_t, \quad (2.1)$$

where $AvgPPE$ is the average of state PPE in each year (with and without a two year lag), $Nat_Support$ is the percent of U.S. adults that support increased education spending in each year, and ϵ is the error term in year t . I drop subjects with missing data from my analysis. The values from this model represent the views of individuals who answered the education spending question.

I then estimate state level public opinion. First, I examine the demographic and geographic predictors of support for increased education spending. For each five year time period (year $t \pm 2$), I fit a separate multilevel logistic regression equation in which support for increased education spending (dichotomous) is a function of educational attainment (less than high school, high school, some college, or college); race (white or non-white); sex (female or male); age (18–44, 45–64, and 65+); U.S. state of residence; the percentage of state residents who identify as liberal⁴ (standardized); U.S. Census region; and poll (GSS or ANES); with varying intercepts by state and varying slopes by race in each state. I drop subjects with missing data from my analysis. The values from this model represent the views of individuals who answered the education spending and demographic questions. Earlier analyses also included family income terciles and more finely-grained age categories,

⁴ The state political ideology data come from Pacheco (2011). For each state, I average the values over the available time series (1976–2006).

but the coefficients for these predictors were small ($\leq |.05|$), often non-significant, and had inconsistently signed relationships with support for increased education spending from year to year. I omit them in favor of model parsimony.

Next, using a separate multilevel model for each year in the time series, I generate predicted probabilities of support for increased education spending for 48 different demographic categories in each state (e.g., a 45–64 year old, white female with a high school degree from Tennessee) with the equation:

$$Pr(Y = 1) = \text{logit}^{-1}(Educ_{isr} + Race_State_{isr} + Sex_{isr} + Age_{isr} + Liberal_{sr} + State_{sr} + Region_r), \quad (2.2)$$

in which each named variable represents the applicable logistic regression coefficient for that variable for individual type i in state s and region r . By excluding the poll coefficient, I default to a slightly lower probability of supporting increased education spending ($Poll$ is an indicator variable for cases from the GSS, wherein the question wording is typically associated with higher support).

I weight these predicted probabilities of support by U.S. Census counts of each demographic category in each state to estimate statewide levels of support for increased education spending. I generate subgroup estimates of support by dividing the predicted number of supporters in each subgroup by the total number of adults in that subgroup.

To evaluate state level education spending responsiveness, I fit a series of OLS regressions that take the form:

$$Y_{st} = \beta_0 + \beta_1 State_Support_{st} + State_s + Year_t + \epsilon_{st}, \quad (2.3)$$

where Y is the outcome (either state PPE in year t , state PPE in year $t+2$, or the change in state PPE from year t to year $t+2$); $State_Support$ is the percentage of the state population that supports increased education spending; $State$ are state fixed effects; $Year$ are year fixed effects; and ϵ is the error term in state s and year t .

Lastly, to explore how the relationship between state level public opinion and education spending varies by the strength of state teachers unions, I reduce the data to a single time period (2000–2010) to match the same years captured by the Fordham Institute teachers union index. I recalculate this index to exclude indicators related to state education spending, and I compare teachers union strength to both state PPE and state level support for increased education spending averaged over the same time frame. I then split the sample into two groups by average teacher union strength. With these two subsamples, I fit a series of OLS regressions that take the form:

$$Y_s = \beta_0 + \beta_1 State_Support_s + \epsilon_s, \quad (2.4)$$

where Y is the outcome (teachers union strength or average state PPE), $State_Support$ is the average percentage of the state population that supports increased education spending, and ϵ is the error term in state s . Using the whole sample, I also regress average state PPE on state support, teachers union strength, and an interaction between the two.

Findings

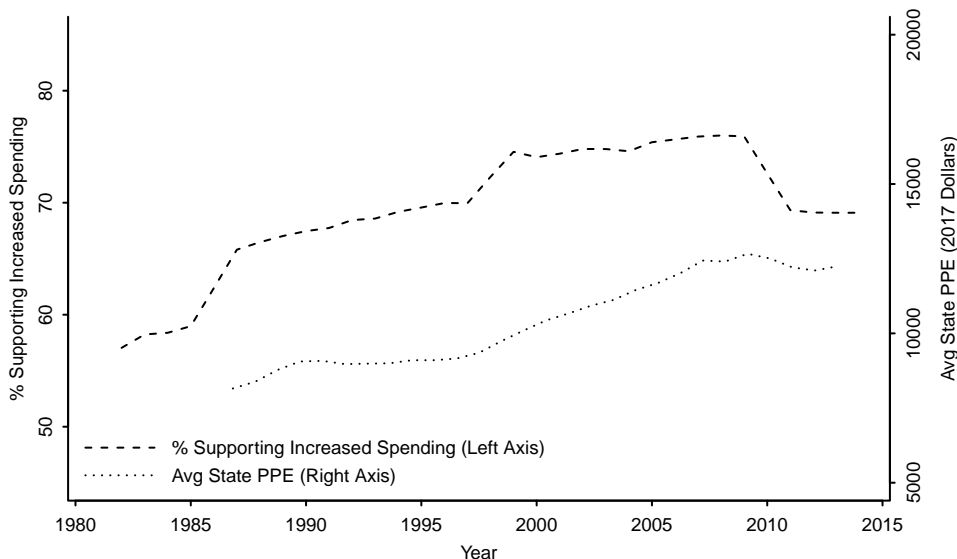
I begin by providing some nationwide context for the relationship between public opinion on education spending and actual spending levels. Next, I generate state level estimates of support for increased education spending. Using these estimates, I explore policy responsiveness in three ways: 1) the relationship between public opinion and spending across states in a given year, 2) the relationship between public opinion and spending within states over time, and 3) the relationship between public opinion and spending after controlling for between-state differences and common trends across states over time. I then investigate whether these relationships differ for whites and non-whites. I forgo an examination of unequal responsiveness by income because of the absence of income-based cleavages in public opinion on this issue. Lastly, I explore how education spending responsiveness varies by the strength of state teachers unions.

Nationwide Education Spending Responsiveness

Figure 2.1 displays the nationwide trend of support for increased education spending compared to the average state PPE in each year. To calculate support for increased spending in year t , I take a simple moving average from both the GSS and the ANES over five year periods ($t \pm 2$) and then take an average of poll averages. I use the NCES CCD to calculate the average state PPE in each year. Broadly speaking, support for increased education spending is robust, ranging from about 57 percent in 1982 to about 76 percent in 2008. Average state PPE ranges from about \$8,155 in 1986 to about \$12,664 in 2009 (inflation-adjusted to 2017 dollars). Both support for spending and actual spending have gradually increased over time with a notable drop-off beginning in 2010.

This relationship is quantified in Table 2.1. A one percentage point increase in support for education spending is associated with a roughly \$289 increase in average state PPE. The same basic pattern holds when I explore the relationship between public opinion and education spending with a two year lag. These larger macro trends in public opinion and spending are important to note as they complicate the interpretation of within-state

Figure 2.1: National Public Opinion on Education Spending and Actual Spending



Notes: Total $n = 70,060$ for public opinion trend. Sources: GSS, ANES, and NCES CCD

Table 2.1: Nationwide Education Spending Responsiveness

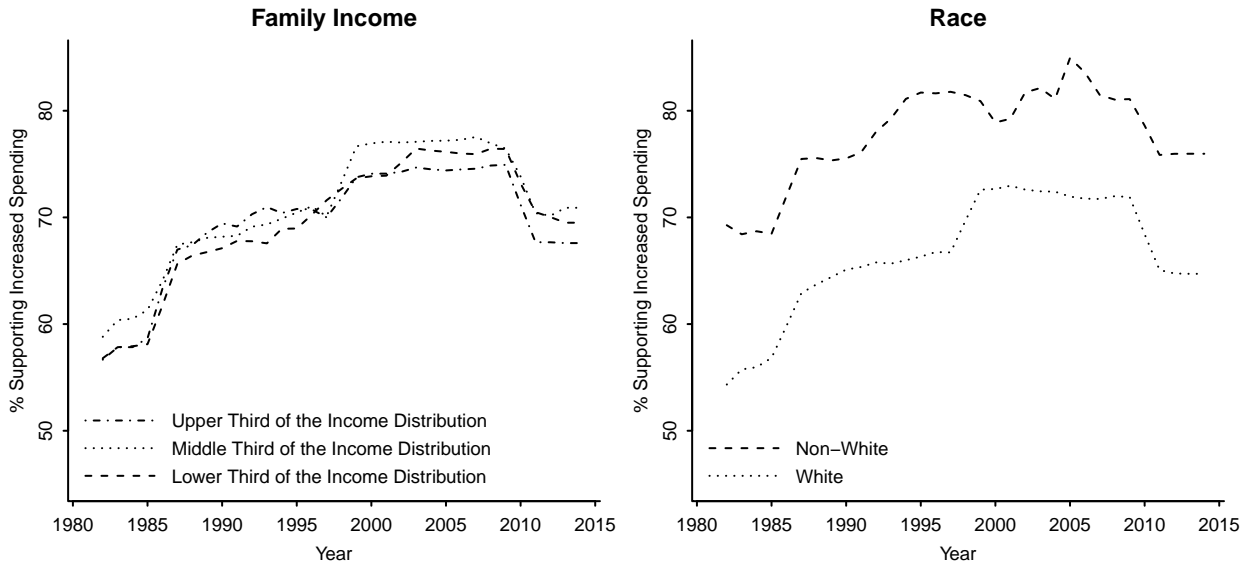
	Avg State PPE	Avg State PPE (2 Year Lag)
% Support for Increased Spending	289.10 (54.21)	260.80 (30.18)
N	28	28

Notes: Values are OLS regression coefficients with standard errors in parentheses; units are nation-years.
Sources: GSS, ANES, and NCES CCD

responsiveness over time. If support for increased education spending and actual spending are both rising across the board, it can be easy to mistake a positive relationship between the two at the state level as a uniquely state-based phenomenon.

Figure 2.2 disaggregates the nationwide public opinion trend by family income tercile and by race (white and non-white⁵). When dividing the subject pool by income, I find no meaningful between-group differences. It may be the case that extremely high income or extremely low income individuals have divergent views on education spending, but there are no major income-based cleavages in public opinion on this issue when considering broad

Figure 2.2: National Public Opinion on Education Spending by Income and Race



Notes: Total $n = 62,762$ for Family Income and Total $n = 69,890$ for Race. *Sources:* GSS and ANES

⁵ I use a simple white/non-white binary to represent racial differences in order to maintain cell density in each demographic category in each state. This coarse categorization is likely to conceal some racial variation in attitudes towards education spending. On the other hand, blacks, Hispanics, and other non-whites are all more likely to support increased education spending than their white peers.

income categories. As a result, this study forgoes an analysis of unequal responsiveness by income. Alternatively, there appears to be nontrivial racial differences in public opinion. Non-whites are more likely to support increased education spending than whites. This pattern is consistent across all years, including the downward trend beginning in 2010. While this divergence makes it conceivable that there could be unequal responsiveness by race, the racial trend lines move at a roughly parallel rate and neither ever dips below 50 percent. I explore the possibility of variation in state level policy responsiveness by race in this paper, but the basic opinion dynamic here—in which the majority of individuals in both groups in all time periods favor the same thing at the national level—does not lend itself to such inequality.

Estimating State Level Public Opinion

The relationships between a series of demographic characteristics and support for increased education spending are displayed in Table 2.2. The models also generate varying intercepts by state and varying slopes by race in each state, but these coefficients are omitted from the table for ease of presentation. Support for education spending is positively associated with increases in educational attainment, identifying as a racial group other than white, identifying as female, and living in a state with a higher percentage of self-identified liberals. Support for education spending decreases with age. All else equal, individuals in the South generally have greater support for more education spending than those in other U.S. Census regions. The GSS question wording is associated with more favorable stances towards education spending than the ANES question wording. Model 2 presents the results of the final model used to predict support for increased education spending. Table 2.2 also displays the results of Model 1, which includes family income terciles and more finely-grained age categories. The coefficients for these predictors are small ($\leq |.05|$), often non-significant, and have inconsistently signed relationships with support for increased education spending from year to year. I omit them in favor of model parsimony.

Table 2.2: Predicting Public Opinion on Education Spending

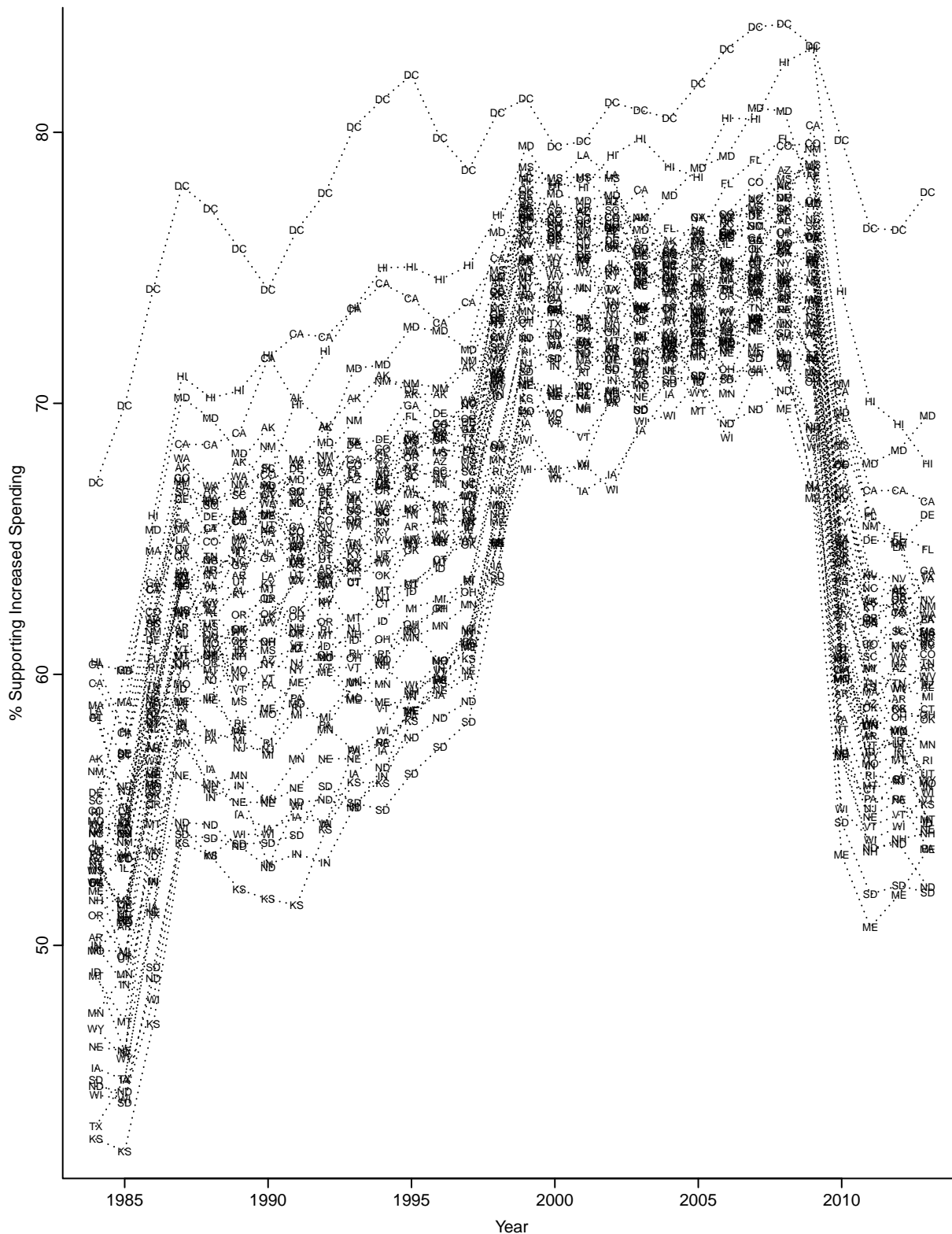
	Support for Increased Education Spending	
	(1)	(2)
High School	0.28 (0.03)	0.30 (0.03)
Some College	0.43 (0.03)	0.44 (0.03)
College+	0.39 (0.03)	0.40 (0.03)
Non-White	0.52 (0.04)	0.51(0.04)
Female	0.29 (0.02)	0.28 (0.02)
Middle 1/3 Income	0.05 (0.02)	
Upper 1/3 Income	-0.01 (0.03)	
Age 30–44	-0.05 (0.03)	
Age 45–64	-0.42 (0.03)	-0.40 (0.02)
Age 65+	-0.84 (0.03)	-0.80 (0.02)
State % Liberal (Standardized)	0.08 (0.03)	0.08 (0.03)
Northeast	-0.05 (0.07)	-0.03 (0.07)
South	0.24 (0.06)	0.25 (0.05)
West	0.05 (0.07)	0.09 (0.07)
GSS	0.30 (0.03)	0.28 (0.02)
Year FE	Yes	Yes
Intercept Varies by State	Yes	Yes
Non-White Coefficient Varies by State	Yes	Yes
N	62,224	69,260

Notes: Values are logistic regression coefficients with standard errors in parentheses; units are individual survey respondents; educational attainment categories compared to Less Than High School; income categories compared to the lower third of the income distribution; age categories compared to 18–29 (Model 1) or 18–44 (Model 2); U.S. Census regions compared to Midwest; GSS compared to ANES.

Sources: GSS, ANES, and Pacheco (2011)

I fit an analogous model for each year from 1984 to 2013, pooling available survey data from the two years before and after each year. I then use the estimated values from these multilevel logistic regression models to generate predicted probabilities of supporting increased education spending for 48 demographic categories in each state and the District of Columbia in each year (for a total of 73,440 separate categories). I then weight these probabilities by U.S. Census counts of each demographic category in each state in each year to estimate statewide levels of support for increased education spending. For 1984–1994, I rely on the 1990 Census (one percent sample); for 1995–2004, I rely on the 2000 Census (one percent sample); and for 2005–2013, I rely on the 2010 American Community Survey (five percent sample). These estimates are displayed in Figure 2.3.

Figure 2.3: State Level Public Opinion on Education Spending



Sources: GSS, ANES, IPUMS, and Pacheco (2011)

Statewide support for increased education spending ranges from about 42 percent in 1985 (Kansas) to about 84 percent in 2008 (DC). After 1986, a majority of adults in all states support increased spending, but there is considerable variation in the level of support between states. Overall, state level public opinion tracks the national trend, with a gradual increase in support until 2009 and a sharp downtick thereafter. With the exception of the 2010 decline, state level opinion is fairly stable over time. I observe only minor changes from year to year. Support for more education spending is highest in liberal and racially diverse states like California, Maryland, Hawaii, and DC. Support is lowest in states with older, whiter, and more conservative populations, such as Wisconsin, Kansas, and the Dakotas.

Table 2.3: State Level Support for Increased Education Spending

Year	Mean	Median	SD	Min	Max
1984	52.73	53.11	4.86	42.85	67.06
1985	52.34	53.20	5.07	42.41	69.91
1986	57.71	58.16	5.08	47.09	74.22
1987	62.60	62.36	4.65	53.77	78.01
1988	62.15	62.27	4.67	53.32	77.17
1989	62.12	62.19	4.87	52.05	75.70
1990	62.56	63.17	5.30	51.71	74.19
1991	62.81	63.64	5.00	51.48	76.39
1992	63.38	63.65	5.02	53.04	77.77
1993	64.04	64.43	5.24	55.07	80.20
1994	64.49	65.23	5.33	55.00	81.23
1995	65.42	65.89	5.14	56.33	82.11
1996	65.62	65.74	4.62	57.31	79.79
1997	66.15	66.06	4.29	58.26	78.61
1998	70.50	71.05	3.98	63.41	80.73
1999	74.58	75.20	3.17	67.56	81.23
2000	73.90	73.89	3.10	67.21	79.48
2001	73.77	74.24	3.19	66.76	79.67
2002	74.03	74.17	3.08	66.81	81.10
2003	73.60	73.50	2.55	68.98	80.81
2004	73.72	73.53	2.14	69.55	80.52
2005	74.00	73.59	2.31	69.73	81.78
2006	74.39	74.54	2.72	68.73	83.09
2007	75.01	74.62	2.60	69.77	83.89
2008	75.33	74.83	2.97	69.82	83.99
2009	74.33	74.57	3.88	66.50	83.19
2010	63.26	63.00	5.12	53.33	79.71
2011	59.87	59.35	4.86	50.67	76.46
2012	60.16	59.68	4.60	51.87	76.39
2013	59.77	59.93	4.82	51.94	77.80

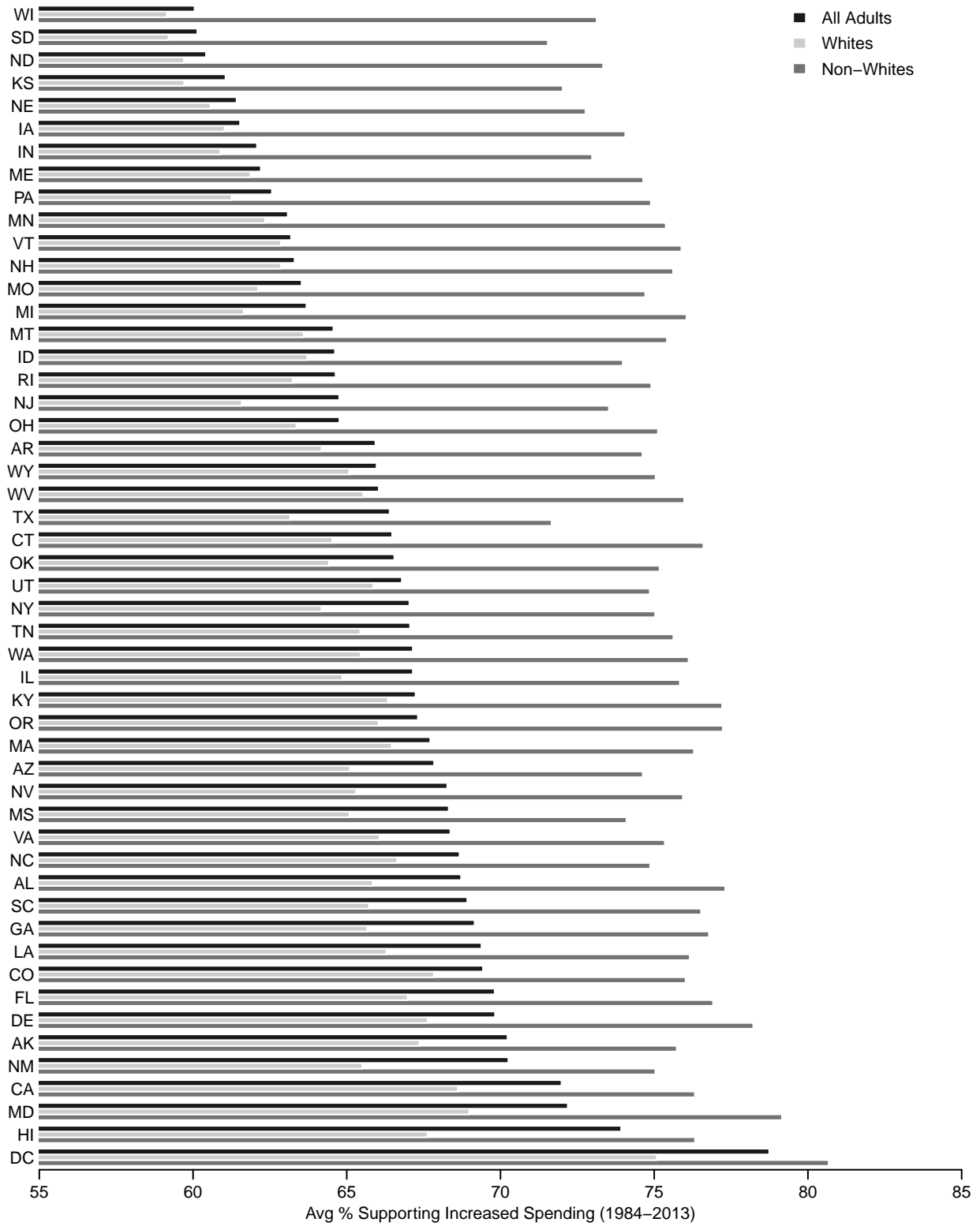
Sources: GSS, ANES, IPUMS, and Pacheco (2011)

Table 2.3 summarizes this information for each year in the time series. Across all 50 states and DC, average support for increased education spending ranges from about 52 percent in 1985 to about 75 percent in 2008. The dispersion of state level public opinion varies over time. The time series begins with a standard deviation of about five percentage points in the 80's and 90's. States converge towards the average as support for education spending grows in the early 00's, but they disperse once more after the 2010 drop.

I also disaggregate state level support for education spending by race by dividing the number of estimated white/non-white supporters by the total number of adults in each group. Non-whites are more supportive of increased spending than whites in all states, but the racial gap varies from state to state. These differences can be observed in Figure 2.4. In this graph, each group of bars represents the average state level support for increased education spending from 1984 to 2013 for all adults, white adults, and non-white adults. The states are sorted by the average public opinion among all adults. States near the top of the graph tend to have wider racial gaps. White support for increased education spending in older, less diverse, and more conservative states is notably weaker than white support in states with a higher percentage of liberals and nonwhites. The lower support for increased education spending among whites in whiter states tends to pull the overall state level estimate in that direction. Conversely, state level public opinion more closely tracks the views of non-whites in more diverse states like New Mexico, California, and Hawaii.

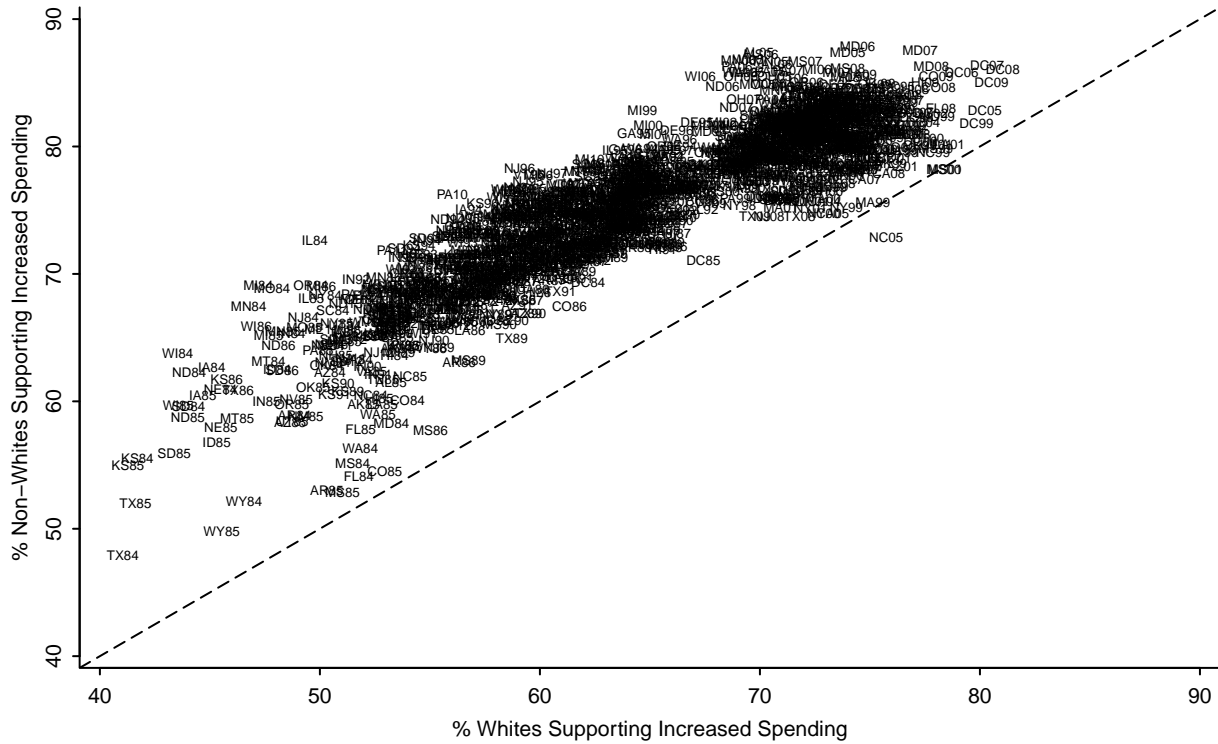
Figure 2.5 explores the relationship between white and non-white public opinion in each state and year. If there were no racial gaps on this issue, the cloud of data would fall neatly along the 45° diagonal line. This is not the case: all but one data point fall above the line, indicating higher support for increased education spending among non-whites in each state and year. However, the relationship between white and non-white public opinion is linear, and its trajectory runs roughly parallel to the 45° diagonal. This indicates that support for increased education spending tends to shift in a parallel fashion among whites and non-whites. As public opinion rises in one group, it tends to rise in the other group as

Figure 2.4: Average State Level Public Opinion by Race



Sources: GSS, ANES, IPUMS, and Pacheco (2011)

Figure 2.5: State Level Public Opinion and Race



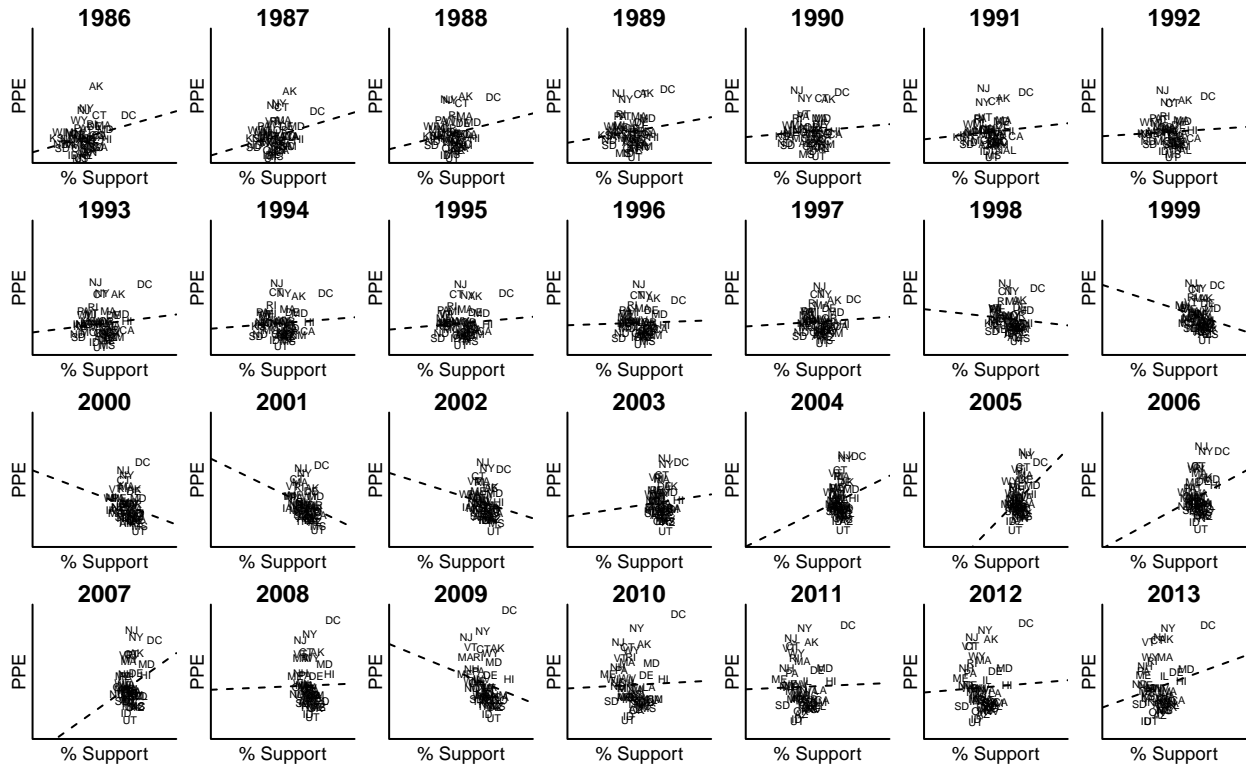
Sources: GSS, ANES, IPUMS, and Pacheco (2011)

well. When support for increased education spending declines, it tends to decline for both whites and non-whites at a similar rate. Moreover, a majority of non-whites in nearly all states and years support increased education spending. With the exception of a small subset of state-year combinations on the far left tail of the scatterplot, the same is true among whites. This pattern is similar to the racial dynamic at the national level (see Figure 2.2). Despite different levels of support between whites and non-whites, a majority of both groups seek greater spending on education, and changes in the level of support tend to occur in parallel.

Evidence of State Level Responsiveness

Figure 2.6 displays the relationships between support for increased education spending and state PPE within each year. Consistent with the nationwide pattern, both public opinion and education spending trend upwards until 2009, followed by a shift downwards. In 22

Figure 2.6: State Level Responsiveness by Year

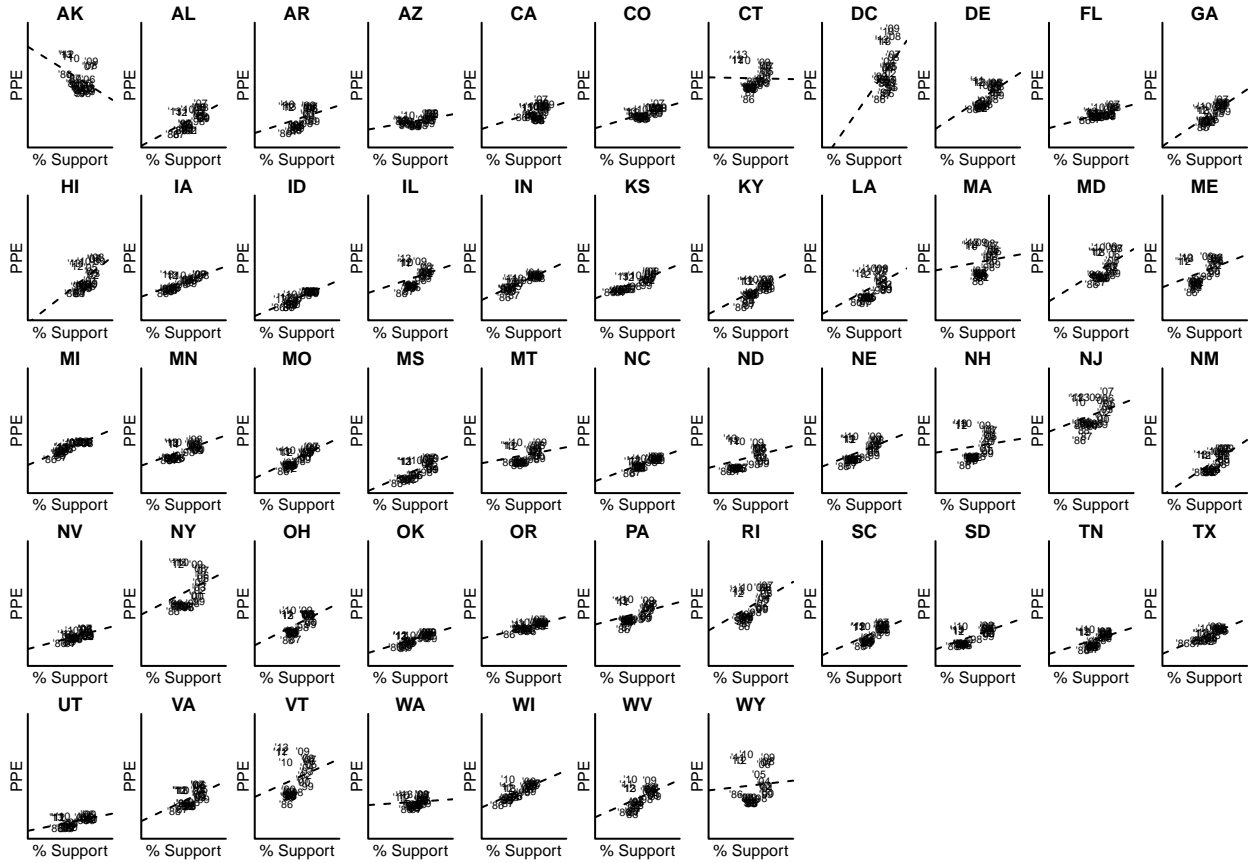


Sources: GSS, ANES, IPUMS, NCES CCD, and Pacheco (2011)

out of 28 years, there is a positive relationship between public opinion and actual spending levels. This pattern provides the initial evidence in favor of *cross-sectional responsiveness*. In most years, states with higher levels of support for increased spending also tend to have higher spending levels per pupil. However, the positive relationship is modest and only occasionally statistically significant. In six of the 28 years, the relationship flips and turns slightly negative. In all years, there are states with relatively high levels of support for increased education spending but relatively low actual spending levels. The reverse is also true: some states with relatively low levels of support actually spend fairly generously.

Within states over time, greater support for increased education spending is clearly associated with higher state PPE (Figure 2.7). In the majority of states, there is a visually apparent linear relationship between the two. I refer to this dynamic as *longitudinal responsiveness*. In some states, the data take the form of a backwards “C.” The upper portion of this shape tends to come from 2010–2013, in which a sharp decline in public opinion is

Figure 2.7: Within State Responsiveness Over Time



Sources: GSS, ANES, IPUMS, NCES CCD, and Pacheco (2011)

met with only a modest decline in spending. I harbor some skepticism as to whether this descriptive evidence for longitudinal responsiveness represents a causal relationship (i.e. that states are deliberately responding to changes in public opinion with increases in per pupil expenditures). Rather, it is quite plausible that both state level public opinion and spending levels are simply tracking larger, national trends.

I explore these relationships in more detail in Table 2.4. Panel A displays the relationships between support for increased education spending among all adults in each state and a series of outcomes: state PPE, state PPE with a two year lag, and changes in state PPE over two years. Model 1 quantifies the average relationship displayed in Figure 2.6: there is a modest, positive relationship between public opinion and education spending between states in a given year. A one percentage point increase in support for more education spending is associated with about a \$39 increase in state PPE. Model 2 quantifies the average

Table 2.4: State Level Responsiveness

	State PPE			State PPE (2 Year Lag)			Δ State PPE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>Panel A: All Adults</i>									
% Support	39.45 (16.70)	98.73 (6.87)	-33.07 (11.45)	32.15 (17.73)	153.54 (6.18)	-50.03 (11.63)	-2.00 (3.25)	11.55 (2.60)	-16.81 (6.49)
Adj. R ²	0.23	0.71	0.92	0.21	0.79	0.92	0.31	0.05	0.36
<i>Panel B: Whites</i>									
% Support	45.04 (20.03)	87.84 (6.72)	-35.21 (11.50)	33.55 (21.16)	143.33 (6.13)	-51.84 (11.68)	-1.98 (3.88)	11.77 (2.53)	-14.96 (6.52)
Adj. R ²	0.23	0.70	0.92	0.21	0.78	0.92	0.31	0.05	0.36
<i>Panel C: Non-Whites</i>									
% Support	112.50 (25.86)	118.64 (8.50)	-13.01 (10.90)	101.13 (27.35)	185.47 (7.76)	-25.04 (11.03)	1.53 (5.03)	11.38 (3.23)	-9.56 (6.13)
Adj. R ²	0.24	0.71	0.92	0.21	0.79	0.92	0.31	0.04	0.36
<i>All Panels</i>									
Year FE	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
State FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	1,428	1,428	1,428	1,326	1,326	1,326	1,326	1,326	1,326

Notes: Values are OLS regression coefficients with standard errors in parentheses; units are state-years.

Sources: GSS, ANES, IPUMS, NCES CCD, and Pacheco (2011)

relationship displayed in Figure 2.7: there is a large, positive relationship between public opinion and education spending within states over time. On average, a one percentage point increase in support for more education spending in a given state is associated with about a \$99 increase in state PPE. These results reiterate the graphical evidence for cross-sectional and longitudinal responsiveness.

Both of these preliminary findings are potentially misleading. Cross-sectional responsiveness may be failing to account for long-term trends within each state, and longitudinal responsiveness may be capturing processes that affect all states in the country in a given year. Model 3 presents the same relationship after including both year and state fixed effects. In this context, I observe a modest, negative relationship. After controlling for between-state differences and common trends across states over time, a one percentage point increase in support for more education spending is associated with \$33 less per pupil. In circumstances in which spending levels are low relative to the state average and low relative to the year average, support for increased education spending tends to be high for that state and year.

In other words, after accounting for baseline differences in spending levels between states and the rising rates of spending common to all states, there is unmet demand for more money to be spent on public schools.

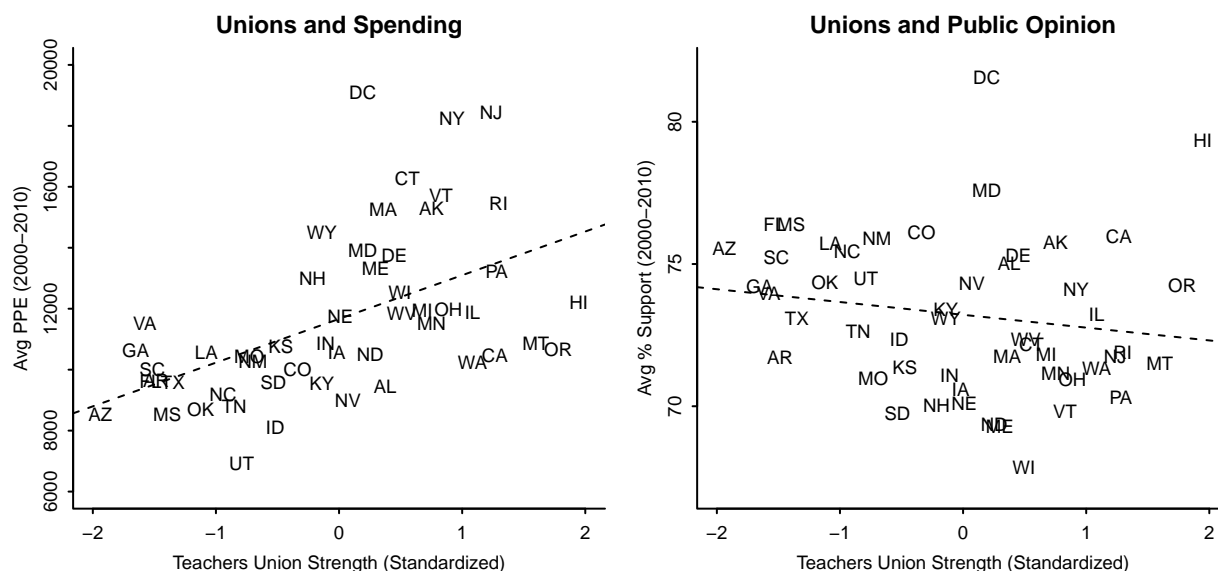
Models 4–6 explore these dynamics with a lagged dependent variable. The same pattern persists, but the relationships are similar or slightly magnified. Models 7–9 examine the relationship between public opinion and changes in state PPE over time. Within each state, a one percentage point increase in support for more education spending is associated with a \$12 larger increase in state PPE two years later (Model 8). However, after also controlling for factors that affect all states in a given year, the negative relationship reemerges: a one percentage point increase in support is associated with a \$17 smaller increase in state PPE two years later (Model 9). Those states that want more spending the most are getting increases in spending at smaller rates.

I also explore whether any of these relationships differ substantially for whites and non-whites. Panel B and Panel C replicate the same analyses for each of these subgroups within each state. The results are generally consistent, indicating a similar pattern of responsiveness for both groups. There are, however, some notable differences in the degree of responsiveness. Contrary to expectations, support for increased education spending among non-whites is slightly more predictive of state PPE, with a marginally higher R^2 and steeper slopes in both the cross-sectional (Model 1) and longitudinal (Model 2) analyses. Moreover, the negative relationship between public opinion and education spending after including both state and year fixed effects is smaller and non-significant for non-whites (Model 3). This is not to suggest that non-whites tend to experience education spending levels consistent with their preferences while whites do not. Majorities of both groups support the same thing. However, changes in non-white public opinion on education spending tend to be associated with larger changes in actual spending than equivalent shifts in white public opinion.

Teachers Unions and State Level Responsiveness

What are the characteristics of states with greater and lesser degrees of education spending responsiveness? I investigate the extent to which responsiveness is conditional on the strength of state teachers unions. Figure 2.8 displays the relationship between teachers union strength and state level education spending as well as the relationship between teachers union strength and state level public opinion on education spending. In both cases, I collapse the analysis down to a single 2000–2010 time period to reflect the equivalent period over which the data for the teachers union strength index were collected. As has been noted in the academic literature on teachers unions, the size, resources, and influence of organized educators are some of the best predictors of education spending levels. I observe the same relationship in my data. Alternatively, teachers union strength appears to be inversely related to support for increased education spending. The states with less powerful teachers unions generally have higher support for more spending on schools.

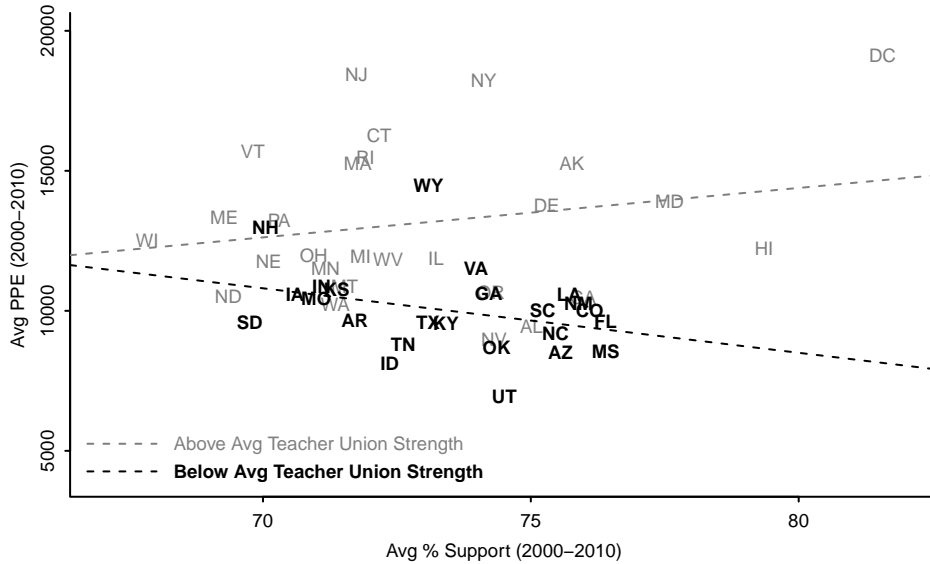
Figure 2.8: Teachers Unions, Education Spending, and Public Opinion



Sources: GSS, ANES, IPUMS, NCES CCD, Pacheco (2011), and Fordham Institute (2012)

When I disaggregate the data by teachers union strength, the relationship between public opinion and education spending bifurcates. Figure 2.9 displays the relationship

Figure 2.9: Teachers Union Strength and State Level Responsiveness



Sources: GSS, ANES, IPUMS, NCES CCD, Pacheco (2011), and Fordham Institute (2012)

between public opinion and education spending separately for states with stronger-than-average teachers unions and states with weaker-than-average teachers unions. Among states with strong unions, greater support for increased spending is associated with modestly higher actual spending. However, among states with weak unions, the reverse is true and to a greater degree. The states with the weakest teachers unions have some of the lowest actual spending levels and the highest support for more spending.

These relationships are quantified in Table 2.5. Among states with strong teachers unions, there is essentially no relationship between public opinion and union strength or between public opinion and actual spending (Models 1 and 2). However, among states with weak teachers unions, both are linked (Models 3 and 4). A one percentage point increase in support for more education spending is associated with a 0.14 standard deviation decrease in teachers union strength. An equivalent increase in support for education spending is also associated with a roughly \$230 decline in average PPE. Model 5 indicates that the two opinion-spending slopes diverge considerably, but the difference is only significant at $p = 0.13$. This analysis provides tentative evidence in favor of the argument that teachers union strength may be a mediating factor in the relationship between public opinion and

Table 2.5: Teachers Union Strength and State Level Responsiveness

	<i>Above Avg Union Strength</i>		<i>Below Avg Union Strength</i>		<i>All States</i>
	Union Strength (Standardized)	Avg PPE (2000–2010)	Union Strength (Standardized)	Avg PPE (2000–2010)	Avg PPE (2000–2010)
	(1)	(2)	(3)	(4)	(5)
Avg % Support (2000–2010)	0.01 (0.03)	176.60 (169.45)	-0.14 (0.05)	-230.38 (148.38)	176.60 (139.07)
Avg % Support × Below Avg Union Strength					-406.98 (261.42)
N	27	27	24	24	51
R ²	0.01	0.04	0.29	0.10	0.37

Notes: Values are OLS regression coefficients with standard errors in parentheses; units are states.
Sources: GSS, ANES, IPUMS, NCES CCD, Pacheco (2011), and Fordham Institute (2012)

education spending. At least on the issue of spending, the interests of teachers unions and the general public are relatively well aligned. Weak state teachers unions may be less able to produce the spending gains desired by the residents of those states.

Conclusions

I find evidence of a complex relationship between statewide support for increased education spending and actual statewide education spending per pupil. At a given time, there seems to be a modest level of cross-sectional responsiveness. States with relatively high support for increased education spending tend to spend a little more, and vice versa. Moreover, within states over time, there appears to be evidence of longitudinal responsiveness. Increases in support for education spending are associated with increases in actual spending. However, this state level relationship may simply be a reflection of larger, national trends over time. After controlling for both between-state differences and common trends across states in each year, I observe a negative relationship between public opinion on education spending and state PPE. In circumstances in which spending levels are low relative to the state average and low relative to the year average, support for increased education spending tends to be high for that state and year.

This basic pattern is the same for both historically advantaged and disadvantaged subgroups. I find no evidence that there are noteworthy cleavages in public opinion on education spending by income level. As a result, I forgo an analysis of unequal responsiveness by income. Alternatively, there are opinion differences by race, but a majority of both whites and non-whites support increased education spending and the preferences of these subgroups tend to shift in parallel. On the other hand, I observe a slightly stronger relationship between non-white public opinion on education spending and actual spending. Changes in non-white support for increased education spending tend to be associated with larger changes in state PPE than equivalent changes in white support.

I also explore whether state level education spending responsiveness varies by the strength of teachers unions in each state. Even with a small sample size of 50 states and DC, the pattern is noticeable. States with the weakest teachers unions tend to have some of the lowest education spending levels and some of the highest support for increased spending on schools. This dynamic is fairly intuitive. At least in the abstract, most Americans support more spending on education. One of the primary political goals of teachers unions is to obtain additional education spending. Therefore, even in the absence of a direct causal relationship between public opinion and public policy on this issue, education spending levels are more likely to reflect education spending preferences in states with stronger teachers unions.

My findings are generally consistent with Berkman's and Plutzer's (2005) study of education spending responsiveness at the school district level. Their analysis captures local cross-sectional responsiveness. I also find evidence of a positive link between public opinion on education spending and actual spending at the state level at a single point in time, but the relationship is modest. In addition to shifting the unit of analysis, this study is able to build upon Berkman's and Plutzer's approach by incorporating longitudinal data on public opinion and education spending. It is only after I account for shared opinion and spending trends over time that I observe a negative relationship between support for increased education spending and actual spending levels. Furthermore, in contrast to their 2005 study, this analysis finds

some evidence of variation in policy responsiveness by the strength of teachers unions. At the state level, there appears to be alignment between the preferences of teachers unions and ordinary citizens on the issue of education spending. Education spending responsiveness is least pronounced in the states with weak or non-existent teachers unions.

The academic literature on policy responsiveness typically finds evidence in its favor: for the most part, differences in enacted policies tend to reflect differences in public opinion. This study suggests that the same is true for education—a policy domain with institutionalized buffers between itself and many of the major actors in electoral politics. However, this relationship is dynamic: support for increased education spending tends to rise when spending levels are low relative to state and year averages. Moreover, the linkage between state level public opinion and education spending may be dependent on the strength of state teachers unions. Lastly, to the best of my knowledge, this study contains the first application of MRP to generate state level subgroup estimates of support for a policy in order to evaluate the extent to which states may be differentially responsive to the preferences of those groups. In the case of education spending, I do not find extensive evidence of unequal responsiveness, but this approach could be used more broadly to study subnational political inequality across a range of issues.

Polarization and the Politics of Education: What Moves Partisan Opinion?

Perhaps the single most prominent trend in contemporary American politics has been the surge in polarization over the past two decades (Pew Research Center 2014). Across an array of issues, Democrats and Republicans have grown increasingly distinct. Compromise across party lines is often seen as a betrayal of ideological principles and antithetical to future electoral success. The typical portrayal of federal policymaking is one of excessive gridlock and dysfunction. Yet it is in this context that two of the most significant federal education laws, the No Child Left Behind Act of 2001 (NCLB) and the Every Student Succeeds Act of 2015 (ESSA), were passed in an overwhelmingly bipartisan fashion (Henig, Houston, and Lyon 2017; McGuinn 2006). Among ordinary citizens, there are notable differences in public opinion on various education issues between Democrats and Republicans, but these differences tend to be smaller than the partisan gaps on issues in other high-profile policy domains (Shapiro et al. 2016). Although public feuds over education issues may be rhetorically red in tooth and claw, federal education policy thus far has largely escaped the pattern of sharp partisan polarization that has embroiled lawmaking in other arenas like healthcare, gun control, reproductive rights, the environment, and immigration. Compared

I would like to thank Paul Peterson, Martin West, Michael Henderson, and the Program on Education Policy and Governance at Harvard University for generously sharing the *Education Next* survey data with me. I would also like to thank Jeffrey Henig, Priscilla Wohlstetter, Justin Phillips, Donald Green, Robert Shapiro, and Robert Erikson for their guidance and thoughtful feedback. This research is supported by the National Academy of Education/Spencer Dissertation Fellowship and the Teachers College Research Dissertation Fellowship. The code for this study can be found on the Open Science Framework at <https://osf.io/pzvjh/>.

to many other issue areas, education may provide more fruitful territory for constructive debate and bipartisan policymaking.

American education policy has a long history of relatively modest partisan gaps in public opinion and frequent examples of bipartisan policymaking. In many instances, it appears that other concerns have outweighed the imperatives of partisan conflict. This study explores the conditions under which partisan polarization and de-polarization occur with respect to public opinion on education issues. To guide this investigation, I pose three general questions. First, does the provision of policy-relevant information cause partisans to converge on the same position? Second, can signals from political elites with ideologically moderate views move partisans closer together? And third, does direct experience with public schools reduce the political abstraction with which one evaluates education policies? I repurpose and extend 17 existing survey experiments to help answer the first two questions, and I conduct a non-experimental data analysis to investigate the third.

Literature Review

Some scholars of American politics have suggested that education is a valence issue—a topic about which most people share common values and beliefs even if they differ on which political party would best advance those goals (Kahn and Kenney 1999). In this review of the relevant literature, I offer evidence in support of the argument that there are relatively minor differences in public opinion on many education issues between Democrats and Republicans. A similar case could also be made for a number of other social and economic group comparisons: the young and the old, the poor and the affluent, whites and people of color, etc. (Page and Shapiro 1992; Berkman and Plutzer 2005; Shapiro et al. 2016). Although there are real and fiercely debated differences on matters of education policy in the U.S., the fault lines of those disagreements tend not to fall neatly along our major political, social, or economic divisions.

Bipartisanship in Federal Education Policy

Debates on matters that involve kids and schools have always been heated and can often be quite acrimonious. Battles over education policy inevitably invoke some of the great fissures in American politics: economic inequality, racial injustice, the role of the federal government, global competitiveness, and even national security. (One of the first federal forays into education policy took the form of the National Defense Education Act of 1958, which directed funds to state and local school systems to expand math, science, and foreign language instruction in response to Sputnik and the growing apprehension that the Soviet Union might win the space race.) Nevertheless, the primary federal K–12 education law, the Elementary and Secondary Education Act, was passed in 1965 and reauthorized in 1968, 1974, 1978, 1981, 1988, 1994, 2001, and 2015—the last two reauthorizations are better known as NCLB and ESSA—with large bipartisan margins under both Democratic and Republican presidents (McGuinn 2017).

This is not to suggest that we live in an age of widespread consensus on issues of education. Rather, the disagreements that define contemporary education policy debates tend to cut across rather than between the two major political parties. For example, in the negotiations that ultimately resulted in the passage of NCLB, the business community on the political right and a subset of the civil rights movement on the political left became unlikely allies in the pursuit of an accountability system that would raise educational standards across the board along with increased pressure to reduce long-standing racial achievement gaps. On the other side, states' rights activists who resisted the expansion of the federal role in education found unexpected partners in the teachers unions, who held that the rise in standardized testing stifled and undermined the teaching profession (Rhodes 2012). These scrambled allegiances provided political cover for both Republicans and Democrats across the political spectrum to support legislation that left their constituencies divided but not wholly opposed (Henig, Houston, and Lyon 2017).

The Relative Absence of Polarization on Education Issues

In American politics more broadly, there is a near universal recognition that the two major parties have become more polarized—meaning that Republicans have grown more conservative while Democrats have grown more liberal, leaving little room for common ground. There are two competing interpretations of this phenomenon: one represented by Fiorina, Abrams, and Pope (2010) and the other by Abramowitz (2010). Both sides agree that political elites have become more polarized. Analyses of roll call votes in Congress show an unmistakable trend within each party towards greater ideological consistency among members (McCarty, Poole, and Rosenthal 2006). Fiorina and his coauthors argue that this trend is not reflected in the population at large. The appearance of widespread ideological division among Americans is an illusion driven by the two-party system that effectively requires Americans to vote for either Republican or Democratic politicians who have indeed become more ideologically consistent and extreme. Most Americans, they contend, are either generally moderate or simply apathetic about politics. Abramowitz, on the other hand, argues that elected officials are merely following the lead of a growing and increasingly ideological portion of the general public that wields disproportionate influence. According to Abramowitz, it is this highly engaged, attentive, and informed subset of the public that is leading the way towards a more polarized politics. The debate hinges on a matter of emphasis: whether one is more concerned about current conditions (in which a majority of Americans are indeed quite moderate and/or uninterested in politics) or ongoing trends (in which polarization is growing over time). Longitudinal surveys indicate that party identification is increasingly associated with political ideology. Compared to previous eras, Democrats are more likely to identify as liberals, and Republicans are more likely to identify as conservatives. Moreover, across an array of issues, the political attitudes of self-identified partisans increasingly diverge in ideologically consistent ways (Bafumi and Shapiro 2009).

Education is not somehow exempt from this trend towards polarization, but recent

work by Shapiro and his coauthors (2016) argues that the polarization of public opinion on education issues is relatively muted in comparison to the partisan and ideological gaps found in other arenas. Although rates of support for specific education policies diverge between Democrats and Republicans, the differences are typically modest. In this section, I replicate and extend some of the historical analyses by Shapiro et al. in order to situate the degree of polarization on education issues over time and among other domestic policy domains.

One of the longest running surveys of social attitudes, the General Social Survey (GSS) conducted by NORC at the University of Chicago, has asked a series of questions on government spending and policy preferences across an array of domestic and foreign issues on a roughly biennial basis since 1973. Figure 3.1 presents the separate trend lines of support for increased spending among self-identified Democrats and self-identified Republicans (including those that say they lean towards one party or another¹) on twelve different issues. For each question, the survey administrator asks the respondent if he or she thinks we are “spending too much, too little, or about the right amount on ____.” Each graph in Figure 3.1 displays the proportion of Democrats suggesting that we spend too little on a given issue and the proportion of Republicans who express the same position. The graphs also display the average gap in support for increased spending on each issue between the two parties over all available years as well as the average gap between the two parties from 1994 onwards (roughly the midpoint in the time series and the year of the “Republican Revolution” in which the GOP took control of the U.S. House of Representatives for the first time in 40 years).

On average, there has been a 13 percentage point gap in support for increased spending on “improving the nation’s education system” between Democrats and Republicans. The size of this gap falls squarely in the middle of the range of similarly constructed gaps on other issues. The average partisan gap on education spending is larger than the gaps on

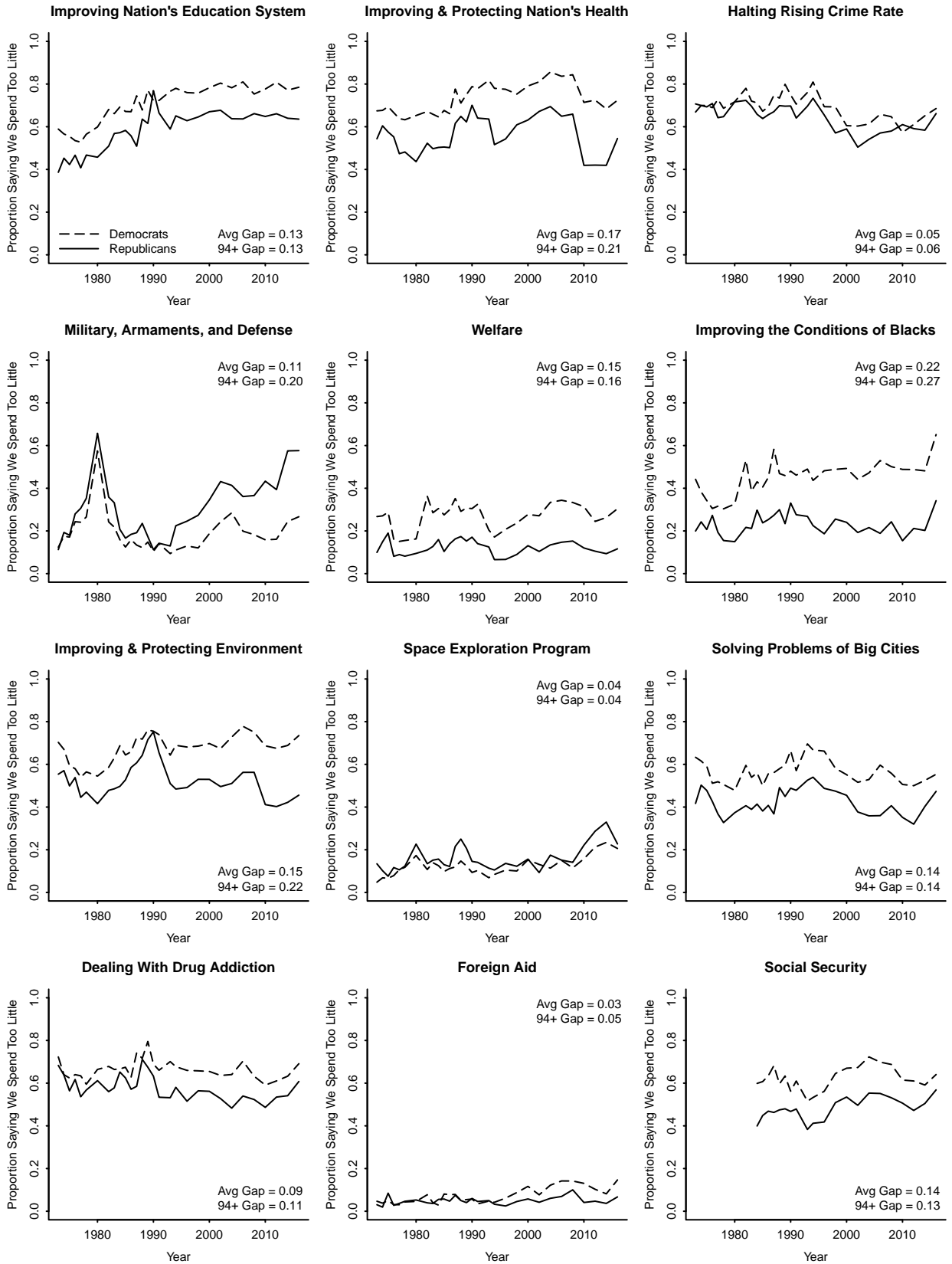
¹ I also constructed similar graphs that exclude so-called partisan “leaners.” The results were substantively equivalent. As is typical, all analyses in this study incorporate “leaners” into party identifications (Keith et al. 1992).

spending on foreign aid, the space exploration program, halting the rising crime rate,² dealing with drug addiction, and the military. On the other hand, the education spending gap is smaller than the gaps on social security, solving the problems of big cities, welfare, the environment, improving and protecting the nation's health, and improving the condition of blacks. Moreover, the partisan gaps on most issues have grown considerably since the mid-90's, while the size of the education gap has remained constant. Over the last two decades, the partisan gaps on the military, improving and protecting the nation's health, the environment, and improving the condition of blacks have grown to roughly twice the size of the partisan gap on education. Given the somewhat arbitrary selection of issues explored by the GSS and the idiosyncratic effects of question wording, it would be unwise to imbue this simple analysis with undue precision. However, the substantive conclusion that one ought to draw from these relationships is fairly straightforward: a partisan gap exists on the question of education spending, but this gap is noticeably smaller and more resistant to contemporary polarizing trends than the analogous gaps on many other high-profile issues.

Figure 3.2 shifts from spending preferences to policy preferences, displaying trend lines of support for twelve social policies among Democrats and Republicans. The GSS asks two questions about education-specific policy preferences: one on sex education in public schools and another on school prayer. Perhaps surprisingly, the average partisan gaps on these two questions about sex, religion, and schools are considerably smaller than the gaps found on other hot-button issues. On average, support for teaching sex education and support for prohibiting bible prayer in public schools diverge by only six percentage points between Democrats and Republicans. For comparison purposes, the average gap on support for access to abortion for any reason is 11 percentage points, and the average gap on support for the death penalty for murder is 17 percentage points. The gaps on sex education and bible prayer have expanded slightly over the past two decades (from 1994 to 2016, they have

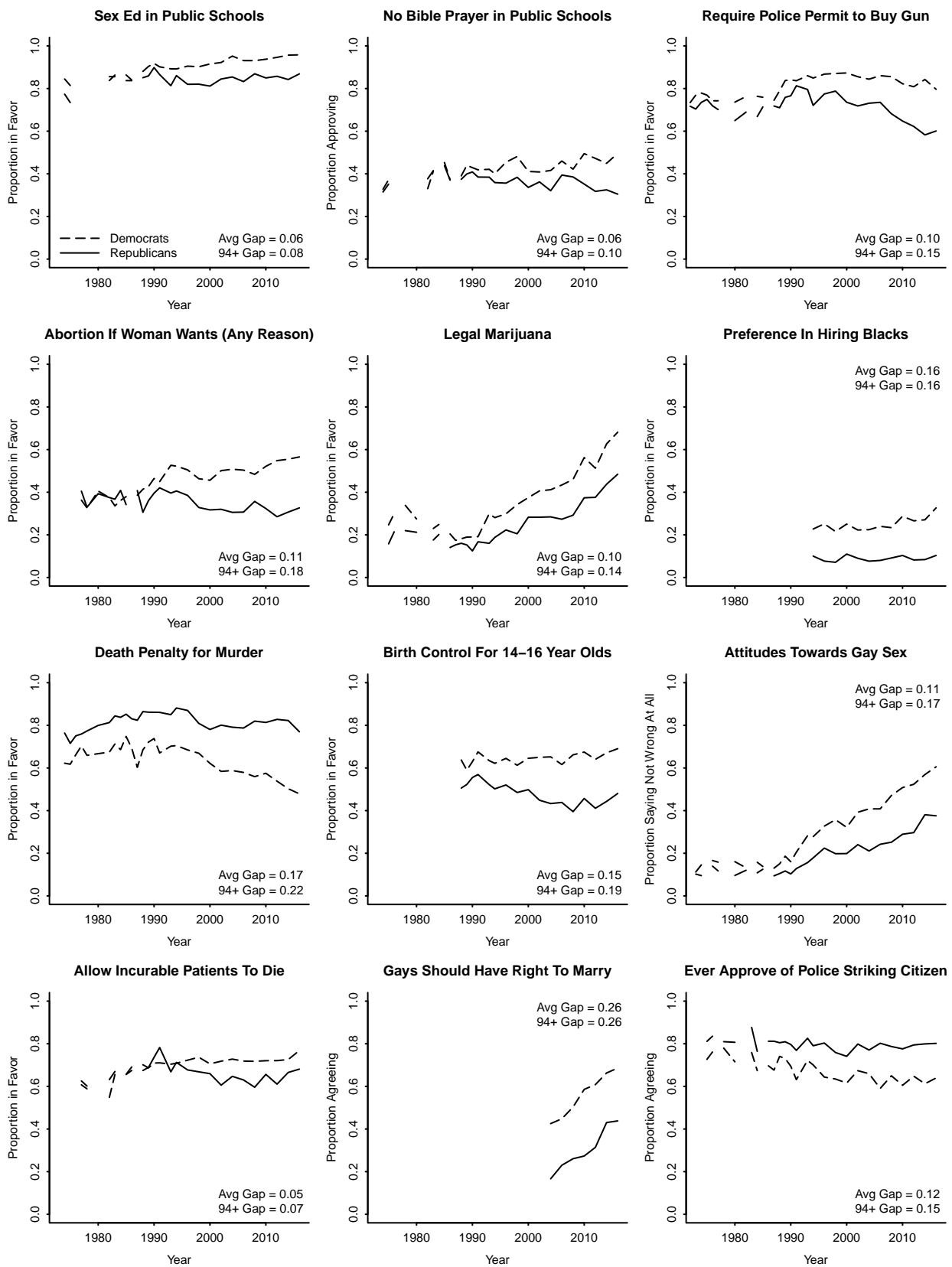
² The leading nature of this question and its incorrect assertion that the crime rate has been consistently rising since 1973 probably results in a skewed sense of consensus. There is almost certainly a greater partisan divide on issues of criminal justice than portrayed here.

Figure 3.1: Polarization and Spending Preferences



Source: General Social Survey (1973–2016)

Figure 3.2: Polarization and Policy Preferences



Source: General Social Survey (1973–2016)

grown to eight and ten percentage points, respectively); however, the differences between the two parties on these education issues during this time period remain modest in comparison to other policy domains.

Many of the more recent education policy debates also exhibit relatively moderate levels of party polarization (Peterson, Henderson, and West 2014; Shapiro et al. 2016). Since 2007, the partisan gaps on graduation tests, grade promotion tests, universal private school tuition vouchers, merit-based pay for teachers, and merit-based teacher tenure have all been about five percentage points or less—although slightly larger gaps can be observed on the Common Core State Standards, teacher salaries, teachers unions, means-tested private school tuition vouchers, and, in some years, charter schools. Moreover, there are only small differences between partisans on beliefs about factual matters pertaining to education policy. Democrats’ and Republicans’ estimates of average districtwide per pupil expenditures and average statewide teacher salaries diverge by about \$1000 each. Partisans differ by a few percentage points in their rates of correct responses to questions about charter schools’ abilities to hold religious services or charge tuition (neither are permitted). The scenario described in this section, in which many Democrats and Republicans share common attitudes and beliefs about issues of education, is potentially conducive to productive debate and mutually acceptable political compromise. In the remainder of the paper, I explore some of the conditions under which partisan consensus is more and less likely on matters of public schooling.

Mechanisms for Polarization and De-Polarization

Political scientists have proposed a number of potential mechanisms that could be driving public opinion polarization over the last few decades. These theories include the long-term electoral decline of conservative Democrats in the South and liberal Republicans in the Northeast, more accurate self-sorting of individuals into the political party that aligns with their ideological preferences, the growth of income inequality, the rise of a highly fragmented

media market, and the decline of major international threats (Abramowitz and Saunders 1998; Bafumi and Parent 2012; Levendusky 2009; McCarty, Poole, and Rosenthal 2006; Prior 2013). However, the presence of different levels of polarization across issues suggests that there are also micro-level mechanisms at work. If Americans are somewhat less polarized on education than on other issues, then presumably there are other pathways for polarization and de-polarization that vary by issue. In this study, I explore whether the degree of partisan polarization on education is affected by the level of subjects' policy-relevant knowledge, the presence of ideologically moderate signals from political elites, and the extent to which subjects have direct experience with public schools.

Policy Information

There is some evidence generated by politically-oriented psychologists and psychology-minded political scientists that higher levels of policy-relevant knowledge can increase polarization between Democrats and Republicans. These researchers suggest that partisans tend to learn new information about policies and politics in politically charged ways. In their classic text, *The American Voter*, Campbell and his coauthors (1960, 133) suggest that “identification with a party raises a perceptual screen through which the individual tends to see what is favorable to his partisan orientation. The stronger the party bond, the more exaggerated the process of selection and perceptual distortion will be.” Years later, Zaller (1992, 241) echoes this sentiment, arguing that politically engaged individuals develop a form of “partisan resistance” that allows them to filter out evidence that contrasts with their prior ideological commitments, generating two distinct political camps that diverge in response to new information. In this section, I consider some of the academic literature on biased and unbiased political information processing and their effects on polarization.

Lord, Ross, and Lepper's (1979) canonical study on biased information assimilation describes a demonstration wherein subjects with differing views on the deterrent effects of the death penalty are provided evidence both for and against deterrence. Subjects tend to

rate evidence that aligns with their pre-existing positions as more rigorous and convincing, and they tend to apply heightened scrutiny to evidence that contradicts their prior beliefs. After assessing the available evidence, the opposing camps' views on the deterrent effects of the death penalty diverge even further. Rather than producing consensus, exposure to a mixed body of evidence on a topic actually increases polarization. Later laboratory experiments replicate this general finding: subjects with differing prior beliefs on a given topic can become more entrenched in their views upon being exposed to new information on that topic, producing even more severe polarization (Taber, Cann, and Kucsova 2009; Taber and Lodge 2006). Even when partisan public opinion moves in the same direction, Democrats and Republicans tend to incorporate new information into their belief systems at different rates, depending on the extent to which it conforms with their political predispositions (Jerit and Barabas 2012).

In contrast to the laboratory experiments that document the polarizing effects of policy-relevant information, longitudinal public opinion survey data from the mid-20th century often reveal roughly parallel partisan responses to events and new information. Evaluations of the president, party competence, and the strength of the economy typically track changes in economic conditions, and these evaluations tend to shift in the same direction for both Democrats and Republicans (Gerber and Green 1999; Green, Schickler, and Palmquist 2002). However, this pattern of seemingly unbiased information processing observable in longitudinal surveys may be changing in the context of our increasingly polarized politics. In their analysis of aggregate public opinion trends from the 1940's to the 1980's, Page and Shapiro (1992) document parallel movement among most social and economic groups (e.g., although whites and blacks may differ on average with respect to many policies, support for those policies tends to rise and fall for both groups at the same time). In the last few decades, however, there now appears to be one exception to these "parallel publics:" Democrats and Republicans (Shapiro and Bloch-Elkon 2006). On many issues, partisan opinion has begun to diverge over time, indicating differential partisan responses to the ongoing flow of events

and information.

The question here is whether the field of education is somehow different. Are individuals able to learn new policy-relevant information about public schooling without triggering partisan reactions? Reckhow, Grossman, and Evans (2015) conduct a series of survey experiments in which they provide additional information about Michigan charter schools to subsets of their subject pool. They note that self-identified liberals and conservatives respond in similar ways to information about some charters' for-profit status and information about universities' roles as a charter authorizers. On the other hand, they also note that conservatives are even more likely to support charter schools upon learning about charters' tendency to hire nonunion teachers, thereby increasing polarization on the issue (although that piece of information may be unusually likely to evoke ideological considerations). Constructive political debate requires a shared foundation of facts as well as the possibility of mutual learning. In this study, I am interested in whether partisan opinion on education issues diverges in response to new information—as it does on many other issues—or if better informed partisans are more likely to converge towards the same position.

Ideologically Moderate Elite Signaling

Political scientists have long recognized the effects of political cues and elite signals on individuals' attitudes and behaviors (e.g., Downs 1957; Lupia and McCubbins 1998; Popkin 1991). Traditional scholarship typically holds up heuristics and cue-giving as boons to democracy, making democratic responsiveness possible even in the absence of a highly active and informed citizenry. However, more recent scholars have expressed concern over the extent to which citizens' positions on questions of government policy are being driven primarily by partisan cues and political endorsements rather than by information on the features and potential consequences of the policies themselves. In a series of lab experiments, Cohen (2003) demonstrates that, in the absence of an endorsement by the Democratic or Republican party, subjects tend to evaluate a policy based on its content and their personal ideological

beliefs; however, when provided a partisan endorsement for or against the policy, subjects tend to forgo an equivalent evaluation and merely adopt the views of their party. The power of such cues may be even more severe in highly polarized contexts. Druckman, Peterman, and Slothuus (2013) randomly assign party endorsements on two contested issues (drilling for oil and gas and immigration status for undocumented children brought to the U.S. in their youth) as well as statements about whether the parties are starkly split on these issues or not. They find that the effects of party endorsements are larger when the debates are described as more polarized. On the other hand, there may be limits to the extent to which party cues can influence individuals' policy preferences. Bullock (2011) argues that the provision of information that signals the ideological content of a policy can have a larger effect on attitudes towards that policy than the provision of the two major parties' positions.

These studies suggest that party cues can be a powerful and potentially misleading source of information about the merits of specific policies. The implication here is that elite signals often serve to reinforce ideological dogmatism and partisan division at the expense of more substantive and pragmatic evaluations of policies. But what if, as in the case of education policy, party lines are less rigid and elite actors occasionally adopt positions at odds with their political bases? The internal divisions within parties over education policy—between the business community and states' rights activists on the right and between civil rights leaders and teachers unions on the left—often result in prominent partisans taking positions that are ideologically atypical, such as George W. Bush's embrace of a strong federal role in education or Barack Obama's support for charter schools and merit-based teacher salaries (Rhodes 2012). For partisans following the policy cues of educational moderates such as Bush and Obama, these elite signals may produce less calcified party lines on the issues.

Direct Experience with Public Schools

The third and final theoretical mechanism for polarization/de-polarization presented here has received less extensive treatment in the political science literature. I hypothesize that greater exposure to a specific public service may reduce the level of political abstraction that individuals apply when considering that service. The comparative politics literature provides some correlational evidence that political polarization is negatively related to the size of government in democratic countries: countries that provide more resources, goods, and services tend to experience less polarized public opinion (Lindqvist and Östling 2010). However, there is no existing research that explicitly studies the effects of experience with government services on polarization.

In the field of education, there is evidence that individuals with more experience with the public schools tend to have different attitudes about them. These differences could plausibly influence the degree of partisan polarization on education issues. The Phi Delta Kappa/Gallup Poll of the Public's Attitudes Towards the Public Schools reliably shows that satisfaction with public education increases along with familiarity with the schools themselves. Parents tend to be far more enthusiastic than the general public about the quality of local schools, and parents tend to grade their own children's schools more generously still (Bali 2016; Berkman and Plutzer 2005; Bushaw and Lopez 2011; Cannon and Barham 1993; Elam 1995). Moreover, greater familiarity not only affects perceptions of school quality, it also appears to be linked to a stronger relationship between perceived quality and official measures of school performance. Parents of school-aged children are considerably more likely than their counterparts with less direct exposure to public education to hold opinions of their local schools that reflect recent school accountability grades (Chingos, Henderson, and West 2012). It is possible that viewing schools as concrete entities with which one has direct experience—as opposed to institutional abstractions—engenders a less politically charged approach to education issues.

Methodology

This study explores the effects of 1) the provision of policy information, 2) the provision of ideologically moderate elite signals, and 3) direct experience with public schools on the level of political polarization on education issues.

The proposed link between policy-relevant information and polarization lends itself to a straightforward empirical test: a survey experiment in which policy information is randomly assigned prior to the polling of attitudes on education issues. This approach would allow the researcher to identify whether or not there are heterogeneous effects of such information on policy preferences by party identification, revealing its polarizing or de-polarizing consequences.

To test whether or not partisans converge on similar positions after being exposed to ideologically moderate elite signals, one could employ another survey experiment in which the provision of moderate policy endorsements by prominent politicians would be randomly assigned prior to the measurement of individuals' education policy preferences. Much like the exploration of policy information and polarization described above, the researcher would again be interested to observe whether or not these elite signals produce heterogeneous treatment effects that would attenuate or exacerbate the partisan gap on a given issue.

With respect to the proposed link between direct experience with public schools and polarization on education issues, there is no simple and inexpensive survey experiment that is able to randomly assign exposure to schools. However, there is a great deal of observable variation in such exposure among Americans. As a first step, a researcher could identify a correlational link between direct experience with public schooling and attitudes towards education issues. The analytic approach would be quite similar to the experiments sketched above, even if the findings would not authoritatively capture a causal relationship. The researcher would be primarily interested in the interaction between party identification and exposure to schooling. The question is whether the relationships between direct experience

with public schools and public opinion on a set of education issues vary by party, resulting in smaller partisan gaps on those issues among individuals with greater exposure to the public school system.

Research Questions

1. Are better informed partisans more likely to converge towards the same position on education issues?
2. Can signals from political elites with ideologically moderate views move partisans closer together on education issues?
3. Does direct experience with public schools reduce political polarization on education issues?

Data Sources

Using data from the Education Next-Harvard University Program on Education Policy and Governance Survey, a nationally representative poll of education policy preferences conducted annually by Knowledge Networks, I repurpose and extend 17 existing survey experiments to estimate the effects of policy information and ideologically moderate elite signals on polarization. I conduct a non-experimental analysis on the same survey data to determine whether or not there is a link between direct experience with public schools and polarization.

To explore the extent to which policy information affects polarization on education issues, I reanalyze data from survey experiments administered in 2008, 2009, 2011, 2012, 2013, and 2014 (the 2010 experiment employs a different question wording) in which additional information on *education spending* and *teacher salaries* are provided to a randomly selected subset of the survey pool alongside questions about these issues. With respect to *education spending*, one half of the subject pool receives current estimates of average

districtwide per pupil expenditures. All subjects are asked, “Do you think that government funding for public schools in your district should increase, decrease, or stay about the same?” I dichotomize responses such that 1 equals “increase” or “greatly increase” (0 otherwise). For *teacher salaries*, one half of the subject pool receives current estimates of average statewide teacher salaries. All subjects are asked, “Do you think that teacher salaries in your state should increase, decrease, or stay about the same?” I dichotomize responses such that 1 equals “increase” or “greatly increase” (0 otherwise).

To explore the extent to which the provision of ideologically moderate elite signals affects polarization on education issues, I reanalyze data from survey experiments administered in 2009 and 2010 in which Barack Obama’s positions on *charter schools*, *merit-based teacher pay*, *school accountability*, and *testing* are provided to a randomly selected subset of the survey pool alongside questions about these issues. With respect to *charter schools*, one-third of the subject pool receives Obama’s position (“President Barack Obama has expressed support for charter schools.”) while another third of the subject pool does not. The remaining third receives a different treatment and is excluded from this analysis.³ All subjects are asked, “Many states permit the formation of charter schools, which are publicly funded but are not managed by the local school board. These schools are expected to meet promised objectives, but are exempt from many state regulations. Do you support or oppose the formation of charter schools?” I dichotomize responses such that 1 equals “somewhat support” or “completely support” (0 otherwise). For *merit-based teacher pay*, one-third of the subject pool receives Obama’s position (“President Barack Obama has expressed support for the policy of basing teachers’ salaries, in part, on their students’ academic progress on tests.”) while another third of the subject pool does not. The remaining third receives a different treatment and is excluded from this analysis.⁴ All subjects are asked, “Do you favor or oppose basing a teacher’s salary, in part, on his or her students’ academic progress

³ These subjects receive a message about research on the policy’s effects on student achievement.

⁴ See previous footnote.

on state tests?” I dichotomize responses such that 1 equals “somewhat favor” or “completely favor” (0 otherwise). For *school accountability*, one half of the subject pool receives Obama’s position (“As you may know, this year Congress is expected to take action on the federal school accountability law. President Barack Obama has proposed to maintain the current requirement that all students be tested in math and reading each year in grades 3–8 and once in high school.”). All subjects are asked, “Do you support or oppose this proposal?” I dichotomize responses such that 1 equals “somewhat support” or “completely support” (0 otherwise). For *testing*, one half of the subject pool receives Obama’s position (“President Obama has proposed that states be required to toughen the standards and tests used to evaluate student performance.”) All subjects are asked, “Do you support or oppose this proposal?” I dichotomize responses such that 1 equals “somewhat support” or “completely support” (0 otherwise).

The Education Next poll does not contain a survey experiment that randomly assigns exposure to the public school system (nor is such an experiment easily conceivable). To tackle the question of whether or not the relationship between public school exposure and education policy preferences varies by party identification, I pool the survey responses from 2008 to 2014 and conduct an analysis on all available data. As a proxy for direct experience with the public schools, I use the presence or absence of children in the house (coded 1 if there was a child under the age of 18 in the household and 0 otherwise). For dependent variables, I use the original, unmodified versions of the *education spending*, *charter schools*, *vouchers*, *teacher salaries*, and *merit-based pay* questions as they appear in the various survey administrations. This allows me to employ identical question wording throughout for each survey question. The sample size for each sub-analysis varies according the number of years in which the question was asked and the size of the subset of the survey pool that receives the consistent version of the question. For each education policy preference question, I dichotomize answers as described in the previous two paragraphs.

A small number of subjects did not answer some of the questions on education policy

preferences. For each case, I code their response as “Do Not Support” or “Do Not Favor.” This allows me to retain my focus on the various probabilities of support for a range of education issues among Democrats and Republicans while maintaining the integrity of the original random assignments that lend the experiments their internal validity.

The Education Next poll also collects extensive demographic information on its respondents. For my analyses, I use measures of subjects’ age, educational attainment, race/ethnicity, gender, income, U.S. Census region, the number of children under the age of 18 in the household, political ideology (Conservative, Liberal, or Moderate/Undecided/Other), and party identification (Republican, Democrat, or Independent/Undecided/Other). There are only a few instances of missing data for these demographic characteristics. Some respondents did not answer the political ideology or party identification questions. For political ideology, I code missing values as Moderate/Undecided/Other. For party identification, I code missing values as Independent/Undecided/Other. This study is interested in the differences between those who actively identify as Democrats and Republicans. Subjects with missing political identity data can be recoded as “Other” without affecting the comparison of interest. Moreover, by recoding these subjects into the existing “Other” category rather than creating a new “Missing” category, I am able to employ a simpler model specification.

Analytic Approach

The analytic approach for each test of the three polarization mechanisms proceeds in the same fashion. I fit a series of ordinary least squares (OLS) regression equations:

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 Rep_i + \beta_3 Other_i + \beta_4 T_i \times Rep_i + \beta_5 T_i \times Other_i + \beta_6' \mathbf{X}_i + \epsilon_i, \quad (3.1)$$

where Y is the outcome (each education policy preference coded as 0 or 1); T is the treatment (the provision of policy information, the provision of Obama’s position, or the presence of children under the age of 18 in the household); Rep is an indicator for Republican or Republican “leaner;” $Other$ is an indicator for Independent/Undecided/Other (leaving

Democrats and Democrat “leaners” as the comparison group); \mathbf{X} is a vector of covariates for age, educational attainment, race/ethnicity, gender, income, U.S. Census region, political ideology, and survey year (when data are pooled from multiple survey administrations), and ϵ is the error term for individual i .

In each model, the coefficients of interest are the same. For a treatment to be associated with a decrease in the average partisan gap on a given issue, one would expect to see substantively and statistically significant values with opposite signs for β_2 and β_4 . An exception applies when β_4 is larger in absolute value than β_2 . In this case, the treatment would be associated with an increase in the average partisan gap on a given issue.

Findings

Policy Information

Table 3.1 displays the results of 12 survey experiments conducted between 2008 and 2014 on the effects of the provision of average districtwide per pupil expenditures and average statewide teacher salaries on support for increased education spending and increased teacher salaries, respectively. I focus here on the extent to which there is treatment effect heterogeneity among Democrats and Republicans. The results of the experiments are remarkably consistent. Among Democrats, there is a moderately large negative effect of providing current spending levels on support for increased education spending in general and teacher salaries in particular. Depending on the year, the effect ranges from a nine to 24 percentage point decrease in the probability of supporting more spending. There is a slightly smaller negative effect of the same information among Republicans. These effect size differences between parties tend to be minor (between one and nine percentage points), and they are only statistically significant in a few cases (Models 13–14 and 19–22). However, the pattern is quite uniform across nearly every experiment. There are only two exceptions to the rule—teacher salaries in 2009 and 2011—in which the effect size is essentially identical for

Table 3.1: The Effect of Policy Information on Polarization

	2008				2009			
	More Spending (1)	Teacher Salaries (2)	Teacher Salaries (3)	Teacher Salaries (4)	More Spending (5)	Teacher Salaries (6)	Teacher Salaries (7)	Teacher Salaries (8)
Information	-0.13 (0.02)	-0.13 (0.02)	-0.13 (0.02)	-0.12 (0.02)	-0.12 (0.02)	-0.11 (0.02)	-0.12 (0.02)	-0.13 (0.02)
Republican	-0.23 (0.02)	-0.12 (0.03)	-0.15 (0.02)	-0.07 (0.03)	-0.22 (0.03)	-0.14 (0.03)	-0.10 (0.03)	-0.04 (0.03)
Info × Republican	0.03 (0.03)	0.03 (0.03)	0.02 (0.03)	0.01 (0.03)	0.04 (0.04)	0.04 (0.04)	0.00 (0.04)	0.00 (0.04)
Covariates		Yes		Yes		Yes		Yes
N	3,228	3,228	3,234	3,234	3,251	3,251	3,251	3,251
	2011				2012			
	More Spending (9)	Teacher Salaries (10)	Teacher Salaries (11)	Teacher Salaries (12)	More Spending (13)	Teacher Salaries (14)	Teacher Salaries (15)	Teacher Salaries (16)
Information	-0.17 (0.02)	-0.17 (0.02)	-0.09 (0.02)	-0.09 (0.02)	-0.21 (0.03)	-0.21 (0.03)	-0.24 (0.02)	-0.24 (0.02)
Republican	-0.27 (0.03)	-0.22 (0.03)	-0.22 (0.03)	-0.17 (0.03)	-0.22 (0.04)	-0.16 (0.04)	-0.18 (0.03)	-0.13 (0.03)
Info × Republican	0.02 (0.04)	0.03 (0.04)	0.00 (0.04)	0.01 (0.04)	0.09 (0.05)	0.11 (0.05)	0.06 (0.04)	0.07 (0.04)
Covariates		Yes		Yes		Yes		Yes
N	2,632	2,632	2,632	2,632	1,519	1,519	2,993	2,993
	2013				2014			
	More Spending (17)	Teacher Salaries (18)	Teacher Salaries (19)	Teacher Salaries (20)	More Spending (21)	Teacher Salaries (22)	Teacher Salaries (23)	Teacher Salaries (24)
Information	-0.17 (0.02)	-0.18 (0.02)	-0.23 (0.02)	-0.23 (0.02)	-0.21 (0.02)	-0.22 (0.02)	-0.23 (0.02)	-0.23 (0.02)
Republican	-0.22 (0.02)	-0.15 (0.02)	-0.20 (0.02)	-0.17 (0.02)	-0.29 (0.02)	-0.19 (0.03)	-0.19 (0.02)	-0.12 (0.02)
Info × Republican	0.03 (0.03)	0.04 (0.03)	0.09 (0.03)	0.09 (0.03)	0.09 (0.03)	0.09 (0.03)	0.04 (0.03)	0.04 (0.03)
Covariates		Yes		Yes		Yes		Yes
N	5,569	5,569	5,569	5,569	3,491	3,491	5,266	5,266

Notes: Values are linear probability model coefficients with standard errors in parentheses; Republican compared to Democrat (Independent/Undecided/Other/NA not shown); covariates include age, educational attainment, race, gender, income, U.S. Census region, children in household, and political ideology; party identification variables contain individuals who say they lean towards one party.

Source: Education Next Survey, Program on Education Policy and Governance, Harvard University

Democrats and Republicans. In all other cases, Democrats respond a little more forcefully to the information than their Republican peers. This consistency across many experiments suggests a small but persistent difference in the way Democrats and Republicans respond to the provision of these pieces of information. The magnitudes of the treatment effects tend to increase in the later experiments, but the changes are largely limited to Democrats.

This results in greater convergence in public opinion in the treatment groups over time. The partisan gaps in the control groups stay fairly constant from year to year.

In order to increase the statistical power available to identify this treatment effect heterogeneity, I pool the data from all six years and analyze them as if they were two large experiments. Table 3.2 displays the results. Overall, Republicans are less likely to support increased education spending than their peers on the other side of the political spectrum. Among Democrats, there is a moderately large negative effect of the provision of education spending data on education spending preferences: roughly a 20 percentage point decline in the probability of supporting increased expenditures. The negative effect is about five percentage points smaller for Republicans. This suggests that the provision of policy-relevant information on education spending can indeed reduce the partisan gap in support for related policies (although it is possible that this pattern is unique to information about spending). These findings provide tentative evidence in favor of the hypothesis that better informed partisans are likely to be less polarized on some education issues.

This is not the pattern of responses we would expect from the perspective of the biased information processing literature. In general, the provision of education spending data tends to induce more conservative attitudes towards education spending in general and teacher

Table 3.2: The Effect of Policy Information on Polarization (All Years)

	More Spending		Teacher Salaries	
	(1)	(2)	(3)	(4)
Information	-0.17 (0.01)	-0.17 (0.01)	-0.19 (0.01)	-0.19 (0.01)
Republican	-0.24 (0.01)	-0.16 (0.01)	-0.18 (0.01)	-0.12 (0.01)
Info × Republican	0.05 (0.01)	0.05 (0.01)	0.04 (0.01)	0.04 (0.01)
Covariates		Yes		Yes
N	19,690	19,690	22,945	22,945

Notes: Values are linear probability model coefficients with standard errors in parentheses; Republican compared to Democrat (Independent/Undecided/Other/NA not shown); covariates include age, educational attainment, race, gender, income, U.S. Census region, children in household, and political ideology; party identification variables contain individuals who say they lean towards one party; all models hold survey year constant. *Source:* Education Next Survey, Program on Education Policy and Governance, Harvard University

salaries in particular. If reactions were shaped primarily by party identification, then we would expect to see smaller effects for Democrats, who presumably would be more likely to A) ignore the spending data, B) subject it to heightened scrutiny, or C) simply conclude that current spending levels are still inadequate. Instead, Democrats make a larger correction in response to the spending data, resulting in an overall convergence in opinion. Partisans seem to be responding to the information itself and not to the ways in which that information would facilitate or inhibit partisan goals. What is not clear is whether this dynamic is attributable to the type of information provided or to the nature of the policy domain. Additional research is necessary to explore whether similar patterns emerge in response to different kinds of education information and in response to spending data in other areas like healthcare, environmental protection, and criminal justice.

Ideologically Moderate Elite Signaling

Table 3.3 displays the results of five survey experiments conducted in 2009 and 2010 on the effects of the provision of an ideologically moderate policy endorsement from former President Barack Obama on a range of education policies. There is a sharp distinction between the results of the 2009 experiments and the 2010 experiments. In 2009, there is a modest positive effect of Obama's endorsement of charter schools on Democrats' support for charters (about a nine percentage point increase in the probability of support). Republicans, on the other hand, remain unmoved by Obama's endorsement. As a result, the partisan gap on the issue is essentially reduced to zero. A similar pattern appears in the 2009 experiment on merit-based teacher pay, but the treatment effect heterogeneity fails to meet the threshold of statistical significance.

In 2010, however, a dramatically different result occurs. Democrats have a predictable response to Obama's endorsements: they become somewhat more supportive of those policies. Republicans, however, respond negatively to Obama's endorsements, despite the fact that his positions are more consistent with the modal Republican stance. In the

Table 3.3: The Effect of Ideologically Moderate Elite Signals on Polarization

	2009					
	Charter Schools		Merit Pay			
	(1)	(2)	(3)	(4)		
Elite Signal	0.09 (0.03)	0.09 (0.03)	0.16 (0.03)	0.16 (0.03)		
Republican	0.11 (0.03)	0.09 (0.04)	0.04 (0.03)	0.03 (0.04)		
Signal \times Republican	-0.09 (0.05)	-0.08 (0.05)	-0.06 (0.05)	-0.06 (0.04)		
Covariates		Yes		Yes		
N	2,164	2,164	2,142	2,142		

	2010					
	Accountability		Rigorous Testing		Merit Pay	
	(5)	(6)	(7)	(8)	(9)	(10)
Elite Signal	0.10 (0.02)	0.10 (0.02)	0.14 (0.03)	0.13 (0.03)	0.05 (0.03)	0.05 (0.02)
Republican	-0.01 (0.03)	0.03 (0.03)	0.02 (0.03)	0.02 (0.03)	0.03 (0.03)	0.03 (0.03)
Signal \times Republican	-0.14 (0.04)	-0.15 (0.04)	-0.16 (0.04)	-0.16 (0.04)	-0.14 (0.04)	-0.13 (0.04)
Covariates		Yes		Yes		Yes
N	2,776	2,776	2,776	2,776	2,776	2,776

Notes: Values are linear probability model coefficients with standard errors in parentheses; Republican compared to Democrat (Independent/Undecided/Other/NA not shown); covariates include age, educational attainment, race, gender, income, U.S. Census region, children in household, and political ideology; party identification variables contain individuals who say they lean towards one party.

Source: Education Next Survey, Program on Education Policy and Governance, Harvard University

treatment group, the probability of Democrats supporting the policies that Obama endorses increases by between five and 14 percentage points, but the probability of Republicans supporting those same policies decreases by between two and nine percentage points. By contrast, in the control groups, Democrats and Republicans only diverge by three percentage points or less. In all three 2010 experiments, the provision of an ideologically moderate elite signal actually serves to increase polarization.

As a result, a consistent interpretation of the data remains elusive. It may be the case that, in a less heated political context, such signals can have de-polarizing consequences. However, extreme resistance to the politician providing the signal may alter the underlying dynamic. Alternatively, perhaps 2009 is the aberrant case, captured at the tail end of a president’s so-called honeymoon period at the beginning of the first term. In more typical

political contexts, the negative partisanship apparent in 2010 may be the norm. A more general understanding of the effects of ideologically moderate opinion leadership on education issues requires a broader set of experiments employing the positions of a variety of Democrats and Republicans at different times.

Direct Experience with Public Schools

Table 3.4 displays the results of a series of regressions of education policy preferences on the presence of children under the age of 18 in the household (a proxy for exposure to the public school system). Compared to their peers without kids at home, individuals with children in the household have a smaller partisan gap in support for increased education spending. Both Democrats and Republicans with children at home are more likely to support increased spending than their childfree co-partisans, but the Republican position shifts more, reducing the Democrat-Republican gap by about eight percentage points. Individuals with children in the household also have a smaller partisan gap on support for charter schools. Democrats with children at home are slightly more likely to support charters than their childfree co-partisans, while Republicans with children at home are slightly less likely to

Table 3.4: The Link Between Children in the Household and Polarization

	2008–2014 More Spending		2008–2014 Charter Schools		2008–2011 Vouchers		2008–2010 Teacher Salaries		‘08–‘11, ‘13 Merit Pay	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Child	0.05 (0.01)	0.04 (0.01)	0.02 (0.01)	0.04 (0.01)	0.07 (0.02)	0.04 (0.02)	0.07 (0.02)	0.03 (0.02)	0.01 (0.01)	0.00 (0.01)
Republican	-0.27 (0.01)	-0.18 (0.01)	0.15 (0.01)	0.13 (0.01)	-0.04 (0.02)	0.01 (0.02)	-0.13 (0.02)	-0.07 (0.02)	0.07 (0.01)	0.06 (0.01)
Child × Rep	0.08 (0.02)	0.08 (0.02)	-0.05 (0.02)	-0.05 (0.02)	-0.04 (0.03)	-0.02 (0.03)	0.00 (0.03)	0.01 (0.03)	-0.03 (0.02)	-0.00 (0.02)
Covariates		Yes		Yes		Yes		Yes		Yes
N	10,847	10,847	17,228	17,228	3,801	3,801	4,554	4,554	12,239	12,239

Notes: Values are linear probability model coefficients with standard errors in parentheses; Republican compared to Democrat (Independent/Undecided/Other/NA not shown); covariates include age, educational attainment, race, gender, income, U.S. Census region, and political ideology; party identification variables contain individuals who say they lean towards one party; all models hold survey year constant. *Source:* Education Next Survey, Program on Education Policy and Governance, Harvard University

support charters than their childfree co-partisans, reducing the Democrat-Republican gap by about five percentage points. The partisan gaps on vouchers, teacher salaries, and merit-based teacher pay do not appear to vary by the presence of children in the household.

These findings are robust to the inclusion of a large range of covariates, such as age, educational attainment, race, gender, income, U.S. Census region, and political ideology. However, the presence of children in the household is not random, and the possibility of selection bias remains. It is reasonable to assume that individuals who currently have children in their house may have systematically different attitudes towards issues of education than those whose households do not contain or no longer contain children—for reasons unrelated to the differential exposure to public schools induced by the presence or absence of kids. Most of these individuals are parents, and the kinds of individuals who choose to have children may be a self-selecting group with somewhat different education policy preferences. These analyses, therefore, should not be read as definitive evidence in favor of the argument that greater direct experience with the public schools reduces political polarization. Rather this should be viewed as tentative evidence that invites future investigations into the issue.

Conclusions

The partisan gaps on issues of education policy tend to be less dramatic than analogous gaps in other high-profile policy domains like healthcare, environmental issues, welfare, reproductive rights, gun control, drug legalization, and criminal justice. In our highly polarized era, this could make education policy a uniquely appealing area for political actors to engage in constructive debate and bipartisan policymaking. This study explores the conditions under which partisan polarization and de-polarization occur with respect to public opinion on education issues. I investigate the extent to which 1) the provision of policy-relevant information, 2) the provision of ideologically moderate signals from political elites, and 3) direct experience with public schools cause partisans to converge on the same

position. I find consistent evidence that the provision of education spending information has de-polarizing consequences, but the effects of ideologically moderate elite signals on polarization vary by year. I also find tentative evidence in favor of a link between direct experience with public schools and reduced polarization on education issues.

To test the effects of policy-relevant information on polarization, I reanalyze 12 survey experiments that randomly assign information on current education spending levels before polling respondents on their attitudes towards increased education spending in general and increased spending on teacher salaries in particular. Although the differences in effect sizes by party identification are small, I find consistent evidence that the provision of spending data reduces the partisan gap on education spending questions. While this evidence for treatment effect heterogeneity only occasionally meets the conventional threshold for statistical significance, the pattern is remarkably consistent across a dozen essentially identical experiments—arguably a better indicator of validity. These results are somewhat surprising from the perspective of the literature on biased information processing. In this case, both Democrats and Republicans shift towards a more conventionally conservative position, with Democrats exhibiting a larger overall change. Partisans' reactions to the provision of education spending data do not appear to be shaped by the expectations of their party affiliations.

To test the effects of ideologically moderate elite signals on polarization, I reanalyze five survey experiments that randomly assign former President Obama's positions on a range of education issues before polling respondents on their attitudes towards those issues. The results of the experiments conducted in 2009 are considerably different from the results of the experiments conducted in 2010. In 2009, the provision of Obama's position tends to shift Democrats towards the conventionally Republican position while Republicans are generally unmoved, effectively reducing or even eliminating the partisan gaps. In these cases, partisans react in politically predictable ways, but the ideologically atypical content of the elite signal has de-polarizing consequences. In 2010, however, Republicans respond quite negatively to

Obama's positions, increasing polarization on those issues. Obama's 2010 endorsements appear to ignite Republicans' partisan attachments, adding political heat to previously lukewarm debates. The results of these analyses do not provide consistent evidence on the effects of ideologically moderate elite signals. Additional research is necessary in order to explore the effects of policy endorsements from a broader range of figures from across the political spectrum.

Finally, to understand the link between direct experience with public schools and polarization, I conduct a non-experimental analysis that investigates the relationships between the presence of children in the household (a proxy for direct experience) and a range of education policy preferences as they vary by party identification. I find evidence that partisans with children at home are less divided on education spending and charter schools. However, with the current analysis, it is not possible to argue definitively that these instances of partisan convergence are directly caused by different levels of experience with public schools. Indeed, there may be another factor, such as parental status itself, that drives this heterogeneity. Although the underlying proposition—the link between experience with public schools and polarization—may resist straightforward experimentation, future researchers could consider a number of other approaches that address this issue indirectly. For example, a researcher might conduct a survey experiment in which a random subset of the subject pool is primed to remember concrete details about their own or their children's schooling (features of the building, teachers' names, etc.), thereby calling the memories of those experiences to mind. Alternatively, with the right data, a quasi-experimental approach could be possible. In some school districts, there are strict rules regarding birthdays and matriculation in the younger grades. One could imagine a regression discontinuity design based on birthdays and school entry that explores the effects of years of schooling (or years of parenting a child in school) on education policy preferences and polarization.

Each of these tests generate as many (or more) questions as answers. However, the preliminary conclusions of this study are fairly straightforward, pending replication in

other contexts. With respect to their political attitudes on issues of education, partisans are capable of responding to some pieces of policy-relevant information in ways that are unconditioned by their partisan identities, potentially facilitating more open and productive debate. A similar dynamic may follow the information accrued and the experiences gleaned from greater direct experience with public schools. However, the power of party affiliations can reemerge if prominent political elites take an explicit position in an ongoing debate. In some cases, partisans appear to remobilize in accordance with or in opposition to that position. If political actors and ordinary citizens are interested in bipartisan solutions to education issues, the path forward may lie in the conversations and decisions that occur at less politically elevated levels, in which the blessings and curses of famously polarizing politicians can be kept safely at bay.

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Preface

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Appendix

Learning About Schooling: Survey Instruments

Survey 1

Q1.1 We are conducting an academic study about public schools in the United States. We are looking for your opinions. This survey will take about 5-7 minutes to complete. At the end of the session, you will receive a code to enter on Mechanical Turk to be paid \$0.50.

This study contains two short follow-up surveys. Only take this survey if you are also willing to take a follow-up survey tomorrow and another follow-up survey in 10 days.

The follow-up surveys will only take about 2-3 minutes to complete and will pay \$1.00 each.

Eligibility: You must be 18 years or older and a resident of the United States to be eligible to take these surveys.

Q1.2 The informed consent form for this study is displayed below. Please click the button on the bottom of the page to confirm that you agree to participate in this study.

INFORMED CONSENT

Study Title: State Education Systems in the United States

Principal Investigator: David M. Houston

Institution: Teachers College, Columbia University

Contact: david.houston@tc.columbia.edu

INTRODUCTION

You are being invited to participate in this research study called “State Education Systems in the United States.” You may qualify to take part in this research study if you are 18 years or older and if you are a resident of the United States. In total, it will take about 10-15 minutes of your time to complete.

WHY IS THIS STUDY BEING DONE?

This study is being done to determine how the provision of relevant data affects political attitudes about education.

WHAT WILL I BE ASKED TO DO IF I AGREE TO TAKE PART IN THIS STUDY?

If you decide to participate, you will complete a short online survey and two follow-up surveys. Upon completing each part of the survey, you will receive a code to enter on Mechanical Turk. You will receive \$0.50 for the completion of the initial survey. You will receive \$1.00 for completing each successive follow-up survey. Participation in this study is completely voluntary.

WHAT POSSIBLE RISKS OR DISCOMFORTS CAN I EXPECT FROM TAKING PART IN THIS STUDY?

This is a minimal risk study, which means the harms or discomforts that you may experience are not greater than you would ordinarily encounter in daily life while taking informational surveys. However, you do not have to answer any questions or divulge anything you don't want to talk about. You can stop participating in the study at any time without penalty. The principal investigator is taking precautions to keep your information confidential and prevent anyone from discovering or guessing your identity, such as removing your email address from the survey data and keeping all information on a password protected hard drive and locked in a desk drawer.

WHAT POSSIBLE BENEFITS CAN I EXPECT FROM TAKING PART IN THIS STUDY?

Participation in this study will result in you earning \$0.50 to \$2.50, depending on how many parts of the survey you complete. Otherwise, there is no direct benefit to you for participating in this study.

WHEN IS THE STUDY OVER? CAN I LEAVE THE STUDY BEFORE IT ENDS?

The study is over when you have filled out all parts of the survey. However, you can leave the study at any time even if you haven't finished. If you exit a survey without completing it, you will not receive the code that you must enter on Mechanical Turk to receive your payment.

PROTECTION OF YOUR CONFIDENTIALITY

The investigator will keep all data locked in a desk drawer in a locked office. Any electronic or digital information will be stored on a computer that is password protected. Regulations require that research data be kept for at least three years.

HOW WILL THE RESULTS BE USED?

The results of this study will be published in journals and presented at academic conferences. Your name or any identifying information about you will not be published.

WHO CAN ANSWER MY QUESTIONS ABOUT THIS STUDY?

If you have any questions about taking part in this research study, you should contact the principal investigator, David M. Houston at david.houston@tc.columbia.edu.

If you have questions or concerns about your rights as a research subject, you should contact the Institutional Review Board (IRB) (the human research ethics committee) at 212-678-

4105 or email IRB@tc.edu. Or you can write to the IRB at Teachers College, Columbia University, 525 W. 120th Street, New York, NY 10027. The IRB is the committee that oversees human research protection for Teachers College, Columbia University.

PARTICIPANT'S RIGHTS

- I have read and discussed the informed consent with the researcher. I have had ample opportunity to ask questions about the purposes, procedures, risks and benefits regarding this research study.
- I understand that my participation is voluntary. I may refuse to participate or withdraw participation at any time without penalty to future student status or grades.
- The researcher may withdraw me from the research at his or her professional discretion.
- If, during the course of the study, significant new information that has been developed becomes available which may relate to my willingness to continue my participation, the investigator will provide this information to me.
- Any information derived from the research study that personally identifies me will not be voluntarily released or disclosed without my separate consent, except as specifically required by law.
- I should receive a copy of the Informed Consent document.

Q1.3 This study contains two short follow-up surveys.

You will receive a link to take the first follow-up survey tomorrow. It will only take about 2-3 minutes to complete and will pay \$1.00.

You will receive a link to take the second follow-up survey in 10 days. It will also only take about 2-3 minutes to complete and will pay \$1.00.

Please provide an email address to receive a link to the follow-up surveys. Your email address will be permanently deleted from the data and will never be used for any purpose other than sending the link to the follow-up survey.

[text field for email address]

Q1.4 How old are you?

[drop down list of ages]

Q1.5 Are you a resident of the United States?

- Yes
- No

Q1.6 What is your primary state of residence?

[drop down list of states]

Q1.7 In the following section, we will provide some state government performance data. Please indicate that you've read the information by selecting the correct option from the choices below.

Q2.1 The total population of [insert state here] was about __ in 2016. (U.S. Census Bureau)

What was the total population of [insert state here] in 2016?

[four answer choices—only one of which is correct]

Q2.2 The average unemployment rate in [insert state here] was __% in 2016. (U.S. Bureau of Labor Statistics)

What was the average unemployment rate in [insert state here] in 2016?

[four answer choices—only one of which is correct]

Q2.3 The median household income in [insert state here] was \$__ in 2015. (U.S. Census Bureau)

What was the median household income in [insert state here] in 2015?

[four answer choices—only one of which is correct]

Q2.4 __% of eligible [insert state here] residents voted in the 2016 general election for President of the United States. (U.S. Elections Project)

What percentage of eligible residents voted in the 2016 general election in [insert state here]?

[four answer choices—only one of which is correct]

Q2.5 [**Only display if subject is in treatment group**] __% of eighth graders in [insert state here] public schools were considered proficient in math in 2015. (National Assessment of Educational Progress, U.S. Department of Education)

What percentage of eighth graders were considered proficient in math in [insert state here] public schools in 2015?

[four answer choices—only one of which is correct]

Q3.1 Thank you. In the following section, we will ask for your opinions on some issues in your state.

We only have a few questions. Please take your time.

Q3.2 How confident are you in the [insert state here] public elementary and secondary school system?

- Not at all confident
- A little confident
- Fairly confident
- Very confident

Q3.3 Do you support or oppose increasing the amount of money that [insert state here] spends on public elementary and secondary schools?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q3.4 Do you support or oppose increasing public school teacher salaries in [insert state here]?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q3.5 Do you support or oppose evaluating teachers in [insert state here] based on student achievement?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q3.6 Do you support or oppose increasing the number of charter schools in [insert state here]?

- Strongly oppose
- Somewhat oppose
- Somewhat support

- Strongly support

Q3.7 Do you support or oppose the use of publicly-funded tuition vouchers for low-income families to send their children to private schools in [insert state here]?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q3.8 Do you support or oppose the adoption of the Common Core State Standards in [insert state here]?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q3.9 How confident are you in [insert governor name here], the governor of [insert state here]?

- Not at all confident
- A little confident
- Fairly confident
- Very confident

Q4.1 Thank you for your answers! Before you finish, please provide a little bit of information about yourself.

Q4.2 Are you the parent/guardian of a school-aged child?

- Yes
- No

Q4.3 What is your gender?

- Male
- Female

Q4.4 Please specify your race/ethnicity:

- White
- Hispanic or Latino

- Black or African American
- Other

Q4.5 What is the highest degree or level of school you have completed?

- Less than a high school diploma
- High school diploma
- Some college credit (no degree)
- Associate's degree
- Bachelor's degree or higher

Q4.6 Generally speaking, do you usually think of yourself as a Republican, a Democrat, or an Independent?

- Republican
- Democrat
- Independent

Q4.7 When it comes to politics do you usually think of yourself as:

- Extremely liberal
- Slightly liberal
- Moderate or middle of the road
- Slightly conservative
- Extremely conservative

Q4.8 Thank you for participating. Please save the code on the following page to receive \$0.50 for taking this survey.

You will receive a link via email to take the first follow-up survey tomorrow at 9:00 AM Eastern Daylight Time. The first follow-up survey will only take about 2-3 minutes and will pay \$1.00.

You will receive a link via email to take the second follow-up survey on Thursday, July 20th at 9:00 AM Eastern Daylight Time. The second follow-up survey will also only take about 2-3 minutes and will pay \$1.00.

Survey 2

Q1 Welcome back!

This is a follow-up survey for a study about public schools in the United States. This survey will take about 2-3 minutes to complete. At the end of the session, you will receive a code

to enter on Mechanical Turk to be paid \$1.00.

The MTurk HIT for this survey is called:

“Follow-up survey about public schools in the United States (2-3 minutes)”

You can find a link to the HIT here:

<https://www.mturk.com/mturk/searchbar?selectedSearchType=hitgroups&searchWords=Follow-up+survey+about+public+schools+in+the+United+States+%282-3+minutes%29&minReward=0.00&x=0&y=0>

Please open the MTurk HIT in a new tab before continuing with the survey.

Q2 In the following section, we will ask for your opinions on some issues in your state.

We only have a few questions. Please take your time.

Q3 How confident are you in the [insert state here] public elementary and secondary school system?

- Not at all confident
- A little confident
- Fairly confident
- Very confident

Q4 Do you support or oppose increasing the amount of money that [insert state here] spends on public elementary and secondary schools?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q5 Do you support or oppose increasing public school teacher salaries in [insert state here]?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q6 Do you support or oppose evaluating teachers in [insert state here] based on student achievement?

- Strongly oppose

- Somewhat oppose
- Somewhat support
- Strongly support

Q7 Do you support or oppose increasing the number of charter schools in [insert state here]?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q8 Do you support or oppose the use of publicly-funded tuition vouchers for low-income families to send their children to private schools in [insert state here]?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q9 Do you support or oppose the adoption of the Common Core State Standards in [insert state here]?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q10 How confident are you in [insert governor name here], the governor of [insert state here]?

- Not at all confident
- A little confident
- Fairly confident
- Very confident

Q11 Thank you for participating. Please save the code on the following page to receive \$1.00 for taking this survey.

You will receive a link via email to take the second follow-up survey on Thursday, July 20th at 9:00 AM Eastern Daylight Time. The second follow-up survey will also only take about 2-3 minutes and will pay \$1.00.

Survey 3

Q1 Welcome back!

This is the second follow-up survey for a study about public schools in the United States. This survey will take about 2-3 minutes to complete. At the end of the session, you will receive a code to enter on Mechanical Turk to be paid \$1.00.

The MTurk HIT for this survey is called:

“Follow-up survey about public schools in the United States (2-3 minutes)”

You can find a link to the HIT here:

<https://www.mturk.com/mturk/searchbar?selectedSearchType=hitgroups&searchWords=Follow-up+survey+about+public+schools+in+the+United+States+%282-3+minutes%29&minReward=0.00&x=0&y=0>

Please open the MTurk HIT in a new tab before continuing with the survey.

Q2 In the following section, we will ask for your opinions on some issues in your state.

We only have a few questions. Please take your time.

Q3 How confident are you in the [insert state here] public elementary and secondary school system?

- Not at all confident
- A little confident
- Fairly confident
- Very confident

Q4 Do you support or oppose increasing the amount of money that [insert state here] spends on public elementary and secondary schools?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q5 Do you support or oppose increasing public teacher salaries in [insert state here]?

- Strongly oppose
- Somewhat oppose

- Somewhat support
- Strongly support

Q6 Do you support or oppose evaluating teachers in [insert state here] based on student achievement?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q7 Do you support or oppose increasing the number of charter schools in [insert state here]?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q8 Do you support or oppose the use of publicly-funded tuition vouchers for low-income families to send their children to private schools in [insert state here]?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q9 Do you support or oppose the adoption of the Common Core State Standards in [insert state here]?

- Strongly oppose
- Somewhat oppose
- Somewhat support
- Strongly support

Q10 How confident are you in [insert governor name here], the governor of [insert state here]?

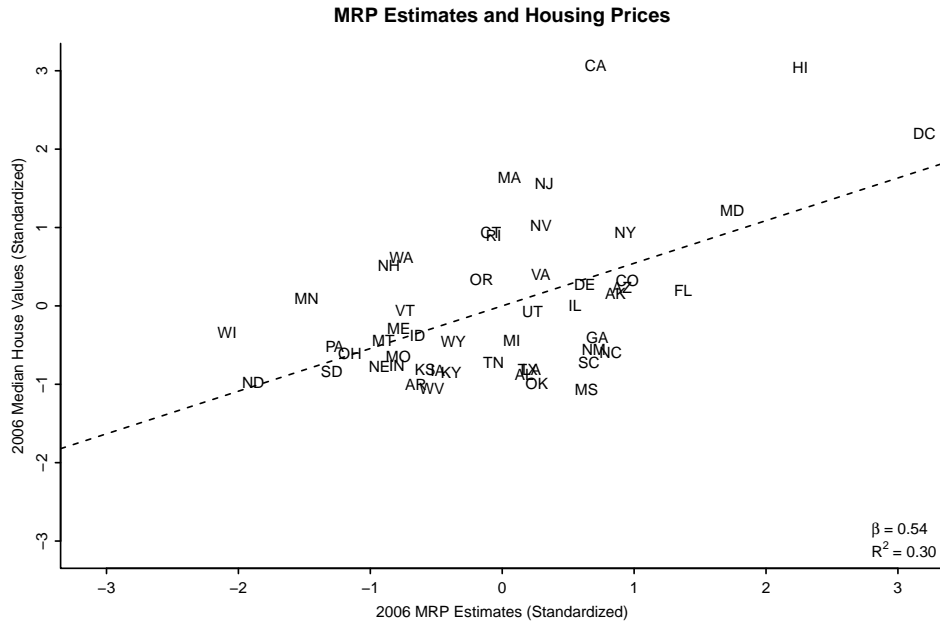
- Not at all confident
- A little confident
- Fairly confident
- Very confident

Q11 Thank you for participating in this study. You have completed all three surveys.

Please save the code on the following page to receive \$1.00.

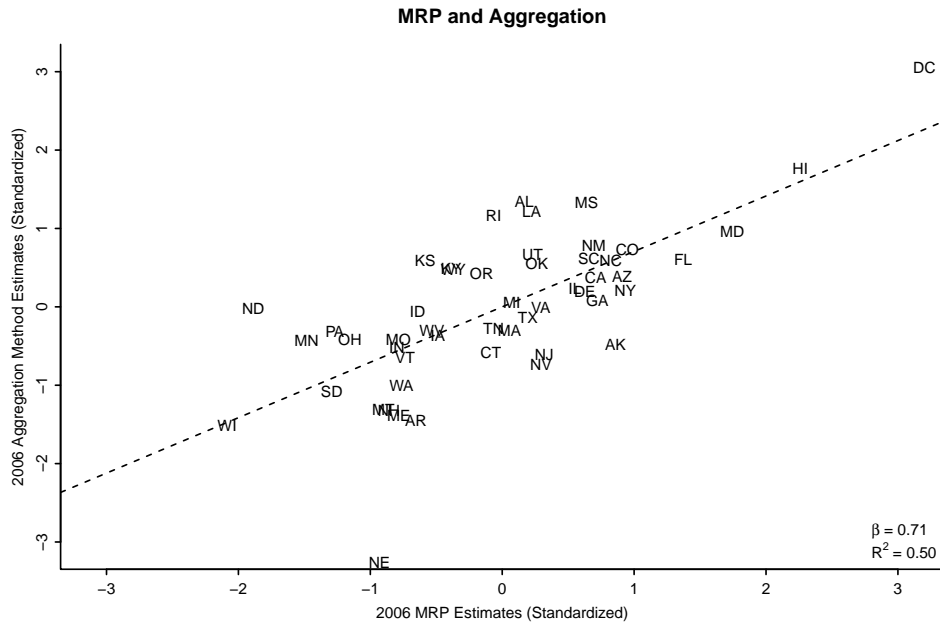
Schoolhouse Democracy: MRP Validity Checks

Figure A.1: Convergent Validity



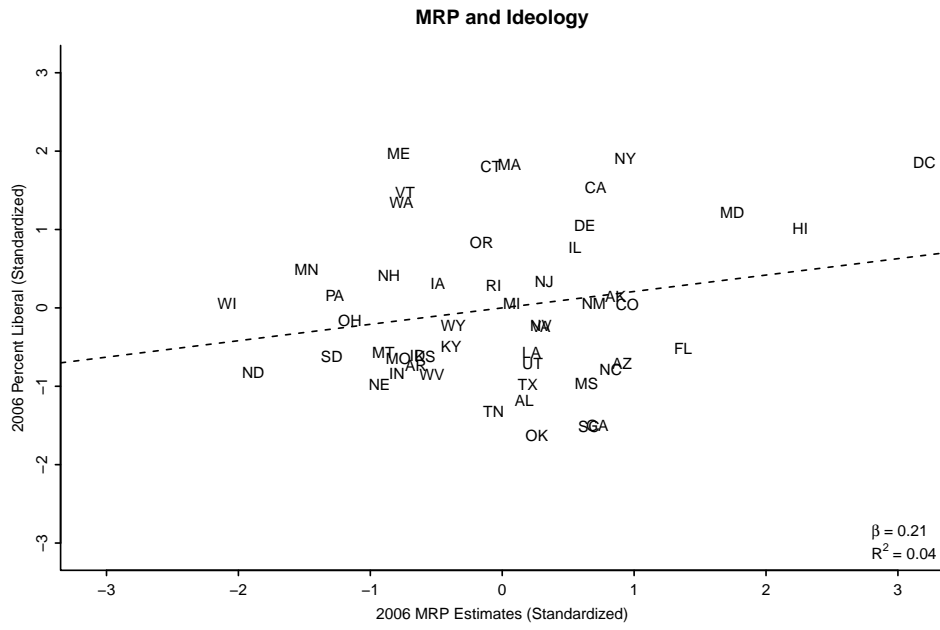
Source: American Community Survey 2005–2007 (3 Year Estimates)

Figure A.2: Criterion Validity



Source: Aggregation method pools all available data from 2000–2012

Figure A.3: Discriminant Validity



Source: Pacheco (2011)