The Potential of Title I Funding

A thesis presented

by

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One

Introduction

Introduction

The public education system in the United States is far from equitable. The quality of public education varies greatly from state to state and district to district. A student's place of residence is unfortunately a large determinant of the public education opportunities he is afforded. A child growing up in South Central Los Angeles is going to have access to a very different public education than a child in Greenwich, Connecticut. Children with the unfortunate plight of living in a high-poverty area are most often subjected to the worst public schools the nation has to offer. Because school districts are primarily funded through local taxes, school districts in high-poverty areas are essentially trapped in a state of underfunding. The ultimate effect is that these districts are unable to offer their students a quality education.

The federal government has developed programs to support underfunded school districts and help equalize opportunities available to students. These programs offer funding to school districts to equalize district budgets, funding for community centers focused on promoting education, funding for students with special needs, and funding for

students learning English as a second language. The effects of these programs are often questioned and widely debated. The simple continuation of the debate attests to the level of complexity involved in proper analysis of education funding. For decades, scholars have debated the justification for, and the effects of, increased educational spending. There is little consensus regarding the appropriate levels of government education funding (with positions ranging from complete privatization of school districts to complete federalization of school districts), how the current funding should be spent, or if increasing funding actually improves student performance. As the debates continue, however, so does the flow of funding. It is crucial that it be determined if these programs are effective—or possibly more importantly, if the programs *can* be effective.

This idea of program evaluation is particularly relevant with the current transition in presidential administrations. The Obama Administration has promised a comprehensive overhaul of the public education system (The Agenda • Education 2009). The first hints of this reform came with the passing of the American Reinvestment and Recovery Act of 2009 (ARRA). The ARRA includes provisions for nearly $47 billion to be appropriated by the Department of Education (Elmendorf 2009). Only a few weeks into his tenure as President, President Obama showed his willingness to attempt to improve the education system through the use of federal funding. With such readiness to increase the budget of federal programs, it is absolutely essential to know the potential effects of each program.

In addition to reforming and restructuring current programs, there has been an ongoing push to fundamentally change the American attempt at public education. Increasing access to educational opportunities is a major focus of reform (Ladd 2002).

Upper and middle class families inherently have more choice over where their children attend school because of their ability to move between school districts or enroll in private schools and it has been shown that lower income families—for whom private school is not a possibility—tend to move only either within a single low-performing school district or into a different low-performing school district (Ladd 2002). One popular method of providing access to better school districts is issuing vouchers to students in low performing schools which allow them to enroll in a higher-performing one. This program expanded greatly over the last several years, but is still far from widespread acceptance (McGuinn 2006). Another older, more common, and less popular attempt at providing increased access is the practice of busing students from low-performing school districts to higher-performing ones. Quite often, however, this process incites both racial and socioeconomic resentments resulting in the persistence of unequal opportunities (Danns 2008).

The combination of a strong desire for reform and a presidential administration ready to take on the challenge is promising for the future of public education. Unfortunately, the government is not a position to be pouring money into programs that are not accomplishing their goals. If a program is found to be ineffective, it may be appropriate to discontinue it and attempt to create a new more, effective program. Government action is seemingly necessary and inevitable, but the actions must be carefully planned in order to maximize the returns on scarce resources.

General Direction

This thesis will discuss the ability of the federal government to improve the performance of low-achieving students in high-poverty areas. The federal government is charged with equalizing the disparities in public education opportunities between, and often within, states. While the Department of Education has a small budget relative to other federal departments (roughly $68.6 billion per year), it does not have a budget so small that it is insignificant (Budget Office—U.S. Department of Education 2009). Federal programs must be under constant review to ensure that the programs are effective and that the $68.6 billion budget is spent appropriately.

This study will specifically investigate federal funding provided to school districts in high-poverty areas. As previously discussed, the federal government currently finances several programs aimed at decreasing the disparities in public education opportunities, and there are many new and proposed programs that will be competing for federal funding (Programs 2008). While analyses of the new programs is necessary before the programs receive large appropriations, that is not the focus of this study. Instead, I will look at funding structures (particularly federal funding to high-poverty school districts) that are already in place. High-poverty districts are consistently some of the worst performing districts in the nation and often receive supplemental aid form the federal government (Title I Part A Program 2008). This suggests that either the supplemental funding is not enough to improve student achievement, the funding is not being used properly, or student performance is unrelated to a given district's level of funding. If the analyses in the following chapters find that increasing funding can help raise low-

performing districts' levels of achievement, perhaps federal funding can be a tool for improving overall student performance.

History

Before beginning a discussion of the effectiveness of specific federal programs, it is necessary to examine the evolution of the federal government's role in education policy. Education policy has been historically delegated to local communities and state governments, so how the federal government exerts influence is not entirely intuitive (McGuinn 2006). The 1954 Supreme Court decision in *Brown v. Board of Education of Topeka* marked one of the first exertions of federal power over education policy (Brown v. Board of Education, 347 U.S. 483 1954). Federal influence through legislation followed soon after (McGuinn 2006). The path of federal involvement can be tracked through three paramount pieces of legislation: the Elementary and Secondary Education Act (ESEA), the Goals 2000: Educate America Act, and the No Child Left Behind Act (NCLB).

The Elementary and Secondary Education Act was a federal statute enacted on April 11, 1965, and has since been reauthorized every five years. The primary goal of the statute is to provide federal funding for primary and secondary education. The funding is to be used for instructional materials, professional development, educational support programs, and the promotion of parent involvement. The statute's lasting legacy is the funding directed at low-income schools laid out in Title I.. The funding is intended to assist school districts with high numbers or high percentages of low-income children ensure that all children have the opportunity to meet state academic standards. By

accepting this funding, these "Title I schools" agree to be regulated by federal education policy (The Elementary and Secondary Education Act 1965).

In 1994, Bill Clinton signed The Goals 2000: Educate America Act. The Act was an attempt at standards-based reform (reform in which the federal government set education standards that states must meet or else face federal sanctions). States were encouraged to formulate their own plans for reform and, if successful, were rewarded by the federal government. The potential rewards were quite low, however, as Congress appropriated a total of only $105 million to be used for awards in 1994 (Goals 2000: Educate America Act 2001).

In 2002, the No Child Left Behind Act (NCLB), the successor to Goals 2000, was signed by George W. Bush. NCLB is attempt at correcting the flaws of Goals 2000 while maintaining the use of standards-based reform. The main focuses NCLB are improving teacher quality, accurate student testing, scientifically based research of student progress, and providing families with a choice of public schools. Though some of the inadequacies of Goals 2000 are rectified by NCLB, the lack of funding that is necessary to truly enforce the policy limits NCLB's impact (NCLB and Other Elementary/Secondary Policy Documents 2008).

Specific Direction

This study will examine the effects, and the maximum potential, of the Title I program. The reasons for studying Title I are not necessarily obvious. After all, once a school district has received funding—be it from federal, state, local, or private sources— the source becomes largely inconsequential. One dollar from the federal government buys

just as much as one dollar from a local government. I chose to examine the Title I program for three reasons: size, comparability, and availability of data. The yearly Title I budget is quite large—the average yearly budget since 2000 is roughly $11.5 billion (Funding Status Title I Part A Program 2008). With such a large amount of money dedicated to the program, it is essential to know precisely the program's effects. Title I also allows for comparability across states. Since the funding allocations are determined at the federal level, differences in student performance across states can be attributed to each state's use of the funding. The final reason is the large amount of available data on the program. The National Center for Education Statistics provides a rich database of information including Title I allocations, district expenditure details, student performance, and district demographics for nearly every school district in the United States. The importance of Title I to federal education policy also justifies my selection of the program.

In the coming chapters, I will observe how changes in Title I funding affect graduation rates in seven states: California, Indiana, Michigan, Mississippi, New Jersey, New York, and Wisconsin. For each state, I will compare student performance in a dataset containing all of the school districts in the state to student performance in a dataset containing only the school districts receiving the highest concentrations of Title I funding per student (which will be referred to as "Title I heavy districts"). This will show the differences in sensitivity to spending variances between the population of all districts in a state and the population of Title I heavy districts.

The study will also in part investigate the effects of Title I by examining a rich secondary literature of case study analyses to complement the aggregate data analysis.

Close observation of individual school districts offers a level of analysis not possible in an aggregate study. These observations will illuminate individual districts' decisions about how to spend Title I funding—decisions which I expect will affect student performance. Analysis of these decisions can help develop a "best practices" method for using federal funding to effectively improve the performance of low-achieving students. This close analysis may be the ultimate determinant of my decision regarding whether or not the program has the potential to be effective. The aggregate analysis is an excellent start because it will show general trends and sensitivity to money, but the qualitative analysis will most clearly show when and why money actually matters.

As with all studies of student performance, it is important to coose measurement tools carefully. According to the National Center for Education Statistics, most Title I funding (73%) is used for instructional expenditures. Instructional expenditures include teacher and teacher aid salaries, instructional materials, student computers, and other technology (Stullich, Eisner and McCrary 2007). Because of the strong correlation between Title I funding and instructional spending, I will use instructional spending per student as an independent variable. While disaggregation of the reported data to determine the specific portion of instructional spending that comes from Title I funding is not possible, the fact that Title I funding is so overwhelming used for instructional spending allows instructional spending to to serve as a sufficient proxy in schools receiving high levels of Title I funding. The qualitative analysis will provide a more explicit tracking of Title I appropriations. Hight school graduation rates will be the measure of student success—the study's dependent variable. The reasons for choosing these variables will be further discussed in Chapter Three.

Expectations

I expect to find that increased federal funding will result in higher levels of student achievement. The intuition for this expectation is simple: higher levels of funding allow districts to spend more money on the resources students need to succeed—teachers, small class sizes, technology, transportation, and an array of other resources. At the individual level, the additional resources allow teachers to pay greater attention to each student's strengths and weaknesses. When schools are able to focus on individual students, students should be more likely to succeed.

I also expect to see funding increases result in higher increases in student achievement in districts receiving the highest concentrations of Title I funding per student. It seems intuitive that increases in the resources mentioned above will have a larger effect in districts where the resources are more scarce to begin with. Finding funding to have a higher influence in these districts would be the best evidence for continuing support for the program. This would show that the program is working and that increasing the budget could increase Title I's ability to reach more students and thus help close the achievement gap between well-funded and poorly-funded school districts.

It is important to note that observing Title I funding to have no apparent impact on student performance does not necessarily translate to the funding have no real effect. It is entirely possible that the funding is simply stemming extremely low student performance due to underfunding. That is, removing Title I funding from district budgets could lead to a systematic decline in student performance. The elevated performance relative to the absence to Title I funding is actually an instance of Title I funding working exactly as intended.

Two

Relevant Literature

Introduction

Before proceeding with my analysis, it is important to examine the state of the academic literature regarding education policy in the United States. While this would ordinarily provide generally accepted evidence and prevent any repetitive and unnecessary analysis, the sharp debates over nearly every aspect of federal education policy largely prevent using this chapter as a surrogate for later performing basic and common analysis. Nonetheless, it is essential to review the relevant academic debates to properly evaluate the analyses of the following chapters.

The following sections will briefly discuss the scholarly research on three topics: the effects of educational spending on student performance, the proper role of the federal government in public education, and the recent evaluations of the Title I program. A full discussion of these topics would be imprudently long, so instead I present only the most relevant and important points of each debate. Once the basic information for each topic is understood, I will proceed with my analysis of the Title I program.

The Effects of Money

Over the past century, and particularly the past thirty years, the pervasive attitude toward education funding is that increasing funding will monotonically increase student performance (Grubb, Huerta and Goe 2006). There has been a surge in the literature, however, suggesting that simply increasing funding is not a reasonable method for increasing student performance. Partially fueling the debate is the inability to properly experiment and isolate the effects of funding; all studies of student achievement variances due to funding variances are necessarily quasi-experiments and thus imperfect predictors of the actual effects. Scholars can attempt to create counter-realities based on observations to see how students would perform in the absence of funding, but the public school system in the United States is so large that a researcher can conjure a counter-reality that will convincingly show both sides of nearly any debate. This is not to relegate these explorations to a state of futility, however, since they can illuminate important successes and failures in the education system. Many scholars have studied the effects of money, and the studies generally find one of two things: funding is a major factor in student performance or funding is a minor factor in student performance, if a factor at all.

To say that money has absolutely no effect on student performance is, of course, quite extreme. A more accurate summarization of the "money has no effect" camp is that recent drastic increases in education funding have not produced increases in student achievement. During the last forty years, education spending has more than doubled. This has allowed for smaller classes, higher teacher salaries, and higher quality teachers. Student performance over this period, however, has been stagnant. Between 1960 and 1990 the student teacher ratio fell from 26:1 to 17:1 and the percentage of teachers with a

masters degree more than doubled from 23% to 56%. During the same period, student performance on the math section of the National Assessment of Educational Progress improved slightly, but student performance on the science section fell and SAT scores became noticeably lower (Hanushek 1995). Many other studies show results that are quite similar. A 1989 literature review found that only thirteen of sixty-five studies showed significant positive relationships between funding increases and student achievement increases (Hanushek 1989). Other studies note that real expenditures have greatly risen, but the glaring need for program reform remains (Lips 2008). These studies imply that reforms should focus on factors other than money. One study found that family background appears to be a stronger predictor of student performance than school funding, so future reforms may instead focus on changing student attitudes rather than funding (Grubb, Huerta and Goe 2006).

The other side of debate projects proper funding as a panacea for the problems of the public education system. The motivating factor behind this argument is that money has the ability to provide students with higher quality teachers, smaller classes, access to technology to assist in learning, and the individualized attention they need in order to thrive. A study by the Consortium for Policy Research in Education found that districts which used their resources well were able to greatly improve student achievement. Some districts reported student gains so great that the percentage of students passing state proficiency states as much as doubled. The study found several common characteristics among these high-performing districts including expenditures which reduced class sizes and invested heavily in teacher training (Odden 2007). These findings show the exact

opposite effects of reducing class size and developing teachers that were reported in the Hanushek study discussed in the previous paragraph.

Gaps in achievemnt gains between wealthy and poor schoo distrcits provide further evidence for the importance of school funding (Lankford, Leob and Wyckoff 2002). In 1993 the Campaign for Fiscal Equity challenged New York's school financing system claiming students in New York City were not being provided with a sound basic education. After ten years of trials and appeals, the system was found to be unconstitutional and increased funding to New York City schools was mandated (Chambers, Levin and Parrish 2006). Research to determine the affects of funding on education quality was a major part of the trial. The research and subsequently the court ruling found that

> *for a majority of districts significantly higher levels of spending are*
> *required if the state wishes to provide a sound basic public education to*
> *all public school students. Furthermore, the results show a clear negative*
> *relationship between the district-level shortfall in spending and*
> *educational outcomes across virtually all student subpopulations.*
> (Chambers, Levin and Parrish 2006, 1-2)

Similar research indicates that increasing the resources available to districts is necessary for the public education system to provide students with a sound education.

The methodology varied considerably across the discussed studies. Two studies—Lips 2008 and Hanushek 1995—had no true experiment, but rather simply presented statistics of increasing funding and stagnating or decreasing performance (based on standardized test scores and graduation rates) and concluded the funding was ineffective. The methodology in Grubb Huerta and Goe 2006 and Hanushek 1989 is not meticulously explained, but the provided statistics suggest they used ordinary least squares regressions to explain the effects of district resources on student performance. The implicit

assumption in all of these studies is that increasing funding should monotonically increase student performance. This assumption also holds for Odden 2007 who finds that funding has a positive effect on student performance and thus calls for funding increases. While the relationship between funding and student performance is seemingly intuitive, it is not necessarily true. This relationship will be explored in later chapters.

Although the debate over the effects of funding on student performance is sharply divided, it is becoming increasingly relevant as educational expenditures continue to rise. Careful examination of this debate should be the starting point for any analysis of study concerning student performance, and more importantly for any legislation concerning education funding. The level of government at which education policy is developed, however, is the topic of an entirely different debate.

The Proper Federal Role

A major component of American federalism is the relationship between the federal and state governments. The general opinion is that state governments do not look favorably upon federal legislation that will ultimately expand federal power at the expense of the states. This view applies to education policy, yet there are substantial advantages to an increased federal presence. A federal presence can help ensure that all students have access to an education that will prepare them for the national and global job markets rather than one aimed at simply meeting qualifications determined by a given state. The past several years have seen a great expansion in federal influence over education policy through Goals 2000 and NCLB, and scholars have met the expansion with mixed reactions.

The argument for a federal presence is simple: the federal government has the resources to do things state and local governments simply cannot. Commonly cited abilities exclusive to the federal government include consistent data collection and interpretation across states; the provision of large scale programs to students with disabilities, those from high-poverty areas, and those learning English; and making sure federal funds are spent responsibly (Hodgkinson 2008). Scholars also often choose to look abroad to nations with relatively centralized education policies. Other industrialized nations have had success through strong federal policies that stress quality early-childhood education, programs to help students transferring between states, and national job databases to match teachers and school districts (Lykins and Heyneman 2008). In light of these arguments, the federal government appears to have the ability to help improve, and more importantly equalize, educational opportunities across states.

The natural counter to these arguments is that the current policies produced by the federal government are simply failing. Studies condemn federal intervention based on the lack of results produced by Goals 2000 and NCLB (Lips 2008). The policies are criticized for being exceedingly bureaucratic and complex while not increasing student achievement. An increased federal role is also likely to strain the relationship between the federal and state governments. Because the traditional federal role in education has been fairly limited, the encroachment of NCLB on state policies is met with increasing opposition by state and local educators and policymakers (Sunderman and Kim 2007). This point is particularly relevant to the analysis in the following chapters when states consider, accept, and even welcome federal intervention. Although states and localities generally resist federal intervention, in areas with "more severe financial problems,

officials might be expected to adopt a different attitude" (Brown, Fossett and Palmer 1984, 125). While on the whole there may be resistance to federal intervention and aid, the low-income areas severely influenced by Title I funding should be more welcoming of the federal policies upon receiving their much needed financial aid.

While the debate over the proper amount of federal intervention continues, federal influence over education policy continues to grow. Though some denounce this growth as a descent into bureaucracy and inefficiency, the hopeful look to nations with centralized education policies for hope. The hopeful also stand by their claims that the federal government can best serve students with special needs through large scale programs. In order for these programs to succeed, however, they must first win the support of the state and local agencies who ultimately implement federal policies.

Title I

The Title I program is, as expected, less controversial than the other staples of federal education policy. The program represents a much smaller encroachment of federal policy and is more of a supplemental resource to schools in need. Much, though not all, of the Title I discussion centers around how the program can most effectively be implemented rather than on if the program should exist. The main point at issue is the method by which funding is allocated, and how this limits the abilities of the program.

Title I funding is distributed throughout 93% of the nation's school districts, and from there is further disbursed to 56% of all public schools (Final Report on the National Assessment of Title I: Summary of Key Findings 2007). Analysis of three-year trend data shows that within schools receiving Title I funding, student proficiency levels show

overall positive trends. When considering only the highest-poverty areas, however, the positive trends disappear and the results are instead permeated with mixed trends and insignificant results (Final Report on the National Assessment of Title I: Summary of Key Findings 2007). This is a particularly troubling result. While the funding is helping to raise overall levels of achievement, the students in the highest-poverty areas—the students Title I is designed to assist—have not shown improvement. This is partially explained by the expanding proportion of students who are counted as Title I participants during the last ten years. Districts have also increasingly used Title I funding to fund schoolwide reform programs (Final Report on the National Assessment of Title I: Summary of Key Findings 2007). The change from programs targeting specific low-income and low-performing students to programs targeting entire schools greatly increases the number of participants—particularly the number of higher-performing participants—and thus inflates the apparent effectiveness of the program. The possibility also exists that the highest-poverty schools do not show improvement because even with Title I funding they remain severely underfunded. The levels of funding required for affecting student achievement will be explored in later chapters. With Title I funding affecting such a large number of schools, it is crucial that funding distribution formulas and predicted effects are calculated correctly.

A common claim is that the Title I funding structure is too complex to be effective (Aud 2007, Lips 2008). Funding mechanisms have become so obscure that funding often does not reach its intended targets. The distribution of funds shows a level of variability that is likely unintended (Aud 2007). The murkiness of funding procedures often diverts funding to larger school districts, thus creating a great inequality in per

student funding (Title I Weighted Grants Skewed Toward Largest Districts 2007). In addition to funding being directed to the wrong students, a significant portion of Title I grants are lost to administrative expenses (Aud 2007). With so much of Title I funding never reaching its intended students, the program can hardly be expected to be effective. This is not to say that the program cannot help high-poverty students, however. When the funding reaches its intended targets and is spent properly, student achievement gains can be attained (Rubenstein and Wodatch 2000). This will be further explored in Chapter Five.

The methodology used in these studies is quite consistent. Aud 2007, Lips 2008, and the study concerning grants skewed toward largest districts all present close inspections of Title I appropriation procedures and all reach roughly the same conclusion: funding distribution formulas are inequitable and are in desperate need of revision. Rubenstein and Wodatch 2000 is not particularly concerned with the distribution process, but rather examines what happens once school districts actually receive the federal funding. Through interviews with teachers and administrators, classroom observation, and close examination of district financial records, the researchers determined the ground level effects of Title I funding.

Only the rarest critiques of the Title I program call for the program's complete abolition. The criticisms are instead followed by calls for program or disbursement reform. The general agreement is that it is a worthy program that, with modification, can help close the achievement gap that is persistent in American public schools. Though there is disagreement over the modification needed, the consensus that the program can work is a beacon of hope in a polarized and often pessimistic arena.

Going Forward

Federal education policy sparks debates that are often highly divisive and not easily resolved. A major strain on the relationship between the federal and state governments is the perceived infringement of federal education policies on state policies. While the debate of the merits of this infringement continues, the influence of the federal government over education policy continues to grow. With the prominence of NCLB and the continually increasing budget of the Department of Education, the relegation of the federal government to a minimal role in public education seems less and less likely.

Compared to other topics, the debate over the Title I program seems almost convergent. The current major points of contention are how to make the program more effective and efficient, as opposed to other programs where the debate centers around justifying the program's existence. However, the true effectiveness and maximum potential of the Title I program remain unknown. A complete evaluation of the program needs to be able to definitively conclude how much effect the program can have on individual students.

The next several chapters will present an analysis of the Title I program based on per student expenditures. Student performance will be analyzed in relation to each district's Title I grant. By establishing that higher per student Title I funding provides the opportunity for higher levels of student achievement, the Title I budget increases of the last several years can be justified and continued. If this relationship is not found to be true, however, the formulas by which district grants are determined will need to be refigured, and perhaps the budget of the program will need to be reconsidered.

Three

The typical States

Introduction

In this chapter I will explore the relationship between Title I funding per student and student performance. As discussed earlier, there is disagreement in the literature over the effects of funding on student performance, so this chapter will take a narrow look at the effects of a particular type of funding—federal funding through the Title I program. The program has a constantly increasing budget, but the returns on the investment remain relatively unknown. With a budget that is roughly 20% of the Department of Education's outlays, it is essential that the effectiveness of the program be determined (Budget Office—U.S. Department of Education 2009).

A crucial note is that the total number of dollars spent is not the critical measurement in this chapter. I will instead explore the effects of Title I funding per student. There are several advantages to using dollars per student. The obvious advantage is the measure controls for school districts receiving constant grants from the federal government but having changing populations. It also corrects for changes in funding that in absolute numbers appear extreme, but are actually proportional to the number of

students in a given district. Per student spending also provides a shortcut for quantifying

abstract expenses allowing for proper comparison to other spending options. For

example, it can be difficult to assess how much access to technology is given up by

spending $50,000 on classroom instruction rather than on expanding a computer lab to be

used by 100 students. If the $50,000 is instead viewed as $500 per student, it is quicker to

see that each student is giving up $500 of access to technology. While this does not help

in justifying the spending one way or the other, it is important to be able to make simple

and accurate comparisons. This will become important later in this chapter when

examining regression coefficients.

The use of funding per student measures is not a unanimous practice in the

literature. The main reason is that the size of the Title I grant per student is not

necessarily indicative of the overall size of the grant. Figure 1 shows the alignment—or

misalignment—of per student Title I funding with school poverty level.

FIGURE 1
Average Title I School Allocation Per Low-Income Student, by School Poverty Level, 1997-98 and 2004-05

(Stullich, Eisner and McCrary 2007)

21
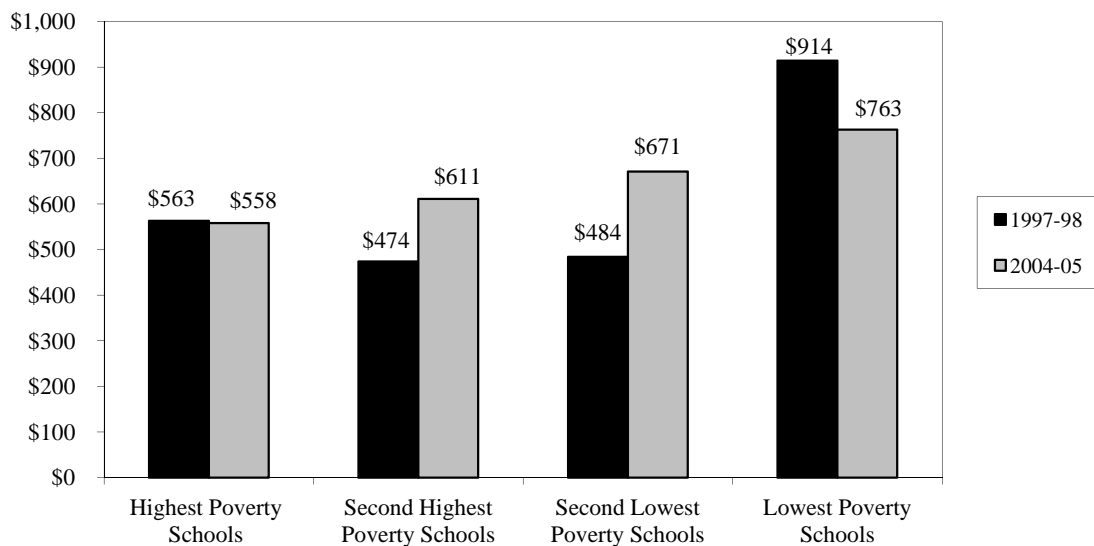
The disparities between poverty level and Title I allocations per student are large enough to cause researchers interested only the highest poverty school districts to use other measures—often the overall Title I grant to a district. It is important to note, however, that these numbers are largely a function of district populations. If Title I funds were equally distributed across all school districts, the larger districts would obviously have lower allocations per student. There is a trend in the literature for studies using regression models—Grubb Huerta and Goe 2006 and Hanushek 1989—to examine funding per student and for studies observing and reporting statistics—Lips 2008 and Hanushek 1995—to focus on absolute funding figures. Since the purpose of this study is to analyze the achievement gains of students most influenced by funding from the Title I program through regression models, it is appropriate to use a funding per student measure as an independent variable.

I will use high school graduation rates as my measure of student performance. Graduation rates have a distinct advantage over their counterparts—namely, standardized test scores. Graduation rates are a more comprehensive measure of student competency measuring a student's abilities over the course of four years rather than four hours. The influence of a school curriculum is largely reduced in measuring student performance by examining graduation rates. While a particular course being taught at a high school can severely impact a student's performance on a standardized test, a single course only impacts a student's probability of graduating in the most extreme cases. An example of this is the recent agreement between Detroit Public Schools and Kaplan to provide all students an ACT preparatory course as part of the school curriculum (Detroit Public Schools 2007). This gives students in Detroit an advantage on the ACT compared to

students from another city, for this example, Flint, but the course does not make the students in Detroit more likely to graduate than the students in Flint. Graduation rates thus serve as a proxy for the intellectual ability gained by a student during the preceding years of his education and offer a fair assessment of the schools providing the education.

High school graduation rates are among the less common measures of student achievement in the literature. Most studies instead look to data from the National Assessment of Educational Progress (a national standardized test) of fourth and eighth grade students. The advantage of NAEP data is twofold. First, the data cover two distinct periods of learning. Students are expected to make a tremendous amount of progress between fourth and eighth grade, so the test data give a comprehensive view of the education system. Second, the progress of individual classes can be tracked. It would be very easy to compare test results from the 2005 eighth grade class to the results from the 2001 fourth grade class and measure the progress. I am choosing to use graduation rates, however, because these rates give a more complete review of each individual student's capabilities. Graduation is also the ultimate goal of the public education system. A student's score on a test administered when he is in fourth grade is insignificant compared to whether or not the student graduates from high school.

Method

In order to analyze the effectiveness of the Title I program, we must determine the effects of money granted to school districts. This analysis will rely heavily on the assumption that school districts seek to maximize the performance of their students. While it is sometimes argued that school districts try to project lower student success

rates to secure federal funding, the sanctions outline by No Child Left Behind—financial punishment, distribution of vouchers to students wishing to leave the school, shutting down the school altogether, etc.—create a strong incentive for districts to push their students toward higher performance (Stullich, Eisner and McCrary 2007). Because Title I grants are based largely on poverty statistics generated by the United States Census Bureau, it is much more difficult for school districts to skew statistics in an effort to obtain more funding (Title I Part A Program 2008). In addition, the data do not show districts lowering their graduation rates in an attempt to secure funding, but rather that districts tend to systemically report inflated graduation rates. This is a problematic trend as some states overreport their graduation rate by more than 20% (see Figure 2). Although this will limit the precision of the estimated effects of money in future sections, this does not invalidate the study. This study looks at how funding can change student performane, thus raising a graduation rate from 75% to 80% is conceptually equivalent to rasing a graduation rate from 85% to 90%.

The following analysis can be broken down into four steps. First, I will establish that higher levels of funding from the federal government produce higher levels of spending on instruction per student. Second, I will show that increases in spending on instruction per student result in increases in graduation rates. Third, I will explore the relationship between district spending on instruction per student and graduation rates in districts heavily influenced by Title I funding. Last, I will track how spending on instruction in one year affects graduation rates the following year in all districts in a given state and also how spending on instruction in one year affects graduation rates two, three, and four years later in Title I heavy schools.

FIGURE 2
NCES Calculated and State Reported Graduation Rates, 2004
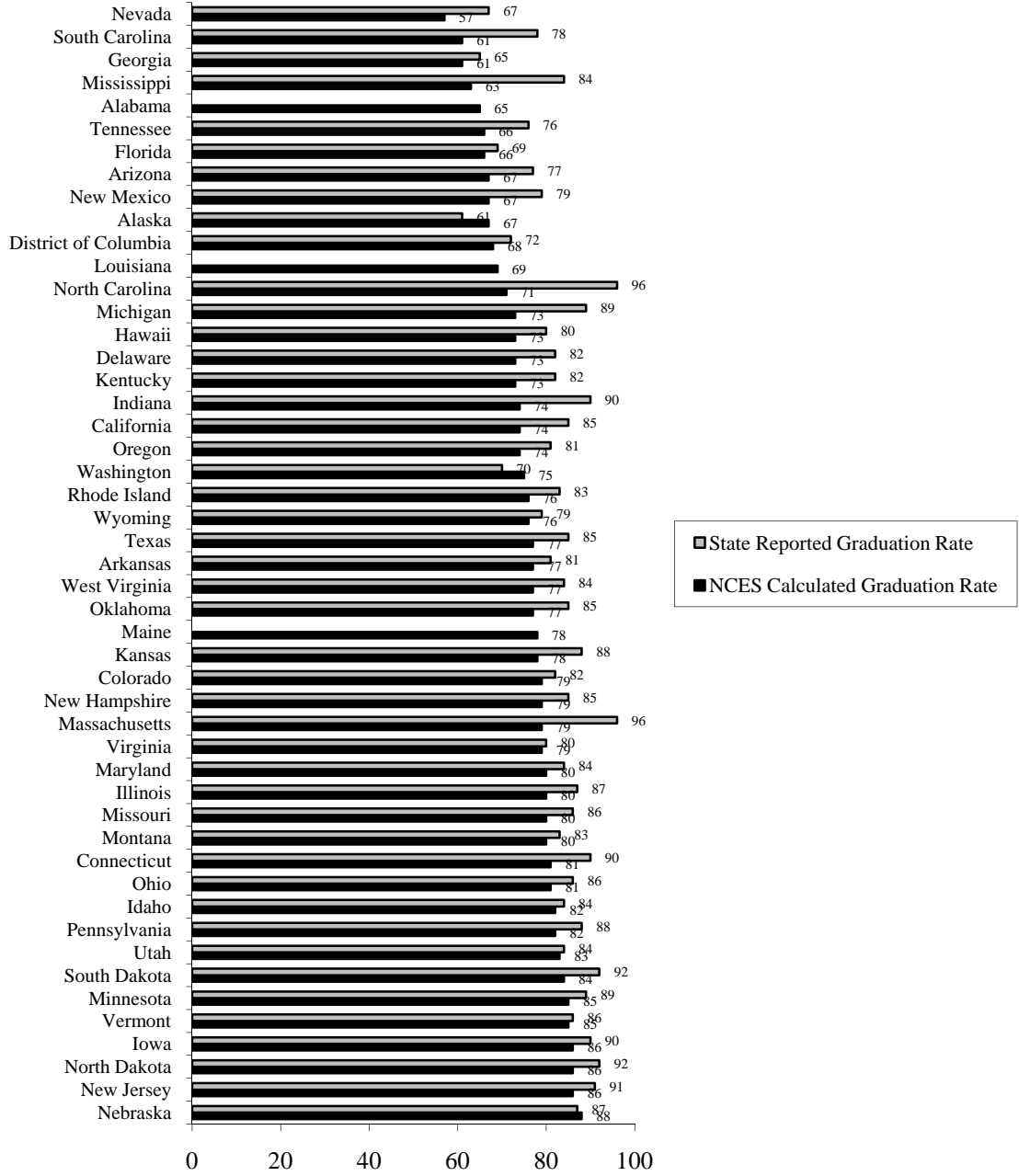
(Stullich, Eisner and McCrary 2007)

It is important to keep in mind that the following analysis is only one possible

explanation. Many alternative explanations can, and have been, quite convincingly

proposed. A major criticism of proposals calling for increasing school funding to improve

student performance is that there is an upper threshold for effective spending. It is

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possible that there exists a limit of effective spending and any spending beyond this limit is essentially wasteful. To test for these effects, I will split school districts into several groups based on expenditures for student, isolate the effects of each level of spending, and determine if such a threshold exists.

This study will look at student performance and district expenditures in seven states: California, Indiana, Michigan, Mississippi, New Jersey, New York, and Wisconsin. Table 1 shows the median graduation rates of all states in 1998 with the states that will be examined in bold.

TABLE 1
Graduation Rates by State, 1998

Alabama	66%	Idaho	81%	Missouri	74%	Pennsylvania	78%
Alaska	64%	Illinois	74%	Montana	81%	Rhode Island	71%
Arizona	69%	**Indiana**	**74%**	Nebraska	84%	South Carolina	57%
Arkansas	75%	Iowa	85%	Nevada	61%	South Dakota	85%
California	**67%**	Kansas	76%	New Hampshire	72%	Tennessee	60%
Colorado	68%	Kentucky	71%	**New Jersey**	**84%**	Texas	67%
Connecticut	70%	Louisiana	70%	New Mexico	67%	Utah	87%
Delaware	70%	Maine	74%	**New York**	**65%**	Vermont	79%
District of Columbia	63%	Maryland	74%	North Carolina	63%	Virginia	74%
		Massachusetts	73%	North Dakota	87%	Washington	66%
Florida	56%	**Michigan**	**73%**	Ohio	78%	West Virginia	84%
Georgia	56%	Minnesota	80%	Oklahoma	77%	**Wisconsin**	**81%**
Hawaii	70%	**Mississippi**	**64%**	Oregon	66%	Wyoming	77%

(Greene 2002)

The selected states represent a both a variety of achievement levels and state education policies. By examining dissimilar states, I can discern which practices are most likely to lead to national policies which will promote high student achievement.

Expectations

The model presented in this chapter looks to establish three important relationships: the relationship between Title I grants and district spending on instruction per student, the relationship between instructional spending per student and graduation rates on a statewide basis, and the relationship between instructional spending per student and graduation rates in school districts in which have the highest concentrations of Title I funding per student. While the overall expectation is that per student spending and graduation rates will increase with increases in federal funding, it is important to more closely examine each of these relationships.

Increases in federal aid can be expected to cause increases in the amount of money spent on instruction per student. The magnitude of the increases will vary by district—this is important because it may be an explanatory variable of student performance. There is always concern that when a provider of a local public good knows there is incoming aid from a higher level of government, the local agency will reduce its spending and the "aid" serves to only return the locality to its previous level of spending. This, however, does not appear to be the case. The crowding-out of state and local spending is low and often close to zero, meaning that total spending will rise by nearly the entire amount of the federal grant (Hines and Thaler 1995). This relationship justifies treating federal grants as "additional" money available to school districts that should produce visible effects on student performance.

The studies discussed in Chapter Two that concluded money did not have a significant effect on student performance had a common theme: each study evaluated the education system as a whole. In this study, I am looking for the effects of money on a

specific subset of the population—districts that are severely underfunded. I seek to establish that funding has a significant impact on this subset of the population.

In most situations, states prefer to not rely on the federal government for program funding. Federal funding is less than an absolute guarantee and if the funding should suddenly stop, a heavily reliant state would find itself in a major crisis (Brown, Fossett and Palmer 1984). Public education funding is no different. Funding from the federal government accounts for only 12% of total education expenditure (The Federal Role in Education 2009). As discussed earlier, however, not all districts have the option of avoiding reliance on the federal government. High-poverty districts, the main recipients of Title I funding, often have severe budget problems and accept funding from every available source. We should thus expect to see higher concentrations of federal funding in high-poverty areas and subsequently observe instructional spending increases as federal funding increases.

The expected relationship between district spending on instruction per student and graduation rates is fairly intuitive—as more resources are devoted to increasing the proficiency of students, we should see increases in the number of students graduating. In reality, graduation rates are determined by a very large number of factors, many of which are intangible. This must be accounted for in the model in order to properly estimate the effects of instructional spending. Increased spending on instruction per student not increasing student performance could be evidence of two situations. First, the amount of money spent on instruction per student could have a threshold of effectiveness. If it is shown that there are performance increases up to a certain level of spending, but the graduation rate stagnates above this level, a threshold is established. At this point, it

would be beneficial to divert the money being spent on instruction above the threshold to other areas. Another possible cause of not seeing a positive relationship between instructional spending per student and graduation rates is that there is simply not a significant relationship. It is possible that simply pouring money into student instruction is not an effective way to increase student performance. While the idea that money spent on instruction has absolutely no impact on student performance is both unlikely and extreme, it cannot be disregarded as a possibility.

The relationship I expect to most clearly explain student performance in low income school districts is the relationship between instructional spending per student and graduation rates in Title I heavy districts. If it is established that increasing federal funding increases spending on instruction per student, and increased spending on instruction per student increases graduation rates, the syllogism implies that increasing Title I funding will improve student performance. A more interesting result would be to find that although increased instructional spending per student has a positive effect on graduation rates in the overall state poputlaions, Title I heavy districts chose not use the grants from the federal government to increase spending on instruction. This would naturally lead to a discussion of the optimal allocation of resources for increasing student performance.

I expect the relationship between increases in Title I funding and student performance within Title I heavy districts to be much more pronounced in my study than is found throughout the literature. This is a result of my choice to measure the effects of increased funding in underfunded districts rather than in the entire state populations. As discussed earlier, districts with the highest per student Title I funding are not necessarily

the most impoverished districts. This means that the Title I funding in my "Title I heavy"

is less likely to be diverted into a schoolwide reform program and will instead be used to

improve the abilities of low-income and low-achieving students. The study will thus

provide an analysis of the maximum potential of the Title I program.

Data

The data used for this study were collected by the National Center for Education

Statistics (NCES) in the U.S. Department of Education Institute of Educational Sciences.

The NCES builds a Common Core of Data (CCD) through five annual surveys sent to

state education departments. The CCD contains general descriptive information on

schools and school districts, data on the students and staff, and fiscal data (Common Core

of Data 2008). It is important to note a few limitations of using the CCD. Though the

information provided is fairly thorough and accurate, it is not entirely complete. State

education agencies do not always provide each type of requested data for a given district.

For example, a state may report a district's Title I funding and the number of enrolled

students, but not report how many students graduated in a particular year. The CCD also

contains information about the population in each school district, but this information is

based on US Census data rather than the district surveys. This can help give a general

idea about the poverty level of a particular district, but it does not necessarily provide up

to date information for each district.

The data range from 1994 to 2005. In 1994, President Clinton signed the

Improving America's Schools Act (IASA) which reauthorized the Elementary and

Secondary Education Act of 1965 (Improving America's Schools Act of 1994 2006). The

IASA included major provisions for the Title I program and expanded help available to disadvantaged students. Because the IASA changed the distribution of Title I funding, it would not be appropriate to analyze school performance and spending prior to 1994. The end date of 2005 was selected because it is the most recent year of available data.

In the following sections, data will be analyzed from several states. The first states discussed will be the "typical" states. By comparing two states that are fairly similar, I can avoid the mistake of claiming that characteristics unique to a given state are true of all states. The conclusions drawn from the initial analysis will then be compared to both high- and low-achieving states. By determining how well districts in various states perform given the size of the Title I allocations per student, we can determine which states use the funding well and which states use the funding poorly. Closer investigation can then determine a "best practices" method for distributing and using Title I funding.

After the analysis of the "typical" states, I will turn to states which have more progressive education policies—namely, states that restrict how much districts can spend. Expenditure equalization is an important part of the Title I program, so it is useful to oberserve how these limitations affect student performance. At this point, not only are comparisons between achievement gains of low-achieving students important, but comparing overall state graduation rates can help evaluate the merits of policies equalizing district spending.

The first section of the study will analyze spending and graduation rates in public school districts in the state of Michigan. Michigan provides a good baseline example of public education in the United States. Greene reports that Michigan had a graduation rate

one percent higher than the national median in 1998 (Greene 2002). Michigan is also typical in that it does not restrict spending disparities between districts. This allows an unobscured look at how differences in funding affect student performance. I will then replicte the analysis with data from Indiana and compare the results. In 1998, Indiana had a graduation rate equal to the national median (Greene 2002). I will then test the robustness of the results from these two similar states by replicating the analysis with data from Wisconsin (a state with a graduation rate eleven percent higher than the national median in 1998), data from New York (a state with a graduation rate nine percent below the national median in 1998), and data from Mississippi (a state with a grduation rate ten percent below the national median in 1998) (Greene 2002).

To test the effectiveness of more innovative approaches to school funding, I will also examine data from California and New Jersey. New Jersey guarantees a "foundation level" of spending per student in each district. The state then redistributes funding raised by property taxes across districts based on the average property value in a given district to equalize education spending per student across the state (The Glen Rock New Jersey Board of Education 2005). California limits per student spending differences to $300. Any revenue raised by a school distrcit that would create spending of $300 per student more than the lowest-spending district is redistributed by the state to other districts (Gruber 2007). Citizens in California have made attempts to circumvent the redistributive policies, but have not had any major success. I will discuss these attempts in greater detail in Chapter Five. Any extreme differences between California or New Jersey and the other five states could be evidence of the effectiveness of these progressive policies.

Michigan

As described in the previous section, the first step in my analysis is to establish a positive relationship between federal funding and district instruction expenses. The equation

$$Instruction\ per\ student_i = \beta_0 + \beta_1 Title\ I\ funding\ per\ student_i + u_i$$

estimates the relationship between Title I funding per student and instructional spending per student for each year i between 1995 and 2005.[1] This equation establishes a significant positive relationship for each year. The mean β_1 coefficient for the eleven single-year regressions is 1.799, though for the purposes of the study I am only interested in the fact that there is a significant positive relationship.[2]

The next step is to establish the relationship between money spent on instruction per student and student performance. I use the equation

$$Graduation\ rate_i = \beta_0 + \beta_1 Instruction\ per\ student_i + \beta_2 District\ adults'\ education_i + u_i$$

to show this relationship. This regression is run for each year between 1995 and 2005. The *district adults' education* variable[3] is included to help control for factors affecting

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[1] Each school year will be referred to by the year in which the school calendar ends. For example, the 2004-2005 school year will be referred to as 2005.

[2] The particular value of β_1 is only helpful insofar as it is both positive and significant. Because the model does not account for all the ways school districts can spend money, the coefficients suffer from an omitted explanatory variable bias and should not be used in an attempt to predict the actual amount of the Title I funding spent by districts. This step is merely to confirm the high correlation between Title I funding per student and instruction per student discussed earlier.

[3] This is a dummy variable taking the value of 1 if the percentage of adults in a given district with any type of college degree is greater than the percentage of adults in the district who did not receive high school diplomas. These limits were picked to estimate the amount of emphasis put on education in the student's home.

graduation rates that occur outside the classroom. Other variables that affect graduation rates—for example, student attitudes—are intangible and thus not included in the model. Models of student achievement in the relevant literature often include various control variables—district median income, upper and lower class dichotomies, parent education, parent involvement, class size, etc. The *district adults' education* variable is intended to serve as a proxy for many of these varibales since parents' education level is often associated with income, parental involvement, and student attitudes (Grubb, Huerta and Goe 2006). In order to avoid over specifying this nonrandomized model, the model has been limited to two independent variables (Achen 1986).

When considering all the districts in the state of Michigan, this equation does not provide evidence of a significant positive relationship. Of the eleven years studied, six showed a significant relationship. This relationship, however, is not one that was expected. The mean β_1 coefficient for the significant results is -0.00001321. This indicates that for each additional dollar spent on instruction, the graduation rate for the district actually falls by 0.001321%. This result is discouraging for two reasons. The first, and obvious, reason is that increasing instructional spending per student appears to lead to decreases in student performance. The second reason is that a decrease of 1% in the graduation rate corresponds to an increase of $757.10. Considering the average amount spent on instruction per student per year over the analyzed period was $5,634.98 with a standard deviation of $799.04, it is reasonable to infer that districts' expenditures directly impact graduation rates.

The above equation also fails to produce evidence a positive relationship between instructional spending per student and graduation rates for school districts heavily

influenced by Title I funding. For this set of districts, eight of the eleven years produce

significant results. The mean β_1 coefficient for the significant results is -0.0000346.

Comparing this to the mean β_1 for the state as a whole presents an interesting puzzle. The

data again produce a negative coefficient suggesting an inverse relationship between

instructional spending per student and graduation rates. However, the absolute value of

the coefficient is greater for the generally poorer school districts heavily influenced by

Title I funding than it is for the state as a whole. In short, money appears to have a greater

influence in the more poorly funded districts. The β_1 coefficient of -0.0000346 suggests

that the graduation rate will decrease by 1% when instruction per student is increased by

only $293.58. While the inverse relationship exists, this could be evidence that money is

relevant in predicting student performance in Title I heavy districts. .

It is important to consider why there is an apparent negative relationship between

instructional spending per student and graduation rates. There are two properties of the

data that must be examined—major outliers and variable composition A group of outliers

with the right combination of properites (high instructional spending per student with low

graduation rates and low instrucitonal spending per student with high graduation rates)

could skew the regression and produce the negative relationship. The data, however, do

not show this to be the case. Figure 3 shows each district's graduation rate and

instructional spending (corrected for inflation) for the state of Michigan between 1995

and 2005. The number of observations is sufficiently large that the relatively few points

outside of the general mass are unlikely to significantly impact the line of best fit.

Another possible problem could lie in the composition of the *instruction per*

student variable. Teacher salaries account for an estimated 66% of instructional

FIGURE 3
Graduation Rates vs Instructional Spending per Student in Michigan, 1995-2005[4,5]
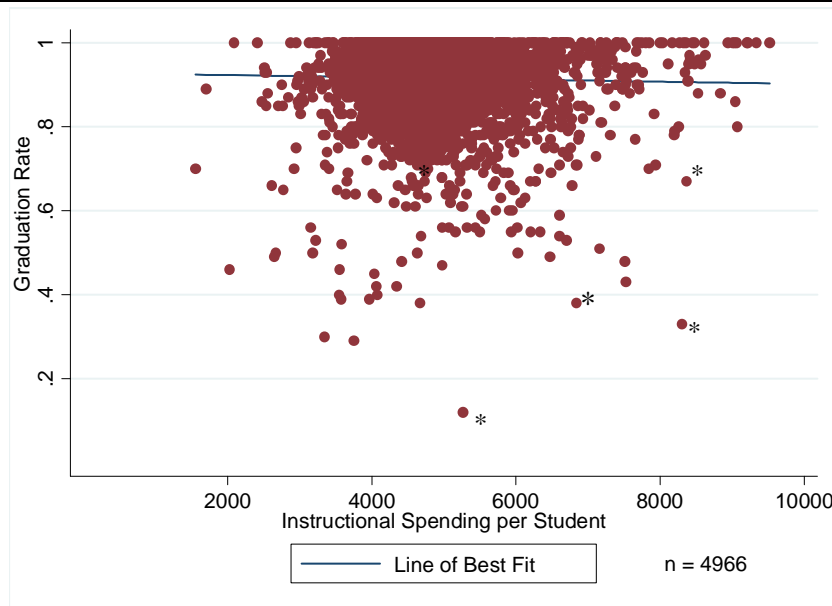
spending (Stullich, Eisner and McCrary 2007). If we can determine where teacher

salaries are highest, we may gain some insight into the negative relationship. The

conclusions of a study tracking teachers in the state of New York for fifteen years may

offer an explanation. The study found the salaries of teachers of nonpoor students are

higher than those of teachers of poor students. It also found that the salaries of teachers of

high-achieving students are higher than those of teachers of low-achieving students

(Lankford, Leob and Wyckoff 2002). This is evidence that schools with lower graduation

rates are not paying higher salaries in an attempt to improve teaching and increase student

performance. It also supports the hypothesis that districts with higher instructional

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[4] Asterisks denote districts with combinations of small populations and low graduation rates. The
small populations often cause an inflated measure of instructional spending per student and the
relatively small sample of 12th grade students largely randomizes graduation rates.

[5] This population contains an unusually high number of districts reporting 100% graduation rates.
When these districts are omitted from the sample, the line of best fit has a slightly more negative
slope, but the general relationship between instructional spending per student and graduation rates
is essentially unchanged.

spending per student will have higher levels of student achievment. Another major

determinant of instructional spending per student is the student to teacher ratio. However,

several studies find that class sizes are not significant factors in estimating student

performance (Lankford, Leob and Wyckoff 2002, Hanushek, Evidence, Politics, and the

Class Size Debate 2002).

Though the cause of the negative relationship between instructional spending and

graduation rates in the above model has not been resolved, it is helpful to examine other

models. To further investigate the effects of funding, I will introduce three new variables:

change in graduation rate, *change in Title I funding per student*, and *change in*

instructional spending per student. These variables are the difference in graduation rate,

Title I funding per student, and instruction per student, respectively, between a given year

and the previous year. For example, c*hange in Title I funding per student*$_{05}$ = Title I

funding in 2005 — Title I funding in 2004. The equation

$$\textit{Change in graduation rate}_i = \beta_0 + \beta_1 \textit{change in Title I funding per student}_i + u_i$$

will establish the relationship between the change in graduation rate and the change in

Title I funding per student from one year to the next for a given school district. The data

show overwhelmingly that when considering all the school districts in Michigan, there is

not a significant relationship between the changing graduation Title I funding and the

changing graduation rates. Only one of the ten years (1998) shows a significant

relationship. In this case $\beta_1 = 0.0001362$, meaning that a \$1 increase in Title I funding per

student corresponded to an increase of 0.01362% in the graduation rate between the 1997

and 1998 school years. Given that I previously found Title I heavy school districts to

have similar, but more intense, relationships with money, it is reasonable to expect that there will be a stronger effect in the Title I heavy school districts.

Regressing the above equation for Title I heavy districts yields similar results to those of the state as a whole. Again only one of the ten years (this time 1999) shows a significant relationship. In this case $\beta_1 = 0.000618$. This again illustrates that Title I heavy districts and the state as a whole exhibit similar behaviors, but money has a stronger effect in the poorer schools.

At the beginning of this chapter, I considered the relationship between graduation rates and instructional spending per student and found an inverse relationship. The results of the two preceding paragraphs have indicated that possible positive relationships could lie in observing changes in graduation rates and spending in particular districts. I will now look to see how yearly changes in instructional spending per student affect changes in graduation rates. The equation

$$\textit{Change in graduation rate}_i = \beta_0 + \beta_1 \textit{Change in instructional spending per student}_i + u_i$$

fails to produce evidence of a consistent relationship. Only three of the ten years exhibited significant relationships and of these years the mean β_1 was 0.00000466. It is encouraging to see the positive relationship, however the coefficient is so small that it is essentially zero. To create a one percent increase in the graduation rate, instruction per student would have to be increased by $2,145.92—an amount too large to be a feasible option in many school districts.

Considering only Title I heavy districts in the above model again produces results similar to that of the state as a whole. Two years show a significant relationship where the mean β_1 is 0.00008575. This suggests that it may be possible to increase graduation

rates in poor school districts through increasing spending on instruction. The estimate for β_1 predicts that to increase the graduation rate by 1%, instructional spending must increase by \$116.62 per student. This might be a feasible solution if schools have increased available resources, and it provides the foundation for the next set of analysis.

The preceding analysis shows that there might be a link between the graduation rate of a given year and the difference in spending from the previous year. I will now take that idea one step further. The Title I heavy districts have been narrowed down to a representative sample that can be tracked over longer periods of time. I now allow for a longer time lag to analyze the lasting effects of spending in a given year.

I first analyze the effects of a two year lag using the equations

$$Graduation\ rate_{i+2} = \beta_0 + \beta_1 Instruction\ per\ student_i + \beta_2 District\ adults'\ education_i + u_i$$

$$Graduation\ rate_{i+2} = \beta_0 + \beta_1 Title\ I\ funding\ per\ student_i + \beta_2 District\ adults'\ education_i + u_i$$

The first equation produces seven significant results in the nine two year lag periods analyzed. The mean β_1 is -0.0001353 which suggests increasing instructional spending by \$1 decreases the graduation rate by 0.014% two years later. The second equation produces three significant results with a mean β_1 of -0.00037. Though fewer significant results were produced, this suggests that Title I funding has an impact—albeit a negative impact—on student performance over a two year period.

The following two equations analyze the effect of a three year lag:

$$Graduation\ rate_{i+3} = \beta_0 + \beta_1 Instruction\ per\ student_i + \beta_2 District\ adults'\ education_i + u_i$$

$$Graduation\ rate_{i+3} = \beta_0 + \beta_1 Title\ I\ funding\ per\ student_i + \beta_2 District\ adults'\ education_i + u_i$$

The first equation produces five significant results for the eight three year lag periods. The mean β_1 is -0.0001397 again suggesting an inverse relationship between instructional spending and future graduation rates. The second equation produces two significant results with a mean β_1 of -0.0004209. Higher Title I funding again correlates with lower future graduation rates.

The following two equations analyze the effect of a four year lag:

$$Graduation\ rate_{i+4} = \beta_0 + \beta_1 Instruction\ per\ student_i + \beta_2 District\ adults'\ education_i + u_i$$

$$Graduation\ rate_{i+4} = \beta_0 + \beta_1 Title\ I\ funding\ per\ student_i + \beta_2 District\ adults'\ education_i + u_i$$

The first equation again provides several significant results. Five of the seven periods analyzed show significant relationships with a mean β_1 of -0.0001228. The second equation produced four significant results with a mean β_1 of -0.000422.

It is remarkable that the within the instructional spending and Title I funding groups of equations, the mean β_1 values stay relatively constant. This implies that the amount of time passing between the expenditure and the graduation year is relatively unimportant. However, the mean β_1 of instructional spending with time lags (-0.0001326) is approximately four times larger than the β_1 when considering graduation rates in the same year as expenditure in districts heavily influenced by Title I funding (-0.00003406) implying that expenditure has a much stronger effect on student performance in subsequent years. This result will be compared to data from other states to see if it is significant, or simply a fluke.

Many of the results discussed in this section have seemed rather discouraging. Table 2 provides a summary of the regression results. It is important to keep two things in mind when drawing conclusions from these results. First, only 33% of the regressions

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TABLE 2

Regression Results for Michigan 1995–2005

Regression	Number of Significant Results	Number of Insignificant Results	Mean β_1 for Significant Results	$ per Student to Change Grad Rate by 1%
Instruction per student$_i$ = β_0 + β_1 Title I funding per student$_i$ + u$_i$	11	0	1.79858106	—
Graduation rate$_i$ = β_0 + β_1 Instruction per student$_i$ + β_2 District adults' education$_i$ + u$_i$ (Overall)	6	5	-0.00001321	$757.10
Graduation rate$_i$ = β_0 + β_1 Instruction per student$_i$ + β_2 District adults' education$_i$ + u$_i$ (Title I Heavy)	8	3	-0.00003406	$293.58
Change in graduation rate$_i$ = β_0 + β_1 change in Title I funding per student$_i$ + u$_i$ (Overall)	1	9	0.00013620	$73.42
Change in graduation rate$_i$ = β_0 + β_1 change in Title I funding per student$_i$ + u$_i$ (Title I Heavy)	1	9	0.00061800	$16.18
Change in graduation rate$_i$ = β_0 + β_1 change in instructional spending per student$_i$ + u$_i$ (Overall)	3	7	0.00000467	$2,142.86
Change in graduation rate$_i$ = β_0 + β_1 change in instructional spending per student$_i$ + u$_i$ (Title I Heavy)	2	8	0.00008575	$116.62
Graduation rate$_{i+2}$ = β_0 + β_1 Instruction per student$_i$ + β_2 District adults' education$_i$ + u$_i$	7	2	-0.00013536	$73.88
Graduation rate$_{i+2}$ = β_0 + β_1 Title I funding per student$_i$ + β_2 District adults' education$_i$ + u$_i$	3	6	-0.00037397	$26.74
Graduation rate$_{i+3}$ = β_0 + β_1 Instruction per student$_i$ + β_2 District adults' education$_i$ + u$_i$	5	3	-0.00013970	$71.58
Graduation rate$_{i+3}$ = β_0 + β_1 Title I funding per student$_i$ + β_2 District adults' education$_i$ + u$_i$	2	6	-0.00042090	$23.76
Graduation rate$_{i+4}$ = β_0 + β_1 Instruction per student$_i$ + β_2 District adults' education$_i$ + u$_i$	5	2	-0.00012280	$81.43
Graduation rate$_{i+4}$ = β_0 + β_1 Title I funding per student$_i$ + β_2 District adults' education$_i$ + u$_i$	4	5	-0.00042203	$23.70

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(not counting the regressions confirming the positive relationship between Title I funding and instructional spending) yielded significant results. While the coefficients from the significant regressions are helpful guides in exploring the data, they are not definitive relationships. Second, the inverse relationship between funding and graduation rates does not mean funding necessarily harms student performance, particularly in the Title I heavy districts. In poorer school districts, we expect to see lower graduation rates and higher rates of Title I funding per student. The negative coefficients could simply mean that the Title I funding is growing faster than the graduation rates.

Still, there are a few particularly useful conclusions that can be drawn from the Michigan data. The first is that Title I heavy districts behave much like the overall state population of districts, only more sensitive to funding. The second is that the effects of spending do not appear to be much strong several years after the expenditure. The strongest evidence for positive relationships between graduation rates and funding is seen when comparing differences in graduation rates and expenditures between consecutive years. In order to test the robustness of these conclusions, the same analyses will be applied to a fresh set of data.

Indiana

For the purposes of this study, I consider Indiana fairly similar to Michigan. Over the period studied, the states have similar graduation rates and GDP per capita (Greene 2002, Gross Domestic Product by State 2007). If the conclusions drawn from the Michigan data are valid, we should expect to see similar patterns in the Indiana data. The set of analyses used in the previous section will thus be applied to Indiana school

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TABLE 3

Regression Results for Indiana 1995-2005

Regression	Number of Significant Results	Number of Insignificant Results	Mean β_1 for Significant Results	$ per Student to Change Grad Rate by 1%
Instruction per student$_i$ = β_0 + β_1Title I funding per student$_i$ + u_i	11	0	2.31408391	—
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i (Overall)	7	4	-0.00001241	$805.52
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i (Title I Heavy)	5	6	-0.00001974	$506.59
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u_i (Overall)	1	9	-0.00182600	$5.48
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u_i (Title I Heavy)	1	9	0.00163680	$6.11
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u_i (Overall)	1	9	0.00001830	$546.45
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u_i (Title I Heavy)	2	8	0.00009730	$102.77
Graduation rate$_{i+2}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i	5	4	-0.00004346	$230.10
Graduation rate$_{i+2}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u_i	2	7	-0.00024780	$40.36
Graduation rate$_{i+3}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i	4	4	-0.00005345	$187.09
Graduation rate$_{i+3}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u_i	2	6	-0.00030455	$32.84
Graduation rate$_{i+4}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i	4	3	-0.00005248	$190.57
Graduation rate$_{i+4}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u_i	1	6	-0.00027840	$35.92

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districts. To prevent unnecessary methodological repetition, all regression results will be presented in a table and then conclusions will be discussed.

The results from Indiana are quite similar to the results from Michigan. As expected, both states show increases in instructional spending per student as Title I funding per student increases. Indiana also demonstrates that districts heavily influenced by Title I funding are more sensitive to funding and spending changes. The analyses of instructional spending affecting graduation rates within a given year and of changes instructional spending in consecutive years show that the amount of money needed to affect graduation rates in Title I heavy districts is much smaller than in the state as a whole. The signs of the mean β_1s are also consistent with the Michigan results. Only the regression

$$\textit{Change in graduation rate}_i = \beta_0 + \beta_1 \textit{Change in Title I funding per student}_i + u_i$$

produces a β_1 with the sign opposite of the sign of the Michigan coefficient. Too much emphasis should not be placed on this difference, however, since this regression produced only one significant result in both Indiana and Michigan.

The Indiana data also support the conclusion that instructional spending per student has a greater effect on graduation rates in years after the expenditure than in the concurrent year. The β_1s for the two, three, and four year lags are again fairly constant (with a mean value of -0.0004979). This value is roughly two and a half times the β_1 for graduation rates in the same year as instructional spending in Title I heavy districts. This again implies the expenditures have a greater effect in later years.

The previously unexplained negative relationship between instructional spending and graduation rates persists in the Indiana data. This is helpful for the purposes of this

study because it offers evidence that negative relationship in Michigan was not a fluke, but it also does nothing to explain the relationship. While Indiana, as expected, supports the conclusions drawn from analyzing Michigan, it is not helpful in explaining unexpected regression results. For this, we look to states dissimilar from Indiana and Michigan.

Wisconsin

Wisconsin consistently has graduation rates significantly higher than those of Michigan and Indiana (Greene 2002). Comparing the results from Michigan and Indiana to the data from Wisconsin could show how differences in the relationship between Title I funding and instructional spending lead to higher student achievement. The results of the Wisconsin regressions are presented in Table 4.[6]

The results of the Wisconsin regressions are similar to that of Michigan and Indiana. There is again a positive correlation between the amount of Title I funding a school district receives and the amount that district spends on instruction per student. Wisconsin also supports the claim that districts heavily influenced by Title I funding are more sensitive to funding and spending changes than districts in the overall population. It is interesting to note that Wisconsin shows a consistent—and higher—number of significant results for single year changes in both instructional spending per student and Title I funding per student, each with positive β_1s. While still outnumbered by insignificant results, it is remarkable that the state with the highest graduation rates also has the highest number of significant positive relationships for single year changes.

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[6] The available data did not contain graduation rate information for 2004 and 2005. The analysis of Wisconsin thus covers the period of 1995-2003.

TABLE 4

Regression Results for Wisconsin 1995-2003

Regression	Number of Significant Results	Number of Insignificant Results	Mean β_1 for Significant Results	$ per Student to Change Grad Rate by 1%
Instruction per student$_i$ = β_0 + β_1Title I funding per student$_i$ + u$_i$	9	0	1.72133659	—
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u$_i$ (Overall)	6	3	-0.00001423	$702.58
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u$_i$ (Title I Heavy)	5	4	-0.00005362	$186.50
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u$_i$ (Overall)	3	5	0.00065963	$15.16
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u$_i$ (Title I Heavy)	3	5	0.00096803	$10.33
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u$_i$ (Overall)	3	5	0.00010753	$92.99
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u$_i$ (Title I Heavy)	3	5	0.00016123	$62.02
Graduation rate$_{i+2}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u$_i$	4	3	-0.00006103	$163.87
Graduation rate$_{i+2}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u$_i$	4	3	-0.00031765	$31.48
Graduation rate$_{i+3}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u$_i$	4	2	-0.00005870	$170.36
Graduation rate$_{i+3}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u$_i$	3	3	-0.00034003	$29.41
Graduation rate$_{i+4}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u$_i$	3	2	-0.00005577	$179.32
Graduation rate$_{i+4}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u$_i$	2	3	-0.00029815	$33.54

There is one important difference between the Wisconsin results and the Michigan and Indiana results: the Wisconsin data does not show a significantly stronger relationship between instructional spending and graduation rates in subsequent years than between graduation rates and instructional spending in the same year. The β_1s for the two, three, and four year lags are again fairly constant (with a mean value of -0.00005850) while the β_1 for concurrent instructional spending per student and graduation rates is -0.00005362. The absolute value of the coefficient for the lags is 1.09 times greater than it is for the concurrent expenditures and graduation rates which implies that instructional spending per student has a constant effect on student performance regardless of when performance is measured. This result is important because it dispels the idea that it takes time for students to reflect the impact of the increased expenditure.

Unfortunately, Wisconsin does nothing to help resolve the counterintuitive negative relationship between instructional spending per student and graduation rates. It does, however, help to show that this relationship extends into the higher performing states. Wisconsin also more clearly shows a decline in the power of money over longer time intervals. As the graduation year gets further away from the year of the expenditure, the number of significant results steadily declines. This seems to be evidence of spending having a strong immediate effect, but if it is not sustained, having a limited long term impact. To see if these trends apply to the nation as a whole, it is necessary to compare these data to that of a low performing state.

New York

New York has the second lowest graduation rate of the states analyzed in this study (Greene 2002). It is also one of the largest recipients of Title I funding (ESEA Title I LEA Allocations 2008). Comparing the conclusions from Michigan, Indiana, and Wisconsin to the data from New York will determine if the conclusions apply to the nation as a whole. The regression results from New York are presented in Table 5.[7]

The results for New York are reasonably similar to the results from the other states. There is again a positive relationship between Title I funding per student and instructional spending per student. The difference in sensitivity to money between all of the districts in New York and the Title I heavy districts is incredibly pronounced. The regression of graduation rates on instructional spending for Title I heavy districts produces a significant result for each year analyzed. The mean β_1 for these results (-0.001476) is quite unexpected, but this is the first regression to produce a significant relationship in each year. New York is also different from Michigan and Indiana—and similar to Wisconsin—in that there is no noticeable decline in the effectiveness of money over time.

New York produces results different from the other states for the regressions regarding single year changes. Though a higher number of significant results are produced, the sign of the β_1s for three of the four regressions is negative. The trend for the other states had been for the β_1s to be positive. While the evidence from the other states suggested that increasing funding and instructional spending would increase graduation rates in the following year, the increased funding and spending actually

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[7] The available data did not contain graduation rate information for 2004 and 2005. The analysis of New York thus covers the period of 1995-2003.

TABLE 5

Regression Results for New York 1995–2003

Regression	Number of Significant Results	Number of Insignificant Results	Mean β_1 for Significant Results	$ per Student to Change Grad Rate by 1%
Instruction per student$_i$ = β_0 + β_1Title I funding per student$_i$ + u_i	9	0	5.00241400	—
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i (Overall)	2	7	-0.00000303	$3,300.33
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i (Title I Heavy)	9	0	-0.00001476	$677.61
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u_i (Overall)	3	5	-0.00011800	$84.75
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u_i (Title I Heavy)	4	4	-0.00023713	$42.17
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u_i (Overall)	5	3	0.00000996	$1,004.02
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u_i (Title I Heavy)	3	5	-0.00003757	$266.19
Graduation rate$_{i+2}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i	5	2	-0.00001828	$547.05
Graduation rate$_{i+2}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u_i	6	1	-0.00028998	$34.48
Graduation rate$_{i+3}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i	5	1	-0.00001930	$518.13
Graduation rate$_{i+3}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u_i	4	3	-0.00029933	$33.41
Graduation rate$_{i+4}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i	2	3	-0.00001109	$902.12
Graduation rate$_{i+4}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u_i	4	1	-0.00027658	$36.16

correlated with lower graduation rates in the following year in New York. This is likely an extension of the recurring intra-year negative relationship between instruction per student and graduation rates. It is peculiar, however, that the worst performing state in the sample is also the only state to display this relationship.

The negative relationship between instructional spending per student and graduation rates persists in New York. As discussed above, the relationship is even extended to the single year change regressions. The relationship thus exists in states performing at all levels and is likely a characteristic of the entire nation. Though the reasons for this relationship have yet to be determined, we will now look at a state with low performance and very low overall educational expenditures.

Mississippi

There is an unusually high concentration of states with low-performing states in the southeastern part of the United States. Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee all have graduation rates well below the national median (Greene 2002). In addition to the low graduation rate, Mississippi also has one of the lowest per pupil education expenditures in the nation (Public Education Finances 2006). Analyzing data from Mississippi will show how changes in funding and expenditures affect districts in a state where funding is particularly scarce. Comparing the results from Mississippi to the results from the other states will show how the overall level of funding affects student performance. The results of the Mississippi regressions are presented in Table 6.

TABLE 6

Regression Results for Mississippi 1995-2005

Regression	Number of Significant Results	Number of Insignificant Results	Mean β_1 for Significant Results	$ per Student to Change Grad Rate by 1%
Instruction per student$_i$ = β_0 + β_1Title I funding per student$_i$ + u_i	11	0	0.74302686	—
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i (Overall)	2	9	-0.00003700	$270.27
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i (Title I Heavy)	0	11	—	—
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u_i (Overall)	0	10	—	—
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u_i (Title I Heavy)	1	9	0.00008800	$113.64
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u_i (Overall)	1	9	0.00056340	$17.75
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u_i (Title I Heavy)	0	10	—	—
Graduation rate$_{i+2}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i	2	7	-0.00003250	$307.69
Graduation rate$_{i+2}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u_i	2	7	-0.00002875	$347.83
Graduation rate$_{i+3}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i	1	7	-0.00003350	$298.51
Graduation rate$_{i+3}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u_i	3	5	-0.00007423	$134.72
Graduation rate$_{i+4}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i	2	5	-0.00003885	$257.40
Graduation rate$_{i+4}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u_i	3	4	-0.00007853	$127.34

The only strong similarity between Mississippi and the other states analyzed is the positive correlation between the amount of Title I funding a school district receives and the amount that district spends on instruction per student. The lack of significant results beyond this relationship makes analysis and comparisons to other states difficult. Mississippi did not produce enough significant results to compare the sensitivity to funding changes in Title I heavy districts to the sensitivity in the state as a whole. The few significant results do, however, allow for a comparison of the time lag analysis to the concurrent expenditure and graduation rate analysis. The β_1s for the two, three, and four year lags are fairly constant (with a mean value of -0.00003495) while the β_1 for concurrent instructional spending per student and graduation rates is -0.00003700. This result is similar to Wisconsin and New York in that there is not a major change in the effectiveness of instructional spending between the year in which the expenditure takes place and the year in which student performance is measured.

While the lack of significant results makes analysis of funding effects in Mississippi difficult, when combined with the fact the Mississippi spends very little on education, it raises an important question: is there a minimum amount of spending that is necessary in order for the spending to be effective? This seems fairly intuitive. It would be unreasonable to expect spending $10 per student per year to cause high student achievement, but would spending $10,000 per student per year cause high student performance? Would spending $20,000 per student per year? If so, at what points do spending per student become a key factor in predicting student outcomes?

Threshold Effects

  The analyses of the five states presented in this chapter have each produced a counterintuitive inverse relationship between instructional spending per student and graduation rates. Previous sections have considered outliers in the data and variable composition as causes for this relationship, but neither was shown to be definitive. This section will instead consider the possibility of the existence of upper and lower thresholds of effective spending.

  To test for thresholds, I assign each state's districts to one of three groups depending on the district's amount of instructional spending per student: those who spent more than one standard deviation less the mean amount of spending (*Less*), those who spent within one standard deviation of the mean amount of spending in either direction (*Mean*), and those who spent more than one standard deviation more than the mean level of spending (*More*). After adjusting the data for inflation so all years could be considered at the same time, the equation

$$Graduation\ Rate_i = \beta_0 + \beta_1 District\ adults'\ eduction_i + \beta_2 Less_i + \beta_3 Mean_i + u_i$$

provided estimates of the effects of funding. The coefficients of *Less* and *Mean* give the relative importance of instructional spending per student in these categories to the importance of instructional spending per student in the *More* category. The coefficients are compared to the *More* category so that we will be able to see if the districts that spend the most on instruction per student have significantly different graduation rates from the rest of the districts. We can then use these results to infer whether or not continually increasing instructional spending per student produces continually increasing graduation rates. The results of this regression are presented in Table 7.

TABLE 7

Threshold Effects Regression Results (Typical States)

State	Coefficient on *Less*	Significant?	Coefficient on *Mean*	Significant?
Michigan	0.0270636	Yes	0.0209771	Yes
Indiana	0.0310962	Yes	0.0157195	Yes
Wisconsin	0.0056607	No	0.0103247	Yes
New York	0.0203043	No	-0.0039599	No
Mississippi	0.0016792	No	-0.0061363	No

This analysis does not provide clear evidence of spending thresholds. Two states, Michigan and Indiana, provide the expected results. Spending effects in *Less* and *Mean* are significantly different than *More*. Moreover, the effect is strongest in *Less*, meaning that changes in spending have a larger effect in districts that spend less.

New York and Mississippi, however, do not show significant differences in graduation rates across the different spending categories. This means in these states, increasing the amount of instructional spending per student will not produce a significant increase in graduation rates. This is evidence that the assumption that increasing funding monotonically increases graduation rates—which is implicitly included in the regression analyses presented earlier in this chapter—is false.

Wisconsin provides yet a different interpretation of the thresholds. As spending moves away from the mean—both from increased and decreased spending—the effect on graduation rates weakens. This implies that there is both an upper and lower threshold for effective spending. If this interpretation is correct, districts in the *Less* category can improve their graduation rates by increasing their instructional spending per student, but the districts currently in the *Mean* category have no motivation to increase their spending.

To further explore the effects of thresholds, we will follow the pattern of analyses established earlier in this chapter, except we will substitute the threshold categories for the *instructional spending per student* variable in the equation. We now consider

$$\text{Change in graduation rate}_i = \beta_0 + \beta_1 Less_i + \beta_2 Mean_i + u_i$$

where *Less* is the group of districts who changed their instructional spending by more than one standard deviation less than the mean and *Mean* is the group of districts who changed their instructional spending by less than one standard deviation from the mean. The results from this regression are presented in Table 8.

TABLE 8

Threshold Effects in Single Year Instructional Spending per Student Changes (Typical States)

State	Coefficient on *Less*	Significant?	Coefficient on *Mean*	Significant?
Michigan (Overall)	-0.0164826	Yes	-0.0105861	Yes
Indiana (Overall)	-0.0143350	Yes	-0.0010093	No
Wisconsin (Overall)	-0.0258305	Yes	-0.0114075	Yes
New York (Overall)	-0.0234545	Yes	-0.0176693	Yes
Mississippi (Overall)	-0.0064651	No	-0.0079548	No
Michigan (Title I Heavy)	-0.0317391	No	-0.0166952	No
Indiana (Title I Heavy)	-0.0779892	Yes	-0.0332014	Yes
Wisconsin (Title I Heavy)	-0.0465594	Yes	-0.0131011	No
New York (Title I Heavy)	-0.0109583	No	-0.0146676	No
Mississippi (Title I Heavy)	0.0040741	No	-0.0016204	No

The threshold analysis for single year changes in graduation rates and instructional spending per student produces interesting results. The overall analysis for each state shows significant differences between the effects of spending in the different categories. The coefficients also show that districts should (in most cases) be motivated

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to increase their instructional spending to attain higher graduation rates. This is evidence of increasing Title I funding and instructional expenditures.

There is less evidence of thresholds in the analysis of each state's Title I heavy districts. Only two states had showed significant differences for the *Less* category and only one state showed significant differences for the *Mean* category. The coefficients for the significant results are again negative suggesting that as districts increase their amount of instructional spending, graduation rates should increase. This lack of significant results, however, offers more evidence that the assumption that increasing funding monotonically increases student performance is incorrect.

Mississippi stands out as being the only state to not produce a single significant result. This is noteworthy given Mississippi's extremely low overall level of educational spending, and could indeed be a function of the low levels of spending. Had the categories been based on absolute numbers rather than relative statistics (for example, if *More* had been defined as districts spending more than $10,000 on instruction per student rather than as districts spending more than one standard deviation more than the mean amount of spending), perhaps Mississippi would have shown significant results.

To continue this analysis we consider the equation

$$\textit{Change in graduation rate}_i = \beta_0 + \beta_1 \textit{Less}_i + \beta_2 \textit{Mean}_i + u_i$$

where *Less* is the group of districts who received a Title I grant more than one standard deviation less than they received the previous year and *Mean* is the group of districts who received a Title I grant within one standard deviation of the grant they received the previous year. These results are presented in Table 9.

TABLE 9

Threshold Effects in Single Year Title I Funding per Student Changes (Typical States)

State	Coefficient on *Less*	Significant?	Coefficient on *Mean*	Significant?
Michigan (Overall)	-0.0140126	No	-0.0155479	Yes
Indiana (Overall)	-0.0000349	No	0.0066993	No
Wisconsin (Overall)	-0.0032459	No	-0.0030315	No
New York (Overall)	-0.0329058	Yes	-0.0133331	Yes
Mississippi (Overall)	-0.0055427	No	0.0011488	No
Michigan (Title I Heavy)	-0.0266517	No	-0.0371695	Yes
Indiana (Title I Heavy)	-0.0673968	Yes	-0.0527978	Yes
Wisconsin (Title I Heavy)	-0.0302177	No	-0.0116829	No
New York (Title I Heavy)	-0.0331071	No	-0.0174058	No
Mississippi (Title I Heavy)	-0.0500150	Yes	-0.0200000	No

This analysis does not support the hypothesis that there are thresholds of effectiveness for Title I grants. For the entire population of districts in each state, only one state showed a significantly different *Less* category and only two states showed a significantly different *Mean* category—hardly enough to claim there is an overall trend.

The analysis of Title I heavy districts produces similar results. In this subset, only two states had either a significantly different *Less* or *Mean* category and only one state showed a significant difference for both categories. Mississippi showed a significant difference between the *Less* category and the *More* category for districts heavily influenced by Title I. It is noteworthy that the state spending the least on education was one of the two to show a significant difference between the *Less* and *More* groups.. This suggests that the federal funding can make a difference in student outcomes.

The final part of this analysis tests for thresholds of effective spending based on student outcomes in subsequent years. The equation

$$Graduation\ rate_{i+k} = \beta_0 + \beta_1 District\ adults'\ education_i + \beta_2 Less_i + \beta_3 Mean_i + u_i$$

where i is the year of expenditure, k is the number of years after the expenditure student performance is measured, *Less* is the group of districts who spent more than one standard deviation below the mean amount of instructional spending per student, and *Mean* is the group of districts who spent within one standard deviation of the mean amount of spending. The results of this analysis are presented in Table 10.

Michigan and Indiana, as they did with the threshold analysis of instructional expenditures and graduation rates in the same year, produce the expected results. In each of the two, three, and four year lag analyses, these two states show significant differences between the spending categories. They also consistently show that instructional spending makes the biggest difference in districts that spend the least and the least difference in districts that spend the most. This indicates that the returns to spending are positive but decreasing, and likely produce a curvilinear relationship between instructional spending per student and graduation rates.

Wisconsin and New York show a significant difference between the *Less* and *More* categories, but not between the *Mean* and *More* categories. This shows that money has the largest impact on the districts spending the least on instruction per student and no distinguishing impact on the *Mean* and *More* categories. This is helpful in showing that funding is important to districts in the *Less* category, but it also is evidence that the assumption of funding increases monotonically increasing graduation rates is false.

Mississippi once again produces no significant results. This is of particular importance considering all other states (at least for the *Less* category) showed strong significant relationships. This could once again be a result of variable definitions and

TABLE 10

Threshold Effects in Lag Regressions (Typical States)

State	Coefficient on *Less*	Significant?	Coefficient on *Mean*	Significant?
Michigan (2 Year Lag)	0.1981393	Yes	0.1459786	Yes
Indiana (2 Year Lag)	0.0530789	Yes	0.0471610	Yes
Wisconsin (2 Year Lag)	0.0866667	Yes	-0.0016667	No
New York (2 Year Lag)	0.1530827	Yes	0.0719298	No
Mississippi (2 Year Lag)	0.0570513	No	0.0411538	No
Michigan (3 Year Lag)	0.1339840	Yes	0.1045535	Yes
Indiana (3 Year Lag)	0.0651712	Yes	0.0524412	Yes
Wisconsin (3 Year Lag)	0.0960000	Yes	0.0122500	No
New York (3 Year Lag)	0.1566667	Yes	0.0750000	No
Mississippi (3 Year Lag)	0.0322603	No	0.0408219	No
Michigan (4 Year Lag)	0.1629945	Yes	0.1292347	Yes
Indiana (4 Year Lag)	0.0663542	Yes	0.0557770	Yes
Wisconsin (4 Year Lag)	0.1175000	Yes	0.0400000	No
New York (4 Year Lag)	0.1555000	Yes	0.0581285	No
Mississippi (4 Year Lag)	0.0371429	No	0.0669697	No

and serve as evidence that there is an overall threshold (in absolute dollar terms) that must be broken for instructional spending per student to be effective.

The threshold analyses produced extremely mixed results. Two states, Michigan and Indiana, consistently showed that the amount of money a district spent on instruction per student affected the district's graduation rate. They showed that spending was most important to districts that spent the least and that the amount of spending became less important and districts spent more and more. These states supported a curvilinear relationship between instructional spending per student and graduation rates.

Wisconsin and New York did not yield consistent results. The results were often mixed or insignificant and prevented a clear pattern of instructional spending's impact on particular categories from emerging. While not explicitly defining the relationship between instructional spending per student and graduation rates, these states indicate that increases in spending do not simply result in monotonically increasing graduation rates.

Mississippi produced very few significant results. In addition to providing evidence against the assumption that spending monotonically increases graduation rates, this shows that there may be a minimum level of spending that is required for instructional expenditures to be effective. While a different set of analyses is required to determine exactly what that threshold is, for now we are satisfied to conclude that increasing instructional spending per student will not lead to continually increasing graduation rates.

Conclusions

When considering the conclusions reached by this study, it is important to bear in mind that only 33.2% of the regressions produced significant results. The coefficients produced are thus likely to be good estimators of the proper coefficients, but that is also their limit. The numbers are meant to be used as guidelines to relationships rather than strict population parameters. That said, there are a few useful patterns that emerge from the data.

In short, money matters more in school districts with constrained budgets. In most cases, it was shown that in districts receiving high levels of Title I funding per student, smaller amounts of money can change the graduation rate. This is an important result

because it helps justify granting large sums of money to poorly funded school districts. It also gives some credibility to the claim that proper funding can equalize opportunity in public schools and eventually equalize achievement rates.

While money can affect graduation rates, a recurring negative relationship persisted between instructional spending per student and graduation rates. A preliminary discussion of why this relationship could exist was outlined in the "Michigan" section of this chapter, and though the data continued to display this relationship, no driving forces became apparent. There are a number of other variables that could have been included in this chapter's models—student attitudes, teacher quality, students' natural abilities, etc.—which were not because of their immeasurability. Other measurable variables—each district's unemployment rate, each district's size, each district's location—were not included because "with quasi-experimental data derived from nonrandomized assignments, controlling for additional variables in a regression may worsen the estimate of the treatment effect, even when the additional variables improve the specification" (Achen 1986, 27). Identifying and quantifying each variable that affects graduation rates could help explain the negative relationships in this chapter and extend this study, but this is at the very least a daunting and likely impossible task.

In an attempt to identify a possible force behind the negative relationships, I attempted to determine if there exists a threshold for effective instructional spending per student. The results were mixed and far from definitive, but showed that the assumption that increases in instructional spending per student monotonically increase graduation rates is false. This is an important results when considering not only the conclusions of

this study, but also the conclusions of every studying assuming funding increases

continuously cause proportional achievement increases.

To continue the search for national trends in the relationship between Title I

funding per student and student achievement, it is necessary to take the conclusions

drawn from "typical" states and compare them with conclusions from states that deviate

from standard policies. In the next chapter, data from two states with more progressive

education policies will be analyzed. Though the threshold analysis has shown that

conclusions drawn from this type of analysis must be cautiously reviewed, the

comparison of typical states to atypical states can still be informative. This analysis will

be helpful not only as a comparison to the analysis of this chapter, but also as an

evaluation of the policies employed by these states.

Four

The Progressive States

Introduction

The delegation of the bulk of education policy to state governments allows each state to develop the policy it thinks will most efficiently, equitably, and properly educate its youth. This benefits the nation as a whole because states are free to experiment with their policies and learn from what other states have done. This becomes increasingly important as criticism of the public education system becomes more severe. A state policy is by nature much more fluid and flexible than a federal policy, so states can implement new policies in a relatively short amount of time.

California and New Jersey are two states with progressive education policies that are of great interest to this study. Both states attempt to limit the disparity in educational spending per student across school districts. If student achievement is directly related to educational spending per student, we should expect to see, if these policies are effectively carried out, smaller variances in graduation rates. It will also be important to see how each state performs in comparison to other states. It is possible that equalizing spending will equalize student achievement, but this does not necessarily mean that it will *improve*

student achievement. Student outcomes can, after all, be equalized just as easily by lowering the graduation rates of high-performing districts as by raising the graduation rates of low-performing districts.

The same procedures used to analyze Michigan, Indiana, Wisconsin, New York, and Mississippi will be used to analyze New Jersey and California. Although the threshold analysis in the previous chapter directly challenges some of the assumptions of the analyses, for the sake of consistency and comparability the same analyses will be applied to New Jersey and California. Once the data from the progressive states have been analyzed, I can draw more accurate conclusions about national trends in the causes of student achievement.

New Jersey

The New Jersey public school system has a history of attempted equal spending across school districts. For much of the recent past, the New Jersey state government has decided what it considers the appropriate "cost" of a high school education, and adjusts the district funding schedules accordingly (The Glen Rock New Jersey Board of Education 2005). While several formulas for distribution have been used, they all apply the same policy. If a district can raise the appropriate level of funding through property taxes, the burden of funding the district then falls on the locality. Any taxes collected above the amount required to fund the school district are collected by the state. If the district cannot raise enough money, the state then redistributes the excess property taxes based on the average property value in each district (Gruber 2007).

If variances in funding lead to variances in graduation rates, we should expect to see smaller variances in states such as New Jersey that have equity controls for educational spending. The variances of all districts in each state—where all years studied are aggregated into one variable—are presented in Table 11.

TABLE 11
Variances of Graduation Rates for all Districts in Each State

State	Variance
Mississippi	0.00398627
Indiana	0.00419506
Wisconsin	0.00447213
New Jersey	0.00530028
Michigan	0.00653625
California	0.02986813
New York	0.07875522

Table 11 shows New Jersey does not have a significantly smaller variance than the other states studied. Although the initial hypothesis that New Jersey would have a smaller variance in graduation rates was rejected, it is instructive to apply the same regression analyses that were applied to the other states as New Jersey is ranked as a high-performing state (Greene 2002). The results of the regressions are presented in Table 12.[8]

The New Jersey results present several remarkable relationships. The most striking characteristic is the lack of significant relationships between spending and student performance. New Jersey is the first case where it is not demonstrated that Title I heavy school districts are more sensitive to funding and spending changes than the districts in the state as a whole.

Conspicuously absent from the results is the negative relationship between instructional spending per student and graduation rates that has appeared in the analyses

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[8] Due to an insufficient amount of available data, the mutli-year lag regressions have been omitted.

TABLE 12

Regression Results for New Jersey 1995-2005

Regression	Number of Significant Results	Number of Insignificant Results	Mean β_1 for Significant Results	$ per Student to Change Grad Rate by 1%
Instruction per student$_i$ = β_0 + β_1Title I funding per student$_i$ + u_i	9	2	4.20581055	—
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i (Overall)	2	9	0.00000637	$1,569.86
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u_i (Title I Heavy)	0	11	—	—
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u_i (Overall)	4	6	0.00046690	$21.42
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u_i (Title I Heavy)	2	8	0.00077755	$12.86
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u_i (Overall)	2	8	0.00004885	$204.71
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u_i (Title I Heavy)	2	8	0.00003980	251.26

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of each of the other states. There are three possible explanations for this. First, it could be that the only unusual aspect is the positive coefficient for the regression of instruction per student on graduation rate for the state as a whole. Other states have positive single-year change coefficients. To confirm or reject this explanation, access to a richer data source is required. Second, the positive coefficients could be a consequence of the lower number of significant results. Perhaps if the relationship was stronger, we would observe more significant regressions and be able to justify the positive coefficient. Third, the redistributive policies of New Jersey could be effective in improving student performance. Due to the limited amount of available data, the effects of instructional expenditures on future graduation rates cannot be analyzed.

The analyses of New Jersey provide seemingly contradictory results. The information in Table 12 suggests that New Jersey's equalization policies might actually be ensuring all students have an equal opportunity to succeed. The high variance of graduation rates, however, suggests that New Jersey's results are not necessarily an improvement over the previously analyzed states. To further explore the effects of expenditure equalization requirements, I will now examine a state with an even stricter redistributive policy.

California

Of the seven states analyzed in this study, California has the strictest policies regarding expenditures per student. Discrepancies in per student expenditures per district are not allowed to exceed $300. That is, if the district with the smallest expenditures spends $1,000 per student, no district can spend more than $1,300 per student. If a district

raises an amount of money such that spending discrepancies will exceed $300, the state government redistributes the money to poorer districts (Gruber 2007). This is not to say that instructional spending per student cannot vary by more than $300. Suppose there are two school districts A and B each with total expenditures of $2,000. If A spends $1,200 per student on instruction and $800 per student on building renovations and B spends $1,600 per student on instruction and $400 per student on building renovations, overall spending is equal, but instructional spending per student varies by more than $300. This policy also may cause localities to tax citizens less than the optimal amount thus reducing the quality of the state school system as a whole, but that is a topic for another study.

California residents have tried finding various ways around the redistributive policies to ensure that their children's schools districts have ample budgets. Most of these attempts have been rather unsuccessful. The California Department of Education reports that about 6% of school funding comes from miscellaneous local revenues including "fees on commercial or residential construction; special elections for parcel taxes; contributions from parents, businesses, and foundations; cafeteria sales; and interest on investments by local school districts" (A Guide to California's School Finance System 2007). Among the most popular methods for attempting to increase school revenues are elections for parcel taxes and districts forming private foundations to receive contributions. To institute parcel taxes, districts have to hold a special election and have a two-thirds majority in favor of the new tax. This two-thirds majority requirement causes many proposed parcel taxes to be killed on election day (Local Sources of Revenue 2007). Slightly more successful are the private foundations formed by districts to receive

contributions from individuals and local businesses. The number of private foundations

has skyrocketed since the early 1970s. By 1995, at least one organization was operating

in one third of all California school districts (Brunner and Sonstelie 1997). These

foundations raised an estimated $100 million in 2005 (Local Sources of Revenue 2007).

With the conservative assumption that private foundations continued to operate in only

one third of the districts in 2005, the accumulated revenue divides into roughly $300,000

per district. While this is certainly more successful than other attempts at raising revenue,

$100 million is a very small fraction of California's education funding and is unlikely to

make a major difference in overall school funding.

As with New Jersey, we would expect California's funding limitations to limit the

variance of graduation rates. However, Table 11 shows that California has the second

highest variance in graduation rates. The fact that the two most populous states in the

study—and among the most populous states in the country—have the highest variance in

graduation rates suggests that variance is more a function of population and a diverse

composition of districts than of simple dollars and cents. Although California does not

have a small variance in graduation rates as a result of funding constraints, it is still

helpful to run the previous regression analyses to see if the conclusions from the previous

states apply to California—another low performing state (Greene 2002). The results of

the regressions are presented in Table 13.

Like New Jersey, California yields low number of significant results. Any

commentary of the values of the coefficients is almost moot because of the overwhelming

number of insignificant results. The results do show, however, that Title I funding has no

significant effect on graduation rates in future years. If the funding does not have an

TABLE 13

Regression Results for California 1995-2005

Regression	Number of Significant Results	Number of Insignificant Results	Mean β_1 for Significant Results	\$ per Student to Change Grad Rate by 1%
Instruction per student$_i$ = β_0 + β_1Title I funding per student$_i$ + u$_i$	11	0	2.70818663	—
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u$_i$ (Overall)	2	9	-0.00000110	\$9,090.91
Graduation rate$_i$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u$_i$ (Title I Heavy)	1	10	0.00002250	\$444.44
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u$_i$ (Overall)	3	7	-0.00000913	\$1,094.89
Change in graduation rate$_i$ = β_0 + $\beta_1$change in Title I funding per student$_i$ + u$_i$ (Title I Heavy)	1	9	0.00002730	\$366.30
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u$_i$ (Overall)	5	5	-0.00000030	\$33,783.78
Change in graduation rate$_i$ = β_0 + $\beta_1$change in instructional spending per student$_i$ + u$_i$ (Title I Heavy)	1	9	-0.00000738	\$1.355.01
Graduation rate$_{i+2}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u$_i$	1	8	0.00003300	\$303.03
Graduation rate$_{i+2}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u$_i$	0	9	—	—
Graduation rate$_{i+3}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u$_i$	3	5	0.00003550	\$281.69
Graduation rate$_{i+3}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u$_i$	0	8	—	—
Graduation rate$_{i+4}$ = β_0 + β_1Instruction per student$_i$ + β_2District adults' education$_i$ + u$_i$	1	6	0.00005830	\$171.53
Graduation rate$_{i+4}$ = β_0 + β_1Title I funding per student$_i$ + β_2District adults' education$_i$ + u$_i$	0	7	—	—

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immediate effect, these results predict that the funding will essentially be wasted. The California data support the hypothesis that districts heavily influenced by Title I are more sensitive to changes in funding, but again since most results were insignificant, this might be due more to chance than the actual relationships between the variables.

The proper interpretation of the California data is unclear. The state with the strictest spending equalization policy has the highest variance in graduation rates. It also has the second fewest number of significant results (behind Mississippi) as shown by Table 13. The few significant results do, however, support the hypothesis that money has a greater effect on student outcomes in the Title I heavy districts. Because the large dataset is unable to give a clear of view of the interaction between funding and student performance, Chapter Five will further explore the effects of Title I funding and instructional expenditure in California.

Threshold Effects

As in Chapter Three, it is important to test for thresholds of effective spending. The thresholds should be less pronounced in California and New Jersey because of their restrictive spending policies. However, since this study is concerned with instructional spending per student rather than overall spending per student, it is possible that instructional spending varies greatly between districts and that thresholds could be observed.

I now apply the procedure used to test for thresholds in the typical states to New Jersey and California. Table 14 presents the results of testing for thresholds when

instructional spending per student and graduation rates are measured in the same year

using the equation

$$Graduation\ Rate_i = \beta_0 + \beta_1 District\ adults'\ eduction_i + \beta_2 Less_i + \beta_3 Mean_i + u_i$$

Both New Jersey and California show that the *Mean* category differs significantly from

the *More* category, but the *Less* category does not. This implies that there exists both an

TABLE 14

Threshold Effects Regression Results (Progressive States)

State	Coefficient on *Less*	Significant?	Coefficient on *Mean*	Significant?
New Jersey	-0.0074461	No	0.0104265	Yes
California	-0.0503215	No	0.1287093	Yes

upper and lower threshold of effective instructional spending per student. Changes in

spending have strong effects on districts in the *Mean* category (particularly in California

given its unusually large coefficient), but do not have effects in the *Less* and *More*

categories. This is further evidence that the assumption of monotonicity is incorrect.

To test the assumption of monotonicity in the single-year change analysis, we

now consider the equation

$$Change\ in\ graduation\ rate_i = \beta_0 + \beta_1 Less_i + \beta_2 Mean_i + u_i$$

where the *Less* and *Mean* categories correspond to categories of changes in instructional

spending per student. These results are presented in Table 15.

These results very closely follow the pattern established by the typical states.

There exist significant differences between the spending categories for the overall

TABLE 15

Threshold Effects in Single Year Instructional Spending per Student Changes (Progressive States)

State	Coefficient on *Less*	Significant?	Coefficient on *Mean*	Significant?
New Jersey (Overall)	-0.0319038	Yes	-0.0182510	Yes
California (Overall)	-0.0430221	Yes	-0.0371433	Yes
New Jersey (Title I Heavy)	0.0018391	No	-0.0078739	No
California (Title I Heavy)	0.0006065	No	-0.0455654	No

analyses, but the coefficients show that increasing instructional spending per student can lead to increased graduation rates.. This give districts an incentive to increase their instructional spending per student.

The Title I heavy districts yielded drastically different results. Both states showed no significant difference between the spending categories in Title I heavy districts. This lack of significant differences offers further evidence against the assumption of monotonicity.

To test for thresholds in the amount by which Title I grants to particular districts must change in order to impact student performance, consider the equation

$$Change\ in\ graduation\ rate_i = \beta_0 + \beta_1 Less_i + \beta_2 Mean_i + u_i$$

where the *Less* and *Mean* categories correspond to the amount by which a particular district's Title I grant changes from one year to the next. The results from this equation are presented in Table 16.

This analysis provides a mixed view of changing Title I grants. For the overall analysis, the two states differ sharply—significant differences exist in New Jersey, but not in California. In New Jersey, the significant coefficients are both negative implying that an increase in a districts Title I grant from the previous year's grant is associated

TABLE 16

Threshold Effects in Single Year Title I Funding per Student Changes (Progressive States)

State	Coefficient on *Less*	Significant?	Coefficient on *Mean*	Significant?
New Jersey (Overall)	-0.0252241	Yes	-0.0176282	Yes
California (Overall)	-0.0141516	No	-0.0175498	No
New Jersey (Title I Heavy)	-0.0522003	Yes	-0.0224116	No
California (Title I Heavy)	-0.0069905	No	-0.023681	No

with an increased graduation rate. The results are contradictory and do not establish a trend, however they offer evidence against the assumption of monotonicity.

The Title I heavy districts also show that simple increases in Title I grants do not result in immediately higher graduation rates. Only one category (*Less* in New Jersey) produced a significant result. Title I heavy districts showing that increases in Title I grants do not produce short term results is strong evidence against the assumption that increasing funding will monotonically increase graduation rates.

To complete the threshold analysis, we test for thresholds of effective spending measured by graduation rates several years after the spending takes place using the equation

$$Graduation\ rate_{i+k} = \beta_0 + \beta_1 District\ adults'\ education_i + \beta_2 Less_i + \beta_3 Mean_i + u_i$$

where i is the year of expenditure, k is the number of years after the expenditure student performance is measured, *Less* is the group of districts who spent more than one standard deviation below the mean amount of instructional spending per student, and *Mean* is the group of districts who spent within one standard deviation of the mean amount of spending in either direction. Due to a lack of available data, the analysis of thresholds in New Jersey has been omitted. The results of this analysis are presented in Table 17.

TABLE 17

Threshold Effects in Lag Regressions (Progressive States)

State	Coefficient on *Less*	Significant?	Coefficient on *Mean*	Significant?
California (2 Year Lag)	0.0577968	No	0.0513333	No
California (3 Year Lag)	-0.0535412	No	-0.0061538	No
California (4 Year Lag)	0.0248390	No	0.0484849	No

California definitively shows a lack of significant differences between the spending categories. This contrasts with the pattern established by the typical states. All states—with the exception of Mississippi—showed at least a significant difference between the *Less* and *More* categories. California, however, shows that the amount instructional spending per student does not impact graduation rates in subsequent years.

It is notable that both California and Mississippi did not produce and significant results. One explanation considered for Mississippi's lack of significant results was that it ranks 47th in overall per pupil education expenditure. California ranks 26th in overall per pupil expenditure, however, suggesting that a closer analysis of these states is needed to determine why the level of instructional spending per student seemingly has no effect on future student performance.

Conclusions

Comparing the results from California and New Jersey to the results from Indiana, Michigan, Mississippi, New York, and Wisconsin shows that simply equalizing funding does not necessarily equalize student outcomes. According to Table 1, these policies have had very different effects on student performance. New Jersey has an overall graduation rate which ranks among the best in the country, while California's graduation rate is

much lower and among the worst in the country. This indicates that there must be factors other than the ones analyzed in this study having a dramatic impact on student performance.

While these analyses were unable to isolate the specific causes of high student achievement, they were able to consistently show an important fact: money matters most to school districts that have the least. This fact gives hope that proper funding allocations can improve the public education system in the United States. Policymakers and educators are becoming increasingly committed to the idea of reform and are attempting to correct policies and funding structures.

With the current transition to the Obama administration and the near future of education policy not yet known, it is important to consider the implications of the new administration's plans given the results of this chapter. Obama's proposed plan includes so much spending on education that it "would amount to the largest increase in federal aid since Washington began to spend significantly on education after WWII" (Dillon, Stimulus Plan Would Provide Flood of Aid to Education 2009). With such an amount of spending being proposed, it is crucial to be able to predict the effects of throwing money at school districts.

Five

A Closer Look

Introduction

The results of the previous chapters showed a rather bleak view of the Title I program. According to reports from the National Center of Education Statistics, the bulk of Title I funding is spent on instructional materials, but my results show that this spending is unlikely to have a significant impact on student performance (Stullich, Eisner and McCrary 2007). These results were more discouraging than being simply insignificant—they actually showed increases in instructional spending to decrease graduation rates. The threshold analyses also offered serious challenges to the assumption that increasing instructional spending per student will increase graduation rates. Since this assumption is implicitly built in to the linear regressions of the previous chapters, I now turn to a rich secondary literature to more closely examine the relationship between Title I funding and student achievement. This literature will attempt to track the flow and usage of Title I funding and examine how the funding affects student performance.

The following sections will examine three studies tracking the usage of Title I funding. These studies take a very different approach to assessing the Title I program

than my analysis. While my analysis was entirely quantitative, the following studies gathered their information through classroom observation, interviews with teachers and administrators, and careful review of school budget documents. These methods provide much richer data for determining the factors affecting student performance, but necessarily limit the scope of the study. This type of work is an excellent complement for the large scale analysis of the previous chapters particularly because of its ability to analyze individual district spending issues. Though it can be difficult to track how the dollars from individual funding sources—federal grants, local property taxes, state assistance, etc.—are spent, budget analysis provides insight into *how* money is spent, while the aggregate data only tells *how much* money is spent.

Each of the following studies has a unique focus, but when considered together they offer a glimpse of how funding is actually used. The first study that will be presented hypothesizes that the Title I program is ineffective largely because the funding is diverted away from helping low achieving students. Since the funding does not reach the intended recipients, it cannot be expected to improve student achievement. The second study compares how Title I funding is spent between high-achieving and low-achieving schools within a single school district. This tests to see if particular spending patterns lead to higher student performance. The last study presented examines how Title I funding is used in high performing schools from a variety of districts and states. From this analysis, the researchers are able to develop a "best practices" plan for the effective use of Title I funding.

Misused Funds

In her 2005 study, *Strengthening Title I to Help High-Poverty Schools*,
Marguerite Roza posits that the reason Title I is an ineffective program is that the funding
often does not reach its intended recipients. She describes the current system as having
two major flaws:

> *First, district funds-allocation practices are so murky and complex that it is*
> *difficult to determine how much money is spent at any individual school. The*
> *assumption that non-categorical funds are spent equitably is incorrect. Second,*
> *the spirit of the law—that these federal funds are used only to augment services*
> *for disadvantaged students—is easily broken. This is true even when school*
> *administrators are committed to the intent of the law and make every effort to*
> *follow it to the letter.* (Roza, Miller and Hill 2005, 2)

The salient point of her argument is that district spending procedures are so complicated
and bureaucratic that Title I funding often gets mixed into more general funding and is
eventually directed toward the wealthier schools with the largest budgets in a given
district. This problem is perpetuated by the fact that "school budgets are developed at the
[district] central office, and decisions about what services will be received, whom to hire,
what to pay individuals, and how to allocate teachers among schools are made at the
district level" (Roza, Miller and Hill 2005, 5). The intended recipients of Title I funding
are thus not only not receiving the needed aid, but they are unable to change the district's
spending policies.

A more serious issue discussed is that the requirement that "districts must equalize educational services purchased with state and local funds before Title I funds are brought into the mix" is simply not being met (Roza, Miller and Hill 2005, 3). By analyzing teacher salaries and non-categorical spending in relation to Title I budgets, Roza shows that spending before the influx of Title I funding is quite unequal. Because the formulas for allocating Title I funding are based on the requirement that spending is initially equalized, the resulting allocation of funds is inappropriate, and actually channels a disproportionately high level of Title I funding to wealthier schools. This result was observed earlier in Figure 1.

Although Roza's analysis provides an excellent description of how Title I funding can be misused, her conclusions are not groundbreaking. She suggests prohibiting "districts from budgeting…Title I funds on the basis of average [teacher] salaries" and insisting "that districts provide equitable resources (as computed in terms of real dollars) to each school within the [district], before Title I funds are brought to bear" (Roza, Miller and Hill 2005, 19). While these recommendations seem like they could greatly improve the Title I program, they mostly just call for proper enforcement of existing rules.

The fact that Title I dollars are not necessarily disbursed properly by districts provides a possible reason for the negative relationship between instructional spending per student and graduation rates found in my analysis. If funding aimed to improve the performance of low achieving students never reaches the targeted students, how can the program be expected to succeed? Unfortunately, the data used in my analysis cannot confirm how the Title I funding was allocated by each district. It would therefore be inappropriate to definitively conclude that funding not reaching students is the driving

force behind the observed relationship between instructional spending per student and graduation rates. To more fully develop this relationship, we will now look at how Title I funding is used once it reaches its intended targets.

Spending Choices

Eric Barela undertook the task of developing a Title I Best Practices study for the Los Angeles Unified School District in California (LAUSD). This is the second largest school district in the country covering about 710 square miles, employing around 84,000 people (approximately 45,000 teachers), with a student enrollment of roughly 700,000. Approximately 70% of the LAUSD's schools are eligible to receive Title I funding (Christie 2008). This particular study analyzed spending at elementary schools, and though it is not a perfect translation to high schools, it is still informative to study the districts's decision making process concerning Title I funding allocations and expenditure. The purpose of Barela's work was to inform district decision makers about how high-achieving schools used the additional resources to supplement their core curricula and how the schools were implementing their curricula, with the idea that by learning about the practices of the high-achieving schools, the district board members could enact policies that would improve the low-achieving schools. California has different classifications for schools based on their performance. This study included eight Academic Achievement Award schools (AAA) and four Watch List schools (WL). A school attains AAA status my meeting all Adequate Yearly Progress criteria (as defined by No Child Left Behind) for two consecutive years. A school is classified as WL when it does not meet all Adequate Yearly Progress criteria for one year.

The sheer size of the LAUSD allows for a more decentralized funding decision-making process, a stark contrast from the findings of the Roza study. Barela found that funding priorities were quite different in the AAA and the WL schools. "AAA schools were more likely to use their Title I funds for teacher and substitute pay and paraprofessional pay" (Barela 2008, 533). This is consistent with my hypothesis that as instructional spending per student increases, student performance will increase. This also means that, at least within the district, these AAA schools would fall into either the *More* or *Mean* category in the previous chapters' threshold analyses. While more data would be require to explicitly define into which category these schools fall, it is a safe assumption that they would not fall into the *Less* category.

Spending choices in the WL schools were quite different. "WL schools were more likely to spend their Title I funds on school health professionals. Although these professionals provide a valuable service, they do not provide individualized and differentiated instruction" (Barela 2008, 533). There are three important implications of this statement. First, schools are sometimes forced to make difficult decisions regarding how to spend their money. It is possible that the WL schools would have liked to spend their Title I funding on instruction, but these schools appear to be in a position where this is a luxury they are not afforded. Children must be healthy in order to learn, so spending on health professionals supersedes the need for additional teachers and instructional materials. This seems to reveal the true nature of the problem at hand: even with the influx of Title I funding, some schools simply don't have enough money to provide a proper education for students. The second implication is that the spending choices these schools are forced to make likely put them in the *Less* category in the previous threshold

analysis. While again more data is need to explicitly define the categories, this is a safe assumption. The final implication is that individualized and differentiated instruction improves student performance. This is further evidence for the hypothesis that increased instructional spending per student should result in higher student achievement.

When considering the LAUSD in terms of the spending thresholds, the threshold analyses of the previous two chapters are clarified. Although only an anecdotal case, the LAUSD very clearly shows schools with relatively high instructional expenditures outperforming the schools with lower instructional expenditures. This is evidence that instructional expenditure is a factor in predicting student outcomes and gives low-performing districts with low instructional spending per student motivation to increase (when possible) their expenditures.

In addition to the financial differences, Barela noted that the AAA schools and the WL school operated in very different environments. The AAA schools encouraged the professional development of their teachers much more than the WL schools. The teachers in the AAA schools were more likely to collaborate and share teaching strategies and ideas, while teachers in the WL schools were more isolated and relied heavily on a "call and response" teaching technique. The AAA teachers were also more likely to have positive relationships with administrators; the WL teachers were often at odds with administrators. These factors combined to create a key difference between the two sets of teachers: the WL teachers rigidly adhered to the "scripted" state curriculum, while the AAA teachers were more likely to deviate from the "scripted" curriculum and encourage more spontaneous and individualized academic discussion among the students. This allowed the AAA teachers to more closely tailor the state curriculum to the strengths and

weaknesses of each unique class, and thus improve overall student performance (Barela 2008).

It is important to consider the differentiated teaching styles in relation to the finding that teachers in higher performing schools have higher salaries (Lankford, Leob and Wyckoff 2002). This intuitively makes sense—higher salaries attract higher quality teachers and thus produce higher quality students. Because the AAA schools largely spend their Title I funding on teacher salaries, we expect to—and indeed do—see higher quality and more motivated teachers employed at the AAA schools (Barela 2008). This offers further evidence for the hypothesis that higher levels of instructional spending per student produce higher student achievement.

The use of Title I funding for purposes other than improving the performance of low-achieving students—even for very reasonable purposes such as providing students with basic healthcare—can contribute to the negative relationship between instructional spending per student and graduation rates seen in the earlier analysis. The WL schools provide an excellent example of how Title I funding increases can be put to good use, but even if student achievement remains constant after the influx of federal funding, my aggregate analysis would have concluded that increasing funding was decreasing student performance. To complete the investigation of these apparent negative relationships, I will now look to a study of how several districts with high achieving students spend Title I funds.

Successful Practices

In a 2000 study, Michael Rubenstein and Jessica Wodatch examined the role of Title I funding in eighteen secondary schools. The schools analyzed served disadvantaged students, were engaged in school improvement efforts, and had either consistently high or improving rates of student achievement. Each school is an example of a successful Title I program. The researchers conducted three day visits to each school where they observed classroom instruction and interviewed teachers and administrators.

Several trends appeared across these successful Title I schools. In general, the schools relied on three strategies to improve teaching: providing teachers opportunities to expand their professional expertise, using accountability systems, and using data collection and analysis to guide school decisions. These schools also made a clear effort to engage the students in their education and made strong attempts to involve parents in the schools. Several of the schools also created smaller learning communities within schools to provide students with the individualized instruction and support they need to succeed (Rubenstein and Wodatch 2000). Each district and each school implemented these efforts in a unique way. The aggregate data does not capture these efforts and their omission could be a driving forcing behind the recurrent apparent negative relationship between instructional spending and graduation rates. However, Rubenstein and Wodatch do not specifically investigate how these factors affect student performance, so it would not be appropriate to speculate as to the impact and magnitude of these factors.

The schools in this study were the stark opposite of the schools in the Roza study in that district coordinators had little control over how individual schools spent their allocated Title I resources. The schools in the Rubenstein and Wodatch study either had

school Title I coordinators, or spending decisions were made by the school principal. This gave each school the opportunity to tailor its spending to the unique needs of its student body (Rubenstein and Wodatch 2000). A possible explanation for the autonomy appearing in this study is that Roza investigated larger school districts—though none nearly as large as the LAUSD—while Rubenstein and Wodatch investigated much smaller districts. It is possible that the smaller districts had more flexible spending procedures which allowed schools to manage their own Title I funding.

Rubenstein and Wodatch found Title I funding playing a relatively limited role to be a common characteristic in the successful schools. The "schools used Title I funding to provide low-achieving students extra instruction during and beyond the school day, through the use of in-class assistants, before- and after-school tutoring, summer programs, and computer labs to help students complete assignments" (Rubenstein and Wodatch 2000, ix). Equally important is that the funding was *not* used for schoolwide reform programs. The Title I funding reached its targeted students, was spent appropriately, and the students showed improved levels of achievement.

The study included only one school which had qualified for and implemented a schoolwide Title I program. This program diverted money from the targeted students and was instead spent largely on hiring additional teachers to reduce overall class sizes (Rubenstein and Wodatch 2000). Though the argument can be made that this will help improve the school as a whole, the salient point is that funds which were intended to be spent on a very specific segment of the student body are now being spent on the whole school. The apparent effectiveness of the program will be limited when the low-achieving students' progress—the metric by which the program is judged—is impeded by the

schoolwide reform program. This underestimation of Title I is to be expected with a schoolwide program, however, as the Roza and Barela studies showed that diverting funds from individualized instruction for low-achieving students reduces the school's level of achievement.

Unfortunately, Rubenstein and Wodatch do not include the actual dollar amounts the analyzed school districts spent acquiring various resources. This makes direct comparison to the previous chapters' threshold analysis difficult, though there are some inferences that can be safely made. Since the study only considers districts strongly influenced by Title I, we can assume they would fall into my "Title I Heavy" classification. Because the study notes that much of the Title I funding was spent on extra instruction, in-class assistants, and tutoring, we can assume that these schools would not fall into the *Less* category. Though we cannot explicitly assign the schools to either the *Mean* or *More* categories, the fact that they will not fall into the *Less* category is evidence that there is a correlation between the high performance of these schools and the higher levels of instructional spending. This is evidence that increasing levels of instructional spending out of the *Less* category can lead to higher levels of student performance.

Rubenstein and Wodatch show federal education programs in a much more positive light. The common trend in these high-achieving schools is improving teachers, using accountability systems, and using data collection to guide school decisions—all staples of No Child Left Behind—which shows that federal policies might not be as inappropriate and archaic as some claim. More importantly, it showed that federal funding can make a difference in the performance of low-achieving students. The researchers conclude that "if federal policymakers want Title I to play a prominent role in

promoting higher standards and improved achievement in secondary schools, they will have to find ways to give the programs more leverage in those schools" (Rubenstein and Wodatch 2000, 43).

Conclusions

The aggregate data of the previous chapters presented a puzzling relationship between instructional spending per student and graduation rates: as instructional spending increased, graduation rates decreased. To investigate possible causes of this relationship, I examined three studies which looked closely at spending decisions and student outcomes in several schools. Though each study had its own methodology, data, and objectives, a few important patterns emerged that provide some insight into the apparent negative relationship between instructional spending per student and graduation rates.

In order for the Title I program to be effective, the funding must reach the targeted students. In the Roza study, the funding was diverted from the targeted students and thus, their achievement did not improve. In the Barela study, the funding reached the students, but decisions regarding how the money was spent affected whether or not the targeted students' achievement improved. In the Rubenstein and Wodatch study, the funding reached the targeted students, the money was spent properly, and the targeted students' achievement improved.

In each study, the level at which spending decisions are made affected student achievement. In the Roza study, the district board made all spending decisions leaving no control to the individual schools. The schools had to accept the resources purchased by the district and simply do the best they could. The districts in the Barela and Rubenstein

and Wodatch studies, however, deferred some spending decisions to the individual schools. This allowed the schools to tailor the spending to the needs of their particular student body and thus improve student achievement.

Although this chapter was not able to definitively explain the negative relationship between instructional spending per student and graduation rates, several possible causes were uncovered. It is possible that the relationship is due to districts simply misappropriating their Title I funding. If the funding never reaches the students, it is unreasonable to expect the program to be effective. It is also possible that Title I funds are diverted from instructional spending to another worthy cause—for example, basic healthcare for students—and thus funding increases but student performance stays the same. In the aggregate data this appears only as the districts receiving higher levels of funding with no achievement gains. Another possible explanation is that student performance is more closely linked with variables that are more difficult to quantify such as teacher development or parent involvement. These are factors that are not observed in the aggregate data. Though the list of reasons why this apparent negative relationship occurs goes on, it is sufficient to say that the aggregate dataset is simply not rich enough to capture all the determinants of graduation rates.

The Barela and Rubenstein and Wodatch studies provide some evidence of a lower threshold of effective spending. In both cases, the districts and schools having higher levels of instructional spending per student have higher levels of student performance. While they do not provide the absolute numbers needed to determine a dollar figure threshold that must be crossed for instructional spending to be effective, the

mere evidence that one exists helps justify increasing instructional spending per student in an attempt to increase student achievement.

This chapter provides a much more positive view of the Title I program than the preceding chapters. The Rubenstein and Wodatch study in particular shows that when all of the regulations regarding the distribution and use if Title I funding are followed, the program can improve the performance of low achieving students. This is particularly relevant given the current transition to the Obama administration and the expected increased federal role in public education. If the federal government is going to continue increasing its role in education policy, it is imperative that federal programs can be properly modeled to give accurate predictions of results before the government begins pouring money into its programs. The next chapter will outline the expected changes of the federal role in education and the expected policies for the next several years, and will evaluate these policies based both the aggregate analysis of the previous chapters and the qualitative analysis of this chapter.

Six

Looking to the Future

Introduction

Since early in his presidential campaign, Barack Obama has promised strategic education reform. His ideas have centered on three issues: reforming No Child Left Behind, investing in early childhood education, and making college affordable for all Americans (Education 2008). Obama believes that teachers too often are forced to merely prepare students for standardized tests. While this method increases observed student achievement since students are essentially trained to take tests which measure their progress, the overall intellectual development of the students is impeded. Obama also promised to encourage early childhood education through a "Zero to Five" plan (Education 2008). This type of program would ensure that all children are ready to begin learning when they enter kindergarten. The final step in his proposed education plan is making a college education affordable for all students. A major component of this step is a new "American Opportunity Tax Credit" of $4,000 in exchange for community service. This tax credit would drastically reduce the cost of attending the average public college

or university and would make attending community college almost completely free (Education 2008).

Since campaign promises can be largely rhetoric and are not guarantees of future policies, it is necessary to reexamine the Obama Administration's plan for federal involvement in public education. Though it is too early in Obama's tenure as President to precisely predict the future path of education policies, decisions made during the Administration's first months—most notably the passage of the American Recovery and Reinvestment Act of 2009—provide a preview of future legislation. From these decisions I will infer how future policies will affect public education given the results of both my aggregate analysis and the qualitative analyses discussed in the previous chapters.

Initial Months

Although official legislation has not been passed and executive orders have not yet been signed, the Obama Administration had made it clear that they will stand by their campaign promises regarding education. The coming months will see new policies proposed, current legislation restructured, and federal aid and influence increased. The three faceted plan of reforming No Child Left Behind, emphasizing early childhood education, and making college a realistic option for all students appears to still be among the Administration's top priorities. This commitment is reaffirmed by the White House commenting that "America faces few more urgent challenges than preparing our children to compete in a global economy" (The Agenda • Education 2009).

The first step in preparing students for this global economy is to ensure that all students are ready to learn when they enter kindergarten. To ensure this, the

Administration is promoting a "Zero to Five" plan which, coupled with Early Learning

Challenge Grants, provides access for all young children to educational opportunities and

encourages states to move towards voluntary universal pre-school. This initiative will

also be supplemented by drastically increased funding for the Head Start and Early Head

Start programs (The Agenda • Education 2009).

The Obama Administration is stressing the need for comprehensive reform of the

public school system and No Child Left Behind. The highest priority is simple: give

NCLB the funding it needs. From there, methods for testing students, measures of student

performance, and accountability systems will be reformed, though the details of these

reforms are not yet clear (The Agenda • Education 2009). Additional support to low-

achieving students will become much more readily available through tutoring outside the

classroom, summer programs, and additional funding for the 21st Century Community

Learning Centers Initiative[9] (The Agenda • Education 2009). By expanding the

opportunities available to all students, the administration hopes students will begin to

thrive in the public school system.

It is believed that strong students are shaped by highly qualified teachers, so the

Administration will focus on recruiting, preparing, retaining, and rewarding high quality

teachers. Part of the proposed process for recruiting teachers is a Teacher Service

Scholarship, which will cover four years of undergraduate or two years of graduate

teacher education. It will also be required that all schools of education be accredited. This

will help to ensure that teachers are prepared to properly teach their students. The

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[9] The 21st Century Community Learning Centers Initiative is a program supporting the creation of
community learning centers that provide academic opportunities for students during non-school hours.
These are concentrated and high-poverty areas with low-performing schools.

Administration will also promote new ways of increasing salaries for accomplished educators. There will also be financial incentives for teachers to work in underserved areas such as extremely rural and inner city districts (The Agenda • Education 2009).

The final piece of the plan to improve the education system is to make a college education a possibility for all students. The cornerstone of this plan is an American Opportunity Tax Credit. In exchange for 100 hours of community service, a student receives $4,000 to be put towards the cost of a college education. This amount will cover two-thirds of the cost of the average public university and will make community college completely free. The Administration also plans to greatly simplify the process of applying for financial aid to assist with college tuition. Rather than fill out an additional form to apply for aid, applicants need only to check a box on their tax form and will automatically be considered for federal aid (The Agenda • Education 2009).

While these plans are still only plans, they describe a reformed education system that is focused exclusively on students. The shift of attention from bureaucracy to students is necessary if the system is expected to improve. If the Obama Administration is able to adhere to the plans and guidelines they have outlined during their initial months in office, we can expect to see a very different American public education system in only a few short years.

A First Glimpse

On February 17, 2009, President Barack Obama signed the American Recovery and Reinvestment Act (ARRA) into Law (Sahadi 2009). The bill is essentially a large economic stimulus package intended to help turn the tide against the current recession.

The legislation allocates $787 billion dollars to various projects such as improving

infrastructure, developing energy projects, and providing families with tax cuts and

government benefits (Sahadi 2009). Also included in ARRA are provisions for spending

on public education amounting to nearly $47 billion (Elmendorf 2009). By analyzing

how this $47 billion is to be spent, predictions can be made about the focus of future

legislation. It is important to distinguish this bill from education policy. While ARRA

increases the budget of the Department of Education, it does not start any new education

initiatives or begin the implementation of President Obama's campaign promises.

The money allocated to educational spending by ARRA can be broken down in

four main categories: education for the disadvantaged ($13 billion), special education

($12.2 billion), student financial assistance for higher education ($16.5 billion), and

miscellaneous spending ($2.1 billion). Though the spending is to be spread out over four

years, the bulk to expenditure will take place in fiscal years 2010 and 2011 (Elmendorf

2009). The money allocated to education for the disadvantaged is of particular interest to

this study because the entirety of the $13 billion is slated to be spent in accordance with

Title I policies (American Recovery and Reinvestment Act of 2009 2009).

The additional $13 billion from ARRA will greatly expand the capabilities of the

Title I program. Since 2000, the average yearly budget of the Title I program has been

roughly $11.5 billion, and the 2008 budget was $13.9 billion (Funding Status Title I Part

A Program 2008). The funding from ARRA will provide an additional $494 million in

2009, $6.2 billion in 2010, $5.7 billion in 2011, and $520 million in 2012 (Elmendorf

2009). While each of the next four years sees an increase in the Title I budget, 2010 and

2011 can expect budgets nearly one and a half times the 2008 budget, and twice as much

as the 2000-2003 budgets (Funding Status Title I Part A Program 2008). With such huge

upcoming budget increases, it is crucial to determine how effective the money will be,

how it should be spent, and how long returns on the investment will last.

Predicted Effects

While the $13 billion allocated to the Title I program by ARRA is only a small

fraction of the spending outlined by the bill, it represents a huge budget increase for the

program. It is expected that the increased budget will allow the program to more

effectively close the achievement gap between students in low- and high-poverty areas.

Though this seems like a fairly simple and intuitive causal model, it is important to

consider the results of the previous chapters in predicting the effects of the increased

budget.

The results of the models discussed in Chapter Three and Chapter Four allow for

only one conclusion: increasing Title I funding will not increase student performance and

is therefore better spent elsewhere. Each model—whether analyzing graduation rates in

the same year as expenditures or years after expenditures—most often showed no

significant improvement in student performance due to larger Title I budgets. When there

was a statistically significant relationship, it almost always showed that higher

instructional spending per student, which is created by higher Title I funding per student,

is associated with lower graduation rates. More importantly, the statistically significant

relationships did not necessarily coincide with practically important relationships. The

amount of funding per student required to cause a substantial change in graduation rates

was often so large that even if higher spending had been shown to cause higher graduation rates, it is simply not a viable option in many districts.

The threshold analyses raised serious objections to the assumption that increasing Title I funding and instructional spending per student causes monotonically increasing graduation rates. The analyses produced three conclusions concerning thresholds of effective spending. The first conclusion is that a district's level of instructional expenditure does not affect student performance. This is particularly pronounced in California and Mississippi. These states rarely showed differences in spending categories to affect graduation rates. If this conclusion is true, the additional funding from ARRA is unlikely to improve student achievement and may actually be a waste of resources.

The second conclusion is that there exists both an upper and lower threshold for effective spending. In these cases, most notably New York and Wisconsin, the amount of spending had little influence in districts that spent either a very small or very large amount on instructional spending per student, but significantly affected student performance in districts spending close to the mean amount on instruction per student. If this is the proper conclusion, the additional funding from ARRA will help districts that spend the least on instruction per student. If these districts are able to increase their expenditures to levels close to the mean, we can expect to see increases in student performance.

The final conclusion is that there exists a curvilinear relationship between instructional spending per student and student performance. This result is shown clearly by Michigan and Indiana. In these states, instructional expenditures have the strongest affect on districts spending the least on instruction per student, have a slightly weaker

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effect on districts spending close to the mean amount on instruction, and have the least effect on districts spending the most on instruction. This pattern of diminishing returns is the best evidence supporting the ARRA's increase of the Title I budget. Under this conclusion, all districts can improve their student outcomes, and the districts with the greatest need for the additional funding will see the greatest gains in student achievement.

Although the third conclusion from the threshold analyses supports the ARRA's Title I budget increases, the other analyses present rather pessimistic conclusions. A proper evaluation, however, requires a closer analysis of how individual districts and schools use their Title I funding. For this, we turn to the conclusions drawn from the qualitative analysis in Chapter Five.

Drastically increasing Title I funding appears much more reasonable though these analyses in Chapter Five. The most important finding of this chapter is that when Title I funding reaches its targeted students and is spent in ways that help students succeed in their core classes, the program works. The implications of the Barela study show several benefits of increasing Title I funding. If the level of funding available is sufficient to not only cover not only unintended, but necessary costs—such as healthcare professionals to treat students—but also to be applied toward improving the performance of low-achieving students, it is possible that rapid rates of improvement will be observed.

The qualitative analysis also showed that the increased budget should be accompanied by increased restrictions on how the money can be spent and regulations governing how the funding reaches the targeted students. However, this has not been the case for the funding allocated by ARRA. The funding from ARRA is allocated to states and districts through the same failing formulas Marguerite Roza described as "murky and

complex" (Dillon, Some Rich Districts Get Richer as Aid Is Rushed to Schools 2009, Roza, Miller and Hill 2005). The funding discrepancies are so severe that some states are facing large cutbacks while other states are "swimming in cash" (Dillon, Some Rich Districts Get Richer as Aid Is Rushed to Schools 2009). The number of dollars per student granted to each state varies greatly as illustrated in Figure 4.

FIGURE 4
Educational Funding per Student Allocated by ARRA
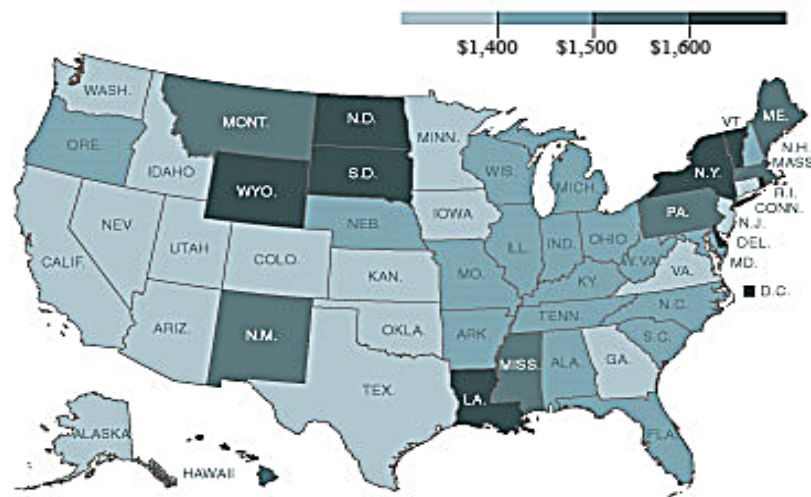
From The Department of Eduction, National Center for Education Statistics, and Center for Budget and Policy Priorities in (Dillon, Some Rich Districts Get Richer as Aid Is Rushed to Schools 2009)

Though the differences in funding appear to be small, when multiplied by the number of students in each state the discrepancies become very large. This is exemplified by districts in Utah struggling to avoid laying off teachers and cutting specialized classeses, while districts in Wyoming are building new schools and giving students laptop computers (Dillon, Some Rich Districts Get Richer as Aid Is Rushed to Schools 2009).

Figure 5 shows the contrast in the relative need of school districts. This figure shows the percentage of each state's education budget gap that is relieved by the ARRA

funding and shows that the funding is clearly not being distributed to the states in the greatest need of supplemental funding.

Educational Funding per Student Allocated by ARRA as a Percentage of State Educational Budget Gaps

From The Department of Eduction, National Center for Education Statistics, and Center for Budget and Policy Priorities in (Dillon, Some Rich Districts Get Richer as Aid Is Rushed to Schools 2009)

States such as North Dakota, Montana, West Virginia, and Wyoming do not have gaps in their education budgets, yet are receiving supplemental funding just like the states with huge budget gaps. This problem is exacerbated when considering the information in Figure 4. North Dakota and Wyoming are receiving among the highest levels of federal funding, while many states with significant budget gaps are receiving lower per student grants. If the federal funding is to be effective in stemming budgetary problems and promoting high student performance, the allocation formulas must be revised.

Once the allocation formulas are corrected, eliminating the option of Title I heavy districts using the ARRA funding for schoolwide programs would make both the ARRA funding and the Title I program more effective. While schoolwide reform and improvement is certainly a worthy cause, the spirit of Title I targets the lowest-achieving

students. Of the $13 billion allocated to the Title I program by ARRA, only $5 billion is required to be used for targeted grants (the remaining $8 billion is divided between education finance incentive grants and school improvement grants) (American Recovery and Reinvestment Act of 2009 2009). Since targeted programs are the most effective use of funding in increasing the performance of low-achieving students, requiring a larger portion of the budget to be dedicated to targeted grants can help improve student achievement. While the $5 billion requirement is an excellent addition to the Title I budget, the analyses in Chapter Five suggest that even more targeted grants would improve the program's results.

Evaluation

The overall analysis shows that the spending outlined by ARRA is a step in the right direction. While the debate still exists over how money affects student performance, for low-achieving and high-poverty students, additional funding appears to provide students with opportunities that were previously nonexistent. With the deficit spending abilities of the federal government, increased federal involvement in public education can provide these students with the resources they need to improve their performance.

The first major educational spending decision by the Obama Administration reaffirms their commitment to the promises made on the campaign trail. Included in the bill are major provisions for improving educational opportunities available in high-poverty areas and for making college accessible to all Americans. The authorization of these large expenditures less than one month after becoming President shows Obama's strong desire to improve the public education system in the United States.

The spending outlined by the ARRA must only be a first step, however. If the Obama Administration continues to make decisions and distribute money based on horrifically failing allocation formulas, the anticipated education reform will not materialize. Reevaluating how allocations are determined and the usage restrictions placed on federal education grants will improve the federal government's ability to positively influence public education.

Even the most sophisticated models cannot always accurately predict the outcome of something as complex as student performance. The true effects of education policies are only seen in retrospect, and the budget increases of ARRA will be no different. The early indications, however, show that the next several years of education policy are likely to look quite different than the last several years. Based on the conclusion that with proper administration the Title I program can work, it is very possible that the next few years see the gap between low- and high-achieving students shrink.

Seven

Conclusions

Introduction

It is quite clear that public education opportunities for children in the United States vary greatly based on the child's residence. Children who happen to live in a high-poverty school district are unfortunately subjected to poor public schools with little opportunity for educational advancement. One of the strongest attempts to equalize the education system has been supplemental federal funding provided by the Title I program. For over forty years Title I has been identifying school districts in need and providing them with funding to improve the performance of their lowest-achieving students. While the program has remained a centerpiece of federal education policy with an ever increasing budget, the true effects of the program remain largely unknown.

The persistence of the Title I program has not been without criticism. Scholars have argued that the program is failing for numerous reasons—funding not reaching the intended students, the program being overly bureaucratic, and money simply not being the solution to name a few. The legitimacy of these arguments is quite important given the size of the Title I program. If the program's yearly budget of nearly $14 billion is

unable to help improve student achievement, perhaps it is time to consider if the money would be best spent on other programs. This naturally leads to the question of not necessarily *does* the program work, but *can* the program work.

The previous chapters have examined the performance and achievement gains of students in school districts receiving the highest levels of per student Title I funding. This briefly ignored the problems in the program's funding and distribution structures, and instead focused on finding if the funding improves the performance of the recipient students. Finding improvement in these students would support the continuation of the program and provide an excellent starting point for further research to develop more equitable distribution mechanisms.

Summary of Findings

The previous chapters had two key objectives. First, it was necessary to establish that increases in Title I funding led to increases in instructional spending per student. Second, the chapters attempted to establish the relationships between instructional spending per student—and implicitly Title I funding per student—and high school graduation rates. The relationships were explored through a variety of models examining immediate effects of spending, effects of spending in subsequent years, and the effects of changes in spending from one year to the next.

As expected, it was definitively established that that increases in Title I funding per student caused increases in instructional spending per student. After establishing this fact, the following results were far less definitive. Only 33% of the regressions yielded

significant relationships between district expenditures and graduation rates. When there were significant results, however, a few important relationships were established.

First, a counterintuitive inverse relationship appeared between graduation rates and instructional spending. This study was unable to identify the true cause of this relationship. It is important to keep in mind the difference between statistical and practical significance. While it was shown that that increases in instructional spending per student decrease graduation rates, the amount by which instructional spending would need to change to produce a noticeable drop in graduation rates was so large that the relationship was most often practically insignificant.

The second important finding is that there is a positive relationship between the amount by which expenditures changed from one year to the next and the amount by which graduation rates changed from one year to the next. This helps to disaggregate the data and isolate spending levels in individual districts. When a given district increased its instructional spending in a particular year, that year on average had a higher graduation rate than the previous year. This is evidence for the idea that instructional spending does influence student performance, and that achievement gains are best observed through comparisons to earlier years.

The final important finding was that state policies requiring district spending equalization can be effective. The analysis of California and New Jersey produced far fewer significant results than the analysis of Indiana, Michigan, New York, and Wisconsin. A possible cause of this lack of significance is that spending equalization has caused spending to converge to a point where changes in expenditures do not have a large impact on student achievement. The lack of significant results in Mississippi challenges

the idea that the fewer significant results is evidence of an effective equalization policy. Although California, Mississippi, and New Jersey all produce a very small number of significant results, the causes for each state's lack of results are not necessarily the same. It is possible that Mississippi simply does not spend enough money on education for its spending to impact student performance. California and New Jersey, however, have much higher per student expenditures, so the amount of spending being too low is likely not the cause of the insignificant results. A more likely cause is that the models in this study were largely based on changes in Title I grants and instructional spending per student. Since California and New Jersey restrict variances in spending, it is not surprising that each of these states had a low number of significant results. This could very possibly be evidence that the restrictive spending policies do actually equalize educational opportunities and outcomes across school districts.

The evidence was not unanimously in support of equalization policies, however. Table 11 shows that the policies are not effective in equalizing student outcomes. The policies also do not necessarily improve the overall performance of the state's students. According to Table 1, New Jersey ranks among the highest achieving states, but California consistently has one of the worst graduation rates in the nation.

The qualitative analysis in Chapter Five highlighted some of the major problems with the Title I program. Overly complex distribution formulas sometimes channel money intended for high-poverty areas into wealthier school districts. Even if funding does reach the targeted students, there is no guarantee that it will be spent appropriately. The analysis showed, however, that when funding reaches the proper students and is

spent responsibly, Title I funding can improve the performance of low-achieving students.

Tests for thresholds of effective instructional spending per student failed to establish a national pattern. Two states, California and Mississippi, consistently failed to show significant differences in graduation rates based on the district's general level of instructional spending per student. Two other states, New York and Wisconsin, showed the amount of spending to important in districts with instructional spending near the mean level of spending, but that the amount of spending became increasingly less important as districts spent either extremely small or large amounts on instruction per student. Still two more states, Indiana and Michigan, showed a curvilinear relationship between instructional spending per student and graduation rates based on the district's general level of spending. The amount of instructional spending per student was highly influential in districts spending the least, slightly less influential in districts spending roughly the mean, and much less influential in districts spending the most. While these three conclusions make it difficult to determine if and where effective spending thresholds exist, the all raise serious objections to the idea that simply increasing spending per student will monotonically increase graduation rates.

Future Agenda

This study was restricted by the limitations of aggregate analysis. For example, it was not possible to verify the accuracy of the finances reported by each school district. The modeling process also did not allow for the inclusion of intangible variables such as student attitude or parent involvement. The linear regression model also limited the

accuracy findings because of the assumption of monotonicity. It would be reasonable to hypothesize that the relationship between expenditure and student achievement is curved rather than linear. An ideal dataset for finding the true relationship would contain financial information disaggregated to the school level, precise measures of student performance (through either graduation rates), and the overall achievement level each school (to test for "peer effects" in which students are positively influenced by being surrounded by high-achieving students), as well as measurements of student attitudes, parental involvement, and parental education. This dataset would allow the researcher to control for many more factors affecting student performance and would yield more accurate estimates of how funding affects student achievement.

The research presented here does, however, provide an excellent starting point for further evaluations of the Title I program. A helpful extension to this study would analyze the different effects of using Title I funding for improving low-achieving students and using Title I funding for schoolwide reform. It would be helpful to compare how the money is spent, how this was used to improve student performance, and how student achievement changed in each category. If an analysis such as this shows that the program simply does not work as it is currently designed, perhaps it is time to create a new program rather than restructure a perpetually failing one.

Based on the evidence from this study, I would expect to find that programs targeting low-achieving students improve student performance while schoolwide reform programs do not. Funding is most effective when it has a very specific goal and is spent responsibly. Schoolwide reforms are too broad to improve the performance of the lowest-achieving students. While schoolwide reform is a noble goal, it is not the goal of Title I

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and should thus be part of a different policy. When Title I funding is diverted to schoolwide reform, it impedes the ability of Title I to assist low-achieving students therefore lowering the overall quality of the program.

Prescriptions

When properly administered, the Title I program appears to work. Despite the criticisms of bureaucracy and over complexity, the funding that reaches its intended targets has positive effects. The regressions measuring changes in funding and performance between consecutive years foreshadowed this success and the qualitative analysis explained how the program can work. This small success shows that while still far from perfect, the Title I program is on the right track.

Ensuring that Title I funding reaches its intended targets and is spent responsibly is the key to a successful program. The Obama Administration has already shown that it is not shy about spending large sums of money in an attempt to improve the quality of public education and narrow student achievement gaps. The results of the aggregate data analyses in the study show that money is not the only factor in determining student performance, but the qualitative analyses suggest that it can certainly make a difference. This finding provides comfort that the ever increasing amount of federal money spent on education is not going to waste.

This is not to say that the resources cannot, and need not, be used more effectively. Even with well intentioned programs such as Title I, educational opportunities in the United States are very unequal. The current administration is in a

position to improve the nation's public education system, but must follow three guidelines to make Title I an effective program.

The Obama Administration needs to start enforcing the rules and regulations that are supposed to govern how federal aid is spent. The current lack of enforced regulation has allowed school districts to consistently divert education funding meant for low-income districts into wealthier districts and administrative costs. This misuse of funding must be prevented, and if it persists, it must be punished. Enforcing the current rules would help improve the quality of low-income school districts without requiring the passage of any new legislation or the creation of any new programs.

The next step is for the current administration to simplify and recalculate the distribution mechanisms that allocate federal aid to particular districts. The federal aid provided by the American Reinvestment and Recovery Act of 2009 was distributed based on the old formulas and essentially provided federal aid to all the wrong states. By simplifying and adding transparency to the funds allocation process, federal grants will be more likely to award to the states and districts in the greatest need.

The Obama Administration must also prevent Title I funding from being diverted into schoolwide reform programs. The spirit of Title I requires that federal funding be directed to low-achieving and low-income students. As the definition of who qualifies to receive the benefits of Title I funding broadens, the assistance to the targeted low-achieving and low-income students is necessarily diminished. With the prevention of funding being channeled into schoolwide programs, the targeted students will receive the resources necessary to produce noticeable achievement gains.

While improving the Title I program is a big step toward equalizing educational opportunities in the United States, it is only one aspect of a much larger process. A true reform of education policy requires not simple program changes, but changes in the way students, parents, and policy makers think about public education. While this fundamental shift may take decades to develop, the short term push of increasing the Title I budget will likely be a boost to the performance of low-income and low-achieving students.

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