Three papers on factors that influence investment in public education from a political science perspective

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THREE PAPERS ON FACTORS THAT INFLUENCE INVESTMENT IN PUBLIC EDUCATION FROM A POLITICAL SCIENCE PERSPECTIVE

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ABSTRACT

This dissertation addresses the broad question of what influences investment in public education using an originally compiled data set on all school districts in the United States from 1992-2012. Different dimensions of this question are addressed in three stand-alone papers. The first paper asks how does segregation in a school district influence public investment within a school district? Segregation leads to more investment in education unlike other types of public goods, while integration leads to less. The second paper explores how segregation across political boundaries contributes to variation in investment and which groups are harmed by it. In areas that are segregated along school district lines, there is increased variation in what is collected in each district. Districts with higher African American populations collect less in revenue but have a higher tax burden. The third paper examines the role of the state and party in power. It asks whether or not state politicians reward school districts that vote in favor of the party in power through more financial benefits from school funding formula transfers. I find evidence that funding formulas are susceptible to political influence and that parties are able to influence the geographic distribution of education funds to core voters. Together this research finds that funding for public education is shaped not only by economic factors, but also residential patterns within the district and surrounding districts as well as state level partisan influences.

INDEX WORDS: Dissertation, Local Government, Public Education, Segregation, Diversity

Dedication

To the little one, who gave me the biggest motivation to finish. And to Steve, who helped in so many ways along the way.

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Preface

This project was born out of an interest in further understanding why public education, touted as a pillar of the American Dream, still varied so widely throughout the United States. This has been a long standing interest of mine. In my personal statement when applying to the Georgetown PhD program, I described one of my goals for the program: "One of my primary interests is public policy analysis in regard to public education. My interest in education started as a child trying to figure out why the public school system that I attended could not even offer a geography class while the public school system in the adjacent city offered a plethora of Advanced Placement classes. This, of course, came down the difference in funding between the two school systems." This project began as a desire to better understand the influences that shape our education system in the United States.

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Chapter 1

Introduction

When Micheal Brown was gunned down by police in 2014, his mother through her grief, exclaimed, "You took my son away from me. You know how hard it was for me to get him to stay in school and graduate? You know how many black men graduate? Not many!" (Glass 2015). Education is often the foundation for life-long opportunities and achievement. But access to good public education varies significantly across the United States. For minorities, opportunities have been even more limited. In 2013 by grade 12, there was a white-black achievement gap of 30 points in reading test scores and 30 points in math test scores, both achievement gaps increasing from previous years of testing (NCES 2016*b*). As with test scores,there is also significant variation in funding for public education. Districts that share borders can spend significantly different amounts on educating children. In her presidential address at the annual American Education Research Association conference, Ladson-Billings (2006) stated "One of the earliest things one learns in statistics is that correlation does not prove causation, but we must ask ourselves why the funding inequities map so neatly and regularly onto the racial and ethnic realities of our schools." While there is clear evidence that education opportunities and outcomes vary across the United States, evidence on what influences investment in public education is less clear. However, it is of great importance in understanding educational opportunities.

The goal of this dissertation is to understand what influences investment in public education through the lens of political science. While there is a significant amount of research on the financing of public education, it is primarily from an economic perspective. Not only can political science help provide a new perspective on financing for public education, education provides an opportunity to test theories in political science in new ways. There are over 10,000 school districts in the United States enrolling 50.4 million children (NCES 2016*a*). As Berkman and Plutzer (2005) notes, school districts provide a "natural laboratory" in which a wide range of questions regarding governance can be tested. Because there is a direct link between citizens within the district, where the money is coming from, and where it will go, districts provide a way to test theories about investing in public goods. Unlike with other public goods, it is quite clear who will benefit from investment in public education. This is helpful in understanding the role of race and partisanship in public investment.

This dissertation focuses on two big questions in political science. The first focuses on race and diversity, which have shaped much of the research in political science over the last 50 years. While significant progress has been made in identifying the ways in which race influences the political process, there are still questions that remain. Diversity has consistently been shown to drive down investment in public goods (Alesina, Baqir and Easterly 1999; Costa and Kahn 2003; Glaser 2002; Habyarimana et al. 2007; Harris, Evans and Schwab 2001; Hero 2003; Hoxby 2000; Luttmer et al. 2001; Poterba 1994; Poterba 1996; Putnam 2007). There have been challenges to this broad-sweeping finding that diversity will always reduce investment in public goods. Instead, it has been argued that the effect of diversity is much more nuanced. Research has found that it is more about a rapid change in diversity and not the level of diversity that predicts a decrease in investment (Hopkins 2009); salient national issues, particularly involving spending on crime, are more susceptible to diversity's influence (Hopkins 2011); and collective action is hampered in segregated cities, making investment in some types of public goods more difficult (Trounstine 2015*b*).

By focusing on investment in public education, this project looks at this question from a new angle. It focuses on the type of interaction required for that good. Many studies have shown that Americans often do not know the demographic breakdown of their own community (Alba, Rumbaut and Marotz 2005; Gallagher 2003; Martinez, Wald and Craig 2008; Nadeau, Niemi and Levine 1993; Sigelman and Niemi 2001; Wong 2007). With schools in most areas of the United States, where a person lives determines where they will attend school. Diversity should have little effect in segregated areas, because there will be little contact between groups and little knowledge about different groups within the community. However, in an integrated setting, there will be increased contact among groups because they will attend the same schools, increasing the likelihood that negative effects of diversity will occur. This study looks to provide further evidence that diversity does not imply that a decrease in investment will occur. Instead, contact among groups matters more than the actual level of diversity.

The second area focuses on the allocation of targetable goods to voters, with a new test for understanding distributive politics. There is a long-standing debate in how political parties allocate targetable goods to voters. Cox and McCubbins (1986) argue in favor of a core voter model where parties will allocate distributive benefits primarily to their core supporters. Others argue that a swing model is more appropriate because parties cannot credibly threaten to withhold distributive rewards from their favored party and therefore should not waste rewards on them (Stokes 2005; Dixit and Londregan 1996). However, this debate has mainly focused on using targetable goods to persuade voters. If, instead, parties are trying to mobilize voters, then parties are likely to follow the core voter model (Cox 2009). Evidence for this is mainly at the federal level (Ansolabehere, Gerber and Snyder (2002); Ansolabehere and Snyder (2006) focus on state transfers to counties) but less evidence exists for smaller units of government. Can parties be more strategic in their targeting of core voters?

There are many reasons that make public education an ideal place to test this. Public education is the largest expenditure of state governments (Bernstein 2014). In addition, school districts often include more homogeneous voters than counties or even congressional districts. Mobilizing voters is a primary goal for parties, and organized interest groups can play an important role in mobilizing voters (Schlozman and Tierney 1986). Teacher unions can be dominant forces in elections with mobilizing efforts (Moe 2005), especially in off-cycle elections (Anzia 2011). Political parties have incentive to leverage these interest groups and can target more homogeneous groups by distributing benefits to school districts. However, the majority of transfers from the state level to a school district occur through funding formulas (Odden and Picus 2014). Funding formulas are touted as a way to distribute money fairly, but often lack transparency and are difficult to understand. There are many incentives for parties to strategically engineer a funding formula to benefit core supports, but are they able to do so? This study looks to provide further insight into whether state parties follow the same patterns as parties at the federal level and whether funding formulas are susceptible to the same partisan influences.

1.1 Organization of this Study

This dissertation examines three aspects that influence funding for public education: racial segregation within a school district, racial segregation between school districts, and a test of the core voter model as applied to state transfers for public education. Each chapter represents a stand-alone article devoted to trying to understand one area in more detail. The first two seek to answer similar questions about the role that race plays, but from different perspectives. The third article shifts the focus from race to partisanship, focusing on the ability of elected officials to target core supporters through state transfers to local districts. However, each article draws on the same originally compiled data source on school districts across the United States from 1992-2012.

Data comes primarily from the National Center for Education Statistics, the US Census Bureau, ProPublica, and the Harvard Dataverse. Spatial data was leveraged to create school district measures of segregation and partisanship. Details about data collection efforts and spatial joining are provided in the appendix. The remaining chapters are organized as follows.

Chapter Two asks how does segregation in a school district influence public investment in education? Previous literature has identified racial diversity as a key predictor for spending less on public goods. But while some diverse cities struggle to provide basic services, other diverse cities thrive. Recent research has explored the role of segregation, suggesting that political polarization in segregated places prevents groups from coming together to agree upon taxation and spending, and ultimately driving down investment (Alesina and Zhuravskaya 2011; Trounstine 2015*b*). But does this finding translate to all contexts of local government, particularly funding for public education?

In an integrated setting, students from different racial groups are much more likely to attend the same school and have increased contact with different groups. Segregation allows parents to send children to homogeneous schools, which can affect the likelihood of a parent choosing between private and public education, whether to support or oppose tax increases for public education, and possibly affect local property values. Instead of integration making collective action easier as it does with other types of public goods, integration decreases support for investment in public education. To show this, I use a natural experiment that exploits quasi-random variation in school segregation using court desegregation orders. The release from a court order creates exogenous variation in school segregation and allows comparison of districts that have had their order lifted to districts still under a court order. Next, I directly compare my data to city expenditures from Trounstine (2015*b*) to help establish the difference between education and other types of goods. I find that white-black segregation leads to more investment in public education while white-Hispanic segregation, as well as segregation by income, have no effect.

Chapter Three asks how does racial segregation across an area, in this case a county, contribute to variation in public education investment? When explaining variation in per child revenue between school districts, explanations are often based on economic differences, like differences in median household income. And when trying to understand the effect of race on investment in public goods, research has often focused on *within* jurisdiction segregation and diversity. In many areas of the United States district boundaries coincide with racial cleavages. Districts are homogeneous within but highly segregated between. Boundaries can serve as a way to exclude people and concentrate resources.

I find that counties that are residentially segregated have more unequal local revenue collected for education between school districts than counties that are racially integrated. In areas where segregation exists along boundaries, I find that districts that encapsulate larger minority groups, particularly African American, collect less in local revenue than in integrated communities but have a higher tax burden. In addition, test scores are lower for minority districts in segregated counties than in integrated ones.

Chapter Four asks do state politicians reward school districts that vote in favor of the party in power? With large shares of money at the state level to transfer to local governments and the ability to target core voters, it would seem likely that politicians would take advantage of the ability to distribute education funds. However, in understanding how states distribute them, little emphasis is given to partisan influences, particularly the congruence between local school districts and the state level. Political science research offers evidence that politicians distribute benefits to loyal or core voters in hopes of maximizing electoral benefits. Much of this research is at the federal level, with a few exceptions focusing on state distributions to counties. While counties do define geographically similar areas, they are less likely to define homogeneous populations in terms of voting preferences. School districts, because of the way district boundaries are created, often define fairly similar populations.

Through a series of panel models, I was able to leverage changes in partisanship at the state level to test how it influences the distribution of funds in subsequent years. I find evidence that funding formulas are susceptible to political influence and that parties are able to influence the geographic distribution of education funds to core voters. School districts in the South, however, do not follow the same pattern as the rest of the United States. There are no consistent significant results in the South, likely due to the prominence of county based school districts and distinctive nature of the Democratic party in the South.

Through this dissertation, I sought to engage two different worlds with the hope of gaining new knowledge in each and ultimately have a better understanding of the different pressures in financing education. These questions are timely as the United States continues to undergo demographic changes. In 2013, the majority of students in public schools came from low-income families (Suitts 2015), and in 2014, public school enrollment became a majority-minority for the first time (Maxwll 2014). Chief Justice Earl Warren wrote in his decision for *Brown v. Board of Education (1954)* that "education is perhaps the most important function of state and local governments...

It is the very foundation of good citizenship... where the state has undertaken to provide it, is a right which must be made available to all on equal terms." If we pay attention only to one side, that is the economic conditions within a district, of what determines the amount of investment in public education, we will miss areas that will struggle to provide an education for the next generation. By incorporating research from political science, there is a clearer picture of what shapes investment for public education.

Chapter 2

Exit or Invest: How Segregation Still Shapes Public Education

2.1 Introduction

Many scholars have found that diversity is associated with decreases in public investment and social capital (i.e., Alesina, Baqir and Easterly 1999; Putnam 2007)[1] and funding for education is no exception (Poterba 1996; Hoxby 2000). But while some diverse cities struggle to provide basic services, other cities thrive in providing a wide range of public goods. To explain this puzzle, Alesina and Zhuravskaya (2011) and Trounstine (2015*b*) point to segregation. Political polarization in segregated places prevents groups from coming together to agree upon the appropriate level of taxation and spending, and ultimately driving down investment (Trounstine 2015*b*).

But does this finding translate to all contexts of local government, particularly funding for public education? A typical school district contains school catchment areas in which a child's residents determines which school she attends. Therefore, if a school district is residentially segregated, then the schools themselves are likely to be segregated. But in an integrated setting, students from different racial groups are much more likely to attend the same school, and have increased contact with different groups. While contact theory posits that increased, regular contact with members from a different group can reduce prejudice (Allport 1954), it is only likely to do so under certain conditions, i.e. when there is equal status and repeated interactions

[1]Costa and Kahn (2003); Glaser (2002); Habyarimana et al. (2007); Harris, Evans and Schwab (2001); Hero (2003); Luttmer et al. (2001); Poterba (1994)

(Pettigrew 1998). Race is still a factor some parents, particularly white parents, use as a proxy for school quality (Holme 2002; Johnson and Shapiro 2003; Krysan and Farley 2002), suggesting that equal status has not yet been met. In addition, there has been a strong resistance to integration in public schools, with over 700 school districts under court order to desegregate since the passage of *Brown v. Board of Education* (ProPublica 2014). Instead of integration making collective action easier as it does with other types of public goods, integration decreases support for investment in public education. Segregation allows parents to send children to homogeneous schools, which can effect the likelihood of a parent choosing between private and public education, whether to support or oppose tax increases for public education, and possibly effect local property values themselves.

This paper uses an originally compiled data set of over 11,000 school districts from 1995 to 2011, which allows the observation of demographic changes and then the subsequent response in local investment. It is supplemented with two additional analyses. This paper takes seriously concerns of endogeneity, particularly self-selection into neighborhoods. For example, it is likely that individuals who are more tolerant of diversity are more likely to select neighborhoods that are integrated. The first supplemental analysis is a natural experiment that exploits quasi-random variation in school segregation using court desegregation orders. While the districts that have been placed under a court desegregation order are not random, the timing of when the order is lifted is quasi-random. This release from a court order creates exogenous variation in school segregation and allows comparison of districts that have had their order lifted to districts still under a court order. Timing in placement under a court desegregation order and release from orders as a strategy for causal identification has been applied in other settings as well, including education, criminal activity, and mixed-race births (i.e. Gordon and Reber 2016; Johnson 2011; Weiner, Lutz and

Ludwig 2009). The second analysis, a direct comparison to cities and city expenditures from Trounstine (2015*b*), helps establish the difference between education and other types of goods, such as spending on police or roads.

This paper contributes to the existing research on diversity in several ways. First, not all public goods are the same. While integration helps communities invest more in roads and sewers, it does not cause an increase in school finances. White-black integration leads to *less* investment in public education. Going from the 75th to 25th percentile in white-black segregation within a district, i.e. becoming more integrated, results in $112.74 less per student. With the average district enrolling 3,887 students in 2010, this is a $438,220.38 difference. Second, not all groups react to each other the same way. Prior work on diversity and segregation often include all races and ethnicity into one measure, which can mask differences in response to different out-groups. By looking at white-black and white-Hispanic segregation separately, I find that investment in public education is not related to white-Hispanic segregation. And while race and income are often correlated, investment is not related to income segregation. The pattern holds, but with increased magnitude, when I focus on districts with court desegregation orders using an instrumental variable analysis. These results are robust to limiting the sample to cities studied by Trounstine (2015*b*). In exploring possible mechanisms, I test the effect of segregation on enrollment in public schools. While segregation is not related to public school enrollment in the full sample, in districts that have a court desegregation order lifted, the percent of children attending public schools increases.

This paper proceeds as follows. In part two, I discuss existing efforts to research diversity and segregation and how these factors could affect different types of public investment in different ways. In the third section, I discuss the originally compiled data set of 11,000 school districts from 1995 to 2011. Next, I present the statistical results based on a series of panel data models. In the fifth section, I assess the robustness of the results in two ways. First, I use the overturning of a court desegregation order as an instrument for school level segregation to implement an instrumental variable model explaining segregation and education revenue. Second, I replicate Trounstine (2015*b*) findings and compare her results on city expenditures to education. Finally, I discuss the competing views of integration and offer concluding remarks.

2.2 Interaction and Investment

Race and ethnicity have been found to be prominent factors in determining an individual's political attitudes and policy preferences (Dawson 1994; Enos 2016; Federico and Luks 2005; Kinder and Kam 2010; Kinder and Winter 2001). But what is it about diversity and the interaction among different races that cause lower levels of public investment? Racial threat theory posits that individuals living in close proximity to different racial groups feel threatened, economically and socially, through increased competition over scarce resources (described by Key (1949), built upon by Blumer (1958), Blalock (1967), and Bobo (1988)). This occurs through two mechanisms: diverging preferences and decreased utility of a public good. As a city diversifies, different racial or ethnic groups might have different preferences over the appropriate level of taxes and services (Alesina, Baqir and Easterly 1999; Tiebout 1956). The second mechanism deals with the utility of a public good; a groups' utility level for a given public good is reduced if other groups also use that good (Kruse 2005; Luttmer et al. 2001).

One of the challenges and weaknesses in many studies of racial tolerance is the failure to specify what type of contact is taking place (Oliver 2010). Perhaps it is not the level of diversity that is driving these findings. Alternatively, it is the way in which a community is arranged. Neighborhoods in the United States are highly segregated along racial lines (Oliver 2010). Segregated communities, both residential and professional, by definition are less likely to encounter out-groups on a daily basis and therefore less likely to form ties needed to facilitate collective action. Instead of diverging preferences between groups, it is the lack of communication that drives negative investment. Trounstine (2015*b*) offers evidence of this, finding that segregated cities are more politically polarized and that is why segregated cities are associated with less spending on public goods (specifically police, roads, parks, sewers, and housing/welfare). Residential integration, on the other hand, has been offered as a way to overcome the negative effects of racial diversity (Welch 2001) because integrated communities that have increased communication flows and ties to other groups are better off than segregated ones (Habyarimana et al. 2007).

At the same time, residential integration does not guarantee the type of social ties that facilitate increased corporation and mutual trust. The four conditions outlined by Allport (1954) needed to overcome racial prejudice are equal group status within a situation, common goals, intergroup cooperation, and authority support. In reality, Oliver (2010) finds that integrated neighborhoods do not imply that residents are civically and socially engaged. Instead, integration for minorities, can mean facing threats and intimidation (Bobo and Zubrinsky 1996; Krysan and Farley 2002), and for whites, integration can mean less trust in neighbors, weaker sense of community and being less active civically (Oliver 2010).

Public goods that demand shared space, like public schools, result in a different kind of contact among groups. The decreased utility mechanism is more likely to come into play with public education than other types of goods. People in segregated communities understand that they will not have to share these spaces and therefore might be more willing to invest. But in an integrated setting, they can exit to private schools or move to a more homogeneous school district. "White-flight" is a well-studied phenomena where whites respond to desegregation by exiting to alternative, more homogeneous options (Lutz 2011). In addition, adults who do not have children might be less supportive of education funding if children attending the school are of a different race than their own (Poterba 1996). If people are resistant to the contact that is required of an integrated school, residential integration is likely to have the opposite effect on investing in public schools. I, therefore, hypothesize that communities that become more residentially integrated will invest *less* in their schools than areas that become more segregated.

While the empirical strategy in this article does not allow me to distinguish the specific mechanism, I briefly discuss some of the potential mechanisms that would lead to a decrease in public investment in an integrated environment. First, school budgets are linked to local property taxes because the majority of local revenue for public education is supplied through property taxes (Berkman and Plutzer 2005). Highly rated schools can create higher housing values, and therefore more money collected from property taxes. While not an academic analysis, the real estate firm Redfin put a number on it- homes in areas with highly rated schools cost approximately $50 more per square foot more compared to homes in areas with average rated schools (Unger 2013). But research has continually shown a relationship between the race of students and the perception of school quality (i.e. Holme 2002). And when choosing where to live, school quality is used as a proxy for the racial composition of a neighborhood (National Fair Housing Alliance 2006). In an integrated setting, schools could be perceived to be of a lower quality. This reinforcing link between the users of the good and the quality of the good could effect home values resulting changes in property tax and school budgets.

Beyond housing values, integration could impact the private/public school balance. In a segregated setting, this would mean to a homogeneous public school, perhaps increasing the likelihood of sending their child to a public school over a private school. In an analysis of schools that were required to desegregate, Baum-Snow and Lutz (2011) found that there was an average six to twelve percent decline in white public school enrollment. Lastly, citizens often have a role in the school budget process, either through voting directly on the school budget or voting on a tax increase. In an integrated setting, citizens might be less supportive of an increase in budgets if children are attending private school and if the students are of a different race than themselves.

While the focus of this article is on changes *within* a school district, this does not imply that an increase in investment at the school district level is applied equally to all schools within the district. While it is very difficult to obtain budgets at a school level, a few case studies have revealed that variation in spending exists within school districts. In a study of 89 elementary schools in one urban district in Ohio, Condron and Roscigno (2003) find considerable disparities in spending within a district. These disparities are linked to racial and class cleavages within the district. In addition, this article does not directly speak to the quality of public education in these segregated environments. While I offer a more detailed response in the conclusion, it is important to note that increased revenue within a district does not imply that the revenue is flowing evenly to all groups within a district or that increased revenue is correlated with increased quality.

A second component of this paper is also to move beyond simple measures of diversity. If people respond to different types of public goods in different ways, do all groups respond to the same out-group in the same way? Research often uses one measure to talk about changes in diversity- the Herfindahl index (i.e. Alesina, Baqir and Easterly 1999; Putnam 2007). It is interpreted as the probability that two randomly selected individuals are from the same group. There are many ways to get the exact same Herfindahl index for very different communities. For example, a community that is 30 percent white and 70 percent black would have the same index as a community that is 70 percent white and 30 percent black or 70 percent Hispanic and 30 percent black. But the mix of people is likely to matter. Many of the early theories of racial threat focus on the response of whites to African Americans. By grouping everyone into one measure, it is difficult to know what is driving the results.

There have been two distinctive processes for diversity in the United States- the African slave trade and the immigration of Latinos and Asians in the 20th and 21st century (Putnam 2007). And even more importantly, the ways in which groups have been treated historically differ. Massey and Denton (1993) showed just how different the construction of African American neighborhoods was than any other racial or ethnic group. The ghettos, as they referred to them, were purposefully created to keep this group isolated. The historical context requires that the effect of diversity or segregation on public investment be looked at in more nuanced ways. Segregation concentrates poverty in black neighborhoods (Massey and Denton 1993)

While I do not hypothesize how whites would react to integration with different groups, I do look at White-Black and White-Hispanic segregation separately. It is possible that the reaction would be different for each group. Although busing and court orders are less likely today, tension within communities over education is still high and often related to white-black relations. White-Hispanic segregation might not have the same effect because the process through which white-Hispanic segregation occurred is fundamentally different than white-Black segregation and not marked by the same institutional racism.

2.3 Constructing the Data: Public School Districts

In order to test these hypotheses, I have collected data from a variety of sources that combines school budget information, student demographic information, and community demographic information from 1995-2011. The Public Elementary-Secondary Education Finance Data provided by the U.S. Census Bureau has school district budgets each year from 1995 to 2011(US Census Bureau 1993-2011). This data set breaks apart revenue by local, state, and federal governments and separates out capital projects from the operating budget. The Local Education Agency (School District) Universe Survey, provided by the National Center of Education Statistics, collects student demographic information like the racial and ethnic breakdown of the students and percent of students receiving free and reduced lunch yearly(NCES 1993-2012). I include community level information about the school districts from the 1990, 2000 and the 2007-2011 American Community Survey (US Census Bureau (1990); US Census Bureau (2000); US Census Bureau (2010)). Because the Census data is not yearly, I interpolate data between the three Censuses.

I also use tract level information from the Census to calculate segregation measures, discussed below.[2]. Because the geographic area that is included in a census tract can change over time, I re-weight the 1990 and 2000 tracts to reflect 2010 tract boundaries according to Logan, Xu and Stults (2014).[3] Census tracts are then mapped on to school districts using the 2013 School District Geographic Relationship Files created by the National Center for Education Statistics (National Center for Educa-

[2]For the 1990 and the 2000 Census, tract level data was downloaded directly from the American Fact Finder US Census Website for each state. The 2010 tract level data was downloaded using USCensustract2010 package in R (Almquist 2010)

[3]The US2010 program at Brown University has created STATA code to re-weight tracts in the 1990 and 2000 Census to reflect changes in boundaries from the 2010 Census. This code was written by Brian Stults.

tion Statistics 2013). In addition, to these main data sources, I also added presidential vote by county (CQ Press 2016), city expenditure data for a comparison from Trounstine (2015*b*), mapped private school information onto public school districts (National Center for Education Statistics 2000-2010), and information regarding court desegregation orders in a district (ProPublica 2014).

For this data set, I focus only on Elementary School Districts, Secondary School Districts, and Elementary-Secondary School Districts. I exclude vocational, special needs districts, non-operating districts, state-run districts, charter districts, and educational service agencies. This yields approximately 12,000 school districts. I also limit the analysis to districts that have more than one census tract and have at least one year that has percent African American greater than zero. This requirement is necessary to calculate segregation measures.[4] Because some districts merge, open, or close during this time-frame, the exact number varies from year to year but is stable over time for the vast majority.[5]

In order to test the effects of a changing community and segregation, I use the *Per Child Local Revenue* raised for schools as the primary dependent variable, which includes taxes (property, utility, and sales), charges, and miscellaneous revenue that is used by the school district and collected at the local level. I focus specifically on the local amount raised instead of total per child spending because this is what local citizens and school boards have control over. In 2010, local revenue was approximately 42 percent of the total revenue raised for the average district. State funds are determined mostly through funding formulas (46 percent of total revenue) and federal dollars are

[4]I also excluded outliers in terms of per child local revenue (top and bottom 1% of data). Districts that have small numbers of students can have very large per child spending.

[5]There is a small amount of missing in some of the variables early on in the data set. I re-ran models with imputed data as well as on the districts that had no missing data. Results do not change and are available on request.

mostly doled out through grants (12 percent of total revenue). In order to control for differing sizes of school districts, I calculate this as a per child measure by dividing by school enrollment. All dollar amounts are in 2013 constant dollars. Table 2.1 shows the mean and N for 1995, 2000, and 2010 for all variables.

The most common measure used for segregation is the dissimilarity index, which calculates the percentage of a group's population that would have to change residence for each neighborhood to have the same percentage of that group as the overall area. However, it does not control for the relative size of one group to another group. The Theil H index (1972) calculates a segregation measure that controls for both evenness of the distribution of a group and the relative size. The H index varies between 0 and 1, where 0 indicates that each sub-unit (census tract or school) has the same composition as the entire unit (school district). I use this measure in most models, and the dissimilarity index as well as an isolation index as a robustness check.

I calculate the measure in several ways: white-nonwhite, white-black, and white-Hispanic segregation. This is calculated using both census tracts and schools for each district to create measures for residential segregation and school segregation. For schools, the focus is on segregation in elementary schools because many districts only have one high school. Appendix A contains additional information about the measure. Throughout the paper, *White-Black Segregation, Residential* refers to the segregation measure between white and black residents calculated using the H index and using Census tracts as the sub-unit. *White-Black Segregation, School* indicates that schools are the sub-unit within the district.

For segregation by income, I use the same method as Massey et al. (2003). Using census data, I define households to be either at or below the poverty level, middle class, or affluent (defined as four times the poverty level). I then calculate segregation between poverty households and affluent households. For income segregation at the school level, I use the number of children receiving free lunch compared to the number of children paying for lunch within each school compared to the overall population of the district.

There are many other factors that are likely to affect the amount of revenue raised beyond segregation. Diversity of residents has consistently been highlighted as an important predictor. Diversity can be measured in different ways, but I am using *% Black* and *% Hispanic* to capture the diversity of the district. Beyond the level, the change in diversity can be important (Hopkins 2009). I have also included the five year change in percent African American, *5 yr* Δ *% Black*, and change in percent Hispanic,*5 yr* Δ *% Hispanic*.

Economic conditions within each district are also different. Wealthier areas will be able to raise more revenue than cash-strapped districts. I include *Median Household Income* in thousands of dollars as a measure for district wealth. I include the percent of residents with a bachelor degree or higher, *% Bachelor or higher*, as a proxy for education support and percent of Democratic vote in the previous election, *% Democrat President Vote*, as a proxy for support for government spending. I also include percent of residents who own their home, *% Own Home*. Because property taxes are a large part of investment in local revenue, home owners might have stronger views on changes in taxes. States and the federal government contribute at different rates as well. I include controls for *Per Child State* level funding and *Per Child Federal* level funding. Districts vary in size, which can impact per child costs. To combat this, I include the number of students in a district, *Student Enrollment*, the log of the population, *Log Pop*, and the land area size of the district *Land Area*.

In addition to these variables that are included in all models, I have also collected additional school district information, which was not reliably reported until the 2000s. This includes percent of students receiving free lunch (*% Free Lunch*), per-

Table 2.1: Summary Statistics of Data for 1995, 2000, and 2010

	1995		2000		2010	
	Mean	N	Mean	N	Mean	N
Per Child Local (in thous)	4.57	11,091	4.73	11,123	5.74	11,425
Per Child State (in thous)	4.59	11,108	5.55	11,136	6.06	11,458
Per Child Fed (in thous)	.53	11,108	.67	11,136	1.52	11,458
White-Black Seg., Resident (H Index)	0.09	11,108	0.08	11,136	0.07	11,458
White-Hispanic Seg., Resident (H Index)	0.04	11,108	0.04	11,136	0.04	11,458
White-Nonwhite Seg., Resident (H Index)	0.06	11.108	0.06	11,136	0.05	11,458
White-Black Seg. Resident (Dissimilarity)	0.34	11,108	0.32	11,136	0.30	11,458
Income Segregation	0.19	11,108	0.19	11,136	0.22	11,458
White-Black Seg., School[a] (H Index)	0.08	5,441	0.07	5,385	0.07	5,755
White-Hispanic Seg., School[a] (H Index)	0.06	5,888	0.06	5,881	0.06	5,976
Free-Paid Lunch Seg., School[a] (H Index)	0.05	4,409	0.04	4,865	0.04	5,650
% Black	5.22	11,108	5.38	11,136	6.03	11,458
% Hispanic	6.03	11,108	7.06	11,136	9.81	11,458
5 yr Δ % Black	0.15	11,108	0.14	11,136	0.40	11,458
5 yr Δ % Hispanic	0.98	11,108	0.97	11,136	1.31	11,458
Med. Household Income (in thous)	55.34	11,108	57.08	11,136	52.70	11,458
Log Population	9.05	11,108	9.10	11,136	9.19	11,458
% Bachelor or higher	16.53	11,108	18.39	11,136	21.88	11,458
% Democrat President Vote	45.83	11,108	43.29	11,136	43.39	11,458
% Own Home	74.70	11,108	75.39	11,136	76.26	11,458
Land Area (in thous)	574,342	11,108	578,043	11,136	599,958	11,458
Student Enrollment	3,672	11,108	3,889	11,136	3,980	11,458
Num. Private Schools			2.40	11,136	2.02	11,458
Num. Charter Schools			0.06	11,136	0.19	11,458
% SPED	9.85	11,108	12.61	11,136	13.69	11,458
% Free Lunch	27.01	8,727	25.37	9,137	35.93	11,174

[a]Approximately half of the districts have more than one elementary school. No measure was calculated for districts with only one school.

cent enrolled in Special Education (*% SPED*), and number of charter schools (*Num. Charter Schools*) and private schools (*Num. Private Schools*) in the area.[6] During this time period, the average school district grew in size, per child amounts at all three levels of government increased, percent of the community with a bachelor degree increased, more students received free and reduced lunch, and percent of the community that is Hispanic and African American increased. In addition, the average school district became less white, has a lower median household income, and has become slightly less segregated.

2.3.1 Model Specification

Understanding the impact of changes at the local level is challenging. Local governments are not independent entities from the state (Morgan and Watson 1995), and school districts are no different. States fund education at different levels and set the rules that districts must follow in generating education funds. Some states, such as California and New Jersey, have set tax caps on property tax rate increase. Other states require citizens to vote on school district budgets (for example, New York). Figure 2.1 illustrates the variation by state by plotting per child local revenue by state. Each dot represents the revenue by district, while the state mean is represented by the black dotted line. In some states, such as New Mexico, very little funding comes from local school districts. In other states, such as Connecticut, local districts collect significant revenue from local sources. The intra-class correlation (ICC) also shows that a large part of the variation in per child local revenue occurs between states- 39 percent.

[6]Private schools were geocoded and given a 10 mile buffer radius around for an "attendance" zone. These zones were overlaid with public school district boarders. If they overlapped, then the children in the public school were said to have access to that private school.

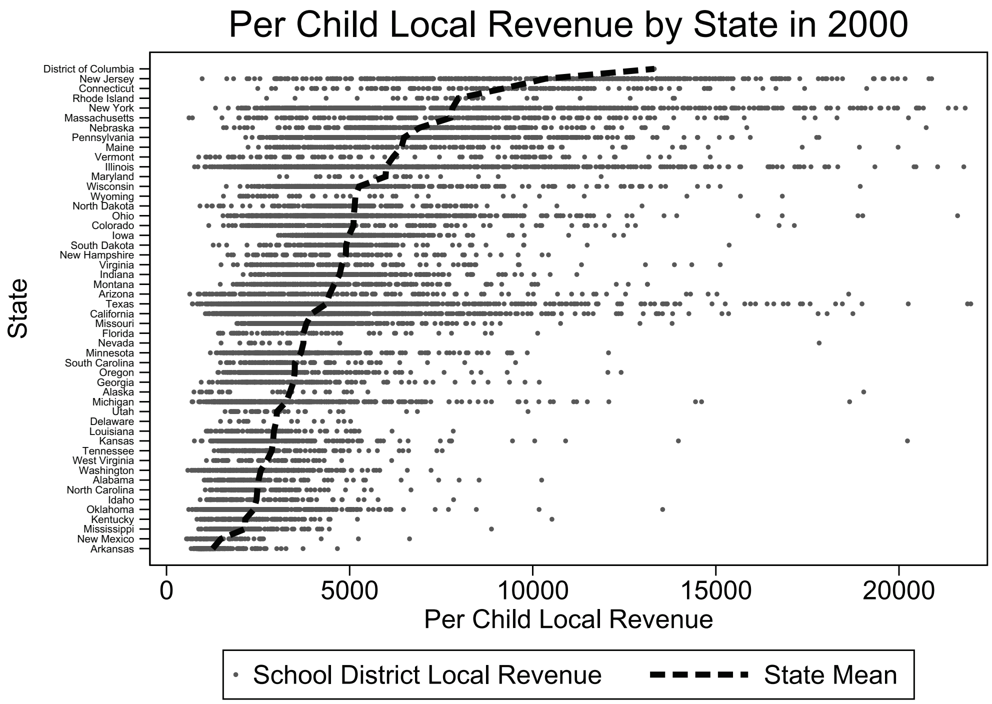


Figure 2.1: Per Child Local Revenue by State in 2000

Note: This graph reflects the variation in per child local revenue by state in 2000. Each black dot represents a school district and the dashed line represents the mean per child local revenue in each state.

In order to account for this state-level variation, I use multi-level modeling which is more flexible than Ordinary Least Squares (OLS). This approach allows the inclusion of state and district level random intercepts to account for this variation and allows for partial pooling of group indicators (Gelman and Hill 2007). Multi-level modeling allows a nested design, with district intercepts nested within state-level intercepts. I use a three-level model. The model has two random-effects equations. The first is a random intercept at the state level (level three) and the second is a random intercept at the school district level(level two). Because this data is over time, level one is the district at each point in time. The model is given by the following equation:

$$\textit{Per Child Local}$$
$$Revenue_{jk,t} = \beta_1 Segregation_{jk,t-1} + \beta_c X_{jk,t-1} + f_t^{year} + u_k^{state} + u_{jk}^{district} + \epsilon_{jk,t-1}$$

for $i = 1; ...; n_{jk}$ first-level observations nested within $j = 1; ...; M_k$ second-level groups (districts), which are nested within $k = 1; ...; M$ third-level groups (states). The third-level random intercept for state intercepts is u^{state} and the second- level random intercept of district is given by $u_{jk}^{district}$ where:

$$u_k^{state} \sim N(0, \Sigma^{state});\ u_{jk}^{district} \sim N(0, \Sigma^{district});\text{ and } \epsilon_{jk} \sim N(0, \sigma_{jk}^2 I)$$

and that u_k^{state},$u_{jk}^{district}$, and ϵ_{jk} are independent. β_1 is the coefficient on *Segregation*, and X is the design matrix for the fixed effects for β_c (where c references controls: percent black, percent Hispanic, change in black, change in Hispanic, median household income, students enrolled, log population, per child state, per child federal, percent bachelor degree, and percent vote for Democrat president). Because it is over time, t references the year of observation where t=1995....2010. The dependent variable is per child local revenue for district j in state k at time t+*1*. When robust is specified, error terms are clustered at the highest level. Therefore, when state and district random effects are both included in the model, the error term is clustered at the state level.

2.4 Large-N Analysis Results

The first set of results tests how segregation within the school district impacts per child local revenue (in thousands of dollars) for all school districts in the United States. I estimate both multilevel models with state and district random effects and a district fixed effect models of per child local revenue where the independent variables are from the year prior. Table 2.2 shows the results with associated p-values in parentheses. Column 1 through 4 are multi-level models with random intercepts for state and school district, include year fixed effects, and robust standard errors. As an additional model check, column 5 contains the results with district fixed effects and year fixed effects and clustering standard errors by district. State fixed effects are not necessary in this model because the state effect is captured within the district fixed effect. The key coefficients of interest are *White-Nonwhite Segregation, Residential*, *White-Black segregation, Residential*, and *White-Hispanic Segregation, Residential*, as measured by Theil's H index. With each segregation coefficient, the coefficient represents the change from complete integration (segregation=0) to complete segregation (segregation=1).

In all models, segregation predicts increased local revenue. But not all segregation measures respond in the same way. While the *White-Nonwhite Segregation* coefficient is very similar in magnitude to *White-Black Segregation*, *White-Hispanic Segregation* is not predictive. When both *White-Black Segregation* and *White-Hispanic Segregation* are in the model as shown in Column 4 in Table 2.2, *White-Black segregation* is the main driver of this relationship. Figure 2.2 plots the marginal change of going from no segregation to complete segregation for both white-black and white-Hispanic segregation (based on column 4). Substantively, going from the 75th to the 25th percentile in *White-Black Segregation, Residential* (0.10 to 0.02; i.e. becoming less segregated) would result in $112.74 less dollars per child. With the average district enrolling 3,887 students in 2010, this is a $438,220.38 difference.

In terms of diversity, the level of African American or Hispanic residents is not directly related to per child revenue, but a change is, a finding consistent with Hopkins (2009). But as with segregation, the response is not uniform to different out-groups. While a five year change in percent Hispanic results in an increase in revenue, a five year change in African American residents predicts a decrease in revenue. Economic factors also matter. Districts with higher median household incomes and a higher percentage of residents with bachelor's degrees collect more in local revenue.

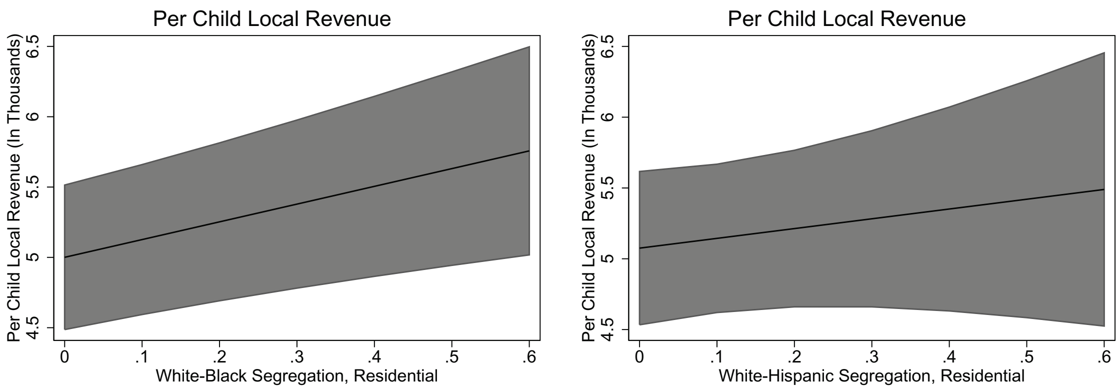


Figure 2.2: Marginal Effect of Segregation

Note: This is the effect of a marginal change in white-black segregation on per child local revenue. This result is from Table 2.2 Column 3. *White-Black Segregation* is measured using the H index (White-Black) residential.

The positive effect of segregation is true across a wide variety of model specifications. Figure 2.3 shows the 95 percent confidence interval for the *White-Black Segregation, Residential* coefficient across twelve different model specifications. "Original Model" plots the coefficient from the multi-level model in Table 2.2 Column 2. The set of models under "Vary Time Frames" show the coefficient when: 2) predicting per child lcoal revenue two years into the future, 3) per child local revenue ten years into the future (that is, crosses a census), and 4) only using five years of data (1995, 1997, 2002, 2007, and 2010). The next set of reported coefficients change or add variables to the model: 5) added percent of students receiving free lunch, special education services, percent of children in the district attending public schools, percent of adults unemployed, and number of charter schools (the data on most of these variables was not available or inconsistently collected until 2000, so they are not included in the original model) 6) replacing Theil's H index with the dissimilarity index, and 7)

Table 2.2: Effect of Segregation on Per Pupil Local Revenue

	Per Child Local Revenue				
	State & District Random Effects				Dist FE
White-Nonwhite Segregation, Residential	1.40 (0.005)				
White-Black Segregation Residential		1.37 (0.000)		1.26 (0.001)	0.73 (0.039)
White-Hispanic Segregation Residential			1.26 (0.095)	0.69 (0.392)	-0.13 (0.819)
% Black	-0.01 (0.169)	-0.01 (0.146)	-0.01 (0.191)	-0.01 (0.141)	-0.03 (0.000)
% Hispanic	-0.01 (0.331)	-0.01 (0.362)	-0.01 (0.291)	-0.01 (0.340)	-0.02 (0.000)
5 yr Δ % Black	-0.02 (0.000)	-0.02 (0.000)	-0.02 (0.000)	-0.02 (0.000)	-0.02 (0.004)
5 yr Δ % Hispanic	0.03 (0.000)	0.03 (0.000)	0.03 (0.000)	0.03 (0.000)	0.02 (0.003)
Students Enrolled	-0.00 (0.057)	-0.00 (0.051)	-0.00 (0.056)	-0.00 (0.049)	-0.00 (0.001)
Med. Household Income	0.02 (0.022)	0.02 (0.023)	0.02 (0.022)	0.02 (0.022)	0.02 (0.000)
Log Pop	-0.46 (0.000)	-0.47 (0.000)	-0.46 (0.000)	-0.48 (0.000)	-0.71 (0.000)
% Bachelor or higher	0.11 (0.000)	0.11 (0.000)	0.11 (0.000)	0.11 (0.000)	0.09 (0.000)
% Dem Pres Vote	0.01 (0.125)	0.01 (0.125)	0.01 (0.120)	0.01 (0.124)	0.01 (0.000)
% Own Home	0.01 (0.027)	0.01 (0.028)	0.01 (0.028)	0.01 (0.026)	0.03 (0.000)
Land Area	0.00 (0.016)	0.00 (0.014)	0.00 (0.015)	0.00 (0.015)	0.00 (.)
Per Child State	-0.14 (0.035)	-0.14 (0.035)	-0.14 (0.035)	-0.14 (0.035)	-0.12 (0.000)
Per Child Federal	0.07 (0.032)	0.07 (0.029)	0.07 (0.031)	0.07 (0.031)	0.07 (0.000)
Constant	4.50 (0.000)	4.55 (0.000)	4.49 (0.000)	4.56 (0.000)	6.51 (0.000)
State/District RE	X	X	X	X	
District FE					X
Number of Districts	11,751	11,751	11,751	11,751	11,751
Observations	177,479	177,479	177,479	177,479	177,479

Note: The dependent variable in all models is the *Per Child Local Revenue* in thousands of dollars. P-values are in parentheses. The first four columns provide the results from multi-level model covering years 1995 to 2011. Standard errors are clustered at state level. The fifth column clusters errors by district.

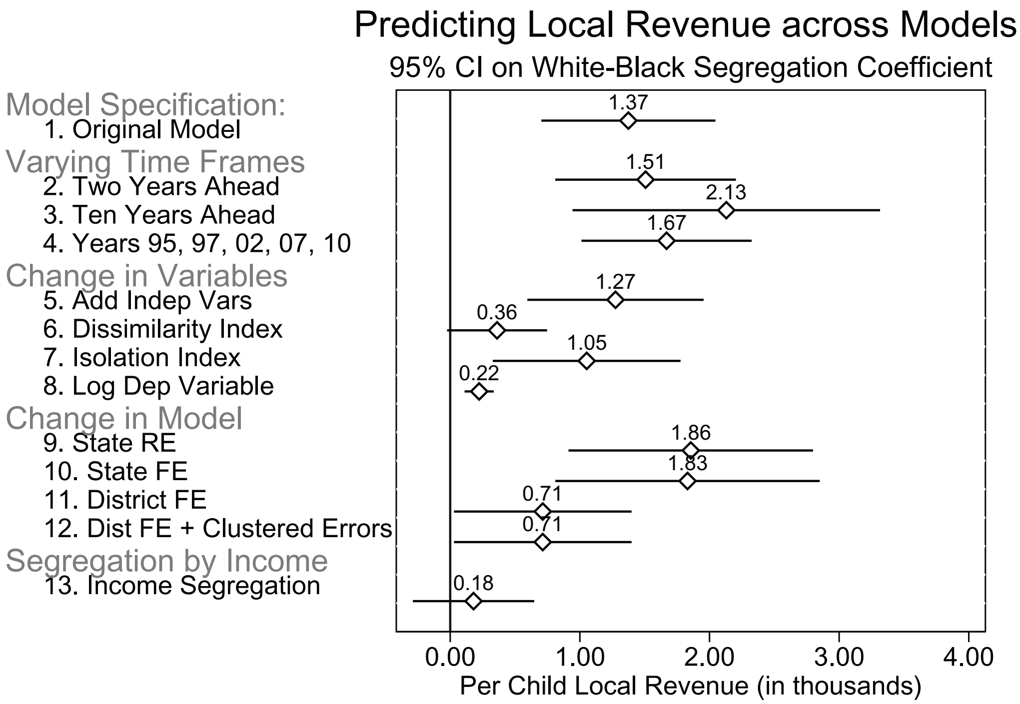


Figure 2.3: Robustness Checks when Changing the Model

Note: The graph plots the 95% confidence interval for the segregation coefficient across 12 different models with *per child local revenue* as the dependent variable. Each row is a new model with changes in either time, independent variables, or model structure.

replacing Theil's H Index with an index of Black Isolation, 8) logging per child local revenue.

The fourth set changes the structure of the model: 9) random effects for states only, 10) state fixed effects only, 11) district fixed effects, and 12) district fixed effects with standard errors clustered by district (this is the same as Table 2.2 Col. 5).[7] The story is

[7]In the appendix, Figure A.2 provides additional robustness checks by looking at the data cross-sectionally for each year.

consistent across all models- white-black segregation increases local revenue for public education. Figure A.1 in the appendix looks at different dependent variables: per capita local expenditures, per child total expenditures, per child current expenditures, per child revenue for instructional purposes, and per child revenue for capital outlay. With the exception of capital projects, all these categories show the same pattern: more segregated places spend more per child. Residential segregation has no effect on capital projects.

The last model in Figure 2.3 under "Segregation by Income" replaces the measure of residential segregation with a measure of income segregation. This measure captures the degree to which families in poverty and affluent families are residentially segregated (affluent is defined as four times the poverty level for a family of four). Because race is often correlated with income, it is possible that it is actually segregation based on income inequalities that is driving this finding. However, segregation by income does not generate the same results. The coefficient is not statistically different from zero. Therefore, race and not income are driving these findings.[8]

In addition to financial dependent variables, enrollment in public schools is also of interest. If people are willing to invest more in schools that see an increase in segregation, is that because more students are going to public school instead of private? Table A.1 in the Appendix includes results from regressions with percent of children attending public school out of total students enrolled in public and private school and total number of students enrolled in public school as dependent variables. These models do not meet the threshold of statistical significance.

[8]Using simulations to compare the coefficient from the original model to income segregation, the one-sided p-value is 0.007. These results indicate that the income segregation coefficient, while not statistically different from zero, is statistically different from the coefficient on *White-Blakc Segregation* from the original model.

2.5 A Natural Experiment: Court Desegregation Orders

While these results are robust to model specifications, there is still concern over endogeniety. Individuals can and do select where to live based on the demographics of their neighbors (Tam Cho, Gimpel and Hui 2013; Chen and Rodden 2009). Jurisdictions represent different levels of taxes and public goods, and people can sort themselves into their desired location (Tiebout 1956). It is therefore difficult to separate out preexisting attitudes on neighborhood choice and funding for education with changes in behavior in response to a current demographic change. While tracking the same districts over time help to mitigate this problem, this section takes it one step further by focusing on a quasi-random event: the overturning of a court desegregation order. Stanford University, U.S. Department of Justice, and ProPublica collected data on which districts have been under court order and if that order has been overturned from 1954 to 2014 (ProPublica 2014). I use this data set to identify the universe of schools under court order.[9]Since *Brown versus Board of Education*, 760 number of schools have been under court order with 323 still under a court order in 2014.[10]

In an analysis of these districts, Reardon et al. (2012) find that districts that are released from court order are very similar to those not released in terms of racial composition, segregation levels and community characteristics. They, as does Lutz (2011), treat the release of a district as a quasi-random event; "Randomness stems from unequal caseloads across district courts, the varying and somewhat unpredictable

[9] I made two adjustments to the data set when comparing it to the Reardon et al. (2012) data. Two cases in Arkansas were identified as overturned in the Reardon but not in the ProPublica data base. Checking an additional source, these cases had in fact been overturned. A third case in Indiana had been overturned but was not going to go into full effect until 2017. This was coded as overturned in Reardon et al. (2012) but not in Probublica. Because it has not gone into full effect yet, I kept it as still under desegregation orders.

[10] To see a discussion of the process for placing a court order and subsequent dismissal of a case, see Reardon et al. (2012)

duration of the release process, varying judicial approaches to desegregation, and the possibility of appeals from interested stakeholders, among other factors" (Reardon et al. (2012), pg. 879). They use this randomness in timing to estimate the effects of release from court oversight on segregation patterns within schools, finding that once a district is released from a court order, racial segregation within the district gradually increases over time.

I, too, exploit this natural experiment in the over-turning of a court order in an instrumental variable model to test how this "random" increase in segregation effects public investment by focusing on a subset of schools that have been placed under a court desegregation order. In these districts that have a court order overturned, the citizens remain fairly constant. Instead, the ability to send your child to a more homogeneous school changes as the order is lifted. As an example, a district might switch from busing children to different schools to achieve a racial balance to neighborhood based schools. Because the change in court order has shown to affect segregation levels within a district, I use this as an instrument for the level of segregation of students within a school district. I focus on segregation between elementary schools. While a majority of districts have more than one elementary school per district, making it possible to calculate segregation measures at the school level, a majority of school districts only have one high school.[11]

To be included in this analysis, a district must have been placed under a court order to desegregate, have more than one elementary school so that school-level segregation can be calculated, and if they have a court order overturned, it has to occur in 1995 or after. This ensures that I have data collected on the school district prior to courts overturning the orders. This leaves 503 school districts for the analysis,

[11]Two school districts in LA are excluded from this analysis. They have dramatic changes to budget and student population post-Katrina

Table 2.3: Comparison of 1995 School Districts under Desegregation Orders

	Not Overturned		Overturned after 1995		
	Mean	Std Dev	Mean	Std Dev	P-Value
Per Child Local (in thous)	3.08	1.93	2.90	2.39	0.360
Per Child State (in thous)	4.56	1.34	4.41	1.20	0.172
Per Child Fed (in thous)	0.75	0.35	0.81	0.32	0.054
White-Black Seg., Residential (H Index)	0.19	0.16	0.17	0.14	0.155
White-Black Seg., Residential (Dissim.)	0.41	0.18	0.39	0.17	0.171
White-Black Seg., School (H Index)	0.12	0.13	0.12	0.14	0.909
% Black	27.23	18.88	28.73	18.36	0.367
% Hispanic	3.99	7.48	4.23	9.46	0.743
5 yr Δ % Black	0.75	2.20	0.62	2.04	0.480
5 yr Δ % Black	1.16	1.60	1.00	1.41	0.261
Med HH Income (in thous)	48.19	16.42	45.63	14.31	0.063
Log Pop	10.62	1.27	10.52	1.15	0.347
% Bach Degree	16.80	10.98	15.71	9.49	0.237
% Pres Dem Vote	48.66	9.87	48.95	10.00	0.749
Student Enrollment	17,460.3	37,753.6	18,092.4	77,600.8	0.907
N	254		249		

Note: This table compares 1995 district characteristics for districts who do not have their desegregation order overturned to districts that do have the order overturned in 1995 or after. The p-value is from a t-test comparing the means.

with 254 districts still under a court order and 249 districts that have had that order overturned. Table 2.3 compares district characteristics between these two types of districts in 1995, before any orders have been overturned. The last column contains the p-value from a t-test comparing the means. Districts are very similar across all categories.

2.5.1 Instrumental Variable Model

I first confirm the relationship between overturned orders and increased school segregation using a similar model to Reardon et al. (2012) using a difference-in-difference approach. With their model, the assumption is that the average within-district trend in segregation would have changed by the same amount in dismissed districts as it did in non-dismissed districts in the same state and year if the court orders had not been overturned.[12] There are two key variables of interest: pre-dismissal trend and post dismissal trend in segregation. The pre-dismissal trend is the year of observation centered at the year of dismissal ($Pre\_Dismissal_{jk,t}$). Districts that are still under desegregation orders are therefore coded zero. The post-dismissal trend is the number of years since dismissal ($Post\_Dismissal_{jk,t}$). It is set to zero for years prior to dismissal.

State-year fixed effects are included to capture average state-specific trends in a particular year. I also include school district fixed effects. The coefficients on these two variables will give the pre- and post-trends in school level segregation. State-by-year fixed effects ($f_i^{state-year}$) are included to capture state-specific trends as are district fixed effects ($f_i^{district}$). The same set of covariates ($X_{i,t}$) are included as in previous models. The first stage is given by:

$$School\ Seg_{jk,t} =$$
$$\beta_1 Post\_Dismiss_{jk,t} + \beta_2 Pre\_Dismiss_{jk,t} + \beta_c X_{jk,t} + f_{j,t}^{state-year} + f_k^{district} + \epsilon_{jk,t}$$

Here, k references district, j references state, and t is for the year of observation.[13] The second stage, predicting the local revenue per child, is then:

$$Per\ Child\ Local\ Revenue_{jk,t} = \beta_3 \widehat{School\_Seg}_{jk,t} + \beta_c X_{jk,t} + f_{j,t}^{state-year} + f_k^{district} + \epsilon_{jk,t}$$

[12] Reardon et al. (2012) had one additional layer of data. They looked at segregation by grade instead of the overall school and therefore included grade fixed effects in their analysis.

[13] The first and second stage are estimated using *xtivreg* in STATA.

where $\widehat{seg_{jk,t}}$ is the predicted level of segregation based on the time since the release of court order from the first stage. State-year fixed effects and district fixed effects are included in the model. Standard errors are adjusted based on the instrumental variable analysis, but are not adjusted for the correlated structure of the error terms.

2.5.2 Instrumental Variable Results

Figure 2.4 plots the marginal effects for the key variables of interest from each stage. Full results from the two-stage regression are in Table A.2 in the appendix. The figure on the left in Figure 2.4 shows the *Post-Dismissal trend*. It is statistically significant, indicating that with each year post-dismissal, segregation within the school district increases. The F-statistic on the excluded instruments is 61.82, higher than the target threshold of 10. The t-statistic for the post-dismissal trend is 10.76. The figure on the right displays the results from the second stage of the regression with *per child local revenue* as the dependent variable. The coefficient on *White-Black Segregation, School* is in the expected direction and statistically significant (p-value$<$0.01).[14] As these districts are no longer required to desegregate, they become more segregated, which results in an increase in local revenue.

One assumption is that people are willing to invest more in schools when they are able to send their children to more homogeneous schools. One way to test this is to see if changes in segregation result in a change how many people are attending public schools. Using the same instrumental variable model, column 3 in Table A.2 shows how a change in segregation predicts a change in the percent of children attending public

[14]If robust standard errors are specified on the full model, then results are very similar. The standard error on *School WB Segregation* in the second stage increases from 1.525 to 1.91 (then the associated p-value is 0.002). However, when robust standard errors are specified, a warning message is displayed that the estimated covariance matrix of moment conditions not of full rank and standard errors and model tests should be interpreted with caution.

school. Going from the 25th to 75th percentile in school segregation, i.e. becoming more segregated, results in 1.77 percentage points more attending public school (an increase from 86.75% to 88.52%).

It is important to note that these results are not directly analogous to the large-n analysis. These districts that have been placed under a court order at one point in time are different from districts that have never been placed under a court order. Comparing Table 2.3 with Table 2.1, we see that the average district is less black than one under court-order (5.22 compared to 27.23 percent black), with less White-Black residential segregation (0.09 compared to 0.19), and less White-Black school segregation (0.08 compared to 0.12). Beyond differing in demographics, the very act of being under a court order is likely to have an impact. When courts intervene in a district, public opinion in support for education can decline regardless of the outcome. Support for equality can be significantly reduced within a district if residents perceive that equality threatens local control of a school (Reed 2001). Therefore, this analysis serves as a robustness check, but estimates between the overall model and the instrumental variable analysis cannot be directly compared.

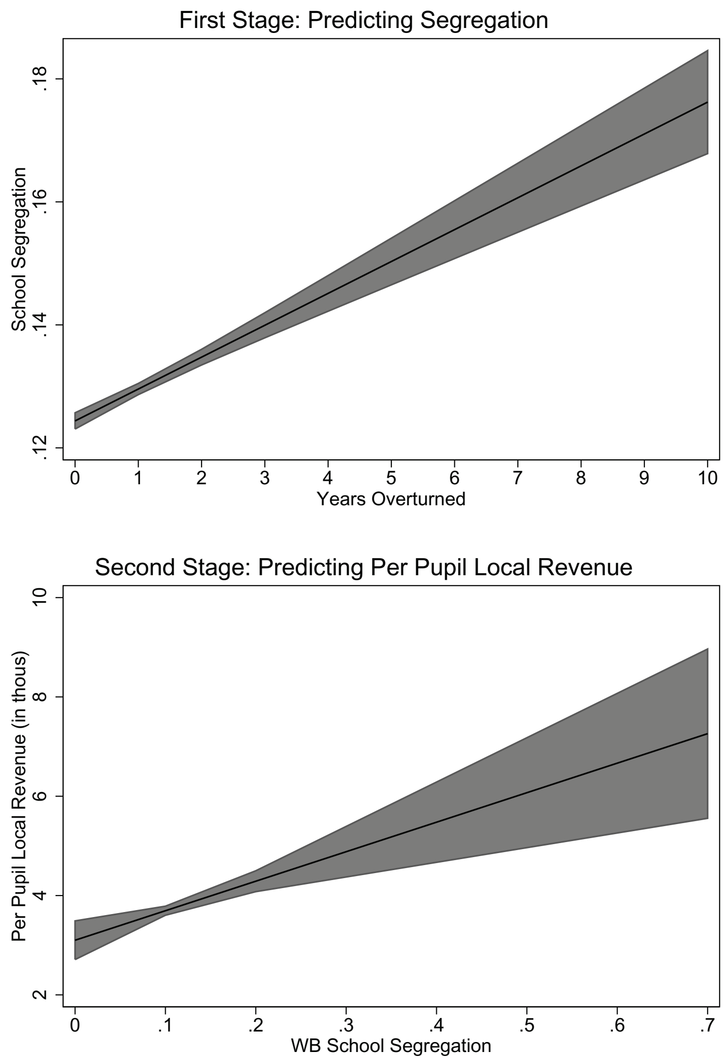


Figure 2.4: Instrumental Variable Analysis

Note: The figure on the top plots the marginal effect and 95% confidence interval for number of years since a court order has been overturned predicting the white-black segregation from the first stage of the IV. The figure on the bottom plots the marginal effect and 95% confidence interval for the predicted segregation from the first stage on per child local revenue.

2.6 School District Revenue Compared to City Revenue

In this last analysis, I test the relationship between segregation and different types of public goods. I compare school district revenue to city revenue for the city or town-dependent school districts in the data set using the data in Trounstine (2015*b*). Trounstine (2015*b*) tests how residential segregation within a city impacts city revenue (direct general expenditures) and finds that an increase in segregation results in a decline in public investment. She finds that segregated cities are more likely to be racially polarized in elections, and therefore less likely to have policy consensus. I obtained the data set used in Trounstine (2015*b*) and matched cities and city-dependent school districts between the two data sets (Trounstine 2015*a*). I include only city or town-dependent school districts in this comparison because these districts will cover the exact same citizens in Trounstine's data set. This results in 476 school districts.[15] In cities and years that we have the same data, our measure of white-nonwhite segregation is correlated at 0.986.

Figure 2.5 shows how the coefficient on segregation changes across Trounstine's data and my own.[16] Troustine also uses the H index as a measure of white-nonwhite segregation. Table A.3 in the appendix shows the full regression results. All models include city fixed effects. The first three models use per capita direct general expenditures as the dependent variable, the same used in Trounstine (2015*b*). The first model, Trounstine Model, is identical to one of the regressions presented in Table 2 of the paper and includes 2,637 cities. The second model subsets to cities that have city-based school districts, are in both of our data sets, and has a segregation measure calculated in Trounstine. There are 133 cities in this model. The third model

[15]There are 688 city or town-based school districts in the United States, but not all of the cities are included in the Trounstine data set.

[16]To keep the comparison consistent, all models use district/city fixed effects and models 1, 2, 6, and 7 cluster standard errors by district/city.

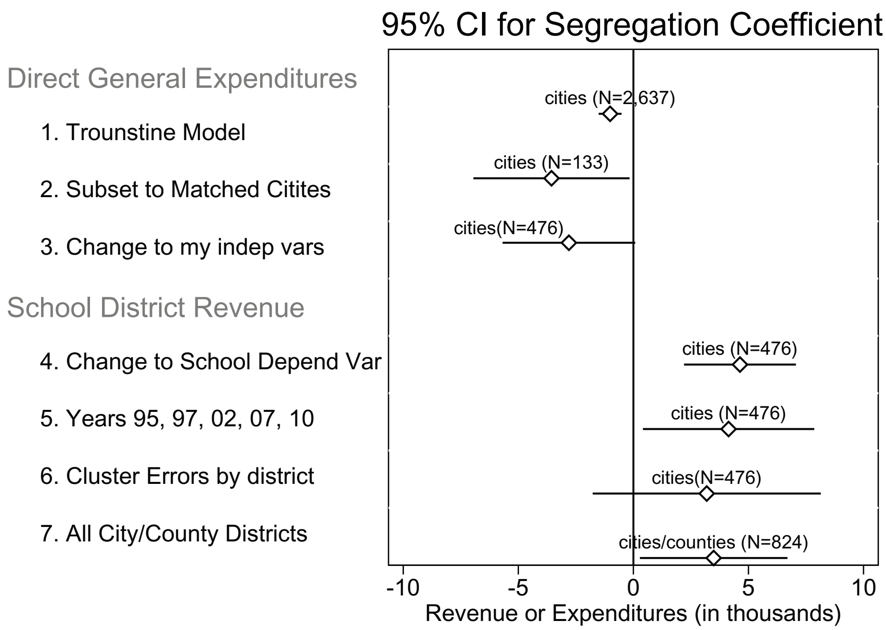


Figure 2.5: Comparing the Coefficient across City versus School Revenue Models

Note: This graph plots the 95% confidence interval from 8 different models to show how the independent variable *White-Black Segregation* changes when predicted *Direct General Expenditures per capita* for city spending and *Local Revenue per child* for school district revenue.

keeps Trounstine's dependent variable but uses the independent variables that I have collected. There are 476 cities in this model because I calculated the H index for a larger number of cities. All three models reach the same conclusion: segregation is associated with a decrease in direct general revenue.

The next set of regressions changes from per capita direct general revenue (revenue for cities) to per child local revenue (revenue for schools) for the dependent variable. The only change in model three to model four (Change to School Depend Var) is the dependent variable. The segregation coefficient switches from negative to positive.

The next two models vary the model specification to show that the effect is not dependent on changes in model structure. The last run includes both city and county dependent school districts. These are the most analogous because they are city or county financially dependent. While one of the models does fail to reach statistical significance at the 0.05 level, the overall pattern is clear: investment in schools is different than other types in response to increased segregation.

2.7 Discussion and Conclusion

Research has continually pointed to the level of diversity, but the ways in which neighborhoods are arranged, the type of public good, and the users of the good are all important in understanding when communities will choose to invest or when they may exit the public system in favor of private options. When a shared space is involved, integration can result in lower levels of revenue for schools. But this does not mean that integration shouldn't be the goal or that more money in these segregated districts is better. After the desegregation order was lifted in Charlotte-Mecklenburg school district in North Carolina in 2001, the reshuffling of students back to neighborhood schools led to a reshuffling of teachers, and black students in these neighborhood schools saw a decline in teacher quality (Jackson 2009). In addition, in Charlotte-Mecklenburg school district, there was a decrease in test scores for both white and minority students who were assigned to schools with more minority students, lower graduation rates for whites, and an increase in crime for minority males after the desegregation order was lifted and children returned to more segregated neighborhood schools (Billings, Deming and Rockoff 2014).

Therefore, even if segregated communities are raising more revenue, it does not follow that every one will benefit. Inequality in teacher quality or per child spending could lead to lower school district quality overall. One way to measure quality is through standardized tests. While test scores are limited in what they measure, they are one way to compare proficiency in math and reading. The George W. Bush Institute compiled Global Report Cards from 2004 to 2009, which create comparable test scores across the United States at the district level (Green and McGee 2011).[17] Using the same model specifications with a multi-level model as in Table 2.2, I use the mean test score of a district as the dependent variable. Because there is only five years of data and it is observational in nature, interpretation of results are limited. The results are in Table A.4 in Appendix B. In line with the findings in Charlotte, I find that white-black school-level segregation is associated with lower test scores in both math and reading for a district on a whole. In terms of residential segregation, white-Hispanic segregation is associated with lower math and reading scores. Increased spending in areas that are becoming more segregated does not translate into greater quality, as measured by test scores. In fact, increased segregation is likely concentrating needs which can increase inequality.

In 2013, the majority of students in public schools came from low-income families (Suitts 2015), and in 2014, public school enrollment became a majority-minority for the first time (Maxwll 2014). The demographics are changing rapidly, but if we pay attention only to diversity or think that integration will solve all problems, we will miss areas that will struggle to provide an education for the next generation.

[17]They use the National Assessment of Educational Progress (NAEP) exam to estimate the distribution of state education quality, which they use to shift distributions of district quality data within each state. These scores are based on tests from a random sample of 4th through 8th graders.

Chapter 3

Between the Lines: How Segregation across School District Boundaries Effects Financing for Public Education

3.1 Introduction

Public education is provided throughout the United States and often touted as a way to give everyone an equal chance in life. It is also the way in which youth have the most contact with government at the local level. However, there is wide variation in how each school district operates and what is spent per pupil from one district to the next. Take the example of St. Louis County, Missouri, which has 29 independent school districts within the one county. School district boundaries encapsulate racial cleavages within the county, as shown in Figure 1. The student population of Normandy was 97 percent African American in 2010.[1] Compare this to school districts just south of Normandy, like Brentwood, where white students make up 71 percent of the school. How does segregation within a county, like St. Louis, effect variation in spending in each of the school districts? As shown in Figure 2, there are stark differences in what each school district invests at the local level in St. Louis County. Normandy is at the bottom, investing $4,402 in local revenue per pupil. Compare this to $14,891 in Brentwood or $18,271 in Clayton. The variation in revenue among these districts has

[1]This is the school district that Michael Brown attended, who was infamously shot by police in 2014.

only increased over time.[2] Even in school districts that are side by side, the student experience is vastly different.

When explaining variation in per child revenue between districts, explanations are often based on economic differences (Hoxby 1998) and not on racial cleavages. And when trying to understand the impact of race on investment in public goods, research has often focused on *within* a jurisdiction segregation and diversity and ignored segregation that occurs along boundaries. This paper seeks to understand how racial segregation across an area, in this case a county, contributes to variation in investment in public education. Literature has been limited in this area. When larger regions have been studied, it is often only urban areas(i.e. Gordon and Monastiriotis 2006),focuses on only a cross-section in time (i.e. La Ferrara and Mele 2006 or it includes areas that cross state lines (i.e. Lewis and Hamilton 2011). Because local governments are not independent entities from the state (Morgan and Watson 1995), jurisdictions that might be in the same region but in different states cannot be compared as easily.

This paper seeks to move the focus of the effects of segregation on public goods *within* a specific boundary to its effects on public goods *between* boundaries. To do so, this paper uses an originally complied data set of over 11,000 school districts and 1,800 counties from 1995 to 2011. First, I establish that in counties with multiple school districts, white-black residential segregation is associated with increased inequality in per child local revenue between districts. Then, I focus on school district level data to better understand the characteristics of what leads to increased inequality. Within these segregated counties, school districts with larger African American populations collect less in local revenue.

[2]State and federal spending within these districts has not greatly altered this pattern either (as shown in Figure B.1 in the appendix). In 2010, per pupil total expenditures for Normandy was $14,694. Brentwood spent $23,320 and Clayton spent $24,522.

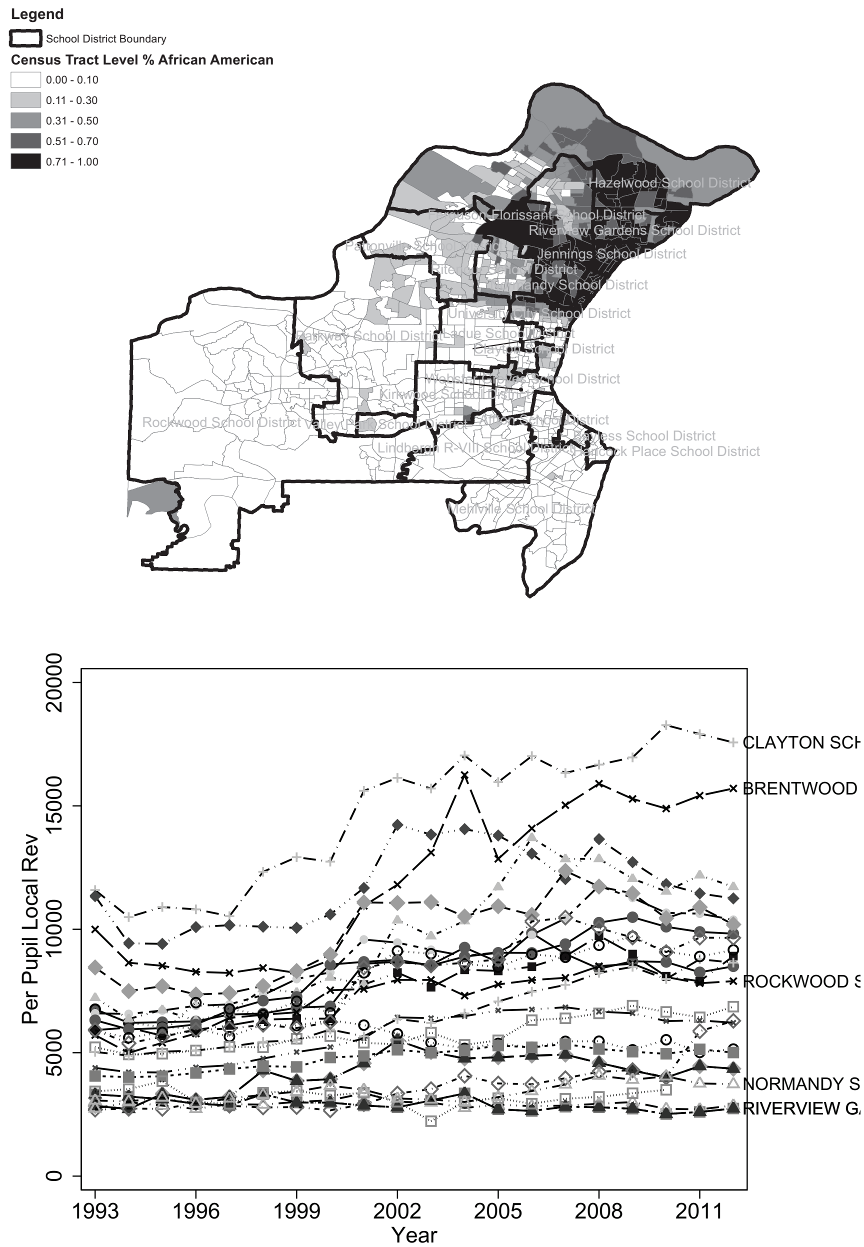


Figure 3.1: Between District Segregation

Note: The figure on the top shows the racial breakdown by school district in St. Louis county, MO. Each school district boundary is represented by a dark line. Census tracts are shaded based on the % of African American residents in each tract. The figure on the bottom shows the per child local revenue for each district within St. Louis County from 1993 to 2011.

To better understand whether the difference in collection is due to desire to support education or ability to contribute, I create a measure to proxy tax burden in the district. This is done by dividing the median household income within a district by what the average household contributes to property tax. I find that an increase in the percentage of African American residents in a district is associated with an increase in tax burden. Therefore, although these districts are collecting less, they are paying more of their income. Lastly, I use test scores as a proxy for school quality. The percent of African Americans within a community is associated with lower test scores, but even more so in segregated counties than in integrated ones.

This paper proceeds as follows. In section two, I discuss the formation of school districts and the impact of school district fragmentation. In the third section, I discuss the components of the data and the models used. Next, I present the statistical results based on a series of panel data models at the county level. In the fifth section, I switch from county level to school district level to identify characteristics of districts that collect less in per child local revenue. Finally, I discuss the competing views and offer concluding remarks.

3.2 Between Districts: How Boundaries Matter

3.2.1 Historic Context

Over the course of the twentieth century, the number of school districts in the United States declined rapidly as school districts consolidated. While there were over 100,000 districts at the start of the century, by the 1970s, that number had dropped to around the current level of approximately 14,000, as shown in Figure 3.2.[3] Explanation for school district consolidation has been attributed to decline in rural populations, a shift

[3]Because of expanded survey coverage, data before and after 1984 are not directly comparable.

from local to state funding in education, and a rise in the percentage of teachers that belong to the National Education Association teacher's unions (Kenny and Schmidt 1994).

An important part of this story is how willing local districts were in the consolidation process. Because school district boundaries define what schools a child is able to attend, changing boundary can have significant implications for residents. Fischel (2009) argues that consolidation was accepted by voters when consolidation proposals included natural community boundaries. That is, many states at first tried consolidation along town or county lines but efforts failed. It was only when consolidation occurred along "organic" community boundaries that it was successful (Fischel (2009), pg. 103). School districts that had different demographic make-ups were perhaps less likely to form an organic community and less likely to consolidate. In addition, consolidation occurred in rural areas, while urban and suburban areas contribute very little to the overall decline in the number of districts (Fischel 2009).

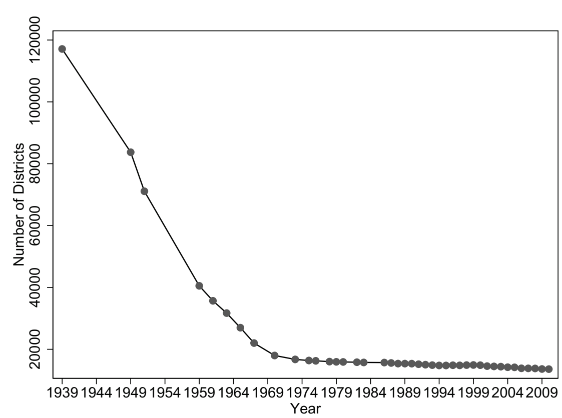


Figure 3.2: Number of School Districts Over Time

The number of school districts from 1939 to 2010. There was a drastic decrease in the number of school district during the first half of the centuryNational Center for Education Statistics (2012)

Interestingly, the timing of the end of massive school district consolidation coincided with the effort to desegregate schools. *Brown v. Board of Education of Topeka* set forth steps to desegregate schools in 1954. But because the ruling failed to outline mechanisms for desegregating, it was not until the federal government threatened to withhold Title I funds in the 1960s that districts, particularly poorer districts, began to comply. By 1970, the average school district in the South had desegregated (Cascio et al. 2008). However, in many areas of the United States, the issue with segregation was not within a school district but segregation between districts. Then, in 1974, it was ruled in *Milliken v. Bradley* that inter-district busing to help achieve integration across districts was unconstitutional. Segregation could only be legally addressed within a district, but could not be addressed when it occurred between two or more districts. With this ruling, it effectively limited ways to address racial disparity and allowed the possibility of racial disparity to grow between districts (Clotfelter 2011).

3.2.2 Types of Districts

While there has been some district consolidation since the 1970s, overall, the change has been minimal. The way in which school district boundaries were created and the type of school district has implications on whether segregation would likely be addressed. The most common type of school districts are independent school districts. These districts are free from other local governments in financial decision making. District boundary lines do not coincide with other types of political jurisdictions. Independent school districts were part of the Progressive movement with the idea that it was better to have school boards separate from partisan politics of cities (Berkman and Plutzer 2005). They are the popular throughout the United States, with the South and parts of the Northeast being an exception. In those regions, dependent school districts or are more common.

Dependent school districts are dependent on either a city, county, township, or in a few cases the state in financial decisions. For these districts, school district boundaries are the same as the it is for the government that they are dependent on. County or city based school districts are most common in the South, while township dependent are more common in the Northeast. Table 3.1 shows the breakdown by fiscal dependence. Approximately 92 percent of school districts in 2010 were fiscally independent from other forms of local government.

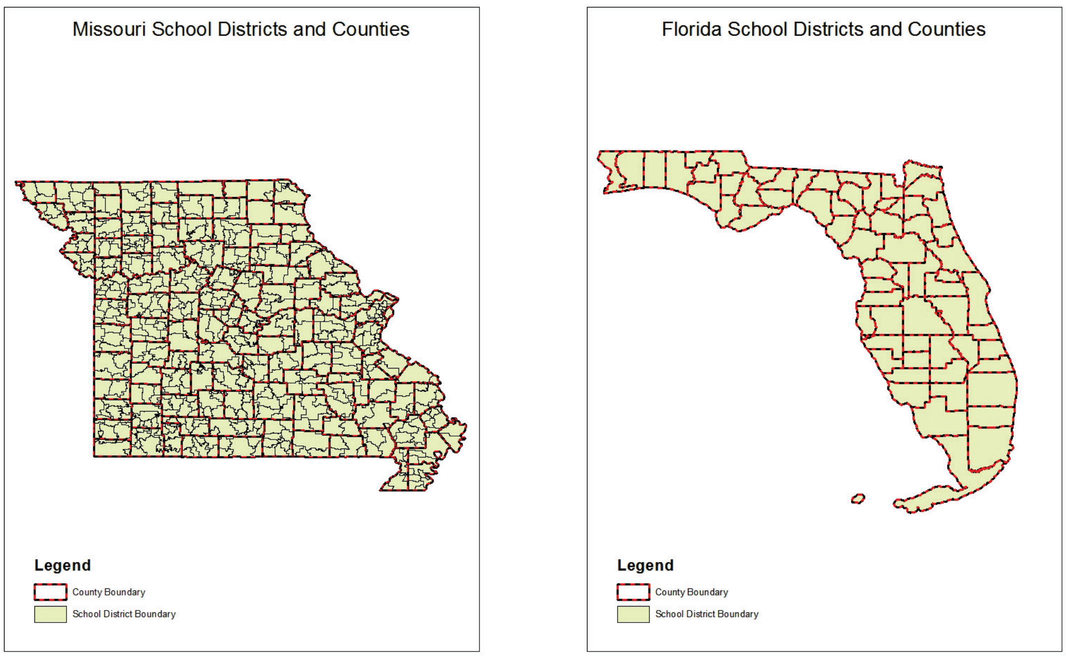


Figure 3.3: Differences in School District Boundaries

Note: County and school district boundaries are mapped for Missouri and Florida. County boundaries are drawn with the thick dashed line. School district boundaries are thinner solid black lines. Missouri, plotted on the top, has 114 counties and 505 independent school districts. Florida, plotted on the bottom, has 67 counties which share the same borders as the 67 county-based school districts

School districts in Florida and Missouri illustrate the difference between the boundaries and the relation to other government boundaries for independent and

Table 3.1: School District Type by Region in 2010

	Midwest	Northeast	South	West	Total	Percent
State Dependent	0	5	0	19	24	0.19
County Dependent	0	0	324	14	338	2.62
City Dependent	0	114	70	18	202	1.56
Town Dependent	2	423	0	0	425	3.29
Independent	4,753	2,162	2,738	2,281	11,934	92.35
Total	4,755	2,704	3,132	2,332	12,923	

Note: This table shows the number of school districts within each region by fiscal dependence for the 2010 school year. It only includes elementary school districts, secondary school district, and elementary-secondary school districts.

dependent schools. Figure 3.3 shows the stark difference between the two states in terms of school district boundaries and their relationship to counties. In Florida, school district are dependent on county governments and their boundaries coincide, making it less likely that school district boundaries were drawn based on racial cleavages. There are 67 counties and each county has its own school district.[4] However, in places like Missouri, school district boundaries have less to do with local government boundaries. While there are 114 counties in Missouri, there are over 500 school districts. Within each county of Missouri, there are many school districts whose boundaries are often related to racial cleavages (see Figure 3.1 to see Saint Louis County, MO district boundaries and their relation to racial cleavages). Independent school districts allow for more variation in revenue and spending simply because there are more school districts in an area. However, does variation exist and is race a likely explanation for any differences?

[4]There are seven additional school districts in Florida. Four research school districts that collaborate with Universities and three school districts that provide extra services, such as for the blind and deaf.

3.2.3 Boundaries as a Way to Exclude

While political boundaries are often used in political science to define our unit of interest, understanding the impact that the boundary itself has is equally important. This is particularly true for school districts, where in many areas of the United States boundaries coincide with racial cleavages. Boundaries are important in identifying the population in which to distribute a certain public good. However, they can also be used as a way to exclude:

> The suburb is the Northern way to insure separate and unequal. It has the advantage of being legal. If housing, education, jobs, and matrimony are to remain a charmed circle among formally equal citizens in an era of public goods, there is a powerful logic behind the existing fragmentation and the basis for considerable resistance to the creation of really general governments (Long 1968, p. 254).

Within the United States, it is common for school districts to be homogeneous in terms of race within but highly segregated between. Bischoff (2008) argues that the social construction of political boundaries affects the demographic composition of the units. Fragmentation of political jurisdictions, she argues, affects residential segregation between school districts. Figure 3.4 illustrates a simple example of this. The figure plots the relationship between the log of the number of school districts and the level of segregation within a county.[5] More school districts within a county are associated with higher levels of segregation.

While some might argue that jurisdictions represent different levels of taxes and public goods, and people can sort themselves into their desired location (Tiebout

[5] The log of the number of school districts is used because there are a few counties, such as Cook County which contains Chicago, that have significantly more districts than the average county.

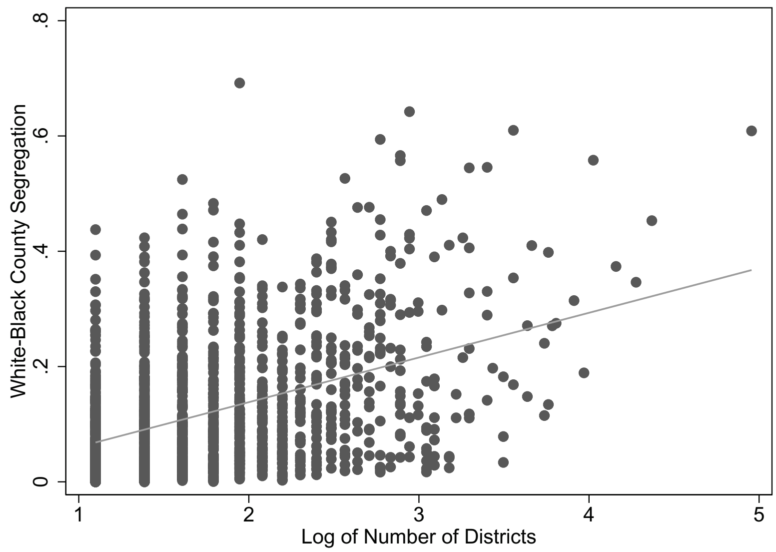


Figure 3.4: Number of School Districts and County Segregation in 2010

Note: The x-axis is the log of the number of school districts within a county and the y-axis is the level of white-black segregation. More school districts within a county are associated with higher levels of segregation.

1956). In this case, boundaries are endogenous to the outcome; people are self-selecting into what is appropriate for them. However, boundaries can serve as a way to exclude people and concentrate resources as well. By regulating housing, zoning, taxation, or other resource policies, political boundaries can serve in ways to keep residents more homogeneous and exclude certain races or economic classes (Danielson 1976; Weiher 1991). Interestingly, the fragmentation of districts is not always beneficial economically for any group. People are willing to give up economies of scale to avoid being in a jurisdiction with significant racial or income heterogeneity (Alesina, Baquir and Hoxby 2004).[6]

[6]There is also an important line of literature focusing on the appropriate size of a jurisdiction in terms of democracy. Small jurisdictions often allow citizens to feel more competent in

But it is the areas with minority populations that are often hurt; segregation concentrates poverty in black neighborhoods (Massey and Denton 1993). Therefore, segregation along district lines could create districts that do not have the same ability to collect revenue as other surrounding districts. The majority of local revenue is garnered through property taxes. If one school district has higher property values than another district, they can tax themselves at a lower rate to obtain the same amount of money. It is also possible that the school structure in an area also has impacts on labor and housing markets of an area (Scott and Holme 2016). In deciding where to live, school quality is used as a proxy for the racial composition of a neighborhood (National Fair Housing Alliance 2006). By reinforcing patterns of segregation, resources are further bifurcated.

In areas that have fragmented school districts, the focus should then shift from residential segregation within the school district to residential segregation between the school districts and what this fragmentation means for citizens. While there is evidence that fragmentation and racial segregation are strongly related, how does that relate to differences in resources?

3.2.4 District Boundaries and Financial Variation

There have been many explanations for differences in funding across school districts, but these explanations are often based on economic differences among districts. Financing for public education is primarily left to local and state governments to determine, with about 42 percent from local sources and 46 percent from the state in 2010. Variation in funding between school districts is often attributed to differences in household income between districts (Hoxby 1998) and an increased sorting

participating (i.e) Almond and Verba (1963); Dahl and Tufte (1973); Lassen and Serritzlew (2011)). This article, however, is not focusing on the appropriate size of a school district in terms of democratic values.

of neighborhoods by income (Putnam 2016). It can be attributed in part for citizens' desire to maintain local control over schools. People generally believe in the idea of equality for school funding, but they are much less likely to support it if they believe that equality will decrease local control of schools (Reed 2001).

More pressure has been placed on states to rectify variation in per child spending. The California Supreme Court decision's declaring the state funding formula to be unconstitutional in *Serano v. Preist (1971)* created a new way to combat financial inequality within a state. Over 40 states have had their funding formulas challenged since then with hopes of equalizing funding (Berkman and Plutzer 2005). While state funding formulas have helped reduce differences in per child spending across districts within states, they have not eliminated the differences among districts (Odden and Picus 2014).

But what is the role of race? Diversity has long been shown to be associated with a decrease in public investment (i.e., Alesina, Baqir and Easterly 1999; Putnam 2007). This finding has been extending to spending on public education as well (Poterba 1996; Hoxby 2000). Racial threat theory provides an explanation for this. Individuals living in close proximity to different racial groups feel threatened, economically and socially, through increased competition over scarce resources (Key 1949; Blumer 1958; Blalock 1967, and Bobo 1988).

More recent research adds to this literature by shifting the focus from the level of diversity within a community to the level of contact among different groups within a community, focusing on school and residential segregation. Kitchens (2017) finds that if residents are segregated within a community, diversity does not have a negative impact on school funding. Instead, it is when schools are integrated, that there is a decline in investment. It is the type of contact among groups that drives the effect on financing public goods. However, the focus of this research, as well as the majority of other research on diversity and segregation, is focused on the effect *within the same* community. But how diversity and segregation between communities effect public investment is equally important.

When segregation occurs along school district lines, it could increase inequality because of differences in ability to collect revenue. Little has been done to combat this type of segregation, but neighborhoods in the United States are highly segregated along racial lines (Oliver 2010). When looking at this kind of school district, it is important to focus on a larger region around the school district to capture the effects of segregation across school district lines. I focus on the county level, where school districts are nested within the county that they reside.[7] I, therefore, hypothesize: *Counties that are residentially segregated will have more unequal local revenue collected for education between school districts than counties that are racially integrated.*

Both individual attitudes, like the desire to be in a more homogeneous district, and the availability of resources could contribute to inequality in education revenue across school districts. Underlying government structures within a region that mediate distribution of local resources can contribute to racial disparity in income (Lewis and Hamilton 2011). Local revenue is primarily driven by property tax. Districts that have higher priced property or more commercial property will be able to collect more in revenue at a lower tax rate. This unequal collection of revenue between districts will result in some communities having less to spend per student. This can translate into different levels of resources at a school or unequal teacher pay in districts that are side by side. In addition, *I hypothesize that in areas where segregation across along boundaries, districts that encapsulate larger minority groups, particularly African American, will collect less in local revenue than in integrated communities.*

[7] Some school districts do cross county lines. School districts are assigned to counties based on where the majority of the school district is located

How does this variation in per child revenue impact quality? Research focusing on international governments suggests that higher segregation in terms of ethnicity and language is associated with significantly lower quality of government (Alesina and Zhuravskaya 2011). However, school choice, as argued by Hoxby (2000), would suggest that more districts would create more competition and better outcomes. This assumes that each district has the ability to contribute the same level of resources. If racial segregation concentrates resources, then certain districts might not be able to compete with surrounding districts. While test scores fail to capture many important aspects of quality, they can be used as a proxy for school quality. Therefore, *I hypothesize that in segregated counties, districts with larger African American citizens will have lower test scores.* In the next section, I describe the data set used to test these hypotheses.

3.3 The Data: County and Public School Districts

Data at both the county and school district level are required to test these hypotheses. Using school budget information, student demographic information, and community demographic information, I created two data sets, one for counties and one for school districts, from 1995-2011. Table 3.2 and Table 3.3 summarize each data for three years: 1995, 2000, and 2010. The Public Elementary - Secondary Education Finance Data provided by the U.S. Census Bureau has school district budgets from 1995 to 2011(US Census Bureau 1993-2011). This data set breaks apart revenue by local, state, and federal governments. All dollar amounts are in 2013 constant dollars. The Local Education Agency (School District) Universe Survey, provided by the National Center of Education Statistics, collects student demographic information like the racial and ethnic breakdown of the students (NCES 1993-2012).

I include community level information about the school districts from the 1990, 2000 and 2010 Census (US Census Bureau 1990; US Census Bureau 2000; US Census Bureau 2010). Because the Census data is not yearly, I interpolate data between the three Censuses. In addition to these main data sources, I included presidential vote by county as a proxy for support for government spending (CQ Press 2016). To obtain county-level measures of all other variables, school districts are aggregated to the county-level. While most school districts do fall within a county, some school districts do cross county lines. When this occurs, school districts are assigned to counties where the largest portion of the district falls in terms of land area.

For this data set, I focus only on Elementary School Districts, Secondary School Districts, and Elementary-Secondary School Districts that are financially independent from other forms of local government or township school districts. I exclude county, city, vocational, special needs districts, non-operating districts, state-run districts, charter districts, and educational service agencies. This yields approximately 11,000 school districts. County and city school districts are excluded because they represent the larger region, county, that I am interested in testing. Because some districts merge, open, or close during this time-frame, the exact number varies from year to year but is stable overtime for the vast majority.[8]

3.3.1 Explanatory Variables

The most common measure used for segregation is the dissimilarity index, which calculates the percentage of a group's population that would have to change residence for each neighborhood to have the same percentage of that group as the overall area.

[8] There is a small amount of missing in some of the variables early on in the data set. As a robustness check, I re-ran models with imputed data as well as on the districts that had no missing data. Results do not change and are available on request.

However, it does not control for the relative size of one group to another group. The Theil H index (1972) calculates a segregation measure that controls for both evenness of the distribution of a group and the relative size. The H index varies between 0 and 1, where 0 indicates that each sub-unit (census tract) has the same composition as the entire unit (district or county). I use this measure in all models and is denoted as *White-Black Segregation District* (or County). For most models, I calculate the white-black segregation. However, the measure is not limited to two groups. I also calculated white-Hispanic-black segregation for some models as well.

To create these measures, I used tract level information from the Census[9]. Because the geographic area that is included in a census tract can change over time, I re-weight the 1990 and 2000 tracts to reflect 2010 tract boundaries according to Logan, Xu and Stults (2014).[10] Census tracts are then mapped on to school districts using the 2013 School District Geographic Relationship Files created by the National Center for Education Statistics (National Center for Education Statistics 2013).

There are many other factors that are likely to affect the amount of revenue raised beyond segregation. Diversity of residents has consistently been highlighted as an important predictor. Diversity can be measured in different ways, but I am using percent African American (*% Black*)and percent Hispanic (*% Hispanic*) to capture the diversity of the district. Beyond the level, the change in diversity can be important (Hopkins 2009). I have also included the change in percent African American and change in percent Hispanic in a five year period (*5 year* Δ *%Black; 5 year* Δ *%Hispanic*).

[9]For the 1990 and the 2000 Census, tract level data was downloaded directly from the American Fact Finder US Census Website for each state. The 2010 tract level data was downloaded using USCensustract2010 package in R (Almquist 2010)

[10]The US2010 program at Brown University has created STATA code to re-weight tracts in the 1990 and 2000 Census to reflect changes in boundaries from the 2010 Census. This code was written by Brian Stults.

Economic conditions within each district are also different. Wealthier areas will be able to raise more revenue than poorer districts. I include median household income reported in thousands of dollars as a measure for district wealth (*Median HH Income (thous)*). I include the percent of residents with a bachelor degree or higher as a proxy for education support (*% Bachelor or greater*) and percent of Democratic vote in the previous election as a proxy for support for government spending (*% Pres Dem Vote*). States and the federal government contribute at different rates as well. I include controls for per child state level funding and per child federal level funding (*Per child state; per child fed*). Districts vary in size, which can impact per pupil costs. To combat this, I include the number of students in a district and the log of the population (*No. of students; Log Population*). For county models, I include the log of the number of school districts as a measure of both choice and fragmentation. Lastly, because local revenue primarily comes from property taxes, districts where there are more home-owners might be more invested in keeping home-values high. I therefore include the percent of residents that own their own home, *% Own home*. The next section describes the results when focusing on the effect of segregation within a county on variation in *per child revenue*.

Table 3.2: Summary Statistics at County Level of Data for 1995, 2000, and 2010

	1995		2000		2010	
	Mean	N	Mean	N	Mean	N
St. Dev. Per Child Local	1.29	1,844	1.31	1,893	1.65	1,901
St. Dev. Per Child State	0.96	1,852	1.17	1,894	1.37	1,915
St. Dev. Per Child Federal	0.27	1,852	0.35	1,894	0.59	1,915
White-Black Seg. County	0.12	1,883	0.10	1,910	0.08	1,945
% Black	4.83	1,884	4.90	1,911	5.56	1,946
% Hispanic	6.08	1,884	7.02	1,911	9.44	1,946
Median HH Income (thous)	48.71	1,884	50.96	1,911	47.79	1,946
Log population	10.36	1,884	10.43	1,911	10.48	1,946
% Bachelor or greater	14.93	1,884	16.01	1,911	20.19	1,946
% Pres Dem Vote	43.51	1,884	39.54	1,910	38.92	1,946
% Own Home	75.43	1,884	76.18	1,911	76.97	1,946
No. of students	15,910	1,884	16,905	1,911	17,535	1,946

Note: This table presents county level data for select years of the data set. It includes counties that have independent school districts. The standard deviation of per child local, state, and federal are in thousands of dollars.

Table 3.3: Summary Statistics at District Level of Data for 1995, 2000, and 2010

	1995		2000		2010	
	Mean	N	Mean	N	Mean	N
Per Child Local (thous)	4.96	11,387	4.95	11,777	5.98	11,205
Per Child State (thous)	4.59	11,467	5.69	11,838	6.22	11,528
Per Child Fed (thous)	0.54	11,467	0.66	11,838	1.51	11,528
White-Black Seg. District	0.08	11,001	0.07	11,377	0.07	11,465
White-Black Seg. County	0.15	10,986	0.13	11,365	0.11	11,465
% Black	3.81	11,454	3.87	11,838	4.67	11,528
% Hispanic	6.07	11,454	7.194	11,838	9.84	11,528
5 year Δ %Black	0.14	11,454	0.13	11,453	0.41	11,379
5 year Δ %Hispanic	0.93	11,454	.92	11,453	1.28	11,379
Median HH Income(thous)	56.16	11,467	57.91	11,838	54.35	11,528
Log population	8.74	11,455	8.78	11,838	8.92	11,528
% Bachelor or greater	17.08	10,877	19.00	10,899	22.75	11,528
% Pres Dem Vote	45.75	11,046	43.23	11,423	44.14	11,528
% Own Home	75.31	11,466	75.91	11,838	76.98	11,528
No. of students	2,629	11,467	2,744	11,838	2,960	11,528
% Property Tax	2.82	11,395	2.58	11,788	1.31	11,508

Note: This table presents district level data for select years of the data set. It includes school districts that are independent school districts.

3.4 Segregation Increases Inequality

In this first set of analyses, the focus is on the county level and whether or not segregation within the county is associated with larger variation in per child revenue. County is chosen as the larger unit to consider because they exist in every state and are also nested within state. While core-based statistical areas (CBSA) do define geographic areas and are frequently used, one CBSA can be in two different states. School districts, like local governments, are not independent entities from the state (Morgan and Watson 1995). States fund education at different levels and set the rules that districts must follow in generating education funds. Combining two districts from two different states would introduce an entirely different set of questions in explaining variation in revenue and spending. By focusing on county instead, I can account for state-specific variation through modeling.

I focus specifically on the local amount raised instead of total per child spending because this is what local citizens and school boards have control over and reflects the resources within a school district. In 2010, local revenue was approximately 42 percent of the total revenue raised for the average district. In order to control for differing sizes of school districts at the district level, I calculate *per child local revenue* as a per child measure by dividing what is collected at the local level by school enrollment. Then, for the county level, I calculate the standard deviation in per child local revenue among the school districts in that county.

The dependent variable is then standard deviation in per child local revenue at the county level. As an example,St. Louis County, MO would be a unit of observation and the standard deviation in *per child local revenue* among the 29 school districts would be the dependent variable. As shown in Table 3.2, the standard deviation in per child local revenue in 1995 for the average county was $1,290. By 2010, there was even more variation in local revenue at the county level with $1,650.

To model the variation in per child local revenue, I use a mixed model approach. I include state and year fixed effects to account for differences in state-level policy regarding education spending and changes over time. In addition, I include county-level random intercepts. County-level random intercepts are a compromise between complete pooling, in which county-level information is ignored and not included in the model, and no pooling, in which separate models are fit within each county (Gelman and Hill 2007). Independent variables are all county-level. The model is given by:

$$d_{jk,t} = \beta_1 Segregation_{jk,t-1} + \beta_c X_{jk,t-1} + f_t^{year} + f_k^{state} + u_j^{county} + \epsilon_{j,t-1}$$

for $i = 1; ...; n_j$ first-level observations nested within $j = 1; ...; M_k$ second-level groups (county). The second- level random intercept of county is given by u_j^{county} where:

$$u_j^{county} \sim N(0, \Sigma^{county}); \text{ and } \epsilon_j \sim N(0, \sigma_j^2 I)$$

and that u_{jk}^{county}, and ϵ_{jk} are independent. β_1 is the coefficient on *Segregation* and X is the design matrix for the fixed effects for β_c (where c references controls: percent Hispanic, change in black, change in Hispanic, median household income, students enrolled, log population, percent that own homes, size of school district, standard deviation of per child state, standard deviation of per child federal, percent bachelor degree, and percent vote for Democrat president). Because it is over time, t references the year of observation where t=1995....2010. When robust is specified, error terms are clustered at the county level.

Do counties that are residentially segregated have greater inequality in per child local revenue? Table 3.4 provides answers to that question. The analysis shows that *White-Black Segregation* at the county-level is associated with increased variation in per child revenue, even after controlling for economic conditions within a county. Column 1 in Table 3.4 shows the results with only two explanatory variables, *White-Black Segregation* and the *Log Number of dDistricts*. Within the same state and year, counties that are more residentially segregated have more variation in per child revenue. The log of the number of districts, a proxy for county fragmentation, is not statistically different from zero.

Column 2 adds covariates to the model. If *White-Black segregation* does cause increased variation beyond economic and attitudinal factors, then I would expect the coefficient on this term to be positive and significant. Again, I find that segregation is associated with an increase in variation in per child local revenue. Figure 3.5 plots the marginal effect of an increase in white-black segregation on the standard deviation in per child local revenue. As *White-Black Segregation* increases, so does the variation in local revenue.

In addition to analyzing white-black segregation, columns 3 and 4 in Table 3.4 replace this with *Multi-Group Segregation* and *Income Segregation*. The multi-group measure is a measure of segregation among all racial and ethnic groups within a county. It is not statistically different from zero, indicating that it is the relationship between White and African American residents that is driving this finding. Column 4 replaces segregation by race and ethnicity with segregation by income. Race and income are often correlated. Instead of segregation by race explaining an increase in variation, it could be that is actually income. However, the coefficient *Income Segregation* is not statistically different from zero. While it might be expected that income segregation should explain variation in revenue at the local level, the model is already controlling for this both through *Median Household Income* and *% Bachelor Degree or higher* as well as the *Standard Deviation of Per Child State Revenue*. Most

Table 3.4: Predicting Variation in Per Child Local Revenue at the County Level

	(1)	(2)	(3)	(4)
White-Black Segregation	0.74**	0.68*		
	(0.27)	(0.27)		
Multi-Group Segregation			0.28	
			(0.19)	
Income Segregation				0.18
				(0.34)
Log Number of Districts	0.07	0.19**	0.20**	0.20**
	(0.04)	(0.05)	(0.05)	(0.05)
% African American		0.00	0.00	0.00
		(0.00)	(0.00)	(0.00)
% Hispanic		0.01*	0.01*	0.01*
		(0.00)	(0.00)	(0.00)
Number of Students		-0.00	-0.00	-0.00
		(0.00)	(0.00)	(0.00)
Std. Dev. in Per Child State		0.00**	0.00**	0.00**
		(0.00)	(0.00)	(0.00)
Std. Dev. in Per Child Federal		0.00*	0.00*	0.00*
		(0.00)	(0.00)	(0.00)
Log of population		-0.27**	-0.26**	-0.27**
		(0.04)	(0.04)	(0.05)
Median Household Income		0.03**	0.03**	0.03**
		(0.00)	(0.00)	(0.00)
% Bachelor Degree or higher		1.41*	1.36*	1.36*
		(0.51)	(0.51)	(0.51)
% Pres Vote Democrat		0.00*	0.00*	0.00*
		(0.00)	(0.00)	(0.00)
Constant	2.25**	2.98**	2.81**	2.91**
	(0.51)	(0.59)	(0.59)	(0.62)
Observations	29,644	29,636	29,636	29,636
Counties	1,893	1,893	1,893	1,893
Year and State Fixed Effects	X	X	X	X
County Random Effects	X	X	X	X

Note: The dependent variable in all models is the *Standard Deviation of Per Child Local Revenue* at the county level in thousands of dollars. The results include state and year fixed effects and county random effects. Robust standard errors that are clustered at the county level are in parentheses. **p<.01, *p<.05

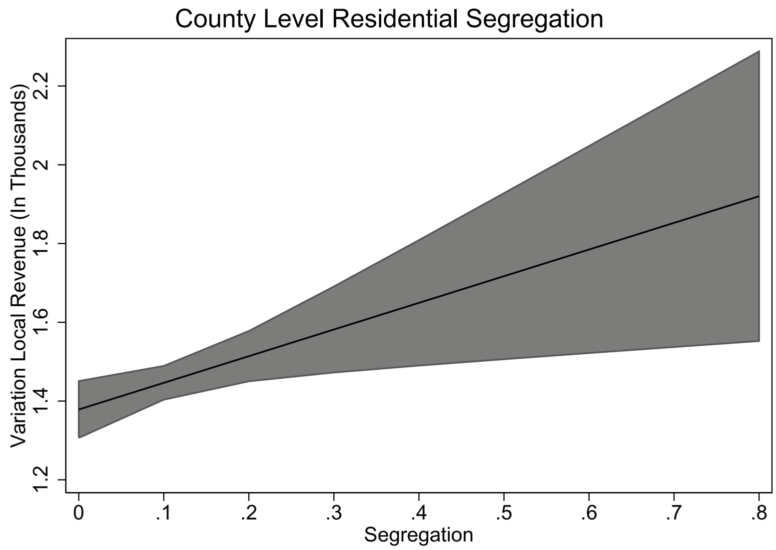


Figure 3.5: County Level Residential Segregation

Note: This figure plots the marginal effect of an increase in segregation on the standard deviation in per child local revenue. It corresponds to Table 3.4 Column 2.

states have funding formulas that theoretically adjust for the financial capacity of the district.

For the last analysis at the county-level, I focus on other types of dependent variables: *Standard Deviation of Per Child Total Expenditures*, *Standard Deviation of Per Child Current Expenditures*, *Standard Deviation of Per Child Instructional Expenditures*, and*Standard Deviation of Per Child Capital Outlay*. These measures include both state and federal funding. Figure 3.6 plots the 95% confidence intervals for the coefficient *White-Black Segregation* for four different dependent variables: per child total expenditures, per child current expenditures, per child instructional expenditures; and per child capital outlay. *White-Black Segregation* does not statistically explain variation in per child total expenditures. However, looking at its components,

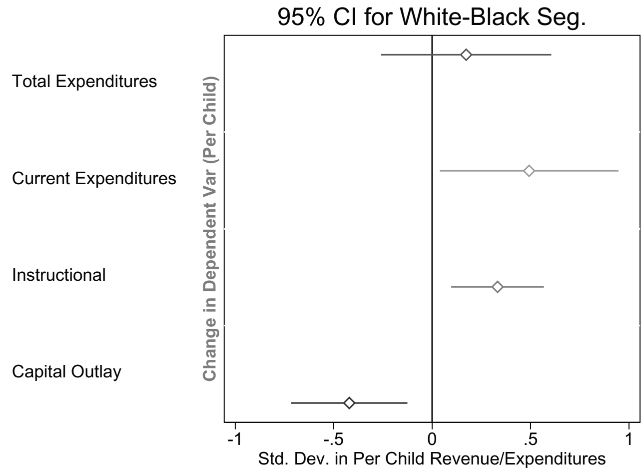


Figure 3.6: Change in Dependent Variable (Standard Deviation)

Note: Each row represents a new regression with the 95% confidence interval on the coefficient *White-Black Segregation* plotted for different dependent variables. Each row is the standard deviation of the per child measure.

current expenditures and per child capital outlay, a different story emerges. *White-Black Segregation* explains an increase in variation in both current expenditures and instructional expenditures but a decrease in variation in variation in capital outlays. Therefore, state and federal revenue help even out variation in spending, particularly when it comes to capital projects. But in regards to money spent on instructional support for things like teachers, there is more variation in spending in more segregated areas.

3.5 Minority Districts Collect Less

The next question, then, is what are the characteristics of districts that collect less in per child local revenue in a segregated setting? The next set of models tests the hypothesis that districts with larger minority groups collect less per child local revenue. In addition, I test if there are differences in tax burden. While certain districts might collect less in revenue, they could actually be paying a larger share of taxes. I determine a median district tax burden by dividing the median household income by the per child revenue that comes from local property taxes. Lastly, I test how school quality, proxied by test scores, is impacted by segregation along racial lines within counties.

In order to understand how one district's revenue compares to another district within the same county, I transform each dependent variable so that it is in relation to the county mean. That is,the dependent variable is the difference between the district per child local revenue and the mean county per child local revenue at time t:

$$d_{jk,t} = y_{jk,t} - c_{n,t} \text{ where } c_{n,t} = \sum_{1}^{j_n} y_{j_n}/q_n$$

where n references counties i=1;...;n and j_n represents district j for county n. The number of districts within county n is given as q_n and the *per child local revenue* for district j in county n is y_{j_n}. A negative number indicates that the district at time t collects less in revenue than the county average, while a positive number would indicate that they collect more than the county average. This is done so that all dependent variables are in reference to the county mean: per child local revenue, per child total expenditures, percent of median household income paid in property taxes, and test scores.

In a simple model, Figure 3.7 plots the difference between the district and county mean for per child local revenue and the level of White-Black segregation in the county. The districts are color coded depending on the race of the population within the district. Grey shows districts that have over 75 percent white. Black dots show districts that have over 25 percent African American. As segregation increases, we can see that there is increased variation in revenue collected and that districts with a large minority population collect less in revenue in more segregated counties. At a basic level, I do find that districts with larger minority populations collect less in local revenue. However, there are many other factors, such as economic conditions, that are not captured in this figure.

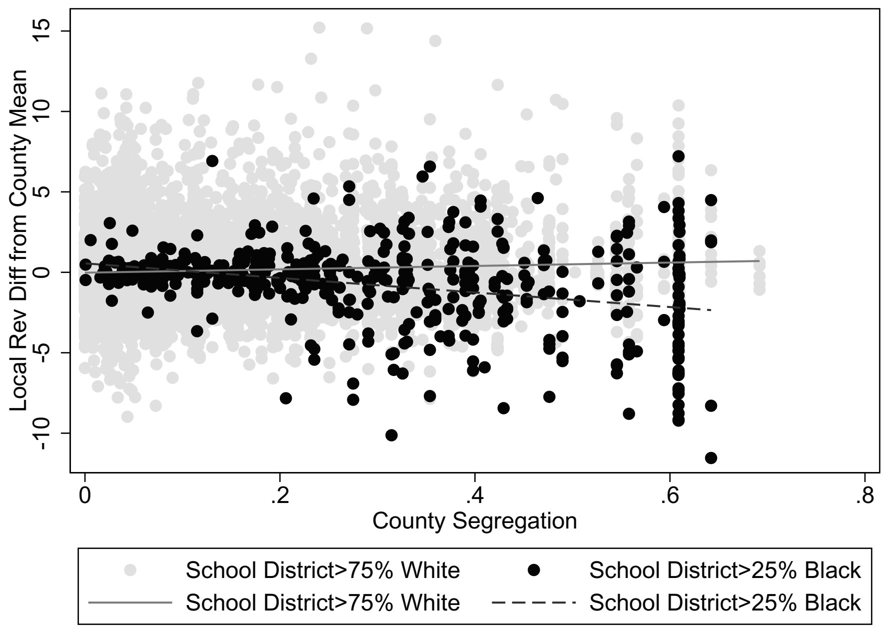


Figure 3.7: Comparison across Counties 2010

Note: This figure plots the difference between each school district local revenue and its county mean against the level of segregation within the county. School Districts where more than 75% of the residents are white are plotted in gray, and districts with more than 25% of residents are African American are plotted in black. As county segregation increases, African American districts receive less in local revenue compared to white districts in this simple model.

To more formally model this, I include state fixed effects to capture time-invariant differences in state policy. I also include year fixed effects to capture changes over time. Therefore, the model captures within state and year differences. I show results from two different ways of pooling county-level information to show consistency in results: complete pooling with no county-level random intercepts and partial pooling with county-level random intercepts. In order to test the hypothesis that in more segregated counties districts with higher minority populations collect less in local revenue, I include an interaction between residential segregation at the county level and percent African American within a school district. The model with complete pooling of county information is given by the following equation:

$$d_{jk,t} = \beta_1 Segregation_{jk,t-1} + \beta_2 \%Black_{jk,t-1} + \beta_3 Segregation \times \%Black_{jk,t-1} +$$
$$\beta_c X_{jk,t-1} + f_t^{year} + f_k^{state} + \epsilon$$

β_1 is the coefficient on *Segregation*, β_2 is the coefficient on *% Black*, and β_3 is the coefficient on interaction between the two. X is the design matrix for the fixed effects for β_c (where c references controls: percent Hispanic, change in black, change in Hispanic, median household income, students enrolled, log population, percent that own homes, size of school district, per child state, per child federal, percent bachelor degree, and percent vote for Democrat president). Because it is over time, t references the year of observation where t=1995....2010. In all models, robust standard errors are shown.

What characteristics predict having a per child local revenue that is below the county mean? Table 3.5 provides insights. Columns 1, 2, an 3 do not include county-level random intercepts. Column 4 includes county-level random intercepts. Column 1 includes only the % Black within the district and the level of segregation at the county but does not include the interaction term between the two. It does include controls for other important factors, like economic conditions and district size. Diversity seems to be driving the results- a one percent increase in African American residents is associated with a $14 decrease from the county mean.

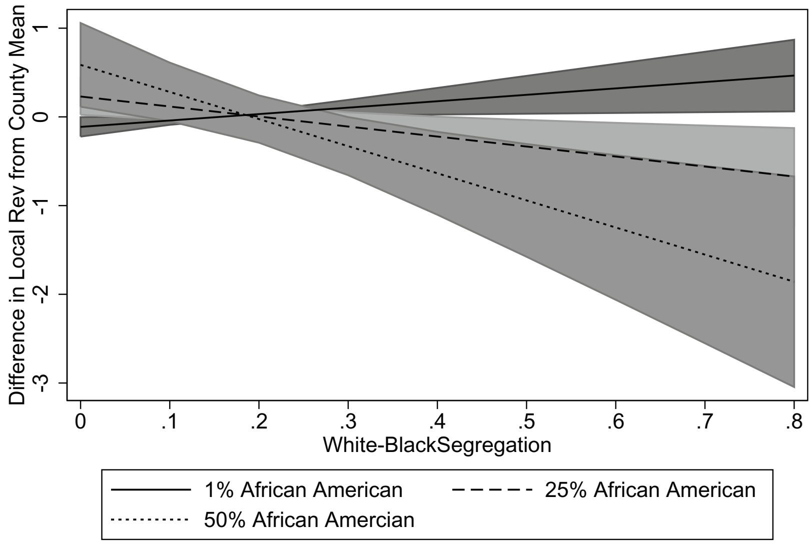


Figure 3.8: County Level Segregation

Note: Marginal effect for a change in *White-Black Segregation* for *Per Child Local Revenue*. Results are from Table 3.5 Column 2.

However, once the interaction is added, Column 2 tells a slightly different story. The interaction term is negative and significant, indicating that it is in segregated counties that districts with larger African American residents collect per child revenue below the county mean. To better understand the relationship, Figure 3.8 plots the marginal effect of a percentage change in segregation for three different percentages African American residents within a district: 1% African American residents, 25% African American residents, 50 % African American residents. When the county is integrated, i.e. *White-Black Segregation* is close to 0, *% Black* within a community does not predict different levels of revenue within a county. But as the county becomes more segregated, districts with larger African American populations collect less than their county mean. If I include county-level random intercepts to partially pool county information as shown in Column 4, results consistent.

This finding is unique to African American populations as well. Column 3 changes the segregation measure from *White-Black Segregation*to *Mulit-Group Segregation*. The interaction is not statistically different from zero. This provides further evidence that not all groups should be treated the same.

As a robustness check to Table 3.5 Column 2, I run the model separately for each year in the data. Because segregation and diversity are often slow moving over time, there is fear that a few observations could drive results in a panel setting. To mitigate this, I show that the results are consistent within each year. Figure 3.9 illustrates these results. It plots 95% confidence intervals for the three key variables: *White-Black Seg X % Black*, *% Black*, *White-Black Seg*. Each year represents the coefficient from the model run *only on that year*. The dashed vertical line represents the coefficient from the full model with all years included (Table 3.5 Column 2). The top graph shows the coefficient for the interaction term across different years. In all years, it was negative, statistically significant and consistent with the full model results. It does appear to becoming more negative over time, the yearly results are not statistically different from one another. The lower left graph shows the coefficient for *White Black Segregation*, and the lower right shows it for *%Black* . For both of these coefficients, earlier years were not statistically significant, but are from 2001 and on. These results not only provide a further robustness check on the data, but also indicate that the effect might be increasing in more recent years.

In addition to understanding which districts collect less revenue at the local level, this section also provides evidence as to whether state and federal funds are able to make up the difference, whether the tax burden is the same, and how this effects quality as proxied by test scores. Table 3.6 displays the results. Models are identical

Table 3.5: Predicting Variation from the County Mean
in Per Child Local Revenue

	(1)	(2)	(3)	(4)
White-Black seg. county	0.363	0.800*		0.875**
	(0.276)	(0.340)		(0.227)
White-Black seg. county X % Black		-0.077**		-0.078**
		(0.024)		(0.030)
% Black	-0.014*	0.014*	-0.014*	0.023**
	(0.006)	(0.006)	(0.007)	(0.009)
Multi-Group seg. county			0.537	
			(0.378)	
Multi-Group seg. county X % Hispanic			-0.011	
			(0.023)	
% Hispanic	-0.003	-0.002	-0.001	-0.010**
	(0.004)	(0.004)	(0.004)	(0.004)
5 year Δ % Black	-0.040	-0.026	-0.039	-0.027*
	(0.021)	(0.015)	(0.021)	(0.013)
5 year Δ % Hispanic	-0.056**	-0.060**	-0.054**	-0.035**
	(0.016)	(0.018)	(0.015)	(0.012)
Per child state	-0.000**	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Per child federal	-0.000	-0.000	-0.000	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
No. of students	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Median household income	-0.015**	-0.016**	-0.015**	-0.010**
	(0.005)	(0.005)	(0.005)	(0.003)
Log population	-0.373**	-0.379**	-0.366**	-0.495**
	(0.062)	(0.061)	(0.062)	(0.042)
% Bachelor or greater	0.073**	0.073**	0.074**	0.099**
	(0.007)	(0.007)	(0.007)	(0.005)
% Dem. president vote	0.000	-0.001	-0.000	0.001
	(0.006)	(0.006)	(0.006)	(0.002)
% Own home	0.005	0.005	0.006	-0.005
	(0.005)	(0.005)	(0.005)	(0.004)
Constant	3.554**	3.524**	3.473**	4.903**
	(0.642)	(0.671)	(0.651)	(0.581)
Fixed Year & State Effects	X	X	X	X
Random County Intercepts				X
No. Counties	1,985	1,985	1,985	1,985
No. Districts	10,871	10,871	10,871	10,871
No. Obs	162,502	162,502	162,502	162,502

Note: The dependent var is the *difference between district per child local revenue and the county per child local revenue*. School district is the unit of observation. Robust standard errors are reported. **p<.01, *p<.05

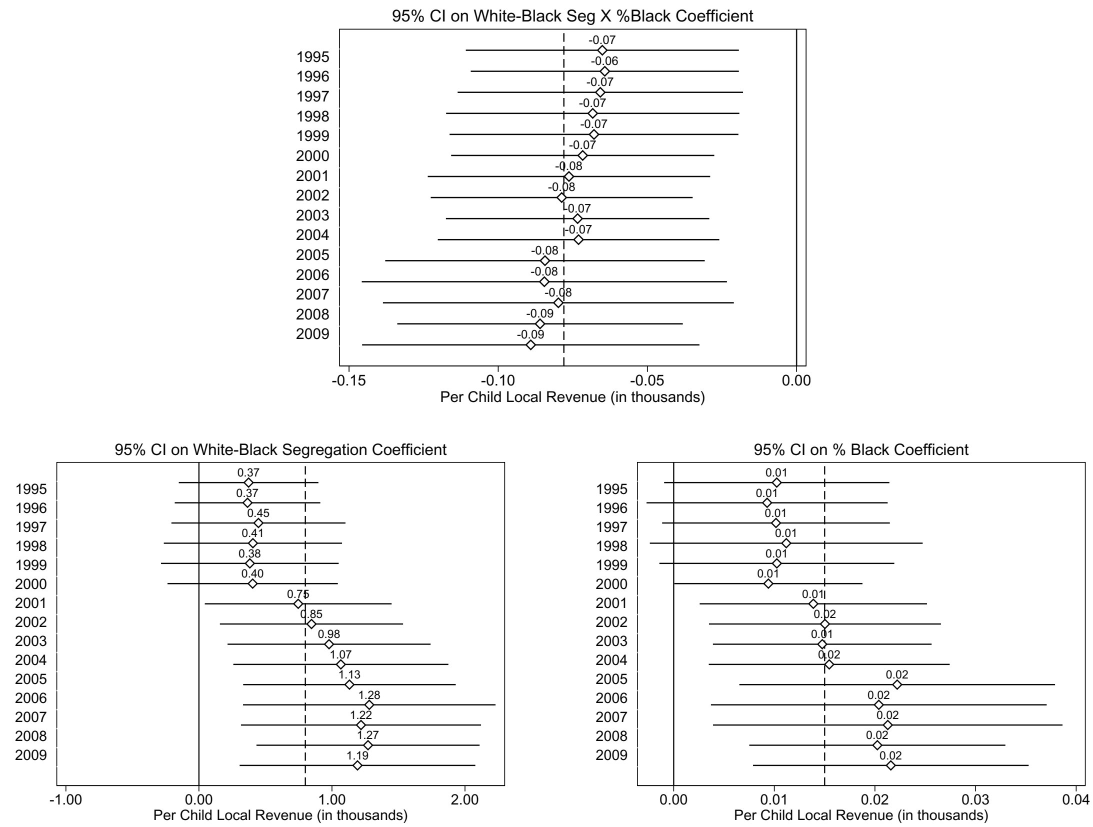


Figure 3.9: Coefficients by Year

Note: Each year represents the coefficient from the model run *only on that year*. The dashed vertical line represents the coefficient from the full model with all years included. The top graph shows the coefficient for the interaction term across different years. The lower left graph shows the coefficient for *White Black Segregation*, and the lower right shows it for *%Black* to the specification of Table 3.4 Column 2 and include state and year fixed effects. The dependent variables are transformed to be the difference from the county mean for a particular district. Column 1 includes revenue raised from all level- local, state, and federal. When state and federal dollars are in the mix, the interaction term is not significant. Districts with high minority populations that are in segregated counties are not worse-off when it comes to total expenditures than districts in more integrated places.

While districts with higher percentage of African American residents collect less in per child revenue, does that mean that they are paying less? As a way to better understand the differences in tax burden, I construct a measure that takes the total revenue collected from property taxes within each district and year and divides it by the number of households in that district. This gives a per household measure of what they contribute to property taxes. Then, I divide the median household income within a district by the per household property tax contribution to get the percent of household income that is spent on property taxes. While this measure is crude, it does provide at a basic level information about tax burden (per household property tax) compared to median household income. In 1995, the mean district had a "tax burden" of 2.82%.

Table 3.6 Column 2 reports the results from the model using the difference in "tax burden" between the district and county as the dependent variable. While the interaction was never significant in any models run and therefore not reported, % Black is positive and statistically significant. That is, a percentage point increase in African American residents within a district results in an increase to the "tax burden" or an increase in the share of property taxes paid relative to median household income.

Because district resources can play a larger role in what is collected in property taxes, further analysis was conducted by looking at urban, suburban, and rural/town districts separately. It is possible that urban districts have more commercial buildings than rural districts, which could influence property tax burdens. Table B.4 in the appendix shows the results from four separate models. The first model is identical to Table 3.5 Column 2 but includes two additional variables *urban district* and *suburban district* to indicate the type of geographic area of the school district. The coefficient on *Urban district* is positive and statistically significant, indicating that districts that are in an urban environment have a larger tax burden. However, even controlling for urban environment, *% Black* is still positive and statistically significant. This is true when running separate models by each geographic type, with the exception of rural and town school districts (shown in Columns 2-4 in Table B.4).

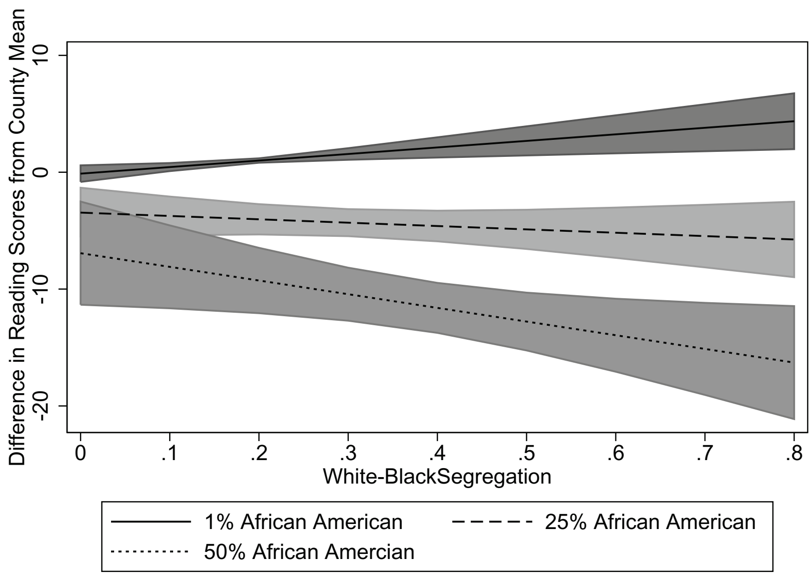
While test scores are limited in what they measure, they are one way to compare proficiency in math and reading. The George W. Bush Institute compiled Global Report Cards from 2004 to 2009, which create comparable test scores across the United States at the district level (Green and McGee 2011).[11] Because there is only five years of data, interpretation of results are limited. However, I do find that in both math and reading a negative relationship between test scores and % Black in the district. The effect is even greater in segregated counties. This is illustrated by Figure 3.10, which plots the marginal effect of a change in *White-Black Segregation* at the county-level for three different districts that have different percentages of African American residents (1%, 25%, and 50%). When a county is integrated, test scores are closer to the county mean for each group. But as segregation increases, districts with very low African American residents perform greater than the mean, while districts with higher percentages perform below the mean.

[11]They use the National Assessment of Educational Progress (NAEP) exam to estimate the distribution of state education quality, which they use to shift distributions of district quality data within each state. These scores are based on tests from a random sample of 4th through 8th graders.

Table 3.6: Predicting Variation from the County Mean for Different Outcomes

	(1) Per Child Expenditures	(2) % Med HH Inc Property Tax	(3) Math Test Scores	(4) Reading Test Scores
White-Black seg. county	0.380*	0.026	6.526**	5.959**
	(0.179)	(0.082)	(1.803)	(1.962)
% Black	0.024*	0.004*	-0.142**	-0.139**
	(0.011)	(0.002)	(0.051)	(0.048)
WB seg. county X % Black	-0.007		-0.431**	-0.353**
	(0.028)		(0.098)	(0.100)
% Hispanic	0.002	-0.003	-0.064**	-0.079**
	(0.003)	(0.004)	(0.016)	(0.020)
5 year Δ % Black	-0.067	-0.007	-0.173	-0.127
	(0.036)	(0.007)	(0.106)	(0.114)
5 year Δ % Hispanic	-0.049**	0.006	-0.273*	-0.296*
	(0.011)	(0.011)	(0.122)	(0.143)
No. of students	0.000*	0.000**	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Median household income	0.000	-0.005*	0.030	0.026
	(0.003)	(0.002)	(0.017)	(0.018)
Log population	-0.578**	-0.226**	-0.571*	-0.610*
	(0.081)	(0.034)	(0.216)	(0.274)
% Bachelor or greater	0.034**	0.008*	0.327**	0.337**
	(0.006)	(0.004)	(0.022)	(0.024)
% Dem. president vote	-0.000	0.004*	0.020	0.014
	(0.003)	(0.002)	(0.045)	(0.047)
% Own home	-0.023**	-0.010**	0.124**	0.140**
	(0.006)	(0.003)	(0.025)	(0.023)
Per child state		-0.000**		
		(0.000)		
Per child federal		-0.000**		
		(0.000)		
Per child expenditures			-0.264**	-0.260**
			(0.039)	(0.044)
Constant	5.877**	2.800**	-7.786*	-8.322*
	(0.853)	(0.428)	(3.234)	(3.276)
Fixed Year & State Effects	X	X	X	X
Years Included	1995-2010	1995-2010	2004-2009	2004-2009
No. Counties; No. Districts	1,905; 10,871	1,904; 10,886	1,896; 10,556	1,896; 10,556
No. Observations	159,392	160,912	58,625	59,284

Note: The dependent variables are all transformed so that they are the difference between the district and the county mean. School district is the unit of observation. The results include state and year fixed effects. Robust standard errors are reported. **p<.01, *p<.05



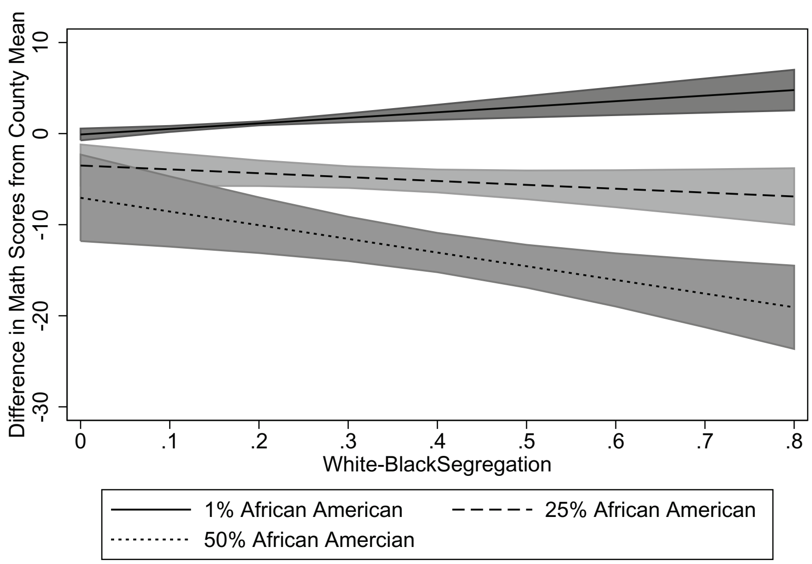


Figure 3.10: The Effects of County Level Segregation on Test Scores

Note: Marginal effect for a change in *White-Black Segregation* for Reading (top) and Math (bottom). Results are from Table 3.6 Columns 3 and 4.

3.6 Discussion and Conclusion

The effects that diversity and segregation have on public goods have long been an important topic in political science, as has understanding the effects of municipal fragmentation. But how do these two fit together? It is important to understand the ways in which boundaries influence communities. In counties with multiple school districts, racial white-black segregation leads to more variation in per child local revenue. This is even after controlling for economic factors within the district. State and federal support do not erase this finding when focusing on spending on instructional support.

In trying to understand the characteristics of districts where funding is less, I find districts with larger African American residents in segregated counties collect less in local revenue than in integrated counties. But this does not mean that they contribute less on a per household bases. An increase in a percentage point in African American residents is associated with an increase in tax burden, or an increase in amount of property tax paid given the median household income. Furthermore, quality of schools, as proxied by test scores, is also related to racial segregation. An increase in the percentage of African American residents is associated with lower test scores, but this is even more true in segregated counties.

While states have worked to combat inequality in funding for public education, variation still exists. In 2010, local revenue was approximately 42 percent of the total revenue raised for the average district while state funds contributed for another 46 percent of the total revenue. This is a significant portion of financing that comes from local governments. If states want to help achieve better equality in financing, it is important to look beyond economic conditions within the district. Fragmentation of districts along racial lines contribute to differences in revenue and different tax burdens. While limited in interpretation, segregation also appears to be hurting academic success as well. Diversity and segregation have important implications for public goods not only within a political jurisdiction but also between jurisdictions.

Chapter 4

Partisan Politics and Education: A Test of the Core Voter Model

4.1 Introduction

When the governor of Maryland, Larry Hogan, took office in 2015, he withheld $68 million in funding for high-cost school systems. This decision directly impacted Prince George's and Montgomery counties, which would have received $20 million and $17 million in extra money each. Interestingly, these counties had overwhelmingly supported the Democratic opponent to Hogan in the election (Hicks 2015). Was the decision to withhold funds politically motivated or just a cost-saving measure? While state funding for education programs has been debated vigorously from ballot boxes to court rooms, the debates often center on economic arguments. Many states rely on a funding formula to distribute education funds to local school districts with the idea that this distribution is at least partially determined by a local district's property tax base. This mathematical formula is often touted as way to fairly distribute funds, but the formula often lacks transparency and can be quite complex. Do politicians manipulate the formula so that it rewards their core constituents more?

Political science research offers evidence that politicians distribute benefits to loyal or core voters in hopes of maximizing electoral benefits. Much of this evidence has focused on federal distributions to congressional districts or, in a few cases, state distributions to counties. While counties do define geographically similar areas, they are less likely to define homogeneous populations in terms of voting preferences. An urban area is likely to be more politically similar to other urban areas in different counties than it is to the rural area within the same county. Funding for public education provides an opportunity to test how strategic state elected officials are in distributing benefits to like voters because it defines a more homogeneous constituency. In addition, public education is the largest expenditure of local and state governments (Bernstein 2014). With large shares of money at the state level to transfer to local governments and the ability to target core voters, it would seem likely that politicians would take advantage of this. However, in understanding how states distribute education funds, little emphasis is given to partisan influences, particularly the congruence between local school districts and the state level. Instead, funding for education is often discussed in economic terms with large emphasis placed on funding formulas. This paper tests whether education funding is influenced by the core voter model, with districts who support the state party in power receiving more benefits.

This paper uses an originally compiled data set to test whether the consistency between state party control and the partisanship of a local school district influence state transfers to that district. I collected data at the precinct level within each state, and using mapping software, spatially joined precinct boundaries to school district boundaries. Once this relationship was established, I was then able to aggregate precinct level information up to school districts to understand the partisan voting patterns within each school district for elections from 2000 to 2010. This data is supplemented with voting data at the county level for presidential elections from 1992 to 2012 as a comparison. By combining this data with financial and demographic information of a school district, I am able to leverage changes in partisanship at the state level to test how it influences the distribution of funds in subsequent years. To account for time-invariant district specific variation as well as differences across elections, I include school district and year fixed effects in all models. I also include measures for potential confounding factors, such as measures for a school district's ability to pay for education.

This article finds evidence that funding formulas are susceptible to political influence and that parties are able to influence the geographic distribution of education funds to core voters. While state transfers to counties provide evidence of partisan distribution, I also find a strong relationship when state party control and local partisan support align focusing exclusively on school districts, particularly for the Democrats. A one percentage point increase in voting for the Democrat candidates in an election when Democrats have control at the state level is associated with a $15.18 per student increase to funding from the state formula, above the state mean.

I proceed as follows. In the next section, I discuss the research regarding distribution of public goods based on partisanship at the state and local level, with emphasis on the core voter model. In the third section, I discuss how public education is funded and differences in funding formulas across states and time. The fourth section details the creation of the data set used to test these theories. Next, I present the statistical results based on a series of panel data models focused at both county level state transfers and then school district state level transfers. Finally, I discuss the results and future areas of research.

4.2 Distributing Public Goods

There is a long literature on how parties allocate targetable public goods and whether they distribute goods to optimize electoral outcomes. The debate has centered whether politicians follow a "core voter model" (or "loyal voter model"), in which money is allocated to areas that contain core or loyal voters (Cox and McCubbins 1986; Cox 2009), or a "swing voter model", in which money is allocated to pivotal electoral areas(Lindbeck and Weibull 1987). While both of these models are derived through game theoretic models, empirical work has found support for these models as well.[1] However, when deciding which model is appropriate, the goal of the party must be understood. Are the parties trying to persuade voters, mobilize voters, or coordinate voting efforts? If the goal is only to persuade voters to choose between two parties and turnout is set, then the research is mixed in what parties are trying to achieve when they distribute public goods. If, however, parties are also trying to mobilize voters to turnout or affect the number and character of alternatives from which voters choose, then there is much more support for the core voter model (Cox 2009). That is, the goal of the party in power is to distribute goods to areas of core supporters.

There are strong incentives for parties to distribute benefits to core supporters. An increase in federal spending benefits is associated with an increase in support in the popular vote for the incumbent in House elections (Levitt and Snyder Jr 1997). It also matters for turnout out. In an analysis of distribution of FEMA aid after Hurricane Katrina, Chen (2013) finds that the aid had an interesting impact on turnout. Not only did turnout increase for the incumbent party but it also decreased for the opposition party in response to aid given in the aftermath of the disaster.

But much of this research has focused on the federal level, with a few exceptions of state transfers to counties (Ansolabehere, Gerber and Snyder 2002; Ansolabehere and Snyder 2006). Can and are parties at the state level able to be more direct in their targeting of benefits? While counties do define geographically similar areas, they often do not define homogeneous populations. Figure 4.1 captures the variation in voting patterns that exist within a county by school district. Each row in the figure represents a different county, with the dashed line representing the county

[1] Examples of articles in support of swing voter model: Stokes (2005); In support of the core voter model: Levitt and Snyder Jr (1995);Levitt and Snyder Jr (1997);Balla et al. (2002)

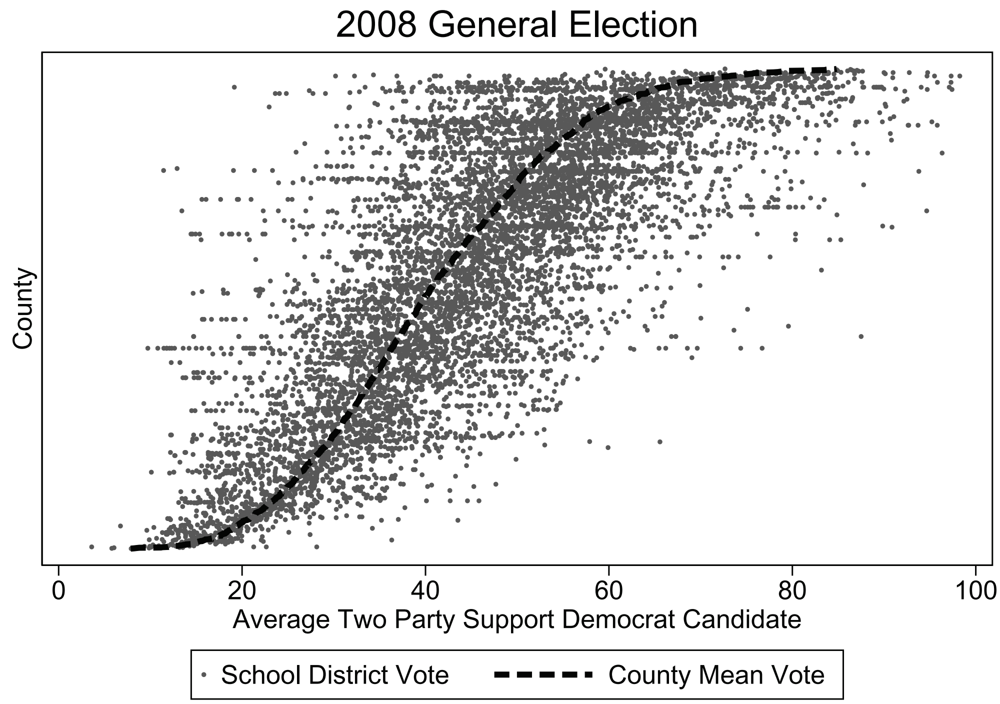


Figure 4.1: County Mean Compared to School District Vote

Note: This figure illustrates the variation in voting that occurs within a county.

mean for the two-party vote for Democrats in the 2008 election. Each school district within that county is plotted along the same horizontal line. The dot represents the school district specific vote for the two-party vote for Democrats in the 2008 election. While there is obviously correlation between the average county and district, there is clearly significant variation within each county in the two party vote for a Democratic candidate.

School districts, on the other hand, often capture much more homogeneous populations. Not only do they often represent much smaller regions than counties, the ways in which school district boundaries were formed created more homogeneous groups. When school districts consolidated during the first half of the twentieth century, consolidation occurred along "organic" community boundaries (Fischel 2009, pg. 103). Research has highlighted that school district boundaries, as well as other types of political boundaries, can serve in ways to keep residents more homogeneous and exclude certain races or economic classes (Danielson 1976; Weiher 1991; Bischoff 2008). Therefore, they represent areas that politicians should be able to more strategically distribute benefits than counties or even congressional districts.

The exception to this are county-based school districts, which are primarily located in the South as shown in Table 4.1. School districts can either be an independent school, that is free from other local governments, or dependent, that is the district is dependent on the city, county, township in financial decisions. Transfers to a county-based school would be analogous to transfers to a county in terms of population covered. Therefore, they would have the same concerns about covering a larger, more heterogeneous population. However, for the majority of school districts of the United States, independent school districts are more common.

Table 4.1: School District Type by Region in 2010

	Midwest	Northeast	South	West	Total	Percent
State Dependent	0	5	0	19	24	0.19
County Dependent	0	0	324	14	338	2.62
City Dependent	0	114	70	18	202	1.56
Town Dependent	2	423	0	0	425	3.29
Independent	4,753	2,162	2,738	2,281	11,934	92.35
Total	4,755	2,704	3,132	2,332	12,923	

Note: This table shows the number of school districts within each region by fiscal dependence for the 2010 school year. It only includes elementary school districts, secondary school district, and elementary-secondary school districts.

The South is not only distinctive in their school district type, but also in their politics. There is variation from state to state in what it means to be a Democrat or a Republican, particularly when focusing on the South. In determining the ideological position of states, Shor and McCarty (2011) found that the Democratic party in many southern states was more conservative than the Republican party in other, non-southern states.[2]. For example, the Democratic party in Mississippi was found to be more conservative than the Republican parties of Connecticut, Delaware, Hawaii, Illinois, Massachusetts, New Jersey, New York, and Rhode Island. Therefore, the differences that exist in the South must be taken into account when trying to understand the relationship between state level party and local district support for that party.

School districts provide an excellent way to test the core voter model and see how strategic state parties are in distributing benefits to a more granular population. The next section discusses the variety of ways in which education funds can be distributed.

4.3 The Complex World of Public School Finance

Funding for public education in the United States is a complicated process that involves all levels of government. In the 2011-2012 school year, states provided approximately 42 percent of public school revenues, local districts provided 46 percent, and the federal government at 12 percent. However, there is considerable variation within each state. For example, the state of Vermont contributed over 85 percent of the revenue, while Illinois contributed less than 30 percent (Odden and Picus 2014).

The ways in which states distribute their money to local school districts can vary as well. Intergovernmental transfers can occur through grants or through a funding formula. Grants, whether unrestricted, categorical, or matching, are sums of money transferred to a district. State funding formulas are methods for transferring money

[2]This finding was based on data from 2002

back to local government. There are three main types: flat-grant, foundation program, and guaranteed tax base (GTB) program (Odden and Picus 2014).[3] States could also uses a combination of the types or fully fund districts. A flat-grant is a fixed dollar sum per student (or per school) that is given to each district. Flat grants treat all districts equally. At the local level, the same inequalities that were created by unequal fiscal capacity still exist. However, at the state level, funding is distributed to all constituents equally.

Foundation programs are used to set a minimum amount of funds needed to provide a quality-education program. States would provide the difference between the minimum amount needed for this program and the level of local revenue to that given district is expected to generate. It also requires that districts have a minimum tax effort before they are allowed to receive state dollars. This establishes a floor amount that every district within a state should be expected to receive. The GTB program ensures that each local district could function as if it had equal tax base per pupil as all other districts within the state. Therefore, districts with a low tax base would receive more state funds while a district with a high tax base would receive less. While some states choose one funding formula approach, others use a combination of approaches to distribute funds. Hawaii is the only state that fully funds schools. Formulas then are often further adjusted to account for additional differences within a district, such as variation in cost from district to district or different levels of need for students with special needs (Odden and Picus 2014).

Over the years, courts and state legislatures have sought to equalize school funding within a state through these various methods of transferring money. However, much of the research has focused on the economic components of funding formulas and

[3]See Odden and Picus (2014) for a full discussion of the details of each funding type.

effects of the funding formulas, and whether or not they achieve equalization.[4] The assumption frequently is that the goal of the process is apolitical, and that the process is trying to redistribute money based on need determined by the local tax base. That is, the focus is on the link between local property taxes and per pupil revenue and how that leads to fiscal inequalities (i.e. Alexander and Salmon 1995; Odden and Picus 2014; Guthrie et al. 2007). The inequality created by uneven tax bases, and therefore uneven spending per pupil, led to court battles to try to equalize funding.

In the landmark case, *Serrano v. Priest (1971)* found California's financing of schools to be unconstitutional. Furthermore, they held that education was a fundamental state right, greatly changing how education spending was determined in California and set off a wave of court challenges to funding formulas (Berkman and Plutzer 2005). As of 2015, 42 states have had their finance system challenged, with about half the states having had their funding systems completely or partially overturned by state's courts (Odden and Picus 2014). Reed (2003) finds that the court systems do generally have a significant impact on the distribution of educational resources. However, inequality is often not reduced. This suggests that there is opportunity to influence the distribution of money through changes in the funding formula in ways that would support a core voter model. While changes to funding formulas can occur incrementally, these rulings have lead to many opportunities for the party in control at the state level to overhaul an existing formula.

[4]There are many debates within education funding about equality in education funding. Should the goal to have all school districts receive equal funding or do some districts require more money to meet the same level of education performance? The goal of this paper is to address the equality of education from the financial side, not the academic output side. In addition, this paper assumes that distribution of public goods is based on school district characteristics within the state. Although research suggests that states do "compete" with one another in determining the appropriate level of goods (i.e. Bailey 2007), that will not be a factor in this paper.

Transfers can happen outside the formulas as well. For example, New York has bullet aid funding that is money that is distributed outside the funding formulas to school districts at the end of each fiscal year. In 2015, $15 million were distributed to schools through this type of funding (Flanagan and Klein 2016). The spokesman for the New York Assembly Speaker Carl Heastie, Michael Whyland said, "The school aid formula can't account for every situation among the nearly 700 school districts statewide, so this is funding to schools that need it" (Harris 2015). However, there is little transparency in how or why this money is distributed to certain districts. In addition, block grants are often given for many different ares such as special education, lunch programs, bilingual education, or transportation to make up for gaps in the funding formula.

With opportunity to influence the distribution of education funds to different geographic locations and the ability to target populations of similar voters in school districts, state transfers for education is likely to follow the core voter model. Therefore, I hypothesize that districts that vote for the party in power at the state level receive more benefits, in terms of state transfers per child, than districts who support the opposing party. I do not focus on differences in specific funding formulas because many states take a combination approach when determining how to allocate money. Which party is in power should also matter. In a study of federal government transfers, Democrats were more successful in skewing distributions in favor of voters through formulas than Republicans have (Levitt and Snyder Jr 1995). Therefore, I also hypothesize that Democrats will be able to leverage benefits from transfers from state funding formulas more than Republicans.

4.4 Data and Methods

Using precinct level election data, school budget data, student demographic data, and community demographic data, I created a data set from 1992-2012.[5] Table 4.2 summarizes the data used for models that use precinct level voting data. Table C.2 in the Appendix summarizes the data used for models that use county level voting data. I first discuss the data used to capture partisanship at the state and local level. Then, I discuss demographic and financial data.

4.4.1 Election Data

In order to understand the congruence between state and local school district partisanship, information is needed about both state party control and local support for parties. For state level information, I use data on state party control from Klarner (2013). This is yearly data that identifies which party has control of the legislative and executive branch within each state and whether the party in control has a veto-proof majority. I follow the definitions of state party control used by Ansolabehere and Snyder (2006) in their analysis of state transfers to counties. Therefore, I define a state as being under Democratic control if the Democrats have a majority in both legislative changes and the governor is a Democrat or Democrats have a veto-proof majority in both legislative chambers. The same definition is applied for Republican control. Divided control occurs when neither major party has control. Table C.1 in the appendix shows the number of years that the state has had either Democrat,

[5]For this data set, I focus only on Elementary School Districts, Secondary School Districts, and Elementary-Secondary School Districts that are financially independent from other forms of local government. I exclude county, city, vocational, special needs districts, non-operating districts, state-run districts, charter districts, and educational service agencies.

Republican, or divided party control. There are 15 states that do not switch party control during this time-frame, and therefore not included in the analysis.

Because policies often take time to implement and budget changes are often slow moving (Ansolabehere and Snyder 2006), I focus on which party is in control over an eight-year period.[6] A period of Democratic Control in a state if Democrats maintained control for at least four of those years and Republicans had control for three or fewer (or it could also be under divided control for four or fewer years). Republican control during this eight year window would require four or more years of Republican control. Therefore, when I am predicting the intergovernmental transfers for the 1993 school year, I focus on the party in control during the years 1985-1992. If Democrats maintain control for at least four of those years, it is coded as under *Democrat Control*. The variables are defined by *Democrat Control*, *Republican Control*, and *Divided Control*.

To determine the congruence with local voters, election data is collected in two ways. The first is in line Ansolabehere and Snyder (2006), who focused on the county level election results and county level transfers. Presidential election data is collected at the county level for the following years: 1988, 1992, 1996, 2000, 2004, 2008, and 2012. This information was compiled from CQ Press (2016) by state and election year. I use this data to identify the average two-party vote received by the Democratic candidate for president for the previous two elections within a county[7] Therefore, when I am predicting the intergovernmental transfers for the 1993 school year, I would use the 1988 and 1992 election results. This variable is called *Dem Vote C*. This county level information serves as a proxy for district partisanship.

However, because counties group a large share of voters together and can have multiple school districts, I use precinct level data to obtain a more granular picture of

[6]Again, this is the same definition used by Ansolabehere and Snyder (2006).

[7]In addition to presidential vote, Ansolabehere and Snyder (2006) also included the average Democratic vote for U.S. senator, and governor.

Figure 4.2: New Jersey by County, School District, and Precinct Boundaries

Note: This figure illustrates the variation in voting that occurs within a county. County boundaries are dashed lines while school district boundaries are dark black. The average vote for the two party 2008 Democratic presidential election for each precinct is color-coded based on the degree of support. The white represents precincts that had less than 20 percent support for the Democratic candidate, while dark black represents precincts that had more than 80 percent support for the Democratic candidate.

partisan turnout within each school district. Precincts or voting districts are smaller divisions within a county and can be aggregated to show the vote within a school district. Figure 4.3 illustrates just how different a county two party vote and the school district votes within the county can be by using New Jersey as an example. County boundaries are dashed lines while school district boundaries are dark black. The average vote for the two party 2008 Democratic presidential election for each precinct is color-coded based on the degree of support. The white represents precincts that had less than 20 percent support for the Democratic candidate, while dark black represents precincts that had more than 80 percent support for the Democratic candidate. The graph on the left includes the entire state while the graph on the right focuses on the county of Camden, New Jersey. Within Camden, there are 35 different school districts. The average Democratic presidential vote in the 2008 election in Camden was 67.5%, but there was wide variation at the precinct level. On the low end, the vote in Waterford Township School District was 53.7%. On the opposite end, the vote in Lawnside Borough School District was 97.4%. By using precinct level data, I have a more accurate view of support for a party within a school district.

Precinct data are not inherently connected to school district boundaries. In order to make this connection, I used the mapping software ArcGIS to match precinct boundaries to school district boundaries.[8] Table C.1 in the Appendix provides the source used for precinct boundaries for each state. This process was done for each state that had precinct boundaries mapped and changed state party control during this time-frame. This resulted in 26 states that are included in this analysis.[9] School district boundaries were mapped using data from the National Center for Educa-

[8]Specifically, I used the “Union” tool to join boundaries based on spatial location of the data.

[9]15 states did not change party control and the remaining nine either did not have boundaries mapped or precinct voting data available.

tion Statistics (2013). For the majority of cases, a precinct was defined to be within a school district if it fell completely inside the school district boundaries. However, there are cases in which a precinct crossed school district lines. When this occurred, the votes for that precinct were counted in all school districts for which it fell inside.

Once the crosswalk between precincts and school districts were complete based on 2010 boundaries, I created crosswalks across different election years. Data collected by Ansolabehere, Palmer and Lee (2014) contains precinct level voting data by state for elections between 2000 and 2012. This includes results for presidential, governor, US House, and US Senate elections. While some states use the same name or precinct code across elections, other states were less consistent in their naming conventions and coding. Through extensive cleaning, I was able to match most precincts over this time frame. Detailed code can be provided upon request that match precincts across years.[10] Vote counts for each election type and year were then aggregated to the school district level. Most years have more than one election, therefore, I take the average Democratic vote across elections within a year. The average two-party vote for a Democratic candidate is rescaled so that it represents the deviation in state party support and local party support. Because there is variation from state to state in average Democratic support, this allows a more accurate comparison of divergence or congruence from state averages. As an example, if the state average two-party vote was 51 percent and the district vote was 55 percent, then the district supported the Democrats four percentage points more than the state average. This variable is called *Dem Vote D*.

In order to understand the impact of the party in power at the state level and its relation to the school district vote, I create an interaction between the two. Therefore,

[10] An example of matching precinct data over time would be the precinct *cedar falls w1p1* in Black Hawk county, Iowa. While it was called that in some years, in other years it was called *cf w1p1*.

Dem Vote D[11] is interacted with *Democrat Control*, *Republican Control*, and *Divided Control* to create *Dem Vote D X Democrat Control* , *Dem Vote D X Republican Control*, and *Dem Vote D X Divided Control*[12]. As Ansolabehere and Snyder (2006), notes these variables measure the direction that the governing party skews funds. The expectation is that if Democrats are in control at the state level, then they would award more money to districts that support Democratic candidates. This interaction captures this relationship.

4.4.2 School District Information

In addition to partisanship information, financial information for each district was collected. To measure the transfers from state to local governments, I use the Public Elementary âĂŞ Secondary Education Finance Data provided by the U.S. Census Bureau from 1995 to 2011(US Census Bureau 1993-2011). This data set breaks apart revenue by local, state, and federal governments and provides what each district receives from each level of government. In addition, state level revenue is further refined by denoting the source. That is, the funding is detailed by whether it is a transfer from a general funding formula, special education program, or a bilingual education program, as examples. All dollar amounts are in 2013 constant dollars.

This data set is the source for the main dependent variables: a per student measure of all state funds to a district and a per student measure of funds from a general formula assistance. Districts vary in size and states vary in their capacity to provide education funding. In order to understand how one district's revenue from the state compares to another district within the same state, I transform each dependent variable so that it is in relation to the state mean. That is,the dependent variable is the

[11] or *Dem Vote C*

[12] or *Dem Vote C X Democrat Control* , *Dem Vote C X Republican Control*, and *Dem Vote C X Divided Control*

difference between the district per child local revenue ($y_{jk,t}$)and the mean per child state revenue ($s_{k,t}$) at time t:

$$d_{jk,t} = y_{jk,t} - s_{k,t}$$

where

$$s_{k,t} = \sum_{1}^{j_n} y_{jk,t}/q_k$$

where j references districts,k references the state, and t references the year. The number of districts within state k is given as q_k. A negative number indicates that the district at time t receives less in revenue from the state than the state average, while a positive number would indicate that they received more than the state average. In addition to the two dependent variables, I also create two explanatory variables from this data set to control for local school district capacity and federal government support. They are both transformed so that they are in reference to the state mean within a given year: *Per child local* and *Per child federal*.

The budget data is paired with student demographic information that is collected by the Local Education Agency (School District) Universe Survey, provided by the National Center of Education Statistics (NCES 1993-2012). I include community level information about the school districts from the 1990, 2000 and 2010 Census (US Census Bureau 1990; US Census Bureau 2000; US Census Bureau 2010).Because the Census data is not yearly, I interpolate data between the three Censuses. These are the sources for the remainder of the explanatory variables.

There are many other factors that are likely to affect the amount of revenue distributed to local governments. Perhaps the most important is the ability of a local district to raise funds. Wealthier areas will be able to raise more revenue than cash-strapped districts. Local governments and the federal government contribute at different rates as well. While I include the actual per child amount that the local district and federal government contribute, I also include *Median Household Income* in thousands of dollars as a measure for district wealth. I include the percent of residents with a bachelor degree or higher, *% Bachelor or higher*, as a proxy for education support. I also include percent of residents who own their home, *% Own Home*. Because property taxes are a large part of investment in local revenue, home owners might have stronger views on changes in taxes. Districts vary in size, which can impact per child costs. To combat this, I include the log of the population, *Log Pop*.

Diversity of residents has consistently been highlighted as an important predictor of investment in public goods. Diversity can be measured in different ways, but I am using *% Black*, *% Hispanic* and *% Asian* to capture the diversity of the district. This is also important because African Americans overwhelmingly support Democratic candidates. Therefore, when Democrats are in control, they could target areas based on demographics which can be highly correlated with partisanship.

In addition to these variables that are included in all models, I have also collected additional school district information, which was not reliably reported until the 2000s. This includes percent of students receiving free or reduced lunch (*% Free Lunch*) and percent enrolled in Special Education (*% SPED*). These measures capture district needs, and states often have specific funding programs to help with these types of needs. Table 4.2 summarizes these district variables for two years in the data set.

4.4.3 The Model

In order to test the hypothesis that districts that support the party in control in elections are rewarded through more financial support, I use the following model. I include district fixed effects to capture time-invariant differences in the district. I

Table 4.2: Summary Statistics

	2002			2010		
	Mean	Std Dev	N	Mean	Std Dev	N
State Dem Control	0.24	0.43	6,817	0.20	0.40	6,822
State Rep Control	0.31	0.46	6,817	0.35	0.48	6,822
Dem Control X Dem Vote	0.04	7.38	5,437	0.00	3.47	5,711
Divide Control X Dem Vote	0.06	10.13	5,437	0.31	10.08	5,711
Rep Control X Dem Vote	0.03	8.04	5,437	0.03	8.81	5,711
Median HH Income	56.28	21.54	6,807	53.47	20.88	6,822
Log Pop	9.04	1.39	6,807	9.10	1.43	6,822
% Bachelor or Higher	19.03	11.81	6493	22.06	13.42	6,822
% Black	5.46	10.87	6,807	5.96	10.98	6,822
% Hispanic	9.93	17.11	6,807	12.22	18.26	6,822
% Asian	1.55	3.96	6,807	2.20	4.89	6,822
% Own Home	75.30	10.99	6,807	75.83	11.73	6,822
% Free and Reduced Lunch	36.08	22.05	6,266	45.28	22.52	6,715
% Special Education	14.02	4.42	6,817	13.05	5.21	6,822

Note: This table presents district level data for select years of the data set. The two-party Democrat vote is relative to the state mean.

also include year fixed effects to capture changes over time. The model given by the following equation:

$$d_{j,t} = \beta_1 DemVoteCountyXDemControl_{j,t-1} + \beta_2 DemVoteCountyXRepControl_{k,t-1} + \beta_3 DemVoteCountyXDividedControl_{j,t-1} + \beta_4 DemControl_{j,t-1} + \beta_5 RepControl_{j,t-1} + \beta_c X_{j,t-1} + f_t^{year} + f_j^{district} + \epsilon$$

β_1 is the coefficient on *Dem Vote County X Dem Control*, β_2 is the coefficient on *Dem Vote County X Rep Control* , and β_3 is the coefficient on *Dem Vote County X Divided Control*. β_4 and β_5 are the coefficients on the dummy variables for whether the state is under Democrat or Republican control. X is the design matrix for the fixed effects for β_c (where c references controls: percent Black percent Hispanic, percent

Asian, median household income, log population, percent that own homes, per child state, per child federal, and percent bachelor degree). j references the school district. Because it is over time, t references the year of observation where t=1992....2012. In all models, robust standard errors clustered at the school district level are shown.

The model is intended to show how a change in party at the state level effects state transfers *within* a local school district, given the local support of the party. Figure 4.3 illustrates a simple example for New Jersey by plotting the Average Democrat Vote compared to per child state transfers to a district. The state was under Republican control in 2002 and Democrat control in 2008. Each dot represents a school district, with the light gray representing 2002 transfers and the black representing 2008 transfers. As Democrats gained control in 2008, there is an increase in state transfers to districts that strongly support Democratic candidates and a decrease for some school districts that have low support, as illustrated by the bivarate regression line. The next section models this relationship.

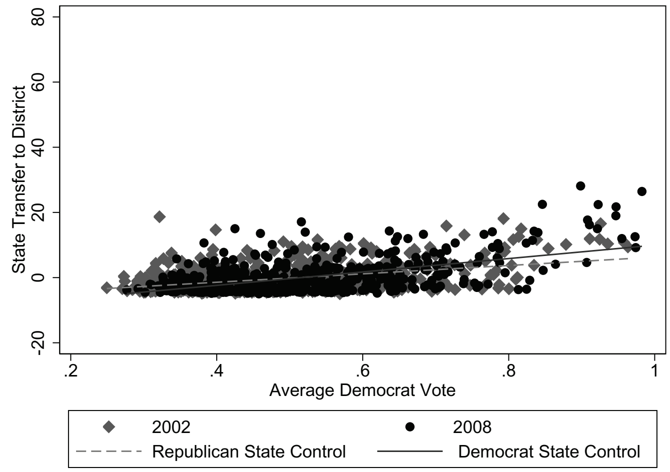


Figure 4.3: New Jersey Average Democrat Vote Per District

Note: This figure plots the average Democrat vote against the state transfer to a school district, as compared to the state mean under Republican control and then under Democrat control. Each dot represents a school district.

4.5 Congruence Between State and Local Party Matters

The first set of results focuses on county level local partisanship as a direct comparison to Ansolabehere and Snyder (2006). Do counties that are more in line with the state level government receive more in state transfers? Table 4.3 seeks to answer this question. The dependent variable in these models is the per child state transfer to the county, relative to the state mean. Therefore, if *Dem Vote X Dem Control C* is positive and significant, that would imply that when Democrats are in control at the state level, each percentage point in the two-party presidential vote for a Democrat that the county voted above the state mean would result in an increase in money from the state.

As previously stated, there is variation from state to state in what it means to be a Democrat, particularly in the South. Because of this, three separate models are run: all counties, counties in southern states, and counties in non-southern states.[13] In Table 4.3, columns (1) and (4) include all states, while the other four columns focus on non-southern and southern states separately. Columns 1-3 include the political variables of interest as well as what the local school district contributes per child, relative to the state mean. Columns 4-6 then add covariates to the model.

When focusing on transfers to a county, Democrat and Divided party control are not strong predictors. However, when Republicans are in control, counties that support the Republican candidate more receive more in funding. This is consistent when looking at all states and non-southern states, but not southern states. A one percentage point decrease in voting for a Democrat candidate results in almost $20 more per student transferred to the county when Republicans are in control at the state level. Figure 4.4 plots the 95% confidence intervals for these political interaction terms for all state transfers (on the left) and for transfers that come from a funding formula (on the right). Looking at the funding formula exclusively eliminates funding that is likely purely based on the number of students that fit that category from the district, such as bilingual education, gifted and talented program, special education program, and school lunch program. Table C.3 in the appendix contains the results for the models with the funding formula as the dependent variable. The results for transfers from the state funding formula are similar but with a few exceptions. There are no significant results for non-southern states, and in southern states and the overall model, an increase in votes for the Democratic two party vote while Democrats are in control leads to *less* money.

[13]Southern states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia, and Texas

Table 4.3: All State Transfers and Party Control
County-Level Transfers and Vote

	(1) All	(2) Non-South	(3) South	(4) All	(5) Non-South	(6) South
Dem Control X	-1.79	-0.69	-1.80	-8.17*	-4.87	-0.11
Dem Vote County	(3.00)	(4.63)	(3.83)	(3.84)	(6.03)	(5.05)
Divide Control X	-1.76	-7.20	2.62	-8.48*	-13.04*	3.04
Dem Vote County	(2.72)	(4.94)	(3.41)	(3.68)	(5.75)	(4.83)
Rep Control X	-8.72*	-18.95*	-0.47	-16.89**	-20.00*	-5.81
Dem Vote County	(4.23)	(8.29)	(4.45)	(5.44)	(8.52)	(6.68)
Dem Control	-19.60	-29.23	-19.26	-16.77	-35.36	7.03
	(18.14)	(25.19)	(26.23)	(21.45)	(30.22)	(27.24)
Rep Control	-5.52	-15.91	12.16	-7.27	-8.26	54.39
	(28.04)	(32.39)	(52.75)	(27.62)	(33.27)	(58.79)
Per Child Local	-0.03*	-0.21**	-0.01	-0.02	-0.21**	0.00
	(0.01)	(0.04)	(0.01)	(0.01)	(0.04)	(0.01)
Per Child Fed				-0.00	-0.04	0.01
				(0.04)	(0.07)	(0.03)
Median HH Income				-7.10	-2.01	-6.94
				(6.95)	(10.87)	(7.88)
Log Pop				-319.99**	-191.06**	-1226.12**
				(95.58)	(73.40)	(193.13)
% Bachelor or greater				-0.01**	-0.01**	-0.01**
				(0.00)	(0.00)	(0.00)
% Black				0.00**	0.01*	0.01**
				(0.00)	(0.00)	(0.00)
% Hispanic				0.00**	0.00**	0.00
				(0.00)	(0.00)	(0.00)
% Asian				0.01**	0.01**	0.01
				(0.00)	(0.00)	(0.01)
% Own Home				-13.77	-12.71	-14.97
				(8.08)	(10.98)	(13.39)
Constant	8.97	-1.24	21.86	4757.48**	3104.87**	14025.29**
	(17.61)	(20.55)	(30.89)	(1135.46)	(1010.86)	(2020.34)
District Fixed Effects	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X
Counties	2,274	1,350	924	2,274	1,350	924
Observations	13,644	8,100	5,544	11,344	6,724	4,620

Note: This includes the following elections: 1992, 1996,2000, 2004,2008, 2012. The results include district and year fixed effects. Robust standard errors that are clustered at the county level are in parentheses. **p<.01, *p<.05

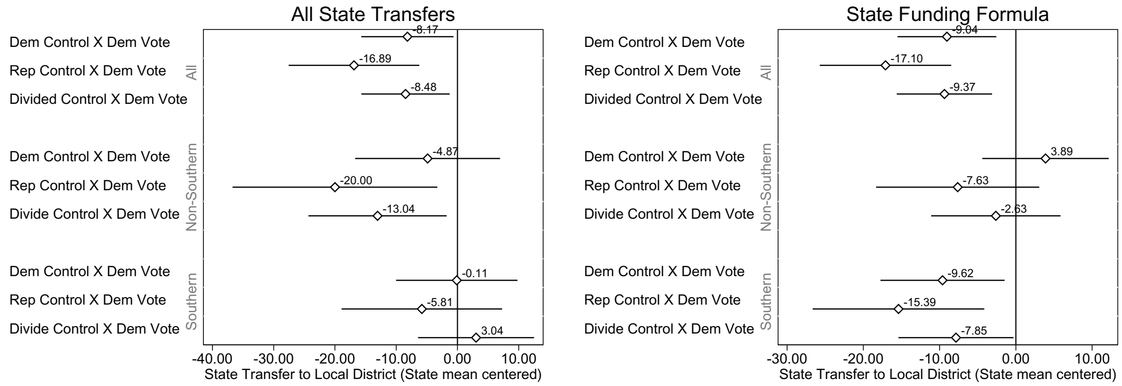


Figure 4.4: County Level Transfers and County Two Party Vote

Note: These figures plots the 95% confidence intervals for party control and presidential vote for Table 4.3 (left) and Table C.3 (right). The data is at the county level and is predicting the state transfers to the county based on state party control and two-party presidential vote within a county (all relative to state mean). Within each graph, three separate models are shown: all districts, districts not in the South, and districts in the South.

One reason that results at the county level are weaker could be that funding to schools can be much more granular than the county level. In many areas of the United States, counties contain multiple school districts and voting within a county can vary a lot. This is particularly true for rural versus urban areas within a county. The next set of results moves from state transfers to a county to transfers to a school district. As an intermediate step, I run models that uses district level transfers but county level two-party vote. While the two-party county vote masks variation in voting preferences between school districts within in the same county, it is an approximation. In addition, I was able to collect more years of data for the county two-party vote than for precinct two-party vote. Figure 4.5 plots the 95% confidence intervals for all state transfers and state funding formula transfers for all states, non-southern states, and southern states. In contrast to county transfers, districts in states under Democrat control receive a benefit for additional support to the Democrat party. This is consistent in the all states and non-southern models. The South has a different relationship, with no significant results for state transfers by the funding formula and significant results, but not the expected direction, for Republican controlled state and two-party Democrat vote.

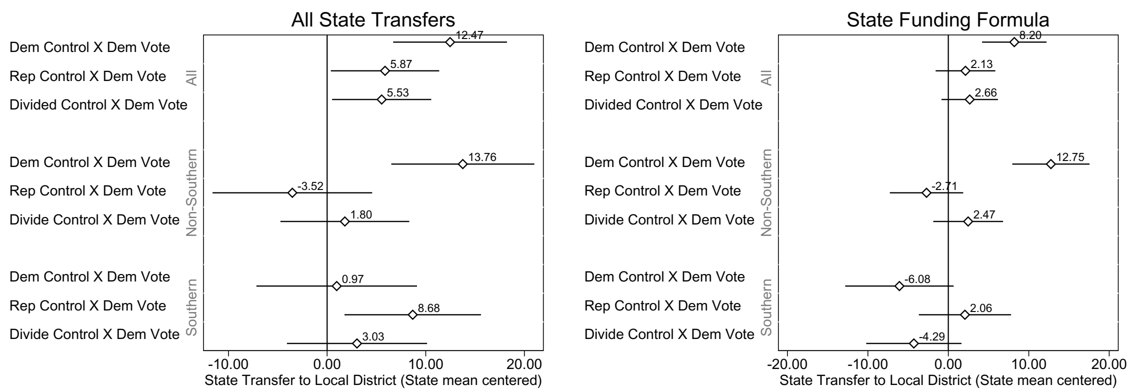


Figure 4.5: District Level Transfers and County Two Party Vote

Note: These figures plots the 95% confidence intervals for party control and presidential vote for Table C.4 (left) and Table C.5 (right). The data is at the district level but two-party presidential vote is at the county level. The models are predicting the state transfers to the district based on state party control and two-party presidential vote within a county (all relative to state mean). Within each graph, three separate models are shown: all districts, districts not in the South, and districts in the South.

The intermediate step provides evidence that transfers at the school district level operate differently than those at the county level. However, it is important to understand the variation in voting patterns within the county and how that contributes to differences in transfers. Using precinct level data, I am able to have an accurate measure of the partisanship within each district. Table 4.4, which focuses on all state transfers, and Table 4.5, which focuses on state funding formula transfers, move from county party vote to district party vote by aggregating precinct data within each district. Figure 4.6 plots the 95% confidence intervals for the key variables.

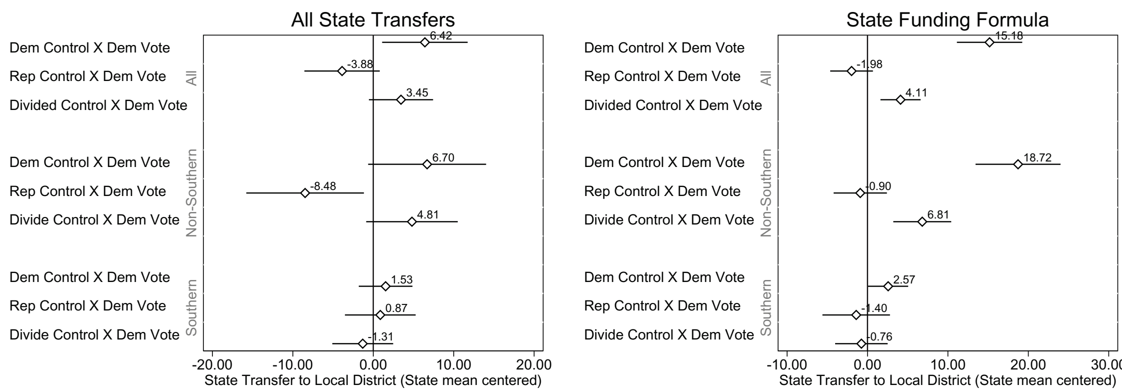


Figure 4.6: District Level Transfers and District Two Party Vote

Note: These figures plots the 95% confidence intervals for party control and Democrat vote for Table 4.4 (left) and Table 4.5 (right). The data is at the district level as well as the two-party vote. The models are predicting the state transfers to the district based on state party control and two-party Democrat vote within the district (all relative to state mean). Within each graph, three separate models are shown: all districts, districts not in the South, and districts in the South.

When looking at the models that contain all states, districts where Democrats are in control at the state and vote above the state mean for Democrats see a boost in transfers. This is true for both all state transfers and state funding formula transfers. A one percentage point increase in support above the state mean while Democrats are in control at the state level is associated with $15.18 more per student in the state funding formula. The effect of a marginal change in two party vote on state funding formula transfers is plotted in Figure 4.7. The left plots the change when Democrats are in control at the state level and the figure on the right plots the change when Republicans are in control. While the relationship is much stronger for Democrats, both are in the expected direction. When looking at non-southern states, particularly for the state funding formula, results are even stronger for Democrat control. As

Table 4.4: All State Transfers and Party Control
Precinct Data for District Vote

	(1) All	(2) Non-South	(3) South	(4) All	(5) Non-South	(6) South
Dem Control X	5.70*	5.87	1.13	6.42*	6.70	1.53
Dem Vote County	(2.70)	(3.63)	(1.51)	(2.71)	(3.74)	(1.70)
Divide Control X	0.91	1.44	0.72	3.45	4.81	-1.31
Dem Vote County	(2.86)	(3.99)	(1.89)	(2.04)	(2.90)	(1.93)
Rep Control X	-6.06*	-10.73**	1.42	-3.88	-8.48*	0.87
Dem Vote County	(2.53)	(3.63)	(2.14)	(2.39)	(3.73)	(2.24)
Dem Control	-103.48	-102.42	-36.18	-72.24	-57.01	-19.91
	(54.33)	(65.84)	(34.62)	(53.03)	(68.79)	(43.16)
Rep Control	-69.56**	-44.43	-37.42	-66.56**	-43.98	13.01
	(22.44)	(28.63)	(32.36)	(25.63)	(27.18)	(44.09)
Per Child Local	-0.16**	-0.14**	-0.21**	-0.14**	-0.15**	-0.20**
	(0.03)	(0.04)	(0.02)	(0.03)	(0.04)	(0.02)
Per Child Fed				0.16**	0.20**	0.08**
				(0.03)	(0.04)	(0.03)
Median HH Income				-11.69	-14.14	11.81
				(7.25)	(8.18)	(9.77)
Log Pop				-1270.7**	-1598.5**	-1039.5**
				(458.93)	(407.61)	(358.28)
% Bachelor or greater				-16.85	-29.05	25.32
				(20.75)	(18.72)	(26.63)
% Black				17.70	-6.99	26.32
				(19.53)	(24.38)	(15.49)
% Hispanic				17.45	14.75	24.45
				(12.72)	(14.16)	(19.27)
% Asian				-5.50	-11.19	70.17
				(20.35)	(21.28)	(42.80)
% Own Home				-0.65	-8.32	19.97
				(9.17)	(11.56)	(12.96)
% Free/Reduced Lunch					7.16**	4.10
					(2.73)	(2.56)
% Special Ed					0.48	64.43**
					(3.14)	(11.70)
Constant	6.71	-30.00	44.06	12274.4**	15969.7**	5317.4
	(38.89)	(41.65)	(23.38)	(4024.5)	(3621.3)	(3415.6)
District Fixed Effects	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X
School Districts	6,829	5,160	1,669	6,812	5,131	1,669
Observations	33,640	25,833	7,807	32,270	22,824	7,517

Note: This includes the following elections: 2000,2002,2004,2006,2008, and 2010. The results include district and year fixed effects. Robust standard errors that are clustered at the district level are in parentheses. **p<.01, *p<.05

Table 4.5: Funding Formula and Party Control
Precinct Data for School Districts

	(1) All	(2) Non-South	(3) South	(4) All	(5) Non-South	(6) South
Dem Control X	14.31**	18.80**	1.56	15.18**	18.72**	2.57*
Dem Vote County	(2.08)	(2.71)	(1.21)	(2.07)	(2.70)	(1.27)
Divide Control X	4.95**	8.23**	0.51	4.11**	6.81**	-0.76
Dem Vote County	(1.25)	(1.72)	(1.68)	(1.27)	(1.84)	(1.67)
Rep Control X	-2.33	-2.07	-1.48	-1.98	-0.90	-1.40
Dem Vote County	(1.31)	(1.58)	(2.10)	(1.36)	(1.69)	(2.14)
Dem Control	-55.92*	-42.14	-34.09	-66.47*	-46.29	-12.82
	(27.76)	(32.09)	(24.17)	(29.37)	(38.52)	(32.61)
Rep Control	-45.42**	-14.39	-30.46	-40.02**	-6.63	24.80
	(14.71)	(15.05)	(29.79)	(15.37)	(16.48)	(41.06)
Per Child Local	-0.22**	-0.22**	-0.22**	-0.21**	-0.22**	-0.22**
	(0.03)	(0.03)	(0.02)	(0.03)	(0.04)	(0.02)
Per Child Fed				0.14**	0.18**	0.04
				(0.02)	(0.03)	(0.02)
Median HH Income				-6.40	-7.89	6.92
				(3.70)	(4.34)	(8.96)
Log Pop				-891.9**	-1086.0**	-1076.3**
				(209.0)	(287.3)	(316.8)
% Bachelor or greater				2.31	9.66	25.26
				(11.85)	(13.43)	(24.14)
% Black				15.31	1.47	17.78
				(10.52)	(13.18)	(14.09)
% Hispanic				17.41*	25.60**	16.22
				(6.79)	(7.49)	(18.76)
% Asian				35.09*	32.93*	65.14
				(13.90)	(14.91)	(39.68)
% Own Home				3.84	-0.05	19.65
				(5.51)	(6.20)	(12.00)
% Free/Reduced Lunch					6.33**	4.52
					(1.78)	(2.51)
% Special Ed					-1.51	56.77**
					(2.75)	(10.16)
Constant	-24.92	-68.24**	64.46**	7794.5**	9474.3**	6270.7*
	(23.12)	(23.39)	(21.16)	(1922.4)	(2610.0)	(3034.0)
District Fixed Effects	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X
School Districts	6,829	5,160	1,669	6,812	5,131	1,669
Observations	33,640	25,833	7,807	32,270	22,824	7,517

Note: This includes the following elections: 2000,2002,2004,2006,2008, and 2010. The results include district and year fixed effects. Robust standard errors that are clustered at the district level are in parentheses. **p<.01, *p<.05

for Republican control, the coefficient is significant for all state transfers but not for state funding formulas. Again, the South does not offer any clear relationship between partisanship at the state and local levels.

The results are consistent in that transfers to like constituents occur when Democrats are in control. While most models indicate a negative relationship when Republicans are in control, it often fails to achieve statistical significance. One possible explanation for the strong Democratic relationship is that Democrats are really just trying to target areas that are their most likely supporters or areas with the most need, not necessarily voters themselves. To test this, I run two additional models: (1) I interact state level control with % Black within a district and (2) I interact state level control with % Free and Reduced Lunch within a district. I also include the interaction with district two party vote. If Democrats are targeting areas that they deem are in the most need or areas that are likely to have high Democratic support and not Democratic voters themselves, then the coefficient for *Dem Vote D X Dem Control* should no longer be statistically significant once these other variables are included in the model. Table 4.6 shows the results. While *% Black X Dem Control* is positive and statistically significant for state funding formula transfers, so is *Dem Vote D X Dem Control*. This is also true for state transfers when *%Free Lunch X Dem Control* is included in the model. While Democrats might be targeting these areas, the results suggest that districts that support Democratic candidates above the state mean receive additional support in the state funding formula.

Table 4.6: State Transfers and Party Control
Precinct Data for School Districts

	(1) All Transfers	(2) Funding Form	(3) All Transfers	(4) Funding Form
Dem Control X	4.35	11.71**	3.29	11.12**
Dem Vote County	(3.14)	(1.90)	(2.60)	(1.84)
Divide Control X	2.42	3.60**	2.70	3.64**
Dem Vote County	(2.04)	(1.34)	(1.94)	(1.25)
Rep Control X	-1.87	0.16	-2.54	-0.46
Dem Vote County	(2.54)	(1.37)	(2.29)	(1.31)
% Black X Dem Con	16.27	21.43*		
	(17.60)	(10.08)		
% Black X Divide Con	14.21	11.00		
	(17.12)	(10.17)		
% Black X Rep Con	4.56	7.88		
	(17.72)	(10.23)		
% Free Lunch X Dem Con			10.07**	10.29**
			(2.44)	(1.60)
% Free Lunch X Divide Con			9.05**	5.41**
			(2.13)	(1.55)
% Free Lunch X Rep Con			1.23	1.94
			(2.19)	(1.40)
Dem Control	-74.98	-122.60**	-39.51	-233.79**
	(71.23)	(37.73)	(96.08)	(69.68)
Rep Control	1.54	-9.12	275.33**	111.59**
	(30.14)	(18.87)	(50.63)	(33.35)
Per Child Local	-0.16**	-0.22**	-0.16**	-0.22**
	(0.03)	(0.03)	(0.03)	(0.03)
Per Child Fed	0.16**	0.14**	0.15**	0.12**
	(0.03)	(0.03)	(0.03)	(0.02)
% Free/Reduced Lunch	6.79**	6.19**		
	(2.10)	(1.47)		
% Black			12.56	8.23
			(17.04)	(9.79)
Constant	13166.12**	9276.09**	13928.37**	9942.73**
	(2687.14)	(1997.52)	(2601.88)	(1920.77)
District/Year Fixed Effects	X	X	X	X
School Districts	6,800	6,800	8,203	8,203
Observations	30,341	30,341	34,039	34,039

Note: The model also includes the following covariates not shown for space reasons: % Hispanic, % Asian, Log Pop, % Speical Ed, Median HH Income, % Bachelor or greater, and % Own Home. This includes the following elections: 2000,2002,2004,2006,2008, and 2010. The results include district and year fixed effects. Robust standard errors that are clustered at the district level are in parentheses. **p<.01, *p<.05

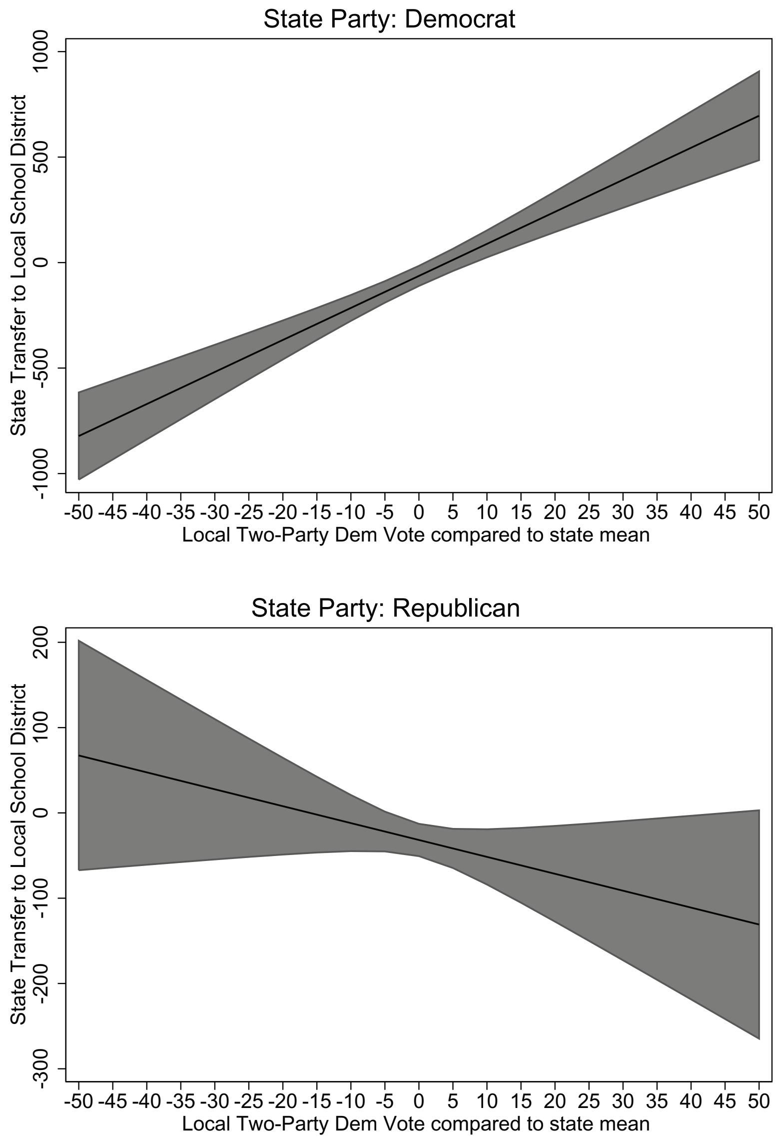


Figure 4.7: Marginal Change in District Two Party Vote on State Transfers

Note: This figure plots the effect of a marginal change in two party Democratic vote within a district on the per child state transfer to the district, relative to the state mean. The top plots the change when Democrats are in control at the state level. The bottom plots when Republicans are in control at the state level.

4.6 Discussion and Conclusion

I have tested whether state party control influences distributions of state transfers to local school districts based on a core voter model. Previous research has found support for the core voter model when looking at total state transfers at the county level, but counties can include a wide variation of voters. I use school districts as a way to define more homogeneous groups of voters. By focusing on education transfers, I create a tough test for the core voter model because a large share of transfers occurs through a formula process. While state funding formulas are often touted as a way to distribute money fairly, they are often not transparent and difficult to understand. This lack of transparency might make it easier for politicians to create formulas that would favor their constituents. The results are consistent, excluding southern states, in that transfers to like constituents occur when Democrats are in control. This is especially true when focusing on the portion of transfers that comes from the funding formula. Even when party control is interacted with likely supports, i.e. percent African American population, or areas with the most need, i.e. percent of students receiving free or reduced lunch, districts who vote at higher rates for Democratic candidates when Democrats are in control at the state level receive more per student in transfers.

While most models indicate a negative relationship when Republicans are in control, it often fails to achieve statistical significance. The explanation for the core voter model is that parties spend the money in areas with the most supporters of that party Cox and McCubbins (1986). But if voters wish that the money was spent in a different way, then the transfers of funds should reflect that. Support for public education has been part of the Democrat platform but not Republicans as of late. This could help explain why I do not find strong evidence of Republicans directing money to their constituents in terms of traditional public education funds. More often, the argument for Republicans is to divert money to charter schools or voucher programs. Therefore, when Republicans are in control at the state level, they are possibly choosing to reward supporting districts with other types of funding for education not captured here. Future research should capture transfers to local districts that include transfers to non-traditional public schools, like charter schools to see if education policy preferences play a role.

These results also suggest that the South is still distinctive. While Ansolabehere and Snyder (2006) did not look at southern and non-southern states separately, of the 13 states that they excluded for not changing party leadership during the time-period they analyzed, 11 were southern states.[14] Therefore, their results are more consistent with non-southern states. In addition to the slow change from Democrat to Republican in the South, southern school districts are different for another reason. Many school districts are county or city based school districts (i.e. Florida, Georgia, Tennessee, Virginia) while non-southern state school districts are typically independent. Independent school districts do not have boundaries based on any other type of local government and there are often multiple independent school districts within a county. County-based school districts, on the other hand, have equivalent boundaries to the county that they are in and include all citizens within that county. Because they often cover a larger more diverse group, perhaps it is harder to target funds based on partisanship.

This research suggests a strong tie between distribution of resources and partisanship of those receiving the resource, at least for the Democrats. However, there are likely other mediating factors. One such area that would be useful to understand

[14] Some would consider all 13 to be southern, depending on whether one counts Maryland and Oklahoma as a southern state.

better in future work would be the role of interest groups in this process. For education, teachers unions have been influential in lobbying for more education funding and are often provide a strong and reliable voting block for Democrats. Future work should address whether state parties are responding to interest groups or average voters or both when following the loyal voter model.

It is also important to remember that there are important implications for the distribution of funds for public education. As Hoxby (2001) notes, because funding formulas are based on local property taxes, the distributive nature is very different than other types of government transfers. The type of funding scheme selected can leave some districts, including poorer districts, worse off. It can also have effects beyond public school finance, including property prices, private school attendance, and student achievement. It is, therefore, important that all factors that influence the distribution of these goods be understood.

Appendix A

Additional Figures and Tables for Chapter Two

A.1 Measures

A.1.1 Theil's H Index

Theil's H Index is a measure that captures the difference between the diversity of a school district and the weighted average of a census tract. It is built from Theil's entropy score:

$$E = \sum_{r=1}^{n} Q_r ln \frac{1}{Q_r}$$

where $Q_r = \frac{1}{r}$ is the proportion of the population of racial group r. Entropy is calculated for each tract and for the district as a whole. The H Index, then measures the degree to which the diversity in each tract differs from the district. It is expressed as a fraction of the district's total diversity and weighted by tract's share of the population. It is calculated as:

$$H = \sum_{n=1}^{k} \frac{\frac{t_i}{T} E - Ei}{E}$$

where T represents the total population of the district and t_i is the population of tract i. E is the entropy of the district and E_i of tract i. The measure varies between 0 and 1, where 0 indicates that all tracts have the same composition as the overall district and 1 indicates that all tracts contain only one group.

Dissimilarity Index

The dissimilarity index is one of the most popular measures of segregation. It represents the proportion of minority members that would have to move to achieve even distribution between tracts to have equal distribution throughout the district (Jakubs, 1977). It is calculated by:

$$D = \frac{1}{2}\sum_{i=1}^{n} \mid \frac{b_i}{B} - \frac{w_i}{W} \mid$$

where b_i is the number of black residents (or other minority group) in a tract and **B** is the total number of black residents in the district. In addition, w_i is the number of white residents in a tract and **W** is the total number of white residents in the district. Massey and Denton (1988) describe these measures in more detail.

A.2 Additional Tables and Graphs

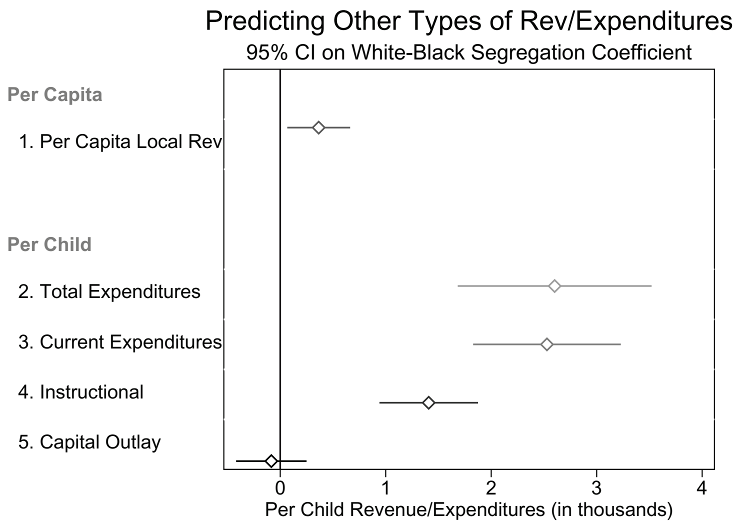


Figure A.1: Robustness Checks Changing the Dependent Variable

Note: Each 95% confidence interval is a new model with a change in dependent variable to reflect different revenue and spending categories, but with the same independent variables and model structure. With the exception of the first measure, which is per capita, these are adjusted to per child measures.

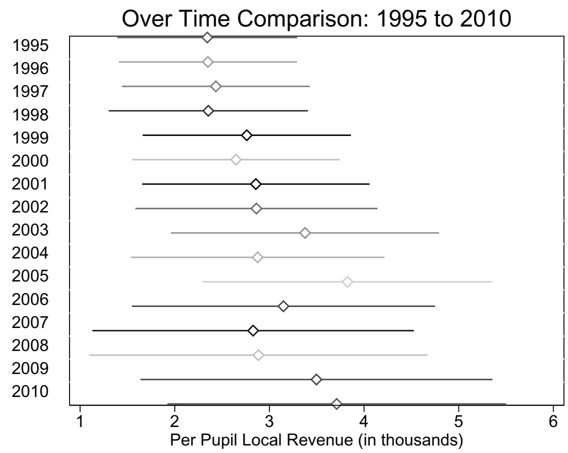


Figure A.2: Robustness Continued

Note: This figure plots the 95% confidence interval for the *White-Black Segregation, Residential* coefficient for each model subset to one year of data. It is equivalent in specification to the model in 2.2 Column 2. The effect is consistent in magnitude and direction across all years.

Table A.1 focuses on the effect of segregation on public school attendance. Census data is used to determine the percentage of children enrolled in public school versus private school. However, the counts are based on the resident of the child, not the school that they attend. Therefore, a child who says he is enrolled in a public school in district A could actually attend a public school in district B. This data is available for the 1990 and 2000 Census and the American Community Survey for the 2007-2011 average. Data is interpolated in between. Total enrollment, however, is available every year from the NCES. While it does not take private school enrollment into account, it does accurately represent the number of students enrolled in a district. Neither residential segregation nor school segregation has a statistically significant effect on the percentage of students attending public school over private school or the number of students enrolled. However, if a school district has or had a court desegregation order, less students attend public school in favor of private school.

Table A.1: The Effect of Segregation on Public School Attendance

	% Public School Residential	% Public School School	Total Enrolled School
White-Black Segregation, Resident	-2.03		
	(0.07)		
White-Hispanic Segregation, Resident	-2.25		
	(0.19)		
White-Black Segregation, School		-0.05	0.04
		(0.86)	(0.03)
White-Hispanic Segregation, School		0.26	0.02
		(0.28)	(0.38)
court_order	-1.77	-1.96	0.04
	(0.04)	(0.03)	(0.57)
% Black	0.04	0.04	0.00
	(0.00)	(0.00)	(0.05)
% Hispanic	0.15	0.15	0.01
	(0.00)	(0.00)	(0.00)
5 yr Δ % Black	0.03	0.03	0.01
	(0.14)	(0.13)	(0.07)
5 yr Δ % Hispanic	0.06	0.05	0.01
	(0.13)	(0.14)	(0.11)
% Free Lunch	-0.02	-0.02	-0.00
	(0.00)	(0.00)	(0.00)
% Own Home	0.05	0.05*	0.01
	(0.01)	(0.01)	(0.00)
Land Area	0.00	0.00	0.00
	(0.00)	(0.00)	(0.59)
Median HH Income	-0.07	-0.07	-0.00
	(0.00)	(0.00)	(0.00)
Log Pop	-2.03	-2.10	0.88
	(0.00)	(0.00)	(0.00)
% Bachelor or Higher	-0.05	-0.05	0.01
	(0.02)	(0.01)	(0.00)
% Dem Pres Vote	0.01	0.01	-0.00
	(0.46)	(0.45)	(0.11)
Per Child Expenditure	-0.03	-0.03	-0.01
	(0.01)	(0.00)	(0.00)
% Catholic	-7.94	-8.04	-0.05
	(0.00)	(0.00)	(0.54)
Constant	112.68	113.14	-0.83
	(0.00)	(0.00)	(0.08)
Number of Districts	6,310	6,319	6,607
Observations	69,737	69,813	76,012

Note: P-values are in parentheses. The dependent variable in Column 1 and Column 2 is the percent of children attending public school that reside in that school district. The dependent variable in Column 3 is the number children enrolled in public school in that district.

Table A.2: Overturned Court Order as Instrument for Segregation

	First Stage	Second Stage	Second Stage
	White-Black Segregation, School	Per Child Local Revenue	Percent Children Public School
Years Overturned	0.005		
	(0.000)		
Time	-0.002		
	(0.000)		
White-Black Segregation, School		6.037	10.032
		(0.000)	(0.000)
% Black	0.000	-0.042	0.11
	(0.869)	(0.000)	(0.000)
% Hispanic	0.001	-0.017	0.164
	(0.018)	(0.074)	(0.000)
5 yr Δ % Black	-0.004	0.019	-0.093
	(0.000)	(0.121)	(0.000)
5 yr Δ % Hispanic	-0.000	0.022	0.008
	(0.849)	(0.248)	(0.829)
Num Elem Schools	0.001	-0.008	0.011
	(0.002)	(0.038)	(0.139)
Students Enrolled	0.000	-0.000	0.000
	(0.252)	(0.012)	(0.000)
Median HH Income	-0.001	0.053	0.010
	(0.000)	(0.000)	(0.433)
Log Pop	0.013	-0.580	-2.960
	(0.180)	(0.001)	(0.000)
% Bachelor or Higher	-0.002	0.156	0.002
	(0.018)	(0.000)	(0.908)
% Dem Pres Vote	0.001	0.014	0.050
	(0.000)	(0.000)	(0.000)
% Own Home	0.001	-0.008	-0.024
	(0.170)	(0.224)	(0.059)
Land Area	-0.000	0.000	-0.000
	(0.072)	(0.000)	(0.000)
Per Child State	-0.001	-0.122	-0.022
	(0.140)	(0.000)	(0.412)
Per Child Federal	-0.005	0.258	-0.343
	(0.030)	(0.000)	(0.000)
Constant	0.335	4.619	152.143
	(0.154)	(0.005)	(0.000)
State-Year & District FE	X	X	X
School Districts; Observations	503; 8,086	503; 8,086	503; 8,103

Note: P-values are in parentheses. Column 1 contains the results from the first-stage of the IV analysis with *White-Black Segregation, School* as the dependent variable. Column 2 is the second stage of the IV analysis, with *Per Child Local Revenue* as the dependent variable. Column 3 is an additional IV analysis with the percent of children attending public school out of children enrolled in a public or private school.

Table A.3: Comparison to Trounstine (2015) City Revenue

	City	City	City	School	School	School	School
Trounstine Seg	-1.01	-3.56					
	(0.000)	(0.040)					
White-Black Segregation, Res			-2.80	4.63	4.14	3.19	3.49
			(0.057)	(0.000)	(0.029)	(0.207)	(0.033)
% Black	0.74	1.83	-0.04	-0.06	-0.03	-0.02	-0.01
	(0.000)	(0.535)	(0.136)	(0.003)	(0.321)	(0.713)	(0.695)
% Asian	-0.85	-4.65					
	(0.015)	(0.347)					
% Hispanic	1.58	5.54	0.02	-0.07	-0.05	-0.02	-0.04
	(0.000)	(0.004)	(0.187)	(0.000)	(0.015)	(0.541)	(0.089)
5 yr Δ % Black	-1.78	2.76	0.07	0.07	0.06	0.06	0.01
	(0.006)	(0.589)	(0.065)	(0.060)	(0.339)	(0.583)	(0.751)
5 yr Δ % Hispanic	-2.05	-6.53	0.02	0.04	0.05	0.05	0.01
	(0.013)	(0.152)	(0.442)	(0.208)	(0.373)	(0.511)	(0.853)
5 yr Δ % Asian	-0.80	-14.78					
	(0.464)	(0.200)					
Median HH Income	0.00	0.00	0.06	0.03	0.02	0.01	0.01
	(0.675)	(0.150)	(0.019)	(0.000)	(0.064)	(0.815)	(0.614)
% Rent (City); % Own (School)	0.55	7.62	0.00	0.08	0.09	0.10	0.09
	(0.155)	(0.008)	(0.887)	(0.000)	(0.000)	(0.001)	(0.000)
% Local Gov Worker	0.01	-0.22					
	(0.763)	(0.157)					
% Over 65	0.49	-0.57					
	(0.280)	(0.899)					
% Bachelor or Higher	6.26	14.01	0.04	0.16	0.14	0.29	0.19
	(0.000)	(0.000)	(0.023)	(0.000)	(0.000)	(0.000)	(0.000)
Log Pop	-0.29	-0.51	-0.43	-2.01	-2.09	-0.60	-2.36
	(0.000)	(0.248)	(0.365)	(0.000)	(0.003)	(0.645)	(0.000)
Students Enrolled			0.00	-0.00	-0.00*	-0.00	-0.00
			(0.811)	(0.007)	(0.035)	(0.091)	(0.409)
% Dem Pres Vote			0.02	0.06	0.05	0.05	0.05
			(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Land Area			0.00	0.00	0.00	0.00	0.00
			(.)	(.)	(.)	(.)	(.)
Per Child State			0.08	-0.07	-0.05	-0.04	-0.06
			(0.000)	(0.000)	(0.007)	(0.039)	(0.001)
Per Child Federal			0.28	-0.04	-0.33	0.20	-0.05
			(0.115)	(0.579)	(0.005)	(0.069)	(0.569)
Constant	2.73	1.30	0.15	12.47	13.57	-5.01	15.93
	(0.000)	(0.798)	(0.976)	(0.007)	(0.057)	(0.696)	(0.019)
Observations	11,194	631	14,15	7,432	2,326	7,432	12,845

Table A.4: Global Report Cards from 2004 to 2009

	Math	Math	Reading	Reading
White-Black Seg., School	-2.86		-2.24	
	(0.001)		(0.016)	
White-Hispanic Seg., School	-0.98		-0.48	
	(0.321)		(0.443)	
White-Black Seg., Residential		-1.54		0.46
		(0.398)		(0.780)
White-Hispanic Seg., Residential		-9.28		-10.52
		(0.001)		(0.000)
Ever Under Court Order	0.32	-0.16	0.15	-0.17
	(0.622)	(0.809)	(0.775)	(0.757)
% Black Students	-0.24	-0.22	-0.23	-0.21
	(0.000)	(0.000)	(0.000)	(0.000)
% Hispanic Students	-0.14	-0.09	-0.16	-0.12
	(0.000)	(0.000)	(0.000)	(0.000)
% Free Lunch	-0.07	-0.09	-0.09	-0.11
	(0.000)	(0.000)	(0.000)	(0.000)
% SPED	-0.02	-0.02	-0.02	-0.02
	(0.464)	(0.479)	(0.412)	(0.549)
% Own Home	0.08	0.06	0.08	0.09
	(0.013)	(0.051)	(0.002)	(0.001)
Land Area	-0.00	-0.00	-0.00	-0.00
	(0.032)	(0.018)	(0.010)	(0.016)
Students Enrolled	-0.00	-0.00	-0.00	-0.00
	(0.594)	(0.385)	(0.270)	(0.103)
Median HH Income	0.11	0.10	0.08	0.07
	(0.000)	(0.000)	(0.000)	(0.001)
Log Pop	-0.16	0.10	-0.40	0.03
	(0.572)	(0.544)	(0.041)	(0.889)
% Bachelor or Higher	0.35	0.37	0.38	0.40
	(0.000)	(0.000)	(0.000)	(0.000)
% Dem Pres Vote	-0.06	-0.08	-0.02	-0.03
	(0.080)	(0.012)	(0.595)	(0.298)
Per Pupil Expenditures	-0.01	-0.01	0.01	0.01
	(0.831)	(0.762)	(0.701)	(0.573)
Constant	44.74	44.99	46.72	43.84
	(0.000)	(0.000)	(0.000)	(0.000)
School Districts	5,997	11,005	5,997	11,005
Observations	29,768	56,312	29,903	56,956

Note: P-values are in parentheses.

Appendix B

Additional Tables and Figures for Chapter Three

This section provides additional tables referenced in the main text. Figure B.1 shows the variation in per child expenditures for each school district in St. Louis county, MO over time. Table B.1 shows results for different dependent variables when trying to understand variation in per child revenue at the county level. Tables B.2 and B.3 return to the school district level and focus on one year at a time. Each column represents a different run from 1995 to 2009. The dependent variable is the difference between what the school district collects in per child revenue and what the county that the district is located in collects on average. Table B.4 stays at the district level but focuses on a different dependent variable. The dependent variable is the percent of median household income that the average household spends on property tax. Again, it adjusted so that it is the difference between the school district and the county average. The four models include additional controls for geographic environment: urban, suburban, and town/rural.

Table B.1: Predicting Variation at the County Level

	(1) Per Child Total Expen.	(2) Per Child Current Expen.	(3) Per Child Instructional	(4) Per Child Capital
White-Black County Segregation	0.17	0.49*	0.33**	-0.42**
	(0.22)	(0.23)	(0.12)	(0.15)
Log No. Districts	0.39**	0.42**	0.19**	0.23**
	(0.07)	(0.07)	(0.03)	(0.06)
% Black	0.01**	0.01*	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
% Hispanic	0.01**	0.01*	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Total No. Students	-0.00**	-0.00	-0.00*	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Std Per Child State	0.00**	0.00**	0.00**	0.00**
	(0.00)	(0.00)	(0.00)	(0.00)
Std Per Child Federal	0.00**	0.00**	0.00**	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Total Log. Population	-0.27**	-0.38**	-0.18**	0.01
	(0.04)	(0.04)	(0.02)	(0.02)
Median Household Income	0.02**	0.01**	0.00	0.02**
	(0.00)	(0.00)	(0.00)	(0.00)
% Bachelor or higher	0.00**	0.00	0.00*	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
% Pres Vote Democrat	-0.01**	0.00*	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Constant	3.65**	5.03**	2.39**	-0.31
	(0.58)	(0.59)	(0.33)	(0.30)
Year and State Fixed Effects	X	X	X	X
County Random Effects	X	X	X	X
Observations	29,636	26,167	29,636	29,636

Note: The dependent variable in all models is the standard deviation in per child expenditures of that category at the county level in thousands of dollars. The results include state and year fixed effects and county random effects. Robust standard errors that are clustered at the county level are in parentheses. **p<.01, *p<.05

Table B.2: Predicting Variation from County Mean by Year

	(1) 1995	(2) 1996	(3) 1997	(4) 1998	(5) 1999	(6) 2000	(7) 2001	(8) 2002
White-Black seg. county	0.250	0.228	0.285	0.251	0.281	0.293	0.611	0.702*
	(0.268)	(0.280)	(0.338)	(0.345)	(0.348)	(0.331)	(0.361)	(0.345)
% Black	0.011	0.009	0.011	0.012	0.011	0.010*	0.014*	0.015*
	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.005)	(0.006)	(0.006)
White-Black seg. county X % Black	-0.063*	-0.061*	-0.064*	-0.067*	-0.068**	-0.071**	-0.076**	-0.078**
	(0.024)	(0.024)	(0.025)	(0.026)	(0.025)	(0.022)	(0.024)	(0.022)
% Hispanic	-0.000	-0.001	-0.002	-0.001	-0.003	-0.004	0.001	0.001
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
5 year Δ % Black	-0.013	-0.013	-0.017	-0.016	-0.015	-0.012	-0.017	-0.019
	(0.012)	(0.009)	(0.012)	(0.012)	(0.012)	(0.010)	(0.013)	(0.023)
5 year Δ % Hispanic	-0.023	-0.032*	-0.029*	-0.040**	-0.034*	-0.024	-0.050*	-0.069*
	(0.014)	(0.013)	(0.013)	(0.012)	(0.014)	(0.015)	(0.022)	(0.027)
Per child state	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000*	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Per child federal	-0.000	-0.000	-0.000*	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
No. of students	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Median household income	-0.016**	-0.016**	-0.019**	-0.019**	-0.017**	-0.015**	-0.016**	-0.016**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Log population	-0.366**	-0.355**	-0.372**	-0.341**	-0.344**	-0.333**	-0.375**	-0.366**
	(0.073)	(0.069)	(0.073)	(0.074)	(0.061)	(0.060)	(0.070)	(0.074)
% Bachelor or greater	0.072**	0.069**	0.072**	0.068**	0.069**	0.074**	0.077**	0.075**
	(0.009)	(0.010)	(0.009)	(0.008)	(0.007)	(0.007)	(0.007)	(0.008)
% Dem. president vote	0.006	0.005	0.004	0.005	0.003	0.003	-0.006	-0.006
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
% Own home	0.006	0.004	0.006	0.006	0.004	0.006	0.005	0.007
	(0.006)	(0.007)	(0.006)	(0.006)	(0.005)	(0.006)	(0.007)	(0.007)
Constant	3.298**	3.627**	3.929**	3.868**	3.697**	2.881**	3.795**	3.570**
	(0.873)	(0.912)	(0.958)	(1.019)	(0.862)	(0.850)	(0.933)	(1.000)
Observations	10,694	10,702	10,711	10,716	10,730	10,720	10,693	10,672

Note: The dependent variable in all models is the *difference between district per child local revenue and the county per child local revenue*. School district is the unit of observation. State fixed effects are included. **p<.01, *p<.05

Table B.3: Predicting Variation from County Mean by Year

	(1) 2003	(2) 2004	(3) 2005	(4) 2006	(5) 2007	(6) 2008	(7) 2009
White-Black seg. county	0.837*	0.905*	0.974*	1.116*	1.047*	1.080*	1.019*
	(0.378)	(0.409)	(0.411)	(0.485)	(0.457)	(0.424)	(0.447)
% Black	0.015**	0.016*	0.023**	0.021*	0.022*	0.020**	0.022**
	(0.005)	(0.006)	(0.008)	(0.009)	(0.009)	(0.006)	(0.007)
White-Black seg. county X % Black	-0.072**	-0.073**	-0.086**	-0.084*	-0.078*	-0.082**	-0.088**
	(0.022)	(0.024)	(0.027)	(0.032)	(0.031)	(0.025)	(0.029)
% Hispanic	0.001	-0.002	-0.001	-0.001	-0.002	-0.003	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
5 year Δ % Black	-0.043*	-0.055*	-0.045	-0.049	-0.073*	-0.080**	-0.061**
	(0.021)	(0.025)	(0.025)	(0.027)	(0.029)	(0.027)	(0.021)
5 year Δ % Hispanic	-0.094**	-0.100**	-0.092**	-0.103**	-0.119**	-0.120**	-0.128**
	(0.025)	(0.027)	(0.030)	(0.029)	(0.024)	(0.026)	(0.030)
Per child state	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Per child federal	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
No. of students	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Median household income	-0.018**	-0.017**	-0.017**	-0.017**	-0.015*	-0.012*	-0.012*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)
Log population	-0.353**	-0.373**	-0.394**	-0.411**	-0.413**	-0.412**	-0.403**
	(0.070)	(0.072)	(0.059)	(0.058)	(0.054)	(0.061)	(0.056)
% Bachelor or greater	0.077**	0.071**	0.068**	0.067**	0.066**	0.070**	0.065**
	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)	(0.006)
% Dem. president vote	-0.007	-0.006	-0.005	-0.006	-0.005	-0.005	-0.003
	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.007)	(0.006)
% Own home	0.011*	0.006	0.007	0.004	0.002	-0.001	0.003
	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.006)	(0.006)
Constant	3.133**	4.083**	4.379**	4.751**	4.623**	4.238**	3.950**
	(0.883)	(1.028)	(0.794)	(0.749)	(0.759)	(0.754)	(0.777)
Observations	10,660	10,551	10,533	10,538	10,546	10,486	10,440

Note: The dependent variable in all models is the *difference between district per child local revene and the county per child local revenue*. School district is the unit of observation. State fixed effects are included. **p<.01, *p<.05

Table B.4: Percent of Median Household Income to Property tax

	(1) All	(2) Urban	(3) Suburban	(4) Town/Rural
White-Black County Segregation	-0.003	-0.020	-0.083	0.132
	(0.083)	(0.461)	(0.276)	(0.066)
% Black	0.004*	0.006*	0.008**	0.003
	(0.002)	(0.003)	(0.002)	(0.002)
Per child state	-0.000**	-0.000**	-0.000**	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
per child federal	-0.000**	-0.000	-0.000	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
% Hispanic	-0.003	0.004	0.005	-0.005
	(0.004)	(0.006)	(0.003)	(0.005)
5 year Δ % Black	-0.007	0.002	-0.021	0.004
	(0.007)	(0.010)	(0.015)	(0.007)
5 year Δ % Hispanic	0.006	-0.043	0.007	0.006
	(0.011)	(0.025)	(0.012)	(0.012)
Urban district	0.301**			
	(0.062)			
Suburban district	0.066			
	(0.047)			
No.of students	0.000**	0.000**	0.000*	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Median household income	-0.005*	-0.000	-0.004	-0.006**
	(0.002)	(0.006)	(0.003)	(0.002)
Log population	-0.243**	-0.074	-0.252**	-0.391**
	(0.035)	(0.061)	(0.047)	(0.053)
% Bachelor or greater	0.007	-0.000	0.008*	0.007
	(0.004)	(0.005)	(0.004)	(0.004)
%Dem. president vote	0.004*	-0.002	0.002	0.006*
	(0.002)	(0.005)	(0.003)	(0.002)
% Own home	-0.009**	-0.016**	-0.007	-0.008*
	(0.003)	(0.005)	(0.004)	(0.004)
Size of district	0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Log No. Districts	0.043	0.114	-0.039	0.085
	(0.044)	(0.183)	(0.057)	(0.046)
Constant	2.872**	2.177*	3.255**	3.838**
	(0.432)	(1.004)	(0.725)	(0.605)
Year and State Fixed Effects	X	X	X	X
Observations	160,348	8,247	35,543	116,558

Note: The dependent variable in all models is the difference between the district and county in the percent of the median household income that is paid on average to property tax. Robust standard errors are in parentheses. **p<.01, *p<.05

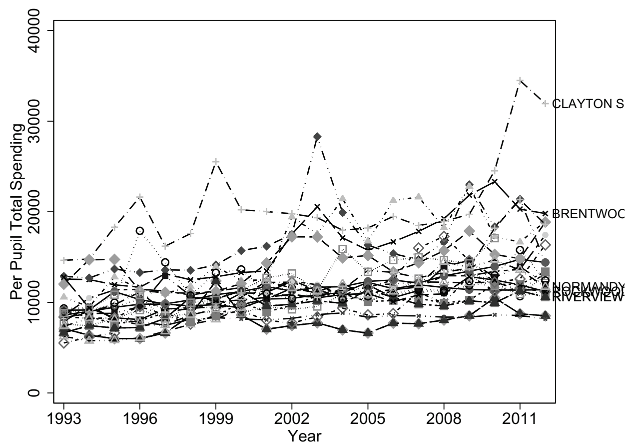


Figure B.1: Per Child Expenditures St. Louis County, MO

Note: Per Child Expenditures for each district within St. Lois County

Appendix C

Additional Tables and Figures for Chapter Four

Table C.1 contains information about the number of years within each state that a party maintained control of state government. It also indicates whether or not the state is included in the precinct data and the source of precinct boundary files.

Table C.1: Years of State Party Control from 1994 to 2011

State	**Dem Rep Divide**	**Include**	**Boundary Source/Exclude**
Alabama	17 - 1 - 0	No	Lack of variation in party control
Alaska	0 - 8 - 10	No	Excluded
Arizona	0 - 10 - 8	**Yes**	Ansolabehere and Rodden (2011*a*)
Arkansas	18 - 0 - 0	No	Lack of variation in party control
California	6 - 0 - 12	**Yes**	Ansolabehere and Rodden (2011*b*)
Colorado[1]	4 - 4 - 10	**Yes**	Ansolabehere and Rodden (2011*c*)
Connecticut	1 - 0 - 17	**Yes**	Ansolabehere and Rodden (2011*d*)
Delaware	3 - 0 - 15	**Yes**	Ansolabehere and Rodden (2011*e*)
Florida	0 - 13 - 5	**Yes**	County=School District[2]
Georgia	9 - 7 - 2	**Yes**	Ansolabehere and Rodden (2011*f*)
Hawaii	18 - 0 - 0	No	Lack of variation in party control
Idaho	0 - 17- 1	No	Lack of variation in party control

Continued on next page

[1]Issues matching precincts in Denver County from 2004 to 2006 and Larimer and Jefferson from 2006 to 2008 due to precinct consolidation

[2]Because counties define school districts, precinct data is not needed

Table C.1 – *Continued from previous page*

State	Dem Rep Divide	Include	Boundary Source/Exclude
Illinois	9 - 2 - 7	No	Precinct data unavailable
Indiana	0 - 5 - 13	No	Precinct data unavailable
Iowa[3]	4 - 2 - 12	**Yes**	Ansolabehere and Rodden (2011*g*)
Kansas	0 - 9 - 9	**Yes**	Ansolabehere and Rodden (2011*h*)
Kentucky	6 - 0 - 12	No	Precinct boundary info unavailable
Louisiana	6 - 0 - 12	**Yes**	Ansolabehere and Rodden (2011*i*)
Maine	8 - 1 - 9	No	Precinct boundary info unavailable
Maryland	18 - 0 - 0	No	Lack of variation in party control
Massachusetts	18 - 0 - 0	No	Lack of variation in party control
Michigan	0 - 7 - 11	No	Precinct boundary/vote match issue
Minnesota	0 - 0 - 18	No	Lack of variation in party control
Mississippi	5 - 0 - 13	Yes	Ansolabehere and Rodden (2011*j*)
Missouri	7 - 4 - 7	**Yes**	Ansolabehere and Rodden (2011*k*)
Montana	0 - 10 - 8	No	Precinct boundary info unavailable
Nebraska	0 - 0 - 18	No	Lack of variation in party control
Nevada	0 - 0 - 18	No	Lack of variation in party control
New Hampshire	4 - 6 - 8	**Yes**	Ansolabehere and Rodden (2011*l*)
New Jersey	6 - 8 - 4	**Yes**	Ansolabehere and Rodden (2011*m*)
New Mexico	9 - 0 - 9	**Yes**	Ansolabehere and Rodden (2011*n*)
New York[4]	2 - 0 - 16	**Yes**	Ansolabehere and Rodden (2011*o*)

Continued on next page

[3]Issues matching precincts in Calhoun, Emmet, Greene, Guthrie, Marion, Pottowattamie, and Wayne Counties from 2004 to 2006. This involves approximately 10 percent of the precincts.

[4]Only has the years 2006, 2008, and 2010

Table C.1 – *Continued from previous page*

State	Dem Rep Divide	Include	Boundary Source/Exclude
North Carolina[5]	11 - 0 - 7	**Yes**	Ansolabehere and Rodden (2011*p*)
North Dakota	0 - 17 - 1	No	Lack of variation in party control
Ohio[6]	0 - 13 - 5	**Yes**	Ansolabehere and Rodden (2011*q*)
Oklahoma	3 - 1 - 14	**Yes**	Ansolabehere and Rodden (2011*r*)
Oregon	4 - 0 - 14	No	Lack of precinct level data
Pennsylvania	0 - 9 - 9	**Yes**	Ansolabehere and Rodden (2011*s*)
Rhode Island	18 - 0 - 0	No	Lack of variation in party control
South Carolina	0 - 9 - 9	**Yes**	Ansolabehere and Rodden (2011*t*)
South Dakota	0 - 17 - 1	No	Lack of variation in party control
Tennessee	10 - 3 - 5	**Yes**	Ansolabehere and Rodden (2011*u*)
Texas	1 - 9 - 8	**Yes**	Ansoloabehere and Palmer (2011)
Utah	0 - 18 - 0	No	Lack of variation in party control
Vermont	5 - 0 - 13	**Yes**	Ansolabehere and Rodden (2011*v*)
Virginia[7]	0 - 2 - 16	**Yes**	County/City boundaries used
Washington	9 - 0 - 9	No	Lack of precinct level voting data
West Virginia	18 - 0 - 0	No	Lack of variation in party control
Wisconsin	2 - 3 - 13	**Yes**	Ansolabehere and Rodden (2011a1)
Wyoming	0 - 15 - 3	**Yes**	Ansolabehere and Rodden (2011*w*)

[5] Issues matching 2006 to 2008 precinct data occurred for precincts in the following counties: Buncombe, Cumberland, Harnett, Lee, and Rockingham. This affects approximately 7 percent of the data in NC.

[6] It appears that there was precinct consolidation between 2008 to 2010 that is hard to trace. While all 2010 precincts have matches to prior years, there are many 2008 precincts that disappear by 2010. This primarily affects precincts withing Cuyahoga, Franklin, Hamilton, Lucas, and Montgomery counties and about 15 percent of the data in OH.

[7] School districts are county or city based so those boundaries are used to aggregate vote counts

Table C.2: Summary Statistics when County Presidential Vote is Used

	2008			2008		
	Mean	Std Dev	N	Mean	Std Dev	N
State Dem Control	0.10	0.31	9,269	0.18	0.38	9,269
State Rep Control	0.28	0.45	9,269	0.27	0.45	9,269
Dem Control X Dem Vote	-0.02	2.51	9,269	0.05	4.51	9,269
Divide Control X Dem Vote	0.02	6.83	9,269	0.07	6.89	9,269
Rep Control X Dem Vote	0.05	4.43	9,269	0.05	5.67	9,269
Median HH Income	57.54	19.91	9,266	53.96	18.70	9,265
Log Pop	9.15	1.34	9,265	9.22	1.37	9265
% Bachelor or Higher	18.24	10.89	8885	21.22	12.40	8,885
% Black	4.72	10.58	9,266	5.40	10.88	9265
% Hispanic	7.78	15.14	9,266	9.89	16.32	9,265
% Asian	1.34	3.46	9,266	1.98	4.28	9265
% Own Home	75.40	10.77	9,266	76.17	11.15	9,265

Note: This table presents district level data for select years of the data set. The two-party Presidential Democrat vote is relative to the state mean and is at the county level.

Table C.3: Funding Formula and Party Control
County-Level Transfers and Vote

	(1) All	(2) Non-South	(3) South	(4) All	(5) Non-South	(6) South
Dem Control X Dem Vote County	-0.78	8.81**	-7.43*	-9.04**	3.89	-9.62*
	(2.57)	(3.26)	(3.43)	(3.30)	(4.23)	(4.15)
Divide Control X Dem Vote County	-1.41	2.89	-4.00	-9.37**	-2.63	-7.85*
	(2.33)	(3.48)	(2.99)	(3.19)	(4.32)	(3.84)
Rep Control X Dem Vote County	-7.93*	-6.43	-5.25	-17.10**	-7.63	-15.39**
	(3.37)	(4.92)	(3.93)	(4.39)	(5.45)	(5.73)
Dem Control	-7.83	-4.62	-17.01	-15.10	-21.35	13.96
	(14.71)	(20.22)	(23.52)	(16.54)	(23.78)	(23.24)
Rep Control	-6.27	-10.46	7.34	-3.59	-4.63	53.38
	(22.41)	(22.45)	(45.08)	(21.89)	(22.74)	(47.83)
Per Child Local	-0.04*	-0.28**	-0.00	-0.02	-0.25**	0.01
	(0.01)	(0.03)	(0.01)	(0.02)	(0.03)	(0.01)
Per Child Fed				-0.03	-0.05	-0.04
				(0.04)	(0.06)	(0.03)
Median HH Income				-9.59	-11.80*	-2.24
				(5.17)	(5.34)	(8.00)
Log Pol				-274.44**	-117.25*	-1292.22**
				(80.21)	(48.83)	(176.39)
% Bachelor or greater				-0.01**	-0.01**	-0.01**
				(0.00)	(0.00)	(0.00)
% Black				0.00*	0.00	0.01**
				(0.00)	(0.00)	(0.00)
% Hispanic				0.00**	0.00**	-0.00
				(0.00)	(0.00)	(0.00)
% Asian				0.01**	0.01**	0.01*
				(0.00)	(0.00)	(0.01)
% Own Home				-6.36	-5.36	-5.92
				(6.87)	(7.19)	(12.02)
Constant	3.81	0.49	21.45	3827.23**	2256.52**	13794.20**
	(14.14)	(15.29)	(29.36)	(995.57)	(750.76)	(1895.45)
District Fixed Effects	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X
Counties	2,274	1,350	924	2,274	1,350	924
Observations	13,644	8,100	5,544	11,344	6,724	4,620

Note: This includes the following elections: 1992, 1996,2000, 2004,2008, 2012. The results include district and year fixed effects. Robust standard errors that are clustered at the district level are in parentheses. **p<.01, *p<.05

Table C.4: All State Transfers and Party Control
County Vote Proxy for District

	(1) All	(2) Non-South	(3) South	(4) All	(5) Non-South	(6) South
Dem Control X	3.98	3.70	1.99	12.47**	13.76**	0.97
Dem Vote County	(2.66)	(3.46)	(3.60)	(2.94)	(3.70)	(4.15)
Divide Control X	-2.03	-8.45**	5.15	5.53*	1.80	3.03
Dem Vote County	(2.33)	(3.11)	(3.02)	(2.56)	(3.33)	(3.62)
Rep Control X	0.05	-12.80**	9.93**	5.87*	-3.52	8.68*
Dem Vote County	(2.64)	(3.98)	(3.14)	(2.80)	(4.13)	(3.53)
Dem Control	-32.31	-78.59**	-13.68	-31.81	-78.11**	14.62
	(21.68)	(28.96)	(24.42)	(22.49)	(29.30)	(25.32)
Rep Control	-15.94	27.88	-18.83	-26.71	12.54	-46.89
	(17.18)	(20.70)	(34.46)	(17.50)	(20.66)	(39.52)
Per Child Local	-0.19**	-0.16**	-0.30**	-0.18**	-0.15**	-0.29**
	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)
Per Child Fed				0.24**	0.25**	0.16**
				(0.04)	(0.05)	(0.04)
Median HH Income				-4.30	-3.88	-0.32
				(2.49)	(2.74)	(5.73)
Log Pop				-709.75**	-685.32**	-820.55**
				(129.11)	(159.80)	(136.53)
% Bachelor or greater				-43.79**	-50.92**	-2.22
				(6.92)	(7.99)	(11.18)
% Black				10.90*	7.90	13.42
				(4.89)	(5.77)	(6.92)
% Hispanic				14.05**	15.41**	24.75**
				(4.06)	(4.89)	(6.58)
% Asian				0.97	-5.32	77.49**
				(8.40)	(8.83)	(20.74)
% Own Home				-0.20	-6.69	13.37*
				(3.97)	(4.75)	(6.10)
Constant	-73.1**	-96.8**	12.2	7148.1**	7515.5**	6214.9**
	(14.2)	(14.7)	(27.2)	(1147.8)	(1417.2)	(1275.8)
District Fixed Effects	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X
School Districts	9,269	7,431	1,838	9,266	7,428	1,838
Observations	55,614	45,072	10,542	53,679	43,287	10,392

Note: This includes the following elections: 1992, 1996,2000, 2004,2008, 2012. The results include district and year fixed effects. Robust standard errors that are clustered at the county level are in parentheses. **p<.01, *p<.05

Table C.5: Funding Formula and Party Control
County Vote Proxy for District

	(1)	(2)	(3)	(4)	(5)	(6)
Dem Control X	3.99*	8.47**	-7.46**	8.20**	12.75**	-6.08
Dem Vote County	(1.81)	(2.26)	(2.89)	(2.04)	(2.45)	(3.44)
Divide Control X	-1.06	-2.28	-3.92	2.66	2.47	-4.29
Dem Vote County	(1.58)	(2.04)	(2.45)	(1.79)	(2.21)	(3.02)
Rep Control	-0.67	-6.74**	1.38	2.13	-2.71	2.06
Dem Vote County	(1.77)	(2.31)	(2.62)	(1.89)	(2.33)	(2.92)
Dem Control	-17.84	-63.01**	-4.24	-24.77	-62.70**	11.55
	(16.16)	(22.12)	(21.35)	(16.98)	(22.33)	(21.90)
Rep Control	-7.91	32.63*	-22.27	-16.13	22.37	-10.25
	(11.63)	(13.07)	(28.78)	(11.54)	(12.43)	(32.19)
Per Child Local	-0.23**	-0.21**	-0.29**	-0.22**	-0.20**	-0.29**
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
Per Child Fed				0.15**	0.16**	0.09*
				(0.03)	(0.03)	(0.04)
Median HH Income				-2.88	-2.11	-1.66
				(1.77)	(1.89)	(4.26)
Log Pop				-545.48**	-421.51**	-943.96**
				(78.26)	(89.24)	(118.88)
% Bachelor or greater				-22.53**	-27.15**	3.61
				(3.97)	(4.36)	(9.39)
% Black				7.68*	5.50	10.86*
				(3.61)	(4.21)	(5.45)
% Hispanic				9.40**	11.20**	14.42**
				(2.57)	(2.93)	(5.47)
% Asian				6.50	-0.60	70.97**
				(5.59)	(5.80)	(18.69)
% Own Home				0.34	-3.68	8.50
				(2.67)	(3.03)	(5.06)
Constant	-64.94**	-89.20**	20.08	5260.27**	4464.97**	7887.31**
	(9.78)	(10.02)	(24.28)	(670.69)	(765.64)	(1092.61)
District Fixed Effects	X	X	X	X	X	X
Year Fixed Effects	X	X	X	X	X	X
School Districts	9,269	7,431	1,838	9,266	7,428	1,838
Observations	55,614	45,072	10,542	53,679	43,287	10,392

Note: This includes the following elections: 1992, 1996,2000, 2004,2008, 2012. The results include district and year fixed effects. Robust standard errors that are clustered at the district level are in parentheses. **p<.01, *p<.05

Appendix D

Details of the Data

Main Data Sources

Below, I describe the main data sets for this dissertation and identify the code that was used to create the data set. Data sets that were not part of a main analysis are not included below.

Public Elementary - Secondary Education Finance Data (1992-2013)

Source: http://www.census.gov/govs/school/

Code: "create_budget_file_013015.do"

Summary: This data contains budget information for public school districts in the United States from 1992-1993 school year to 2012-2013 school year.

NCES Demographic Information

Source: http://nces.ed.gov/ccd/elsi/tableGenerator.aspx

Code: "create_school_demographic_file_020415.do"

Summary: This file collects specific information about students in the school system. I have collected race/ethnicity information, information on lunch status, information about English language learners, and whether or not the school district has charter schools. Race/ethnicity information is not available until 1998.

1990, 2000, and 2010 Census

Source: http://www.icpsr.umich.edu/icpsrweb/DSDR/studies/2953

Code: "1990_census.do"'; "2000_census.do"; "2010_census.do"

Summary: Each of these three files combines tables from the census of interest and creates new variables for characteristics of citizens within each school district.

Court Desegregation Orders

Source: http://cepa.stanford.edu/content/brown-fades-end-court-ordered-school-desegregation-and-resegregation-american-public-schools

Code: "combine_data_full_update.do"

Summary: This file merges data about which schools are under a desegregation order to the full data set and creates new variables regarding timing of order.

Measures of Segregation

Source: Tract census data

Code: " seg_measures_050816.R"

Summary: This code calculates many different measures for segregation at different levels (district, county,CBSA) and for different groups (all, white-black, etc.)

County Presidential Vote

Source: CQ Press

Code: "combine_states.do"

Summary: County data was available by year and state. This code combines each election year and state into one data set.

Precinct Voting Data

Source: Harvard Dataverse

Code: "precinct_to_district.do"

Summary: There are several files that take precinct level data to school district boundaries. More details below.

Private School Data

Source: https://nces.ed.gov/surveys/pss/privateschoolsearch/

Code: Geocoding done in ArcGIS; Webscrapping done in R

I used the National Center for Education Statistics to get a list of private schools from 1998 to 2012 (every two years). If the school exited in 2012, then there was an associated address. If it did not, then I had to use web-scrapping to find an address. Details below on geocoding the data.

Combining Data

I am using the NCESID, which is the National Center for Education statistics District Id, to combine much of the data. NCESID does change within a school for a handful of school districts. I keep the NCESID that is most recent. In addition, I change all dollar figures to be in 2013 constant dollars. The file "combine_data_full_update.do" merges all the data into one data set. Each unit of observation is a school district, year.

Precinct Data to School Districts

In order to obtain district level two-party vote, I start with precinct level data. Precinct level data is obtained from Harvard Dataverse. First, I matched 2010 precinct boundaries to 2010 school district boundaries using ArcGIS. In many cases, precinct boundaries are mapped one to one to school districts. That is, the boundary of the precinct fits entirely into one school district. However, there are cases in which a precinct could cross two (or possibly more) districts. This is shown in Figure D.1. Because it is impossible to know which set of voters belongs to each school district, the precinct will be associated with both school districts. This is done in ArcGIS using the "union" tool. This tool joins to input feature classes (precinct and school district boundaries) and creates a new output feature class that maintains and joins the fields within the original two input features. This is done for each state. Once the output feature class is obtained, the information from ArcGIS is moved into R so that it can be joined with other data.

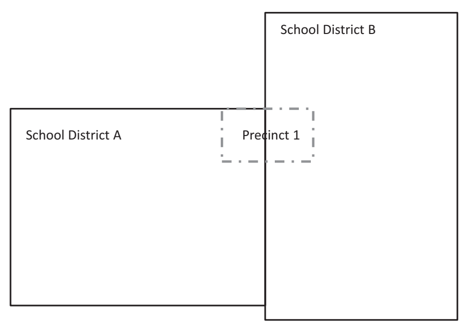


Figure D.1: Joining Precinct Boundaries with District Boundaries

An example of how precinct boundaries might overlap two school districts.

Once the crosswalk between precinct and school district boundaries was created, then precincts needed to be matched over time. While some states, such as Texas, used the exact same precinct code from one election to the next, many states were less consistent in naming conventions across time. Extensive cleaning of precinct

Table D.1: Examples of Matching Precincts Over Time

County	Old Precinct Name	New Precinct Name
halifax	ENF 1	ENF-1
halifax	ENF 2	ENF-2
halifax	ENF 3	ENF-3
davidson	abbotts cr #02	abbotts creek #02
davidson	cotton gr #10	cotton grove #10
davidson	tville 1 #60	thomasville 1 #60
davidson	tville 10 #76	thomasville 10 #76

data was required in order to match precincts across time. This was done through editing code to clean data and hand matching precincts. Precincts were always matched within state and county. The code that contains all the decisions made is "precinct_to_districts.do". There is an accompanying excel file that has all decisions that were made by myself. Below is an example from North Carolina on how precincts were represented in two different years and how they were matched.

Once precincts were established across time, vote counts were aggregated to school district level based on the crosswalk established. For each election type (president, governor, sentate, or house), the two-party vote for the Democratic candidate was calculated as well as an average across all elections within that district/year. This data was then merged on to the full data set.

Method for Geocoding Private Schools

The National Center for Education Statistics collects information on private schools. The survey is given every two years. Using these surveys from 2000 to 2012, I compiled a list of private schools that existed at least once during this time frame. The surveys also provide information about the location of the school. In 2010 and 2012, the longitude and latitude of most schools is provided (27,919 schools). From 2008 forward, the survey asks for the mailing address of the school (although some schools do give PO Boxes). Between 2000 and 2006, the survey asks for the mailing city, state, and zip code, but does not ask for actual addresses. Of the 34,831 schools, this leaves 6,912 schools that I do not have any additional location information beyond city. I wrote a program in R to scrape addresses from BING in hopes of finding more specific information about these schools. I was able to find addresses for an additional 1,480 schools. Unfortunately, many of these schools that do not have addresses ceased to exist in the early 2000s. Because of this, they are less likely to have a web presence so finding the address is unlikely. Of the schools that have addresses but did not have latitude/longitude, I geocoded the addresses using the Census Bureau geocoding service through a program I wrote in R.

This leaves 5,432 schools that either had no address or the address provided could not be geocoding (the most common reason was that a PO Box was given instead of an actual address). I then turned to the city information as a next step to provide location information. Since my goal is to place the private school within a public school district, I decided to use the city center geocode location for the remainder of the schools. I used the geocode function in R to geocode the cities listed for each of the schools. In the end, all 34,831 schools were either geocoded by either their address or city.

I then use the 2010 school district boundary shape files compiled by the United States Census Bureau to match private schools to public school districts. By doing this, I will be able to show what areas have a choice between public and private schools. This is an important, and currently missing link, in this area. If given the choice between investing in a diversifying public school or a private school, parents might select the private school for their children. This is much easier than moving to

Figure D.2: Public School Boundaries and Private Schools

Note: This is an example of two private schools that are in two school school districts. The figure on the right creates a ten mile radius around the school to show areas of possible access.

a new school district (but not without cost). In addition, not all areas have private schools, so people might be more likely to continue to invest in public schools because there is no alternative. While this method does allow me to place private schools within public school districts, it is not perfect. Unlike public schools, there are rarely residential restrictions on private schools. Students who live outside the school district are still eligible to attend the school as long as they meet whatever requirement the school has.

As a solution to this, I have created a boundary around the private schools to represent the likely area that the private school services. I have thus chosen a radius of 10 miles around the private school to serve as the boundary. I then used ArcGIS to spatial join private school areas to public school districts (based on the 2010 school district boundary file created by the US Census). Because I know longer have points, private school boundaries can overlap with more than one school district. The count of private schools within a district will be based on access to private schools. Therefore, this number can actually be larger than the total number of private schools within the United States. Figure D.2 illustrates this. The image on the left shows the location of two private schools within school districts. Each private school is close to the boarder of other school districts, but using its exact location would imply that only kids within the school district that it is located would have access.

D.1 Codebook

The table below gives the main variables of the data set. The table gives the variable name; number of observations; percent of data that is missing; mean, min and max of variable; variable description; and source of data. If the source says "derived", then the variable was changed in some way from its original source.

Table D.2: Codebook

Variable	Obs (&Missing)	Mean	Min	Max	Label	Source
year	273835 (0 %)	2003	1993	2013	Year	NCES
STATE	273835 (0 %)				State Identification Number	NCES
state_num	273835 (0 %)	26.9	1.0	51.0	State Identification Number	NCES
ncesid	273835 (0 %)				Unique District Code	NCES
NAME	273835 (0 %)				School System Name	NCES
V33	273835 (0 %)	3,507.2	0.0	1,077,381.0	Students Enrolled	NCES
gov_type	273835 (0 %)				District Type (Indep, Depend)	NCES
SCHLEV	273835 (0 %)				School Level Code	NCES
TOTALREV	273835 (0 %)	39484.3	0.0	1.9e+07	TOTAL REVENUE	NCES
TFEDREV	273835 (0 %)	3135.1	0.0	2110674.4	Total Rev Federal Sources	NCES
TSTREV	273835 (0 %)	18631.1	0.0	8351737.2	Total Rev State Sources	NCES
C01	273835 (0 %)	12882.2	0.0	5189990.7	General formula assistance	NCES
C05	273835 (0 %)	1033.1	0.0	1250569.9	Special education programs	NCES
C12	273835 (0 %)	327.9	0.0	109365.5	Transportation programs	NCES
C04	273835 (0 %)	275.8	0.0	728096.9	Staff improvement programs	NCES
C06	273835 (0 %)	379.5	0.0	481541.5	Basic skills attainment programs	NCES
C09	273835 (0 %)	90.2	0.0	83703.3	Vocational education programs	NCES
C11	273835 (0 %)	572.5	0.0	992768.6	Capital outlay and debt service	NCES
C07	273835 (0 %)	53.1	0.0	155444.5	Bilingual education programs	NCES
C08	273835 (0 %)	43.6	0.0	131386.7	Gifted and talented programs	NCES
C10	273835 (0 %)	40.1	0.0	50114.6	School lunch programs	NCES
C13	273835 (0 %)	1735.3	0.0	1963681.1	All other revenues from state sources	NCES
C38	273835 (0 %)	720.8	0.0	224133.3	State payments on behalf - Benefits	NCES
C39	273835 (0 %)	51.5	0.0	41737.5	State payments on behalf - Nonbenefits	NCES
C35	273835 (0 %)	154.5	0.0	718635.9	State revenue - Nonspecified	NCES
C24	273835 (0 %)	270.9	0.0	1012121.9	Census state, NCES local revenue	NCES
TLOCREV	273835 (0 %)	17718.1	0.0	8635675.1	Total Revenue from Local Sources	NCES
T06	273835 (0 %)	11561.1	0.0	2386590.2	Property taxes	NCES
T09	273835 (0 %)	228.2	0.0	219941.9	General sales or gross receipts taxes	NCES
T15	273835 (0 %)	25.6	0.0	23679.3	Public utility taxes	NCES
T40	273835 (0 %)	121.8	0.0	128993.6	Individual and corporate income taxes	NCES

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Table D.2: – continued from previous page

Variable	Obs (&Missing)	mean	Min	Max	Label	Source
T99	273835 (0 %)	112.7	0.0	752425.9	All other taxes	NCES
T02	273835 (0 %)	2789.3	0.0	8127264.7	Parent government contributions	NCES
D23	273835 (0 %)	370.4	0.0	587883.2	Revenue from cities and counties	NCES
D11	273835 (0 %)	346.8	0.0	141851.4	Revenue from other school systems	NCES
A07	273835 (0 %)	68.2	0.0	22261.2	Tuition fees	NCES
A08	273835 (0 %)	6.9	0.0	16108.7	Transportation fees	NCES
A09	273835 (0 %)	533.2	0.0	52379.7	School lunch revenues	NCES
A11	273835 (0 %)	16.4	0.0	10573.1	Textbook sales and rentals	NCES
A13	273835 (0 %)	261.0	0.0	243378.8	District activity receipts	NCES
A20	273835 (0 %)	73.4	0.0	66533.5	Other sales and service revenues	NCES
A15	273835 (0 %)	10.3	0.0	23156.4	Student fees, nonspecified	NCES
U22	273835 (0 %)	385.4	0.0	228389.8	Interest earnings	NCES
U97	273835 (0 %)	738.2	-1223.0	712876.8	Miscellaneous other local revenues	NCES
TOTALEXP	273835 (0 %)	40130.4	1.6	2.0e+07	Total Expenditure	NCES
TCURINST	273835 (0 %)	20794.1	0.0	1.3e+07	Total current spending instruction	NCES
E13	273835 (0 %)	20244.0	0.0	1.3e+07	Current op. expenditure Instruction	NCES
J13	273835 (0 %)	529.7	0.0	145517.7	State payments behalf Instr. benefits	NCES
J12	273835 (0 %)	3.6	0.0	183797.6	Retirement system transfer Instr.	NCES
TCURSSVC	273835 (0 %)	11563.3	0.0	3804701.0	Total current spend support serivce	NCES
E17	273835 (0 %)	1640.5	0.0	398729.4	Current op. exp - Pupil support	NCES
E07	273835 (0 %)	1449.1	0.0	888072.6	Current op. exp - staff support	NCES
E08	273835 (0 %)	643.6	0.0	252007.9	Current op. exp - General admin	NCES
E09	273835 (0 %)	1863.2	0.0	691919.3	Current op. exp - School administration	NCES
V40	273835 (0 %)	3263.3	0.0	1448674.0	Current op. exp - O&M of plant	NCES
V45	273835 (0 %)	1408.0	0.0	847046.0	Current op. exp - transportation	NCES
V85	273835 (0 %)	83.7	0.0	149082.7	Current op. exp- Nonspecified support	NCES
J11	233639 (15 %)	1.6	0.0	99818.4	retirement system transfer - Support	NCES
TCUROTH	273835 (0 %)	1443.2	0.0	521952.6	Total Current spending for other prog.	NCES
E11	273835 (0 %)	1357.4	0.0	521952.6	Current op. exp - Food services	NCES
V60	273835 (0 %)	58.7	0.0	46324.2	Current op. exp - Enterprise operations	NCES
V65	273835 (0 %)	21.8	0.0	117945.3	Current op. expend- Other programs	NCES
V70	273835 (0 %)	206.2	0.0	126424.7	Current op. exp - Community services	NCES

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Table D.2: – continued from previous page

Variable	Obs (&Missing)	mean	Min	Max	Label	Source
V75	273835 (0 %)	148.6	0.0	209296.9	Current op. exp - Adult education	NCES
V80	273835 (0 %)	56.9	0.0	253091.7	Current op. exp - Other nonelem-second prog.	NCES
J10	273835 (0 %)	5.7	0.0	5379.7	State payments on behalf Other	NCES
TCAPOUT	273835 (0 %)	4183.2	0.0	2634509.6	Total Capital outlay expend.	NCES
F12	273835 (0 %)	3121.3	0.0	2491598.1	Construction	NCES
K09	273835 (0 %)	229.3	-1.0	221075.6	Instructional equipment	NCES
K10	273835 (0 %)	488.8	0.0	166763.0	Other equipment	NCES
K11	273835 (0 %)	59.3	0.0	139327.0	Nonspecified equipment	NCES
G15	273835 (0 %)	282.9	0.0	583227.7	Purchase of land and existing structures	NCES
TCURELSC	273835 (0 %)	33800.6	0.0	1.8e+07	TOTAL CURRENT SPENDING	NCES
L12	273835 (0 %)	95.5	0.0	227378.2	Payments to state governments	NCES
M12	273835 (0 %)	57.2	0.0	93594.1	Payments to local governments	NCES
Q11	273835 (0 %)	562.7	0.0	913487.0	Payments to other school systems	NCES
I86	273835 (0 %)	1018.7	0.0	627816.1	Interest on school system debt	NCES
Z32	273835 (0 %)	21403.1	0.0	9855929.2	Total salaries and wages	NCES
Z33	273835 (0 %)	14564.4	0.0	8242056.3	Total salaries and wages Instruction	NCES
V11	273835 (0 %)	1174.4	0.0	301076.2	Total salaries and wages Pupil support	NCES
V13	273835 (0 %)	913.9	0.0	502266.7	Total salaries and wages Instr. staff	NCES
V15	273835 (0 %)	300.1	0.0	163568.1	Total salaries and wages General admin.	NCES
V17	273835 (0 %)	1402.9	0.0	516843.9	Total salaries and wages School admin.	NCES
V21	273835 (0 %)	1272.2	0.0	634308.7	Total salaries and wages O&M	NCES
V23	273835 (0 %)	534.5	0.0	98960.0	Total salaries and wages transportation	NCES
V29	273835 (0 %)	475.1	0.0	248105.1	Total salaries and wages Food services	NCES
V90	222830 (19 %)	1089.0	0.0	559103.1	Current operation expend. supp. services	NCES
CONUM	142944 (48 %)				ANSI State and County Code1	NCES
CSA	142944 (48 %)				Consolidated Statistical Area1	NCES
CBSA	142944 (48 %)				Core-Based Statistical Area1	NCES
cpi_2013	273835 (0 %)	1.3	1.0	1.6	Consumer Price Index Adjustment	

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Table D.2: – continued from previous page

Variable	Obs (&Missing)	mean	Min	Max	Label	Source
AgencyName	273835 (0 %)				Agency Name	NCES
state	273835 (0 %)				State Name	NCES
AgencyTypeDistrict	273835 (0 %)				Agency Type	NCES
UrbancentricLocaleDis	77496 (72 %)				Urban-centric Locale	NCES
BoundaryChangeIndicator	273835 (0 %)				Boundary Change Indicator Flag	NCES
CBSAIDDistrict	142944 (48 %)				CBSA ID	NCES
CSAIDDistrict	142944 (48 %)				CSA ID	NCES
LatitudeDistrict	77496 (72 %)				Latitude	NCESp
LongitudeDistrict	77496 (72 %)				Longitude	NCES
AgencyCharterStatusDis	196038 (28 %)				Agency Charter Status	NCES
CongressionalCode	77496 (72 %)				Congressional Code	
TotalStudentsUGPK12	273835 (0 %)	3509.5	0.0	1077381.0	Total Students (UG, PK-12)	NCES
LimitedEnglishProficient	164031 (40 %)	323.2	0.0	326893.0	Limited English Proficient	NCES
IndividualizedEducation	264380 (3 %)	435.7	0.0	149525.0	Individualized Education Program	NCES
FreeLunchEligiblePublic	239109 (13 %)	1216.0	0.0	696747.0	Free Lunch Eligible	NCES
ReducedpriceLunchEligible	175413 (36 %)	276.4	0.0	184918.0	Reduced-price Lunch Students	NCES
TotalFreeandReducedLunch	179885 (34 %)	1535.3	0.0	769176.0	Total Free and Reduced Lunch	NCES
AmericanIndianAlaskaNative	207435(24 %)	42.0	0.0	11145.0	American Indian/Alaska Students	NCES
AsianorAsianPacificIslan	207435 (24 %)	156.6	0.0	134844.0	Asian or Pacific Islander Students	NCES
HispanicStudentsPublic	207435 (24 %)	686.4	0.0	541514.0	Hispanic Students	NCES
BlackStudents	207435 (24 %)	582.1	0.0	383582.0	Black Students	NCES
WhiteStudents	207435 (24 %)	2048.8	0.0	168563.0	White Students	NCES
HawaiianNatPacificIsl	43768 (84 %)	13.7	0.0	61959.0	Hawaiian Nat./Pacific Isl. Students	NCES
TwoorMoreRacesStudents	43768 (84 %)	96.5	0.0	18979.0	Two or More Races Students	NCES
TotalRaceEthnicityPublic	207431 (24 %)	3539.3	0.0	1074175.0	Total Race/Ethnicity	NCES
total_people_ipo	228338 (17 %)	23451.2	-5.8	8268203.0	Total People (interpolated)	Derived Census
per_white_ipo	228338 (17 %)	83.0	0.4	100.0	Percent White Community	Derived Census
per_black_ipo	228338 (17 %)	5.1	0.0	98.8	Percent Black Community	Derived Census
per_hispanic_ipo	228338 (17 %)	7.5	0.0	99.6	Percent Hispanic Community	Derived Census
per_asian_ipo	228338 (17 %)	1.4	0.0	65.5	Percent Asian Community	Derived Census
per_other_ipo	228338 (17 %)	3.0	0.0	98.4	Percent Other Community	Derived Census
per_white_below_pov_ipo	228338 (17 %)	10.2	0.0	100.0	Percent White in Poverty	Derived Census

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Table D.2: – continued from previous page

Variable	Obs (&Missing)	mean	Min	Max	Label	Source
per_black_below_pov_ipo	165956 (39 %)	24.0	0.0	100.0	Percent Black in Poverty	Derived Census
per_hispanic_below_pov_ipo	212243 (22 %)	21.0	0.0	100.0	Percent Hispanic in Poverty	Derived Census
same_house_ipo	228338 (17 %)	68.7	0.0	100.0	Percent Same House 5 years	Derived Census
same_county_ipo	228338 (17 %)	16.6	0.0	72.7	Percent Same County 5 years	Derived Census
same_state_ipo	228338 (17 %)	8.3	0.0	100.0	Percent Same State 5 years	Derived Census
own_home_ipo	228338 (17 %)	75.6	0.0	100.0	Percent Own Home	Derived Census
children_enrolled_ipo	214855 (22 %)	4327.1	19.9	1536165.0	Census-Total Children School	Derived Census
children_public_ipo	214855 (22 %)	3796.5	18.4	1210490.0	Census-Total Children Public School	Derived Census
median_hh_income_ipo	228338 (17 %)	55295.7	0.0	264637.5	Census-Median Household Income	Derived Census
highschool_orless_ipo	217782 (20 %)	53.5	3.2	100.0	Percent high school or less	Derived Census
bach_orgreater_ipo	217782 (20%)	19.2	0.0	90.6	Percent Bachelor or higher	Derived Census
employed_male_ipo	228338 (17%)	64.8	0.0	100.0	Percent Males Employed	Derived Census
employed_female_ipo	228338 (17%)	52.9	1.5	100.0	Percent Females Employed	Derived Census
employed_total_ipo	228338 (17%)	58.6	0.0	200.0	Percent Total Employed	Derived Census
unemployed_male_ipo	2228338 (17%)	4.5	0.0	100.0	Percent Unemployed Male	Derived Census
unemployed_female_ipo	228338 (17%)	3.4	0.0	64.0	Percent Unemployed Female	Derived Census
unemployed_total_ipo	228338 (17%)	3.9	0.0	100.0	Percent Unemployed Total	Derived Census
number_of_households_ipo	228338 (17 %)	13129.8	0.0	5436454.0	Number of households	Derived Census
region	273835 (0 %)				Region	Derived
black_5_prior	243141 (11 %)	5.0	0.0	99.2	Percent Black 5 years earlier	Derived Census
change_black_5years	203471 (26 %)	0.3	-48.2	24.8	5 yr Change Black	Derived Census
change_black_10years	137310(50 %)	0.5	-96.3	49.6	Change in percent Black 10 yrs	Derived Census
white_5_prior	243141 (11 %)	83.9	0.0	100.0	Percent White 5 years Early	Derived Census
change_white_5years	203471 (26 %)	-1.9	-37.8	47.7	Change in percent White 5 yrs	Derived Census
change_white_10years	137310 (50 %)	-3.8	-75.5	95.3	Change in percent White 10 yrs	Derived Census
hispanic_5_prior	243141 (11 %)	6.9	0.0	100.0	Percent Hispanic 5 years Early	Derived Census
change_hispanic_5years	203471 (26 %)	1.1	-31.0	34.2	5 yr Change Hispanic	Derived Census
change_hispanic_10years	137310 (50 %)	2.2	-62.1	59.5	Change in percent Hispanic 10 yrs	Derived Census
other_5_prior	243141 (11 %)	2.9	0.0	99.0	Percent Other 5 years Early	Derived Census
change_other_5years	203471 (26 %)	0.2	-27.0	15.0	Change in percent Other 10 yrs	Derived Census
change_other_10years	137310 (50 %)	0.5	-54.0	29.9	Change in percent Other 10 yrs	Derived Census
asian_5_prior	243141 (11 %)	1.3	0.0	76.1	Percent Asian 5 years earlier	Derived Census

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Table D.2: – continued from previous page

Variable	Obs (&Missing)	mean	Min	Max	Label	Source
change_asian_5years	203471 (26 %)	0.3	-17.6	17.2	Change in percent Asian 10 yrs	Derived Census
change_asian_10years	137310 (50 %)	0.6	-35.3	34.4	Change in percent Asian 10 yrs	Derived Census
cbsa_id	226375 (17 %)	22684.4	0.0	78850.0	Core based statistical area id	Census
dissim_wb_ipo	226375 (17 %)	0.3	0.0	1.0	White-Black Dissim Index District	Derived Spatial
dissim_wb_cbsa_ipo	226375 (17 %)	0.6	0.0	0.9	White-Black Dissim Index CBSA	Derived Spatial
dissim_wb_county_ipo	226375 (17 %)	0.4	0.0	1.0	White-Black Dissim Index County	Derived Spatial
isolation_b_ipo	226375 (17 %)	0.1	0.0	1.0	Black isolation index	Derived Spatial
TheileH_ipo	2226375 (17%)	0.1	-0.0	1.0	H index all- comm. (district)	Derived Spatial
TheileH_wb_ipo	226375 (17%)	0.1	-0.0	0.9	H index white-black- comm. (district)	Derived Spatial
TheileH_wh_ipo	226375 (17%)	0.0	-0.0	0.6	H index white-hispan- comm. district	Derived Spatial
TheileH_wnw_ipo	226375 (17%)	0.1	-0.0	0.8	H index white-nonwhite- comm. (district)	Derived Spatial
TheileH_wb_cbsa_ipo	226375 (17%)	0.3	0.0	0.7	H index white-black- comm. (cbsa)	Derived Spatial
TheileH_wb_county_ipo	226375(17%)	0.2	-0.0	0.7	H index white-black- comm. (county)	Derived Spatial
TheileH_all_cbsa_ipo	226375 (17%)	0.2	0.0	0.7	H index all- community (cbsa)	Derived Spatial
TheileH_all_county_ipo	226375 (17%)	0.1	-0.0	1.0	H index all- comm. (county)	Derived Spatial
citacc_5	245511 (10%)				Berkman- Citizen Tax Vote	Berkman (2005)
citizen_access	244377 (11 %)	2.1	1.0	5.0	Berkman- Citizen Tax Vote	Berkman (2005)
name10	83733 (69 %)		.	.	District Name	Derived Spatial
students_private_ipo	83733 (71 %)	794.8	1.0	186930.0	private school enrollment	Derived Spatial
numteach_ipo	83733(71 %)	65.8	0.1	12903.9		Derived Spatial
numpri_black_ipo	83733 (71 %)	76.6	0.0	34390.0	private num. blacks students	Derived Spatial
numpri_white_ipo	83733 (71 %)	589.3	0.0	109867.0	private num. white students	Derived Spatial
numpri_asian_ipo	83733 (71 %)	41.6	0.0	26351.0	private num. asian students	Derived Spatial
numpri_hisp_ipo	83733 (71 %)	74.7	0.0	32301.0	private num. hispanic students	Derived Spatial
numpri_indian_ipo	83733 (71 %)	5.7	0.0	2714.0	private num. indian students	Derived Spatial
num_privschools_ipo	837331 (33 %)	1.8	0.0	610.0	private num. schools	Derived Spatial
per_pupil_local	273835 (0 %)	5539.9	0.0	158195.4	Per Pupil Local Rev	Derived NCES
per_pupil_state	273835 (0 %)	5748.0	0.0	90806.0	Per Pupil State Rev	Derived NCES
per_pupil_fed	273835 (0 %)	889.6	0.0	114180.3	Per Pupil Federal Rev	Derived NCES
per_pupil_local_mean	273835 (0 %)	5810.6	106.5	148071.4	Mean per pupil local district	Derived NCES

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Table D.2: – continued from previous page

Variable	Obs (&Missing)	mean	Min	Max	Label	Source
per_pupil_state_mean	273835 (0 %)	6035.1	0.0	3480100.5	Mean per pupil state district	Derived NCES
per_pupil_fed_mean	273835 (0 %)	976.4	0.0	162333.8	Mean per pupil fed district	Derived NCES
per_pupil_local_cbsa_mean	273835 (0 %)	5779.0	214.5	118987.4	Mean per pupil local cbsa	Derived NCES
per_pupil_state_cbsa_mean	273835 (0 %)	5989.9	0.0	81612.2	Mean per pupil state cbsa	Derived NCES
per_pupil_fed_cbsa_mean	273835 (0 %)	946.3	3.4	22245.4	Mean per pupil fed cbsa	Derived NCES
state_abb	254464 (7 %)				state abbreviation	NCES
county_name	254464 (7 %)				county name	NCES
per_IEP	273835 (0 %)	12.5	0.0	49.9	Percent SPED	Derived NCES
percent_public	214848 (22 %)	91.0	26.2	100.0	Percent in Public Schools	Derived Census
percent_public2	227314 (17 %)	89.8	2.6	100.0	Geospatial based percent public	Derived Spatial
median_hh_income_thous	228394 (17 %)	55.3	0.0	264.6	Median household income (thous)	Derived Census
log_pop	228394 (17 %)	8.9	1.3	15.9	Log of total pop	Derived Census
total_students	273835 (0 %)	3508.7	0.0	1077381.0	Total students	NCES
per_afnam_student	207435 (24 %)	7.1	0.0	100.0		Derived NCES
per_white_student	207437 (24 %)	76.7	0.0	100.0	Percent white students	Derived NCES
per_hispanic_student	207437 (24 %)	10.1	0.0	100.0	Percent hispanic students	Derived NCES
per_asian_student	207437 (24 %)	1.8	0.0	80.5	Percent asian students	Derived NCES
per_am_indian_student	207437 (24 %)	3.0	0.0	100.0	Percent indian students	Derived NCES
per_hawaiian_student	43768 (84 %)	0.2	0.0	34.5	Percent hawaiian students	Derived NCES
per_twoormore_student	43768 (84 %)	2.2	0.0	99.0	Percent two or more race students	Derived NCES
per_free	239096 (13 %)	30.3	0.0	100.0	Percent free students	Derived NCES
per_reduced	175413 (36 %)	8.6	0.0	99.5	Percent reduced	Derived NCES
per_freeandreduced	179885 (34 %)	39.9	0.0	100.0	Percent free and reduced students	Derived NCES
county_code	266598 (3 %)				County Code	Derived NCES
num_priv_log	182634 (33 %)	0.6	0.0	6.4	Log Num private schools	Derived NCES
tot_schools_	169762 (38 %)	6.9	0.0	1429.0	Total schools	Derived NCES
tot_charter_	149492 (45 %)	0.1	0.0	198.0	Total Charter schools	Derived NCES
urban	263914 (4 %)				District in urban setting	Derived NCES
seg_diff	226304 (17 %)	-0.1	-0.9	0.9		Derived
same_as_count	273835 (0 %)	0.2	0.0	1.0		Derived
countycode	253255 (8 %)	.	.	.		
percent_catholic_ipo	253255 (8 %)	15.0	0.0	100.0	Percent Catholic (interpolated)	Derived

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Table D.2: – continued from previous page

Variable	Obs (&Missing)	mean	Min	Max	Label	Source
catholic_year	253255 (8 %)	1961.6	1952.0	1971.0	Year of data- Catholic	Derived
total_students_charter	10684 (96 %)	812.0	0.0	60455.0	(sum) TotalStudentsUGPK12Dist	Derived NCES
hispanic_charter	10684 (96 %)	155.7	0.0	15125.0	(sum) HispanicStudentsPublicSchool	Derived NCES
black_chater	10684 (96 %)	310.3	0.0	36813.0	(sum) BlackStudents	Derived NCES
white_charter	10684 (96 %)	300.5	0.0	12309.0	(sum) WhiteStudents	Derived NCES
hawiaan_chater	10684 (96 %)	0.8	0.0	418.0	(sum) HawaiianNatPacificIslStude	Derived NCES
twoormore_chater	10684 (96 %)	8.2	0.0	1051.0	(sum) TwoorMoreRacesStudentsPubl	Derived NCES
total_race_chater	10684 (96 %)	806.0	0.0	59428.0	(sum) TotalRaceEthnicityPublicSch	Derived NCES
charter_school_count	196038 (28 %)	0.1	0.0	100.0	(sum) count	
income_seg_dist_ipo	226495 (17 %)	0.2	0.0	0.7	Income Segregation (district)	Derived Spatial
income_seg_cbsa_ipo	104614 (62 %)	0.4	0.0	0.6	Income Segregation (cbsa)	Derived Spatial
income_seg_county_ipo	226340 (17 %)	0.3	0.0	0.6	Income Segregation (county)	Derived Spatial
district_count	266598 (3 %)	13.9	1.0	143.0	Number of districts in county	Derived NCES
has_charter	196038 (28 %)	0.1	0.0	1.0		Derived NCES
tract_count	266598 (3 %)	10.4	1.0	2753.0	(max) tract_count	Derived Spatial
districtname_global	77658 (72 %)				District Name	GRC
stateabbreviation_global	77658 (72 %)				State Abbreviation	GRC
totalpk12enrollment	77658 (72 %)	.	.	.	2009 Total PK-12 Enrollment	GRC
national_math	71824 (74 %)	54.7	1.0	98.0	Global Report Card- Math National	GRC
national_read	72793 (73 %)	54.8	1.0	97.0	Global Report Card- Read National	GRC
state_math	47581 (83 %)	52.9	1.0	98.0	Global Report Card- Math State	GRC
state_read	48453 (82 %)	53.0	1.0	95.0	Global Report Card- Read State	GRC
per_pupil_local_thous	269526 (2 %)	5.3	0.5	22.0	Derived NCES	
dissim_wb_schoollev	111547 (59 %)	0.3	0.0	1.0	dissim_wb	Derived NCES
dissim_wh_schoollev	111547 (59 %)	0.2	0.0	1.0	dissim_wh	Derived NCES
dissim_fp_schoollev	102362 (63 %)	0.2	0.0	1.0	dissim_fp	Derived NCES
hindex_fp_schoollev	102362 (63 %)	0.0	0.0	1.0	hindex_fp	Derived NCES
hindex_wb_schoollev	111547 (59 %)	0.1	0.0	1.0	hindex_wb	Derived NCES
hindex_wh_schoollev	119256 (56 %)	0.1	0.0	1.0	hindex_wh	Derived NCES
hindex_wb_schoollev_ip	116640 (57 %)	0.1	0.0	1.0	H Index white-black- student	Derived NCES
hindex_wh_schoollev_ip	120783 (56 %)	0.1	0.0	1.0	H Index white-hispanic- student	Derived NCES

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Table D.2: – continued from previous page

Variable	Obs (&Missing)	mean	Min	Max	Label	Source
dissim_wb_schoollev_ipb	16640 (57 %)	0.3	0.0	1.0	Dissimilarity Index white-black- student	Derived NCES
elem_school_count	234077 (15 %)	4.0	1.0	697.0	(sum) elem_school_count	Derived NCES
hispanic_school	234077 (15 %)	370.5	0.0	281984.0	(sum) hispanic_school	Derived NCES
black_school	234077 (15 %)	307.2	0.0	193730.0	(sum) black_school	Derived NCES
white_school	234077 (15 %)	1021.5	0.0	90141.0	(sum) white_school	Derived NCES
dist_name_stanford	15754 (94 %)				Stanford District Name	ProPublica
city_stanford	15754(94 %)				Stanford city name	ProPublica
state_stanford	15754 (94 %)				Stanford state name	ProPublica
year_lifted_stanford	15754 (94 %)				Stanford- year lifted deseg order	ProPublica
year_lifted_stan_num	8989 (97 %)	1998	1967	2013	Stanford- year lifted deseg order	ProPublica
year_placed_stanford	15754 (94 %)				Stanford- year placed deseg order	ProPublica
year_placed_stan_num	6307 (98 %)	1968		1994	Stanford- year placed r deseg order	ProPublica
		1954				
still_order_stan	15754 (94 %)	0.4	0.0	1.0	Stanford- Still under order	ProPublica
under_order	15754 (94 %)	0.7	0.0	1.0	Ever under deseg order	Derived
years_overturn_stan	15754 (94 %)	4.0	0.0	46.0	Number of years order overturned	Derived
t_stan	15754 (94 %)	2.5	-20.0	46.0	Time (centered around deseg overturn)	Derived
percent_catholic__90_12_upo	223079 (19 %)	0.2	0.0	1.0		Derived
priv_school_ever	273835 (0 %)	0.7	0.0	1.0	Ever have private school	Derived
aland10	266207 (3 %)	7.1e+08	174216.0	2.3e+11	Size of district	NCES
pres_dem_vote	252678 (8 %)	44.3	3.5	93.4	Percent Dem Pres Vote	Derive CQ Press
dem_avg_2pres_	63993 (77 %)	43.9	4.2	91.8		Derive CQ Press
dem_control_8	157078 (43 %)	0.2	0.0	1.0	State Democrat control last 8 years	Derived
rep_control_8	157078 (43 %)	0.2	0.0	1.0	State Republican control last 8 years	Derived
divided_control_8	157078(43 %)	0.5	0.0	1.0	State Divided control last 8 years	Derived
urban_update	262903 (4 %)	.	.	.		Derived NCES
election_number	34911 (87 %)	2.3	0.0	4.0	Number of elections in year	Derived
avg_dem_supp	33749 (88 %)	0.4	0.0	1.0	Average Dem support	Derived

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