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The Relationship Between State Fiscal Effort and State Graduation Rates: A Longitudinal Study

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THE RELATIONSHIP BETWEEN STATE FISCAL EFFORT AND STATE GRADUATION RATES: A LONGITUDINAL STUDY

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ABSTRACT

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In recent decades, the United States has been criticized for failing to produce citizens who can compete in a global society. Legislation, such as the No Child Left Behind (NCLB) Act of 2001, has been implemented with the intention of improving the U.S. education system. Under the guidelines of NCLB, states are tasked with meeting Annual Yearly Progress (AYP) objectives in order to receive federal monies. In addition to testing requirements, one AYP indicator used to measure academic proficiency for high school students is graduation rates. The fiscal and societal impact of students not graduating from high school can be seen when comparing unemployment rates, annual income, and tax contributions to those of graduates. With budget shortfalls at an all-time high, it is imperative that educational leaders and policymakers make well informed decisions about how to invest fiscal resources in order to yield the best results.

The current study utilizes a production function model to examine the relationship between state fiscal effort and graduation rates over time. The use of fiscal effort provides a unique perspective by identifying how high a priority education is for states based on their wealth, not simply as a function of per pupil expenditures. A 2 (fiscal effort categories) x 8 (years) repeated measures analysis of variance was used to determine the relationship between sustained increases and decreases in fiscal effort over

time on graduation rates for the years post-NCLB (2002 to 2009). The categories of states were determined using a linear regression analysis to identify the 10 states with the most sustained increasing fiscal effort and the 10 states with the most sustained decreasing fiscal effort.

The results of this study did not support the interaction effect of fiscal effort categories and time on graduation rates, nor did it support the main effect of fiscal effort categories on graduation rates. The major findings from this study did show a statistically significant relationship between time and graduation rates for both increasing and decreasing fiscal effort categories. This finding suggests NCLB legislation has had a significant impact on graduation rates. Furthermore, these results refute previous research which reports high-stakes testing, commonly associated with NCLB legislation, negatively impacts graduation rates.

DEDICATION

To my dear friend, Isabelle. Thank you for your support and encouragement throughout this journey. Despite your own personal challenges, you have always been able to provide a positive perspective and humorous outlook on the various obstacles I have encountered. You are a reminder that, if we embrace life with an open mind and an open heart, the most wonderful things will find us when we least expect them.

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KEY TERMS

Averaged Freshman Graduation Rates (AFGR): A graduation rate statistic reported by the National Center for Educational Statistics (NCES) which attempts to standardized the calculation method between states. The AFGR is an estimate of the percentage of high school students graduating four years after entering 9th grade. The 9th grade class is estimated by adding the total student enrollment for three consecutive years (8th, 9th, & 10th grade) and dividing by 3.

Fiscal Effort: The ratio of total per pupil expenditures (PPE) to state wealth measured by Gross State Product (GSP) per capita.

Gross State Product (GSP): A measurement of economic output of a state.

Linear Regression: Analyzes the relationship between two variables, X and Y.

Longitudinal: Relating to a study conducted over time.

No Child Left Behind (NCLB): Public Law 107-110 was passed on January 8, 2002. A reauthorization of the Elementary and Secondary Education Act requiring states to meet Annual Yearly Progress (AYP) objectives on five different indicators. For high school, these indicators include high-stakes tests and graduation rates.

Slope: Quantifies the steepness of a line. It equals the change in Y for each unit change in X.

Intercept: The Y value of the line produced by a linear regression. It defines the elevation of the line.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

> Right now, three-quarters of the fastest-growing occupations require more than a high school diploma, and yet just over half of our citizens have that level of education. We have one of the highest high school dropout rates of any industrialized nation, and half of the students who begin college never finish. This is a prescription for economic decline, because we know the countries that out-teach us today will out-compete us tomorrow. (President Barack Obama, in a speech to Congress on February 24, 2009)

With increased fiscal and societal pressure to produce 21st century citizens who can compete in a global society, educational leaders need to be knowledgeable about the role of school finance in improving student achievement. Nationally, the United States has always made education a priority; however, the goals of education have been modified throughout history to align with a changing society. Since the mid 1960's, influential federal legislation and court litigation have emphasized that it is not only an ethical responsibility to provide students equitable and adequate educational opportunities, but also a legal responsibility. In 1983, the National Commission on Excellence in Education (NCEE) released the landmark report, *A Nation at Risk*, which concluded the U.S. education system was falling significantly behind other industrialized nations in preparing students for the global workforce. This report stated, "The educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people." (NCEE, 1983, p.9).

The Commission made numerous recommendations for change which resulted in a slew of efforts at the federal, state, and local levels to improve education. One of those recommendations was improvement in educational leadership and fiscal support.

The high school graduation rate is one common indicator used to assess the level of success of educational systems worldwide. Once regarded as an education leader in the industrialized world, the U.S. has fallen considerably in recent decades. According to the Organisation for Economic Co-Operation and Development (OECD), the U.S. graduation rate ranking has dropped from 2nd to 21st of 28 OECD countries and for the first time is below the OECD average. Although the U.S. graduation rate has remained relatively stable (between 73% and 76%) in recent decades, other countries have improved at a much faster rate (OECD, 2011).

The fiscal and societal impact of students not graduating from high school can be seen when examining unemployment rates, annual income, and tax contribution comparisons of graduates. Federal mandates, such as the No Child Left Behind (NCLB) Act of 2001, have been implemented to set the national educational goal at educating all children to high levels of academic proficiency. These mandates have transformed the orientation of school finance policy directly linking finance to the purpose of education (National Research Council, 1999).

Implications for Educational Leaders

In the current philosophy of teaching and learning, educational leaders have developed policy through a lens of social justice. Social justice, as it pertains to public education, is difficult to define, although it is frequently associated with the pursuit of educational "equity" and/or "equality of opportunity" (North, 2008). International

assessments reveal America's schools are among the most unequal in the industrialized world in terms of spending, curriculum offerings, teaching quality, and outcomes (Darling-Hammond, 2006). This is especially true in urban schools. Data reveal disproportionate numbers of poor, urban, and minority youth dropout each year (Darling-Hammond, 2006). Legislative initiatives and court rulings have attempted to assist educational leaders in the pursuit of social justice by increasing funding and redistributing wealth to ensure all students receive an adequate and equitable education. However, it is clear from the graduation data there is considerable room for improvement.

In 2008-2009 the national graduation rate was 75.5% overall, but there was a significant gap between ethnic groups with white students at 82.0% which was much higher than black students at 63.5% and Hispanic students at 65.9% (NCES, 2011). A poll conducted from 2004 through 2007 shows American adults feel insufficient funding and resources is the top problem facing public schools in their community (Lips, Watkins, & Fleming, 2008). With the majority of states currently experiencing a budget shortfall, and legislation and litigation creating additional pressure, it is ever more necessary for state policy makers to make well-informed decisions about how to invest financial resources. As Anyon (2005) states, "educational policies, which focus on pedagogy, curriculum, and assessment without addressing the macro economy, will not resolve the systemic problems of education." Therefore, educational leaders must remain knowledgeable about educational finance so they can effectively advocate for the needed financial resources to support education in their own districts and states.

Overview of Educational Funding

Revenue

The responsibility of educational funding rests on federal, state, and local governments; however, the majority of the responsibility of education lies with the states. According to the 10th Amendment of the Constitution, "The powers not delegated to the United States by this constitution, nor prohibited by it to the states, are reserved to the states, respectively, or to the people" (U.S. Const. amend. X). In other words, because the U.S. Constitution omits public education from its content, it becomes a state responsibility. Therefore, education is understood as a function of individual state governments who, along with local governments, are primarily responsible for funding and implementing elementary and secondary education.

Despite the purposeful exclusion of education from the U.S. Constitution, the federal government has always encouraged education and supported it financially. The federal government "heavily promoted and financed education even before ratifying the Constitution. After all, the founding fathers deemed an educated populace a matter of national security" (Owings & Kaplan, 2006, p. 50). More recently, enactment of legislation, such as the Elementary and Secondary Education Act (ESEA) of 1965, explains the federal government's considerable increase in contributions to the total education budget over the last half century (Spellings, 2005). This act emphasized equal access to education for all children and aimed to close the achievement gap between different subgroups of students, namely low-income students. Federal funding provided by this act was authorized for professional development, instructional supplies, support

for educational programs, and for the promotion of parental involvement (Spellings, 2005).

Although federal monetary contributions have increased, the federal government still only gives a relatively small percentage to the overall revenue for elementary and secondary education when compared to the states and localities. Since the implementation of legislation such as ESEA, federal revenue percentages have remained relatively constant, accounting for between 8 and 10 percent of total revenue for public education. As illustrated in Figure 1, for the 2008-2009 year, the National Center for Education Statistics (NCES) reports federal, state, and local contributions toward elementary and secondary education as 9.6%, 46.7%, and 43.7%, respectively (NCES, 2011).

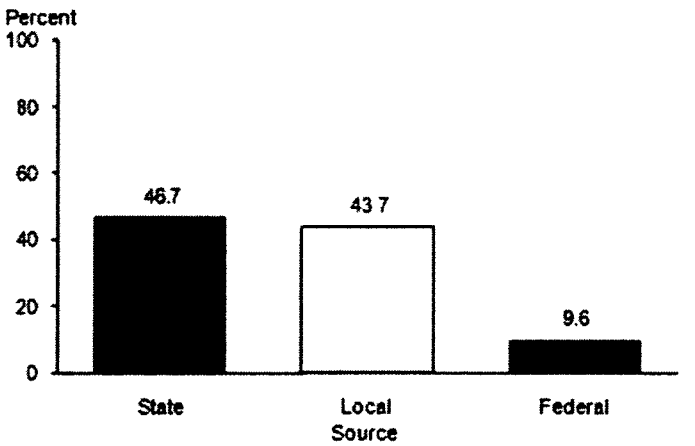

Figure 1: Percentage distribution of revenue for public elementary and secondary education in the United States, by source: Fiscal year 2009 (Retrieved from http://nces.ed.gov/pubs2011/2011329.pdf).

In contrast to the stability in federal funding, state and local funding percentages have fluctuated with one surpassing the other intermittently throughout this same time

period (Snyder & Dillow, 2010). An overview of these spending practices show local governments contributed more to education in the early to mid-1970's than state governments which then took the lead throughout the 1980's. Local governments briefly regained the lead in the early 1990's. From 1995 to the present, state governments have provided more to K-12 education than any other source. Figure 2 illustrates the percentage of revenue from each source for public elementary and secondary education from 1970 to 2008.

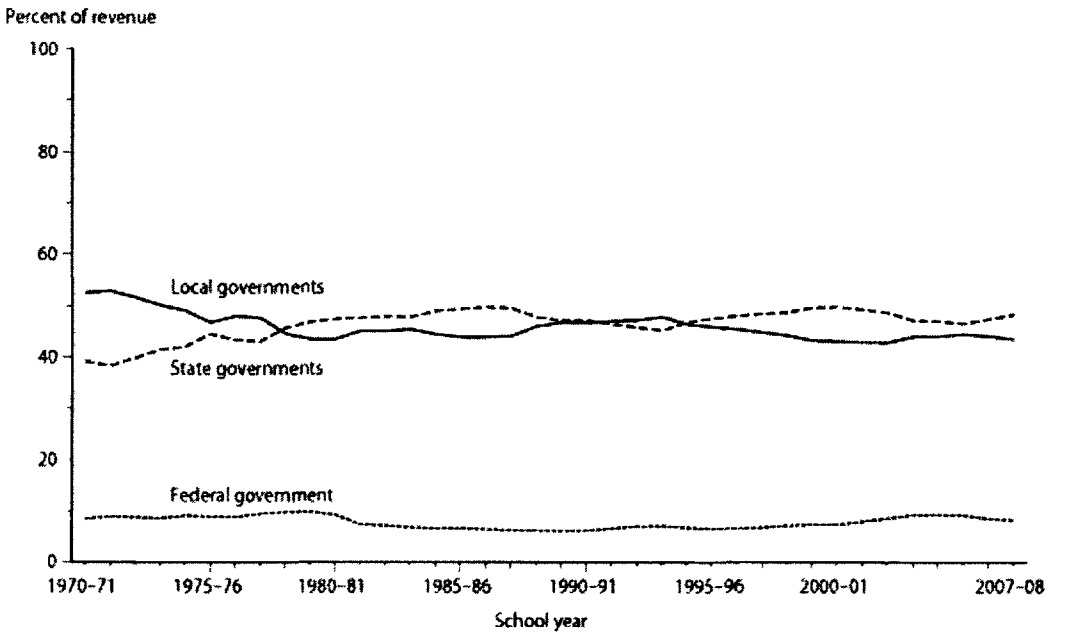

Figure 2: Percentage of revenue for public elementary and secondary schools, by source funds: 1970-71 through 2007-08 (Retrieved from http://nces.ed.gov/programs/digest/d10/figures/fig_09.asp).

Expenditures

The total dollar amount contributed to education over the last five decades has increased between 250 to 300 percent (Snyder & Dillow, 2010). Increased student

enrollment along with the implementation of federal mandates, are the main causes for this increase. An increase in student population results in an increase in costs for the day-to-day operations for schools including teacher salaries and other related expenses (Johnson, Zhou, Nakamoto, & Cornman, 2011). However, this increase is not consistent between states or within states and their localities. Some states are wealthier than others, and some districts within states are wealthier than others, which results in inequitable spending practices. For example, total per pupil expenditures (PPE) for public and secondary education in 2009 ranged from $6,612 in Utah to $17,746 in New York (Johnson et al., 2011).

There are two major measures used to describe state educational expenditures, PPE and fiscal effort. State PPE is the most commonly used measure to illustrate public school spending. This statistic is calculated by dividing the total expenditures for the particular state during a specific period of time by the total student index, such as enrollment or average daily attendance. Although PPE is a valuable indicator of total monetary expenditure, this calculation does not account for the ability of a state to finance education based on its wealth. State fiscal effort provides a more comprehensive view of state spending by showing how high a priority public education is for states. Fiscal effort is calculated by dividing the state's PPE for K-12 education by a measure of its wealth (Owings & Kaplan, 2006, p.186). The Gross State Product (GSP) per capita is frequently used to measure state wealth. The difference between PPE and fiscal effort when describing state level contributions toward elementary and secondary education can be illustrated by looking at a specific state. For example, in 2006 Alabama contributed $7,980 per student and ranked 43rd among all states when comparing PPE. However,

when dividing the PPE by the GSP per capita to determine fiscal effort, Alabama ranked 24th among states. Alabama's fiscal effort ranking shows education is a higher priority than what may be assumed merely by looking at PPE.

Examining fiscal effort allows a unique perspective on how states allocate their resources and where their priorities are for spending. Fiscal effort can vary from year to year; however, tracking state effort "scores" over time allows for trends to be captured. When these scores are plotted, linear relationships can be established and slopes can be determined. Information about the relationship between fiscal effort and time can be inferred from these slope values.

States and Graduation Rates

Legislative Accountability

Although federal government involvement in education is limited under the Constitution, states agree to relinquish much of their autonomy by accepting federal funds in support of federal initiatives. The No Child Left Behind Act (NCLB) of 2001, the most recent reauthorization of ESEA, is the primary federal law affecting K-12 education today (Spellings, 2005). According to NCLB (2001), states must set Adequate Yearly Progress (AYP) objectives using five different indicators to measure academic proficiency for students. If schools fail to meet these objectives, they are subject to sanctions. At the high school level, in addition to test score indicators, states are required to use graduation rates as their fifth academic indicator (National High School Center, 2011). To be in compliance with NCLB, states must abide by the parameters defining graduation rates as the number of students who graduate with a diploma in the standard number of years, not including students receiving General Educational Development

(GED) certificates or alternative diplomas in their graduation rate calculations (National High School Center, 2011).

Despite these defining parameters used to maintain legislative accountability, states vary significantly in how they calculate graduation rates. In an attempt to standardize the calculation method across states, in 2005, all fifty governors signed the National Governor's Association's Graduation Rate Compact (NGA Compact) indicating a commitment to implement a common statistical approach for reporting graduation rate data (NGA, 2006). While this was a positive step toward uniformity, the NGA Compact left numerous details to the discretion of the states which still left room for variance. Also, the NGA Compact did not require states to use this calculation for NCLB accountability and many did not implement it as planned.

In 2008, the U.S. Department of Education (U.S.DOE) issued additional regulations and guidelines to high school graduation rate calculation. This new formula, referred to as the four-year adjusted cohort rate, must be used in determining AYP beginning in school year 2011-2012 (Richmond, 2009). This rate is calculated by dividing the number of students who graduate within four years with a regular high school diploma by the number of students who form the adjusted cohort for that graduating class (Richmond, 2009). Using this formula, only students who earn a regular high school diploma will count toward the graduation rate. This new formula will allow for more accurate comparisons between states, districts, and schools and will allow educational leaders and policy makers to make more informed decisions regarding resource allocations.

For reporting purposes, the NCES uses a calculation method known as the averaged freshmen graduation rate (AFGR) which attempts to standardize data across states. The AFGR is an estimate of the percentage of high school students who graduate four years after entering 9th grade. The incoming freshman class is estimated by adding the total student enrollment for three consecutive years (8th grade, 9th grade, and 10th grade) and dividing by 3 (Chapman, Laird, & KewalRamani, 2010). The purpose of averaging is intended to account for increased grade retention in the 9th grade. It is important to note, the AFGR uses currently available enrollment data and does not track individual students over time as a true cohort graduation rate does. To make the AFGR more similar conceptually to the AYP requirements in NCLB, the AFGR includes only diploma recipients and excludes other high school completers, such as those who received a GED or a certificate of attendance (Chapman, Laird, & KewalRamani, 2010). For the 2008-2009 school year the NCES reported the national AFGR as 75.5% with the numbers dropping even lower for African-American and Hispanic students. State graduation rates ranged from a low of 56.3% in Nevada to a high of 90.7% in Wisconsin (Chapman, Laird, & KewalRamani, 2011).

Societal Accountability

Not only are graduation rates important for states to meet federal accountability standards, but the effects of students not graduating from high school have other significant repercussions which not only impact the individual or the school, but society as a whole. Education is an investment in human capital with a measurable return on this investment. It is estimated each non-graduate costs the federal government approximately $800,000 over the course of his or her lifetime (Smink & Heilbrunn,

2005). This impact can be seen in many ways. Non-graduates are more likely than high school graduates to be unemployed, receive public assistance, create higher criminal justice costs (both as juveniles and adults), and be the parents of non-graduates (Bridgeland, DeIiulio, & Morison, 2006). According to the U.S. DOE, dropouts from the class of 2008 will cost the nation more than $319 billion in lost wages over the course of their lifetime (Richmond, 2009). It is estimated that in 2007, the federal government would have obtained about $45 billion in extra tax revenues and reduced costs in public health, crime, and welfare if the 700,000 20-year old high school non-graduates in the U.S. were cut in half (Levin, Belfield, Muenning, & Rouse, 2007). The importance of these numbers is stressed by Owings and Kaplan (2004) who state, "Education, more than any other social investment, raises the standard of living by increasing employability and spendable income, reduces community social services costs, and thereby increases revenue to support even more education, creating a dynamic synergy."

As shown in Figure 3, the National Center for Education Statistics (U.S.DOE, 2008) estimates there will be a one percent national decrease in public high school graduates between 2007-2008 and 2020-2021. Although increases are projected in twenty-three states, there is an expected decline in the remaining twenty-seven states and the District of Columbia. The social implications of these figures, along with federal mandates requiring states and districts meet AYP, support the need for research to determine effective ways to alter these projections.

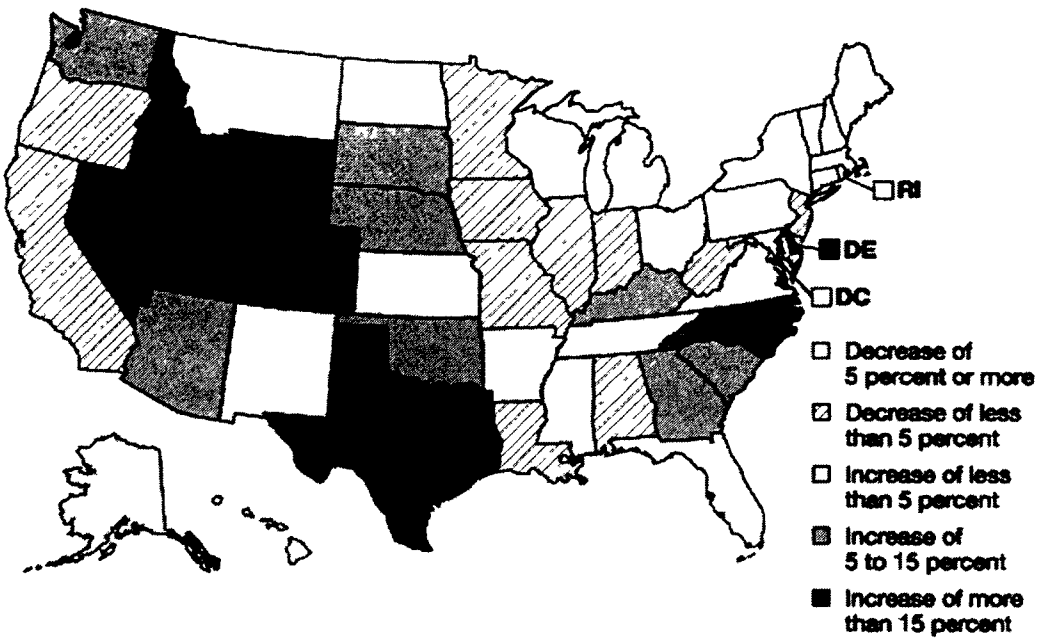

Figure 3: Projected percentage change in the number of public high school graduates, by state: School years 2007–08 through 2020–21 (Retrieved from http://nces.ed.gov/programs/projections/projections2020/figures/figure_08.asp?referrer=list).

Significance of Study

The success or failure of districts is determined as a measure of student achievement. To that end, numerous studies have been conducted to determine what fiscal expenditures have the greatest impact on student achievement. Although education costs have increased, they have not increased consistently across all states and localities in relation to their wealth. Some of this variance in spending is due to the state's or locality's capacity to pay for education. Some states are wealthier than others and to look simply at student outcomes as they pertain to PPE does not give an accurate picture of the effects of spending on education. Instead, this study used the measurement of state fiscal effort over a time period of eight years to investigate the student outcome variable of

graduation rates. The intent of this study was to add to the current body of research examining fiscal practice in education, as well as to influence further research on the topic. Due to the variations in calculation methods for state reported graduation rates, the AFGR reported by the NCES was used for this study.

As shown in Figure 4, the current expenditures for elementary and secondary education exceeds $500 billion, and the numbers are expected to increase over the next decade (U.S.DOE, 2008). All stakeholders, including educators, policy makers, and tax payers, have an expectation to see a return on their financial investment when it comes to public education. These investments in education take time to mature, and therefore, examining the relationship between trends in funding over time is necessary to identify a true relationship between state fiscal effort and graduation rates.

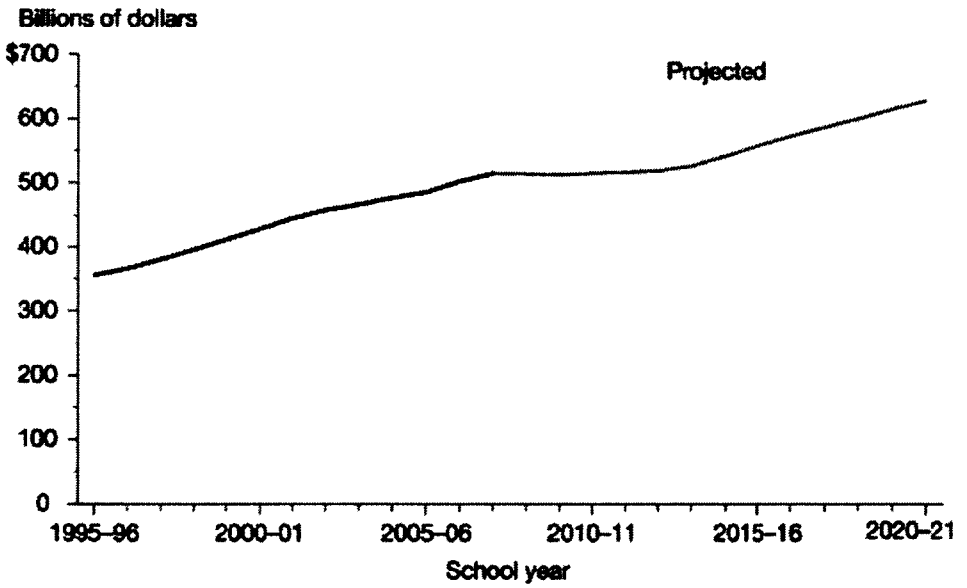

Figure 4: Actual and projected current expenditures for public elementary and secondary schools (in constant 2008-2009 dollars): School years 1995-96 through 2020-21 (Retrieved from http://nces.ed.gov/programs/projections/projections2020/figures/figure_13.asp?referrer=list).

Purpose and Research Questions

The current economic crisis facing this country, along with the literature identifying the importance of funding on education, makes it urgent for government and educational leaders at all levels to make informed decisions regarding educational finance. This study adds to and expands upon the current research about school funding practices and the relationship to student achievement by identifying the association between state expenditures and graduation rates. This research fills an important gap concerning fiscal policy and its implications for improving graduation rates. The current study was guided by three research questions:

1) Which ten states had the steepest sustained increasing slope for fiscal effort from 1996 to 2009?
2) Which ten states had the steepest sustained decreasing slope for fiscal effort from 1996 to 2009?
3) What is the relationship between sustained increases and decreases in state fiscal effort and state graduation rates from 2002 to 2009?

In this study, the ten states with the steepest increasing slope for fiscal effort and the ten states with the steepest decreasing slope for fiscal effort over a 14-year period were determined. The graduation rates in these states were then analyzed from 2002 to 2009 to determine the association between changes in fiscal effort and graduation rates over time. Based on research stating it takes 5 to 7 years for change to become systemic, the state slopes were calculated beginning in 1996 to allow for the effects of the increases or decreases in fiscal effort to be reflected in graduation rates by year 2002 (Berman & McLaughlin, 1978; Fullan 2000).

Methodology Overview

This study is a quantitative analysis examining pre-existing and publically available data from 1996 through 2009. The first two research questions will be investigated by using a linear regression analysis to find the slope of the 'best fit' line between fiscal effort and time over the 14 year period for each state. As previously stated, fiscal effort will be calculated by dividing a state's PPE for K-12 education by the GSP per capita (Owings and Kaplan, 2006, p186). The slope will then be calculated for each of the 50 states. The 10 states with the largest positive slope and the 10 states with the largest negative slope will be identified and utilized for the remainder of the study.

The third research question will use a 2 x 8 repeated measures analysis of variance (ANOVA) implemented with SPSS statistical software. In this design, the '2' represents the categories of states (increasing fiscal effort states and decreasing fiscal effort states) and the '8' represents the time in years (2002-2009). To maintain continuity in graduation rate calculation methods, this study utilizes the most recent state AFGR data released by the NCES and spans post-NCLB years in which AYP reporting was required. The repeated measures ANOVA is the methodological design chosen for this study because it identifies the interaction effect of time and fiscal effort on graduation rates as well as the main effects of fiscal effort categories on graduation rates and time on graduation rates.

Limitations

Threats to the validity of this study may include the use of the AFGR calculation formula. This calculation method does not follow individual students and may not account for states which have a large increase or decrease in populations during a given

time period which can skew data. Also, using a repeated measures ANOVA design requires numerous underlying assumptions be met for results to be valid. However, if these assumptions are not met there are several ways to make appropriate corrections which would provide for a more conservative test of the null hypothesis to increase validity. In addition, repeated measure designs have been shown to provide robust results despite violations of the underlying assumptions (Kinnear & Gray, 2011).

CHAPTER 2

LITERATURE REVIEW

Chapter Overview

This chapter will present findings from the current literature about the relationship between educational expenditures and student achievement. This review begins with a brief introduction reviewing the major reports, legislation, and litigation which have significantly impacted the modern educational system. The introduction will be followed by an overview of the overarching conceptual framework driving the study. There will then be a review of diverse studies showing findings for and against the positive impact of school funding on student achievement followed by a review of research on school spending practices. Attention will then shift to the economic benefits of high school graduation and the research which identifies variables impacting graduation. An overview of the research questions will conclude the chapter.

Introduction

The pressure on the U.S. education system to remain globally competitive, while providing adequate and equal educational opportunities for all students, has created a challenge for educators and policy makers. Over the last half-century, legislation and litigation have fueled research investigating the effects of school expenditures on student achievement to determine if allotting more money toward public education has a positive impact. In addition, research has also focused on where money should be allocated to have the most beneficial effect on various measures of student outcomes. The mixed results of these studies, some showing a positive relationship while others do not, have created a considerable amount of contention among all stakeholders (Lips, Watkins &

Fleming, 2008; Jefferson, 2005). Although the results of these studies continue to show conflicting findings, their impact on the formation of educational policy is indisputable.

James Coleman (1966) directed one of the most influential and controversial studies impacting educational policy. The Equality of Educational Opportunity (also known as the Coleman Report) was ordered by the U.S. Government to analyze educational equality in American schools (Coleman et al., 1966). This study included surveys for nearly 650,000 students, teachers and administrators in over 3,000 schools nationwide (Coleman et al., 1966). Although it has been argued the Coleman Report was misinterpreted, the most publicized findings of his study were that school inputs explain little, if any, differences in student achievement (Coleman et al., 1966). In other words, investing more money was not the key to improving student performance. Coleman's substantial collection of statistical data sparked further research and policy discussions regarding the impact of school budget expenditures on student achievement. Nearly 50 years later, the impact of this report is still quite evident in the educational and political arenas.

Subsequently, other highly influential reports and publications have placed the U.S. education system on trial for failing to produce students with skills necessary to compete and contribute to the greater society. In response to concerns about "widespread public perception that something is seriously remiss in our educational system," the U.S. Secretary of Education, Terrell Bell, established the National Commission on Excellence in Education (NCEE) in 1981 to examine the quality of education in the United States (NCEE, 1983). In 1983, the Commission released the publication, *A Nation at Risk,* which reported the U.S. school system was failing miserably, especially in international

comparisons. These conclusions were supported by national data on graduation rates. Internationally, the U.S. used to have one of the best high school graduation rates but has recently dropped considerably among industrialized nations (OECD, 2011). In an attempt to improve U.S. education, NCLB mandated accountability standards for schools, including improved graduation rates, in order to receive federal monies.

In 2008, *A Nation Accountable: Twenty-five Years After a Nation at Risk,* was released to review the progress of education. This publication reported that of 20 children born in 1983, six did not graduate from high school on time in 2001 (NCEE, 2008). Of the 14 who did graduate on time, 10 began college that fall, but only half of those earned a bachelor's degree by spring 2007 (NCEE, 2008). In addition, graduation data show there is a significant gap between ethnic groups. These differences in achievement have sparked court litigation questioning whether funding structures are providing students adequate and equitable educational opportunities as mandated by legislation.

Equity and Adequacy

The two prevailing principles governing school finance policy are equity and adequacy (Springer, Liu, & Guthrie, 2009). International assessments reveal U.S. schools are among the most unequal in the industrialized world in terms of spending, curriculum offerings, teaching quality, and outcomes (Darling-Hammond, 2006). This is especially true in urban schools which are primarily responsible for educating minority students. In 1999, 70% of the nation's African American students attended predominantly minority schools, and nearly 40% of African American students attended a school with a minority enrollment of 90-100% (Orfield, 2001). Research shows these schools are significantly less well funded than the surrounding suburbs and a

disproportionate number of students dropout each year (Darling-Hammond, 2006). Today, minority and low-income students have the least qualified teachers, limited access to rigorous curriculums, and are more likely to be in large classes where it is easier for students to fall through the cracks (Darling-Hammond, 2006). The variation in achievement between these students and their white counterparts has led to court-mandated reform to alter the funding formulas in multiple states.

Litigation challenging state school funding structures and practices relating to the principles of equity and adequacy has been filed in 45 of the 50 states (National Education Access Network, 2011). The precedent setting case of *Serrano v. Priest* (1976) is generally regarded as the first modern day education finance litigation decision. In this case, the California Supreme Court found that disparities in per-pupil spending, created by the state's funding system, violated the equal protection clause of the California constitution and mandated more equal funding of schools (Alexander & Alexander, 2009). In the case of *Rose vs. Council for Better Education* (1989), the Supreme Court determined the entire Commonwealth of Kentucky school system was in violation of its constitution due to the significant differences in monetary distribution (Alexander & Alexander, 2009). The court ordered the funding formula be altered to sufficiently "provide each child in Kentucky an adequate education" and to reform the current property tax structure (National Education Access Network, 2011). As many other courts have done subsequently, the Kentucky court concluded that "money matters" and that state governments, not local governments, carry the primary responsibility for public education (National Education Access Network, 2011). Court litigation, along with influential reports and legislation, have compounded the controversy about the

relationship between funding and student outcomes and a significant amount of educational finance research has focused on this debate.

Conceptual Framework

Education is an investment in human capital where the return on this investment is evidenced by the knowledge and skills acquired by the student. In turn, this knowledge and skill provides students with the ability to obtain employment, which has long term economic benefits for all of society. In its simplest form, this philosophy of human capital was discussed by Adam Smith in his publication, The Wealth of Nations, in 1776. In this initial publication, and several ensuing editions, vocational training for laborers was related to production (Smith, 1937). Subsequently, this idea has been expanded to include the larger perspective that education, more than any other social investment, creates a higher standard of living by increasing employability and spendable income thereby increasing tax revenue (Owings & Kaplan, 2004). In addition, employed people are less likely to draw from social services funds, which contributes to the overall economic health of a community (Owings & Kaplan, 2004). Therefore, educational finance research investigating the best and most efficient way to produce college-ready and job-ready graduates has become increasingly important as federal, state, and local governments struggle with budget shortfalls.

Studies on educational finance commonly utilize production function models, also called input-output models, in an attempt to examine the relationship between different resource inputs and school outcomes (Hedges, Laine, & Greenwald, 1994). Production function models were designed to study business processes; however, when the standard framework is modified to accommodate specific educational parameters, such as policy

issues and measurement variables, the resulting model is often used to address educational research questions (Hanushek, 1986). In fact, Coleman used such a model for his work in 1966. The majority of these studies are quantitative investigations relying on pre-existing data, in contrast to more experimental methods. The purpose of these studies is to predict the effect a change in resources has on a specified student outcome. Previously, educational production function analyses were focused on the availability of student opportunity (Jefferson, 2005). More recently, these studies have shifted toward examining student achievement but still have yielded inconclusive results (Jefferson, 2005). Commonly studied student outcome variables include standardized test scores, student attitudes and school attendance rates. With research identifying the long term advantages and disadvantages of staying in school, dropout rates and graduation rates have also been used as measures of student outcomes.

Graduation rates and dropout rates have become two of the most publically reported state educational statistics. Although these numbers are related, there is frequently a gap which does not account for some students. For example, in the state of Virginia, according to the 2010 Cohort Report, the dropout percentage is reported as 8.2% and the reported graduation rate is reported as 85.5% (Virginia Department of Education, 2010). This leaves 6.3% of the students unaccounted for due to GED completion, students who are still enrolled in school, or various other reasons. It is important to note this difference because research related to the topic of student graduation is often closely related to research on dropouts. For this reason, research on both topics will be examined.

The current study will utilize the production function model with input identified as fiscal effort and the output as graduation rates. Much of the previous research has used PPE when studying the effects of monetary input on student outcomes but this measure does not take into account the capacity of the governing body to invest in education. For example, a state reporting a lower per-pupil allocation of funds may actually be investing a higher percentage of their overall state wealth. State per-pupil expenditures have increased over time but the total state contribution toward education as a percentage of overall budget allocations has remained at about 22% percent over the last 20 years (Murray, Reuben, & Rosenberg, 2007). Using fiscal effort, also known as tax effort, as the measure of monetary input provides a more complete picture than PPE when discussing how governments invest in human capital through education (Goldschmidt & Eyermann, 1999; Alexander, 2001; Owings & Kaplan, 2006).

The return of investment in human capital can be studied by looking at high school graduation rates. There are various factors influencing graduation rates and these are recognized as part of the conceptual framework. For instance, it is important to acknowledge that student outcomes culminate from years of development and research focused on short periods of time are often misleading (Berman & McLaughlin, 1978; Fullan, 2000). As MacPherson (1993, p. 46) states, "any pupil can have a bad day, any school a bad year. Sensible judgements will therefore be based, not on snapshots, but on repeated measures of pupils and schools." For that reason, longitudinal studies are beneficial to assess the effects of school inputs on student outputs. In addition, other factors influencing outcome measures need to be recognized. Graduating from high school is influenced by many factors including, but not limited to, school climate, teacher characteristics, and access to challenging curriculums (Oakes, 2005). When state fiscal

effort is increased, school districts may be better able to improve factors which increase student achievement. The overview of the intermediary factors influencing this study is shown in Figure 5.

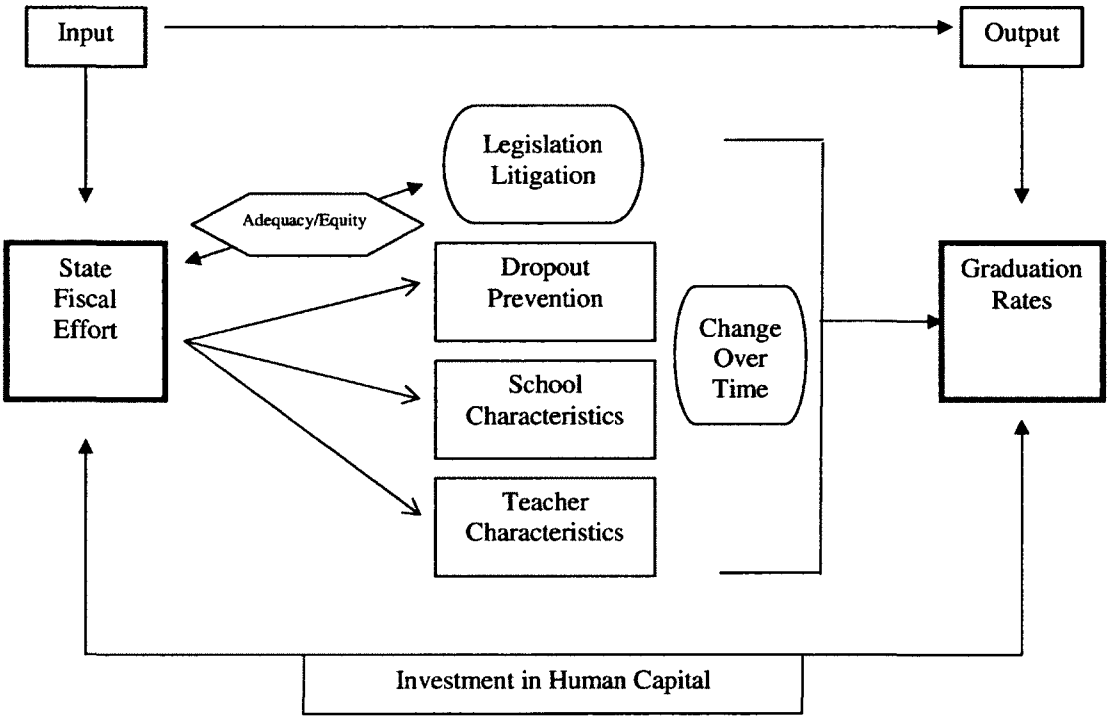

Figure 5: Intermediary factors influencing the relationship between state fiscal effort and graduation rates.

Research Findings on Educational Funding and Achievement

Due to the current climate in education and an emphasis from the federal government on student achievement and financial equity, as shown by legislation and litigation, it is necessary to determine what the relationship is between school funding and student achievement. Research on educational finance and school policy revolves around whether or not funding structures are fair and effective. The research on these topics has yielded a series of conflicting and inconclusive results. Archibald (2006)

claims the reason results have been so varied is because the methodologies are insufficient to produce reliable and sustainable results. Policy makers, educational leaders, and community groups realize student achievement is a function of multiple variables and are searching for specific indicators that can predict and impact the levels of student achievement in public schools.

Studies Reporting No Positive Relationship Between Funding and Achievement

The Coleman Report is repeatedly referred to as the leading study claiming school spending does not affect student achievement. Using a production function model, Coleman's study began with the innovative idea that equality of opportunity should be assessed using equality of output instead of equality of input (Marshall, 1998). This resulted in an extensive collection of data both on resources available to different groups of students and on students' achievements (Marshall, 1998). The major findings of the study concluded that differences in measures of school quality, such as per-pupil spending and size of school libraries, showed little effect on student achievement when students of similar background were compared (Coleman et al., 1966). Also, students' achievement was closely related to not only their own family characteristics, but also to that of other students in the school (Coleman et al., 1966). Despite concern over the questionable coding methodology used in the study, the Coleman Report has gained a reputation in educational circles which has inspired more research. Other major studies conducted by Hanushek (1986), and Lefevre and Hederman (2001), have supported Coleman's conclusions that there is little to no correlation between fiscal resource input and student outcomes.

Hanushek (1986) examined the effect of educational expenditures on student achievement by reviewing 147 different educational production function studies. Attempting to determine where emphasis should be in education, these studies used varying input and output measures. Hanushek concluded average class size, level of teacher training, and the quantity of books in school libraries were all positively related to student achievement; however, he went on to say there was no strong systematic relationship between school expenditures and improved student outcomes (Hanushek, 1986). He also noted that controlling for family background removed any positive correlations that were found in the study (Hanushek, 1986). The analysis method used in Hanushek's study has been challenged as a limitation. This method, known as the vote counting method, was used to produce a single synthesized quantitative conclusion from a variety of studies. This method assigns value to the results of individual studies based on them having a positive effect or no effect. One of the drawbacks to this method is that it often produces a false negative result, also known as a Type II error, because it has low power to detect effects. In addition, Hanushek himself recognized that student outcomes and ability are products of years of student development and research focused on short periods of time can be misleading (Hanushek, 1986). Therefore, studies that investigate school spending over a long period of time reflect more valid results.

In 2001, Lefevre and Hederman released the annual *Report Card on American Education: a State by State Comparison.* This report was intended to assist policy makers at local, state, and federal levels determine what educational resources produce the best results. The study used an ordinary least squares regression (OLS) to analyze nearly 100 measures of educational resources and achievement. This study concluded,

"there is no immediate evident correlation between conventional measures of educational inputs, such as expenditures per pupil and teacher salaries, and educational outputs, such as average scores on standardized tests" (Lefevre & Hederman, 2001). This study did not, however, consider increasing or decreasing state effort over time and was limited by a snapshot of data collected from a single year.

Research studies show implementation of new programs take two to five years to be put into action, another two years to become fully executed and another one to two years to produce steady effects on student outcomes (Berman & McLaughlin, 1978; Fullan, 2000). In short, researchers agree it takes many years for the results of program implementation to be fully realized. Therefore, it is important to use longitudinal data when assessing the impact of educational inputs on school outputs.

Studies Reporting A Positive Relationship Between Funding and Achievement

In contrast to the previous studies mentioned, studies conducted by Hedges, Laine, and Greenwald (1994), Flanigan, Marion, and Richardson (1997), and Verstegan and King (1998), have all shown there to be a positive relationship between fiscal input and student outcomes. Many of these studies built off the previous studies using various methodologies.

Hedges, Laine and Greenwald (1994) reanalyzed the data collected by Hanushek and conducted a meta-analysis using the same studies. Considered to be a more rigorous method, this meta-analyses used a combined significance test and combined estimation method to determine the relationship between the variables in these studies (Hedges, Laine, & Greenwald, 1994). This analysis method allows for the combining of different statistical significance values from studies with the same conceptual idea even though

they may employ different designs or measures of outcome. The results of this study allowed researchers to predict, with a certain degree of certainty, the impact of school inputs on educational outputs. More specifically this study found, "increasing per pupil expenditures by $500 (less than 10 percent of the national average) would be associated with a 0.7 standard deviation increase in student outcome" (Hedges, Laine, & Greenwald, 1994). In other words, it was found that money does matter and is positively correlated with improved student achievement. Hedges, Laine and Greenwald (1994) also noted that most of the studies in Hanushek's work are cross-sectional, and do not take into account the long-term effects of resource inputs on school outputs. Longitudinal studies are currently considered by methodologists to be a better design when studying the effect of school spending on student achievement. Another meta-analysis conducted by Verstegen and King (1998) supported the positive effect of school fiscal input on student outcomes by analyzing more than three decades of data. They found that teacher characteristics, class size and classroom resources all positively influence student achievement.

Taking into account spending as a function of time, Flanigan, Marion, and Richardson (1997) examined the impact of increased financial expenditures on reading achievement in South Carolina's public schools. They looked at student achievement over a seven-year period where education funding in the state increased for four years and then decreased. The results showed student achievement was low during the first two years and then significantly increased during the two years after increased funding occurred, and then decreased as funding decreased. This correlates with management theories which report change takes five to seven years to become systemic (Berman &

McLaughlin, 1978), but less time to undo the positive effects of the change (Fullan, 2000). The findings of Flanigan, Marion, and Richardson (1997) support the positive effects of increased spending on education over time to improve student outcomes, along with a need for more longitudinal studies on the topic.

There are a plethora of studies investigating the effect of school expenditures on student achievement. These studies vary widely in methodology and identified variables. The length of the study, use of different variables, and types of statistical analysis, have all been identified as both strengths and limitations and have contributed to the ongoing debate about the credibility of these controversial findings. For this reason, researchers continue to improve educational input-output study techniques in order to produce more reliable and valid results.

School Spending Practices and Student Achievement

School districts spend the majority of their fiscal resources on instructional expenditures which primarily include salaries for teachers and instructional materials used for student learning (Smith, 2004). The success or failure of districts is often determined by measures of student achievement and, therefore, numerous studies have been conducted to determine what fiscal expenditures have the greatest impact on various outcome measures. Existing literature on school expenditure associates smaller class sizes and better teacher quality (often defined by additional education or more years of experience) with increased student achievement (Hedges, Laine, & Greenwald, 1994). Controlling for other identified student factors such as socioeconomic status, students with disabilities and students with Limited English Proficiency (LEP), which are

associated with increased or decreased student achievement, is necessary when studying the effects of fiscal allocation of resources.

Both Smith (2004) and Archibald (2006) looked specifically at school expenditures for instruction, support, leadership and operations and their impact on student achievement in reading and math. These studies found that expenditures for instruction and support were positively correlated to improved student achievement.

Smith (2004) used the statistical method known as a two-level hierarchical linear model (HLM), to study the effects of money in the educational environment. This method accounts for nested relationships between different variables in the analysis. Scores on the Minnesota Basic Skills Test (MBST) were used as the student outcome measure. Smith (2004) determined that money alone cannot buy student academic excellence, but competitive teacher salaries can attract teachers with more expertise and experience which positively impacts student achievement.

Archibald's (2006) study supported that teacher performance, as indicated by standards-based teacher evaluations, is positively related to student achievement. The methodology of this study uses a more advanced model than previous research, a 3-level HLM, to provide a more comprehensive theoretical framework controlling for other factors affecting student learning. This study found that per-pupil spending at the school level is positively correlated and statistically significant to student achievement in reading. In addition to showing a positive relationship between budgetary input and student output, this study reflects the need for methodological analysis which adequately investigates the impact of various factors on student achievement.

One limitation of the studies conducted by Smith (2004) and Archibald (2006) is that they attempted to determine where money should be spent, not how much should be spent, in order to positively impact student achievement. These studies do not examine increased spending as a variable and they use only a single measurement of a state-level assessment as the indicator of student achievement in one year which has previously been identified as a limitation.

Ilon and Normore (2006) investigated Florida's statewide initiative to reduce class sizes. They examined over 1,700 elementary schools using a linear regression model to determine if class size and per pupil expenditures were a cost-effective means of raising test scores. Although they found that reducing class sizes did have an impact, it was not the most cost effective means of raising achievement scores. In addition, their research suggested hiring teachers with masters' degrees had more of an effect on assessment scores than reduced class sizes.

Grubb (2006) used the National Educational Longitudinal Survey of the Class of 1988 (NELS88) data to describe the effects of school funding patterns. The NELS88 collected data on math, reading, history, and science in addition to measures of progress such as graduation, college enrollment and student attitudes toward educational and occupational ambitions. Revenue available for school resources was used as the input variable. Grubb's (2006) findings showed the most powerful effects of expenditures per pupil were on resources such as lowered pupil-teacher ratios, increased teacher salaries, and teacher experience. He also showed that increased resource allocation toward advanced curriculum, remedial education, staff development and counseling had little effect on student achievement (Grubb, 2006).

Odden and Archibald's (2000) findings also supported the idea that increased funding is not necessary to improve school achievement. This study determined reallocating resources away from ineffective programs toward more efficient practices was shown to be better than merely investing more money. In other words, they concluded there is a need for improved fiscal management of current resources to achieve desired outcomes rather, not just more money. This study included a small sample size (only five schools), over a short period of time, only a single year to draw conclusions. Both of these characteristics are viewed as significant limitations and reduce the likelihood results can be applied to the greater field of educational finance.

These studies concentrated on one funding variable in one state over the course of one year. As noted by Hanushek (1986), this short time span is not nearly long enough to conclude results with any significant meaning about the impact of school funding on student achievement. The results confirm that many of the most effective resources in schools are not related to spending patterns at all. In other words, money alone is not the determining factor in student success. However, money does contribute to other factors such as teachers, leadership, and district support, which are necessary to develop positive student outcomes. Given the various research results, a true correlation between school inputs on student achievement is difficult to isolate.

Court Litigation and School Funding

Court litigation impacting state funding formulas has been a frequent occurrence since the 1970s when legislation and research on school expenditures placed considerable emphasis on the importance of adequacy and equity in U.S. schools. Generally, references to school finance equity places emphasis on resource inputs and the term

adequacy places emphasis on school outcomes (Springer, Liu, & Guthrie, 2009). Several studies have been conducted to determine the impact of court-mandated reform on these two principles.

Card and Payne (2002) studied the effect of school finance reform on the distribution of school spending and student test scores and found that states under court-mandated reform tended to adopt more equitable funding formulas, determined by the relative amounts of state aid received by low income versus high income districts. In addition, Card and Payne's (2002) study found that court-ordered finance reform resulted in a reduction in test score gaps between students in low-income and high-income districts. Although previous research has determined court decisions increase overall spending on education, research has not identified the specific components of school finance that makes a difference in improving student achievement.

Springer, Liu and Guthrie (2009) examined the impact of court-mandated adequacy and equity reform on resource distribution. This study used a state and year fixed effects model and a two-stage regression model and found that court-mandated equity and adequacy reform decreased horizontal inequities across states when compared to no court-mandated reform (Springer, Liu, & Guthrie, 2009). In short, states that had their funding formula deemed unconstitutional had more equitable resource distribution patterns than those that did not. This research also recognized that the impact of court-mandated reform on resource distribution would take time and accounted for this variable in the methodology.

Graduation Rates

The negative social impact of students not graduating from high school is universally acknowledged as a loss in the stock of human capital (Lee & Burkham, 2003). Few studies directly link school expenditures to graduation or dropout rate. The majority of studies conducted on these two measures of student achievement are limited to identifying the positive effects of staying in school or individual school characteristics and programs which contribute to student engagement. More recently, with the implementation of legislation such as NCLB, the impact of high-stakes testing on high school completion has also been a topic among educators and policymakers.

Legislation and High-Stakes Testing

The American Educational Research Association (AERA) (2002) defines "high stakes" tests as those which "carry serious consequences for students or educators." These tests are implemented with the intent of improving education; however, research has shown the impact of these tests may very well have the opposite effect. In 2000, the National Board on Educational Testing concluded there was a negative correlation between high school completion rates and increased use of high-stakes testing (Clark, Haney, & Madaus, 2000). This study included several pieces of evidence to support this conclusion. The most significant evidence to support these findings was an evaluation of the 10 states with the highest dropout rates and the 10 states with the lowest dropout rates in 1986. It was found that in states with the lowest dropout rates, none of them required a minimum competency test (MCT) for graduation. In the states with the highest dropout rates, 9 of the 10 states used the MCT to make determinations regarding student graduation. In addition, this study found a correlation between dropout rates in schools

with a higher proportion of low socio-economic status (SES) students requiring a MCT than similar schools that did not require a MCT. This finding indicates high-stakes testing may have more of an impact on minority students, who traditionally are prevalent in low SES schools, than on higher SES students. These findings were supported in later research where student SES was found to be directly related to performance on high-stakes tests (Cunningham & Sanzo, 2002).

In 2002, Amrein and Berliner conducted a longitudinal qualitative investigation of states before and after requiring high-stakes testing for graduation. They found that 62 percent of these states reported an increase in dropout rates and 67 percent reported a decrease in graduation rates. A quantitative analysis using a multiple regression was conducted by Marchant and Paulson (2005) examining the relationship between states requiring standardized examinations and graduation rates. This study controlled for demographic factors and found a statistically significant difference between states with a graduation exam requirement and those without. The results of these studies suggest high-stakes testing requirements may be negatively influencing graduation rates.

Economic Benefits of Graduation

Education is a major contributor to the overall economic health of the individual and society. Individuals with higher levels of educational achievement earn more money, pay more in taxes, and contribute more to the general consumer economy, in addition to taking fewer resources from the public, than those with less education (Owings & Kaplan, 2004). A variety of research has been conducted to support these claims.

One recent study conducted by Neild & Boccanfuso (2010) analyzed labor market earnings for a cohort of students entering ninth grade in 1996 in the School District of

Philadelphia. This study used a form of hierarchical linear modeling to examine state unemployment data to track student outcomes. They found students with a high school diploma were more likely to be employed than dropouts. This is not a novel discovery; however, they also found that educational attainment was a stronger predictor of weeks worked and annual earnings than race, gender and standardized test scores in eighth grade (Neild & Boccanfuso, 2010). This finding supports the need to close the achievement gap between ethnic groups to increase society's return on their investment in human capital.

Dropout Prevention

Despite on-going debates about the persistence of the achievement gap, results of research addressing the specific component of schools that make a difference in promoting achievement are varied. These include the quality of teachers, especially teachers' ability to teach content to diverse populations. Access to more challenging curriculums, along with schools and classes which are organized so students are well known and well supported, frequently is a useful predictor of student achievement (Oakes, 2005; Lee & Burkam, 2003). In addition, schools that demonstrate an authoritative climate, characterized by high standards for behavior and maturity and by positive communication and respect, are shown to have lower dropout rates (Pellerin, 2005).

Lee & Burkham (2003) used a sample of 3,840 students in 190 urban and suburban schools and applied multilevel methods to identify the role of school organization and structure in keeping students in school. They found schools with smaller class sizes, more advanced curriculum, and an environment that promotes

positive teacher-student interactions were shown to have lower dropout rates (Lee & Burkam, 2003).

Bridgeland, DeIiulio, and Morison (2006) conducted one of the most comprehensive surveys of high school dropouts and reported most dropouts said they would have finished high school if only they had more challenging coursework, engaging classroom experiences, and access to extra help. In addition, nearly 70% said they were not motivated to work hard and two-thirds would have worked harder if more were demanded of them (Bridgeland, DeIiulio & Morison, 2006).

Rumberger & Lim (2008) reviewed 25 years of research and over 200 published studies analyzing national, state, and local data to identify statistically significant predictors of high school dropout and graduation. This research concluded there is no one predictor of a student choosing to dropout of high school. In long tem studies tracking students from pre-school through high school they found early academic performance and early academic and social behaviors were significant indicators of high school graduation supporting the need for increased funding to support high quality pre-school programs and small classes in elementary school (Rumberger & Lim, 2008). Belfield & Levin report these programs were also cost effective with an estimated two to four dollar return on every dollar invested (Rumberger & Lim, 2008).

There is extensive research on intermediary factors affecting student dropout and graduation; however, research showing a direct impact of school funding on graduation rates is much less abundant. One study conducted by Lips, Watkins and Fleming (2008) analyzed national graduation rate data from 1991 through 2005 and found they remained relatively stable despite a considerable increase in federal K-12 education spending. In

addition, they compared high school graduation rates to PPE in the nation's fifty largest cities. In 2005, the PPE in these cities ranged from $6,558 in Mesa, Arizona to $16,879 in Boston, Massachusetts (Lips, Watkins, & Fleming, 2008). They found there was no correlation between spending and graduation rates (Lips, Watkins, & Fleming, 2008). As with many other studies, two limitations are most notable, accounting for spending over time or the capacity of state and local governments to contribute to education.

The current study adds to the literature about school funding practices and the impact on student achievement by examining the relationship between increasing and decreasing state expenditures and graduation rates. Fiscal effort, defined as the ratio of total per pupil expenditures and state wealth measured by the Gross State Product (GSP) on a per capita basis, reflects the states' use of fiscal capacity to invest in education (Owings & Kaplan, 2006). This measure gives a different perspective than merely using PPE by showing how much of a priority education is to different states. Researchers agree that the use of longitudinal data is important when identifying the effects of school inputs on student output (Berman & McLaughlin, 1978; Hanushek, 1986). For this study, graduation rate data spanning 8 years, post-NCLB implementation, provides a more comprehensive and valid picture of the relationship between changes in fiscal effort and graduation rates over time.

Research Questions

In this study, the 10 states with the steepest increasing slope for fiscal effort and the 10 states with the steepest decreasing slope for fiscal effort from 1996 to 2009 were identified. The graduation rates in these states were then analyzed to determine if there is

a significant association between sustained increases and decreases in fiscal effort and graduation rates over time. This study was guided by three research questions:

1) Which ten states had the steepest sustained increasing slope for fiscal effort from 1996 to 2009?
2) Which ten states had the steepest sustained decreasing slope for fiscal effort from 1996 to 2009?
3) What is the relationship between sustained increases and decreases in state fiscal effort and state graduation rates from 2002 to 2009?

CHAPTER 3

METHODOLOGY

Chapter Overview

The primary purpose of this study is to examine the relationship between state fiscal effort and graduation rates over time. To examine this relationship, graduation rates in states with sustained increases and decreases in fiscal effort over time were analyzed. The methodology used in this study is discussed in this chapter. Chapter 3 is divided into sections including a description of the research design, state sample, measures, data collection and procedures, data analysis, and limitations.

Research Design

This study is a quantitative analysis using an ex-post facto longitudinal design examining archived state data on state fiscal effort from 1996 to 2009. Graduation rate data from 2002 to 2009 were also utilized in this study. The primary independent variable in this study, fiscal effort, was calculated for each of the fifty states between 1996 and 2009. A second independent variable in this study was time. The time factor was a key component in this longitudinal analysis of 8 years of data. Most researchers agree using a longitudinal study provides for more reliable results in production function studies because it allows time for the effects of resource inputs to be reflected in resource outputs (Berman & McGlaughlin, 1978; Hanushek, 1986). The dependent variable in this study will be graduation rates. Until recently, there has been no standardized formula used to calculate state graduation rates and different states can vary considerably in their methods (Richmond, 2009). Therefore, this study utilizes AFGR data reported by the NCES in order to maintain continuity in graduation rate calculation methods.

This study was guided by 3 main questions:

1) Which ten states had the steepest sustained increasing slope for fiscal effort from 1996 to 2009?
2) Which ten states had the steepest sustained decreasing slope for fiscal effort from 1996 to 2009?
3) What is the relationship between sustained increases and decreases in state fiscal effort and state graduation rates from 2002 to 2009?

The current research design can be described as a 2 (fiscal effort categories) x 8 (years) repeated measures analysis of variance (ANOVA). In this design, the '2' represents the two state categories (increasing fiscal effort and decreasing fiscal effort) and the '8' represents the number of years (2002 to 2009) being analyzed. Table 1 is an outline of the design of this study.

Table 1: Repeated measures ANOVA research design examining the relationship between state fiscal effort and graduation rates from 2002-2009.

State Categories	Time			
	States	Graduation rates (GR) over time (1-8 years)		
States with Increasing Fiscal Effort	1	GR1	(GR2...GR7)	GR8
	2	GR1	(GR2...GR7)	GR8
	3	GR1	(GR2...GR7)	GR8
	4	GR1	(GR2...GR7)	GR8
	5	GR1	(GR2...GR7)	GR8
States with Decreasing Fiscal Effort	6	GR1	(GR2...GR7)	GR8
	7	GR1	(GR2...GR7)	GR8
	8	GR1	(GR2...GR7)	GR8
	9	GR1	(GR2...GR7)	GR8
	10	GR1	(GR2...GR7)	GR8

To examine the association between fiscal effort and graduation rates over time, a linear regression analysis was used to determine the 10 states with the largest positive slope and 10 states with the largest negative slope in fiscal effort from 1996-2009. The 2 (fiscal effort categories) x 8 (years) repeated measures ANOVA was then conducted on these 20 states to measure the strength of association between state fiscal effort and graduation rates.

State Sample

The sample analyzed in this study initially included all 50 states. The 10 states with the largest positive slope and the 10 states with the largest negative slope for fiscal effort from 1996 to 2009 were used for the remainder of the study. These 20 states were examined to determine the relationship between state fiscal effort and state graduation rates over time.

Measures

For the purpose of this study, state fiscal effort was calculated by dividing the state PPE for K-12 education by the Gross State Product (GSP) on a per capita basis. PPE is calculated by dividing the total K-12 expenditure by the number of students enrolled for each year of the study (1996-2009). The GSP is defined as the sum of spending by consumers, businesses and government on goods and services, in addition to investment and foreign trade (U.S. Department of Commerce, 2011). To calculate annual GSP per capita for each state, the GSP was divided by the state population for each year of this study (1996-2009).

From these calculations, the data needed to calculate fiscal effort was available. Owings and Kaplan (2006) define fiscal effort according to the following equation:

$$E = \frac{R}{TB}$$

In this equation, E represents fiscal effort, R is the revenue allocated toward public school K-12 education measured as PPE by state, and TB is the tax base used as a measure of state wealth. The measure of state wealth for this study will be the GSP per capita.

Averaged freshman graduation rates calculated and reported by the NCES were used in this study. Historically, the method for calculating graduation rates varies from state to state which makes interstate comparisons difficult. For example, some states determined graduation rates by calculating the number of entering twelfth graders who graduated in the same year; however, this does not account for students who drop out in the earlier grades (Richmond, 2009). Other states often include GED or special diploma recipients as being high school graduates which inflates graduation rate data (Richmond, 2009). Therefore, the use of AFGR data provided the most consistent calculation method.

Data Collection and Procedure

All data for this study are pre-existing and publically available. The NCES contains yearly data on K-12 education expenditures along with the state reported student enrollment for that year. From this data, PPE are calculated and reported. The data on GSP is available from the U.S. Department of Commerce Bureau of Economic Analysis. The U.S. Census Bureau contains information on total state populations. Dr. Bill Owings and Dr. Leslie Kaplan have used this information to calculate fiscal effort and have compiled State Effort Tables spanning decades which are made available to graduate students conducting research on the topic. Averaged freshman graduation rate data is available from the NCES.

To answer the first two research questions, a linear regression analysis was conducted for all 50 states examining the relationship between state fiscal effort and time. The slope for each state was calculated and the 10 states with the largest positive slope and the 10 states with the largest negative slope was determined. Using these 20 states, a 2 (fiscal effort categories) x 8 (years) repeated measures ANOVA was conducted using the SPSS statistical software package.

Data Analysis

To answer the first two research questions, states with the steepest incline and steepest decline in fiscal effort over a 14-year period were determined using a linear regression to determine the line with the "best fit" between fiscal effort and time represented by the equation:

$$Y = mX + b$$

In this equation, 'Y' represents the dependent variable, fiscal effort, and 'X' represents the independent variable, time. The slope, m, is determined by calculating the change in 'Y' at any two points divided by the change in 'X':

$$m = \frac{\Delta Y}{\Delta X}$$

The 10 states with the largest positive slope and the 10 states with the largest negative slope were then used for the remainder of the study.

The primary goal of this study was to determine the association between state fiscal effort and graduation rates over an 8-year period. To achieve this goal, a 2 (fiscal effort categories) x 8 (years) repeated measures ANOVA was conducted in SPSS. This design was used to determine whether there are main effects for each of the independent

variables, fiscal effort and time, separately on the dependent variable, graduation rates. Also, this methodological design identifies if there is an interaction effect between fiscal effort and time together on graduation rates.

Using a 2 (fiscal effort categories) x 8 (years) repeated measures ANOVA provides the statistical method to determine if change has occurred over time. The validity of this method lies in several assumptions. The main underlying assumption of a repeated measures ANOVA is that of sphericity, also known as homogeneity of covariance, which requires comparable levels of variance between each set of different scores of the repeated measure (Girden, 1992). Violation of this assumption often results in a Type 1 error, where the null hypothesis is rejected when it is actually true (Kinnear & Gray, 2011). In SPSS, Mauchly's Test was conducted to determine if the assumption of sphericity had been violated. In addition, Levene's test was implemented to test the assumption of homogeneity of variance and its purpose is to determine whether to accept the result of the *F* test statistic (Kinnear & Gray, 2011). Box's test was also performed to test the assumption of homogeneity of variance-covariance matrices. In other words, it is assumed that the variance-covariance matrices in the different categories have all been sampled from the same population (Kinnear & Gray, 2011).

Limitations

Threats to internal validity include the calculation method used to determine AFGR for the individual states. Because this method does not track individual students, it does not take into account changes in enrollment due to students leaving and entering the state.

Other limitations to using a repeated measures ANOVA are the requirement of meeting numerous assumptions for results to be valid. If the assumption of sphericity is violated, by altering the degrees of freedom the Greenhouse-Geisser, the Huyndh-Feldt, and the Lower-bound tests can be used to correct for violations of sphericity (Kinnear & Gray, 2011).

An alternative approach to the analysis of repeated measures, hierarchical linear modeling (HLM), arguably offers a better methodological design because it does not require assumptions of sphericity be met and it is more suitable for studies with incomplete data. However, the current study contains a complete data set and the Greenhouse-Geiser test was used to circumvent violations of assumptions of sphericity. In addition, repeated measures ANOVA have been shown to provide robust results despite violations of the underlying assumptions (Kinnear & Gray, 2011).

CHAPTER 4

RESULTS

Chapter Overview

The purpose of this study was to examine the relationship between state fiscal effort over time on state graduation rates. The first section of this chapter contains the results of the first two research questions identifying the sample of states to be included in the study. The next section reports the results from the third research question which used the 2 (fiscal effort categories) X 8 (years) repeated measures analysis to determine the relationship between these two variables on graduation rates. This chapter contains the descriptive and inferential statistics related to the research questions in this study.

State Sample

Two research questions were addressed to determine the states to use as the sample for this study: "Which ten states have the steepest sustained increasing slope for fiscal effort from 1996 to 2009?" and "Which ten states have the steepest sustained decreasing slope for fiscal effort from 1996 to 2009?" An analysis was conducted on all 50 states to determine the slope of the best fit line for each over the identified time period. Of the 50 United States, 36 states resulted in a positive slope and 14 resulted in a negative slope for fiscal effort over the 14 year period.

Table 2 and Table 3 contain descriptive information on these states including the slope, the mean fiscal effort, and the standard deviation from 1996 to 2009. These tables also include the mean graduation rates from 2002 to 2009 for each state. The slopes of the states indicate the strength of the relationship between fiscal effort and time. States with a more positive or negative slope indicate a greater relationship between these two

variables. For example, New Mexico had a slope of +0.542. This indicates that, on average, fiscal effort increased by 0.542% each year from 1996 to 2009. In contrast, Texas had a slope of -0.114 indicating an average decrease in fiscal effort of 0.114% each year from 1996 to 2009. These numbers show that New Mexico has a stronger relationship between fiscal effort and time than does Texas. The first two research questions in this study were to determine the states with the most sustained increasing and decreasing slopes for fiscal effort.

For states with increasing fiscal effort, the mean fiscal effort ranged from a low of 20.54% in Georgia to a high of 32.06% in Vermont from 1996 to 2009. The mean graduation rate for these states ranged from 60.80% in South Carolina to 85.90% in Vermont. Although Vermont had the most positive slope, the highest average fiscal effort and the highest mean graduation rate in this study, this was not the trend throughout all the states. For example, for the ten states with increasing fiscal effort, New York had the smallest positive slope, the eighth highest mean fiscal effort, and the fifth average graduation rate. South Carolina had the fifth most positive slope, the seventh mean fiscal effort, and the lowest average graduation rate showing inconsistent trends within this category.

States with decreasing fiscal effort from 1996 to 2009 ranged from a low mean fiscal effort of 18.61% in Texas to a high mean fiscal effort of 28.42% in Montana. The mean graduation rate from 2002 to 2009 ranged from a low 65.69% in Florida to 85.91% in Iowa. As with states with increasing fiscal effort, trends between states in the decreasing effort category were not consistent. For example, Idaho had the least negative slope for fiscal effort; however, it had the third lowest mean fiscal effort and the third

highest average graduation rate. Oregon, on the other hand, had the most negative slope for fiscal effort and the eighth highest mean fiscal effort with the fifth average graduation rates.

Table 2: Characteristics of the ten states with the most increasing slope for fiscal effort (E) from 1996 to 2009.

State	Slope	Mean % E	Std. Dev.	Mean GR 2002-2009
Vermont	+0.840	32.06	3.57	85.90
New Hampshire	+0.554	22.66	2.40	80.66
New Mexico	+0.542	21.63	2.53	65.11
Arkansas	+0.475	23.27	2.24	76.14
South Carolina	+0.442	23.80	2.03	60.80
Hawaii	+0.427	21.74	1.88	74.16
Georgia	+0.425	20.54	1.89	63.06
Mississippi	+0.397	23.20	1.91	62.85
Maine	+0.368	30.30	1.76	77.66
New York	+0.335	28.58	1.73	66.03

Table 3: Characteristics of the ten states with the most decreasing slope for fiscal effort (E) from 1996 to 2009.

State	Slope	Mean % E	Std. Dev.	Mean GR 2002-2009
Oregon	-0.245	23.14	1.86	74.14
Oklahoma	-0.212	21.28	1.39	77.10
Alaska	-0.142	21.97	1.64	67.80
Kansas	-0.125	23.33	1.17	78.34
Montana	-0.117	28.42	1.38	81.26
Texas	-0.114	18.61	1.16	74.08
Iowa	-0.075	21.29	0.99	85.91
Florida	-0.072	21.39	0.86	65.69
Washington	-0.055	18.62	0.95	73.66
Idaho	-0.039	20.43	1.33	80.60

Figures 6 and 7 show the scatterplots of Oregon and Idaho where slopes are -0.245 and -0.039, respectively. These states represent the most negative and least negative slopes in the study. Figures 8 and 9 show the scatterplots of Vermont and New York where slopes are +0.840 and +0.335, respectively. These states represent the most positive and least positive slopes in the study. Visual inspection of these lines indicate states with positive slopes show a more linear relationship between fiscal effort and time than those with decreasing slopes. States with decreasing slopes showed a more cubic relationship with fiscal effort increasing and decreasing during different segments over the 14 years. These figures illustrate the trend that exists for all states in the study.

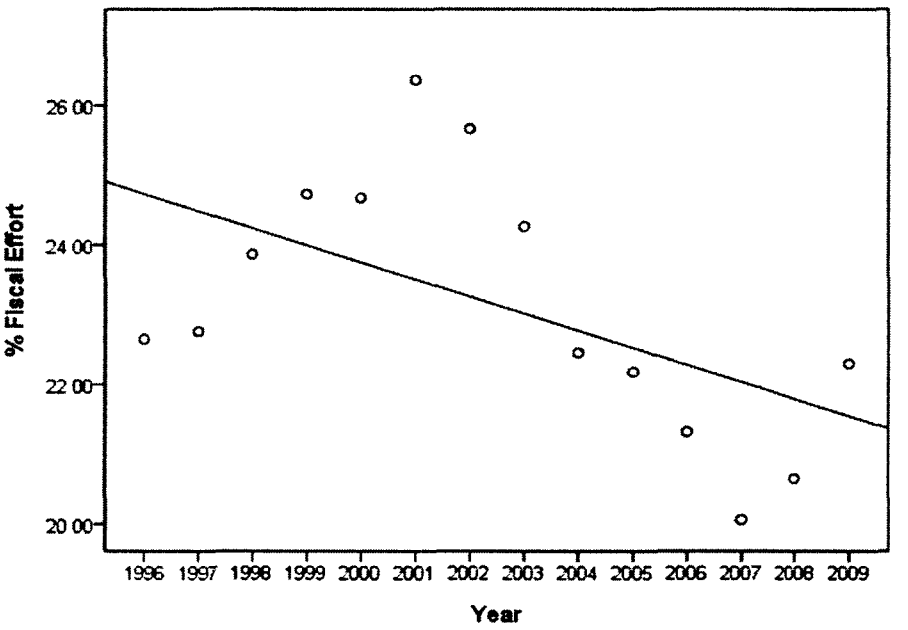

Figure 6: Scatterplot of Oregon, state with the most negative slope this study.

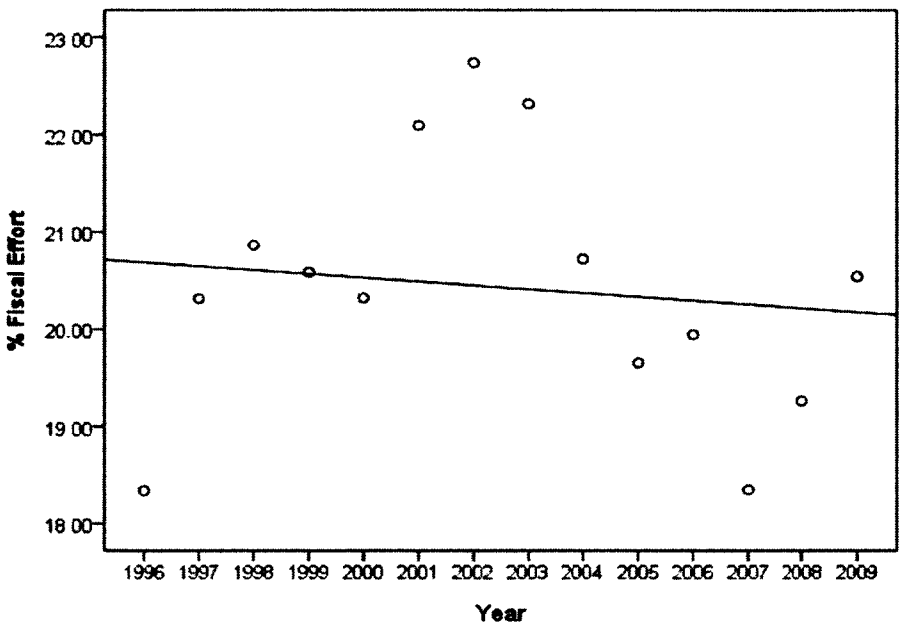

Figure 7: Scatterplot of Idaho, state with the least negative slope this study.

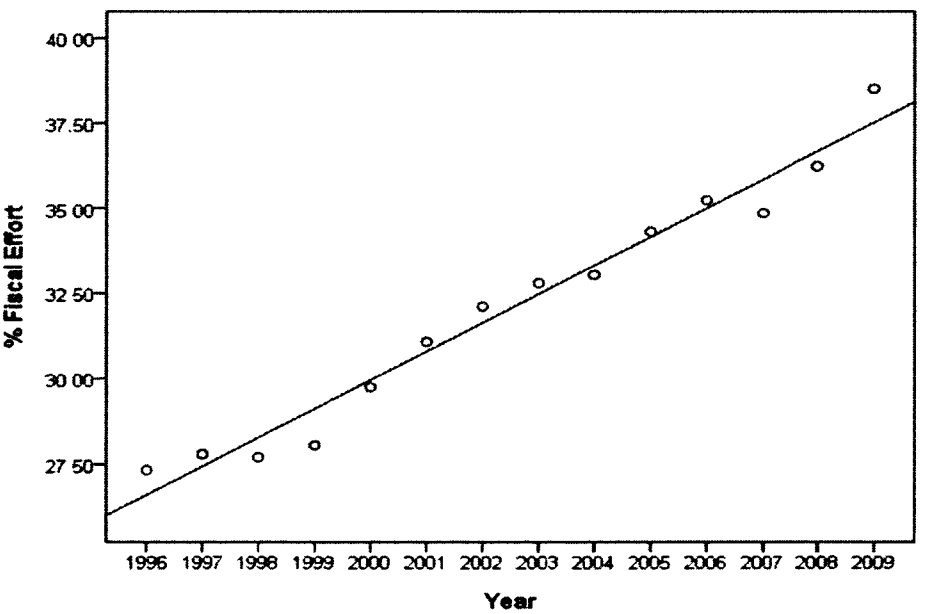

Figure 8: Scatterplot of Vermont, state with the most positive slope in this study.

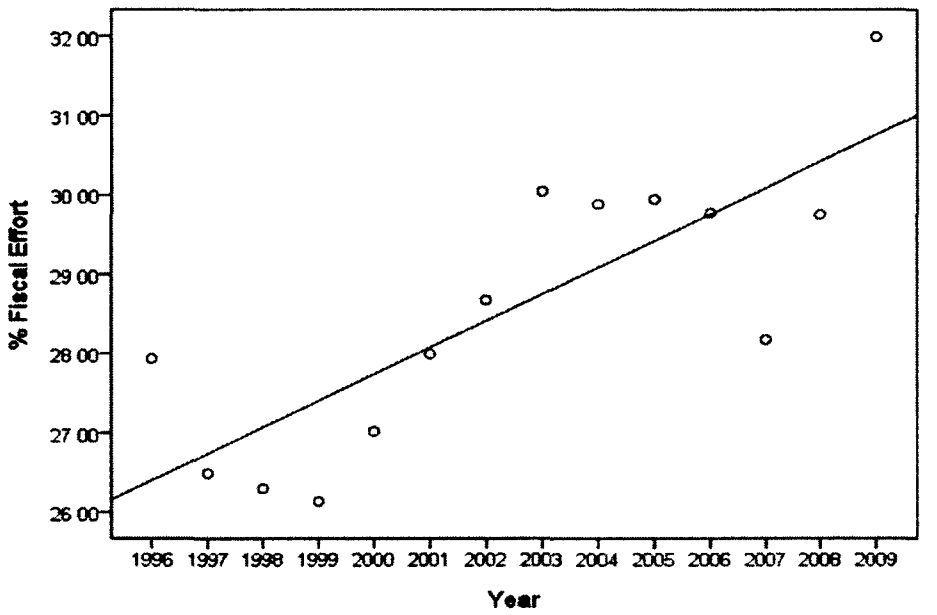

Figure 9: Scatterplot of New York, state with the least positive slope in this study.

Figure 10 identifies all the states and whether fiscal effort was decreasing or increasing. The states with an asterisk indicate if that state was in the top 10 in the corresponding fiscal effort category. The ten states with the most increasing fiscal effort appeared to cluster in the Northeast and Southeast regions of the U.S., whereas the ten states with the greatest decrease in fiscal effort clustered in the Southwest and Pacific Alaska regions.

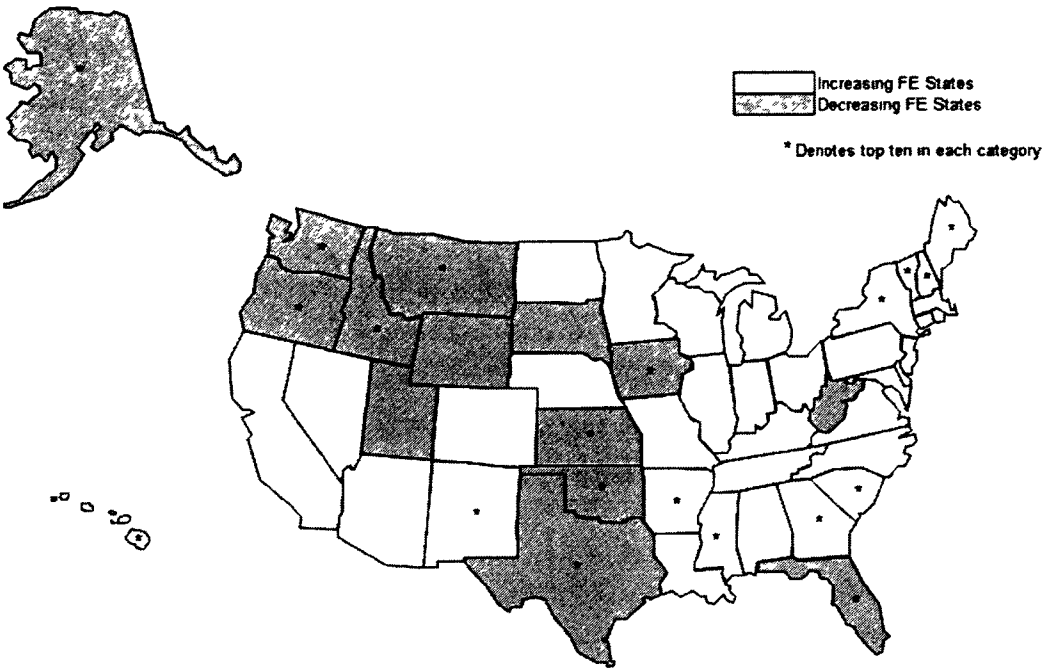

Figure 10: States with increasing and decreasing slopes for fiscal effort from 1996 through 2009.

Repeated Measures Analysis

To address the third research question, "What is the relationship between sustained increases and decreases in state fiscal efforts on state graduation rates over time?" a 2 (fiscal effort categories) x 8 (years) repeated measures ANOVA was conducted using the SPSS statistical software package. A preliminary analysis was conducted to evaluate

the assumptions associated with using a repeated measures design. The assumption of variance-covariance matrices was tested with Box's test and resulted in a Box's M=93.61, df=36, p=.111, showing this assumption was not violated. Levene's test was used to test the assumption of the homogeneity of variance over the eight years being studied. Six of the eight years were shown to not violate this assumption, p> .05. For 2003, Levene's

test showed a significant value of p=.027 and in 2004 the value approached significance at p=.051. Although these values indicate a violation of this assumption, repeated measures analysis are considered robust with respect to violating this assumption, especially when there are equal numbers of observations within the different groups (Kinnear & Gray, 2011). An additional assumption for a repeated measures ANOVA includes the Mauchly's test of Sphericity, which resulted in a Mauchly's W=.002, with an approximate X^2= 99.80, df=27, p<.05. Given the p-value for the Mauchly's test, the Greenhouse-Geisser corrected degrees of freedom were used to test for statistical significance.

An examination of the univariate statistics showed no statistically significant *category X year* interaction effect ($F_{1,18}$=2.323, p=.097, partial η^2 =.114). The analysis of the main effects showed a statistically significant effect for *time* ($F_{1,18}$=9.166, p <.05, partial η^2=.337), with both groups showing an increase in graduation rates across the eight years studied (see Figure 11). The main effect comparing the two categories of states showed no statistically significant effect for *categories* ($F_{1,18}$=1.87, p=.189, partial η^2=.094) suggesting no statistically significant relationship between increasing and decreasing fiscal effort on graduation.

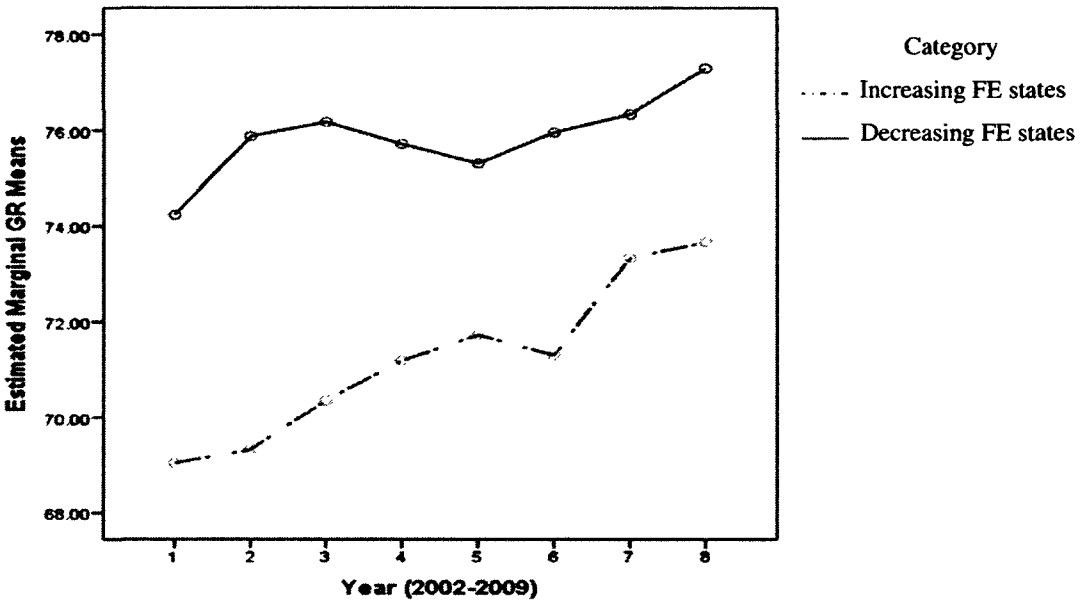

Figure 11: Observed mean graduation rates (GR) of states with increasing and decreasing fiscal effort (FE) from 2002-2009.

CHAPTER 5

DISCUSSION

Chapter Overview

The purpose of this study was to examine the relationship between state fiscal effort and graduation rates over time. To better understand the context of this study, Chapter 1 included an introduction to related issues in education both past and present. It also included an overview of educational funding, information on states and graduation rates, reviewed the significance of the study, an overview of the methodology, and the purpose and research questions. Chapter 2 included a review of the literature and provided information on the varied findings regarding the relationship between educational expenditures and student achievement. Also included in Chapter 2 was information on school spending practices and factors influencing graduation rates. Chapter 3 included a review of the methodology and information on the state sample, measures, data collection, data analysis and limitations. Chapter 4 included an analysis of the results from the research questions. The final chapter includes an overview of methods and results, a review of the major findings as they relate to the literature, and discusses the sample of states. Chapter 5 concludes with limitations of the study and direction for future research.

Introduction

As states become progressively more financially stressed and federal mandates continue to demand more educational accountability, determining the relationship between educational expenditures and student achievement becomes increasingly important. Societal pressure to produce citizens who can contribute to the national

economy is an expectation of the U.S. education system which has been ridiculed for its inability to do so. In 1983, *A Nation at Risk* claimed the U.S. education system was not preparing students for the global workforce and created a slew of discussion and debate about how to improve education at the federal, state, and local levels. Improving educational leadership and fiscal support was one recommendation made in this report. The importance of research-based and data-driven decision making to make sound determinations about the direction of education creates a monumental task for educational researchers.

In an effort to improve education for all students, federal legislation has been enacted over the last half century to encourage and promote student achievement. Although education is a state responsibility, the financial incentive offered by the federal government to adhere to legislative initiatives is too alluring for states to decline. The most recent legislation impacting education, NCLB (2001), holds states accountable for reporting graduation rates. Although high school graduation has always been revered as a measure of student achievement, not until the passing of NCLB were states held accountable for this statistic (Richmond, 2009). The requirement for states to be held accountable for student graduation is grounded in the indisputable research reporting the negative fiscal and societal impact of student failure to complete high school. This impact can be seen when looking at unemployment rates, annual income, and tax contributions when compared to graduates.

Overall, the total dollar amount contributed to education has increased considerably over the last half century; however, increases are not consistent across all states and localities in relation to their wealth. The current study utilized fiscal effort as

the measure of educational expenditure because it takes into account the ability of a state to contribute to education. The measure of fiscal effort identifies how much of a priority education is for a state by looking at the ratio of PPE to a measure of state wealth. This study used GSP per capita as the measure of state wealth. When discussing state fiscal effort it is important to acknowledge that some state budgets include a fixed monetary contribution for education. Other states provide for a greater equalization of funding. The state per pupil expenditure also reflects local, state, and federal funding. Effort is not the same as funding. Effort is a ratio of funding to wealth as measured by state per capita GSP. Consequently, increases and decreases in per capita GSP would reflect a change in state fiscal effort even though the total dollar amount contributed toward education might remain the same. Therefore, state fiscal effort may be more a reflection of the state of the economy versus how high a priority education is for states. Moreover, per capita GSP is a lagging economic indicator and as such may not reflect current state conditions. The use of fiscal effort in this study provides a different perspective than the majority of other studies examining the relationship between educational expenditures and student achievement. The inclusion of time as a variable adds validity to the results of the study.

Summary of Methods and Results

This study was a quantitative analysis using archived data on state fiscal effort and graduation rates. The study was guided by three main questions:

1) Which ten states had the steepest sustained increasing slope for fiscal effort from 1996 to 2009?

2) Which ten states had the steepest sustained decreasing slope for fiscal effort from 1996 to 2009?
3) What is the relationship between sustained increases and decreases in state fiscal effort and state graduation rates from 2002 to 2009?

The first two research questions were designed to identify the sample of states to be used to address the third and primary research question. A simple linear regression was conducted to determine the best fit line used to calculate the state slope The third research question in this study examined the relationship between sustained increases and decreases in fiscal effort over time. In this study, the two independent variables were fiscal effort and time and the dependent variable was graduation rates. To address this question, a 2 (fiscal effort categories) x 8 (years) repeated measures analysis was conducted. This methodological design tests whether there are separate main effects for the fiscal effort categories on graduation rates and for time on graduation rates. Also, it identifies if there is a significant interaction effect for fiscal effort categories and time together on graduation rates from 2002 to 2009. Based on research stating it takes 5 to 7 years for change to become systemic (Berman & McLaughlin, 1978; Fullan, 2000), the state slopes were calculated beginning in 1996 to allow for the effects of the increases or decreases in fiscal effort to be reflected in graduation rates by year 2002.

Overall, the findings did not support there is a relationship between state fiscal effort and graduation rates. Both the main effect of fiscal effort on graduation rates and the interaction effect of fiscal effort and time on graduation rates showed no significant

association between these variables. However, the results did indicate a significant main effect between the variable time and graduation rates from the years 2002 to 2009.

Major Findings of Study

Interaction Effect: *Fiscal Effort X Time on Graduation Rates*

The results of this study showed there was no significant interaction effect between the fiscal effort categories and time on graduation rates. The mean values for the data show an increase in graduation rates for both groups from 2002 to 2009; however, statistical significance was not achieved. In other words, increasing and decreasing fiscal effort from 1996 to 2009 had no significant impact on graduation rates from 2002-2009. These results were consistent with the findings of Lips, Watkins, and Fleming (2008) who also showed that increased spending over time did not affect graduation rates. They analyzed national graduation data from 1991 to 2005 and found no correlation between increased federal spending and increased national graduation rates. In addition, Lips, Watkins, and Flemings (2008) looked at the 50 largest U.S cities and found no correlation between PPE and high school graduation in 2004. The current study fills a gap in the research by investigating the effects of increased and decreased effort at the state level and found similar results. The results of this study contradict the findings of researchers such as Flanigan, Marion, and Richardson (1997) who found that increased financial expenditures over time were correlated to increases achievement. Their research used a different measure of student achievement, reading test scores, to determine that increases and decreases in spending over time were correlated to student achievement. The time component in these studies is important because it supports the literature reporting longitudinal research is more valid than research spanning shorter

periods of time. The current study, which uses the most recent eight years of reported AFGR data also spans the time post implementation of NCLB.

Main Effect: *Fiscal Effort on Graduation Rates*

The results of this study showed no main effect between the two categories of fiscal effort (increasing and decreasing fiscal effort) on state graduation rates. This conclusion supports the findings of Coleman (1966), Hanushek (1986) and Lefevre and Hederman (2001) who claim educational funding has little to no effect on student achievement. Although the current study supports the findings of these researchers, it is important to note that this study does not take into account how money is being allocated but how much in terms of fiscal effort as a function of increased and decreased spending. As Hanushek (1998) notes, "The existing evidence simply indicates that the typical school system today does not use resources well (at least if promoting student achievement is their purpose)." Other researchers have found that increased spending along with proper allocation of resources does indeed have an impact on student achievement.

Main Effect: *Time on Graduation Rates*

The most interesting finding in this study was the statistically significant relationship between time and graduation rates. To complement the inferential statistics of this finding, an assessment of the effect size showed the partial $\eta^2 = .337$. This suggests a large effect size indicating a strong relationship between the two variables, time and graduation rates. In addition to showing statistical significance, the results of this study demonstrated practical significance as well. The term "practical significance" implies a research result that will be viewed as important to stakeholders, including

educational leaders and policymakers, to influence the practice of education. Studies with a large effect size are generally shown to be more powerful. The power of a study indicates the probability of rejecting the null hypothesis when it is false. The more power a study is shown to have, the less likely it is for a Type II error to occur. That is, the less likely it is to fail to reject the null hypothesis when it is actually false. The observed power in this study was shown to be .987 indicating the sample size was more than adequate to provide valid results.

This finding was surprising given the related research on the effects of high-stakes testing on graduation rates. This study encompasses the years post-implementation of NCLB where testing accountability standards are at an all time high. The current study contradicts claims made by previous researchers who state high-stakes testing lowers graduation rates (Clarke, Haney & Madaus, 2000; Marchant & Paulson, 2005). Researchers claim high-stakes testing requirements set forth in NCLB are counterproductive to the goal of educating all students to high levels of proficiency. On the contrary, this study shows for the states investigated, graduation rates have significantly increased in the post-NCLB era. This result carries significant implications for educators and policymakers.

Discussion on State Sample

Regression Analysis

The methodological design of this study specifically isolates states with sustained increases and decreases in fiscal effort. When looking at these trends it is important to consider the statistical phenomenon known as regression to the mean (RTM). This occurs when initial measurements which are large or small are followed by measurements

which are closer to the mean. Visual inspection of the scatterplots and the y-intercept of the regression line can provide information regarding whether or not real sustained increases or decrease have occurred or if RTM is to explain for the change.

Also, an examination of the y-intercept line and the slope value can be used to evaluate other trends associated with fiscal effort and time. For example, states with an initially high y-intercept value and a low slope value would indicate sustained high state effort input over time. By design, these states would not have been captured in this study. The same would be true of states with sustained medium effort or low effort. Therefore, states which initially had a low effort and gradually increased over time may appear "better", defined by increased graduation rates, than the states which maintained high-effort over the same time period.

Graduation Rates

The geographic clustering of states with increasing and decreasing fiscal effort from 1996 to 2009, as shown in Chapter 4, is an interesting occurrence. This clustering of states could be indicative of specific economic, societal, or educational occurrences in these areas which may or may not have influenced the results of this study. Possible influences will briefly be discussed in this section.

The use of state graduation rates as a measure of student achievement is a difficult task because there are a variety of factors influencing this statistic. Historically, high school graduation rates have been a common indictor used to assess the success and competitiveness of the U.S. with other nations; however, not until NCLB (2001) were states held accountable for this measure of student achievement. Furthermore, not until the 2011-2012 school year has there been a consistent and uniform graduation rate

calculation method required by states. The current study utilizes the AFGR reported by the NCES to report graduation rates of states. This calculation method uses the combined enrollment percentage of high school students who graduate four years after entering 9th grade. The incoming freshman class is estimated by adding the total student enrollment for three consecutive years (8th grade, 9th grade, and 10th grade) and dividing by 3 (Chapman, Laird, & KewalRamani, 2010). This method does not track individual students and, therefore, does not take into account students who move into or out of a particular state during this time period which could affect the graduation rates. This is important as it pertains to the current study, especially given the geographic clustering of the sample states. An influx or exodus of students to and from different geographic areas could have impacted the reported AFGR for a particular time period. For example, if a state has more students transfer in than transfer out within a certain time period the graduation rate for that state would be inflated and vice versa. The largest mass migration in the U.S. since the 1930's came in 2005 when Hurricane Katrina hit Louisiana and forced nearly one million people out of their homes. Many of these people fled to the surrounding states. Although Louisiana is not one of the states used in this study, the four states directly attached to Louisiana are all included. This migration is one possible factor influencing the AFGR for these states during this time period and may have influenced the results of the study.

State graduation requirements vary considerably and may be a contributing factor to higher or lower graduation rates in states. For example, one state may require more credits than another for graduation, or require the completion of high-stakes testing, thus affecting the graduation rate. In addition, states have different requirements for

compulsory attendance in schools. For example, some states require students remain in school through the age of 18 while others only require students remain through the age of 16, making it easier for students to drop out. It is important to mention these factors as they pertain to the current study.

Despite these variations among states and the previous lack of a consistent graduation rate calculation method, graduation rates continue to be a method to determine how well states are preparing U.S. citizens for the global economy. Advocates for creating a national education standard have used these factors as an argument for their cause. Creating a national standard would make all states set the same standards and create uniformity between measurement criteria. Allowing states to determine their own standards allows for individual states to make changes which could influence graduation reporting. For example, in 2007 Washington State eliminated a pending high school graduation requirement to pass the math portion of the state assessment when it appeared a significant number of students would not graduate based on this requirement (McCluskey, 2010). That same year, Maryland approved an alternate evaluation in the form of a project to enable students who did not pass the state assessment to graduate (McCluskey, 2010). These various factors are examples of the problems researchers face when using graduation rates as a measure of student achievement and must be taken into consideration when interpreting results.

Limitations

The purpose of this study was to determine the relationship between sustained increases and decreases in fiscal effort over time. One limitation to this study is the method used to identify the sample of states. Using slopes of states to determine states

with sustained increases and decreases for fiscal effort may not have accurately identified trends within states. Visual inspection of the scatterplots of state fiscal effort over time, as shown in Chapter 4, showed states identified as the most increasing had a linear relationship; however, states with decreasing slopes did not show a linear relationship. Instead, the fiscal effort for the states with negative slopes fluctuated between increasing and decreasing fiscal effort over the 14-year period. Therefore, these states may not have adequately represented states with a sustained decrease in fiscal effort.

Another limitation impacting the identification of states to use in the study was the use of reported GSP data from 1996 to 2009 to calculate fiscal effort. In 1997, the U.S. changed from using the Standard Industrial Classification (SIC) system to the North American Industry Classification System (NAICS) to categorize business establishments for statistical purposes. This change to NAICS created a more dependable classification method based on a consistent economic concept by grouping industries which use similar processes together instead of the SIC method of grouping industries based on demand or production (U.S. Census Bureau, 2012). This change in classification systems created a discontinuity in the GSP time series which may have influenced the fiscal effort calculations used to determine state slopes.

A final possible limitation to this study was the use of a repeated measures analysis to determine significant results. Arguably, a more advanced statistical model, such as a hierarchical linear modeling, would offer a better methodological design because it does not require the underlying assumptions be met. However, repeated measures ANOVA have been shown to provide robust results despite violations of these assumptions (Kinnear & Gray, 2011).

Implications for Future Research

The findings from this study have significant implications for the direction of future research. Most importantly, with the new requirements set forth for more accurate reporting of graduation rates, the current research should be replicated in the future. The use of the Four-Year Adjusted Cohort Rate for graduation reporting purposes tracks individual students and will provide more accurate graduation rate information. These new reporting statistics could provide more reliable conclusions about the relationship between fiscal effort and time on graduation rates.

Additional research should include looking at trends within states focusing on specific school districts to determine the relationship between fiscal effort and student graduation rates at the local level. Examining individual districts' effort in addition to identifying where funding was allocated by category (instruction, support services, etc.) will provide valuable information about the relationship between these variables. Research within states would also reduce the variability associated with the current issues related to graduation rate calculations.

Finally, future research should include an examination of the y-intercept associated with the linear regression analysis. States with a high intercept value and sustained high effort would not have been reflected in this study because there would not be room for sustained increases in fiscal effort over time. The same would be true for states with sustained medium and low effort. Research conducted on states with sustained high effort, medium effort, and low fiscal effort may provide more insight on the relationship between fiscal effort and graduation rates and provide insight on the ideal effort input in order to maximize student achievement.

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