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RELATIONSHIP BETWEEN SCHOOL DISTRICT SIZE AND PATTERNS OF SCHOOL EXPENDITURES

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I have numerous people to thank for helping me get to this point. While I have been pursuing my Ph.D. for seven years, the journey goes back even farther. Having grown up in a home with two educator parents and spending many of my formative years wandering around a large, state research university, I have long seen the completion of a terminal degree as a goal worth pursuing. This document is not only the end result of my research; it is a cumulative reflection of all exposure I have had to public eduation.

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As far back as I can remember, I've been at school. Before I started Kindergarten even, I would visit Jane Brooks School for the Deaf in Chickasha, Oklahoma, where my mom, Ellen Kanak, was a teacher. On some level, I know that has contributed to my outlook on public education. Although I did not have a context on what I was learning then, I can see now how those years helped me understand the importance of teaching all students as if they were your own. When we moved to Norman, I observed as she continued to work with hearing impaired students as well as other children with disabilities. Meanwhile, I watched as my step-father, Jack Kanak, led the Psychology Department at the University of Oklahoma. Between trips to the top of Dale Hall Tower and department activities in our home, I spent a lot of time around people who valued education. Each of you shared your value of both academics and education with all of your children.

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My research interest stems largely from the varied career I have been fortunate to have. I have taught in large school districts and been a principal in a small one. I have worked in rural, suburban, and urban schools. I have lived in communities that are growing and one that is shrinking. I have worked at the state level on grant programs and school performance reviews that have taken me in some professional capacity into more than 100 school districts. My own practical knowledge of what it takes to make decisions that are best for children has been challenged and enhanced by these varied perspectives. To all the employers who have provided me with these glimpses into our profession – and to all of the students, parents, teachers, and administrators in Oklahoma – thank you for the background you have given me to complete this study.

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Abstract

The purpose of this study was to explore the relationship between school district size and spending for instructional and administrative costs. This report expands on existing research topical to school funding issues, such as: economies and diseconomies of scale; ideal school/district size; expenditures per pupil; adequacy and equity; and school consolidation. Testing existing datasets from Oklahoma school districts and their coded expenditures, this study explored and answered three research questions:

1. Is there a significant relationship between school district size and instructional expenses?
2. Is there a significant relationship between school district size and administrative expenses?
3. Have these relationships changed over time?

This study employed multiple regression tests conducted in SPSS. Each test included the same nine independent variables: average daily membership (ADM), the natural log of ADM, school district type, free/reduced lunch percentage, students per square mile, assessed property value, percent of district revenue from the state, percent of district revenue from the federal government, and total dollars spent per student. The first question was answered using 2010-11 school year data and running two tests – first on percent of total expenditures on instruction, then on dollars per pupil spent on instruction. The second question was answered using 2010-11 school year data and running two more tests – first on percent of total expenditures on administrative costs, then on dollars per pupil spent on administrative costs. Finally, the third question was

answered running these same four tests with 2005-06 and 2000-01 data, then comparing the results against those from the 2010-11 tests.

Chapter I

Introduction

Since the 1800s, public education has faced funding crises and political pressure to operate more efficiently while demonstrating greater effectiveness. Solutions that were popular in the 19th century are still popular in today's political climate: consolidation of schools, increased transportation for pupils, a more professional teaching force, finding connections between the curriculum and the real world, and supervision that comes from beyond the scope of the community (Tyack, 1974). Throughout the United States over the last several years, legislatures have struggled to meet statutory obligations in all areas of government – not just education. Facing a crisis in the funding of public education compounds the political burden. With this confluence of pressures, policy makers inevitably have looked to find savings for school districts with an eye towards putting more money into the classroom. In 37 states, funding for education was lower in 2011 than 2010, and in 30 states, it was lower than in 2008 (Oliff & Leachman, 2011). With such pervasive funding problems, states have looked to increase efficiencies as a way to put more money into classrooms. As it was more than 100 years ago, two solutions invariably surface when funding for schools is scarce: consolidating schools and reducing administrative costs (Duncombe & Yinger, 2007). These remedies are intertwined in many ways and have been the focus of numerous studies since the 1960s (Colegrave & Giles, 2008).

Often, the focus has been on various methodologies for establishing something of an optimal school district size. On one hand, small school districts that have their own governing bodies are left largely to their own devices; they find ways to survive

fiscally and to satisfy state and federal regulations, within the letter, if not the intent of said regulations. On the other hand, they take more money per-pupil to stay open, and the lack of centralized control over their operations diminishes the extent to which state taxpayers shouldering the majority of the burden for the expense of educating students can feel confident that students across their particular state are receiving a similar and adequate education. Studies across several states in the 1990s (Butler & Monk, 1985; Ratcliffe et al., 1990; Callan & Santerre, 1990; Gyimah-Brempong & Gyapong, 1991; Deller & Rudnicki, 1993; Downes & Pogue, 1994; Duncombe et al., 1995; Duncombe et al., 1996; Reschovsky & Imazeki, 1997; Reschovsky & Imazeki, 1999) showed that savings through consolidation were largely found in administrative functions, but also that they were diminishing after a certain point (Andrews, Duncombe, & Yinger, 2002).

This study focuses on how economies and diseconomies of scale contribute to the extent to which school districts choose to spend money on instruction. Using Oklahoma data from the 2000-01, 2005-06, and 2010-11 school years, this study will also highlight how the relationship between district size and per pupil spending in the categories of instruction and administration has changed over time.

Background

The thrust to make public education more efficient is almost as old as public education itself. In 1869, Massachusetts passed a law providing public funding for the transportation of students to and from school (Probst, 1908). Finding relief to transportation issues of that time led first to Quincy closing two schools and eventually further consolidation in the state. By 1927, when a study in Washington State showed higher achievement in consolidated schools than in schools that had not consolidated,

reformers were determined to demonstrate the efficacy of efficiency (Stone & Curtis, 1927). Throughout the late 1800s and early 1900s, states pursued the twin benefits of consolidation – cost savings and increased opportunities for students. To achieve goals in both areas, about 90% of school board positions were eliminated between 1930 and the 1970s. However, during this time, the number of principal and superintendent positions grew. Simultaneously, the states began to take a greater interest in regulating education. This made sense as the local share of funding for education declined from more than 80% in 1930 to less than 50% in the early 70s, with states picking up the bulk of the difference (Howell, 2005). To further illustrate the extent to which school consolidation has already impacted the nation's education systems from a cumulative viewpoint, between 1930 and 2011, the number of school districts in the United States declined from about 128,000 to about 13,500, and the number of school sites from about 238,000 to about 91,000 (NCES, 2011). This reflects a continuation of the movement begun by Progressives in the 1890s to increase the professionalism and scientific influence in education (Howell, 2005).

Statement of Problem

While research discussing the effects of school size on variables such as spending and student performance is copious, the volume of scholarly work concerning the impact of district size on these outputs is scarce. For the sake of standardizing cost functions across states, NCES defines *instructional expenditures* as "current expenditures for activities directly associated with the interaction between teachers and students, [including] teacher salaries and benefits, supplies (such as textbooks), and purchased instructional services" (Sable, Plotts, & Mitchell, 2010, p. 32). Among the

100 largest school districts in the country, the percentage of total expenditures dedicated to instructional purposes ranges from 30.8 percent in Philadelphia to 96.3 percent in Puerto Rico (which is an outlier, as the next highest district is New York City at 65.0 percent) Nationally, the average is 52.8 percent (Sable, Plotts, & Mitchell, 2010). While some of the variance in spending is likely a matter of differences in policy and coding of funds from state to state, it is unclear if school district configuration plays any part in how funds are spent.

School districts are formed based on criteria established by each state; therefore, comparing their organization, spending, and effectiveness nationally is problematic. Each state has a different way of organizing school districts. During the 2008-09 school year, there were a total of 13,976 public school districts in the United States, serving a total of 48,604,272 students. Seventy-two percent of the school districts had fewer than 2,500 students, accounting for about 16 percent of all public school enrollment (Sable, Plotts, & Mitchell, 2010). Hawai'i has a single school district, while California and Texas each have over 1,000 (NCES, 2011). Several states use a county system to organize public education, while others utilize systems that blend county, municipal, and historical boundaries. Additionally, some schools serve predominantly rural populations while others serve urban or suburban students primarily. All of this leads to school districts of varying sizes, both in terms of student population and land area. School districts in most northeastern states are laid out according to townships that mirror municipal boundaries. In the Midwest, there are examples of this along with districts with boundaries determined by geographic necessity. In the West, the arid climate, along with the disparity of concentration from coastal cities to inland

communities dictates district shape and size. In the South, most states have countywide systems with exceptions in place for the major cities. In many parts of the country, these boundaries and tendencies coincide with historical attitudes towards slavery and later on, segregation (Fischel, 2007).

Past studies have focused on the process of school consolidation, the qualitative issues surrounding school consolidation, and specific political issues intricately tied to consolidation; however, there has been little research on the actual relationship between a school district's size and categorical spending directly related to instruction. This study examines this relationship and fills a portion of the gap in the research.

Context

The state of Oklahoma is instructive as a context for the lack of clarity in the relationships among categories of expenditures. In Oklahoma, school district expenditures fall into the following broad categories: Instruction, Student Support, Instructional Support, District Administration, School Administration, District Support, and Other. For the sake of determining per-pupil expenditures, Debt Service is considered separately. During the 2010-11 school year, districts coded between 27.7 percent and 88.0 percent of all expenditures for instructional costs. In terms of dollars, that equates to a high of $10,694 per pupil in one district and a low of $2,687 per pupil in another district (Office of Accountability, 2012). These numbers alone are alarming because they raise issues about adequacy and equity in funding. Analyzing per pupil funding overall also sheds light on perceived funding inequities and inefficiencies. The highest overall per pupil spending by a district is $21,369, while the lowest is $4,148.

The National Center for Education Statistics (NCES) classifies all school districts as belonging to one of the following categories: city, suburban, town, and rural. Using the 2006 NCES definition, which states that "rural areas are designated by Census as those areas that do not lie inside an urbanized area or urban cluster," in Oklahoma, 77 percent of all school districts are designated as rural. Within that designation, NCES makes three further distinctions: (1) fringe districts—those that are fewer than five miles from an urban area; (2) distant districts—those that are between five and 25 miles from an urban area; and (3) remote districts—those that are more than 25 miles from an urbanized area. In Oklahoma, 62 districts are classified as fringe, 179 are distant, and 175 are remote. By comparison, the state has 7 city districts, 19 suburban districts, and 118 town districts. Oklahoma has more remote rural districts than city, suburban, and town districts combined (NCES, 2007).

Currently, state aid to schools in Oklahoma is established using a formula consisting of many elements. Of greatest consideration are Average Daily Membership (ADM) and the ability of the district to produce local funding from the tax base. Other weights within the formula are based on certain student populations. For example, first grade students count as greater weight on a district's ADM than ninth graders do. Students with physical and learning disabilities count more as well. Gifted and economically disadvantaged students are also weighted. Funding levels for salaries, textbooks, operating costs, and other expenses are determined from this formula. School districts receive local revenue based on the tax base as determined by county assessors. Additional revenue can be raised by passage of a bond issue for buildings, improvements, technology, transportation, and other limited expenses. Federal aid

comes in the form of block grants to schools, as determined through a formula that heavily weights poverty. Additional federal aid is available through the several discretionary grant programs, some of which are distributed directly to the schools and some of which are filtered through state education agencies (Office of Accountability, 2012).

The extent to which the cost of public education includes a number of indivisibles that have to exist in any district (Duncombe & Yinger, 2007) is compounded in Oklahoma by the fact that so many districts operate in remote locations. From January 1, 1946 to June 30, 2011, the number of school districts in Oklahoma decreased from 4,450 to 534 through annexation and consolidation. Of these school closings, 2,393 were mandated and 1,516 were voluntary (OSDE, 2009). A previous study of consolidations in Oklahoma showed that "immediate financial advantages were not necessarily gained" by combining districts (Cummins, 1997, p. 331). With that in mind, this study neither seeks to advocate nor discourage consolidation of school districts. The focus of this paper is on the extent to which districts of different sizes and composition spend the available revenues.

Statement of Purpose

The purpose of this study is to explore the relationship between school district size and the categorical spending directly tied to instruction and administration. To the extent that education production function research explains only part of this relationship, this study does not confirm or disconfirm existing theory, but adds a piece to the puzzle that has not been thoroughly examined. While the political implications of school district size are important to acknowledge, in a larger sense, policy makers must

be mindful of how size and instructional spending are related. This study provides some additional insight that will be important in statewide fiscal decision making. To that end, each fiscal variable is analyzed within appropriate lenses, including enrollment size, geographic location, socio-economic status, and the physical size of the district. While the prospect of school consolidation will always lie in the background when school size and finance are discussed, this paper does not proffer a stance on the best way for policy makers to proceed accordingly.

Research Questions

To explore the extent to which school district size impacts the amount and percentage of money used for instruction, this study will focus on the following research questions:

1. Is there a significant relationship between school district size and instructional expenses?
2. Is there a significant relationship between school district size and administrative expenses?
3. Have these relationships changed over time?

States secure funding for schools and align districts through very different mechanisms. Accordingly, the best way to pursue these questions is to take data from one state and look at these relationships over time. Oklahoma, with over 500 school districts, provides a robust starting point. Ranging in size from Oklahoma City Public Schools, with over 41,000 students, to Straight Public Schools, with only 48 students, the variety of school districts to be studied sheds light on the extent to which district size impacts how school leaders prioritize funding (Office of Accountability, 2012).

Using publicly available data, this study examines the relationship between school district size and output variables such as total spending per pupil, spending for instruction and instructional support, and spending for site and district-level administration. Since district size does not act alone in determining how schools spend money, all tests include controls for poverty, as well as input variables such as total funding available per pupil and the percentage of funding derived from state and federal revenues.

Significance of the Study

Increasingly, school districts in the U.S. face severe funding cuts. Policy makers who discuss the impact of lost revenue often assume there is room to trim around the edges of districts' budgets without impacting instruction. As that discussion begins to emphasize efficiency, the size of school districts becomes a bigger issue. In particular, lawmakers and other leaders begin to discuss reducing the number of administrative units for which their states bear responsibility. For example, in recent years, Arkansas eliminated all districts with fewer than 350 students, leading to a series of voluntary mergers and forced annexations (Office for Education Policy, 2010).

Andrews, et.al. (2002) define economy of scale in relation to education through a cost model representing various school inputs (number of teachers and support staff, salaries, specialized facilities, etc.) and referencing them against outcomes (test scores, dropout rates, etc.). While the authors recognize that outputs are cumulative in nature, they omit this factor from their model. They do, however, include, three different measures of scale: activities, student outcome, and school district size. The authors define economy of scale as "the relationship between costs and the quantity of school

activities" and that "technical economies of scale would exist if the cost per lesson decreased as the number of lessons provided by a school increased" (p. 247). In other words, the more students a district has, the more lessons that district is providing to students.

Conversely, many cost-function studies show that at a certain point, a diseconomy of scale occurs. That is to say that an increase in the number of units in production actually leads to an increase in the cost per unit. Factors that may contribute to larger schools and districts realizing a diseconomy of scale include the potential for "lower student and staff motivation and parental involvement," (Andrews, et. al., 2002, p. 248) as well as a greater likelihood that unions will organize. Several studies (Duncombe et al. 1995, 1996; Reschovsky & Imazeki 1997, 1999) have used log-linear models to estimate costs per pupil with different types of expenenses and found a U-shaped cost curve. With administrative costs, economies of scale exist at even the highest levels of enrollment. However, these cost savings approach an asymptote, and depending on the state, may reach 90 percent of the potential for efficiency before the district reaches 2,000 students.

Limitations and Assumptions

As previously stated, differences in how states fund and organize school districts limit the utility of comparisons of spending across state lines. Accordingly, this study will focus on one state – Oklahoma. Having a large number of small, rural districts, Oklahoma is a prime state for examining where education dollars are spent. This research fills a hole in the body of knowledge and lends itself to expansion and replication in other settings.

An additional limitation exists in the datasets to be used. The state of Oklahoma accounts for school district spending within seven "core expenditure areas" (Office of Accountability, 2012). These are: Instruction, Student Support, Instructional Support, District Administration, School Administration, District Support, and Other. An eighth expenditure category, Debt Service, is a function of whether school district voters have passed bond issues to support capital improvements and are in the process of repaying those. Use of this data for research purposes includes the assumption of a normal distribution of errors in coding data at the local level.

Overview of Methodology

Data were collected from the database kept at the Office of Accountability as derived from the Oklahoma Cost Accounting System. Each category of school expenditures was coded to each school district for the 2000-01, 2005-06, and 2010-11 school years. Costs in each year were not converted to 2011 dollars because comparisons occur within each year, and the cross-year analysis used standardized regression coefficients.

Research questions one and two were addressed through a series of multiple regression tests using 2010-11 data only. For question three, results of the tests were compared with similar tests from 2005-06 and 2000-01. These school years were deliberately selected because 2000-01 coincides with the year before the No Child Left Behind Law went into effect and 2005-06 represents the midpoint year between the two. Multiple regression tests also included variables that could impact categorical spending. Specifically, models also included independent variables, such as: school district type, free/reduced lunch percentage, students per square mile, assessed property value,

percent of district revenue from the state, percent of district revenue from the federal government, and total dollars spent per student.

Chapter II

Review of Literature

Odden, Monk, Nakib, and Picus (1995) concluded that the public has more theories than facts about how education dollars are spent. In public discourse, facts about public education spending are often obscured between ideas that large percentages of school spending are wasted in an "administrative blob" and opinions about the extent to which higher teacher salaries are necessary to maintain a strong teaching force. Important public conversations about how to "restructure the use of resources to produce higher levels of student achievement" (p. 161) rely on an understanding of facts over the rhetoric. Their study of spending in all 50 states showed that neither a blanket assertion that all education dollars are used wisely nor that there is a tremendous amount of education spending waste would be accurate.

This literature review discusses the theoretical framework behind education productivity research. To further frame the research questions and methods, this section contains five areas of focus – each with a slightly different emphasis on production and education policy. Each makes connections to the other areas of focus, as well as to the study that follows. Collectively, these sections demonstrate the need for this research.

Theoretical Framework

Education production function research began in earnest in the 1960s, with researchers attempting to estimate relationships between selected schooling inputs and educational outcomes (Monk, 1992). Unfortunately, much of this research is a history of inconsistent and insignificant results coupled with conceptual inadequacies in the models used by researchers. The key question often not asked is how education models

look different than other types of production models (p. 308). Monk sums up the early research saying that "progress toward estimating the education production function required a more micro-approach" (p. 308). While studies from the 1970s and early 1980s trended towards looking at classroom level inputs, by 1990, researchers had reverted back to looking at "aggregate levels of analysis" (p. 309).

One line of study within productivity theory has been the examination of the relationship among configurations of inputs. Within this work:

> "…schooling becomes conceptualized as a nested production process where the ultimate production of educational outcomes presupposes the production of prerequisite organizational attributes. Research pursuing this tack can be viewed as an attempt to raise the underlying production model to a new and higher level of sophistication" (Monk, 1992, p. 311).

A recurring conclusion in these studies is that effective schools have an atmosphere conducive to instruction, which can mean different things in different places. An inherent limitation is the fact that often what makes effective schools effective is "idiosyncratic and difficult to replicate" (Monk, 1992, p. 311). In a sense, from a policy-making perspective, this would indicate linear relationships between configurations and inputs. In other words, if *a, b,* and *c* are present in the school then the district should provide *x, y,* and *z.* If configuration predicates inputs, then it should follow that the combination of these should also predict outcomes. Unfortunately, the causal links between those suppositions has never been firmly established by researchers. As such, no clear formula ties together inputs to production to outputs.

Easy to lose in any analysis is that one of the differences between education and other industries in production is the "nested nature of decision making and the reciprocal nature of the relationships that exist across all levels" (Monk, 1992, p. 312). Administrators must both supervise and work to meet the needs of their teachers. Teachers must both supervise and work to meet the needs of their students. As such, as Monk points out, "The potential for results such as these to be translated into bad social policy is real indeed" (p. 313).

Monk also critiqued the use of economic models used to study classroom processes. His observations were that the studies, on the whole, tend to "become technical very quickly" and cause problems for "the relative lack of economic sophistication that can be found among practitioners of public policy" (Monk, 1992, p. 315). He noted that such studies tend to oversimplify the distinction between whole class and individual instruction, obscuring every nuance lying between them. Additionally, the micro-level data that would be necessary to fully illustrate differences in classroom processes either are not available or are not consistent between classrooms, schools, districts, states, and the country. Most critically, Monk pointed out the "perverse" conclusions of many of these studies, vis-à-vis using economic principles to inform practices around student placement, teacher education, and teacher evaluation.

Monk (1992) concluded by considering the multiple possibilities in future research. First was the possibility that "there is no such thing as a tractable production function." Under this assumption, the role of the district and/or state would be "the setting of targets, the dissemination of ideas that might be tried by teachers, and perhaps efforts to make it easier for teachers to try ideas out" (p. 316). Next was the idea that

"reality includes a slightly tractable production function that is highly idiosyncratic but whose properties teachers have some hope of discovering" (p. 317). Under this framework is the realization that no two classrooms, schools, districts, or states are exactly alike. While it would be possible through research to gain an understanding of what works, it would be simplistic to overlay solutions from one setting to another and expect identical outcomes. Finally, he considered the possibility that "there is in fact an underlying production function that is quite tractable" (p. 317). This would compel policy-makers to find the best ways to spend money and ensure that the maximum level of spending possible is done in this way.

In 1995, the National Center for Education Statistics used school district revenue and expenditure data overlaid against U.S. Census data for the first time (Parrish, Matsumoto, & Fowler, 1995). This study of 1990 school and demographic data was the first of its kind, presenting "not only the actual revenues and expenditures, and those resources adjusted for geographic cost-of-living differences, but also resources adjusted for variations in school districts' student need" (p. 3). One of their findings is that nationally, even after adjusting for differences between states, more money was spent per pupil in small districts, districts with high minority populations, and districts with higher levels of poverty (p. 12). Additionally, districts serving larger populations of poor, limited English proficiency, and minority students tended to spend a larger percentage of their money on instruction (p. 22).

Picus (1997) stated that while most of what would be considered production occurs at schools, it is districts that raise revenue and determine where the money goes. Even when sites have funds to manage, the amount of funds and amount of control over

those funds is determined at the district level (p. 317). Further presenting a challenge to researchers is the fact that each state raises and distributes funds for education in vastly different ways (p. 319). When given the opportunity to use school-level data, Picus found that inherent problems lie in using datasets that are prepared for policy-makers rather than for researchers (p. 328).

Odden and Clune (1995) discussed the importance as researchers of maintaining focus on the factors that schools control. While recognizing that "low student performance may be due in part to declining social and economic conditions of children and their families, lack of hard work by students, and lack of parental support for schools" (p. 6), they pointed out that school districts often spend what limited funds they have on things that are not proven to raise student achievement. For example, while raising teacher salaries is an incentive to join and remain in the profession, doing so without also working "strategically to enhance teacher professional expertise" (p. 6), does not improve student outcomes. Even more critical is the fact that resources are unequally distributed to schools and within them among classrooms. Additionally, bureaucratic influences lead to disconnected efforts that take the focus away from results.

Odden, Monk, Nakib, and Picus (1995) cited other coding differences between states. While some allow districts to count expenditures for curriculum development and staff development as administrative or support services, others place these costs in the direct instruction category (p. 164). Monk, Pijanowski, and Hussain (1997) also noted the wide variation from state to state in the levels of funding from federal, state, and local sources (p. 52). They also explained that while the amount and source of

funding has been changing drastically since the 1960s, the percentage of funds spent on administration has held steady at between ten and eleven percent since 1967 (p. 54). Their research showed that new mandates and reforms tend to hit smaller, poorer districts harder than larger ones with greater access to resources. They also showed that any new funding tends to be spent either on deferred property maintenance or reducing class sizes (p. 56).

Hartman, Bolton, and Monk (2001) explained that one of the problems with data is the different meanings assigned to it by categories of users. School and district administrators collect data as proscribed by state and national policy makers. They use the data to manage their districts and schools and make sense of spending patterns to inform decision making and implement school improvement. Meanwhile, researchers rely on data that is compiled for them to conduct analysis of revenue and expenditure practices. They also use this data to evaluate funding adequacy and equity between schools and districts. State and national policy makers review revenue and expenditure data to develop legislative responses. Two of these three groups – administrators and policy makers – use data to make decisions about improving education (p. 84).

Studies specific to states have also shown that school district size, poverty levels, and increases in funding all interact to determine how education dollars are spent. These "micro-level" studies build upon existing research over the productivity in education (Monk & Hussain, 2000, p. 1). In studying school districts in New York, Monk and Hussain used "multiple regression models to identify the independent effects of important structural attributes on internal resource allocation practice" (p. 2). Key findings in New York are that for every 10 percent increase in spending per pupil, there

was a 3.99 percent increase in the number of professional positions (p. 5), a ten percent higher property wealth per student indicated an increase in .28 professional positions per 1,000 students (p. 10), and a 10 percent increase in free and reduced lunch participation corresponded with an increase of .18 positions per 1,000 students (p. 12). Other findings included that "changes in spending levels occasion changes in how resources are being allocated internally at micro levels of the system" (p. 7). In short, student poverty and district property wealth – separate measures of a school district's access to resources – showed different impacts on decision-making. This demonstrated to an "internal resource allocation process [that] is quite complex and consists of substantively important base and share effects that are distributed across levels of decision making" (p. 21).

Looking at public education funding reform in Ohio, Monk and Theobald (2001) framed their study around three basic principles that have emerged after decades of school finance research. First is the idea that it is the state's job to ensure local districts offer at least a bare minimum level of education. Next is that the state bears responsibility for providing funds to meet that minimum set of expectations. Finally, at the local level, taxpayers may choose to exceed these minimum standards and tax themselves accordingly (p. 505). They also took the position that the wealth of a state as a whole must be considered within any reasonable definition of what constitute an "adequate education" (p. 508). While Ohio had not settled on a standard of adequacy, the authors express hope that policy makers could "work to minimize the resulting tendency for the upward movement [of the standard] to undercut the remaining areas of baseline consensus" (p. 515).

To that point, Sample and Hartman (1990), in studying equity among Pennsylvania school districts, pointed out that "not all communities seek the same outcomes" (p. 50). Using the framework developed by Berne and Stiefel (1984), they asked four key questions: who are in the groups for which equity should be considered; what resources should be distributed equitably among group members; how should it be determined whether that equitable distribution has occurred; and what measurements will determine degrees of equity? (p. 51). They determined that in any sense, sweeping reforms to the Pennsylvania school funding system did not create the equity policy makers had hoped (p. 69).

Napier (1997) found that in Mississippi school districts, the availability of funding to school districts was only equalized by local efforts to increase millages for schools. In other words, for poor districts to have the same level of funding that wealthier districts have, communities have to raise their own taxes (p. 8). As the willingness of the district to levy mills indicates the values and priorities of patrons within the district, funding for schools is dependent less on formulas and policy makers than it is on the patrons in individual communities.

Studying states in which the largest number of school districts are rural poses different challenges altogether. Citing Jacobs (1984), Howley (2004) wrote that in financing schools, "rural-urban disparities (favoring urbanized areas) are part of the fabric of human reality" because urban centers drive the economy (p. 261). This policy tilt drives the push for uniformity in national standards and is an extension of more than a century of efforts to create the "one best system" of public education (DeYoung, 1987). Policy discussions using definitions of equity "anchored to the level of inputs

common in suburban districts" tend to short the disparate needs of urban and rural school districts (Howley, 2004, p. 265). They also often lack another critical acknowledgement:

> "local wealth plays a very influential role in (urban and rural) school funding, no matter how equitable a state's funding scheme, and whether or not local property taxes are the source of school funding (that is, wealth influences culture). Moreover, norms of school and district size vary widely across the United States, and so therefore do the norms of financial support for schools and districts of varying size" (Howley, 2004, p. 268-269).

Other disparities among states exacerbate the difficulty in analyzing the availability and use of school district funding. One is that only eight states – including Oklahoma – provide no funding for facilities, leaving that burden to communities through bond elections (Sielke, 2004). Combined with the fact that rural schools already have issues with sparsity, transportation, and consolidation, it is easy to see how spending decisions are not always made with the same priorities between districts (Mathis, 2003). Also, with increased federal regulations under No Child Left Behind, "notions of community and the broader purposes of education are *a priori* eliminated" (p. 121). In Arkansas, prior to the slate of consolidations in the last decade, a fiscal study predicted they would yield a savings of 1.6 percent – not the windfall called for by policy makers (p. 122). School districts in rural areas also have more difficulty attracting and retaining staff (p. 124) and addressing physical plant needs (p. 126). Exacerbating these problems, state funding mechanisms in place to address the rural factors are typically "clumsy" at best (p. 129).

Inasmuch as factoring for rural schools makes the study of education productivity more difficult, the differences in rural schools in different parts of the country provides further complication. Monk (2007) described some of those differences:

> "…rural communities vary widely both within themselves and across regions of the nation. Some rural areas, particularly resorts, for example, feature extremely valuable real estate, whose high property taxes have implications for funding rural schools. Yet poverty can exist in these same resort settings….Rural school districts in the western United States also differ from those in the east, partly because of geography and partly because of history. In years past, many small country schoolhouses dotted the nation's eastern, particularly northeastern, states. As school district consolidation has proceeded over the years, the number of districts has declined substantially, but many small districts continue to exist, particularly in New York and Pennsylvania. Elsewhere, particularly in the south, county-level districts are more common, and consolidation efforts are more typically focused on individual schools" (p. 157).

Monk (2007) showed that rural schools also tend to have teachers who are more frequently white, less educated, and receiving lower compensation (p. 159). Often, this is because they arrive straight out of college and work in locations too remote to pursue advanced degrees. These conditions also often reflect less fiscal discretion in a district's spending capacity (p. 159). Because of this, teachers tend to leave after a brief tenure or stay for the duration of their careers (p. 164).

Economies and Diseconomies of Scale

Related to the research on education production, the body of work describing the pull between economies and diseconomies of scale in public education is critical to understanding public education finance. Andrews, Duncombe, and Yinger (2002) defined *economy of scale* in relation to education through a cost model representing various school inputs (number of teachers and support staff, salaries, specialized facilities, etc.) and referencing them against outcomes (test scores, dropout rates, etc.). While the authors recognized that outputs are cumulative in nature, they omitted this factor from their model. They did include, however, three different measures of scale: activites, student outcome, and school district size. This study discussed the first of these measures only. The authors define *economy of scale* as "the relationship between costs and the quantity of school activities" and that "technical economies of scale would exist if the cost per lesson decreased as the number of lessons provided by a school increased" (p. 247). In other words, the more students a district has, the more lessons that district is providing to students. As this number increases, the unit cost of each lesson decreases. As long as this holds true, the model would show an economy of scale to be in place.

Later, Baker and Duncombe (2004) modified these projections to include population sparsity in their model. The size of a school or district, measured by enrollment figures alone, does not accurately predict the costs of educating the students to be served. Recognizing this, 16 states use some kind of measure of sparsity to make adjustments to their funding formulas. In a report prepared for the Wyoming Legislative Service Office (Picus & Seder, 2004), consultants used this information to help prepare

conclusions and make policy recommendations regarding the small school adjustment in that state. The cogent finding in this study was the *lack* of statistically significant differences between per-pupil staffing levels and spending in different categories. In spite of the public perception that an economy of scale is present, making larger schools more efficient, the Wyoming study shows no clear indication of this.

Looking at 20 years of consolidations in New York State from the mid 1980s to the mid 2000s, Duncombe and Yinger (2007) continued the discussion of economies of size. Building on the writing of Tholkes (1991) and Pratten (1991), they demonstrated that certain flat costs exist in operating a school district of any size. For example, school districts will have at least one superintendent and usually at least one bus. Whether that bus carries 20 students through country roads or 60 students through city streets, it is an essential cost. As students are added, those costs go up to a degree dependent on other variables. Within this framework, they find five areas of savings relative to the economies of size.

The first area is the *indivisibles*. This considers the fact that individuals have certain capacities to do their work, and that adding students does not always make them less efficient. For example, if consolidating schools raised the average class size by a small number of students, the quality of instruction would likely be the same. Also, a school needs to have a principal and central administration, no matter the size. Adding students through consolidation does not necessarily change the number of administrative staff. The second area is *increased dimension.* A small school may have one computer lab that is used by one or two classes daily. Through consolidation, that number may grow to three or four. Similarly, the third area, *specialization*, focuses on

the ability of the labor force to specialize and become better at what they do. This, in response to the trend towards standards-based education, may help schools become more effective by reducing the number of preparations each teacher needs to make for each school day. The fourth area is *price benefits of scale*. Large districts save money by buying large quantities of supplies and equipment. This is simply not feasible in small school districts. The last area is in regard to *learning and innovation*. The presence of collegiality may lead to greater progress in school reform because the varied experience of more professionals can add to the existing body of knowledge (Duncombe & Yinger, 2007).

The authors used a formula accounting for school spending per pupil, school performance, input prices, enrollment, environmental cost factors, and school district inefficiency to review the most recent school consolidations in New York. They found that in all cases, consolidation led to less cost in the operations of school districts. Smaller districts had a higher percentage of cost savings when they consolidated, but even two relatively larger districts with enrollment over 1,500 saw significant savings. Additionally, they found that some of the initial costs of consolidation diminished over time. While capital spending in the initial years after consolidation caused a spike in outlay, it was still comparable to those spikes in non-consolidating districts. Overall, consolidating districts spent less in every statistical category, except for administration, than their peers in other rural districts (Duncombe & Yinger, 2007).

Other studies have found different results when looking at outputs. Funk and Bailey (1999) found that while large Nebraska schools spent less per-pupil than small ones, the smaller districts achieved higher results in terms of graduation rates, making

the effective efficiency of small schools greater. Another study in Minnesota found that small school districts make up for the overall lack of resources in the formula for their needs by passing larger local referenda (Thorson & Maxwell, 2002). Where a state's formula has no or an inadequate adjustment for sparsely populated school district, this can place an increased burden on local taxpayers. For each state, what constitutes "small" is different; therefore the way each state's school funding formula accounts for size is also different.

The authors also found several points worthy of further inquiry. One is the extent to which initial needs for capital costs decline after the ten year period following consolidation they studied. The salient question is whether this is a one-time impact, or if it repeated due to the limits in mechanisms by which districts can raise funds for capital expenditures. Also, the study did not represent a true cost benefit analysis of consolidation because factors relating to additional costs to families or communities are not revealed. For example, consolidation may impact transportation costs and housing values.

Colgrave and Giles (2008) discussed the use of meta-regression analysis (MRA) to determine Optimal School Size (OSS) and Optimal District Size (ODS), as researched in studies dating back to 1966. Many studies use ordinary least squares (OLS) regression, matching cost per student against school size. As discussed earlier, this is a restrictive approach; factors exacerbating the costs of small schools, such as sparse population or topography, prevent a two-dimensional analysis from being accurate.

Several studies have found that economies of scale from school consolidation provide for increases in efficiency and a decrease to operating costs (Tholkes, 1991; Duncombe & Yinger, 2007). In their study of twelve pairs of consolidating districts in New York, Duncombe and Yinger (2007) found that in all cases, consolidation led to lower costs per pupil. Smaller districts that combined had a higher percentage of cost savings when they consolidated, but even two relatively larger districts with enrollment over 1,500 saw significant savings. Additionally, they found that some of the initial costs of consolidation diminished over time. While capital spending in the initial years after consolidation caused an immediate increase in outlay, it was still comparable to those increases in non-consolidating districts. Overall, consolidating districts spent less in every statistical category, except for administration, than their peers in other rural districts. They also noted that several negative consequences may exist to an extent that they at least partly offset any savings that would be seen through consolidation. Examples include higher transportation costs, the likelihood of labor organization, decreased motivation and effort by school staff, lower student engagement, and lower parental involvement (Andrews, Duncombe, & Yinger, 2002, p. 248).

A prior study of consolidation in Oklahoma schools demonstrated that economies of scale exist to a point and then begin to plateau (Jacques, Brorsen, & Richter, 2000). When school size reached about 965, the authors found that per pupil costs did not decline to any real extent and test scores declined. A caveat to the second finding is that the authors lack confidence in the measures of student achievement since they are reported in averages rather than in groupings that would elucidate more clarity on different bands of students.

Ladd (2008), however, did look at equity and the overall health of school districts through the lens of every student receiving a minimum set of skills. In this viewing, the key issue is determining what the minimum set of skills will be. And again, it raises the question of whether or not small school districts are less than adequately situated to provide those skills. Bruce Biddle and David Berliner, writing for WestEd, a California-based think tank, have found that "American funding differences generate huge disparities in the quality of school buildings, facilities, curricula, equipment for instruction, teacher experience and qualifications, class sizes, presence of auxiliary professionals, and other resources for conducting education" (Biddle & Berliner, 2003). While suits challenging the legality of unequal funding based on district property taxes have been filed in more than three-fourths of the states, the authors found that recent litigation in states has shifted from demands of equity to demands of adequacy. While some states have been left through consolidation with school district boundaries that are roughly contiguous with municipal and/or county boundaries, this is not true across the country. These misaligned boundaries also contribute to disparities in the allocation of resources.

Where consolidation matters relative to this study is that researchers studying education finance to this point have focused on the idea that bigger schools or school districts are more efficient. While that body of work discusses outputs such as student achievement as evidence of this efficiency, it does not fully discuss how the size of student population impacts how money is spent. To the extent that this may influence outcomes, it is important to have an understanding of relationships among district size, funding, and educational outcomes.

Ideal School/District Size

Overlapping with this are the numerous studies that have discussed the ideal size of a school and a school district relative to both efficiencies and student outcomes. The value in looking at both efficiencies and outcomes is that public schools not only need to prudently use taxpayer dollars, but also because schools must produce students who are academically prepared for life beyond school.

Starting with Friedkin & Necochea (1988) in California, researchers have attempted for more than two decades to define ideal school size relative to socioeconomic status (SES) (Howley, Strange, & Bickel, 2000, p. 2). One reason for the lack of research is that "District size is considered even less interesting than school size by most researchers interested in school performance" (Bickel & Howley, 2000, p. 2) Where research does exist, it often overlooks the extent to which school district size, as a variable, interacts with other districts, such as poverty (Bickel & Howley, 2000, p. 4) Their study in Georgia found that "large schools in large districts show the highest proportion of variance in achievement associated with SES" (Bickel & Howley, 2000, p. 20). Separate studies in Ohio, Texas, Georgia, and Montana further demonstrated that extremely large schools (though defined differently for each state) produce lower test scores (Howley, Strange, & Bickel, 2000, p. 4).

Bickel, Howley, Williams, and Glascock (2000) explored the relationship between school size and student achievement using more than 1000 high schools in Texas. Their study also questioned whether cost savings are possible without increasing school size. Their dataset included 116 schools that were the only schools in a rural district. Serving students from the beginning of public education (with a starting point

of Kindergarten, Pre-K, or Early Childhood) through twelfth grade, these schools were found to operate at about $1,017 less per pupil than other schools in the study. However, as these schools grew larger, their savings also decreased (p. 5). One key finding of the study was that as school size increases, so does the cost of raising test scores for poor students (p. 15). The authors have conducted similar studies in multiple states and found this to be true in every one of them (p. 29). They also have found that any "negative relationship between size and expenditure per pupil becomes increasingly tenuous as school size increases, and eventually savings become negligible" (p. 29).

None of these studies explored the inputs – the decisions made locally about where money is spent. Additionally, none of the research discussed how this could vary by the size of district. In as much as schools are effective or not, it is unclear whether local decisions about priorities in spending are a contributor. While previous research on school and district size does discuss both of these factors, however, this study focused on how money was spent. The ultimate outcome of student achievement is a question to pursue in a separate study.

Expenditures per Pupil

Among Oklahoma school districts, there is a wide range of per pupil funding and thus, per pupil expenditures. This study looks at how school district size correlates to per pupil expenditures. The models to be tested will show how much both of these variables affect the amount of money going directly to instruction. Schools and districts having the ability to spend enough money is an important concept to understand in school finance; but it is equally important to follow that money to see where districts spend it. As economic conditions change, those patterns may also change.

Baker (2003) further delineated the most recent wave of increased funding for public education. On average, funding to school districts (all states) increased per pupil three times more in the second half of the 1990s than it did in the first half. Because of this, he noted that when money is short, "fiscally conservative state legislatures often criticize local school district officials for inefficient use of existing funds" (p. 1). He also questions the impact of state policies mandating percentages of expenditures by category to the extent that they may "encroach" upon a district's ability to meet state and federal mandates (p. 3). This confluence of policies and the impact on districts has led to policy makers to complain of a "productivity collapse" in schools (p. 4). Researchers also often point to the fact that in spite of differences in district populations, locations, and sizes, expenditure patterns tend to be more similar than different (Goertz & Natriello, 1999). One of Baker's findings was that "districts in states with economies of scale policies allocated significantly less funding to core instruction" and that "economies of scale policies were marginally positively associated with increased shares of expenditures to central administration" (Baker, 2003, p. 16). Higher spending per pupil is also closely "associated with lower core instructional spending and higher total and central administrative spending (p. 19). The same analysis of schools with high levels of poverty showed that the commensurate increase in federal funding yields a lower instructional share (p. 20). In other words, schools and districts that get more dollars to spend tend to place a lower percentage of that money in instructional costs.

In looking at different variables that may impact the effectiveness of schools, researchers must look within states and not try to make comparisons between them. For

example, per pupil expenditures in one state may be vastly different from an adjacent state. Those two states may also have very different approaches in how school districts are organized and how revenues are collected and distributed. It becomes imperative then to look at studies of such variables within individual states. One of the earliest of these, funded by the National Center for Education Statistics, found that overall, funding disparities between districts have decreased since 1980, while increasing in a few states (Hussar & Sonnenberg, 2000). The study found "formidable conceptual challenges" in examining equity on a national level (p. 2). Hussar and Sonnenberg also recommended that researchers looking at equity within states should explore separate elementary-serving districts in separate studies (p. 7).

Hartman (1988, 1994, 1999) looked at the spending patterns of school districts of different sizes in Pennsylvania. Beginning with the premise that "the level of school spending and the quality of educational programs has a strong intuitive appeal" (Hartman, 1988, p. 438), he concluded that districts with significantly higher spending per pupil were likely to have "lower class sizes, higher salaries for teachers…more teacher aides, additional support and administrative personnel, and greater amounts allotted for supply and equipment items" (p. 439).

In each study, he ranked districts by per pupil spending, isolated the fifty highest spending districts, the fifty lowest spending districts, and the fifty districts whose per pupil expenditures would have put them in the middle (Hartman, 1988). He then tested the relationship between per pupil expenditures and a number of other variables related to spending and school characteristics. The strongest relationships were between total spending per pupil and class size. The studies also show that the highest spending

districts are paying more for teachers and administrators. Most telling is that the highest spending districts were spending more on instruction per pupil than the lowest spending districts were spending altogether.

Hartman (1994) slightly changed the second iteration of the study by looking deeper school districts' revenue sources. With similar overall results as in the first study, Hartman also found that schools in the high-spending group received 77 percent of their revenue from local funds and 21 percent from the state. Meanwhile, the low-spending districts received 36 percent of their funding from local sources and 60 percent from the state. He also found that high-spending districts also tended to spend more dollars on instruction, but less as an overall percentage of total expenditures. The third study, more than a decade later, reached the same conclusion. High-spending districts – all but one of which are in suburbs of Pittsburgh and Philadelphia – were able to pay teachers with roughly the same levels of experience and educational attainment more money to teach there. They were also able to hire more teachers and lower class sizes (Hartman, 1999, p. 408). This research follows a similar pattern as the three Hartman studies in Pennsylvania – looking at three sets of school expenditure data, each five years apart .

Wilkins (2002) found no statistically significant difference between student performance in districts that had the highest and lowest per pupil expenditures in a study of West Virginia schools. Complicating the results was the fact that school districts depend on multiple funding sources, have disparate inherent economic capacities, varying levels of student needs, and other, more qualitative variables (Wilkins, 2002). Another study – this one combining per pupil funding with other

variables such as poverty, school size, and the percentage of funding schools receive from state, local, and federal sources – used a model for predicting school district expenditures in Ohio. The multiple regression analysis of eight variables showed that per pupil expenditures interacted with other variables to explain much of the variance in school performance in rural schools (McCracken & Peasley, 1995).

Greenwald, Hedges, and Laine (1996) found in a meta-analysis of more than 60 studies examining the extent to which a relationship exists between school resources and student achievement, that smaller schools, smaller classes, highly educated teachers, and more experienced teachers are positively correlated to student achievement. Each of these variables costs more money. They noted:

> While many would have hoped that increasing resources would be positively related to achievement, we did not expect that the synthesis of data from a wide variety of studies over a three decade period would yield conclusions so uniform in direction and comparable in magnitude (Greenwald, Hedges, & Laine, 1996, p. 385)

They continued to say that money is not as big of a determinant as "how we spend the money" (Greenwald, Hedges, & Laine, 1996, p. 385). This again points to gaps in the research. Much has been written to the conclusion that spending more money in schools *can* impact student achievement. Schools usually have bigger wish lists than means to fulfill them. However, the interplay between variables within this hole is a the focus of this study.

This was also the basis for Hanushek's response to Greenwald, Hedges, & Laine (1996). While three decades of research point to the conclusions of their research, it did not account for the variance in how money is spent (Hanushek, 1996). In other words:

> My interpretation is that there is actually a distribution of underlying parameters, that is, that there is an underlying heterogeneity in the use of resources. In certain circumstances resources are used effectively. In many they are not used well at all. And in some they are employed in ways that are actually harmful to achievement. In this case, the policy question is how to identify or select situations that involve effective use of resources and discard others . (Hanushek, 1996, p. 402)

Hanushek reiterated this point later in research on the next area of focus, adequacy and equity:

> The overarching problem stems from the empirical evidence available to estimate the costs of adequate student proficiency. The consultants' work would be simple, if scholars had shown, repeatedly, something like the following: An additional expenditure of one thousand dollars per pupil will translate, on average, into a 15 percent gain in student proficiency. Unfortunately, such studies do not exist. Research has not shown a clear causal relationship between the amount schools spend and student achievement. After hundreds of studies, it is now generally recognized that how money is spent is much more important than how much is spent (Hanushek, 2006, p. 7).

Adequacy and Equity

One reason policy makers are so focused on the amount of money schools spend is the vast number of cases that have been litigated in state and federal courts. These lawsuits typically center around issues of adequacy and equity in school funding formulas. Since before Brown v. Board of Education, these related topics have been pursued both in policy circles and through academic study. Discussing how different states define each term helps develop an understanding of how school districts get different funding levels in the first place. Additionally, as states have attempted to remedy equity issues in funding over the last 40 years, there have been studies that discuss the relative impacts of the different approaches for doing so. In terms of the this study, it is important to know those methodologies and their limitations.

Funding for public education is at disparate levels among school districts, both between the states and within them. The question at hand then is whether this rises to the level of being an inequality issue. Since every child in the country is afforded the right to a public education, and states are the providers (and still, to a large extent, the policy-makers on educational issues), ensuring equal opportunity in education is imperative.

In 1968, a group of Mexican-American parents brought a class action suit against the state of Texas and several school districts within the city limits of San Antonio. The suit—which would eventually become the landmark US Supreme Court case *San Antonio School District v. Rodriguez* (1973) – on behalf of poor and minority children around the state, claimed that the Texas system for financing public education was too heavily reliant on the local tax base and that this disparity accounted for similar

disparities in per-pupil expenditures among the various districts. Three years later, in December 1971, a District Court found: (1) education is a fundamental right; (2) wealth is a suspect class; and (3) the Texas system violates the Equal Protection clause of the 14th Amendment to the US Constitution. The US Supreme Court, in a 5-4 ruling with multiple dissents, dismissed all three findings (San Antonio School District v. Rodriguez, 1973).

Early in his written opinion, Justice Powell acknowledged that the population and economic shifts of the early 20th century had led to "growing disparities in population and taxable property between districts [that] were responsible in part for increasingly notable differences in levels of local expenditure for education" (p. 13). In his opinion, the solution, recommended by an 18-member panel in 1947 and enacted by lawmakers, was adequate. They recommended a "funding scheme that would guarantee a minimum or basic educational offering to each child and that would help overcome inter-district disparities" (p. 19). In other words, Texas had created a minimum standard, and on paper at least, they had set out to overcome disparities so that this standard was met universally. They had not set out to create absolute equity.

The results of the formula were alarming. Edgewood Independent School District, in the inner-city, had the highest property tax rate of the 7 districts in the metropolitan area. Yet this only produced a minimal per-pupil contribution to the school finance system. Meanwhile, Alamo Heights Independent School District, situated in a more suburban setting, with a tax rate almost 20% lower, generated more than 12 times per-pupil than Edgewood. Combined with all sources of funding, the total amount of per-pupil expenditures in these neighboring districts was $356 in Edgewood and $594

in Alamo Heights. The District Court had ruled that there was no "compelling state interest" (p. 16) to keep the formula for redistribution of tax dollars that Texas lawmakers had established. Powell wrote, "No proof was offered at trial persuasively discrediting or refuting the State's assertion" (p. 24) that the minimum standards were met.

In his dissent, Justice Brennan asserted that the majority erred in writing that the right to an education must be "explicitly or implicitly guaranteed by the Constitution" before it merits Constitutional protection. The Court could not have stood on principle and unanimously overturned school segregation in *Brown v. Board of Education* had this been true. Justice Marshall, who himself argued before the court in *Brown*, wrote compellingly in his dissent from *Rodriguez* of the "right of every American to an equal start in life" (San Antonio School District v. Rodriguez, 1973, p. 63). He took exception to the majority's suggestion that the appellees should pursue remedies through the political process, stating that it "has proved singularly unsuited to the task of providing a remedy for this discrimination." He further deconstructed the language of the majority decision, basically calling it a reversal to the days of "separate but equal." In many ways, some of the more powerful language from Marshall's dissent has framed the discussion of equity for the ensuing decades:

> In my view, though, even an unadorned restatement of this contention is sufficient to reveal its absurdity. Authorities concerned with educational quality no doubt disagree as to the significance of variations in per-pupil spending. Indeed, conflicting expert testimony was presented to the District Court in this case concerning the effect of spending variations on

> educational achievement. We sit, however, not to resolve disputes over educational theory but to enforce our Constitution. It is an inescapable fact that if one district has more funds available per pupil than another district, the former will have greater choice in educational planning than will the latter. In this regard, I believe the question of discrimination in educational quality must be deemed to be an objective one that looks to what the State provides its children, not to what the children are able to do with what they receive. That a child forced to attend an underfunded school with poorer physical facilities, less experienced teachers, larger classes, and a narrower range of courses than a school with substantially more funds - and thus with greater choice in educational planning - may nevertheless excel is to the credit of the child, not the State…Indeed, who can ever measure for such a child the opportunities lost and the talents wasted for want of a broader, more enriched education? Discrimination in the opportunity to learn that is afforded a child must be our standard" (San Antonio School District v. Rodriguez, 1973, p. 122).

Daniel J. Losen (2004) found that *Rodriguez* deflated hopes of *Brown* serving as a stepping-stone to breaking apart other instances of "institutional forms of discrimination." By failing to "assert that unequal distribution of resources can also harm the potential of poorer students and further stratify society," the *Brown* ruling itself left room for the Court to rule as it did in *Rodriguez* argued Tsesis (2004). Cashin (2004) added:

> The Court did not help with the equality battle between urban and suburban school districts when it declared in 1973 that education was not a fundamental right under the United States Constitution and therefore the State of Texas was not required to provide equal funding to all school districts…The battle for equal or adequate funding in public education would be left to a later generation of civil rights lawyers and it would be fought in state courts based upon state constitutions. To date, litigation has been brought in forty-five states and about twenty state supreme courts have ordered funding equalization remedies based upon a state constitutional requirement of an adequate education. But this battle has focused almost exclusively on closing the disparities in financing between poor and wealthy school districts. Like the pre-Brown cases, fighting for "equal" or enhanced resources has proved easier than fighting for integration. Even so, there is little evidence that such litigation has improved outcomes for either minority children or poor children, or both, and the record in actually equalizing funding is mixed. Moreover, it has been argued that urban school districts require not only equal funding, but also greater amounts to meet the significant challenges of educating large numbers of poor students (p. 343).

Two areas of activism and study have emerged from this. Foremost was the fact that while an occasional case will ask the Court to revisit the ruling in *Rodriguez*, the real battles are currently being fought—with some success—on the state level. Some states have completely re-written their funding formulas based on court orders. But

none have re-written them because of Supreme Court orders. With recent changes to the Court, strengthening its conservative leanings, the 1973 positions expressed in *Rodriguez* seem to be out of play at that level. The second point is that equalization is not enough – that greater emphasis should be placed on funding urban schools than on their suburban and rural counterparts.

One of several existing models, the Resource Cost Model (RCM) is used to analyze the cost of delivering the state standards to students (National Access Network, 2006). Further guidance in this can come from the courts. In 1995, the Wyoming Supreme Court required the state to calculate the cost of the "basket of goods and services" to provide all students with a "proper" education. The Oregon Council on the Oregon Quality Education Model, a "23-person body of legislators, educators, business leaders, advocates, and other community representatives," appointed experts to work groups that devised prototypical schools, considering the cost to educate students with varying needs. Each state, and each judgment for that matter, redefines the various processes for costing out the "basket of goods." In Arkansas, base per pupil costs were calculated at $5,864 with other amounts added on for various factors (National Access Network, 2012). The work culminated in two bills passing through the Arkansas legislature and increasing school spending by $121.7 million over the next two years.

Hanushek (2006) discussed several approaches for "costing out" equity in school funding (p. 6). The first was professional judgment – relying on professional educators to develop a set of educational experiences that would meet the desired outcomes and establish a cost for them. One shortcoming of this method is that professionals are not asked to operate within the framework of any budgetary

limitations but rather to develop a program "unfettered by any sense of realism or thoughts of trade-offs" (p. 8). As a result, courts mandating spending levels based on such studies never test the assumption that this "basket" in fact has all the goods necessary to achieve the desired results (p. 10).

Analysts also use "evidence-based" models to study equity in school funding across school districts. These studies select "specific studies that relate to elements of a model school and translate these studies into precise estimates for resource needs" (Hanushek, 2006, p. 12). Again, this approach has a drawback – namely that they focus on the expected impact of programs on the reduction of deficits in student performance rather than the likelihood of programs to reach a proscribed standard (p. 13).

Also with inherent limitations, the "successful schools" approach highlights the practice of effective schools irrespective of "many non-school factors that affect student performance, such as family background, peer relationships, and prior schooling experiences" (Hanushek, 2006, p. 15). By calculating costs for a "subset of successful schools" (p. 17), this approach does not consider the impact of those critical variables.

The "cost-function" approach, which is relevant to the methodology discussed in Chapter 3, "relies on current spending and achievement patterns across the full set of schools in a state" (Hanushek, 2006, p. 17). This method uses a range of metrics from successful schools, including student characteristics indicators, student achievement levels, and categorical spending. Unfortunately, much of the literature in this area concludes with the finding that "absent other reforms that would make the education system more efficient, large spending increases are required to obtain a noticeable achievement gain" (p. 18).

Monk and Theobald (2001) warned against a singular approach to solving adequacy and equity concerns:

> "The important point for policy makers to realize is that there is no single, best, uncontroversial method that answers fundamental questions about what constitutes an adequate education. The research on this topic is disappointingly thin and inherently problematic. A definitive answer essentially presupposes knowledge about how future labor markets are going to operate well into the 21st century. Conjecture is certainly possible, but results based upon conjecture will always be subject to challenge" (p. 509).

Baker (2006) also is critical of studies designed to estimate the exact cost of adequacy. From average expenditure studies conducted in the 1980s to resource cost modeling during the decades since, no model has satisfied a combination of professionals, consultants, and policy makers (Baker, 2006, p. 171). Even evidence-based models often lack the subtle nuance of the "cost of comprehensive school reforms" (p. 173). Baker further explained:

> "In a perfect world with perfect information about the relationship between resource mix and student outcomes (for guiding bottom-up analysis), perfect data on student outcomes, and perfect measures of district inefficiency (for guiding top-down analysis), resource cost and statistical cost function analysis would produce the same results. All distortions in cost estimates would be eliminated in each type of analysis. Resulting distortion of resource-oriented and performance-oriented analyses may be quite similar or quite different" (p. 175).

Baker also noted that other problems arise in studies trying to link spending in performance, noting that models may not take into account that schools or districts often spend more than is necessary to achieve the desired levels of student outcomes (p. 176). Describing this as an inefficiency, he also pointed out that existing models fail to account for the extent to which the impact of spending on outcomes may be overstated.

School Consolidation

Ultimately, school finance policy discussions enter into a consideration of how consolidation of school districts can act as a mechanism for achieving two specific outcomes. The idea that schools can operate more efficiently and deliver better curriculum if they serve more students has been a staple of public policy discussions since the 1860s (Cubberly, 1914). However, considerable research indicates that consolidation for the sake of these two ends is no guarantee that either will materialize. The body of work on school consolidation includes limitations that have been found to exist in the extent to which larger schools generate savings or offer a more comprehensive curriculum. Relative to these conclusions, this study establishes patterns of how schools spend their money and explore whether school size (and perhaps consolidation) have any impact on those decisions.

Studies of school consolidation often reach common conclusions. Probably most frequent are those revolving around the notion that consolidating school districts within states will lead to greater efficiency. In discussing efficiency, Bard, Gardner, & Wieland (2005) reflected on several studies that try to proscribe an ideal school size. They determined, based on the wide variance in conclusions between these studies, that "there is not an ideal or optimal district or school size that is universally agreed upon"

(p. 9). Fischel (2007) discussed the historically increased momentum for consolidation as the state share of financing education has increased. In particular, southern school districts typically have been consolidated along county boundary lines to curb the effects of segregation. Monk (2007) pointed out that most of the easily-accomplished consolidations have already been accomplished, and that the hard cases as defined by scarcity or challenging geography are all that remain. Self (2001) discussed the importance of a business model and incentives, such as increased pay for teachers as ways of developing buy-in among stakeholders for the consolidation. Surveys of teachers reported greater professional development since consolidation. While this does not equate to remunerative compensation, it does lead to greater overall satisfaction in the profession.

Another consideration is the extent to which school consolidation allows districts to broaden the academic opportunities for students. Policy makers looking at curriculum have historically pushed for high school education in rural areas that is as convenient and comprehensive as in more densely populated areas. Fischel (2007) explained that the elimination of one-room schools in rural areas created the "jigsaw-puzzle" pattern of school districts in many states (p. 32). Ultimately, this has left rural areas with odd-shaped districts based on social and economic conditions that were more true decades ago than they are now.

Bard, Gardener, & Wieland (2005) cited several studies showing that achievement scores are reduced measurably when students spend more times on buses. To add texture to this point, they cited a story of a four-year-old riding 80 minutes each way every day. The authors stated that in the winter, the student left home in the dark

and returned in the dark. Whatever efficiencies are created by the configuration of schools that led to this, they questioned whether the human impact is worth the savings. Ledbetter (2006) also discussed the extent to which high school access contributed to consolidation in Arkansas in the years immediately after World War II. While proponents of consolidation sought to modernize education by extending schooling for all students, opponents believed that annexation decisions would be made in some kind of a bureaucratic vacuum. Some of the concern expressed by communities to be affected by this was that local districts would not have their day in front of any kind of administrative body to appeal annexation decisions. Looking at the body of literature in this area, it is important to note that while pockets of voluntary consolidation have occurred over time, they are usually the exception. In most cases, large-scale consolidations have been mandated at the state level.

In recent years, some of the drive for school consolidation has been about preparing more students for college. Without a doubt, some schools are too small to offer a comprehensive curriculum. Of the Ohio superintendents surveyed by Self (2001), only 32 percent in districts with fewer than 100 students thought that the small size of the school district limited the academic opportunities of students. Conversely, 77 percent of superintendents in districts with fewer than 600 students felt that as a small district, they were limiting the opportunities of their students. This shows that the standard for what constitutes "adequate" in academic content is determined locally.

It is also important to note the impact of school districts within communities. In short, losing a school due to consolidation can cost a community its sense of identity and financial viability. However, the decline of a town's financial viability is often the

precipitous event leading to the decline of enrollment. Bard, Gardener, and Wieland (2005) wrote that considering the needs of stakeholders is critical to the success of a consolidation effort. They found that "when community interests were ignored during consolidation proceedings, educational absenteeism and community disintegration increased" (p. 5). They also cited several studies showing that "school consolidation actually creates greater hardships for families as children leave familiar neighborhoods, additional taxes are levied to support mergers, and larger facilities built" (p. 5). To an outsider, a small, rural school district may not seem viable financially. Its curriculum may seem limited or antiquated. To the community supporting it, a completely different perception exists.

Ledbetter (2006) referred to the same concerns in his look at historic consolidations in Arkansas. As discussed earlier, he wrote that changes from the 1946 referendum that failed to the one that passed two years later were made "to address fears that local control and community identity would be lost if the local school district was abolished (p. 53). Some of these changes included "provisions scheduling board elections sooner [after the consolidation], preserving elementary schools as close to a child's home as possible, and guaranteeing appeal to the courts [of the state decision to effect consolidation]" (p. 53). Fischel (2010), while not specifically discussing the effect of consolidations on local communities, offered a point contrary to the prevailing opinion that "consolidation was forced on rural districts" (p. 17). Rather, he contended that throughout America in the 1920s, "rural residents wanted a more regular pathway to high school" (p. 18) and that consolidation was that pathway. The perception of local resistance then stems in part from the fact that "even where consolidation was not

controversial, there were legitimate reasons for the state to attempt to coordinate them," and that the resulting "oddly configured district might forestall later consolidations" (p. 19).

Historically, overarching factors in society have had a major impact on school consolidations. Self (2002) discussed the changes that have come about nationally in education due to the Industrial Revolution and the fact that society has changed to such an extent that the previous model of education is no longer relevant. Progressives viewed education the way industrialists viewed production – with the mentality that bigger is better. To an extent, that mentality still prevails. To create a more efficient and effective anything is the goal of reformers in many a milieu. In education, these motivations are also reflective of changes in society, developments in technology, and the different demands that the public places on educators. Because consolidation is reflective of a swing in priorities from the status quo, he concluded that "a plan should include the identification of needs, goals, and objectives; the establishment of procedures; and some form of evaluation or feedback" (p. 4). In other words, it is not enough to consolidate to save money. Planning should include benchmarks by which the change will be measured and hopefully determined to have been successful.

Ledbetter (2006) discussed the influence of business progressives in the 1940s. Much of the drive behind the initiatives that were posed to voters in 1946 and 1948 came from their "reforming zeal" that they brought to "all aspects of Arkansas government and politics" (p. 56). The coalition shifted the emphasis of their campaign away from the fiscal savings that consolidation could generate towards the "educational benefits … specifically guaranteeing to every student access to an accredited high

school" (p. 57). While the motivation remained the same, the talking points had changed.

Fischel (2010) discussed how slavery and segregation created economies in which countywide consolidation was favorable in the South. He stated that "rural districts in the South usually run along county lines, sometimes with a 'hole in the doughnut' for a separate city district" (p. 24). While he insisted that this is true for most southern states, he excluded Oklahoma, Texas, and Arkansas, whose school districts more closely resemble those of Midwestern states. In most cases, Southern states found that running separate school districts in the same area for white and non-white students was costly and looked to merge administration of the two. At first, this deepened the disparity in spending between schools. Only after court intervention did this gap begin to narrow.

Summary

Collectively, these areas of education finance research form a foundation upon which this study was developed. Each piece is critical in explaining theory behind the methodology discussed in the following chapter. Then as the data are put through multiple regression tests, the results are tied back to these existing areas. This study contributes to the existing knowledge in these five areas, but more importantly, also to a relatively untouched line of inquiry.

All of these areas of research impact major policy discussions that shape every aspect of operation of public schools. What this body of literature fails to yield is information about how school districts spend their money. If funding is to be distributed to schools based on factors such as enrollment, participation in the free and reduced

lunch program, sparsity, growth, and myriad other factors – all combined dispassionately inside a respective state's formula – then school districts actually will have little control over how much money they spend. The control is within how they spend it.

Oklahoma, the state explored within this study, places limitations on the amount of general fund monies that can be carried over to the next fiscal year. School districts operating close to that limit will spend an amount close to that year's revenue. Over time, this leads to a consistent pattern of expenditures. Whether size impacts the extent to which school districts spend that money for instruction or administration is explored in the following chapters.

While this study is informed by these prior areas of research, it does not simply replicate the inquiries upon which they were written. Instead, it tests the impact of school district size and other key variables against categorical spending in Oklahoma school districts. Several multiple regression tests are used to establish the predictive value of variables relative to size, sparsity, poverty, sources of funding, and the total expenditures per pupil. Results show the extent to which these models hold a significant predictive value for combinations of these variables.

Chapter III

Research Design and Methodology

Chapter Two included a review of several relevant areas of research of education finance that frame this study. Each of these topics informs the research, but between them are questions that need further exploration. This study focuses on those questions, specifically how the size of a school district impacts the percentage of expenditures to be coded for instruction and administration, as well as to the extent that those relationships have changed over time. This chapter further illustrates where existing research creates an opportunity to study those questions and the methods for quantifying them. Sections on the research questions, data collection procedures, analysis procedures, and limitations follow.

Research Questions and Predictions

As stated in Chapter One, the purpose of this study is to explore the relationship between school district size and instructional and administrative spending. Making use of publicly available data for each school district in Oklahoma, this study provides some additional insight that will be important in statewide fiscal decision making. Accordingly, each fiscal variable is analyzed alongside appropriate controlling variables, including enrollment size, geographic location, socio-economic status, and the physical size of the district.

To explore the extent to which school district size impacts spending decisions, this study focuses on the following research questions:

1. Is there a significant relationship between school district size and instructional expenses?

2. Is there a significant relationship between school district size and administrative expenses?
3. Have these relationships changed over time?

To establish context for the data that were analyzed, it is important to consider the size of the dataset. In each year of the study, there are over 500 school districts in Oklahoma. Multiple regression tests run using the complete dataset for the 2010-11 school year (the most recent year with available data) provide the initial insights into the extent of the relationships among variables. The tests include coding differences for *independent school districts* (those teaching all grades Pre-Kindergarten through 12), and *dependent school districts* (those teaching only elementary grades), to highlight any differences that may be present between those groups.

Additionally, several options were considered as a proxy for poverty in the models tested. Federal free and reduced lunch rate participation was selected over U.S. Census data on poverty rate and household income for several reasons. First is that Census data are a snapshot in time, while free and reduced lunch rates vary from year-to-year. Estimates exist on interim changes between decennial data captures, but they do not extend to all parts of all states, and they are not recalculated by school district. Most importantly, the three measures are all highly correlated. Table 1 shows correlations among the three measures of poverty. Ultimately, the decision was made to use free and reduced lunch rate since it would represent data collected during the same school year as all of the other data.

Table 1: Correlations Between Poverty Measurements

	Lunch	Poverty	Household
Lunch		-.587*	.474*
Poverty	-.587*		-.574*
Household	.474*	-.574*	

*Significant at .01

This study includes four separate regression models for each of the 2010-11, 2005-06, and 2000-01 databases. Each model includes the following nine independent variables: average daily membership, the natural log of average daily membership (to account for non-normal distribution of the data), district type, free and reduced lunch rate, density, assessed property value per pupil, percentage of funding from the state, percentage of funding from the federal government, and total expenditures per pupil. The first and second tests for each school year use total instructional costs – first as a percentage of overall spending, and second as a dollar figure. The third and fourth tests for each school year follow the same pattern, but with total administrative costs.

The third research question was addressed using the same tests that were used with the 2010-11 data, but on the 2005-06 and 2000-01 datasets. Based on the low number of school consolidations in the state during this time, there might have been some efficiencies gained in terms of the percentage of dollars going to the classroom. However, this study was not designed to calculate this. Changes in the economy, which have led to reduced allocations to school districts, may also have impacted the percentage of money that has reached the classroom. As such, the same tests using data from the 2005-06 school and 2000-01 school years showed the extent to which any patterns are consistent or changing over time.

Data Collection

The state of Oklahoma served as the context for the study. The large number of districts – with most of them being small, rural districts – allows for a high degree of freedom in the regression tests. Datasets were obtained from the Office of Accountability *Profiles in Education* Database (see http://schoolreportcard.org/reports.htm) by contacting their staff. Each year's dataset includes information from the U.S. Census, the Oklahoma State Department of Education, the school district itself, and other local, state, and federal sources. Variables used in this study were selected from more than 100 different statistical indicators contained within each dataset. Table 2 shows descriptive statistics for the nine independent variables in the study.

Rationale for Methodology

The major thrust of this study was to find the extent to which the size of a school district impacts spending decisions, specifically in terms of the percentage of spending for instruction and administration. To that end, multiple linear regression models were used to explain the interactions among these variables. The use of multiple regression models allows for an examination of the power of each dependent variable on the separate categories of school expenditures.

Multiple regression studies are appropriate "where the goal is to forecast an outcome based on data that were collected earlier" (Cohen, Cohen, West, & Aiken, 2003, p. 3). That is the case with this non-experimental study of ex post facto data. For each model, results are reported both discussing the strength of each model (R^2) well as the standardized coefficient of each independent variable. Running the four tests for

each year studied, and reporting the results with standardized coefficients revealed the extent to which ADM impacts spending, but also provided context among other variables as to the magnitude of that impact.

Since each research question required the use of a family of tests, a Bonferonni correction was applied to the significance level. Doing so controlled for the increased likelihood of Type I errors possible when performing multiple tests on the same data (Abdi, 2007).

Variables and Coding in SPSS

This study employed multiple regression tests conducted in SPSS. Table 2 shows the indicators that are included in the dataset and the code that is used for each variable in SPSS. The models are described later in this chapter using these codes. This section discusses the rationale for the inclusion of selected key variables.

Table 2: Description of Variables and SPSS Codes

Variable	Code
Average Daily Membership	ADM
Natural Log of ADM	LOGADM
School District Type (0 for Dependent; 1 for Independent)	DISTTYPE
Free/Reduced Lunch Percentage	LUNCH
Average Daily Membership/Square Mile	DENSITY
Assessed Property Value per Student	PROPERTY
Percent of Revenue from the State	STATE
Percent of Revenue from the Federal Government	FEDERAL
Total Dollars	TOTDOL
Total Instructional Percent	TOTINPCT
Total Instructional Dollars	TOTINDOL
Total Administration Percent	TOTADPCT
Total Administration Dollars	TOTADDOL

Independent Variables

Average Daily Membership is the primary independent variable of the study. This is the average student enrollment for all school days in any given district. While larger districts have the ability to defray the cost of certain expenses that occur in all districts across a larger population, smaller districts still incur those same expenses. In two hypothetical districts, one with 500 students, the other with 5,000 students, the cost of a superintendent, for example, is going to be comparable. However, the cost of that superintendent defrayed across ten times the enrollment may allow for a greater percentage of money to remain available for instructional expenses. At the same time, as districts grow so might the size of their central office administration. The district with 5,000 may have multiple administrators who make the per pupil district administration costs between the two districts seem less disparate.

Because of non-normal distribution of data in the ADM variable, it was necessary to transform the data in SPSS using the natural log. Doing so introduced a *transformed log ADM* variable into each database. Discussion of the regression test results includes both the original and transformed variables.

Free and Reduced Lunch is also an important variable to include in the models because of the extent to which this value may contribute both to revenue and spending. Students eligible for the federal school lunch program generate extra federal revenue through various programs, such as Title I, Child Nutrition, and e-Rate. High free/reduced lunch participation also increases the likelihood that schools will receive discretionary grant funding from the federal government. As a proxy for poverty, this data also has an impact on a district's ability to attract and retain experienced, high-

quality teachers and the amount of effort that goes into helping students achieve at proficient levels. As a result, this variable also contributes to many spending decisions within schools.

State Funding refers to the percentage of a school district's funding that is received through the state aid formula. Oklahoma uses a weighted average daily membership (ADM) value to determine funding to school districts. Students in different grades receive different weights in the formula. Additional weights are added for various classifications of students, such as identification for special education or gifted services. Districts with high assessed property values (ability to raise money locally) are assessed "chargeables" in the formula, lowering their state aid. Additional funding is received by school districts for programs such as transportation, with factors for calculating population density and the number of bus riders used to set the amount that schools receive. During years in which the state cuts funding to education, this category of revenue is impacted most. For the 2010-11 school year, 45.5 percent of all school revenue in Oklahoma came from the state (Office of Accountability, 2012, p. 42). (A third source, *Local Funding*, refers to the percentage of a school district's funding that is provided through local and county resources. This is not included as an independent variable due to concerns of Collinearity with the *State Funding* variable.)

Federal Funding refers to the percentage of a school district's funding that is received through various federal programs. For 2010-11, schools in Oklahoma received an average of 17.0 percent of their revenue from the federal government. This percentage has increased since the passage of No Child Left Behind in 2001 and

increased further due to funding through the American Recovery and Reinvestment Act (ARRA) of 2009.

Total Dollars refers to the per pupil expenditures of school districts each year, exclusive of bond debt repayment. Including this grand total in the model makes sense because it could account for a school district's ability to put more money into instruction. For example, if two districts have the same number of students, and one has the ability to spend $500 per pupil more, then it likely has the ability to put more money into instruction.

Dependent Variables

The Oklahoma Office of Accountability summarizes all school expenditures into one of the following seven categories: Instruction, Instructional Support, Student Support, District Administration, School Administration, District Support, and Other. An eighth category – Debt Repayment – captures the amount of money per pupil that each district is spending during each school year paying off bonded indebtedness, which is calculated apart from the other categories. For this study, Instruction and Instructional Support were combined to create *Total Instructional Percent* and *Total Instructional Dollars*. Similarly, District Administration and School Administration were combined to create *Total Administration Percent* and *Total Administration Dollars*.

Change Over Time

The extent to which key variables interact can vary from year to year. As Table 3 shows, during the course of the last ten years, several values have changed considerably. First of note is that the Average Daily Membership of school districts has grown by nearly seven percent during this time. This is a combination of two factors:

fewer school districts and more students enrolled in public education over this time. Also worth noting is that since the 2000-2001 school year, the percentage of students statewide participating in the free and reduced lunch program has increased by nearly 12 percentage points. Schools have more students altogether, and more of those students are in poverty. During the years studied, the state portion of funding for public education has declined dramatically, while the local and federal shares have increased. Meanwhile, when adjusted to 2011 dollars, per pupil expenditures across the state have shown a negligible increase (Office of Accountability, 2000-2012).

Table 3: Selected Independent Variables – State Averages

Year	ADM	Lunch	Local	State	Federal	Total Spending	2011 Dollars
2000-2001	1139.5	48.8%	31.8%	58.0%	10.2%	$5,925	$7,525
2005-2006	1162.2	55.5%	34.3%	52.2%	13.5%	$6,882	$7,679
2010-2011	1238.3	60.6%	37.4%	45.5%	17.0%	$7,586	$7,586

Summary

This chapter described the source and relevance for each variable that is used in constructing the models to be tested in this study. While the fundamental question continues to be the relationship between school district size and the percentage of expenditures that go to instruction, simply placing these two columns side-by-side and running correlations would miss the impact of other key variables. Likewise, looking only at the most recent year's data would provide but a useful snapshot rather than a definitive picture of how dynamic the relationship between the variables is. The results of the tests in the following chapter provide more detail about the nature and magnitude of these relationships.

Chapter IV

Analysis of Data

The first three chapters provided background, discussed existing bodies of research, and explained the research questions and methodology of this study. This chapter provides an overview of the supporting descriptive statistics as well as results from the multiple regression tests. The first section of this chapter discusses findings from the 2010-11 school year. The next section explores how results from the 2005-06 and 2000-01 school years compare with those from 2010-11. The final section discusses the explanatory power of these models and the different combinations of variables within this study. For the purpose of discussing data and model results, this chapter refers to each variable by the SPSS code used in Chapter 3.

Descriptive Statistics and Correlations

Table 4 shows the descriptive statistics for all of the independent variables, including the transformed LOGADM variable. These statistics reveal two critical pieces of information about the variables in this study. First is that the range of variables is quite disparate. This is the reason that standardized coefficients are used to analyze the results of the regression tests. Also, of all the original variables, ADM had some of the most volatile standard deviation, Skewness, and kurtosis statistics. The natural log transformation corrected for these tendencies, introducing more normal distribution of the variable, and thus improving the models.

The variables are measured on different scales, with those representing percentages of student populations having minimum and maximum values less than 1, and those representing dollar amounts and enrollment counts being quite high. Of note

are several variables with wide ranges. One example of this is PROPERTY with a high of $522,522.43 and a low of $2,424.79. This translates to the highest district having more than 207 times the bonding capacity per pupil than the lowest one. While this is not a direct measurement of family wealth, it does speak to a school district's resources. On the other hand, the disparity between the highest (1.09) and lowest (.04) values for the LUNCH variable does represent family income, but it does not speak specifically to the resources available to the school district. (Free and reduced lunch participation rates can exceed 100 percent because of the discrepancy in reporting dates for applications and fall enrollment count.) In reality, a district with a very high value for PROPERTY could have either a very low or very high value for LUNCH. The variables have different impacts on school district budgeting however. While districts with a high value for PROPERTY have the means to take care of capital improvements with greater consistency, districts with a low LUNCH value tend to have students who come to school with better preparation in the home.

Table 4: Descriptive Statistics for Independent Variables from 2010-11 Dataset (n = 523)

	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
LOGADM	1.68	4.62	2.706	.493	.800	.107	1.143	.213
ADM	48.17	42128.53	1245.023	3445.369	7.961	.107	78.228	.213
DISTTYPE	.00	1.00	.805	.397	-1.544	.107	.385	.213
LUNCH	.04	1.09	.669	.163	-.608	.107	.615	.213
DENSITY	.14	1613.35	21.138	83.711	14.250	.107	255.607	.213
PROPERTY	2524.79	522662.43	45269.741	48288.914	4.345	.107	27.832	.213
STATE	.06	.80	.504	.113	-1.118	.107	1.432	.213
FEDERAL	.01	.58	.188	.072	1.434	.107	4.728	.213
TOTDOL	4148.11	21369.40	8548.806	2092.687	1.981	.107	6.158	.213

The descriptive statistics also show that the source of funding is quite varied. STATE sources accounted for between six and 90 percent of funding; and FEDERAL

sources accounted for between one and 58 percent of funding. Because the models used in this study excluded funding from local sources (due to concerns about Collinearity), their data were not included with the descriptive statistics. Nevertheless, it is noteworthy that the range for this variable is quite wide. Local funding accounted for between five and 90 percent of district revenue across the state.

Among the expenditure variables, the range of TOTDOL is also quite large. School districts spent between $4,148.11 and $21,369.40 per pupil. The combined instructional variables, TOTINPCT and TOTINDOL show this picture in another context. While TOTINPCT ranges from .31 to .88, TOTINDOL ranges from $2,693.41 to $11,323.25. Again, the dollar amount shows in terms of funding for instruction, how much is making its way into the classroom. Similarly, the combined administration variables, TOTADPCT and TOTADDOL, show that school districts have different needs in total administrative costs. The range for TOTADPCT is .04 to .31, while the range for TOTADDOL is $163.73 to $4,924.61. This shows that the variance among school districts for administrative costs is not as large as it is for instructional costs.

Table 5 shows the descriptive statistics for each of the dependent variables used in -the four regression models with the 2010-11 dataset. Both in terms of percentage and dollar amounts, there was more variance in spending for instructional costs than there is for administrative costs among school districts. The most skewed of these variables is Total Administration Dollars. For this variable, the mean is much closer to the minimum value than the maximum value. This indicates that fewer districts populate the top end of the range than the bottom of it. While most Oklahoma school districts serve fewer than 500 students, this is an indication that most small districts tend

to keep per pupil administrative costs in a similar range as their larger counterparts, and that only at the smallest enrollment levels does that category of spending increase sharply.

Table 5: Descriptive Statistics for Dependent Variables from 2010-11 Dataset (n = 523)

	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
TOTINPCT	.31	.88	.577	.048	-.185	.107	4.885	.213
TOTINDOL	2963.41	11323.25	4894.954	1063.546	1.962	.107	6.104	.213
TOTADPCT	.04	.31	.102	.027	1.711	.107	8.902	.213
TOTADDOL	163.73	4924.61	894.357	403.906	3.320	.107	23.125	.213

Table 6 shows correlations among all the variables within the 2010-11 dataset. Cohen (1988) described correlations having values greater than an absolute value of 0.50 as having a strong effect size and correlations having values greater than an absolute value of 0.30 as having a medium effect size. The results in the table show many relationships among variables that could be described as either large or medium.

While ADM only shows a large correlation with LOGADM and a medium correlation with DENSITY, the transformed variable produces stronger correlations. LOGADM also has a large correlation with TOTDOL and TOTADDOL, as well as medium correlations with DISTYPE, LUNCH, DENSITY, TOTINDOL, and TOTADPCT. This shows that transforming ADM to LOGADM was useful not only in helping to make a more normally distributed variable, but in demonstrating relationships that exist with other variables. For example, ADM and LOGADM are both negatively correlated with TOTDOL, showing that as districts increase in size, they tend to spend less per pupil. However, with the transformed variable, the effect size is large (-.530), while with the original variable, it is small (-.167). With the data made more

normal, the relationship between district size and many of the other variables becomes more evident, at least on the correlational level.

Many of the remaining independent variables also show correlations of medium and large effect sizes. Two that are large make sense on an intuitive level as well. First is the large negative correlation (-.742) between STATE and PROPERTY. This is due to the fact that the availability of assessed property valuation may also affect the "chargeables" against a school district, thus lowering its state aid. Similarly, the strong positive correlation (.622) between FEDERAL and LUNCH makes sense because of the funding mechanisms tied to participation in the federal child nutrition program. As stated earlier, districts with a higher percentage of free and reduced lunch students gain funding through the state formula as well as opportunities to participate in various federal programs. Of the independent variables, TOTDOL correlates to a medium or large effect with eight of the other variables in all, including all four dependent variables.

Of the four dependent variables, TOTADDOL has the most medium and large correlations. This includes a large negative correlation with LOGADM, indicating that larger school districts do tend to have lower total administrative costs. It should be noted, however, that TOTINDOL also has a medium negative correlation with LOGADM. This indicates that larger school districts also tend to have lower total instructional costs. Meanwhile, there is a small positive correlation between TOTINPCT and LOGADM, but a medium negative correlation between TOTADPCT and LOGADM. This shows, to some extent, the tendency for a higher percentage of

expenditures to be coded for instruction in larger districts and a somewhat greater tendency for larger school districts to spend less on administrative costs.

It should also be noted that a few of the correlations listed in the table could did not prove to be statistically significant. This was most true with DISTYPE, which was not significantly correlated with five other variables. This could be in part because the variable is dichotomous rather than continuous. Additionally, DENSITY and STATE each proved not to be correlated with four other variables. Among the relationships not establishing significance, one was particularly curious: TOTINPCT and TOTINDOL. While both of the instructional spending variables proved to be correlated to other variables, they did not with one another. This indicates no demonstrable link between the amount of per pupil spending and the percentage of per pupil spending. This finding reinforces the decision to run tests both by dollar and percentage.

Table 6: Correlations for All Variables from 2010-11 Dataset (n = 523)

	LOGADM	ADM	DISTTYPE	LUNCH	DENSITY	PROPERTY	STATE	FEDERAL	TOTDOL	TOTINPCT	TOTINDOL	TOTADPCT	TOTADDOL
LOGADM	1	.650	.438	-.348	.367	-.243	.027*	-.170	-.530	.263	-.481	-.425	-.544
ADM	.650	1	.145	-.140	.409	-.032*	-.135	-.104	-.167	.098	-.143	-.232	-.213
DISTTYPE	.438	.145	1	-.168	.059*	.012*	-.015*	-.249	-.062*	-.104	-.107	.115	.032
LUNCH	-.348	-.140	-.168	1	-.135	-.180	.225	.622	.339	-.126	.350	.132	.249
DENSITY	.367	.409	.059*	-.135	1	-.056*	-.019*	-.085*	-.134	.103	-.107	-.154	-.159
PROPERTY	-.243	-.032*	.012*	-.180	-.056*	1	-.742	-.410	.504	-.201	.464	.172	.410
STATE	.027*	-.135	-.015*	.225	-.019*	-.742	1	.218	-.312	.202	-.259	-.050*	-.213
FEDERAL	-.170	-.104	-.249	.622	-.085*	-.410	.218	1	.220	-.117	.196	-.035*	-.070*
TOTDOL	-.530	-.167	-.062*	.339	-.134	.504	-.312	.220	1	-.421	.920	.310	.794
TOTINPCT	.263	.098	-.104	-.126	.103	-.201	.202	-.117	-.421	1	-.057*	-.415	-.481
TOTINDOL	-.481	-.143	-.107	.350	-.107	.464	-.259	.196	.920	-.057*	1	.180	.660
TOTADPCT	-.425	-.232	.115	.132	-.154	.172	-.050*	-.035*	.310	-.415	.180	1	.780
TOTADDOL	-.544	-.213	.032*	.249	-.159	.410	-.213	.070*	.794	-.481	.660	.780	1

*Not statistically significant at $p < .05$

Research Questions One and Two

The first research question asked if there is a significant relationship between school district size and instructional expenses. Two separate multiple regression tests were run using the 2010-11 dataset to explore this. In the first, TOTINPCT was the dependent variable. In the second, TOTINDOL was the dependent variable.

The second research question asked if there is a significant relationship between school district size and administrative expenses. Again, two separate multiple regression tests were run using the 2010-11 dataset to explore this. In the first, TOTADPCT was the dependent variable. In the second, TOTADDOL was the dependent variable.

All four of these tests included nine independent variables: LOGADM, ADM, DISTYPE, LUNCH, DENSITY, PROPERTY, STATE, FEDERAL, and TOTDOL. Table 7 shows the model results for these four tests. Using the thresholds established by Cohen (1988) in interpreting R and R^2 values, the effect size for the first model (TOTINPCT) was medium, while the effect size for the other three models was large.

Table 7: Model Results for Dependent Variables from 2010-11 Dataset

	TOTINPCT	TOTINDOL	TOTADPCT	TOTADDOL
R	.491	.925	.558	.833
R Square	.241	.856	.312	.693
Adj. R Square	.241	.853	.300	.688

According to Kline (2004), for standardized coefficients, a Z score $\geq |.10|$ would be considered small, between |.30| and |.50| would be considered medium, and $\geq |.50|$ would be considered large. With all of the models having significance, and three of them having a large effect size, it is instructive to the research question to look at the extent to which the independent variables have Z scores that would indicate a large impact on the dependent variables.

Table 8 shows the SPSS output of coefficients for the first test (TOTINPCT). Even with the Bonferroni correction applied, four of the independent variables were significantly related to TOTINPCT. Of the independent variables demonstrating a significant relationship with the dependent variable, LOGADM is strongest, with a medium positive relationship. This indicates that within the dataset, as enrollment size increases, there is a tendency for the percentage of spending for instruction to increase as well. There was also a medium negative relationship between TOTDOL and the dependent variable. This indicates that as districts have more money to spend overall, they spend a smaller percentage of it on instruction. A small negative relationship was found between DISTYPE and the dependent variable. Since this is a dichotomous indicator, this result shows a slight tendency for K-8 districts to have a higher percentage of expenditures coded for instruction. There was also a small positive relationship between STATE and the dependent variable, indicating that districts with a higher percentage of revenue from state aid put a higher percentage of their resources into instruction.

Table 8: Coefficients for TOTINPCT Test for 2010-11 Dataset

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	.531	.031		17.411	.000		
LOGADM	.030	.007	.308	4.024	.000	.253	3.953
ADM	-1.250E-6	.000	-.090	-1.556	.120	.445	2.246
DISTTYPE	-.031	.006	-.257	-5.293	.000	.626	1.597
LUNCH	.022	.016	.073	1.341	.181	.495	2.022
DENSITY	8.645E-6	.000	.015	.351	.725	.804	1.244
PROPERTY	1.445E-7	.000	.145	1.791	.074	.225	4.450
STATE	.084	.027	.198	3.129	.002	.371	2.696
FEDERAL	-.067	.042	-.100	-1.575	.116	.369	2.710
TOTDOL	-6.915E-6	.000	-.301	-4.719	.000	.363	2.757

Table 9 shows the SPSS output of coefficients for the second test (TOTINDOL). Five of the independent variables showed significance (.05 Type I error rate) within this

model. Of these, four had standardized coefficients with an absolute value between .069 and .104. While technically, LOGADM rises to the level of a small effect size under the criteria put forward by Kline (2004), none of these indicate a particularly strong relationship. The fifth independent variable, TOTDOL, has a coefficient of .950, which is near the maximum value. In other words, even though this model is stronger than the previous one in terms of R^2 value, most of that strength lies within a single variable.

Table 9: Coefficients for TOTINDOL Test for 2010-11 Dataset

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	-94.453	294.430		-.321	.748		
LOGADM	224.942	71.810	.104	3.132	.002	.253	3.953
ADM	-.009	.008	-.029	-1.162	.246	.445	2.246
DISTTYPE	-250.083	56.772	-.093	-4.405	.000	.626	1.597
LUNCH	545.159	155.105	.084	3.515	.000	.495	2.022
DENSITY	.097	.237	.008	.408	.683	.804	1.244
PROPERTY	.001	.001	.038	1.078	.282	.225	4.450
STATE	505.433	258.753	.054	1.953	.051	.371	2.696
FEDERAL	-1023.603	407.751	-.069	-2.510	.012	.369	2.710
TOTDOL	.483	.014	.950	34.137	.000	.363	2.757

Table 10 shows the SPSS output of coefficients for the third test (TOTADPCT). Three of the independent variables were statistically significant (.05 Type I error rate) within this model. The largest coefficient was LOGADM (-.734), demonstrating a strong negative relationship between district size and the percentage of total expenditures coded for administration. This finding is offset somewhat by the fact that ADM has a small positive coefficient. This difference between the original variable and transformed variable can be explained by the fact that the non-transformed ADM variable is less normally-distributed. The third variable showing statistical significance within this model, DISTTYPE, produced a medium positive coefficient. This indicates a

tendency for K-12 districts to spend more as a percentage of overall spending as they increase in size within the dataset.

Table 10: Coefficients for TOTADPCT Test for 2010-11 Dataset

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.195	.016		11.903	.000		
LOGADM	-.040	.004	-.734	-10.077	.000	.253	3.953
ADM	1.355E-6	.000	.173	3.144	.002	.445	2.246
DISTTYPE	.027	.003	.397	8.581	.000	.626	1.597
LUNCH	.000	.009	-.001	-.023	.982	.495	2.022
DENSITY	4.778E-6	.000	.015	.362	.718	.804	1.244
PROPERTY	-2.582E-8	.000	-.046	-.597	.551	.225	4.450
STATE	-.005	.014	-.021	-.350	.727	.371	2.696
FEDERAL	-.021	.023	-.056	-.936	.350	.369	2.710
TOTDOL	7.575E-8	.000	.006	.096	.923	.363	2.757

Table 11 shows the SPSS output of coefficients for the fourth test (TOTADDOL). Four of the independent variables showed significance (.05 Type I error rate) within this model. The largest coefficient was TOTDOL (.693). This shows a strong positive relationship between total dollars spent per pupil and total administrative spending per pupil. Combined with the results from the second test, this indicates that districts spending more per pupil altogether tend to spend less for instruction and more for administration. Additionally, LOGADM produced a medium negative coefficient. This shows the tendency for districts to spend less on administration as they increase in size. In this model, DISTYPE produced a small positive coefficient, showing a slight tendency for K-12 districts to spend more per pupil on total administrative costs as well. While ADM and FEDERAL were statistically significant, both had a magnitude that would be considered small.

Table 11: Coefficients for TOTADDOL Test for 2010-11 Dataset

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	541.779	163.146		3.321	.001		
LOGADM	-298.616	39.790	-.365	-7.505	.000	.253	3.953
ADM	.011	.004	.096	2.618	.009	.445	2.246
DISTTYPE	196.567	31.458	.193	6.249	.000	.626	1.597
LUNCH	-35.287	85.945	-.014	-.411	.682	.495	2.022
DENSITY	.013	.132	.003	.101	.920	.804	1.244
PROPERTY	-.001	.000	-.070	-1.357	.176	.225	4.450
STATE	13.213	143.377	.004	.092	.927	.371	2.696
FEDERAL	-596.705	225.938	-.106	-2.641	.009	.369	2.710
TOTDOL	.134	.008	.693	17.077	.000	.363	2.757

It is worth noting that in all four of these tests, three variables (DENSITY, PROPERTY, and STATE) failed to show statistical significance. Additionally, LUNCH was only statistically significant once, and then yielded a coefficient with a negligible magnitude. These results do not preclude the possibility that these factors impact school spending; rather they indicate the likelihood that such impact is not felt in terms of instructional or administrative costs. It is also notable that the tests over the data from 2010-11 produced results that do not raise concerns about Collinearity.

Research Question Three

The final part of this study was to determine how much the relationship between district size and spending patterns has changed over time. To answer this question, the same four multiple regression tests were run with data from the 2005-06 and 2000-01 datasets. The results from all three datasets were then compared to determine whether the models had comparable overall predictive power and whether the effect size and direction of the coefficients of statistically significant variables was consistent.

2005-06 Dataset

During the 2005-06 school year, there were 540 school districts in the dataset – 17 more than there were five years later. Table 12 shows the model results for this school year. For TOTINPCT, the effect size was small. For the other three tests, the effect size was large. This only represents a difference from the 2010-11 dataset for the first model, which had a medium effect size in that sequence of tests.

Table 12: Model Results for Dependent Variables from 2005-06 Dataset

	TOTINPCT	TOTINDOL	TOTADPCT	TOTADDOL
R	.350	.963	.544	.912
R Square	.123	.927	.296	.831
Adj. R Square	.108	.926	.284	.828

Table 13 shows the SPSS output of coefficients for the first test (TOTINPCT) from this dataset. With the Bonferroni correction applied, only two of the independent variables showed significance (.05 Type I error rate) within this model. Both were medium in effect size, with PROPERTY being positive (.329) and TOTDOL being negative (-.476). This differs from the same test run over the 2010-11 dataset, in which LOGADM, ADM, and DISTYPE all showed significance.

Table 13: Coefficients for TOTINPCT Test for 2005-06 Dataset

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	.583	.025		23.360	.000		
LOGADM	.007	.007	.079	.958	.339	.246	4.071
ADM	-4.446E-7	.000	-.033	-.543	.587	.446	2.244
DISTTYPE	-.002	.006	-.018	-.334	.739	.583	1.716
LUNCH	-.019	.016	-.074	-1.200	.231	.435	2.298
DENSITY	3.435E-5	.000	.059	1.309	.191	.807	1.239
PROPERTY	2.904E-7	.000	.329	3.139	.002	.151	6.616
STATE	.054	.026	.126	2.070	.039	.446	2.241
FEDERAL	.083	.046	.137	1.810	.071	.289	3.459
TOTDOL	-7.876E-6	.000	-.476	-4.837	.000	.171	5.840

Table 14 shows the SPSS output of coefficients for the second test (TOTINDOL) from this dataset. In this test, only TOTDOL was statistically significant, and the coefficient was large (.915). This indicates that one variable accounted for nearly all of the predictive value of this model. In the 2010-11 version of this test, TOTDOL was still the only independent variable with a large effect size, but four other variables did show statistical significance.

Table 14: Coefficients for TOTINDOL Test for 2005-06 Dataset

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	583.038	224.435		2.598	.010		
LOGADM	-20.092	64.121	-.007	-.313	.754	.246	4.071
ADM	.000	.007	-.001	-.047	.962	.446	2.244
DISTTYPE	23.481	51.710	.007	.454	.650	.583	1.716
LUNCH	19.254	141.958	.002	.136	.892	.435	2.298
DENSITY	.224	.236	.012	.948	.344	.807	1.239
PROPERTY	.001	.001	.053	1.762	.079	.151	6.616
STATE	140.502	232.558	.011	.604	.546	.446	2.241
FEDERAL	700.360	410.155	.037	1.708	.088	.289	3.459
TOTDOL	.474	.015	.915	32.372	.000	.171	5.840

Table 15 shows the SPSS output of coefficients for the third test (TOTADPCT) from this dataset. In this test, three variables were statistically significant. With a large effect size, LOGADM was negatively correlated to the dependent variable. Additionally, the ADM variable produced a small positive coefficient, and the DISTTYPE variable produced a medium positive coefficient. These results matched those from the same test run over the 2010-11 dataset.

Table 15: Coefficients for TOTADPCT Test for 2005-06 Dataset

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.160	.012		13.580	.000		
LOGADM	-.032	.003	-.699	-9.498	.000	.246	4.071
ADM	1.089E-6	.000	.155	2.829	.005	.446	2.244
DISTTYPE	.021	.003	.363	7.598	.000	.583	1.716
LUNCH	-.006	.007	-.044	-.791	.429	.435	2.298
DENSITY	-5.948E-7	.000	-.002	-.048	.962	.807	1.239
PROPERTY	2.299E-8	.000	.050	.528	.598	.151	6.616
STATE	.007	.012	.032	.588	.557	.446	2.241
FEDERAL	.028	.021	.088	1.299	.194	.289	3.459
TOTDOL	6.887E-8	.000	.008	.090	.928	.171	5.840

Table 16 shows the SPSS output of coefficients for the fourth test (TOTADDOL) from this dataset. In this test, five variables were statistically significant (after applying the Bonferroni correction). The coefficient for TOTDOL was large and positive, as it was with the 2010-11 model. Meanwhile, the coefficient for LOGADM was smaller than the other test, but still negative. PROPERTY, DISTTYPE, and STATE had also had small positive coefficients. As with the 2010-11 tests, the variables in the 2005-06 dataset raised no concerns about Collinearity.

Table 16: Coefficients for TOTADDOL Test for 2005-06 Dataset

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-119.388	114.324		-1.044	.297		
LOGADM	-188.948	32.662	-.208	-5.785	.000	.246	4.071
ADM	.008	.004	.060	2.236	.026	.446	2.244
DISTTYPE	132.643	26.340	.118	5.036	.000	.583	1.716
LUNCH	-153.171	72.311	-.057	-2.118	.035	.435	2.298
DENSITY	.025	.120	.004	.207	.836	.807	1.239
PROPERTY	.002	.000	.209	4.546	.000	.151	6.616
STATE	520.650	118.462	.117	4.395	.000	.446	2.241
FEDERAL	470.130	208.927	.075	2.250	.025	.289	3.459
TOTDOL	.122	.007	.704	16.313	.000	.171	5.840

2000-01 Dataset

During the 2000-01 school year, there were 543 school districts in the dataset – 20 more than there were ten years later. Table 17 shows the model results for this school year. For TOTINPCT, the effect size was small; for TOTADPCT, the effect size was medium; and for TOTINDOL and TOTADDOL, the effect size was large. For the first model, this is the same result as with the 2005-06 dataset. For the second and fourth, this is the same as with both other datasets. However, the TOTADPCT model had shown a large effect size with the other two datasets.

Table 17: Model Results for Instructional Variables from 2000-01 Dataset

	TOTINPCT	TOTINDOL	TOTADPCT	TOTADDOL
R	.367	.949	.467	.976
R Square	.135	.900	.218	.953
Adj. R Square	.120	.898	.205	.952

Table 18 shows the SPSS output of coefficients for the first test (TOTINPCT) from this dataset. Five of the independent variables showed significance (.05 Type I error rate) within this model, compared with two from 2005-06 and two from 2010-11. Two of the coefficients had a medium effect size (TOTDOL -.405 and FEDERAL .345). Three others had a small effect size (PROPERTY .237; LUNCH -.231; and STATE .177). The independent variables tied directly to the research question – ADM and LOGADM – did not prove statistically significant.

Table 18: Coefficients for TOTINPCT Test for 2000-01 Dataset

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.605	.029		21.197	.000		
LOGADM	.002	.007	.025	.293	.769	.230	4.346
ADM	-8.579E-7	.000	-.065	-1.065	.288	.438	2.282
DISTTYPE	.003	.006	.024	.455	.649	.573	1.744
LUNCH	-.053	.015	-.231	-3.488	.001	.371	2.693
DENSITY	-9.332E-6	.000	-.015	-.316	.752	.759	1.317
PROPERTY	3.518E-7	.000	.237	2.681	.008	.208	4.796
STATE	.079	.030	.177	2.647	.008	.365	2.741
FEDERAL	.203	.047	.345	4.293	.000	.251	3.981
TOTDOL	-1.022E-5	.000	-.405	-5.012	.000	.248	4.027

Table 19 includes results from the second test (TOTINDOL) from this dataset. After applying the Bonferroni correction, two of the independent variables showed significance (.05 Type I error rate) within this model, compared with one from 2005-06 and five from 2010-11. As with the other models, the coefficient for TOTDOL is very large (.929), accounting for almost all of the predictive power of the model. The other statistically significant variable – FEDERAL – had a coefficient that would not even be considered small (Kline, 2004). The independent variables tied directly to the research question – ADM and LOGADM – did not prove statistically significant.

Table 19: Coefficients for TOTINDOL Test for 2000-01 Dataset

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	747.695	207.037		3.611	.000		
LOGADM	-47.989	53.408	-.026	-.899	.369	.230	4.346
ADM	-.003	.006	-.010	-.505	.614	.438	2.282
DISTTYPE	58.990	40.610	.026	1.453	.147	.573	1.744
LUNCH	-231.035	109.409	-.048	-2.112	.035	.371	2.693
DENSITY	-.069	.214	-.005	-.322	.748	.759	1.317
PROPERTY	-.001	.001	-.018	-.585	.559	.208	4.796
STATE	-30.615	215.916	-.003	-.142	.887	.365	2.741
FEDERAL	1006.133	343.805	.080	2.926	.004	.251	3.981
TOTDOL	.499	.015	.929	33.774	.000	.248	4.027

Table 20 shows the SPSS output of coefficients for the third test (TOTADPCT) from this dataset. After applying the Bonferroni correction, two of the independent variables showed significance (.05 Type I error rate) within this model, compared with three each from the other two datasets. As it did in the other two models, LOGADM has large negative (-.664) coefficient. The other statistically significant variable – DISTTYPE – has a medium positive (.376) coefficient.

Table 20: Coefficients for TOTADPCT Test for 2000-01 Dataset

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	.150	.014		10.542	.000		
LOGADM	-.031	.004	-.664	-8.318	.000	.230	4.346
ADM	1.002E-6	.000	.144	2.490	.013	.438	2.282
DISTTYPE	.021	.003	.376	7.428	.000	.573	1.744
LUNCH	-.003	.008	-.026	-.409	.682	.371	2.693
DENSITY	1.004E-5	.000	.030	.680	.497	.759	1.317
PROPERTY	5.975E-8	.000	.076	.911	.362	.208	4.796
STATE	.021	.015	.087	1.380	.168	.365	2.741
FEDERAL	.030	.024	.098	1.276	.202	.251	3.981
TOTDOL	-1.012E-6	.000	-.076	-.994	.321	.248	4.027

Table 21 shows the SPSS output of coefficients for the fourth test (TOTADDOL) from this dataset. Six of the independent variables showed significance (.05 Type I error rate) within this model, compared with five from the 2005-06 dataset and six from the 2010-11 dataset. Five of the six coefficients for these variables have an absolute value between .054 and .112, which would be considered small. However, for this model, PROPERTY had a coefficient of .905, which was unlike the result yielded in any other model for any other year. This shows that the taxable property value in a district had a large impact on per pupil administrative costs ten years ago. As with the 2010-11 and 2005-06 tests, the variables in the 2000-01 dataset raised no concerns about Collinearity.

Table 21: Coefficients for TOTADDOL Test for 2000-01 Dataset

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	110609.935	5260.606		21.026	.000		
LOGADM	6865.388	1357.041	.100	5.059	.000	.230	4.346
ADM	.851	.149	.082	5.728	.000	.438	2.282
DISTTYPE	-4498.410	1031.872	-.054	-4.359	.000	.573	1.744
LUNCH	-19697.620	2779.983	-.110	-7.086	.000	.371	2.693
DENSITY	7.452	5.449	.015	1.368	.172	.759	1.317
PROPERTY	1.059	.024	.905	43.766	.000	.208	4.796
STATE	-2521.297	5486.212	-.007	-.460	.646	.365	2.741
FEDERAL	9224.105	8735.760	.020	1.056	.291	.251	3.981
TOTDOL	2.218	.376	.112	5.905	.000	.248	4.027

Summary

The previous sections of this chapter included descriptive data, correlations among variables, and results of multiple regression tests for the 2010-11 dataset in pursuit of an answer for the first and second research questions. Additionally they provided further multiple regression tests for the 2005-06 and 2000-01 datasets to help answer the third research question.

From these results, several generalizations are possible. One is that school district size has an impact on spending. This impact tends to be felt more consistently in terms of administrative costs than it does with instructional costs. It also tends to be stronger when measured relative to expenditures calculated by percentage than by dollar amount. District type and total expenditures per pupil also seem to have a consistent impact on the categorical expenditures of school districts.

Chapter V

Findings, Conclusions, and Recommendations

This chapter includes an overview of the study, a review of key elements of the research that framed it, and a brief review of the methodology and results. The following discussion of findings and conclusions are built around these elements. Finally, the chapter will include recommendations for future research and policy consideration.

The purpose of this study was to explore the relationship between school district size and the categorical spending directly tied to instruction and administration. Often lacking in policy discussions is an understanding of how size and instructional spending are related. The results of this study can provide some additional insight that would be useful in statewide fiscal decision making.

To explore these relationships, this study focused on the following research questions:

1. Is there a significant relationship between school district size and instructional expenses?
2. Is there a significant relationship between school district size and administrative expenses?
3. Have these relationships changed over time?

Beginning in the 1960s, researchers have attempted to estimate relationships between schooling inputs and educational outcomes using production function models (Monk, 1992). Using publicly available data from three separate school years, this study examined the relationship between school district size and spending on instruction and

administration. All multiple regression tests also included controls for other variables that are often discussed as contributing to the variance in school expenditure patterns.

One common finding throughout all eras of research has been that what makes schools either effective or efficient is often "idiosyncratic and difficult to replicate" (Monk, 1992, p. 311). This adds to the challenge faced by school leaders and policymakers. Picus found that while the ways for schools to generate revenue are usually out of their control, there is concerted discretion at the district level, even in districts with nominal site-based decision making (1997).

Hartman (1990) studied equity in funding and spending among Pennsylvania school districts and found that because "not all communities seek the same outcomes," school districts do not spend money the same way. Napier (1997) found that the way states fund education also contributes to decision-making.

Andrews, Duncombe, and Yinger (2002) defined economy of scale as "the relationship between costs and the quantity of school activities," but cautioned that at a certain point, a diseconomy of scale occurs. A prior study of Oklahoma schools found that economies of scale peak at around an enrollment of 965 before a diseconomy of scale begins to occur (Jacques, Brorsen, & Richter, 2000).

Another research topic relevant to this study is expenditures per pupil. Over time, as the influx of federal funding and regulations has increased school funding but decreased spending flexibility, there has been greater concern with how that money is spent (Hanushek and Rivkin, 1997).

Lawsuits over adequacy and equity in school funding also impact the research relevant to this study. Beginning with the Rodriguez decision in 1973, most states have

since faced at least some sort of lawsuit challenging the fairness of how schools are funded (Cashin 2004).

An objective of much of the political discourse in Oklahoma with regard to school funding is to try to close down small school districts. With over 400 independent districts serving K-12 students and more than 100 more serving only elementary grades, many politicians believe that school consolidation is a way to put more money in the classroom. However, many studies have shown that "school consolidation actually creates greater hardships for families as children leave familiar neighborhoods, additional taxes are levied to support mergers, and larger facilities are built" (Bard, Gardener, & Wieland, 2005).

Findings

To answer the first and second research questions, four separate multiple regression tests were run using publicly available data for the 2010-11 school year. Each model included independent variables for average daily membership, the natural log of the average daily membership variable, district type, free and reduced lunch rate, density, assessed property value per pupil, percentage of funding from the state, percentage of funding from the federal government, and total expenditures per pupil. Total instructional costs and total administrative costs – both calculated using dollar amounts and then percentages – were the dependent variables. To answer the third research question, the same tests were run for the 2005-06 dataset and the 2000-01 dataset.

Table 22 shows the strength and direction of the standardized regression coefficients generated from the multiple regression tests from the 2010-11 dataset

(including only statistically significant variables with coefficients larger than absolute value .10). Only the LOGADM variable proved significant in each of the four models. The magnitude of the coefficient on the overall models was lower when the dependent variable was a dollar amount, rather than percentage. Additionally, DISTTYPE and TOTDOL were each significant in three of the models. The type of district tended to influence administrative costs more than instructional costs and was more noticeable in the models using percentages than dollar amounts as the dependent variable. On the other hand, the total per pupil expenditure variable tended to subsume the entire model when dollar amounts were the dependent variables.

Table 22: Effect Size and Direction of Coefficients from 2010-11 Dataset

	TOTINPCT		TOTINDOL		TOTADPCT		TOTADDOL	
	Size	Direction	Size	Direction	Size	Direction	Size	Direction
LOGADM	med	pos	small	pos	large	neg	med	neg
ADM					small	pos		
DISTTYPE	small	neg			med	pos	small	pos
LUNCH								
DENSITY								
PROPERTY								
STATE	small	pos						
FEDERAL							small	neg
TOTDOL	med	neg	large	pos			large	pos

These results indicate that the answer to question one is yes. School district size does impact the percentage of spending on instruction. Larger districts tend to spend a higher percentage of overall expenditures in the classroom. While other variables do contribute to the first model, school district size has the largest effect. The second model confirms what the first model demonstrates. Even though increases to total spending are bound to have a large impact on categorical spending on instruction, the effect was not so large as to completely overshadow the significance of school district

size. However, as districts have more money to spend, a smaller percentage of it gets coded for instructional costs.

One possible explanation for this is that of the *indivisible* costs within school districts, the largest is in fact instruction. All of the things that are coded as instructional expenses (teachers, textbooks, desks, etc.) are hardest to cut when funding is short. Meanwhile, districts with more to spend per pupil spend more per dollar on instruction but less as a percentage of overall spending. This indicates that ancillary services are funded only after schools settle on adequate levels of staffing and instructional materials.

These results also indicate that the answer to question two is yes. District size has a large negative effect on spending for administration as measured by percent and a medium negative effect on spending for administration as measured by dollar. In other words larger districts spend less on administration either way the spending is measured.

Again, this can be explained rather intuitively, as the cost of a single administrator can be defrayed over a larger student population in larger school districts. Even as districts become large enough to need two principals or add more central office staff, they are still inherently more capable of absorbing those costs than smaller districts are. This is consistent with decades of research showing that increasing school district size contributes to economies of scale (Tholkes, 1991; Pratten, 1991; and Duncombe & Yinger, 2007).

While the answer to research questions one and two – the effect of school district size on spending patterns – is the key finding, it is worth noting that the transformed LOGADM variable was the only variable that significantly contributed to

all four models. It is also important to note that this combination of independent variables does not completely explain the variance in spending patterns among Oklahoma school districts. While each model in the 2010-11 dataset produced an R^2 score that would be considered either medium or large, all had emergent limitations. In both models using dollar amounts as the dependent variable, the impact of the total per pupil spending variable accounted for the vast majority of predictive power. Given the correlations between TOTDOL and the four dependent variables (ranging in absolute value between .310 and .920), this is not entirely surprising. Meanwhile, the models using percentages as dependent variables showed more clearly the impact of school district size while accounting for the contribution of other variables. However, even with effect sizes that would be considered medium and strong, there is much that cannot be ascertained from the results about other factors impacting expenditures.

Question Three asked whether these relationships have changed over time. The data reveal the answer to be mixed. Table 23 shows the effect size and direction of coefficients from the 2005-06 dataset, while Table 24 shows this for the tests run over the 2000-01 dataset. School district size had no impact on the models for instructional expenses in either of these years. While the effect of school district size on instructional expenses was found in the tests run over the 2010-11 dataset, it was untraceable in previous years. In this respect, it is likely that the relationship has changed somewhat.

On the other hand, the relationship between school district size and administrative expenses was found to be fairly consistent for all three years' tests. Each dataset produced a coefficient for LOGADM that was large and negative for the test over TOTADPCT. This indicates that the impact of school district upon spending on

administrative costs by percentage is relatively consistent over time. However, the relationship showed some change over time with the tests using TOTADDOL as the dependent variable. In 2000-01, the coefficient for LOGADM was small and positive. In 2005-06, it was small and negative. In 2010-11, it was medium and negative. This indicates that larger school districts used to spend more per pupil on administration than smaller ones, but now that tendency has reversed. One possible explanation for this is that budget cuts have forced larger districts to reduce the size of administrative staff while smaller districts have less flexibility to do so.

Table 23: Effect Size and Direction of Coefficients from 2005-06 Dataset

	TOTINPCT		TOTINDOL		TOTADPCT		TOTADDOL	
	Size	Direction	Size	Direction	Size	Direction	Size	Direction
LOGADM					large	neg	small	neg
ADM					small	pos		
DISTTYPE					med	pos	small	pos
LUNCH								
DENSITY								
PROPERTY	med	pos					small	pos
STATE							small	pos
FEDERAL								
TOTDOL	med	neg	large	pos			large	pos

Table 24: Effect Size and Direction of Coefficients from 2000-01 Dataset

	TOTINPCT		TOTINDOL		TOTADPCT		TOTADDOL	
	Size	Direction	Size	Direction	Size	Direction	Size	Direction
LOGADM					large	neg	small	pos
ADM								
DISTTYPE					med	pos		
LUNCH	small	neg					small	neg
DENSITY								
PROPERTY	small	pos					large	pos
STATE	small	pos						
FEDERAL	med	pos						
TOTDOL	med	neg	large	pos			small	pos

Conclusions

While school district size has predictive power in these models, the size of that power varies. School district size does impact the amount and percentage of money that is spent on instructional and administrative costs. It is not, however, the only variable that impacts those patterns of expenditures. Larger school districts only slightly outspend smaller ones in the classroom, but this relationship has varied over time. Conversely, spending on administration does decrease as a percentage of overall spending in larger districts, and this relationship has remained consistent over time. School district size is fairly consistent predictor of how districts will spend their money. From these results, the following conclusions can be made.

1. Larger school districts are slightly more efficient in terms of instructional spending and district and school administration costs.
2. Data for Elementary Districts act differently than data for K-12 Districts do. Generally, this difference manifests in the tests over administrative spending variables more than it does in tests over instructional spending variables.
3. Districts with more money to spend overall tend to put more dollars but a lower percentage of overall spending into instruction. They tend to put both a higher dollar amount and percentage of overall spending into administration.

Policy Implications

The findings and conclusions from this study make a strong case that school district size has an impact on spending for instruction and administration. This does not, however, either validate or invalidate different suggestions by policymakers about possible changes to school funding or organization. With so many districts in Oklahoma

serving small numbers of students in rural areas, it is worth looking at the way those districts are organized and funded to see if more money can make its way into classrooms. Nothing in this study suggests implicitly that school consolidation would create greater efficiencies, but this study was not directly aimed at answering that question. It also was not designed to measure the relationship between the amount of money spent on instruction and the quality of education received by students. As such, policymakers should use research such as this study to answer the following questions:

1. Do the differences between K-12 Districts and Elementary Districts indicate that greater efficiencies would be possible by placing the Elementary Districts under the umbrella of a K-12 district? In many of the tests run in this study, the magnitude and direction of the relationships differed based on district type. This indicates a difference in the nature of work done in those districts.
2. Is mandating "minimum instructional costs" in terms of percentage of spending viable or necessary? The results of this study show that when school districts have more money to share, a smaller percentage of that money goes into instruction. This study does not, however, consider whether this is good or bad. Schools provide more than instruction for students. Counselors, school nurses, custodians, cafeteria workers, and bus drivers are non-instructional staff. The changes from 2000-01 to 2010-11 show districts having more students and at best, flat funding. In the meantime, the percentage of spending on instructional costs increased. While increased mandates and regulations upon school districts can be a cause of increasing staff that does not provide direct instruction to students, this does not appear to have occurred. This study also does not explore

the extent to which these non-instructional positions manifest in the form of administrative roles or the extent to which this impacts instructional effectiveness – for good or bad.

3. Would small school districts benefit from cost-sharing programs to help save money on bulk purchasing and other non-instructional expenses? This study only focused on expenses coded for instruction and administration. Schools already co-op services for programs such as alternative education, special education, and athletics. On occasion, schools even share positions for nurses, psychologists, and counselors. In the future, even without school consolidation, school districts may choose to share other staff or services to help preserve the amount of money that is available for instruction.
4. Can changes to the funding formula provide more money for instruction, and should the legislature find new sources of funding to increase the overall share for each district? Within the answer to research question three is the context of declining state support for school districts. It is also evident that districts have been differently impacted by those changes. Some parts of the state have been able to increase local support because of increased oil and gas revenues over the past decade, while others have had no such failsafe in place. As the size and composition of school districts throughout Oklahoma change over time, it is important to re-examine the components of the funding formula to make sure that school funding is managed in a way that is consistent with the priorities of policymakers.

5. Would setting a standard for minimum school district size be realistic or necessarily create efficiencies that would make more available for classroom instruction? When Arkansas did this, a savings of about 1.6 percent was found (Mathis, 2003). Other states have found unintended consequences such as long bus rides for young students and a negative impact on community support for schools after waves of school consolidations. These impacts would need to be considered by policymakers. If the state wishes to pursue consolidation as a way to create a more efficiently run public school system, it will also need to ensure that it does so in a way that does not create conditions adverse to student learning. While Arkansas saw a limited amount of savings after consolidations, even 1.6 percent added to the total amount of money available would make a difference in what is available in the weighted formula.

Recommendations for Further Research

Just as the findings of this study point to implications for public policy, they also demonstrate areas in need of continuing research. In some cases, these are ongoing lines of research building on a body of existing knowledge that goes back decades. In other, they are topics of recent interest because of economic conditions or even public policy decisions. Future studies relevant to this one should attempt to answer the following questions:

1. Do school districts spending more money on instruction have better outcomes for students? This could be measured any number of ways. Outputs for academic performance, graduation rate, and myriad other variables speak to student outcomes from instruction. While those data may be more impacted by

poverty than spending data was in this study, it would be instructive to control for poverty and explore the relationship between spending by category and student results. Such a study should also include controls for poverty, district size, assessed property value, and total spending.

2. Has the elimination or reduction of instructional or non-instructional services during the economic downturn impacted the quality of instruction in schools? While this is an extension of the previous question, it exists within its own set of problem statements. On one hand, it is instructive to know what school districts would do with more money. On the other hand, knowing this does not explain what districts would do if they had more money and then that money was reduced. That is, in effect, what has happened during the last ten years. School districts have weathered two economic downturns. In between them, some services that were eliminated were not restored. As districts continue to recover from these events, there have been other technology and policy changes that will also impact their spending patterns. Meanwhile, the cumulative effects of budget shortfalls over the last several years is likely to have a greater impact on instruction and instructional effectiveness than what this study can capture.
3. Have recent policy changes impacted how school districts have spent money? From the implementation of the Common Core State Standards to the Teacher/Leader Evaluation system to increased high-stakes testing for third-graders and high school students, all policy changes have a fiscal impact. These reforms require restructuring and refocusing on tasks. They take time and collaboration for principals and teachers to fully understand. Tying together

with the two previous questions, they also are not necessarily tied to improving the quality of instruction.

4. Does the use of technology present an opportunity for school districts to save money? One recent reform is legislation requiring that school districts offer online instruction for all grade levels and all subjects. Over time, data will be available about how school districts are responding to this mandate. It is possible that this will create a more efficient model for delivering instruction in some areas, but if schools have to buy additional equipment and upgrade network capabilities, any efficiency might be lost. Additionally, more publishers are making their textbook content available digitally, but schools lack available devices on which to utilize these resources. Finally, more of the state testing process is computer-based, meaning that districts will have recurring costs to upgrade and maintain an adequate number of computer workstations.
5. Do the results of this study translate to trends in other states? With every state organizing and funding public education in different ways, there is a strong likelihood that the outcome of similar tests would be different elsewhere. In states such as Florida and Alabama, which organize school districts by county, a similarly-organized dataset would have fewer cases and possibly less statistical significance. As such, looking at data at the school level might be preferable. Also, even in other states that have large numbers of districts, such as California and Texas, education is organized and paid for quite differently than in Oklahoma. Differences in the way school funds have been distributed over time would also likely be present.

Summary

The purpose of this study was to explore the relationship between school district size and the categorical spending directly tied to instruction and administration. The results of twelve multiple regression tests from three school years covering a span of ten years show that this relationship is present. School district size, district type, and total expenditures per pupil are all useful predictors in the models used for this study. The other side of this study is that the size of school districts showed a stronger relationship with administrative costs than it did with instructional costs. Over time this linkage with administrative costs has become even more pronounced. These results should contribute to the overall understanding that researchers have of the relationship between school district size and spending. This study should also contribute to future lines of research.

References

Brown v. Board of Education, 347 (US 483 1954).

San Antonio School District v. Rodriguez, 411 (US 1 1973).

Education Funding Disparities: What Do the Dollars Buy? (1999, Winter). *Journal of Education Finance, 24*(3), 389-408.

Andrews, M., Duncombe, W., & Yinger, J. (2002). Revisiting economies of size in American education: are we any closer to a consensus? *Economics of Education Review, 21*, 245-262.

Baker, B. D. (2003, Summer). State Policy Influences on the Internal Allocation of School District Resources: Evidence from the Common Core of Data. *Journal of Education Finance, 29*(1), 1-24.

Baker, B. D. (2006, Fall). Evaluating the Reliability, Validity, and Usefulness of Education Cost Studies. *Journal of Education Finance, 32*(2), 170-201.

Baker, B. D., & Welner, K. G. (2010, April). Premature celebrations: the persistence of inter-district funding disparities. *Education Policy Analysis Archives, 18*(9), 1-30.

Baker, B., & Duncombe, W. (2004). Balancing District Needs and Student Needs: The role of Economies of Scale Adjustments and Pupil Need Weights in School finance Formulas. *Journal of Education Finance, 29*(3), 195-221.

Bard, J., Gardener, C., & Wieland, R. (2005). *Rural School Consolidation Report.* National Rural Education Association.

Berne, R., & Stiefel, L. (1984). *The Measurement of Equity in School Finance.* Baltimore: John Hopkins Press.

Bickel, R., & Howley, C. (2000, May 10). The Influence of Scale on School Performance: A Multi-Level Extension of the Matthew Principle. *Education Policy Analysis, 8*(22), 1-32.

Bickel, R., Howley, C., Williams, T., & Glascock, C. (2000). *High School Size, Achievement Equity, and Cost: Robust Interaction Effects and Tentative Results.* Washington, DC: Rural School and Community Trust.

Biddle, B. J., & Berliner, D. C. (2003). *What Research Says About Unequal Funding for Schools in America.* WestEd.

Cashin, S. D. (2004). American Public Schools 50 Years After Brown: A Separate and Unequal Reality. *Howard Law Journal, 47*(2).

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Hilldale, NJ: Lawrence Erlbaum Associates.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/ correlation analysis for the behavioral sciences* (3 ed.). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Colegrave, A. D., & Giles, M. J. (2008). School cost functions: A meta-regression analysis. *Economics of Education Review, 27*, 688-696.

Cubberly, E. P. (1914). *Rural Life and Education: A Study of the Rural School Problem as a Phase of the Rural Life Problem.*

Cummins, R. C. (1997). *Voluntary Consolidation in Rural Oklahoma Schools: A Descriptive Study of Strategies that Facilitate the Process.* Norman, OK: University of Oklahoma.

DeYoung, A. J. (1987). The Status of American Rural Education Research: An Integreated Review and Commentary. *Review of Educational Research*, 123-47.

DeYoung, A. J., & Howley, C. B. (1990). The Political Economy of Rural School Consolidation. *Peabody Journal of Education, 67*(4), 63-89.

Duncombe, W. D., Miner, J., & Ruggiero, J. (1995). Potential cost savings from school district consolidation: A case study of New York. *Economics of Education Review, 14*, 265-284.

Duncombe, W. D., Ruggiero, J., & Yinger, J. M. (1996). Alternative approaches to measuring the cost of education. In H. F. Ladd, *Holding schools accountable: Performance-based reform in education* (pp. 327-356). Washington, D.C.: The Brookings Institution.

Duncombe, W., & Yinger, J. (2007). Does School District Consolidation Cut Costs? *Education Finance and Policy, 2*(4), 341-375.

Fischel, W. A. (2007). *The Congruence of American School districts with Other Government Boundaries: A Google Earth Exploration.* Hanover, NH: Dartmouth College.

Friedkin, N., & Necochea, J. (1988). School system size and performance: A contingency perspective. *Educational Evaluation and Policy Analysis, 10*(3), 237-49.

Funk, P. E., & Bailey, J. (1999). *Small Schools, Big Results: Nebraska High School Completion and Postsecondary Enrollment Rates by Size of School District.* Nebraska Alliance for Rural Education.

Goertz, M., & Natriello, G. (1999). Court-Mandated School Finance Reform: What Do the New Dollars Buy? In Ladd, Chalk, & Hansen, *Equity and Adequacy in Education Finance: Issues and Perspectives* (pp. 99-135). Washington, D.C.: Committee on Education Finance, Commission on Behavioral and Social Sciences and Education, National Research Council.

Greenwald, R., Hedges, L. V., & Laine, R. D. (1996). The effect of school resources on student achievement. *Review of Educational Research, 66*(3), 361-396.

Hanushek, E. A. (1996). A more complete picture of school resource policies. *Review of Educational Research, 66*(3), 397-409.

Hanushek, E. A. (2006). The alchemy of "costing out" an adequate education. *Adequacy Lawsuits: Their Growing Impact on American Education*, (pp. 1-35). Harvard University.

Hanushek, E. A., & Rivkin, S. G. (1997). Understanding the twentieth-century growth in U.S. school spending. *Journal of Human Resources*, 35-68.

Hartman, W. T. (1988, Spring). District Spending Disparities: What Do the Dollars Buy? *Journal of Education Finance, 13*(4), 436-459.

Hartman, W. T. (1994, Summer). District Spending Disparities Revisited. *Journal of Education Finance, 20*(1), 88-106.

Hartman, W. T. (1999, Winter). What Do the Dollars Buy? *Journal of Education Finance, 24*(3), 389-408.

Hartman, W. T., Bolton, D. G., & Monk, D. H. (2001). A Synthesis of Two Approaches to School-Level Financial Data: The Accounting and Resource Cost Model

Approaches. In NCES, *Selected Papers in School Finance* (pp. 77-120). Washington, D.C.: U.S. Department of Education.

Howell, W. G. (2005). *Beseiged: School Boards and the Future of Education Politics.* Brookings Institution Press.

Howley, A. (2003). Tried and True: The Rural School Curriculum in the Age of Accountability. *The Educational Forum, 68*(1), 14-23.

Howley, C. (2004, Winter). A Critical Introduction to Useful Works about Rural Life and Education. *Journal of Education Finance, 29*(3), 257-272.

Howley, C., Strange, M., & Bickel, R. (2000, 12). Research about school size and school performance in impoverished communities. *ERIC Clearinghouse on Rural Education and Small Schools*, 1-8.

Hussain, D. H. (2000, Spring). Structural Influences on the Internal Allocation of School District Resources: Evidence from New York State. *Educational Evaluation and Policy Analysis, 22*(1), 1-26.

Hussar, W., & Sonnenberg, W. (2000). *Trends in Disparities in School District Level Expenditures per Pupil.* National Center for Education Statistics, Washington D.C.

Jacobs, J. (1984). *Cities and the Wealth of Nations: Principles of Economic Life.* New York: Random House.

Jacques, C., Brorsen, B. W., & Richter, F. G. (2000). Consolidating Rural School Districts: Potential Savings and Effects on Student Achievement. *Journal of Agricultural and Applied Economics, 32*(3), 573-583.

Kline, R. B. (2004). *Beyond significance tesing.* Washington, D.C.: American Psychological Association.

Ladd, H. F. (2008). Reflections on Equity, Adequacy, and Weighted Student Funding. *Education Finance and Policy, 3*(4), 402-423.

Ledbetter, C. R. (2006). The Fight for School Consolidation in Arkansas 1946-1948. *The Arkansas Historical Quarterly*, 45-57.

Losen, D. J. (2004). Challenging racial disparities: the promise and pitfalls of the no child left behind act's race-conscious accountability. *Howard Law Journal, 47*(2).

Mathis, W. J. (2003, Fall). Financial Challenges, Adequacy, and Equity in Rural Schools and Communities. *Journal of Education Finance, 29*(2), 119-136.

McCracken, J. D., & Peasley, D. D. (1995). *Rural Ohio school expenditure and student achievement.* Columbus, Ohio: Ohio State University.

Monk, D. H. (1992, Winter). Education Productivity Research: An Update and Assessment of Its Role in Education Finance Reform. *Educational Evaluation and Policy Analysis, 14*(4), 307-332.

Monk, D. H. (1996, Spring). The Importance of Balance in the Study of Educational Costs. *Journal of Education Finance, 21*(4), 590-591.

Monk, D. H. (2007, Spring). Recruiting and Retaining High-Quality Teachers in Rural Areas. *The Future of Children, 17*(1), 155-174.

Monk, D. H., & Hussain, S. (2000, Spring). Structural Influences on the Internal Allocation of School District Resources: Evidence from New York State. *Educational Evaluation and Policy Analysis, 22*(1), 1-26.

Monk, D. H., & Theobald, N. D. (2001, Summer). A Conceptual Framework for Examining School Finance Reform Options for the State of Ohio. *Journal of Education Finance, 27*(1), 501-501.

Monk, D. H., Pijanowski, J. C., & Hussain, S. (1997, Winter). How and Where the Education Dollar is Spent. *The Future of Children, 7*(3), 51-62.

Napier, L. (1997). Funding Disparities Between Public School Districts in Mississippi. *Mid-South Educational Research Association.* Memphis, TN.

National Access Network. (2006). *A Costing Out Primer.* Columbia University.

National Access Network. (2012, April 10). *National Access Network.* Retrieved from Costing Out: http://www.schoolfunding.info/policy/CostingOut/factsheetslist.php3

NCES. (2011). *Common Core of Data.* Washington, D. C.: U.S. Department of Education: National Center for Education Statistics.

Odden, A., & Clune, W. (1995, December). Improving Educational Productivity and School Finance. *Educational Researcher, 24*(9), 6-10.

Odden, A., Monk, D., Nakib, Y., & Picus, L. (1995, October). The Story of the Education Dollar: No Academy Awards and No Fiscal Smoking Guns. *The Phi Delta Kappan, 77*(2), 161-168.

Office for Education Policy. (2010). *Act 60: The past, present, and future of school consolidation in Arkansas.* University of Arkansas.

Office of Accountability. (2000-2012). *Profiles Database*. Oklahoma City: State of Oklahoma.

Office of Accountability. (2012). *2011 Profiles in Education State Report.* Oklahoma City: State of Oklahoma.

Oklahoma State Department of Education. (2007). *Annual Report: Statistical Report on Oklahoma Public Schools and the State Department of Education.* Oklahoma City: State of Oklahoma.

Oklahoma State Department of Education. (2011). *Oklahoma Cost Accounting System.* Oklahoma City: State of Oklahoma.

Oliff, P., & Leachman, M. (2011). *New school year brings steep cuts in state funding for schools.* Washington, D.C.: Center on Budget and Policy Priorities. Retrieved February 18, 2012, from http://www.cbpp.org/files/9-1-11sfp.pdf

Parrish, T. B., Matsumoto, C. S., & Fowler, W. J. (1995). *Disparities in Public School District Spending 1989-90.* U.S. Department of Education, National Center for Education Statistics, Washington, D.C.

Picus, L. O. (1997, Winter). Using School-Level Finance Data: Endless Opportunity or Bottomless Pit? *Journal of Education Finance, 22*(3), 317-330.

Picus, L. O., & Seder, R. (2004). *Small Schools in Small School Districts and small Schools in Large School Districts: Are there cost differences that should be captured in the small school adjustment of the wyoming school funding formula?* North Hollywood, CA: Lawrence O. Picus and Associates.

Pratten, C. (1991). *The competitiveness of small firms.* Department of Applied Economics Occasional papers. Cambridge, UK: Cambridge University Press.

Probst, A. F. (1908). Consolidation and Transportation: A Rural School Problem. *The Elementary School Teacher, 9*(1), 1-16.

Reschovsky, A., & Imazeki, J. (1997). The development of school finance formulas to guarantee the provision of adequate education to low-income students. In J. W. J. Fowler, *Developments in school finance* (pp. 123-147). Washington D. C.: US Department of Education.

Reschovsky, A., & Imazeki, J. (March, 1999). Does the school finance system in Texas provide students with an adequate education? *Paper presented at the Annual Meeting of the American Education Finance Association.* Seattle, WA.

Sable, J., Plotts, C., & Mitchell, L. (2010). *Characteristics of the 100 Largest Public Elementary and Secondary School Districts in the United States: 2008-09.* U.S. Department of Education, National Center for Education Statistics, Washington, D.C.

Sample, P. R., & Hartman, W. T. (1990, Summer). An Equity Simulation of Pennsylvania's School Finance System. *Journal of Education Finance, 16*(1), 49-69.

Self, T. L. (2001). *A Post Consolidation Evaluation - The Effects Eight Years Later.* Chicago: Mid-Western Educational Research Association.

Sielke, C. (2004, Winter). Rural Factors in State Funding Systems. *Journal of Education Finance, 29*(3), 223-236.

Stone, C. W., & Curtis, J. W. (1927). Progress of Equivalent One-Room and Graded-School Pupils. *The Journal of Educational Research, 16*(4), 260-264.

Tholkes, R. J. (1991). Economies of Scale in Rural School District Reorganization. *Journal of Education Finance*, 497-514.

Thorson, G. R., & Maxwell, N. J. (2002). *Small Schools Under Siege: Evidence of Resource Inequality in Minnesota Public Schools.* Mankato, MN: Center for Rural Policy and Development.

Tsesis, A. (2004). Justice at War and Brown v. Board of Education. *Howard Law Journal, 47*(2).

Tyack, D. B. (1974). *The One Best System.* Harvard University Press.

United States Department of Labor. (n.d.). *CPI Inflation Calculator*. Retrieved February 23, 2012, from Bureau of Labor Statistics: http://stats.bls.gov/data/inflation_calculator.htm

Wilkins, W. E. (2002). No simple solution: Do smaller classes, more experienced and educated teachers, and per pupil expenditure really make a difference? *Annual International Conference of the Society of Educators and Scholars*, (p. 19). San Antonio, TX.