AN ASSESSMENT OF TEXAS SCHOOL FINANCE REFORM: THE HEALTH OF SCHOOL FUNDING SINCE 2006

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Abstract

The constitutionally-required need to establish a system of school funding for school districts in Texas with the aim of providing equity and adequacy while removing inefficiency and arbitrariness is well-documented. The mechanisms by which school districts receive funding have been embroiled in litigation for 40 years. Historically, the relationship between property wealth per student and the revenue a school district has the ability to generate has caused inequities in the school finance system. The heavy reliance on local property taxes to raise revenue for school districts combined with reform efforts as a result of litigation and legislation have struggled to make progress towards reducing inequality among the state's school districts. Additionally, school districts face external pressures to meet accountability standards as measured by student performance on standardized assessments with the amount of funding they receive as determined by the Texas Education Agency's (TEA) Foundation School Program (FSP). The purpose of this study was the assessment of the provision of an equitable system of education by analyzing current methods through which financial resources are allocated to school districts in Texas by focusing on equity measures and student performance on standardized assessments.

The sample was comprised of the 1025 school districts in Texas. In this study three equity principles were selected to determine the equity within a school funding system: fiscal neutrality, horizontal equity, and vertical equity. The measurement of fiscal neutrality was accomplished through the use of multiple regression analysis, which factored in local property wealth and school district Maintenance & Operations (M&O) taxes and its affect on a school district's total local and state revenue. Horizontal equity

was assessed through the measurement of multiple equity measures including range, restricted range, coefficient of variation, Gini Coefficient, McLoone Index, and Verstegen Index. Vertical equity was also investigated using multiple regression analysis to assess vertical equity provisions in the FSP. Analysis included school district characteristics related to student populations and a school district's finances to determine their effect on student performance on standardized assessments.

Fiscal neutrality regression analysis revealed property wealth per weighted average daily attendance (WADA) accounted for a significant amount of variation of the revenue a school district is able to generate, thus violating the principle of fiscal neutrality. For those school districts who tax above the maximum statutory amount of $1.04, their M&O tax rate explained a significant amount of variation in the revenue per WADA at the compressed rate they received. For the assessment of horizontal equity, findings clearly point to a system in which inequity exists in the top half of distribution as determined through the Verstegen Index. Vertical equity analysis through hierarchical regression predicted a school district's decreased performance on the Texas Assessment of Knowledge and Skills (TAKS) are primarily linked to students who are classified as economically-disadvantaged and at-risk. As a whole, school districts with higher percentages of students who are considered most difficult to educate are not meeting performance standards with current vertical equity provisions.

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CHAPTER 1

INTRODUCTION

Funding disparity among Texas school districts has been a source of contention for decades. For the past 40 years court cases in Texas have challenged the methods of funding K-12 education and these courts have mandated the Texas Legislature to create more equitable ways to finance public education (Imazecki & Reschovsky, 2004). The relationship between property wealth per student and the revenue a school district can generate has caused inequities in the school finance system which has defined and influenced the legislative and judicial responses to the system (Kauffman, 2009). Reform efforts initiated by lawsuits and impacted by the legislative process have made progress towards reducing inequality despite the heavy reliance on local property taxes to raise revenue for school districts; however, these mechanisms for funding school districts in Texas have continued to come under intense scrutiny (Imazecki & Reschovsky, 2006). The advent of standards-based performance accountability linked to educational adequacy has allowed the reform efforts to focus on students in areas of low property wealth who are considered to be more costly to educate (Imazecki & Reschovsky, 2006; Rubenstein, Ballal, Stiefel, & Schwartz, 2008).

This has led to the belief by multiple stakeholders in Texas that the system of school finance is not effective and efficient enough to allow for all students to achieve at expected levels. Article VII, section 1 of the Texas Constitution dictates it is the duty of the Legislature to establish and provide for the support and maintenance of efficient system of education (Tex. Const. art. VII, §1). The system through which school districts in Texas are funded has reached a critical juncture. The established mechanisms that

fund Texas school districts have been described as inadequate, inequitable, inefficient, and arbitrary (Lesley, 2010). On October 11, 2011, the Texas Taxpayer and Student Fairness Coalition filed the first of six consolidated lawsuits by various coalitions against the state of Texas on the basis of these claims. This coalition consists of more than 400 Texas school districts alleges that the school finance system is unconstitutional. Robert Scott, then Commissioner of Education, Susan Combs, Comptroller of Public Accounts, and the State Board of Education were named as defendants in this lawsuit.

For most of the plaintiffs their argument is simple; the current finance system is unconstitutional in Texas because it does not treat school districts and taxpayers fairly. Members of the Texas Legislature set these events in motion when they enacted House Bill 1 in 2006, which established a target revenue system. These legislative actions then culminated in 2011 when the Legislature reduced school funding formulas by four billion dollars (McCown, 2011). These budget cuts amplified the already strained financial condition of numerous school districts in Texas. In addition to the Texas Taxpayer and Student Fairness Coalition group of plaintiffs, school districts have banded together by joining various other coalitions in an effort to have the school finance system in Texas declared unconstitutional (Smith, 2012). These various coalitions include a group of property wealthy school districts represented by the Texas School Coalition, a group of property poor districts represented by the Mexican American Legal Defense and Education Fund (MALDEF), and large school districts represented by the Thompson and Horton law firm. The Texas Charter School Association (TCSA) and the Texans for Real Efficiency and Equity in Education (TREE) (intervenor) primary emphasis centers on charter schools and their ability to operate with fewer restrictions.

Background of the Study

The current school finance system in Texas in large part was in response to the rulings issued in the series of *Edgewood* court cases (between 1989 and 1995), which were specifically designed to provide school districts equalized revenue for equal tax rate (Imazeki & Reschovsky, 2006). Despite these court cases, school district wealth is still a contributing factor to per-student funding inequity (Equity Center, 2011). Most recently, House Bill 1 (2006) set changes into motion whereby the Maintenance and Operations (M&O) tax rate of all school districts in Texas was compressed by one-third. Compression of the M&O tax rate was the result of plaintiffs in Court in the *West Orange-Cove et al. v. Neely et al.* (2004) successfully arguing that due to the falling share of state aid and the costs to meet accountability standards, school districts had lost all meaningful discretion over their property tax rates (Imazecki & Reschovsky, 2006). Due to fact that a large majority of school districts were taxing at capacity, local property taxes had become a de facto state ad valorem property tax, which is constitutionally prohibited (Imazecki & Reschovsky, 2006). The Texas Legislature compressed the tax rate in a response to this Texas Supreme Court ruling (*Neely et al. v. West Orange-Cove et al.,* 2005) which determined that since numerous school districts were taxing at the maximum allowable amount of $1.50, this was equivalent to a state property tax.

With respect to the hold harmless provisions of House Bill 1 (2006) this approach was developed to ensure school districts would not lose revenue as a result of the tax compression measures. This feature for school funding was termed target revenue. Each school district in Texas had a per-student revenue target based on revenue per weighted

student in 2005-2006. Put simply, school districts would receive additional state aid to account for the loss of revenue due to the reduction in the tax rate.

Target revenue hold harmless provisions were subsequently modified by the Legislature in 2007 and 2009 to offset the differences lost from the compression of the rate and in theory at least, to reduce inequity in funding between school districts. The issue with the target revenue system is that target funding amounts are based on revenue per weighted student at a specific point in time and are not adjusted for changing requirements, inflation, and anomalies of a particular school year (Texas Association of School Boards, 2010). As of 2011, there were approximately 900 school districts that received funding based upon hold harmless provisions (McCown, 2011). The foundation program formulas, which determine the funding school districts receive, are intended to support equity; however, the resource levels are based on target funding and not the foundation program guaranteed yield calculations, so equity is compromised (Texas Association of School Boards, 2010). The intent of state guaranteed yield funding, which are incorporated into the foundation program formulas, is to supplement school districts for each penny of tax rate levied and raised at the local level that fall below a level established by the Legislature (Kauffman, 2009).

Provisions in House Bill 1 (2006) allowed districts to have discretion in setting local tax rates. These provisions included allowing districts to approve an additional four cents with board approval and could increase their tax rate by 13 cents if a successful tax ratification election was held. The compression of the tax rate with the discretion provisions has created a situation in which many school districts have received voter approval to tax at the maximum amount of $1.17.

As of summer 2011, 220 school districts in Texas were taxing at the maximum of a $1.17 and 649 were taxing at $1.04, which is the highest rate allowed without seeking a tax ratification election (McCown, 2011). This situation is analogous to the circumstances that initiated the *West Orange-Cove et al. v. Alanis et al.* (2003) case. Despite increases in property values in Texas and tax rates, which increase revenue for districts, these increases in value and locally-generated revenue result in a reduction of state aid and districts are forced to continually raise their property tax rates to the maximum allowable by law to minimize the loss of state aid and meet rising education costs (Imazeki & Reschovsky, 2006). According to Imazecki and Reschovsky (2006), the goal would be to create a system of school finance that achieves neutrality by guaranteeing that districts with equal tax rates have available equal amounts of revenue per pupil. The inability of school funding formulas to achieve neutrality is the foundation of the *Edgewood* and *West Orange-Cove* court cases.

Despite the complexity of school finance formulas, inequity continues to persist among school districts in Texas. Additionally, concerns exist with respect to the determination if adequate funding is being provided to school districts to meet the needs of all students in Texas. According to Imazecki and Reschovsky (2006), "the state's system of school finance fails to provide adequate revenues to a set of school districts with above average concentrations from minority and low-income families" (p. 3). As reported by the Equity Center (2011), preliminary data from the Texas Education Agency's (TEA) 2011-2012 Summary of Finances detailed the school district with the least amount of revenue had $4,615 per weighted average daily attendance (WADA) as compared to a school district with the most revenue per weighted student at $14,248.

The determination of student performance correlated to school districts with low property wealth and high tax rates is of particular interest when determining if school funding formulas are meeting the needs of students from low-income families in Texas.

Statement of the Problem

The problem this study explores was the inequity that exists between school districts in Texas in the amount of revenue they are able to generate to educate their students. This responsibility is measured upon student performance indicators and standards that have consistently risen since their inception in Texas. School funding formulas in their most accurate form will increase equity to all taxpayers and students with the goal of providing an education that is not dependent on the wealth of any particular school district. According to Berne and Stiefel (1999), wide differences in property values continue to exist, which often lead to inequities in finance, and educational success is still often related to socioeconomic status, race, ethnicity, and gender. The amount of revenue school districts are able to generate is determined from complex guaranteed yield formulas that take into consideration revenues derived from local property taxes and the subsequent distribution of state funds.

The design of funding formulas in Texas over the past four decades has gone through multiple iterations as a result of previous litigation and legislation. Changes in the manner in which school districts are funded looms on the horizon with pending litigation. Currently, there is a lack of empirical research that assesses the health of the school finance system in Texas since House Bill 1 in 2006 and a study in this area has the ability to provide a significant contribution.

My rationale for this study consists of analyzing school funding formulas in Texas by exploring the differences that exist among similarly situated and contrasting school districts in the revenue per student they are able to generate based on their student populations and the property wealth of the district. Considerations were given based on the varying characteristics of the school district and the students they are required to educate. Based on these differences in funding, a quantitative study was selected to assess how these differences create inequity and whether or not they meet a constitutionally-required adequate level of education as measured by assessing student performance. Student performance is examined through the analysis of student performance on the Texas Assessment of Knowledge and Skills (TAKS).

Purpose of the Study

The purpose of the present study is the assessment of the provision of an equitable system of education by analyzing current methods through which financial resources are allocated to school districts in Texas by focusing on equity measures and student performance on standardized assessments. Specifically, this study will demonstrate if current finance school structures as impacted by House Bill 1 (2006), which include the hold harmless provisions, have negatively affected fiscal neutrality among school districts. In addition, horizontal equity and vertical equity measures are assessed to determine the health of the school finance system in Texas.

Significance of the Study

This study is important in Texas due to what has become a constant string of lawsuits against the state of Texas in which the majority of the plaintiff groups allege the current school finance system is unconstitutional. For the most part, plaintiff groups

argue primarily on the basis that the current system is arbitrary, inadequate, inequitable, and inefficient. This quantitative research study will analyze the plaintiffs' claims correlated to measures of student performance to provide a greater understanding to the educational community of the system through which public schools in Texas can impact the provision of equitable and adequate resources to all school districts.

In particular, this study reported herein is designed to determine if the current school finance system in Texas is efficient as demonstrated through the state's use of the target revenue hold harmless provisions of House Bill 1 passed in 2006. The spine of this study focuses on fiscal neutrality, horizontal equity, and vertical equity by addressing student performance correlated to revenue equity. This study simultaneously assessed the efficiency of school funding formulas and the relationship to student performance.

Additionally, this study extends the body of literature through its analysis of adequate funds are being provided to ensure all students are meeting increased performance standards. According to Rebell (2005), legislatures and education departments put substantial effort into developing performance standards, but substantially less effort into ensuring schools have adequate resources that allow students to meet expectations. Hanushek and Lindseth (2009) call attention to an overarching problem, which is the non-existence of empirical evidence for the determination of the costs of attaining specific levels of student performance, especially for the most disadvantaged students.

School districts are expected to meet and exceed performance-based standards as well as college readiness indicators as established by the TEA. Despite increases in standards-based accountability measures, funding levels utilizing guaranteed yield

formulas have remained relatively unchanged since their inception in Texas in 1982. The ability for an educational leader to have access to equitable funding without regards to wealth of the district has the possibility to reduce the burden many school leaders face, which is to provide a quality education. Additional analysis included in this study is an examination of the Foundation School Program (FSP) and whether or not it has provided sufficient revenue for students who are determined to be economically disadvantaged, limited English proficient, at-risk, or receive special education services. Disparities in educational expenditures create differences among students' educational opportunities as a function of race and socioeconomic status (Darling-Hammond, 2011). Further analysis will explore whether a correlation exists related to ethnicity.

Specifically, the determination of the extent of the inequity and inadequacy that exists among school districts in Texas and the impact on student performance on standardized assessments could have far-reaching policy implications. According to Leyden (2005), "scientific research reveals a better understanding of the education production process; the courts can refine their judgments and thereby assure that legal standards fit with best possible understanding" (p. 177). Analyzing the results of student performance after reforms have been implemented provides an evaluation of the effectiveness of state-mandated reforms (Rebell, 2009). The subsequent analysis will determine if ethnicity or being at-risk, economically disadvantaged, limited English proficient, and the funding amounts available for these students in Texas reasonably provide adequate resources to meet minimum passing requirements for standardized assessments.

Research Questions

The research questions for this study are:

1. Have school finance reform measures been associated with the degree of fiscal neutrality among school districts in Texas since House Bill 1 (2006)?
2. How has House Bill 1 (2006) been associated with the overall horizontal equity between Texas school districts?
3. Have vertical equity provisions in school funding formulas provided adequate resources for those programs, which have been identified for additional funding by the Texas Education Agency?

Theoretical Frameworks

Berne and Stiefel (1984) proposed three equity principles to determine the equity within a school funding system: fiscal neutrality, horizontal equity, and vertical equity. To answer the aforementioned research questions, the theoretical frameworks of fiscal neutrality, horizontal equity, and vertical equity were selected for inclusion in this study. These frameworks were chosen to assess the overall health of the school finance system in Texas. Univariate and multivariate correlations are utilized to assess the three theoretical frameworks.

Fiscal Neutrality

Fiscal neutrality is a school finance equity concept which specifies that no relationship should exist between the education of children and the property wealth that supports the public funding of that education (Berne & Stiefel, 1999). The work done by Coons, Clune, and Sugarman (1970) was largely responsible for setting the platform for which the initial court cases of the 1970's in Texas and elsewhere across the nation

challenged the methods through which schools were funded. According to Walker (2005), these scholars provided an alternative legal framework for repudiating public education finance systems on the inherent inequalities generated by wealth-based systems of funding.

The concept of fiscal neutrality as examined by Odden and Picus (2004) assesses the relationship between property wealth per student and combined local and state general revenues per student. Fiscal neutrality focuses on the inputs into the educational process and the importance of equalizing fiscal capacity of school districts in order to provide a quality education equally (Reschovsky, 1994). The examination of fiscal neutrality through statistical analysis determines the extent equalization measures in school funding formulas neutralize the revenue a school district is able to generate as a function of its property wealth.

Horizontal Equity

School districts that are considered to be similar to each other along dimensions that relate to the cost of providing a basic education, such as wealth, size, and socioeconomic status, should have comparable levels of funding (Toutkoushian & Michael, 2007). Initially developed by Berne and Stiefel (1984), horizontal equity is based on the concept that students who are alike should be treated alike. This school finance framework developed by Berne and Stiefel (1984, 1999) is the most comprehensive and has been utilized by researchers to conduct empirical studies of equity structures of school finance systems (Odden & Picus, 2004).

According to Toutkoushian and Michael (2007), horizontal equity measures are based on the assumption that all school districts are similar in terms of characteristics that

determine the level of funding they need to deliver basic services. The selection of horizontal equity as a theoretical concept served to assess the extent of equitable funding mechanisms in Texas. Odden and Picus (2004) believe that an equitable school funding mechanism would provide uniform levels of per-student funding to all school districts. When this occurs, there are equal expenditures in funding levels such as per-student expenditures, student/teacher ratios, and teacher access to resources. The limitation of the horizontal equity framework is that in most cases the assumption that children are substantially equal is easily refuted and can be applied only to subgroups where equity is acknowledged (Toutkoushian & Michael, 2007).

The selection of horizontal equity as a framework is a central theme of past and pending litigation. Previous school finance litigation has claimed that a regular education program should be provided equally to all students, or that all students should be provided access to an adequate education (Odden & Picus, 2004). This research, as correlated to the school finance system in Texas, will address current horizontal equity dispersion to determine if public schools are providing an education that allows school districts to access resources in an equitable manner.

Vertical Equity

Vertical equity addresses the differences among students and the costs associated with educating or providing services to these students. The concept of vertical equity is a component of Berne and Stiefel's (1984) original work which was updated in 1999 to incorporate evolving school finance issues, such as adequacy (Odden & Picus, 2004). For education funding to be equitable, school districts with higher costs to educate student populations should receive more funding than their counterparts to compensate

for the difference (Toutkoushian & Michael, 2007). Three characteristics of vertical equity have been identified: (a) characteristics of children, (b) characteristics of districts, and (c) characteristics of programs (Odden & Picus 2004). For example, vertical equity characteristics could include the number of special education served, the size of the school district, and if the district has a bilingual program. The characteristics of vertical equity would vary widely across the state of Texas, which presents a dilemma in determining equitable funding mechanisms that account for these differences.

According to Odden and Picus (2004), consensus exists that additional resources should be allocated to a particular group of students or school districts; however, very little consensus has been reached in relation to the specific values or judgments that are universally accepted. The mechanisms through which vertical equity provisions are implemented are entrenched in the adequacy approach to school finance litigation. An analysis of public school funding in Texas using the theoretical framework of vertical equity can provide the conceptual lens to measure the efficiency and adequacy of funding formulas to account for student differences.

Delimitations

This study assessed the performance of students from specific sub-groups and ethnicities. Low socioeconomic status, special education, limited English proficient, and at-risk students were selected for analysis. To reduce the scope of research three broad groups of White, Hispanic, and African-American student populations were selected for inclusion in the study. Individual campuses were not selected as the unit of study. Only school district-wide data was utilized for analysis.

Limitations

This study is limited to Texas schools and may not be generalized to other states; however, other states will be interested in these results from Texas due to its size, diversity, and possible similar funding mechanisms. Private schools and charter schools are not included in this study as the study centered traditional school districts (K-5, K-8, and K-12). The methods selected for the analysis of fiscal neutrality, horizontal equity, and vertical equity include methodologies as adapted from Neymotin (2010), Brownson (2002), and developed by Berne and Stiefel (1984). Other models and methods have been used and developed in equity and neutrality studies not utilized in this study.

The study is limited to reported student performance data as recorded by the TEA through its Academic Excellence Indicator System (AEIS) from 2006 to 2011. The study is limited to five school years of student performance and financial data. Student performance is based solely on district-wide TAKS student performance. Student performance indicators do not represent 100% of students enrolled in each of the school districts in the study, as only grades 5and 8 were selected for analysis. Financial data was limited to the information from reported by the TEA's Office of School Finance which is responsible for administering the FSP and for producing financial reports utilized in this study.

Definitions

AEIS (Academic Excellence Indicator System): The Academic Excellence Indicator System (AEIS) compiles a wide range of information on the performance of students in each school and district in Texas annually. This information is put into the annual AEIS reports. The following student performance indicators are included in AEIS reports:

1. Results of Texas Assessment of Knowledge and Skills (TAKS); by grade, by all grades tested;
2. Participation in the TAKS tests;
3. Exit-level TAKS Cumulative Passing Rates;
4. Progress of Prior Year TAKS Failers;
5. Results of the Student Success Initiative;
6. English Language Learners Progress Measure; Attendance Rates;
7. Annual Dropout Rates (grades 7-8, grades 7-12, and grades 9-12);
8. Completion Rates (4-year longitudinal);
9. College Readiness Indicators;
10. Completion of Advanced / Dual Enrollment Courses;
11. Completion of the Recommended High School Program or Distinguished Achievement Program;
12. Participation and Performance on Advanced Placement (AP) and International Baccalaureate (IB) Examinations;
13. Texas Success Initiative (TSI) – Higher Education Readiness Component;
14. Participation and Performance on the College Admissions Tests (SAT and ACT), and College-Ready Graduates;

"Performance on each of these indicators is shown disaggregated by ethnicity, sex, special education, low-income status, limited English proficient status (since 2002-03), at-risk status (since 2003-04, district, region, and state), and beginning in 2008-09, by bilingual/ESL (district, region, and state, in section three of reports). The reports also provide extensive information on school and district staff, finances, programs, and student demographics" (Texas Education Agency, 2007-2011).

Chapter 41 District: As established by the Legislature in Texas Education Code (TEC) Chapter 41, the Texas Education Agency (TEA) since 2006 classifies any district that exceeds a value of $319,500 property wealth per student as Chapter 41. Districts that are deemed to be property wealthy are required to share their wealth with property poor school districts. The funds that are distributed by the property wealthy districts are recaptured by the school finance system to assist with financing of public education in school districts that are property poor (Equity Center, 2012).

Chapter 42 District: Since 2006 a school district with a property wealth per student that is below $319,500 is classified as Chapter 42. These school districts receive Foundation School Program (FSP) additional funding through the foundation program funding formulas to ensure the funding they receive meets an established minimum level. Chapter 42 districts do not pay recapture (Equity Center, 2012)

Compressed Tax Rate: School districts tax rates were compressed as a result of House Bill 1 (2006). Tax rates were compressed by 33.3% as result of this measure (Equity Center, 2012). The M&O tax rate for the majority of school districts was compressed from $1.50 to $1.00 per $100 valuation of property.

Fiscal Neutrality: Fiscal neutrality is a school finance equity concept which specifies that no relationship should exist between the education of children and the property wealth in that particular district that supports the public funding of that education (Berne & Stiefel, 1999).

Foundation School Program (FSP): The FSP is administered by the TEA to provide for the allocation of funding to support the instructional program of students in Texas. The FSP consists of two tiers. The first tier provides funding for a basic program, including

district and student cost adjustments necessary to provide additional funding for identified students. The second tier provides a guaranteed yield system that is contingent on the setting of local property taxes which allows for school districts to have equal access to revenue sufficient to support instructional programs. The target revenue hold harmless provisions established in 2006 by House Bill 1 and modified in 2009 to compensate for the one-third reduction in M&O tax rates are included in the FSP (Equity Center, 2012).

Horizontal Equity: School districts that are considered to be similar to each other along dimensions that relate to the cost of providing a basic education, such as wealth, size, and socioeconomic status, should have comparable levels of funding (Toutkoushian & Michael, 2007).

Property Wealth per Weighted Average Daily Attendance (WADA): The total amount of taxable property located in the school district's legal boundaries divided by the total number of weighted students in the school district.

Target Revenue Hold Harmless: These are provisions that guarantee school districts receive at least as much state funding as they received prior to legislative changes that compressed school districts' Maintenance and Operations (M&O) tax rates which may have reduced their funding (Equity Center, 2012).

Tax Ratification Election: A tax ratification election is required when a school district wants to adopt a tax rate above its rollback rate. The rollback rate would provide roughly the same local taxes and state aid per WADA as was available the previous year, plus debt service taxes, and $0.06 (Equity Center, 2012).

Vertical Equity: For education funding to be equitable, school districts with higher costs to educate student populations should receive more funding than their counterparts to compensate for the difference (Toutkoushian & Michael, 2007).

Weighted Average Daily Attendance (WADA): WADA is the weighted average daily attendance figure used state funding formulas to calculate the amount of state and local funds a district is entitled to. Additional funding is weighted for students who are in special education, career and technology, bilingual, gifted and talented, and compensatory education programs or courses of study (Equity Center, 2012).

Organization of Study

Chapter One provides the background, context, and frameworks selected to assess the health of school funding mechanisms in Texas. This chapter also identified the problem statement, significance of the study, research questions, delimitations, limitations, and relevant definitions. Chapter Two provides an in-depth examination related to the central tenets of school finance reform over the past 40 years. This chapter will conduct a review of literature related to equity, fiscal neutrality, and adequacy in Texas school funding mechanisms and address the context of the study. The amount of funding required to meet performance standards and the connection between money and performance were topics included in Chapter Two. Funding models were discussed, which included the current methods of funding in Texas. Chapter Three focuses on the methodology utilized in the research study. The rationale, research questions, population, design, methods for collection, and analysis of data for the research the study were presented in Chapter Three. Chapter Four provides the analysis of results utilizing established statistical methods to measure the degree of fiscal neutrality and equity of the

school finance funding system. Chapter Five summarizes the results of the study as determined by the three research questions. Implications of the findings as compared to the literature review, policy implications, recommendations, and implications for future research are included in Chapter Five.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

This chapter contains a review of literature that describes the evolution of theoretical frameworks utilized to address problems encountered in public school finance systems. These theoretical frameworks provide the justification and the lens through which funding mechanisms in Texas can be evaluated. The advent of a standards-based accountability system in Texas, the examination of the funding necessary for the provision of an adequate education, models for funding education, and the examination of how the amount of funding affects student performance are included in this chapter. The chapter begins with a survey of research utilizing the theoretical frameworks chosen for inclusion in this study, then provides a description of the current school funding system in Texas, and concludes with an analysis of the context of the study.

The approaches to assess equity within a system include three principles: fiscal neutrality, horizontal equity, and vertical equity (Berne & Stiefel, 1984). The equity principles of fiscal neutrality, horizontal equity, and vertical equity are selected for inclusion in this study for their ability to reveal the overall health of school funding mechanisms in Texas. Texas has designed an innovative system of funding school districts to achieve these equity principles through a combination of a foundation formula, guaranteed tax base, and limits on the tax capacity of property wealthy districts (Imazecki & Reschovsky, 2004).

In the *Edgewood I.S.D. et al. v. Meno et al.* (1995) [*Edgewood IV*] court case the Supreme Court of Texas held that an efficient system of school finance does not require

equality of access to revenue at all levels, but held that "if the cost of providing a general diffusion of knowledge rises to the point that a district cannot meet its operations and facilities needs within the equalized program, the State will, at that time, have abdicated its constitutional duty to provide an efficient school system" (Id. at 747-748). This decision by the Supreme Court established a link between constitutional language and goals for public education, which created a window for litigation that funding was not adequate to meet those goals (Robertson, 2005). Brownson (2002), along with researchers Imazeki and Reschovsky (2004), conducted studies to measure fiscal neutrality and revenue (horizontal) equity in Texas. Brownson (2002) assessed the ability of school districts to generate revenue given equal tax effort (fiscal neutrality) using linear regressions and revenue equity using univariate measures of horizontal equity since *Edgewood IV* (1995) for the years 1995-2000.

Brownson (2002) concluded that property wealth is positively associated with the revenue a school district is able to generate at statistically significant levels from 1995-2000, which inherently violated the principle of fiscal neutrality. Additionally, Brownson (2002) reported that school funding mechanisms for the five year period since *Edgewood IV* (1995) improved horizontal equity with an average Gini Coefficient of .6 for cost adjusted revenue per student. This indicates 94% of equal proportions of revenue were available to 94% of students. Brownson (2002) concluded there were still areas in which univariate horizontal equity measures could be improved as calculated by the Verstegen Index. The Verstegen Index which measures equity in the top half of the distribution exhibited inequitable results in two of the six years studied in Brownson's research. With respect to student performance data, Brownson determined that property wealth had an

inverse correlation to the percent of low socioeconomic students, but was less associated with a district's academic performance in grades 3-8.

Imazecki and Reschovsky (2004) analyzed data from K-12 districts from 1987-2001 using multiple measures of horizontal equity (range, restricted range, Gini Coefficient, and the coefficient of variation). Even though large differences in property wealth per student existed, revenue per student was evenly distributed among school districts, with a Gini Coefficient of .102 (Imazecki & Reschovsky, 2004). The coefficient of variation was highest in 1991-92 and declined consistently to .210 for the 1999-2000 school year (Imazecki & Reschovsky, 2004). Imazecki and Reschovsky (2004) concluded the Foundation School Program (FSP) was successful at achieving wealth neutrality and that increases in property values for the 740 school districts with a per-student wealth less than $246,000 resulted in effective wealth neutrality. In 2004, school districts were classified as property wealthy (Chapter 41) if their per-student wealth was greater than $305,000 (Texas Education Agency, 2006).

To determine whether additional revenue that is targeted to students with greater needs is sufficient, Imazecki and Reschovsky (2004) assessed the performance of students by dividing school districts into quintiles based on several variables (percent of students enrolled in English as a Second Language (ESL) program, percent of students in special education, percent of students classified as low socioeconomic status, and equalized property value per student). Results indicated that student performance on the Texas Assessment of Academic Skills (TAAS) from school districts with high rates of poverty and a high concentration of ESL students are generally lower than districts with lower concentrations of poor or ESL students (Imazecki & Reschovsky, 2004).

According to Imazecki and Reschovsky (2004), "weights and cost adjustments currently in the FSP may not allocate an adequate amount of resources to certain school districts with high concentration of students who are costly to educate" (p. 266).

Imazecki and Reschovsky conducted an additional study as a result of the following court cases regarding school finance in Texas. In 2001, the finance system for public education in Texas was challenged again, as school districts claimed the system's maximum tax rate of $1.50, the rate at which most districts were taxing at that time, was essentially a statewide property tax, which is prohibited by Article VII Section 1-e of the Texas Constitution. School districts argued that taxing at the highest allowable rate permitted by statute at that time was essential to provide a basic or adequate education for their students, so meaningful discretion to raise taxes to support their local school system was being denied. A Travis County District Court dismissed the case on July 11, 2001, and the Texas Court of Appeals affirmed the dismissal in 2002. The plaintiffs petitioned the Texas Supreme Court for review (*West Orange-Cove et al. v. Alanis et al.,* 2003) and the state's highest court ruled that the plaintiffs had a valid claim. The case was returned to a Travis County District Court where it was recast to reflect the state's new Commissioner of Education, Shirley Neeley as the named defendant

The Travis County District Court in the *West Orange-Cove et al. v. Neely et al.* (2004) case was faced with determining if property taxes had become, in effect, a state property tax. The court also considered if the funding for school operations was inefficient and if public education was achieving a general diffusion of knowledge. According to Kaufmann (2009), the court had to develop jurisprudence on the adequacy of the school finance system, evaluate the efficiency of the school finance system, and

assess if local property taxes created a state property tax. A study commissioned by the plaintiff school districts was conducted by Imazecki and Reschovsky (2004) in the *West Orange-Cove et al. v. Neely et al.* (2004) case and was presented as evidence. These researchers utilized a cost function approach and calculated the additional cost would range from $405 to $1,511 per student to meet the new performance standards of the Texas Assessment of Knowledge and Skills (TAKS), which replaced the Texas Assessment of Academic Skills (TAAS) during the 2002-2003 school year. In contrast, a study commissioned by the state of Texas, conducted by Gronberg, Jansen, Taylor, and Booker in 2004 reached the conclusion that in aggregate the total funding available for school districts in Texas was sufficient to meet TAKS performance standards. It is important to note that Gronberg et al. (2004) also concluded that it would cost between $226 million and $408 million per year in additional revenues for all districts to meet the passing standards without reducing the spending of districts who currently met those standards.

The Travis County District Court in the *West Orange-Cove et al. v. Neely et al.* (2004) case found that Senate Bill 7 (1993) comprising the then-applicable statutory basis for the state's FSP was unconstitutional. This decision was based on the courts having found that, since many districts were at the maximum tax rate and no longer had local discretion; it constituted a statewide property tax. Senate Bill 7 (1993) originally established the maximum tax rate of $1.50 per $100 valuation a district could tax for maintenance and operations. The trial court found that the finance system was inefficient and did not provide enough money for schools charged with meeting higher state and federal standards. Additionally, the lower test scores among low-income students

indicated a widening gap in educational achievement between rich and poor districts. The Travis County District Court ordered that the legislature address the problem by June 1, 2006.

The state of Texas filed a direct appeal of the trial court's judgment to the Texas Supreme Court (*Neeley et al. v. West Orange-Cove et al.,* 2005). The Supreme Court affirmed the trial court's ruling of local property taxes being the equivalent of a state property tax. In contrast, the Supreme Court did rule in favor of the state on the adequacy and efficiency claims. In a third called special session, following the 79th session the Texas Legislature lowered school district property tax rates to allow for more local control of tax rates. School district local property taxes were compressed by one-third. Provisions included allowing districts to approve an additional four cents with board approval above the maximum M&O tax rate of $1.00. Additionally, school districts could increase their tax rate above $1.04 by a maximum of 13 cents ($1.17) if a successful tax ratification election was held. The lowering of tax rates has created the target revenue system the state of Texas currently uses to fund school districts. Since being resolved in the courts and studied by the aforementioned researchers, legislative decisions have impacted school funding mechanisms.

The analysis of fiscal neutrality, horizontal equity, and vertical equity frameworks as previously utilized by Brownson (2002), Imazecki and Reschovsky (2004), and Neymotin (2010) are assessed in this study to determine the impact on school districts and students subsequent to the modifications in funding mechanisms as a result of House Bill 1 (2006). Additionally, the analysis of the theoretical framework of vertical equity was selected for inclusion to address the continuing concern if funding formulas are

providing adequate funds to educate students to a level required by the TEA. Further, this study advances previous research by assessing the health of funding mechanisms through the addition of vertical equity regression analysis designed to incorporate several school district characteristics.

Equity and Fiscal Neutrality

The idea of equal opportunity is that the success of a student should not depend on circumstances outside the control of the student such as socioeconomic status, geographic location, and ethnicity (Berne & Stiefel, 1999). Funding disparities based on school finance formulas demonstrate the gross inequity that exists between similarly situated and contrasting school districts. The root cause of this inequity is that state education finance systems, including Texas, historically have been based primarily on local property taxes. This method inherently places students at a disadvantage who attend school in districts with low property wealth (Rebell, 2009).

The method of using local property taxes to fund school districts provided the impetus for the examination of the methods for funding public education. School finance equity within the larger context of providing resources to schools has been analyzed extensively since the early equal protection constitutional litigation arguments of the late 1960's and early 1970's. These initial suits argued that there was no educational justification for the wide disparities that existed in per-pupil revenues (Odden & Picus, 2004).

Arthur Wise's *Rich Schools, Poor Schools*: *The Promise of Equal Education Opportunity* (1968) developed a theoretical standard that put forth that the quality of a child's education in the public schools of a state should not depend on where the student

lives or the wealth of the local community. Wise believed (as cited in Darling-Hammond, 2011) the inequality of educational opportunity might constitute a denial by the state of equal protection under the law. Wise's analysis of equality of educational opportunity was the theoretical framework used as a defense in school finance equity litigation cases in the 1970's.

Wise's concepts were expanded upon by the work of Coons, Clune, and Sugarman (1970) through their argument that since local school districts were the creation of state governments, by making school financing heavily dependent on local property taxes, states gave school districts unequal opportunities to be fiscally neutral (Odden & Picus, 2004). The equity principle of fiscal neutrality emerged as a concrete method to effectively establish a correlation between revenues available per student and local property wealth.

The most common approach to examine the equity of school finance systems is the correlation of variation, which measures the funding levels for all districts in the state and reveals how closely they are clustered around the statewide spending mean (Augenblick, Myers, & Anderson, 1997). School finance research on fiscal (wealth) neutrality looks for statistical relationships between education and school district wealth in an attempt to determine if an association exists between educational inputs and the ability to pay (Berne & Stiefel, 1999). The inability to establish a school finance funding mechanism that did not rely so heavily on property taxes (school district wealth) eventually led to the landmark case *Serrano v. Priest* (1971) [*Serrano I*].

The first lawsuit that followed the reform of Wise, Coons, Clune, and Sugarman was heard by the California Supreme Court in the case of *Serrano I* in 1971. The idea

that no child's education should depend on the wealth of his neighbors was argued in the *Serrano* court cases (Berne & Stiefel, 1999). In the opinion issued by the California Supreme Court, they recognized the right to an education in public schools is a fundamental interest that should not be dependent on wealth and determined no compelling state purpose which necessitated the present method of financing (*Serrano v. Priest*, 1971). This decision thus created property wealth per student as a suspect class, which future litigation could argue under the Fourteenth's Amendment Equal Protection Clause (Odden & Picus, 2004).

A case similar to *Serrano I* was filed soon after the August 1971 *Serrano* opinion in Federal Court in Texas. In *Rodriguez v. San Antonio I.S.D.* in 1971, parents of students who attended schools in the Edgewood section of San Antonio argued that the Texas funding system violated the Equal Protection Clause of the Fourteenth Amendment to the Constitution (Sracic, 2006). The Rodriguez plaintiffs' from the property poor Edgewood I.S.D. were only able to generate approximately half of the funds per student as compared to surrounding school districts (Rebell, 2009). In line with Coon's et al. (1970) theory, the plaintiffs claimed that the reliance on local property taxation unfairly favored more affluent districts, creating substantial disparities between districts (Minorini & Sugarman, 1999). The district court finding was in favor of the plaintiffs. This ruling appeared to reinforce the *Serrano I* opinion that education was a fundamental right and property wealth per student to be a suspect classification (Odden & Picus, 2004).

This case was appealed to the U.S. Supreme Court, which agreed that Texas's school finance system was inequitable. However, in a 5-4 split decision, they denied the plaintiffs' claims on the basis that education is not a fundamental interest under the

federal Constitution (Rebell, 2009). Additionally, the U.S. Supreme Court ruled that classifications based on the wealth of school districts were not suspect classes for purposes of federal equal protection analysis (Hanushek & Lindseth, 2009). Since the wealth of school districts were determined not to be suspect classes "the Supreme Court ruled that the Texas system satisfied that test in permitting local participation and encouraging control of each district's schools" (Hanushek & Lindseth, 2009, p. 89).

Despite the gross inequities that continued to persist in state education finance systems, the U.S. Supreme Court ruled in favor of maintaining local control (Rebell, 2009). By necessity school finance reform would now take place at the state level by addressing the responsibilities of states as outlined in their various state constitutions. As a result of *Rodriguez*, virtually all school finance litigation has been resolved in state courts. Soon after the U.S. Supreme Court issued the decision in the *Rodriguez* case, additional states such as New Jersey, Connecticut, and West Virginia had their school finance systems declared unconstitutional (Rebell, 2009). Perhaps surprisingly, these rulings had an unintended result of an overall decrease in public school funding.

Many low poverty school districts desired for a leveling up of school resources. Unfortunately, equalization mandates combined with a property tax cap, as in *Serrano v. Priest* (1976) [*Serrano II*], resulted in a dramatic leveling down of revenues school districts were able to generate (Rebell, 2009). As litigation progressed and school funding systems were modified, these lawsuits reduced funding disparities but no overall increases in funding were witnessed (Hanushek & Lindseth, 2009). Essentially, the amount of revenues property wealthy school districts were able to generate was capped. In California these equalization mandates resulted in an overall decrease in public school

funding and a complete equalization of per-pupil expenditures after ten years of litigation (Leyden, 2005). In 1970, only nine states spent more than California on education and by 2005 California ranked 46th taking into account regional costs (Hanushek & Lindseth, 2009).

In Texas, the Supreme Court ruled in the *Edgewood I.S.D. v. Kirby* (1989) [*Edgewood I*] case that the Texas constitution required the mechanisms of school funding generate similar revenue for similar tax effort. This decision in *Edgewood I* by the Texas Supreme Court reinforced a previously recognized implicit link that the Texas Constitution established between efficiency and equity as set for the by Texas Constitution's efficiency clause (Tex. Const. art. VII, §1). A school district's wealth per student taking into account its tax rate should have no impact on the district's ability to provide funding as established by the FSP. The major equity issue in Texas at that time focused on the gross disparities that existed in tax rates and expenditures between very rich and very poor districts (Kauffman, 2008).

Despite legislatively implemented changes prompted by *Edgewood I*, which included the addition of a second layer of equalization based on tax effort and a guaranteed yield per weighted pupil, the Texas Supreme Court ruled in *Edgewood I.S.D. v. Kirby* (1991) [*Edgewood II*] the school finance system was again unconstitutional. The Texas Supreme Court ruled in *Edgewood II* that the school finance system should ensure school districts receive substantially equal revenues at similar levels of tax effort; however, the Texas Supreme Court did not address equal protection claims (*Edgewood I.S.D. v. Kirby*, 1991).

In states where suits were filed during the 1970's and the early 1980's ten out of 31 found their state's school finance system to be unconstitutional (Darling-Hammond, 2010). Plaintiffs won only two decisions in the early 1980's and "as of 1988, fifteen years after *Rodriguez*, fifteen of the state supreme courts had denied any relief to the plaintiffs, compared with the seven states in which plaintiffs had prevailed" (Rebell, 2009, p.17). After the 1980's, litigation arguments based on equal protection and fiscal neutrality had limited success in their efforts to expose the existing disparities in school funding among school districts. According to Walker (2005), this limited success was attributable to the courts fearing that the use of an equal protection clause might set an unfavorable precedent of the inclusion in other areas of social reform. Growing dissatisfaction in court cases based solely on equity caused a shift in legal tactics that would ultimately lead to the next round of school finance litigation.

Adequacy and Court Reform

The emergence of adequacy-based arguments in 1989 sought to use the education clauses in state constitutions to provide the platform for school finance reform. According to Rebell (2009), "civil rights lawyers changed their focus from equal protection claims based on disparities in the level of education funding among school districts to claims based on opportunities for a basic level education guaranteed by the specific provisions in state constitutions" (p. 17). The majority of courts elected to consider these adequacy claims for the right to a free public education would be considered unsupported unless the courts are willing to enforce education clauses in state constitutions after legislatures do so unsuccessfully (Hanushek & Lindseth, 2009).

Walker (2005) indentified several factors that created an atmosphere where policymakers believed all students have an opportunity to achieve academic standards. First, the publication of *A Nation at Risk* (National Commission on Excellence, 1983) began a movement and subsequent movement that America's students were not learning enough as compared to other countries. Second, the creation of standards-based accountability through the use of student achievement tests could now measure if students were meeting performance measures. Standards-based performance measures are premised on the assumption that all students can meet these high expectations if given adequate opportunities and resources (Rebell, 2009).

The shift from equity to adequacy has occurred because accountability measures and the continuation of the No Child Left Behind Act of 2001, as enacted by Congress in 2002, had delineated performance standards for schools and students (Imazecki & Reschovsky, 2004). Proponents of school finance reform have downplayed the argument that children should have equal access to educational resources in favor of one that centers on a right to a constitutionally adequate education (Keller, 2001). According to Odden and Augenblick (2000), because performance expectations have been clarified, it became easier to seek legal redress when states fail to provide funding that would be adequate for meeting these standards. This idea is reinforced when Lefkowits (2004) states, "data regarding adequate yearly progress (AYP) and the failure of some schools to meet AYP goals may potentially be used as evidence by plaintiffs that states are funding education at inadequate levels" (p. 4).

This belief led to courts declaring numerous state school funding systems unconstitutional because these states had not provided all students access to an adequate

education. Plaintiffs have won 23 of 27 cases based on adequacy arguments since 1989 (Kennedy, 2005). According to Rebell (2009), the courts focused on the substance of the education students received versus the analysis of the funding school districts were able to generate as in the previous equity cases.

Despite these court rulings in favor of adequacy based arguments, adequacy has its limitations. Adequacy requires a complex system of analysis, unlike equity which is measured by determining disparities in funding (Walker, 2005). As exhibited by the example below, the definition of adequacy is as unique as the educational system that is being assessed.

In 2004, an argument was presented that school systems must provide all students in Texas with an adequate education. The Texas Supreme Court accepted the district trial court's constitutionally driven definition of general diffusion of knowledge. At the same time, it warned the legislature that the school finance system was close to being inadequate. Earlier in the litigation process the trial court had developed the following definition of adequacy and the Supreme Court essentially adopted the trial court's definition of adequacy.

> To fulfill the constitutional obligation to provide a general diffusion of knowledge, districts must provide all Texas children access to a quality education that enables them to achieve their potential and fully participate now and in the future in the social, economic, and educational opportunities of our state and nation. Districts satisfy this constitutional obligation when they are reasonably able to provide all of their students with a meaningful opportunity to acquire the essential knowledge and skills reflected in curriculum requirements such that

> upon graduation, students are prepared to continue to learn in postsecondary educational, training, or employment settings (*Neeley et al. v. West Orange-Cove et al.*, 2005).

The trial court's definition of adequacy, albeit a thoughtful and well written statement regarding a district's obligation to educate the children of Texas, provided no measurable objectives upon which adequacy could be quantitatively determined. Adequacy implies a minimum level of education, but as illustrated by the trial court's definition of adequacy, this definition emphasized that placement on the educational skills students need to be successful in the twenty-first century is far more than minimal (Rebell, 2009). Therein resides the difficulty: that states must interpret and utilize the vague language of their constitutions to determine what level of education is required to meet the state's standards.

Umpstead (2007) reinforces this concept: "adequacy is commonly defined as a level of resources that is sufficient to meet defined or absolute, rather than relative, output standards, such as a minimum passing score on a state achievement test" (p. 282). The challenge for policymakers relies on their ability to find a balance between what most people consider an acceptably low standard (ex. all knowledge and skills are imparted by ninth grade) and one that is unobtainable (ex. all students pursue advanced degrees) (Lefkowits, 2004). According to Imazecki and Reschovsky (2004), "the precise definition of an adequate education differs by state and is based on the decisions of state legislatures that are consistent with judicial rulings in each state" (p. 1).

Table 1

History of Texas School Finance

Litigation	Texas Supreme Court Ruling	Legislative Action
5/23/84 *Edgewood I.S.D. v. Kirby (I)* Charged that the state's school finance system was inequitable.	Oct. 2, 1989 - *Edgewood I* Unconstitutional The Supreme Court stated that an efficient system must provide "substantially equal access to similar levels of revenue per pupil at similar levels of tax effort."	SB 1 (6/7/90) – Provided for an increase in the basic allotment and guaranteed yield to achieve 95th percentile of wealth by 1995.
Sept. 1990 *Edgewood I.S.D. v. Kirby (II)* Districts go back to court to challenge the revised system.	Jan. 22, 1991 - *Edgewood II* Unconstitutional Wealthiest school districts cannot be excluded from the system.	SB 351 (4/15/91) – Created 188 County Education Districts (CED) to consolidate tax bases of property wealthy districts with other districts in the county and if necessary, in neighboring counties.
6/17/91 *Carrollton Farmers Branch I.S.D. v. Edgewood I.S.D. (III)* Charged that the CED tax was an unconstitutional state property tax because tax revenue was transferred from one school district to another.	Jan. 30, 1992 - *Edgewood III* Unconstitutional The CED tax constitutes a state property tax because the rate is set in statute and is controlled by the state.	5/1/93 − Legislature passes a constitutional amendment to authorize the re-creation of the CEDs, levy of a tax by the CEDs, and recapture of revenue. SB 7 (5/31/93) – The Local Option Plan which mandates that property wealthy districts to limit access to property value in excess of the equalized wealth level.
6/1/93 *Edgewood I.S.D. v. Meno (IV)* Many poor and wealthy districts challenged the system under SB 7 charging that it was not an equitable system and that the recapture of local taxes was unconstitutional.	Jan. 30, 1995 - *Edgewood IV* Constitutional The system established by SB 7 is financially efficient and meets the Legislature's constitutional obligation to provide for a general diffusion of knowledge statewide.	
2004 *West Orange-Cove v. Neeley* Four wealthy districts file suit claiming the $1.50 statutory M&O rate cap constitutes an unconstitutional state property tax.	Nov. 22, 2005 - *West Orange-Cove* Unconstitutional The Court agrees that the $1.50 M&O rate cap constitutes an unconstitutional state property tax because school districts do not have meaningful discretion in setting their local M&O tax rates. General diffusion of knowledge was equated to an acceptable accountability rating.	HB 1 (5/31/06) – Compressed school district M&O tax rates by one-third and provided a maximum of $0.17 taxing authority that school districts can access at their discretion.

(Texas Taxpayers and Research Association, 2012)

In *Courts and Kids: Pursuing Education Equity through the State Courts* (2009), Rebell outlines four principles in order to comprehensively determine a constitutionally adequate and successful educational system:

> (a) Challenging standards: The development of challenging academic content and performance standards that meet constitutional requirements, (b) Adequate

> funding: The adoption of a state education finance system that provides sufficient funding to all schools to allow them to provide all of their students with a meaningful opportunity to meet state standards, (c) Effective education programs and accountability systems: The development of effective educational programs designed to prepare students to meet state standards and of accountability mechanisms designed to ensure that these programs are properly implemented and funded on sustainable long-term basis, and (d) Improved student performance: Sufficient improvements in performance on validated assessments of academic proficiency and on other indicators such as graduation rates to demonstrate as accurately as possible that all students are receiving the opportunity for a sound basic education on a sustained basis (p. 39).

Rebell's principles have the potential to facilitate the development of a constitutionally acceptable definition of adequacy. Until a constitutionally acceptable definition of adequacy is developed that addresses Rebell's principles, school finance litigation in Texas will continue on the belief that funding mechanisms do not address the inadequacies that currently exist among school districts.

Accountability and School Finance

The TEA has established an intricate system for measuring the performance of students and campuses and has done so since 1995. Since the 2002-2003 school year until the 2010-2011 school year student performance in Texas was assessed in math, reading, writing, science, and social studies on standardized tests known as the Texas Assessment of Knowledge and Skills (TAKS) assessments. In the spring of 2012, the

State of Texas Assessments of Academic Readiness (STAAR™) replaced the TAKS assessments.

The STAAR program at grades 3–8 assesses the same subjects and grades that are currently assessed on TAKS. At high school with the freshman class of 2011-2012 TAKS assessments were replaced with 12 End-of-Course (EOC) assessments: Algebra I, Geometry, Algebra II, Biology, Chemistry, Physics, English I, English II, English III, World Geography, World History, and U.S. History. These EOC assessments have been touted by the TEA for their increase in rigor as compared to TAKS (Texas Education Agency, 2012).

Despite the incorporation of new assessments student performance will continue to be measured in various sub-groups and sub-populations. Specifically, student performance is measured for ethnicity, socioeconomic status, at-risk status, and for students receiving special education services. With few exceptions, all sub-groups and sub-populations are held to the same passing standards.

The TEA's standards-based accountability system measures which campuses and school districts are meeting indicators based on student performance on the aforementioned standardized assessments by setting criteria in multiple areas of measurement. Campus and school districts receive a rating based upon the percentage of students who meet performance standards. School districts and campuses can be rated academically unacceptable, acceptable, recognized, and exemplary. With the advent of the STAAR programs school districts and campuses maintain their assigned accountability rating for the 2011-2012 and 2012-2013 school years.

Brownson (2002) suggests that states must first define adequate educational outcomes and then determine what level of spending is necessary to achieve those outcomes. This statement leaves much to be desired in the form of determining who is responsible, and secondly, who possesses the knowledge and skill to determine these outcomes and the level of corresponding spending necessary. If this statement by Brownson is correlated to the TEA's standards-based accountability, this method would include the allocation of resources based on a specific rating received by a school as indicated by student performance. This type of school evaluation based on ratings is highly related to student and family characteristics, which leads many to argue that the rating a school receives is based on socioeconomic status rather than school performance (Figlio, 2004).

The creation of academic standards-based accountability and the methods through which Texas schools are funded are not interwoven and have reached their current status without consideration to each other. The Texas accountability system is very well established, but there is minimal correlation between the performance of school districts and the allocation of financial resources through the state's FSP (Imazecki & Reschovsky, 2004). The No Child Left Behind Act (NCLB) of 2001 requires that students make annual progress in meeting performance standards for all students and for students classified by ethnicity, socioeconomic status, disability, and limited English proficiency (Imazecki & Reschovsky, 2004).

Imazeki and Reschovsky (2004) advise that imposing statewide performance standards without simultaneously reforming the methods of school finance could result in a district with above average costs not having the ability to adequately educate students.

The incorporation of the state's new testing program in 2011, which is STAAR, reinforces this belief by Imazeki and Reschovsky. Additionally, the rigor of items for end-of-course assessments has been increased by assessing skills at a greater depth and level of cognitive complexity (Texas Education Agency, 2012).

This idea is further supported by Rees (2004) when he states, "the advent of academic standards-based accountability initiatives prior to addressing the funding required to meet these standards is the quagmire resulting from the retrospective rationale dilemma" (p. 3). Retrospective rationale is characterized as raising performance standards without simultaneously considering funding levels necessary to meet the new standards (Rees, 2004). In Texas, the release of the more rigorous STAAR program for the 2011-2012 school year did not coincide with the consideration of funding necessary for school districts to meet the new challenges presented by STAAR. In fact, the Legislature cut public school funding by more than five billion dollars. These budget cuts amplified the already strained financial condition of numerous school districts.

The restructuring of school finance in Texas, which again appears to loom on the horizon, currently utilizes a target revenue approach that many consider to be inadequate to the meet standards-based accountability standards established by the TEA and the NCLB Act of 2001. Lawsuits filed against the state of Texas in 2011 challenged the methods of school funding. Accountability standards and the rigor of state assessments as developed by the TEA, which have continued to rise, give merit to those who believe the Legislature has provided insufficient means to achieve a constitutionally required general diffusion of knowledge. The theoretical framework of vertical equity and its provisions implemented in Texas school funding are ingrained in the adequacy approach

to school finance litigation. As detailed in the Texas Taxpayer and Student Fairness Coalition's 2011 lawsuit, "the structure of the system is designed to deliver a general diffusion of knowledge is irrationally flawed and unable to deliver a constitutional level of education to all the children in Texas is in violation of the suitability provision of the article VII, §1" (*Texas Taxpayer and Student Fairness Coalition et al. v. Scott et al.*, 2011, p. 6).

Methods to Measure Funding and Performance

The link between funding and student performance is a contentious area of research. Extensive research exists in this field; however, no consensus has been reached among researchers regarding this relationship. The discourse of funding and performance centers on the methods utilized in the determination of a correlation between the two. Measuring input to output (production function analysis) is the primary method through which the relationship between spending and student performance is studied.

Analysis of inputs occurs on two levels. Researchers can determine inputs by assessing revenues or expenditures. Revenues take into account state and federal funding, while expenditures are classified by function (instruction, administration, or transportation) or by program (compensatory, special, or bilingual education) (Odden & Picus, 2004). The measurement of outputs traditionally has been measured by student performance. Verstegen and King (1998), through their review of the past 35 years of production function research concluded that increasing school resource inputs when examined in terms of teacher characteristics, class size, curriculum, and technology have a positive impact in student performance.

According to Odden and Picus (2004), the synthesis work of Erik Hanushek has consistently concluded that no systematic relationship exists between the level of funding and student outcomes. Odden and Picus do not side with those who conclude that there is no relationship between school funding and performance. The body of research by Hanushek detailing that increased funding makes no difference has been critiqued for its methodology and interpretations of the data (Darling-Hammond, 2010). Hedges, Laine, and Greenwald (1994) reanalyzed the work of Hanushek and concluded that money does impact student performance.

In order to effectively utilize input to output production function analyses Verstegen and King (1998) propose studies should include these components:

> (a) Individual children and classes were the unit of observation rather than the school, districts, or state; (b) if outputs were expressed in terms of progress or longitudinal growth instead of achievement in one point in time; (c) if resources were identified as those available to a specific child rather than by average resources in a classroom, school or district; and (d) if processes were to include quality, content, and intensity of student teacher interactions and time on task (p. 259).

Production function studies have not traditionally included the Verstegen and King's aforementioned components. Odden and Picus (2004) reinforce this concept by indicating that most analyses of school finance issues occur at the district level and the impact on its students, but not addressing impact on children in a specific setting. Evidence indicates that increased investments have been accompanied by measureable gains without analyzing each financial allocation contributes to inefficiency, since each

investment is not correlated to an output (Darling-Hammond, 2010). The difficulty arises in providing and allocating resources to districts in a manner in which the dollars will be spent to increase student performance.

According to Hanushek and Lindseth (2009), due to the multiple differences that exist in inputs it is not possible to identify specific requirements for a school to reach a specific level of achievement. Additionally, there are too many factors outside the district's control that affect performance. These difficulties present challenges to lawmakers when determining the level of funding schools required to meet performance standards. Hanushek and Lindseth (2009) believe the lack of a significant relationship between spending and achievement presents challenges to those to who claim to know the spending required that will achieve adequate levels of student performance.

Cost of an Adequate Education

The ability to determine what an adequate education should cost is plagued by several factors. In Texas, adequacy is defined by the Texas Supreme Court in the *Neely et al. v. West Orange-Cove et al*. (2005) decision that public education should accomplish a general diffusion of knowledge. The Texas Supreme Court has loosely equated adequacy (general diffusion of knowledge) with an acceptable accountability school rating from the TEA (McCown, 2011). This determination of the costing out of education has proven challenging as the cost to educate students adequately varies across the state of Texas.

The cost needed to achieve a specified level of student performance depends on the wages of the teachers, characteristics of students and their parents, district size, and geographic location (Gronberg, Jansen, Taylor, & Booker, 2004). Additionally, a

problem exists with the assessment of public schools in Texas and how to accurately assess the impact of achievement related to specific inputs or policies. Secondarily, the problem facing courts and legislatures is the nonexistence of recent empirical data of the cost estimates of obtaining a specific level of student performance (Hanushek & Lindseth, 2009).

Two research studies estimating the costs of meeting accountability standards in Texas were conducted in the same year by Imazecki and Reschovsky and Gronberg et al. in 2004. Both studies concluded that the costs for school districts to meet performance standards on standardized assessments are considerably higher for students from a low socioeconomic family or who are limited English proficient; however, no agreement was reached on the specific amount of funding required to meet the TEA's performance standards. There is no consensus by researchers on what it would cost to overcome the adverse effects of poverty that now keep students from achieving at levels comparable to middle-class children (Hanushek & Lindseth, 2009).

The difficulty in the determination of the amount of funding considered to adequately educate students is compounded by the fact that policy makers have differing opinions on which funding methods should be utilized. Individual states often solicit the assistance of school finance experts, such as Odden and Picus. A report by Odden, Picus, Goetz, Mangan, and Fermanich (2006) provided a blueprint for an evidence-based approach to finance adequacy for the K-12 Advisory Committee of Washington Learns. The authors explain, "the evidence based approach to defining and costing school finance adequacy defers to evidence of strategies needed to meet pre-determined goals much more strongly than on the professional judgment of educators" (Picus et al., 2006, p. 3).

The approaches developed by Odden and Picus and their associates have not been universally accepted as illustrated by Eric Hanushek's extensive critique of their 2006 report. Hanushek (2006) emphasized the evidence-based approach utilized by Odden and Picus and their associates only increases expenditures and creates a substantially less efficient operation of schools in Washington State. Additionally, Imazeki and Reschovsky (2004) through their study of estimating the costs needed to meet the Texas accountability standards believe a cost function methodology provides the most practical way for identifying and quantifying factors that influence the cost of education. The following description of the four most commonly accepted models is included to illustrate the vast differences that exist in the current methodologies on how schools should be funded.

Funding Models

Several methods have been developed in order to determine the cost of providing an adequate education. These funding mechanisms take into account individual student characteristics, such as whether or not the student is economically disadvantaged, receives special education services, or is an English language learner. According to Picus, Odden, and Fermanich (2003), educational policy analysts have identified four different methodologies for determining school finance: economic cost function approach, the successful district approach, professional judgment approach, and the evidence-based approach.

Economic Cost Function Approach

Cost function analysis uses extensive data and complex statistical analysis to correlate levels of student performance with dollar amounts needed to meet those targets.

The costs to educate students can differ substantially from one district to another. The key component to the cost function approach is the ability to develop a foundation formula where the average foundation level of funding is adjusted to account for differences in costs across districts to meet performance standards in districts with above average costs (Reschovsky & Imazeki, 2001). Differences in predicted spending can provide insight to determine which factors outside a school district's control affect the cost of educating students (Gronberg et al., 2004).

Recommendations include reforming program weights to increase allocations for children from economically disadvantaged families and decreasing weights to small, mainly rural districts. These recommendations are the result of the work of Imazeki and Reschovsky (2003) through their exploration of using a cost function analysis. Two studies were conducted in 2004 using cost function methodology to generate estimates of the amount of money needed to meet student performance standards in Texas as mandated by the TEA. Calculating the cost of an adequate education needed to satisfy the education clause of Texas constitution's provision of a general diffusion of knowledge was a critical component of the *West Orange-Cove et al. v. Neely et* al. case in 2004.

Results from the Imazecki and Reschovsky (2004) study estimated the costs of meeting the Texas educational accountability standards and determined additional funding was required for students to meet accountability standards. This information was entered as evidence by the plaintiffs that Texas school districts would need at least two billion in additional revenue to satisfy the requirements of the TEA's accountability system (Imazecki & Reschovsky, 2005). The additional costs needed for students to

meet state and federal accountability standards in 2004 at a 55% passing rate ranges from $1.7 to $6.2 billion (Imazeki & Reschovsky, 2004).

These costs are only to reach a level to achieve school district passing rates, but do not include sub-groups of students for which school districts are responsible. The costs to meet the accountability standards are higher in districts with higher percentages of student classified as low socioeconomic status (Imazecki & Reschovsky, 2004; Gronberg et al., 2004). Imazecki and Reschovsky (2004) concluded "that there is little question that for many school districts the cost of meeting accountability standards for each sub-group will substantially exceed the cost meeting the average standard" (p. 1).

In the cost function study by Imazecki and Reschovsky (2004), districts below the 55% passing rate actually spent over $1,000 more than districts with a passing rate of 70%. These results illustrate that additional spending of $1,000 per student is not enough for students to meet passing standards. Districts that are classified as unacceptable by the TEA contained higher percentages of low socioeconomic status students, minorities, and limited English proficient students (Imazecki & Reschovsky, 2004). In the study commissioned by the Texas Joint Committee on Public School Finance by Gronberg et al. (2004) and the one conducted by Reschovsky and Imazecki (2004), they concluded that the costs of meeting the accountability standards are higher in districts that have higher percentages of students from low socioeconomic families. In a follow-up study Imazecki and Reschovsky (2006) classified districts as underfunded if the school districts' students did not meet performance standards and these districts contained higher percentages poor, minority, and limited English proficient students.

Currently Texas funding formulas take into account whether a district is considered small (<1,600) or mid-size (<5,000). Research conducted by Gronberg et al. (2004) concluded that a very substantial estimated cost savings occurred when comparing a very small district (500 or fewer pupils) to a small district (1,600 or fewer pupils) and the economies of scale are realized when a district reaches 25,000. Despite its complexity, this model is accepted by many economists because it takes into account the economies of scale; however, this model is so complex that policymakers and legislators are hesitant about its use.

Successful District Approach

This approach identifies school districts that have performed at a level that is considered adequate. This identification is achieved through the utilization of specific measures of accountability as created by individual states and current reform initiatives, such as the NCLB Act of 2001. This technique equates the amount spent by the successful district to the amount of funding necessary to provide an adequate education.

This method makes an assumption that the amount of money spent in a district with a high level of performance should be adequate for other school districts, with specific adjustments for variations in cost of living and student characteristics (Lefkowits, 2004). In Texas, school districts whose students are not meeting performance standards are spending more per student than districts whose students are successful on state assessments (Imazecki & Reschovsky, 2006). The disadvantage of this method relies on the basis of the specific amount of money spent, not how the money was spent by the district. The incorporation of itemized district expenditure data correlated to a district with similar characteristics is a required component of this approach.

Professional Judgment Approach

According to Lefkowits (2004), in the professional judgment approach educators identify components (curricular, innovative, and instructional programs) necessary to deliver the state's content standards and subsequently economists determine the amount of funding to provide these programs. The concept is supported by teachers and administrators for it affords them the opportunity to provide input on the components necessary to meet the needs of individual students. The potential drawbacks of this process include: the decisions made by the panel of educational professionals are not substantiated by student performance data, relies heavily on the specific educational professionals selected to serve on the panel, and may not be tailored to meet the needs of a school with a large number of at-risk students.

Evidence Based Approach

The evidence based approach identifies all the components of research-based educational strategies, determines a cost for each of the components, and then uses this amount to calculate an adequate spending base for each school (Fermanich, Picus, & Odden, 2003). Two advantages of this approach include the provision of a concrete plan for changing current practices and a clear idea of what reform components are being purchased. Fermanich, Picus, and Odden (2003) suggest this approach provides a funding level to implement a number of school wide educational strategies and these strategies represent the most current and effective strategies and knowledge in education. This approach is limited in its ability to be transferred across districts and not all school reform models have proven to improve student performance. An additional difficulty of the evidence based approach is the inability to appropriately determine a cost for all

components. Costs would have to be continually adjusted and modified to account for differences across a state.

Funding Model for Texas

The Foundation School Program (FSP) is the mechanism through which state revenue is used to fund school districts through a complex assortment of formulas, adjustments, and weights. For the 2011-2012 school year, funding school districts and charter schools in Texas totaled $47.4 billon, $20.4 billion of this total was acquired through state funds, $21.4 billion was generated from local property taxes and the remainder of $5.6 billion was federal funds (Texas Taxpayers and Research Association, 2012). The FPS is responsible for coordinating funding for the five million students in Texas.

The statutory goals of the FSP are to ensure that every school district in Texas has "adequate resources to provide a basic instructional program that would be considered acceptable under the state's accountability system" (Texas Taxpayers and Research Association, 2012, p. 8). This program is administered by the TEA. According to the TEA's website, "the FSP, in its current form, is meant to ensure that all school districts, regardless of property wealth, receive substantially equal access to similar revenue per student at similar tax effort" (Texas Education Agency, 2012). The FSP formula system consists of three tiers and a second layer based on the target revenue system initiated by House Bill 1 (2006).

Tier 1

Funding in Tier 1 begins the basic allotment ($4,765 for the 2012-2013 school year for districts with a compressed tax rate of $1.00), which is the guaranteed level of funding received for each student in average daily attendance (ADA). The (CEI) is included in the calculation of the adjusted basic allotment. The CEI is termed a multiplier because it compensates districts for geographic and cost differences across the state of Texas. CEI values have not changed since 1991 (Daniels et al., 2012). Small (< 1,600 ADA students) and mid-size (1,600 – 5,000 ADA) districts receive an adjustment based on the diseconomies of scale due to increased expenses required to operate school districts of this size.

After calculation of the adjusted allotment, the guaranteed level of revenue is calculated through the use of weights for different groups of students that attend school in that specific school district. These weights are included for students in special education, career and technology education, gifted and talented education, compensatory education (at-risk), bilingual education, and students in the public education grant program. Allotments, which include a specific amount of funding are also given based on the number of high school students in a district, new instructional facilities, students with a parent in the military, full or part-time staff, transportation, instructional materials, and an available school fund allotment (See Table 2 for Weights and Allotments in Tier 1).

Table 2

Weights and Allotments in School Finance Formulas (2011-2012)

Type of Student/ Program	Definitions	Weight	Total Billion
Regular Program	Students enrolled in the regular program which does not include special education students or students enrolled in career and technology programs.	0.9239	$20.3
Special Education	There are 12 special education weights ranging from 1-1 to 5.0 reflecting the severity of the disability associated with the cost of instructional arrangements.	1.1-5.0	$2.4
Career & Technology	The number of students enrolled in career & technology programs in grades 8-12.	1.35	$1.4
Bilingual	Student of Limited English Proficiency or English as a Second Language (ESL)	0.1 Add-on	$0.38
Compensatory Education	Students that are educationally disadvantaged - performing below grade level or are at risk of dropping out of school. Funding is distributed to school districts based on the number of students eligible for the federal free and reduced-price meal program.	0.20 Add-on	$3.0
Gifted and Talented	Students that perform at a high level as determined by individual school districts.	1.35	$0.14
High School Students	Students enrolled in grades 9-12	$275 per ADA	$0.34
New Instructional Facility	Students that attend a newly built campus in the first year and for additional students who attend in the second year. No appropriation made for the 2012-2013 biennium.	$250 per ADA	$0.0
Student with a Parent in the Military	Students with a parent serving in a combat zone or who have been reassigned due to a base closure. No appropriation was made for the 2012-2013 biennium.	$650 per ADA	$0.0
Staff Allotment	$500 for each full-time employee that is not an administrator or subject to a minimum salary schedule; $250 for part-time.	$500 or $250 per qualified employee	$0.13
Transportation Allotment	$0.68 - $1.43 per mile of approved bus route based on the number of students per square mile.	$0.68 - $1.43per mile	$0.3
Instructional Materials Allotment	Funding given to school districts to help with instructional materials and technology needs.	$90 per WADA	$0.5
Available School Fund	Earnings from the Permanent School Fund are distributed to school districts based on prior year ADA.	$247 per ADA	$1.1

(Texas Taxpayers and Research Association, 2012)

Tier 2

Tier 2 funding is a guaranteed yield or enrichment level of funding to school districts which supplements the basic funding provided by Tier 1 (Daniel et al., 2011). The purpose of Tier 2 funding is to ensure that school districts who are unable to generate

minimal revenue receive state revenue to meet the minimum guarantee (Texas Taxpayers and Research Association, 2012). Currently, school districts have the ability to tax above their compressed tax rate up to $1.17. A high percentage of school districts in Texas have a compressed tax rate of $1.00 and have access to $0.17 for enrichment purposes (Texas Taxpayers and Research Association, 2012). In order for school districts to exceed a tax rate of $1.04 school districts must receive voter approval.

Passage of House Bill 3646 in 2009 modified Tier 2 funding to include two levels of guaranteed funding in an attempt to reduce the funding disparity for school districts with low target revenues. The first level of funding includes six pennies of tax rate above a school district's Compressed Tax Rate (CTR) to generate the highest level or enrichment for funding (Daniels et al., 2011). Level 2 pennies generate lower levels of enrichments and include the tax rate from $1.07 through $1.17. In 2010-2011, 1,006 districts had levied tax rates of at least $1.04, which is the maximum that does not require voter approval and 248 school districts had exceeded that amount through voter approval (Texas Taxpayers and Research Association, 2012).

Recapture

The FSP includes a integral facet of the school finance system enacted in 1993 to restrict the amount of local revenue a school district has access to if the district is classified as property wealthy. The purpose of the recapture provisions was to equalize revenues between school districts in effort to create fiscal neutrality (Imazecki & Reschovsky, 2004). According to Imazecki and Reschovsky (2004), "the recapture provision is perhaps the controversial component of the state aid system and has been the impetus for the most recent court cases" (p. 259).

A school district is considered to be property wealthy and is subject to the provisions of the Texas Education Code (TEC) Chapter 41 when its property wealth per WADA exceeds certain wealth levels as set in statute (Daniel et al., 2011). The determination of the amount of recapture owed by a district is done by "calculating the percentage of the district's taxable value that is above the equalized wealth level and then applying that percentage to the taxes generated by the district's tax rate (Texas Taxpayers and Research Association, 2012, p. 19). TEC Chapter 41 school districts have five options available to reduce their property wealth per WADA:

Option 1: Consolidate with another district

Option 2: Detach property

Option 3: Purchase attendance credits from the state

Option 4: Contract to educate nonresidents form a partner district

Option 5: Consolidate tax bases with another district

(Daniels et al., 2011)

In the 2011-2012 school year $1.1 billion was recaptured from 173 school districts as compared to $132 million in 1994 (Texas Taxpayers and Research Association, 2012).

Target Revenue System

The target revenue system was initiated with the compression of the tax rate by House Bill 1 in 2006 and is considered the second layer of funding in finance formulas. In exchange for the mandatory reduction of a district's M&O tax rate school districts receive target revenue funding based on the state and local M&O tax revenue the district would have received if their tax was not compressed (Daniels et al., 2011). For the 2011-2012 school year, 86% of school districts are being funded through the target revenue

system and only 141 school districts are strictly funded through the tier funding formulas (Texas Taxpayers and Research Association, 2012). The target revenue system is a central tenet of the lawsuits filed against the state of Texas in 2011.

Context of Study

The Texas Taxpayer and Student Fairness Coalition was the first coalition on behalf of school districts, students, parents, and businesses directly affected by the school finance system to file a lawsuit against the state of Texas. Their lawsuit centers on the unconstitutionality of state's current educational system finance structure. The four main points include issues related to adequacy, equity, target revenue, and the equivalent of a statewide property tax.

The Texas Taxpayer and Student Fairness Coalition is representing the largest number of property poor and average wealth school districts. The Texas School Coalition is an organization of property wealthy school districts who have selected to be represented by Haynes and Boone law firm (Attorneys, Mike Trachtenberg and John Turner) for the school finance litigation. In a memorandum released by Trachtenberg and Turner on October 1, 2011, they expect litigation to be based on the same claims as proposed by the Texas Taxpayer and Student Fairness Coalition; however, the Texas School Coalition will assert an adequacy and state property tax claim, but not an efficiency (target revenue) or an equity claim (Trachtenberg & Turner, 2011). A third coalition of Texas school districts, the largest of which is Houston I.S.D., represented by the Thompson and Horton Law Firm (Attorneys, David Thompson and Philip Fraissinet) filed a petition as *Fort Bend I.S.D. et al. v. Scott et al.*, (2011). Their legal team will also pursue claims of adequacy, statewide property tax, and the issue of efficiency, suitability,

and arbitrariness related to the current target revenue system, but not an equity claim (*Fort Bend I.S.D. et al. v. Scott et al.*, 2011). Mexican American Legal Defense and Education Fund (MALDEF) is representing school districts with large portions of low-income and English language learning students in a fourth challenge (*Edgewood I.S.D. et al. v. Scott et al.*, 2011). They contend that the Texas Legislature has failed to meet its obligation to provide an efficient school finance system, which has increased inequity for low-wealth districts. The Texans for Real Efficiency and Equity in Education (TREE) acting as intervenor along with the Texas Charter Schools Association (TSCA) have also entered a petition against the state to present their case for charter school funding. TREE will assert that the state should lift the charter school cap and lessen regulations on minimum teacher salaries, class size, and enrollment (Smith, 2012). The TCSA will focus on the 215 charter school contracts currently available and the lack of facilities funding (Smith, 2012). Each of these lawsuits was combined and to be heard in a Travis County District Court.

Despite the limited success and use of equity-based arguments in court cases over the past 20 years, the lawsuit filed by the Texas Taxpayer and Student Fairness Coalition in 2011 challenged the school funding formulas by presenting a compelling argument which illustrated the inequitable differences that exist between school districts. To support their claims the following data was illustrated in their petition:

> In 2010-11, at a compressed tax rate of $1.00 in Tier 1, Austin I.S.D., with approximately 100,000 WADA, was funded at $6,100 per WADA and Fort Worth I.S.D., at the same tax rate with similar WADA, was funded at $5,100 per WADA, creating a Tier I gap of $100,000,000 per year.

> Northwest I.S.D. at $1.00 compressed tax rate in Tier 1 was funded at $6,830 per WADA while Edgewood I.S.D. at the same compressed tax rate was funded at $5,070, a gap of $1,760 per WADA. At Northwest's WADA of approximately 17,000, they enjoy almost 30 million additional dollars. With each 1% growth in WADA this gap will grow by $300,000. Both districts are in the San Antonio region.
>
> Crane I.S.D., at a Tier 1 compressed tax rate of $1.00 with approximately 1450 WADA, was funded at $9,500 per WADA, while Floydada I.S.D., at a similar tax rate and WADA, was funded at $5,000 per WADA, creating a funding gap of over $6.5 million, or a funding advantage for Crane I.S.D. of almost 2 to 1.
>
> Wink-Loving I.S.D., at a Tier 1 compressed tax rate of $1.00 with approximately 570 WADA, was funded at $12,500 per WADA, while Chireno I.S.D., at a similar tax rate and WADA, was funded at $5,030 per WADA, a gap of about $7,500 per WADA, a funding advantage for Wink-Loving of 2.5 to 1 (*Texas Taxpayer and Student Fairness Coalition et al. v. Scott et al.*, 2011. p. 7).

These examples listed above are generated from the TEA's school finance data and were provided by the Texas Taxpayer and Student Fairness Coalition to supply evidence that the current methods of school finance in Texas have been unable to rectify differences in the amount of revenue school districts are able to generate based on local property wealth. This coalition emphasizes "as each of these districts grows, the dollar amount of the inequity is perpetuated and increases proportionately" (*Texas Taxpayer and Student Fairness Coalition et al. v. Scott et al.*, 2011, p. 7). As documented above by the Texas Taxpayer and Student Fairness Coalition petition, property poor school districts

do not have equal access to similar revenues per pupil of tax effort in comparison to property wealthy districts. It is important to note that equity is only one facet of the Texas Taxpayer and Student Fairness Coalition petition. This coalition will argue that current school funding mechanisms in Texas are also inefficient and inadequate, which they deem as a violation of the Texas constitution.

Lines have been clearly delineated between coalitions by which claims have been asserted. The primary existing difference between the Texas Taxpayer and Student Fairness Coalition which is almost entirely composed of TEC Chapter 42 school districts and the Texas School Coalition which is composed of TEC Chapter 41 school districts is related to equity. In a memorandum released by Hayes and Boone Law Firm on behalf of the Texas School Coalition, they emphasize that the focus should be on the state's five billion dollar reduction in public funding during the 2011 legislative session and not on claims that have the potential to pit some school districts against one another (Trachtenberg & Turner, 2011). It is the Texas School Coalition's belief that successful prosecution of the adequacy and state property tax claims would benefit all Texas school districts. The Texas School Coalition is steering well away from the equity issue since doing so would be counterproductive to property wealthy school districts' interests. School districts that are classified as property wealthy will not actively pursue a claim that could ultimately reduce the allocations it receives from the state or increase the amount subject to recapture. The Texas School Coalition raises the level of awareness that property wealthy districts are concerned with how litigation could create a top-down equity structure instead of a more desired bottom-up equalization structure.

As shown in Table 3, all coalitions are unified regarding their stance of the statewide property tax. The restructuring of the amounts upon which school districts can tax and ultimately receive will lead to redesign of the FSP that would seek to remove the arbitrariness and inefficiency of the current target revenue system. The restructuring of what currently is believed to be a statewide property tax as a result of litigation and legislation will have resounding impact on the design of the FSP.

With the exception of the TREE lawsuit, all groups are unified regarding adequacy. Coalitions will attempt to argue that since the Texas Supreme Court's ruling that sufficient funding was provided by the state to be adequate in *Neely et al. v. West Orange-Cove et al.* (2005), the state has continually raised performance requirements and added components that measure college readiness without providing a commensurate increase in financial support. Thompson and Fraissinet (2011) of the Thompson and Horton Law Firm, as detailed in their letter to Texas superintendents and board members, will argue that, "funding was cut for specific programs that the Legislature itself had identified as necessary to help the growing population of at-risk students in Texas reach these higher standards" (p. 4). It is their belief that the state cannot expect performance from students to meet expectations in which no funding system supports achievement of those expectations. In MALDEF's petition against the state, they assert inadequate funding has resulted in only 52% of students meeting College-Ready criteria, including 42% of Latino students, 34% of African-American students, 38% of low-income students, and five percent of English language learner students (*Edgewood I.S.D. et al. v. Scott et al.,* 2011).

Table 3

Description and Claims Asserted by each Coalition in 2011 Lawsuits

	Taxpayer and Student Fairness Coalition	Texas School Coalition	Thompson & Horton	MALDEF	Texans for Real Efficiency and Equity in Education (TREE)	Texas Charter School Association (TSCA)
Who	400 districts, primarily mid to low property wealth	60 property wealthy districts	A range of districts, including the state's largest, Houston I.S.D.	Districts with large percent of low-income and English language	Six parents along with TREE	5 parents of Charter schools in Austin, Dallas, San Antonio, and Houston
Property Tax	X	X	X	X	X	X
Adequacy	X	X	X	X	—	X
Equity	X	—	—	X	—	—
Efficiency	—	—	—	—	X	X
Representation	Equity Center, with attorneys Toni Hunter & Rick Gray	Haynes & Boone, with attorneys Mark Trachtenberg & John Turner	Thompson & Horton, with attorney David Thompson & Philip Fraissinet	MALDEF, with attorney David Hinojosa	Attorney Chris Diamond & former Supreme Court Justice Craig Enoch	Attorneys Robert Schulman, Joseph Hoffer, & Richard Lopez

(Smith, 2012)

The grounds upon which coalitions are able to successfully argue the unconstitutionality of the current Texas school finance system will be the determining factors that legislators will subsequently use to redesign the school funding mechanisms. The goal of pending litigation is to create a flexible funding model that adjusts to and accounts for changes in populations, meets the needs of diverse or at-risk learners, and ultimately determines a funding amount considered to be adequate (Thompson & Fraissinet, 2011). In a paper published by the Intercultural Development Research Association (IDRA) regarding the status of school finance equity in Texas, the author provided the following recommendations for change: (a) update the equalized funding system, (b) eliminate hold harmless funding, (c) eliminate local unequalized enrichment,

(d) adjust costs to serve special populations, (e) provide sustainable funding for facilities, and (f) ensure excellence rather than adequacy (Cortez, 2009).

Texas is a prime example of how court cases have created school funding mechanisms in which many public schools and stakeholders believe the funding they receive from the state is neither equitable nor adequate to prepare students (Imazecki & Reschovsky, 2004). Texas ranked 41st among the 50 states in total expenditures per student for 2009-2010 school year (Texas Taxpayers and Research Association, 2012). Middle school students in Texas had the largest gap between the students who met passing standards on TAKS as compared to their performance on a national test (Imazecki & Reschovsky, 2006). Litigation has the potential to restructure the manner in which funds are allocated to individual school districts; historically, litigation has impacted the methods of funding public school in Texas (Table 2).

Conclusions

The review of literature revealed a gap in empirical research that assessed the overall health of school funding in Texas since House Bill 1 in 2006. Previous research revealed property wealth was shown to be positively associated with the amount of revenue a school district is able to generate at specific levels of wealth per student. The review of literature revealed no consensus has been reached on a specific funding model that accurately determines the level of funding required to achieve a specific level of student performance. The results of reviewed studies did indicate that the amount of funding (weights and cost adjustments) in the FSP is insufficient to meet the needs of students in districts with high populations of limited English proficient and low socioeconomic status students based on student performance on standardized tests.

The information presented in this chapter illustrated the evolution and history of how litigation led to the current methods of funding. The analysis of lawsuits highlighted key components of the school finance system believed to be ineffectual at meeting its constitutional obligation and illustrated dramatic differences between school districts in the amount of funding they receive. The inability of school districts to have meaningful discretion to set local taxes and the current target revenue system are integral components that affect the current distribution of resources to school districts. The description of the FSP funding formulas provided knowledge of the mechanisms which illustrated the TEA's multi-layer approach to achieve equal access to similar revenue per student. The setting of this study was particularly significant due to the multiple lawsuits that were filed against the state of Texas in 2011 claiming that the methods of school finance are inequitable, inefficient, and inadequate to meet the needs of all students in Texas.

CHAPTER 3

METHODOLOGY

Introduction

There are three equity principles utilized to assess equity within a school finance system: fiscal neutrality, horizontal equity, and vertical equity (Odden & Picus, 2004). This chapter emphasizes three theoretical frameworks that provide the foundation of the study and the corresponding statistical models designed to assess the health of school funding mechanisms in Texas. This chapter includes a rationale and design of the study, population and sample, data collection method, data collection analysis, and a chapter summary.

Rationale of the Study

The dominant methodology of quantitative research is inquiry based through the collection of numerical data of samples and subjecting the data to statistical analysis (Gall, Gall, & Borg, 2007). Quantitative statistical methods were selected to complete this study for their ability to support the concepts of each theoretical framework (fiscal neutrality, horizontal equity, and vertical equity) chosen for inclusion in this study. These theoretical frameworks are also referred to as equity principles (Odden & Picus, 2004). The quality of a research study is determined by the depth of rationale and the theoretical constructs that guide the research (Gall, Gall, & Borg, 2007). Each research question addressed one of the aforementioned theoretical frameworks.

Appropriate instrumentation and statistical treatment improve the validity of quantitative data analysis (Cohen, Manion, & Morrison, 2007). To ensure external validity in the design stage, the selected methodologies are appropriate for the research

questions. The statistical methods selected for inclusion in this study are prevailing methods (range, restricted range, coefficient of variation, Gini Coefficient, McLoone Index, Verstegen Index, and multiple regression analysis) in assessing the equity principles of fiscal neutrality, horizontal equity, and vertical equity (Odden & Picus, 2004; Neymotin, 2010).

Research Questions

The research questions for this study are:

1. Have school finance reform measures been associated with the degree of fiscal neutrality among school districts in Texas since House Bill 1 (2006)?
2. How has House Bill 1 (2006) been associated with the overall horizontal equity between Texas school districts?
3. Have vertical equity provisions in school funding formulas provided adequate resources for those programs, which have been identified for additional funding by the Texas Education Agency?

Research Design

Fiscal Neutrality

Fiscal neutrality, also known as wealth neutrality, is a school finance concept which specifies that no relationship should exist within a school district between the education of students and the property wealth where the students reside (Berne & Stiefel, 1999). The concept of fiscal neutrality as more thoroughly defined by Odden and Picus (2004) assesses the relationship between local revenue per student plus state general revenues per student and local property wealth per student. School funding mechanisms should allow school districts to raise equal dollars per student for a given tax rate (Odden

& Picus, 2004). Fiscal neutrality methods focus on the inputs into the educational process and the importance of equalizing fiscal capacity of school districts in order to provide a quality education equally (Reschovsky, 1994). Traditional fiscal inputs variables include total revenues from local and state sources (Odden & Picus, 2004).

Texas has had a long history of school finance litigation and the subsequent modification of school finance formulas in an attempt to achieve fiscal neutrality. Equalization features are built into school funding formulas in Texas in an attempt to account for differences in property wealth per student. Additionally, the adjustment of local property tax rates by a school district has a corresponding effect on local revenues generated, which subsequently affects the distribution of state revenues. In order to measure the degree of fiscal neutrality of the school finance system in Texas, quantitative statistical methods were utilized to determine if a relationship existed between the revenue a school district is able to generate and its local property wealth and M&O tax rate. The determination of the changes in the methods of school finance as initiated by House Bill 1in 2006 have contributed to a lack of fiscal neutrality among school districts was key to assessing the effectiveness of school funding mechanisms in Texas.

The measurement of the degree of fiscal neutrality was based on the research conducted by Brownson (2002) as adapted from Rubenstein, Doering, and Gess (2000). Brownson (2002) suggests "a multiple regression analysis provides the ability to test for statistically significant differences in revenue based on property wealth, holding tax rates constant" (p. 54). According to Gall, Gall, and Borg (2007), multiple regression analysis is widely used by in educational research for its versatility and the ability to yield information about relationships among variables. Multiple regression analysis enables

researchers to measure the relationship between two or more explanatory (independent) variables and an explained (dependent) variable (Cohen, Manion, & Morrison, 2007).

In this study, combined state and local revenue (revenue per WADA at the compressed rate) was selected as the dependent variable and property wealth per Weighted Average Daily Attendance (WADA) and a school district's M&O tax rate served as the independent variables. Since the ability of school districts to generate revenue in Texas is primarily based on local property wealth and the corresponding tax rate, these two factors (independent variables) will be assessed to determine if a relationship exists corresponding to their total local and state revenue by fitting a linear equation to the observed data. The equation for the regression analysis utilized is as follows: $Ln(Y) = ß0 + ß1X_1 + ß2X_2 + \varepsilon$ (1)

Y represents school districts' revenue per student, X_1 represents school districts' property wealth per WADA, and X_2 represents school districts' M&O tax rates. Each school district's annual revenue *(Y)* for input into the regression model is determined by its revenue per WADA at the compressed rate. The beta weights are represented by β. According to Nathans, Oswald, and Nimon (2012), beta weights provide a measure of rank ordering and the importance of predictor variables' contribution to the multiple regression equation accounting for the contributions of other predictor variables. Data was input into the regression model for each of the following school years: 2006-2007, 2007-2008, 2008-2009, 2009-2010, and 2010-2011. M&O tax rate data was divided into three subsets for regression analysis: all school districts, school districts with an M&O tax rate equal to or less than $1.04, and school districts with an M&O tax rate greater than $1.04.

Horizontal Equity

Horizontal equity measures the degree upon which school finance systems distribute funds in an equitable manner. The school finance framework of horizontal equity provides that students who are alike should be treated the same and receive equal portions of state and local revenue per student (Odden & Picus, 2004). According to Toutkoushian and Michael (2007), school districts similar to each other along characteristics that relate to the cost of providing an education, such as wealth, size, or the numbers of low socioeconomic students, should receive similar levels of funding. Berne and Stiefel (1999) state that "horizontal equity is a useful concept if it is measured correctly, as intra-group equality, with equally situated groups identified and separated in an analysis" (p. 19). Odden and Picus (2004) have identified several methods and their corresponding properties for measuring the degree of dispersion (inequality) within school funding mechanisms. The following methods were selected for inclusion in this research study.

Range. The calculation of range is a univariate measure that does not remove equity and nonequity factors on per-pupil funding (Toutkoushian & Michael, 2007). Range is utilized to measure the difference between the highest and lowest revenues per student. Since range does not remove equity and nonequity factors specific for school districts who receive excessively low or high funding due to a particular situation, range is ineffective as a standalone measurement. Despite this negative feature, range is still utilized by researchers to illustrate the maximum degree of inequality in a system (Odden & Picus, 2004). The equation for the calculation of range utilized is as follows:

Range = $X_i(Max) - X_i(Min)$ (2)

X_i = Revenue per WADA at the compressed rate

Restricted range. To control for outliers in sampling, restricted range excludes these outliers to minimize their impact. Restricted range performs better than range because it excludes observations close to the top and bottom of distribution before determining the difference between the highest and lowest revenues per student, which is usually set at the 5th and 95th percentile (Brownson, 2002). The calculation of restricted range when utilized in combination with additional horizontal equity measures provides data for determination of the health of school finance funding methods. The equation for the calculation of restricted range utilized is as follows:

Range = $X_i(P95) - X_i(P5)$ (3)

$X_i(P95)$ = Revenue per WADA at the compressed rate at the 95th percentile

$X_i(P5)$ = Revenue per WADA at the compressed rate at the 5th percentile

Coefficient of variation. The coefficient of variation equity statistic is based on the standard deviation in per-student revenues divided by the mean of per-student revenues to determine the percent variation in the distribution of revenues (Odden & Picus, 2004). The coefficient of variation is more widely used by researchers and analysts than range for it includes all values of data; it is unaffected by inflation, and is easy to understand (Odden & Picus, 2004). The value of the coefficient of variation ranges from 0 to 1.0. According to Odden and Picus (2004), an absolute standard of ten percent or .1 for the coefficient of variation is utilized to establish a cut-off point to separate equitable from inequitable resource allocation distribution methods. The equation for the coefficient of variation *(CV)* utilized is as follows:

$$CV = \frac{\sigma X_i}{\mu X_i} \quad (4)$$

X_i = Revenue per WADA at the compressed rate

Gini Coefficient. Measuring income inequality is the purpose of this equity measure. The Gini Coefficient focuses on the distribution of the data and is selected for use when the policy goal is more equal distribution of education resources for all students (Addonizio, 2003). The Gini Coefficient is a unique numerical value used as a measure of the index of inequality (Lows, 1984). Gini Coefficient values range from 0 to 1.0 and values in school finance are in the .1 to .2 range with a value less than .05 being most desirable (Odden & Picus, 2004). The first 1% of individuals should receive 1% of funding; the first 2% of individuals should receive 2% of funding and continues accordingly (Peterson, 2011). The equation for the Gini Coefficient utilized is as follows: $$G = \frac{\sum_{i=1}^{n} (2i - n - 1) x'_i}{n^2 \mu} \quad (5)$$

Where:

i = School district's order number,

n = Number of school districts,

x'_i = School districts revenue per WADA at the compressed rate

μ = Mean revenue for per WADA at the compressed rate

McLoone Index. This statistic is different from the aforementioned methods in that it measures equity in the bottom 50% of the distribution. According to Addonizio (2003), the McLoone Index "is a ratio of the actual total expenditure in all districts below or at the median expenditure to what the expenditures would be if all districts spent at

exactly the median level" (p. 468). For the this study the unit of analysis will be the individual revenue per WADA at the compressed rate for each school district in Texas below or at the median level excluding charter and private schools. The McLoone Index portrays a quantitative analysis from those school districts most affected by an inequitable school finance system (Odden & Picus, 2004). According to Peterson (2011), the closer the index is to 1.0 the greater the equity within a system with a value of .95 considered as the standard. The equation for the McLoone Index utilized is as follows:

$$\frac{\sum P_i X_i}{\sum P_i (med)} \quad (6)$$

Where:

i = Districts below the state median in revenue per WADA at the compressed rate

P_i = Student enrollment in school district i

X_i = Revenue per WADA at the compressed rate for school district i

med = Median revenue per WADA at the compressed rate

Verstegen Index. This statistic is the converse of the McLoone Index for it measures variation in revenue in the top half of the distribution (Odden & Picus, 2004). The Verstegen Index statistic when utilized in combination with the McLoone Index assesses the disparity in revenues by determining the nature of the distribution of revenues in the top and bottom half. The Verstegen Index standard value is 1.0 and is not affected by inflation (Odden & Picus, 2004). The equation for the Verstegen Index utilized is as follows:

$$\frac{\sum P_i X_i}{\sum P_i (med)} \quad (7)$$

Where:

i = Districts above the state median in revenue per WADA at the compressed rate

P_i = Student Enrollment in school district i

X_i = Revenue per WADA at the compressed rate for school district i

med = Median revenue per WADA at the compressed rate

A school district's revenue per WADA at the compressed rate was utilized for the calculation of horizontal equity measures included in this study. These horizontal equity measures were selected for use to determine if school funding formulas in Texas are distributing funds in an equitable manner to school districts.

Table 4

Commonly Used Measures of Horizontal Equity in School Finance

Metric	Description
Range	Difference between the districts with the highest and lowest revenues per pupil
Restricted Range	Difference in the per-pupil revenues for districts at specific percentiles in the distribution
Coefficient of Variation	Standard deviation in per-pupil revenues divided by the mean of per-pupil revenues
Gini Coefficient	Relationship between the distribution of per-pupil revenues and a uniform distribution of per-pupil revenues
McLoone Index	Ratio of the sums of per-pupil revenues for districts below the median to the sum if all districts were at the median in per-pupil revenues
Verstegen Index	Ratio of the sums of per-pupil revenues for districts above the median to the sum if all districts were at the median in per-pupil revenues

(Odden & Picus, 2004)

Vertical Equity

According to Imazecki and Reschovsky (2004), the pupil weights and other cost adjustments currently in the FSP in Texas may not allocate an adequate amount of resources to certain school districts with high concentrations of student who are costly to educate. Odden and Picus (2004) argue that the definition of adequacy include vertical equity adjustments to ensure all students meet high standards because these students need

additional resources to meet these standards. The ability to determine if equalization measures based on student performance assessments provide the necessary resources for those programs which have been identified for additional funding was a key component of this study.

Texas has indentified vertical equity components and targeted additional resources for each of those factors. Specifically, Texas includes student weight adjustments for students who are classified as economically disadvantaged, receiving special education services, at-risk, gift and talented, bilingual, or enrolled in a career and technology program. Differences in revenue per student were examined to determine if this reflects a weakening in horizontal equity in an effort to improve vertical equity.

Traditional measures in assessing vertical equity provisions in school finance consist of univariate or bivariate statistical approaches, such as weighted dispersion, ratio analysis, and correlations (Odden & Picus, 2004). These methods do not account for multiple vertical equity factors. Multiple regression analysis is useful in that it can take in a range of variables and determine affect on the dependent variable (Gall, Gall, & Borg, 2007). The use of regression as a statistical method allows a researcher to isolate progress toward multiple goals while simultaneously measuring the partial effects of the vertical equity factors on funding (Toutkoushian & Michael, 2007).

Multiple regression analysis has the ability to utilize multiple variables and measure their effect on the dependent variable; however, a researcher must exercise caution if the variables are intercorrelated, thus causing multicolinearity (Cohen, Manion, & Morrison, 2007). The goal of selecting predictor variables is to select variables that are highly correlated to the dependent variable but have low correlations among

themselves (Hinkle, Wiersma, & Jurs, 2003). Regression analysis techniques allow for the inclusion of school district characteristics.

According to Neymotin (2010), because student achievement is affected by school district quality and its characteristics, leaving school district characteristics out of the regression will cause a biased measure of the relationship between test scores and total revenues per student. The multiple regression equation as adapted from Neymotin (2010) for use in this study included school district test scores (percentage meeting passing standard in all four subjects in a specific grade and year on the TAKS) as the outcome measure. Regressions were run separately for each district *k*, year *i*, and grade *g*. The equation for the regression analysis utilized is as follows:

$$TestScore_{k,i,g} = \beta 0 + \beta 1 TRS_{k,i} + \beta 2 DistFin_{k,i} + \beta 3 DistDemo_{k,i} + \beta 4 DistEth_{k,i} + \varepsilon_{k,i,g} \quad (8)$$

TestScore is equivalent to student performance on TAKS; *TRS* is total revenues per student*; DistFin* are variables for district characteristics which include a school district's M&O tax rate and property wealth per WADA; *DistDemo* are variables describing the specific demographics of school districts which include percentages of students classified as limited English proficient, economically disadvantaged, at-risk, and receiving special education services; *DistEth* describes the percentages of students classified as White, African-American, or Hispanic.

Student performance on TAKS assessments is the percentage meeting passing standard in all four subjects in grades 5 and 8. Each school district's total revenue per student for input into the regression model is determined by its revenue per WADA at the compressed rate. Data was input into the regression model for each of the following school years: 2006-2007, 2007-2008, 2008-2009, 2009-2010, and 2010-2011.

Population and Sample

The population for this study included all Texas public school districts, but excluded schools classified as a private or charter school. Private and charter schools do not rely on local property wealth and property taxes to generate revenue. Additionally, the number of charter school fluctuates yearly based on the number of applications approved by the TEA. The selection of all independent and consolidated school districts increases the external validity through the inclusion of the school district characteristics of race/ethnicity, limited English proficient, socioeconomic, special education, and at-risk status. District student performance was drawn from each of these school districts on TAKS assessments in grades 5 and 8. Grades 5 and 8 were selected for inclusion to determine the impact on school funding mechanisms in a primary and secondary school setting. Additionally, the Student Success Initiative (SSI) as implemented by the TEA until 2011 required that students in grades 5 and 8 must meet the passing standard on the TAKS assessments in reading and mathematics before they can be promoted. The purpose of this initiative was to ensure that every student makes academic progress necessary to show a sufficient understanding of knowledge and skills taught and tested at each grade level. School districts with limited enrollment in grades 5 and 8 were excluded from data analysis to minimize their impact when performing the multiple regression analysis.

Data Collection

The validity of quantitative data is improved by careful sampling and appropriate instrumentation and statistical treatment of the data (Cohen, Manion, & Morrison, 2007). For the assessment of fiscal neutrality, horizontal equity, and vertical equity with respect

to the research questions among school districts in Texas this study obtained data of the total local and state revenue that determines a school district's revenue per student (revenue per WADA at compressed rate), their corresponding tax rate (M&O rate), as well as property wealth per WADA. This information was obtained from the TEA's school finance reports and data website (http://www.tea.state.tx.us/index4.aspx?id=6741&menu_id=645&menu_id2=789). Data was obtained for the 2006-2007, 2007-2008, 2008-2009, 2009-2010, and 2010-2011 school years.

The additional data set required to address research question #3 associated with student performance on TAKS assessments was obtained from the TEA's aggregate data system (http://www.tea.state.tx.us/student.assessment/taks/agg/). TAKS assessment data was retrieved for each school district of the percent of students passing all four (English language arts, math, science, and social studies) TAKS assessments in each of the following years 2007, 2008, 2009, 2010, and 2011 for grades 5 and 8. TAKS assessment data for school districts with limited enrollments in grades 5 and 8 was masked and subsequently not utilized in the analysis. The TEA's standards data reports webpage allowed for the retrieval of data which included percentages of students by ethnicity and students classified as limited English proficient, economically disadvantaged, at-risk, and those receiving special education services. (http://ritter.tea.state.tx.us/adhocrpt/Standard_Reports.html). Additional data not available or accessible through the TEA's website was requested in the form of an open records request to the TEA.

Data Analysis

The extent to which extraneous variables have been controlled by the research is termed internal validity (Gall, Gall, & Borg, 2007). The validation of data analysis

occurred by selecting appropriate statistical treatments during the design process and controlling for extraneous variables which minimize the equating of correlations and causes. Data analysis was performed through the use of spreadsheets (Microsoft Excel) and the statistical software program IBM SPSS Statistics 20.0. All data required for the assessment of the research questions were downloaded into a Microsoft Excel workbook. Microsoft Excel was utilized to sort school districts based on pre-determined characteristics obtained through the data collection process. The software program IBM SPSS Statistics 20.0 was selected and utilized to analyze data obtained in relation to each of the research questions. SPSS is a powerful instrument that has the ability to perform any type of data analysis utilized in the social sciences (George & Mallery, 2010). With respect to research question #2, SPSS and Microsoft Excel assisted in the calculation of range, restricted range, correlation of variation, Gini Coefficient, McLoone Index and Verstegen Index. Additionally, SPSS was utilized to perform regression analysis as proposed in research questions #1 and #3.

Chapter Summary

The use of commonly accepted equity principles to assess the health of school finance formulas in Texas was discussed. The measurement of fiscal neutrality is accomplished through the use of multiple regression analysis, which factored in local property wealth and school district M&O tax rates and their affect on a school district's total local and state revenue. Horizontal equity was assessed through the measurement of multiple equity measures including range, restricted range, coefficient of variation, Gini Coefficient, McLoone Index, and Verstegen Index. Vertical equity was also investigated using multiple regression analysis to assess various vertical equity factors including

school district characteristics related to student populations, a school district's finances, and their effect on student performance on standardized assessments. The sample of school districts and the corresponding data were identified for collection through the TEA's website. Microsoft Excel and IBM SPSS Statistics 20.0 were discussed as the primary tools for statistical analysis.

CHAPTER 4

ANALYSIS OF THE DATA

Introduction

The purpose of the present study was the assessment of the provision of an equitable system of education by analyzing current methods through which financial resources are allocated to school districts in Texas by focusing on equity measures and student performance on standardized assessments. Specifically, this study analyzed school finance structures as impacted by school finance reform since 2006 and their effect on the equity concepts of horizontal equity and vertical equity among school districts. In addition, fiscal neutrality was assessed to determine the health of the school finance system in Texas. This study utilized established statistical methods to measure the degree of equity and fiscal neutrality of the school finance system in Texas among the 1025 school districts in Texas (Berne & Stiefel, 1984; Brownson, 2002; Odden & Picus, 2004; Neymotin, 2010).

The first section of this chapter discusses the analysis of fiscal neutrality among school districts in Texas for the years 2006-2007 through 2010-2011. The use of regression analysis facilitated the measurement of the relationship between explanatory (independent) variables and an explained (dependent) variable. In this study, combined state and local revenue was selected as the dependent variable. Property wealth per WADA and a school district's M&O tax rate served as the independent variables. These two factors (independent variables) were assessed to determine if a relationship exists between a school district's total local and state revenue by fitting a linear equation to the observed data.

The second section of this chapter discusses the analysis of horizontal equity measures. Horizontal equity statistical measures assess the degree upon which school finance systems distribute funds in an equitable manner. The horizontal equity metrics in this section include range, restricted range, coefficient of variation, Gini Coefficient, McLoone Index, and Verstegen Index. The analysis of horizontal equity metrics utilized a school district's revenue per WADA at the compressed rate for each of the years 2006-2007 through 2010-2011. The intent of this analysis was to compare revenue schools districts were able to generate subsequent to the changes initiated by House Bill 1 in 2006 to determine if the school finance system has contributed to a more or less equitable funding mechanism. Additionally, the multiple measures of horizontal equity analysis as described in detail in Chapter Three determine what extent the school finance system in Texas meets established standards of equity.

The third section of this chapter discusses the analysis of vertical equity for the years 2006-2007 through 2010-2011. The analysis of school finance equalization measures, their effect on student performance as measured by standardized assessments, and the subsequent determination of the provision of adequate resources for those programs which have been identified for additional funding is included in this section. Regression analysis techniques were utilized as they allowed for the inclusion of school district characteristics. The school district population characteristics of percentages of students by race, students classified as limited English proficient, economically disadvantaged, at-risk, and those students receiving special education services were included in the analysis. Additionally, school district finance characteristics of revenue

per WADA at the compressed rate, M&O tax rate, and property wealth per WADA were included in regression analysis.

Fiscal Neutrality

The ability of school districts to generate revenue in Texas is primarily based on local property wealth and their corresponding tax rate; these two factors (independent variables) were assessed to determine if a relationship corresponds to their revenue per WADA at the compressed rate by fitting a linear equation to the observed data. Combined state and local revenue (revenue per WADA at the compressed rate) served as the dependent variable and property wealth per WADA and a school district's M&O tax rates served as the independent variables.

The independent variables were in entered in two stages, which are referred to as Model 1 and Model 2 (labeled Wealth/WADA and M&O Tax Rate respectively in Tables 5, 6, and 7). Property wealth per WADA was entered into regression equation for Model 1 and both independent variables (property wealth per WADA and M&O tax rate) were input for Model 2. A statistical test of the change in R^2 evaluated the importance of independent variables entered in the second stage (Model 2).

As reflected in Tables 5, 6, and 7, the strength of the relationship between the dependent variable and the independent variables were measured by R^2. R^2 measures the proportion of variability in the criterion variable that is accounted for by the predictor variables (Field, 2009; Hinkle, Wiersma, & Jurs, 2003). R^2 expressed as a percentage represents the percent of variation in the outcome explained by the model and as R^2 increases it provides a measure of the substantive size of the relationship (Field, 2009). R^2 values exceeding 80% indicate a strong relationship and R^2 values less than 50% are

generally considered to indicate a weak relationship. However, there are no commonly accepted established parameters for clear identification of strong or weak relationships since R^2 values fluctuate based on the type of data utilized in the linear regression models.

Both unstandardized and standardized coefficients (values) are included in the analysis. Unstandardized (*b*) coefficients indicate the amount of a one unit increase in the predictor variable and the resulting increase in the dependent variable while holding all other variables constant (Nathans, Oswald, & Nimon, 2012). Unstandardized coefficients have an associated standard error to determine if they are significantly different from zero (Field, 2009). Standardized beta (β) coefficients indicate the number of standard deviations that the dependent variable will change as a result of one standard deviation change in the predictor variable (Field, 2009). Standardized beta coefficients are utilized for their comparability across predictor variables due to being scaled in the same metric (Nathans, Oswald, & Nimon, 2012). According to Field (2009), "standardized beta values are all measured in standard deviation units and so are directly comparable: therefore, they provide a better insight into the importance of a predictor in the model" (p. 239).

Three separate analyses were performed for each year 2007-2008 through 2010-2011 for a total of 12 regressions. Only one regression was completed for 2006-2007 since full compression of a school district's M&O tax rate did not occur until 2007-2008. The first analysis included all school districts in Texas. The second analysis included all school districts taxing at the maximum allowable ($1.04 per $100 valuation of property) and below. The third analysis included all school districts taxing above $1.04. In order

to tax above $1.04 a tax ratification election is required in which voters who reside in the school district must approve a tax increase (maximum of 13 cents above $1.04).

All School Districts Analysis

For all regressions in Table 5 property wealth per WADA (Model 1) was statistically significant in accounting for the variability in the dependent variable (revenue per WADA at the compressed rate). In 2006-2007, property wealth per WADA accounted for just under half the variance for predicting revenue, $R^2 = .428$, $p < .001$. The property wealth per WADA value accounted for 43% of the variation in predicting a school district's revenue. The proportion of variation steadily declined reaching its lowest value in 2009-2010 ($R^2 = .276$, $p < .001$) and in the following year reached its highest level ($R^2 = .451$, $p < .001$). The unstandardized and standardized coefficients are positive for Model 1 indicating a direct relationship between property wealth per WADA and the revenue per WADA at the compressed rate. In 2010-2011, the standard deviation for revenue per WADA at the compressed rate was $902.59 (Table 8) and the corresponding standard deviation of property wealth per WADA was $464,652 (Table 5). Therefore, accounting for the property wealth per WADA standardized beta coefficient value ($\beta = .672$, $p < .001$) in 2010-2011, a $606.54 (.672 x $902.59) increase in revenue per WADA at the compressed rate would occur for every one standard deviation increase in property wealth per WADA values.

Model 2 for all school districts incorporated both predictor variables (property wealth per WADA and M&O Tax Rate) to determine their combined effect on the outcome variable of revenue per WADA at the compressed rate when each predictor

Table 5

Fiscal Neutrality Regression Analysis for all School Districts

	Model 1			Model 2		
	R^2	*b*	β	R^2	*b*	β
2006-2007			*N* = 1026			
Wealth/WADA	.427***	0.002	.654	.427	0.002	.661
M = 232,057		(0.00)	[27.66]***		(0.00)	[27.47]***
SD = 275,117						
M&O Tax Rate				.001	491.69	.036
M = 1.33					(332.77)	[1.48]
SD = 0.07						
TOTAL R^2				.429		
2007-2008			*N* = 1026			
Wealth/WADA	.345***	0.002	.587	.345	0.002	.584
M = 275,727		(0.00)	[23.22]***		(0.00)	[22.06]***
SD = 376,781						
M&O Tax Rate				.000	-220.29	-.012
M = 1.04					(485.75)	[0.45]
SD = 0.06						
TOTAL R^2				.345		
2008-2009			*N* = 1025			
Wealth/WADA	.300***	0.002	.548	.300	0.002	.530
M = 298,134		(0.00)	[20.93]***		(0.00)	[19.26]***
SD = 395,892						
M&O Tax Rate				.003	-1132.89	-.057
M = 1.05					(545.87)	[2.08]*
SD = 0.06						
TOTAL R^2				.303*		
2009-2010			*N* = 1025			
Wealth/WADA	.276***	0.001	.526	.276	0.001	.501
M = 346,599		(0.00)	[19.77]***		(0.00)	[18.2]**
SD = 472,317						
M&O Tax Rate				.006	-1567.9	-.081
M = 1.06					(538.77)	[2.91]*
SD = 0.07						
TOTAL R^2				.282**		
2010-2011			*N* = 1024			
Wealth/WADA	.451***	0.001	.672	.451	0.001	.647
M = 340,290		(0.00)	[28.98]***		(0.00)	[26.79]***
SD = 464,652						
M&O Tax Rate				.006	-1128.6	-.084
M = 1.06					(325.85)	[3.46]**
SD = 0.07						
TOTAL R^2				.457**		

Note. Standard error estimates are in parentheses and *t*-statistics are in brackets. Property Wealth per WADA and M&O Tax Rate are expressed as dollar amounts.
*$p < .05$. ** $p < .01$. ***$p < .001$.

variable was held constant. For 2006-2007 and 2007-2008 the addition of M&O tax rate as a predictor variable had no statistically significant effect on the outcome variable

of revenue per WADA at the compressed rate. For the years 2008-2009, 2009-2010, and 2010-2011, the cross sectional regressions revealed standardized beta coefficients for M&O tax rate for all school districts were statistically significant, $\beta = -.057$, $t = 2.08$, $p < .05$; $\beta = -.081$, $t = -2.91$, $p < .05$; and $\beta = -.084$, $t = -3.46$, $p < .01$ respectively. However, the lower magnitude of the *t*-statistics and higher magnitude standard error values associated with the unstandardized coefficients illustrated M&O tax rate as a predictor variable made no substantial contribution to the model. Additionally, as determined by the proportion of variance (Table 5), M&O tax rate's contribution for predicting the variability of revenue per WADA at the compressed rate was nominal. For example, in 2010-2011 the proportion of variance accounted for by property wealth per WADA in Model 2 ($R^2 = .451$) was more substantial than the proportion of variance for M&O tax rate ($R^2 = .006$). The two predictors in Model 2 combined for 46% of the variance. Thus, M&O tax rate accounted for less than 1% of the variance for predicting revenue per WADA at the compressed rate.

For the all school districts analysis the standard deviation of revenue per WADA at compressed rate was $902.59 (Table 8) in 2010-2011. Accounting for the Model 2 standardized beta coefficient for M&O tax rate ($\beta = -.084$, $t = -3.46$, $p < .01$) in 2010-2011, a $75.82 (-.084 x $902.59) decrease in a school district's revenue per WADA at the compressed rate would occur for every increase in one standard deviation of the M&O tax rate.

School Districts with an M&O Tax Rate Equal to or Less than $1.04 Analysis

The number of school districts taxing at $1.04 or less has decreased from an initial number of 904 in 2007-2008 to 753 in 2010-2011 (Table 6). This decrease is

attributable to an increased number of school successfully holding tax ratification elections in order to increase their tax rate above the maximum statutory amount of $1.04. For school districts with an M&O tax rate of $1.04 or less in Model 1, property wealth per WADA was statistically significant in predicting the variability of a school district's revenue per WADA at the compressed rate. From 2007-2008 to 2010-2011, the highest proportion of variance ($R^2 = .517$, $p < .001$) was observed in 2010-2011. Property wealth per WADA explained 52% of the variation in the revenue per WADA at the compressed rate. The associated unstandardized and standardized coefficients revealed property wealth per WADA was a significant predictor of revenue per WADA at the compressed rate ($b = .002$, $SE = .000$; $\beta = .719$, $t = 28.33$, $p < .001$).

For the school districts included in this subset of data ($n = 753$) the standard deviation for revenue per WADA at compressed rate in 2010-2011 was $1005.48 and the corresponding standard deviation for property wealth per WADA was $469,740. Accounting for the Model 1 property wealth per WADA standardized beta coefficient value ($\beta = .719$, $p < .001$) in 2010-2011, for every increase in one standard deviation of the property wealth per WADA, a $722.94 (.719 x $1005.48) increase in revenue per WADA at the compressed rate would occur.

The addition of M&O tax rate for Model 2 for school districts with an M&O tax rate of $1.04 or less in Table 6 demonstrated no statistically significant relationships existed for any of years included in the study. Therefore, Model 2 did not increase the predictive power through the addition of M&O tax rate. The exclusion of school districts taxing above $1.04 for this data set reduced the variation of school district M&O tax rates. In 2010-2011, of the 753 school districts included in this regression 654 of these

school districts were taxing at $1.04. The $1.04 tax cap created an artificial truncation (censoring) of the dataset, which resulted in the occurrence of overdispersion. As the number of districts taxing at a $1.04 increased each year, the ability to establish a link between revenue per WADA at the compressed rate and M&O tax rate was weakened.

Table 6

Fiscal Neutrality Regression Analysis for School Districts with an M&O Tax Rate Equal to or Less than $1.04

	Model 1			Model 2		
	R^2	*b*	β	R^2	*b*	β
2007-2008			*n* = 904			
Wealth/WADA	.348***	0.002	.590	.348	0.002	.602
M = 294,566		(0.00)	[21.95]***		(0.00)	[21.44]***
SD = 396,701						
M&O Tax Rate				.002	1127.86	.042
M = 1.03					(759.04)	[1.49]
SD = 0.04						
TOTAL R^2				.350		
2008-2009			*n* = 841			
Wealth/WADA	.304***	0.002	.551	.304	0.002	.545
M = 322,782		(0.00)	[19.14]***		(0.00)	[19.26]***
SD = 471,254						
M&O Tax Rate				.000	-653.96	-.020
M = 1.03					(1019.27)	[0.642]
SD = 0.04						
TOTAL R^2				.304		
2009-2010			*n* = 800			
Wealth/WADA	.311***	0.002	.558	.311	0.002	.549
M = 384,492		(0.00)	[19.00]***		(0.00)	[18.20]**
SD = 503,894						
M&O Tax Rate				.001	-913.18	-.033
M = 1.03					(860.67)	[1.06]
SD = 0.05						
TOTAL R^2				.312		
2010-2011			*n* = 753			
Wealth/WADA	.517***	0.002	.719	.517	0.002	.720
M = 383,088		(0.00)	[28.33]***		(0.00)	[27.60]***
SD = 469,740						
M&O Tax Rate				.000	67.95	.004
M = 1.03					(487.65)	[0.14]
SD = 0.05						
TOTAL R^2				.517		

Note. Standard error estimates are in parentheses and *t*-statistics are in brackets. Property Wealth per WADA and M&O Tax Rate are expressed as dollar amounts.
*$p < .05$. ** $p < .01$. ***$p < .001$.

School Districts with an M&O Tax Rate Greater than $1.04 Analysis

The number of school districts taxing above $1.04 has consistently risen from 171 in 2007-2008 to 271 in 2010-2011 (Table 7). As property taxes are a primary source of revenue for school districts, this increase was the result of school districts increasing tax rates in an effort to generate additional revenues. For Model 1, property wealth per WADA accounted for a significant amount of variability of the revenue per WADA at the compressed rate for school districts in this category for all years included in the study. The largest proportion of variance (R^2 = .240, p < .001) was observed in 2007-2008, which accounted for 24% of the variation in the revenue per WADA at the compressed rate. The proportion of variance in this category is lower than the two previously described samples (all school districts and school districts with an M&O tax rate equal to or less than $1.04). This reduction in the proportion of variance for this subset of data is attributable to the smaller sample size, which incorporated a decreased range of property wealth per WADA values.

In contrast to the previously discussed data sets, a significant change in variance occurred in Model 2 with the addition of M&O tax rate in 2009-2010 and 2010-2011. In 2010-2011, when both predictor variables are included (R^2 = .189 for property wealth per WADA and R^2 = .123 for M&O tax rate) they combine for the total variance, R^2 = .315, p < .001. Model 2 explained 32% of the variation in revenue per WADA at the compressed rate. The introduction of M&O tax rate for this selected year explained an additional 12% of variance for revenue per WADA at the compressed rate. The cross-sectional regressions for property wealth per WADA and M&O tax rate in 2010-2011 revealed statistically significant results. Property wealth per WADA as a predictor variable

remained statistically significant as illustrated by standardized beta coefficients (β = .336, $t = 6.39$, $p < .001$). The unstandardized and standardized coefficients for M&O tax rate ($b = -5010.79$, $SE = 723.49$; β = -.365, $t = -6.93$, $p < .001$) demonstrated M&O tax rate's effect on the predictive power of Model 2 as the number of school districts in this subset of the data increased. The negative unstandardized and standardized coefficient values for M&O tax rate indicated a substantial inverse relationship between a school district's tax rate and the revenue they are able to generate.

For the school districts included in this subset of data ($n = 271$), the standard deviation for revenue per WADA at compressed rate in 2010-2011 was $412.99. Utilizing the standardized beta coefficient for tax rate (β = -.365, $p < .01$) in 2010-2011, for every increase in one standard deviation of the M&O tax rate ($0.03), a $150.74 (-.365 x $412.99) decrease in a school district's revenue per WADA at the compressed rate would occur. Additionally, utilizing the standardized beta coefficient for property wealth per WADA (β = .336, $p < .001$) for Model 2 in 2010-2011, a $138.76 (.336 x $412.99) increase in a school district's revenue per WADA at the compressed rate would occur for every increase in one standard deviation of the property wealth per WADA (SD = $396,701). Both predictor variables in this example accounted for a significant amount of variability of the revenue per WADA at the compressed rate per school district.

Table 7

Fiscal Neutrality Regression Analysis for School Districts with an M&O Tax Rate Greater than $1.04

	Model 1			Model 2		
	R^2	*b*	β	R^2	*b*	β
2007-2008			*n* = 121			
Wealth/WADA	.240***	0.004	.490	.240	0.004	.490
M = 135,272		(0.00)	[6.13]***		(0.00)	[6.03]***
SD = 76,241						
M&O Tax Rate				.001	810.5	.028
M = 1.16					(2387.89)	[0.339]
SD = 0.02						
TOTAL R^2				.241		
2008-2009			*n* = 184			
Wealth/WADA	.163***	0.001	.404	.163	0.001	.368
M = 185,478		(0.00)	[5.96]***		(0.00)	[4.96]***
SD = 249,595						
M&O Tax Rate				.007	-2353.03	-.087
M = 1.16					(2005.11)	[1.17]
SD = 0.03						
TOTAL R^2				.170		
2009-2010			*n* = 225			
Wealth/WADA	.073***	0.001	.271	.073	0.001	.193
M = 211,868		(0.00)	[4.20]***		(0.00)	[18.20]**
SD = 301,270						
M&O Tax Rate				.051	-9607.18	-.240
M = 1.16					(2651.73)	[3.62]***
SD = 0.03						
TOTAL R^2				.125***		
2010-2011			*n* = 271			
Wealth/WADA	.192***	0.000	.439	.189	0.000	.336
M = 294,566		(0.00)	[8.01]***		(0.00)	[6.39]***
SD = 396,701						
M&O Tax Rate				.123	-5010.79	-.365
M = 1.16					(723.49)	[6.93]***
SD = 0.03						
TOTAL R^2				.315***		

Note. Standard error estimates are in parentheses and *t*-statistics are in brackets. Property Wealth per WADA and M&O Tax Rate are expressed as dollar amounts.

[a]*SE* equals $SD / \sqrt{N}$, thus estimates of standard errors less than 0.000 may be a function of sample size.

*$p < .05$. ** $p < .01$. ***$p < .001$.

Summary of Fiscal Neutrality

Fiscal neutrality regression analysis revealed property wealth per WADA accounted for a significant amount of variation of the revenue a school district is able to generate. As defined by Berne and Stiefel (1999), fiscal neutrality specifies that no

relationship should exist within a school district between the education of students and the property wealth where the students reside. This analysis of the funding mechanisms through multiple regression illustrated that the methods of determining revenue for school districts violated the principle of fiscal neutrality as defined by Berne and Stiefel.

Multiple regression analysis revealed for school districts taxing at or below the maximum allowable by current statute ($1.04 per $100 property valuation), M&O tax has no relationship to the revenue a school district generates. In 2009-2010 and 2010-2011 for the school districts who tax above $1.04, a significant negative relationship was found to exist between M&O tax rate and revenue per WADA at the compressed rate. From 2007-2008 to 2010-2011, the number of school districts taxing above $1.04 has risen 123%. As more school districts increase their M&O tax rate in the attempt to generate additional revenue the principle of fiscal neutrality is weakened.

Horizontal Equity

The analysis of horizontal equity utilized standard statistical dispersion methods as discussed in Chapter Three. A school district's revenue per WADA at the compressed rate was the primary unit of analysis for each statistical method. A five year trend analysis (2006-2007 through 2010-2011) is included for each statistical measure in this section. Total revenues per school district were measured independently by year to facilitate the development of possible trends or comparisons between years.

Over the period of study from 2006-2007 through 2010-2011 the mean for school district revenue remained relatively stable with overall increase of 3.3%, with 2.3% of this increase occurring from 2009-2010 to 2010-2011. The average mean revenue for school districts increased $293.81 from 2006-2007 to 2010-2011. Median revenues were

included in Table 8 to represent the statistic utilized for the calculation of McLoone Index and Verstegen Index. For the years from 2006-2007 to 2010-2011, the median revenue remained relatively stable with a maximum range of revenue of $13.47 between 2007-2008 and 2009-2010. From 2009-2010 to 2010-2011, the median revenue increased from $5004.83 to $5,163.77.

Table 8

Mean and Median for School District Revenue per WADA at the Compressed Rate

	2006-2007 *N* = 1026	2007-2008 *N* = 1026	2008-2009 *N* = 1025	2009-2010 *N* = 1025	2010-2011 *N* = 1024
Mean	$5275.76 (*SD* = 975.41)	$5254.59 (*SD* = 1081.64)	$5286.12 (*SD* = 1231.97)	$5329.62 (*SD* = 1360.0)	$5457.58 (*SD* = 902.59)
Median	$4997.35	$4991.36	$5002.81	$5004.83	$5163.77

Range and Restricted Range

The first equity calculation of range measured the difference between highest and lowest revenue per WADA at the compressed rate. As reflected in Table 9, the range of the revenue per WADA at the compressed rate increased 37.4% from 2006-2007 to 2009-2010, with a substantial a decrease from $17,030.70 in 2009-2010 to $9,196.76 in 2010-2011. This decrease in range was a result of the adjustment of revenues received by highest and lowest revenue school districts. In 2009-2010, the highest recorded revenue was $18,542.08, as compared to $13,121.86 in 2010-2011. Accordingly, the lowest revenue in 2009-2010 for a school district was $1,511.38, as compared to $3,925.10 in 2010-2011. As demonstrated by these examples range data is susceptible to the effects of outliers.

The restricted range measured the difference in revenue per WADA at the compressed rate at the 5th percentile and the 95th percentile of school districts when ranked by the amount of total combined local and state revenues they are able to generate. The removal of outliers through exclusion of revenues below the 5th percentile and above the 95th percentile for restricted range greatly reduced the revenue gap between school districts as compared to range. For the years from 2006-2007 to 2009-2010, restricted range increased 29%. Restricted range decreased dramatically from $3,369.33 in 2009-2010 to $2,203.03 in 2010-2011, which was a 35% decrease.

Table 9

Summary of the Range and Restricted Range for School Districts

Equity Measure	2006-2007 *N* = 1026	2007-2008 *N* = 1026	2008-2009 *N* = 1025	2009-2010 *N* = 1025	2010-2011 *N* = 1024
Range	$10,662.74	$12,171.66	$14,929.48	$17,030.70	$9,196.76
Restricted Range	$2,379.45	$2,661.52	$3,089.10	$3,369.33	$2,203.03

Coefficient of Variation and Gini Coefficient

The coefficient of variation equity statistic is determined by taking the standard deviation of the revenue per WADA at the compressed rate divided by the mean of per-student revenues to determine the percent variation in the distribution of revenues. According to Peterson (2011), a score of .1 or less is the research standard for equity. The analysis of the coefficient of variation in Table 10 demonstrated an overall decrease in equity from 2006-2007 to 2009-2010. The revenue per WADA at the compressed rate of school districts for the years included in the study as reflected in Table 10 do not meet the coefficient of variation established standard, despite the decrease to .166 in 2010-2011, which was the lowest value observed in the study.

Table 10

Summary of the Coefficient of Variation and the Gini Coefficient for School Districts

Equity Measure	2006-2007 *N* = 1026	2007-2008 *N* = 1026	2008-2009 *N* = 1025	2009-2010 *N* = 1025	2010-2011 *N* = 1024
Coefficient of Variation	.185	.206	.233	.255	.166
Gini Coefficient	.080	.090	.101	.110	.068

The Gini Coefficient is a numerical value used as a measure of the index of inequality in which values range from 0 to 1.0. According to Odden and Picus (2004), values less than .05 are most desirable. To achieve maximum equity for the Gini Coefficient the first 1% of individuals should receive 1% of funding; the first 2% of individuals should receive 2% of funding and continues accordingly (Peterson, 2011). In 2009-2010, the Gini Coefficient for revenue per WADA at the compressed rate for all school districts in Texas reached a maximum value of .110. In 2010-2011, the Gini Coefficient value decreased sharply to .068. The decrease of the Gini Coefficient in 2010-2011 is also reflected by corresponding decreases in range, restricted range, and the coefficient of variation. The aforementioned horizontal equity measures do not assess where in the system inequity exists. The inclusion of the McLoone Index and Verstegen Index allow for the assessment of the bottom and top half of the revenues school districts receive.

McLoone Index and Verstegen Index

According to Brownson (2002), "the McLoone Index examines revenue equity in bottom half of the distribution by comparing the sum of all values below the median to sum of all observations if they had the median" (p. 66). The inclusion of the number of students in each school district in the calculation of the McLoone Index determines the

total amount of revenues distributed on a weighted per student basis. A value of 1.0 represents perfect equity within the bottom half of the distribution. A value of .95 is the equity standard for the McLoone Index (Peterson, 2011). The McLoone Index consistently decreased from an initial value of .963 in 2006-2007 to .934 in 2009-2010, which represents an overall nominal decrease in equity in the bottom half of the distribution (Table 11). The McLoone Index reversed its decline in 2010-2011, with the highest value of .972 among the five years included in the study. Despite the increase in the McLoone Index for 2010-2011, in order to increase all school districts to the median revenue of $5163.77, it would require additional funding in the amount of $370,934,585. This calculation is based on the WADA of 2,610,439 for school districts in the bottom half of the distribution for the year 2010-2011.

The Verstegen Index is the converse of the McLoone Index for it measures the level of revenue of school districts in the upper half of the distribution. As with the McLoone Index a value of 1.0 for the Verstegen Index represents perfect equity within the distribution and a value of 1.05 is considered acceptable for the Verstegen Index (Peterson, 2011). To accomplish a value of 1.05, the revenue per WADA at the compressed rate based on the WADA for each district must be within 105% as compared to if all school districts were to receive median revenue per WADA at the compressed rate.

As shown in the Table 11, the Verstegen Index has risen consistently from an initial value of 1.104 in 2006-2007 to 1.176 in 2009-2010. In 2010-2011, the Verstegen Index dropped to a level below the value of the first year selected for study (2006-2007), with a value of 1.092. Despite the drop in Verstegen Index values for the years from

2006-2007 to 2010-2011, funding mechanisms have failed to meet an acceptable standard. For example, if the value of the Verstegen Index in 2010-2011 was reduced from 1.092 to an acceptable value of 1.05 for school districts in the upper half of the distribution, this results in a difference of $870,227,200 total excess revenue. This calculation is based on the WADA of 3,336,787 for school districts in the top half of the distribution for the year 2010-2011. This example illustrates the revenue school districts receive as determined by complex formulas are more inequitable in the upper half of the distribution as compared to the bottom half.

Table 11

Summary of the McLoone Index and Verstegen Index for School Districts

Equity Measure	2006-2007 *N* = 1026	2007-2008 *N* = 1026	2008-2009 *N* = 1025	2009-2010 *N* = 1025	2010-2011 *N* = 1024
McLoone Index	.963	.952	.947	.934	.972
Verstegen Index	1.103	1.125	1.154	1.176	1.092

Summary of Horizontal Equity

The analysis of horizontal equity measures demonstrate that the current system for funding school districts has not met established standards. House Bill 3646 which was authorized in 2009 modified current provisions in House Bill 1 (2006) by adjusting the basic allotment, guaranteed yield, equalized wealth levels, and the calculation of target revenues. House Bill 3646 infused $1.9 billion into public education in 2009-2010 in an attempt to impart additional revenues to improve equity by reducing the funding disparity between school districts with low target revenues. From 2006-2007 to 2009-2010, the horizontal equity metrics of range, restricted range, coefficient of variation, Gini Coefficient, McLoone Index, and Verstegen Index demonstrated a decrease in

horizontal equity. Despite the infusion of resources initiated by House Bill 3646, improvements in the horizontal equity measures observed in 2010-2011 exceed established standards. The analysis of the coefficient of variation points to lack of equity within the total system. The Verstegen Index revealed inequity exists more extensively in the top half of distribution relative to the median revenue per WADA at the compressed rate for these school districts. The McLoone Index exhibited a more equitable distribution of revenues compared to the median revenue per WADA at the compressed rate for the bottom half of the distribution. Horizontal equity analysis demonstrated the mechanisms by which the revenue school districts receive or are subject to recapture do not provide uniform levels of funding.

Vertical Equity

Hierarchical regression analysis was utilized in determining which independent variables (school district characteristics) contributed to the prediction of the dependent variable (TAKS performance). Hierarchical regression as a statistical method isolated the partial effects of school district characteristics simultaneously to determine their ability to predict TAKS performance. The independent variables of total revenues per student, school district finances, school district demographics, and school district populations were entered as blocks of predictor variables. Hierarchical regression allowed for the assessment of each block of predictor variables in terms of their ability to predict the dependent variable after the previous block of predictor variables were controlled for. The mean (*M*) for all continuous variables are presented in Table 12.

Statistical Mean for all Continuous Variables

The characteristics of school district finances (property wealth per WADA and M&O tax rate) have consistently risen from 2007-2008 to 2010-201l. Full compression of a school district's M&O tax rate did not occur until 2007-2008, which subsequently is reflected in the 2006-2007 M&O tax rates. From 2006-2007 to 2010-2011, property wealth per WADA values increased 46%. Property wealth in a school district and M&O tax rate determine the amount of local revenue school districts generate. Despite increases in both, the mean for revenue per WADA at the compressed rate for all school districts has increased nominally by 3% or approximately $180 per weighted student.

The school district demographics of the percentages of at-risk and limited English proficient students have remained relatively stable; however, the percent of economically disadvantaged students has increased 4.9 % from an initial value of 52.9% in 2006-2007 to 57.8% in 2010-2011. The percent of special education students has declined 2.7% from an initial value of 12.5% in 2006-2007 to a final value of 9.8% in 2010-2011. School district ethnicities represented by the percentages of African-American and Hispanic students have shown reverse trends. Over the five year period of study the percent of African-American students has declined from 8.2% to 7.2%, while the Hispanic population of students has risen from 32.6% to 36.1%. Hierarchical regression assesses the ability of school district characteristics on predicting TAKS performance for each year to determine the impact of consistently shifting school district characteristics.

Table 12

Statistical Mean for Continuous Variables Included in Hierarchical Regression Analysis

Continuous Variables	2006-2007		2007-2008		2008-2009		2009-2010		2010-2011	
	Grade 5 *N* = 999	Grade 8 *N* = 988	Grade 5 *N* = 1007	Grade 8 *N* = 989	Grade 5 *N* = 1000	Grade 8 *N* = 986	Grade 5 *N* = 1001	Grade 8 *N* = 989	Grade 5 *N* = 988	Grade 8 *N* = 980
	M									
TAKS	73.58	62.07	74.66	63.95	76.37	68.01	80.89	72.75	81.09	75.52
Revenue at Compressed Rate	5,279	5,265	5,256	5,249	5,281	5,285	5,347	5,334	5,446	5,444
Property Wealth per WADA	230,637	222,656	271,952	263,686	294,080	288,674	342,812	333,489	331,311	322,608
M&O Tax Rate	1.33	1.33	1.04	1.04	1.05	1.05	1.06	1.06	1.07	1.07
Economically Disadvantaged	52.92	53.01	52.48	52.40	53.37	53.47	56.91	56.94	57.57	57.75
At-Risk	41.37	41.46	40.79	40.91	40.81	40.98	39.90	40.11	39.08	39.40
Limited English Proficient	7.58	7.65	7.84	7.89	7.85	7.90	7.90	7.93	7.91	8.02
Special Education	12.49	12.51	11.48	11.51	10.65	10.65	10.13	10.16	9.80	9.81
African-American	8.19	8.22	8.07	8.15	8.03	8.10	7.21	7.28	7.14	7.21
Hispanic	32.59	32.68	33.33	33.23	34.10	34.15	35.06	35.09	36.06	36.24

Note. The Continuous Variables of TAKS, Economically Disadvantaged, At-Risk, Limited English Proficient, Special Education, African-American, and Hispanic are expressed as percentages. Revenue per WADA at the Compressed Rate, Property Wealth per WADA, and M&O Tax Rate are expressed as dollar amounts.

Multiple Regression Correlations between Continuous Variables

The goal of multiple regression analysis is to select effective predictor variables that account for the variance in the criterion variable which maximizes the multiple *R* (Hinkle, Wiersma, & Jurs, 2003). The correlations among continuous variables (TAKS performance grades 5 and 8, revenue per WADA at the compressed rate, property wealth per student, M&O tax rate, economically disadvantaged, at-risk, limited English proficient, special education, and ethnicities) selected for hierarchical regression analysis were examined and are presented in Table 13. Predictor variables should be highly correlated with the dependent or criterion variable and have low correlations among themselves (Hinkle, Wiersma, & Jurs, 2003).

Correlations between the predictor variables and criterion variables. Of the ten predictor variables in Table 13, seven of these variables (revenue per WADA at the compressed rate, economically disadvantaged, at-risk, limited English proficient, and all three ethnicities) were statistically correlated to grade 5 TAKS performance (criterion variable) from 2006-2007 through 2010-2011. The correlations for these seven predictor variables were weak to moderately strong, ranging from $r = .124$, $p < .01$ to $r = -.509$, $p < .01$. The predictor variables which exhibited consistent moderately strong correlations to TAKS performance were the percentages of economically disadvantaged students, at-risk, and White students. The three predictor variables of property wealth per WADA, M&O tax rate, and the percentage of special education students by school district were not statistically correlated to TAKS grade 5 performance for each of the years included in the study. The only year in which property wealth per WADA was not significantly correlated to grade 5 TAKS performance occurred in 2007-2008. Correlations between grade 5 TAKS performance and property wealth per WADA ranged from $r = .064$, $p < .01$ to $r = .187$, $p < .01$. M&O tax rate was not significantly correlated to the grade 5 TAKS performance in 2008-2009 and also in 2009-2010. In 2006-2007 and in 2010-2011, M&O tax rate exhibited a negative correlation to grade 5 TAKS performance at $r = -.081$, $p < .01$ and $r = -.100$, $p < .01$ respectively. The percent of special education students by district were not significantly correlated to the grade 5 TAKS performance in 2006-2007, 2008-2009, and 2008-2009. Very low negative correlations were observed between grade 5 TAKS performance and the percent of special education students by district in 2009-2010 and 2010-2011 at $r = -.069$, $p < .05$ and $r = -.093$, $p < .01$.

As reflected in Table 13, the same predictor variables (revenue per WADA at the compressed rate, economically disadvantaged, at-risk, limited English proficient, and all three ethnicities) which were statistically correlated to grade 5 TAKS performance for all years included in the study consistently demonstrated higher correlations to grade 8 TAKS performance. The correlations for these seven predictor variables were weak to moderately strong, ranging from $r = .176$, $p < .01$ to $r = -.580$, $p < .01$. As a predictor variable M&O tax rate was only significantly correlated to grade 8 TAKS performance in 2010-2011 ($r = .111$, $p < .05$). The predictor variables of the percentage of special education students and property wealth per WADA were significantly correlated four of the five years in included in this study to grade 8 TAKS performance (2007-2008 through 2010-2011). The percentages of special education students per school district were negatively correlated to grade 8 TAKS performance, ranging from $r = -.096$, $p < .01$ to $r = -.162$, $p < .01$. Except as described above all predictor variables were statistically correlated with grades 5 and 8 TAKS performance by school district. This indicates the data set was suitably correlated to the criterion variable for examination through multiple regression analysis to be reliably undertaken. It should be noted weak correlations exhibited by predictor variables to the criterion variable of TAKS performance reduce the predictive power of multiple regression analysis.

Correlations between predictor variables. The correlations amongst predictor variables (revenue per WADA at the compressed rate, property wealth per student, M&O tax rate, economically disadvantaged, at-risk, limited English proficient, special education, and ethnicity by race) were examined and are presented in Table 13. The statistically significant correlations for all predictor variables were very weak to very

strong, ranging from $r = .067$, $p < .05$ to $r = -.899$, $p < .01$. Statistically significant moderate positive correlations were observed between property wealth per WADA and the revenue a school district is able to generate, ranging from $r = .526$, $p < .01$ to $r = .654$, $p < .01$. Moderately strong correlations were observed between the percent of economically disadvantaged and at-risk students, ranging from $r = .457$, $p < .01$ to $r = .701$, $p < .01$. Both the percent of economically disadvantaged and at-risk students in a school district were also moderately correlated to the percent of limited English proficient students, ranging from $r = .457$, $p < .01$ to $r = .614$, $p < .01$. Additionally, the percentages of economically disadvantaged, at-risk, and limited English proficient students exhibited moderate correlations to the percent of Hispanic students per school district. These moderate to strongly moderate correlations ranged from $r = .457$, $p < .01$ to $r = .705$, $p < .01$.

Statistically significant low negative correlations were observed between M&O tax rate and property wealth per WADA and also between the percentages of economically disadvantaged students and both property wealth per WADA and revenue per WADA at the compressed rate. Additionally, the percentages of special education students per school district exhibited significant low negative correlations to property wealth per WADA, revenue per WADA at the compressed rate, and the percent of limited English proficient students. The aforementioned low negative correlations that were observed ranged from $r = -.088$, $p < .01$ to $r = -.317$, $p < .01$. Significant moderate negative correlations were observed between the percentages of White students per school district to the percentages of economically disadvantaged, at-risk, and limited English proficient students, ranging from $r = -.618$, $p < .01$ to $r = -.694$, $p < .01$. A very

Table 13

Hierarchical Regression Correlations for all Continuous Variables 2006-2007 through 2010-2011

Variables	Year	TAKS 5	TAKS 8	Revenue	Wealth	Tax Rate	Eco Dis	At-Risk	LEP	SPED	White	AA	Hisp
Revenue at Compressed Rate	06-07	.155**	.214**	1									
	07-08	.157**	.196**	1									
	08-09	.173**	.181**	1									
	09-10	.156**	.210**	1									
	10-11	.124**	.177**	1									
Wealth per WADA	06-07	.187**	.184**	.654**	1								
	07-08	-.032	.005	-.183**	1								
	08-09	.065*	.101**	.548**	1								
	09-10	.064*	.133**	.526**	1								
	10-11	.073*	.117**	.672**	1								
M &O Tax Rate	06-07	-.083**	-.054	-.088**	-.187**	1							
	07-08	.114**	.111*	.587**	-.293**	1							
	08-09	-.003	.000	-.223**	-.313**	1							
	09-10	-.050	.007	-.233**	-.304**	1							
	10-11	-.100**	-.021	-.276**	-.297**	1							
Economically Disadvantaged	06-07	-.507**	-.556**	-.270**	-.227**	.039	1						
	07-08	-.458**	-.517**	-.306**	.096**	-.227**	1						
	08-09	-.509**	-.580**	-.308**	-.239**	.084**	1						
	09-10	.501**	-.561**	-.303**	-.203**	-.097**	1						
	10-11	-.480**	-.555**	-.237**	-.208**	.090**	1						
At-Risk	06-07	-.439**	-.547**	-.196**	-.195**	.127**	.701**	1					
	07-08	-.400**	-.481**	-.209**	.050	-.195**	.703**	1					
	08-09	-.444**	-.512**	-.213**	-.203**	.067*	.705**	1					
	09-10	-.414**	-.475**	-.207**	-.181**	.044	.681**	1					
	10-11	-.424**	-.517**	-.167**	-.170**	.052	.687**	1					

*$p < .05$. **$p < .01$.

Table 13 *Continued*

Hierarchical Regression Correlations for all Continuous Variables 2006-2007 through 2010-2011

Variables	Year	TAKS 5	TAKS 8	Revenue	Wealth	Tax Rate	Eco Dis	At-Risk	LEP	SPED	White	AA	Hisp
Limited English Proficient	06-07	-.243**	-.271**	-.059	-.091**	.002	.513**	.601**	1				
	07-08	-.186**	-.191**	-.030	-.020	-.091**	.511**	.611**	1				
	08-09	-.181**	-.238**	-.020	-.098**	-.030	.498**	.602**	1				
	09-10	-.151**	-.208**	-.005	-.108**	-.039	.485**	.609**	1				
	10-11	-.161**	-.219**	-.083**	-.097**	-.043	.457**	.614**	1				
Special Education	06-07	.005	-.028	-.175**	-.158**	.039	.100**	.034	-.317**	1			
	07-08	-.050	-.162**	-.234**	.086**	-.184**	.108**	-.030	-.282**	1			
	08-09	-.050	-.096**	-.238**	-.171**	.091**	.102**	.010	-.282**	1			
	09-10	-.069*	-.148**	-.234**	-.160**	.134**	.117**	.016	-.289**	1			
	10-11	-.093**	-.144**	-.182**	-.128**	.106**	.138**	.015	-.276**	1			
White	06-07	.425**	.441**	.066*	.064*	-.073*	-.687**	-.671**	-.651**	.254**	1		
	07-08	.347**	.352**	.065*	-.010	.068*	-.694**	-.675**	-.650**	.219**	1		
	08-09	.389**	.460**	.060	.076*	.000	-.688**	-.658**	-.641**	.225**	1		
	09-10	.355**	.402**	.057	.090**	-.004	-.625**	-.649**	-.627**	.208**	1		
	10-11	.357**	.379**	.053	.077*	.020	-.623**	-.642**	-.619**	.194**	1		
African-American	06-07	-.222**	-.213**	-.099**	-.062*	.084**	.210**	.216**	-.002	.077*	-.262**	1	
	07-08	-.169**	-.181**	-.102**	-.010	-.073*	.230**	.223**	.020	.105**	-.269**	1	
	08-09	-.209**	-.207**	-.087*	-.078*	-.020	.424**	.227**	.040	.121**	-.268**	1	
	09-10	-.179**	-.176**	-.088**	-.084**	.003	.237**	.226**	.058	.120**	-.278**	1	
	10-11	-.159**	-.200**	-.096**	-.075*	-.022	.240**	.214**	.064*	.134**	-.275**	1	
Hispanic	06-07	-.345**	-.364**	-.033	-.047	.032	.626**	.596**	.658**	-.278**	-.896**	-.186**	1
	07-08	-.295**	-.294**	-.040	.02	-.050	.629**	.601**	.648**	-.255**	-.898**	-.175**	1
	08-09	-.322**	-.398**	-.040	-.050	.010	.619**	.582**	.632**	-.269**	-.899**	-.171**	1
	09-10	.297**	-.347**	-.040	-.057	.002	.588**	.574**	.612**	-.261**	-.897**	-.162**	1
	10-11	-.318**	-.318**	-.014	-.048	-.016	.599**	.571**	.599**	-.253**	-.899**	-.163**	1

*$p < .05$. **$p < .01$.

high negative correlation was observed each year (r = -.899 for 2010-2011, $p < .01$) between the percentages of Hispanic students and White students in each school district. High correlations between predictor variables affect the ability of multiple regression analysis to determine the importance of the correlated variables. According to Tabachnick and Fidell (2001), when a bivariate correlation is too high (.90 or above) the deletion of one the redundant variables would solve the potential issue of collinearity. Alternatively, due to the very high correlation value between these two variables the regression model could include each one of variables interchangeably (Field, 2009). The ethnicity variable of the percentage of White students in each school district was removed prior to hierarchical regression. The percentage of Hispanic students for each district remained in the analysis to ascertain if the state is providing adequate funding to those students in which a documented achievement gap exists. Collinearity will not be an issue after the exclusion of the percentage of White students as a predictor variable in the hierarchical regression.

The aforementioned results from the correlation matrix reveal only bivariate collinearity. The assessment of multivariate multicollinearity in linear regression occurs through the analysis of the Variance Inflation Factor (VIF) and tolerance. These measures are widely used to measure the degree of multicollinearity between the independent variables (O'Brien, 2007).

Hierarchical Regression Analysis

Initial analyses were conducted to ensure no violations of the assumptions of the multiple regression analysis. Specifically, the multiple regression assumptions of linearity, homoskedacity, outliers, and multicollinearity were scrutinized to assess the

distribution of scores and the nature of the relationship between the variables. For each year of analysis included in the study a normal probability plot (P-P) and a scatterplot of the regression standardized residuals were analyzed to ensure linearity and homoskedacity. Additionally, the analysis of standardized residuals greater than 3.3 and less than -3.3 occurred to determine the presence of outliers. According to Tabachnick and Fidell (2001), standardized residuals greater 3.3 or less than -3.3 indicate outliers. All values with standardized residuals exceeding the established range were removed prior to data analysis. VIF and tolerance values offer a clear interpretation on the effects of the multicollinearity (O'Brien, 2007). VIF and tolerance values were analyzed to detect the presence of multicollinearity. The rule of 10 is a threshold established as indicating severe multicollinearity (O'Brien, 2007). No VIF values within study approached the value of 10.

Unstandardized and standardized coefficients (values) are included in the hierarchical regression analysis for predicting TAKS performance proxied by school district characteristics. While holding all other variables constant, unstandardized (*b*) coefficients indicate the amount of a one unit increase in the predictor variable and the resulting increase in the dependent variable (Nathans, Oswald, & Nimon, 2012). A standard error is included for each unstandardized coefficient. Standardized (β) beta coefficients represent the number of standard deviations that the outcome variable (TAKS performance) will change as a result in one standard deviation change in the predictor variable (Field, 2009). The *t*-statistics associated with the standardized beta coefficients reveal the magnitude of the contribution of the predictor variable.

Model 1 hierarchical regression analysis. Model 1, as shown in Table 14, displays the effects of a school district's revenue at the compressed rate on student TAKS performance in grades 5 and 8. Model 1 standardized beta coefficients for revenue per WADA at the compressed rate for all years and grades included in the study are statistically significant at the $p < .001$ level and ranged from $\beta = .124$, $p < .001$ to $\beta = .216$, $p < .001$. Although the unstandardized coefficients have a low standard error value and the standardized beta coefficients are statistically significant, the predictor variable of revenue per WADA at the compressed rate exhibited little effect on TAKS performance for both grades 5 and 8. The highest R^2 value ($R^2 = .047$, $p < .001$) for Model 1 corresponding to grade 8 TAKS performance occurred in 2006-2007. Accordingly, this R^2 value of .047 accounted for only 4.7% of the variance in TAKS performance utilizing revenue per WADA at the compressed rate as the predictor variable. Expressing R^2 as a percentage represents the percentage of the variation the outcome variable (TAKS performance) that is explained by the model (Field, 2009). All *t*-statistics and R^2 are larger for grade 8 TAKS performance than grade 5, which indicated that the predictor variable of revenue per WADA at the compressed rate contributed more significantly to the ability to predict values of grade 8 TAKS performance. As referenced in Table 12, student performance on TAKS are historically lower for grade 8 than grade 5. The increased rigor of grade 8 assessments as demonstrated by the variation in TAKS performance increase the predictive power of the hierarchical regression model.

Table 14

Model 1 Summary of Hierarchical Regression Analysis for predicting TAKS Performance 2006-2007 through 2010-2011

	Model 1							
	Grade 5				Grade 8			
Revenue	*b*	β	R^2	F Change	*b*	β	R^2	F Change
2006-2007		*N* = 999				*N* = 988		
	0.002	.156	.024	24.87***	0.003	.196	.047	48.48***
	(0.00)	[4.99]***			(0.00)	[6.27]***		
2007-2008		*N* = 1007				*N* = 989		
	0.002	.157	.025	25.39***	0.003	.196	.038	39.32***
	(0.00)	[5.04]***			(0.00)	[6.27]***		
2008-2009		*N* = 1000				*N* = 986		
	0.002	.173	.030	30.93***	0.002	.181	.033	33.27***
	(0.00)	[5.56]***			(0.00)	[5.77]***		
2009-2010		*N* = 1001				*N* = 989		
	0.001	.159	.024	24.96***	0.002	.210	.044	45.49***
	(0.00)	[5.00]***			(0.00)	[6.75]***		
2010-2011		*N* = 988				*N* = 980		
	0.002	.124	.015	15.30***	0.003	.178	.032	31.88***
	(0.00)	[3.91]***			(0.00)	[5.65]***		

Note. Standard error estimates are in parentheses and *t*-statistics are in brackets.
*$p < .05$. ** $p < .01$. ***$p < .001$.

Model 2 hierarchical regression analysis. Model 2, as shown in Table 15, incorporated the finance characteristics of property wealth per WADA and the M&O tax rate of school districts. Overall, as shown in Model 2, the predictor variables of property wealth per WADA and M&O tax rate in combination with revenue per WADA at the compressed rate made no significant contribution in predicting TAKS performance in all years, except grade 5 in 2006-2007. For grade 5 TAKS performance in 2006-2007, the addition of school district finance characteristics accounted for an increase in R^2 from 2.4% in Model 1 to 4.0% in Model 2. Despite no significant contribution of school district finance characteristics in predicting TAKS performance for Model 2, the cross sectional regressions for TAKS performance remained statistically significant to revenue per WADA at the compressed rate for school districts, except for grade 5 TAKS

performance in 2006-2007. The regression coefficients with their associated standard error values and absolute values of the *t*-statistics for revenue per WADA at the compressed rate in Model 2 remained consistent throughout the period of study. Relatively small absolute values of the *t*-statistics indicated a lower magnitude effect and ranged from $t = 2.78$, $p < .01$ to $t =$ to 5.28, $p < .001$.

Table 15

Model 2 Summary of Hierarchical Regression Analysis for predicting TAKS Performance 2006-2007 through 2010-2011

Variable	Model 2			
	Grade 5		Grade 8	
	b	β	*b*	β
2006-2007	*N* = 999		*N* = 988	
Revenue	0.001 (0.00)	.062 [1.51]	0.003 (0.00)	.170 [4.08]***
Wealth per WADA	7.51 x 10^{-6} (0.00)	.138 [3.35]***	3.99 x 10^{-6} (0.00)	.060 [1.56]
M&O Tax Rate	-11.100 (6.83)	-.051 [1.62]	-7.109 (7.23)	-.031 [0.98]
R^2	.040		.051	
F Change	7.99***		2.09	
2007-2008	*N* = 1007		*N* = 989	
Revenue	0.002 (0.00)	.140 [3.55]***	0.003 (0.00)	.204 [5.16]***
Wealth per WADA	-1.07 x 10^{-6} (0.00)	.029 [0.71]	-1.29 x 10^{-7} (0.00)	-.003 [0.07]
M&O Tax Rate	0.807 (7.61)	.003 [0.11]	10.032 (8.74)	.038 [1.15]
R^2	.025		.040	
F Change	0.25		0.73	
2008-2009	*N* = 1000		*N* = 986	
Revenue	0.002 (0.00)	.195 [5.28]***	0.002 (0.00)	.186 [4.87]***
Wealth per WADA	-1.08 x 10^{-6} (0.00)	-.032 [0.84]	4.15 x 10^{-7} (0.00)	.011 [0.29]
M&O Tax Rate	5.376 (7.04)	.025 [0.76]	10.774 (7.45)	.048 [1.45]
R^2	.032		.035	
F Change	0.85		1.05	
2009-2010	*N* = 1001		*N* = 989	
Revenue	0.001 (0.00)	.168 [4.54]***	0.002 (0.00)	0.202 [5.45]***
Wealth per WADA	-7.99 x 10^{-7} (0.00)	-.031 [0.83]	1.40 x 10^{-6} (0.00)	0.047 [1.25]
M&O Tax Rate	-3.278 (5.57)	-.019 [0.59]	13.893 (6.32)	0.072 [2.20]*
R^2	.025		.049	
F Change	0.46		2.70	
2010-2011	*N* = 988		*N* = 980	
Revenue	0.001 (0.00)	.117 [2.78]**	0.003 (0.00)	.198 [4.35]***
Wealth per WADA	-4.29 x 10^{-7} (0.00)	-.017 [0.40]	-6.12 x 10^{-6} (0.00)	-.018 [0.39]
M&O Tax Rate	-12.654 (4.84)	-.074 [2.25]*	6.262 (6.76)	.030 [0.93]
R^2	.017		.035	
F Change	2.54		0.596	

Note. Standard error estimates are in parentheses and *t*-statistics are in brackets.
*$p < .05$. ** $p < .01$. ***$p < .001$.

Model 3 hierarchical regression analysis. Model 3, as shown in Table 16, incorporated the school district demographics of the percentages of students who are classified as economically disadvantaged, at-risk, limited English proficient, or receiving special education services. The addition of school district demographic characteristics in Model 3 contributed significantly in predicting the variation in TAKS performance. After the inclusion of school district characteristics, the R^2 values in Model 3 explained a minimum of 23.5% of the variance on grade 5 TAKS performance in 2007-2008 to a maximum of 37.7% on grade 8 TAKS performance in 2006-2007. All R^2 values fall within this range for each grade and year included in the study.

In the cross-sectional regressions for Model 3 the unstandardized and standardized coefficients for the predictor variables (school district demographics) note the presence or absence of significant relationships to the criterion variable of TAKS performance. The school district demographic characteristics of the percent of economically disadvantaged and at-risk students within a school district exhibited a negative correlation to TAKS performance. The school district demographic characteristics of the percent economically disadvantaged students in a school district exhibited the largest standardized beta coefficients, ranging from $\beta = -.366$, $p < .001$ (Grade 8 in 2007-2008) to $\beta = -.470$, $p < .001$ (Grade 8 in 2008-2009). The predictor variable of the percent of at-risk students in a school district accounted for the next largest amount of variability in Model 3. All standardized beta coefficients for the percent of at-risk students ranged from $\beta = -.194$, $p < .001$ (Grade 5 in 2006-2007) to $\beta = -.377$, $p < .001$ (Grade 8 in 2006-2007).

Table 16

Model 3 Summary of Hierarchical Regression Analysis for predicting TAKS Performance 2006-2007 through 2010-2011

Variable	Model 3			
	Grade 5		Grade 8	
	b	β	*b*	β
2006-2007	*N* = 999		*N* = 988	
Revenue	-0.001 (0.00)	-.049 [1.35]	0.001 (0.00)	.047 [1.37]
Wealth per WADA	5.43 x 10^{-6} (0.00)	.100 [2.79]**	3.77 x 10^{-7} (0.00)	.006 [0.18]
M&O Tax Rate	-7.094 (5.94)	-.033 [1.19]	-0.686 (5.93)	-.003 [0.16]
Economically Disadvantaged	-0.351 (0.03)	-.436 [10.90]***	-0.298 (0.03)	-.369 [9.70]***
At-Risk	-0.216 (0.05)	-.194 [4.68]***	-0.421 (0.04)	-.374 [9.55]***
Limited English Proficient	0.212 (0.06)	.130 [3.50]**	0.263 (0.06)	.164 [4.63]***
Special Education	0.345 (0.14)	.076 [2.54]	0.193 (0.13)	.042 [1.50]
R^2	.289		.377	
F Change	86.75***		128.04***	
2007-2008	*N* = 1007		*N* = 989	
Revenue	4.41 x 10^{-5} (0.00)	.003 [0.10]	0.000 (0.00)	.028 [0.81]
Wealth per WADA	4.28 x 10^{-7} (0.00)	.012 [0.32]	-1.93 x 10^{-6} (0.00)	-.045 [1.30]
M&O Tax Rate	3.899 (6.78)	.017 [0.58]**	12.412 (7.35)	.046 [1.67]
Economically Disadvantaged	-0.275 (0.03)	-.379 [9.13]***	-0.293 (0.04)	-.366 [9.16]***
At-Risk	-0.228 (0.04)	-.225 [5.26]***	-0.382 (0.05)	-.339 [8.31]***
Limited English Proficient	0.223 (0.06)	.155 [3.98]***	0.280 (0.06)	.179 [4.89]***
Special Education	0.083 (0.14)	.019 [0.60]	-0.482 (0.15)	-.097 [3.31]***
R^2	.235		.334	
F Change	68.49***		108.24***	
2008-2009	*N* = 1000		*N* = 986	
Revenue	0.000 (0.00)	.030 [0.91]	3.72 x 10^{-5} (0.00)	.003 [0.10]
Wealth per WADA	-2.35 x 10^{-6} (0.00)	-.070 [2.13]*	-1.63 x 10^{-6} (0.00)	-.045 [1.39]
M&O Tax Rate	5.898 (6.02)	.027 [0.98]**	6.883 (6.02)	.031 [1.14]
Economically Disadvantaged	-0.305 (0.03)	-.436 [10.85]***	-0.341 (0.03)	-.470 [12.17]***
At-Risk	-0.258 (0.04)	-.263 [6.37]***	0.283 (0.04)	.277 [6.91]***
Limited English Proficient	0.285 (0.05)	.202 [5.52]***	0.228 (0.05)	.156 [4.45]***
Special Education	0.188 (0.14)	.039 [1.34]	-0.115 (0.14)	-.023 [3.11]
R^2	.301		.375	
F Change	95.43***		133.14***	
2009-2010	*N* = 1001		*N* = 989	
Revenue	-3.37 x 10^{-5} (0.00)	-.004 [0.12]	9.99 x 10^{-5} (0.00)	.010 [0.32]
Wealth per WADA	-1.19 x 10^{-6} (0.00)	-.047 [1.44]	3.07 x 10^{-7} (0.00)	.010 [0.33]
M&O Tax Rate	-2.280 (4.78)	-.014 [0.48]	14.79 (5.23)	.077 [2.83]**
Economically Disadvantaged	-0.302 (0.03)	-.456 [11.7]***	-0.334 (0.03)	-.460 [12.13]***
At-Risk	-0.224 (0.04)	-.249 [6.04]***	-0.244 (0.04)	-.247 [6.20]***
Limited English Proficient	0.296 (0.05)	.232 [6.13]***	0.216 (0.05)	.155 [4.26]***
Special Education	0.183 (0.14)	.040 [1.32]	-0.313 (0.15)	-.061 [2.13]*
R^2	.291		.357	
F Change	93.29***		117.16***	
2010-2011	*N* = 988		*N* = 980	
Revenue	0.000 (0.00)	.020 [0.55]	0.002 (0.00)	.112 [3.05]**
Wealth per WADA	-1.58 x 10^{-6} (0.00)	-.062 [1.71]	3.37 x 10^{-6} (0.00)	-.106 [2.84]**
M&O Tax Rate	-10.39 (4.84)	.060 [2.15]*	6.175 (5.46)	.033 [1.24]
Economically Disadvantaged	-0.237 (0.02)	-.388 [10.07]***	-0.271 (0.03)	-.383 [10.42]***
At-Risk	-0.243 (0.04)	-.296 [7.03]***	-0.345 (0.04)	-.362 [9.08]***
Limited English Proficient	0.243 (0.05)	.202 [5.43]***	0.239 (0.05)	.173 [4.95]***
Special Education	0.056 (0.14)	.012 [0.42]	-0.279 (0.15)	-.053 [1.89]
R^2	.282		.347	
F Change	91.55**		155.89**	

Note. Standard error estimates are in parentheses and *t*-statistics are in brackets.

[a]*SE* equals $SD / \sqrt{N}$, thus estimates of standard errors less than 0.000 may be a function of sample size.

*$p < .05$. ** $p < .01$. ***$p < .001$.

As previously referenced in Table 13, the percentage of limited English proficient students in a school district has a negative correlation to TAKS performance in both grades 5 and 8 for all years included in the study. When the predictor variable of limited English proficient is utilized in combination (hierarchical regression analysis) with the remaining predictor variables in Model 3 (Table 16), the resulting standardized beta coefficient is positive. According to Tabachnick and Fidell (2001), the identification of a possible suppression variable occurs when the variable's Pearson correlation and its beta coefficient have different signs. No relationship existing among variables to having a relationship among variables is also an indicator of suppression. Inclusion of a suppressor variable has a negative effect of enhancing predictive power and increasing R^2 (Meyers, Gamst, & Guarino, 2006). The predictor variable of limited English proficient accounts for majority of the suppression effect, but results suggest the variable of special education accounts may act as a suppressor variable as well. As a result, the predictor variable of limited English proficient does not fully capture the suppressor effect; however, the strength of the predictive power of the predictor variables of economically disadvantaged and at-risk students minimize the suppression effect.

Model 4 hierarchical regression analysis. Model 4, as shown in Table 17, incorporated school district ethnicity percentages by race. Specifically, the percentages of African-American and Hispanic students for each school district were included the regression analysis. As previously discussed, the percent of White students per school district was removed due to collinearity being present between the percent of Hispanic and White students in school districts. The addition of school district ethnicity by race did not substantially increase the predictive power of Model 4, as marginal increases in

Table 17

Model 4 Summary of Hierarchical Regression Analysis for predicting TAKS Performance 2006-2007 through 2010-2011

Variable	Model 4			
	Grade 5		Grade 8	
	b	β	*b*	β
2006-2007	*N* = 999		*N* = 988	
Revenue	-0.001 (0.00)	-.043 [1.20]	0.001 (0.00)	.046 [1.33]
Wealth per WADA	5.92×10^{-6} (0.00)	.109 [3.06]**	7.90×10^{-7} (0.00)	.013 [0.38]
M&O Tax Rate	-5.008 (5.90)	-.023 [0.85]	0.632 (5.93)	.003 [0.11]
Economically Disadvantaged	-0.286 (0.04)	-.355 [7.75]***	-0.269 (0.04)	-.332 [7.53]***
At-Risk	-0.160 (0.05)	-.144 [3.37]***	-0.394 (0.05)	-.350 [8.63]***
Limited English Proficient	0.228 (0.06)	.141 [3.61]***	0.259 (0.06)	.161 [4.33]***
Special Education	0.222 (0.01)	.049 [1.57]	0.143 (0.01)	.032 [1.06]
Hispanic	-0.075 (0.03)	-.136 [2.85]**	-0.029 (0.03)	-.052 [1.13]
African-American	-0.174 (0.04)	-.140 [4.43]***	-0.103 (0.04)	-.082 [2.73]**
R^2	.303		.381	
F Change	10.22***		3.75*	
2007-2008	*N* = 1007		*N* = 989	
Revenue	0.000 (0.00)	.009 [0.24]	0.000 (0.00)	.028 [0.81]
Wealth per WADA	4.65×10^{-7} (0.00)	.013 [0.34]	-2.00×10^{-6} (0.00)	-.045 [1.31]
M&O Tax Rate	3.475 (6.78)	.015 [0.52]	12.097 (7.36)	.045 [1.64]
Economically Disadvantaged	-0.244 (0.04)	-.337 [7.04]***	-0.293 (0.04)	-.360 [7.80]***
At-Risk	-0.203 (0.05)	-.201 [4.53]***	-0.382 (0.05	-.334 [7.92]***
Limited English Proficient	0.236 (0.06)	.164 [4.01]***	0.280 (0.06)	.176 [4.55]***
Special Education	0.032 (0.01)	.007 [0.22]	-0.479 (0.02)	-.096 [3.18]**
Hispanic	-0.036 (0.02)	-.073 [1.50]	-0.002 (0.03)	-.003 [0.07]
African-American	-0.073 (0.04)	-.064 [1.98]	-0.029 (0.04)	-.023 [0.73]
R^2	.238		.334	
F Change	2.18		0.73	
2008-2009	*N* = 1000		*N* = 986	
Revenue	0.000 (0.00)	.041 [1.22]	0.000 (0.00)	.017 [0.82]
Wealth per WADA	-2.26×10^{-6} (0.00)	-.070 [2.14]*	-1.47×10^{-6} (0.00)	-.040 [1.27]
M&O Tax Rate	4.976 (6.00)	.023 [0.83]	6.582 (5.98)	.029 [1.10]
Economically Disadvantaged	-0.262 (0.03)	-.374 [8.01]***	-0.273 (0.03)	-.376 [8.48]***
At-Risk	-0.228 (0.04)	-.233 [5.50]***	-0.243 (0.04)	-.238 [5.84]***
Limited English Proficient	0.301 (0.05)	.214 [5.59]***	0.278 (0.05)	.191 [5.23]***
Special Education	0.115 (0.01)	.024 [0.79]	-0.259 (0.01)	-.051 [1.76]**
Hispanic	-0.047 (0.02)	-.098 [2.12]*	-0.087 (0.02)	-.173 [3.98]**
African-American	-0.108 (0.04)	-.096 [3.07]**	-0.106 (0.03)	-.092 [3.11]**
R^2	.308		.386	
F Change	5.03**		8.96***	
2009-2010	*N* = 1001		*N* = 989	
Revenue	1.50×10^{-5} (0.00)	.002 [0.05]	0.000 (0.00)	.019 [0.58]
Wealth per WADA	-1.21×10^{-6} (0.00)	-.048 [1.46]	3.59×10^{-7} (0.00)	.012 [0.39]
M&O Tax Rate	-2.522 (4.78)	-.015 [0.53]	14.828 (5.22)	.077 [2.84]**
Economically Disadvantaged	-0.278 (0.03)	-.420 [9.50]***	-0.295 (0.03)	.406 [9.40]***
At-Risk	-0.206 (0.04)	-.229 [5.38]***	-0.221 (0.04)	-.224 [5.47]***
Limited English Proficient	0.306 (0.05)	.240 [6.15]***	0.247 (0.05)	.177 [4.71]***
Special Education	0.143 (0.01)	.031 [1.00]	-0.414 (0.02)	-.081 [2.71]**
Hispanic	-0.028 (0.02)	-.062 [1.40]	-0.053 (0.02)	-.108 [2.55]**
African-American	-0.064 (0.03)	-.061 [1.99]*	-0.052 (0.03)	-.045 [1.53]
R^2	.295		.361	
F Change	2.15		3.35*	

Note. Standard error estimates are in parentheses and *t*-statistics are in brackets.

[a]*SE* equals $SD / \sqrt{N}$, thus estimates of standard errors less than 0.000 may be a function of sample size.

*$p < .05$. ** $p < .01$. ***$p < .001$.

Table 17 *Continued*

Model 4 Summary of Hierarchical Regression Analysis for predicting TAKS Performance 2006-2007 through 2010-2011

Variable	Model 4			
	Grade 5		Grade 8	
	b	β	*b*	β
2010-2011	*N* = 988		*N* = 980	
Revenue	0.000 (0.00)	.029 [0.79]	0.002 (0.01)	.115 [3.09]**
Wealth per WADA	-1.55 x 10^{-6} (0.00)	-.060 [1.68]	-3.58 x 10^{-6} (0.00)	-.105 [2.84]**
M&O Tax Rate	-10.815 (4.82)	-.063 [2.24]*	6.175 (5.46)	.030 [1.13]
Economically Disadvantaged	-0.199 (0.03)	-.326 [7.67]***	-0.252 (0.03)	-.357 [8.83]***
At-Risk	-0.214 (0.04)	-.261 [6.03]**	-0.329 (0.04)	-.346 [8.40]***
Limited English Proficient	0.283 (0.05)	.235 [6.09]***	0.253 (0.05)	.184 [5.04]***
Special Education	-0.050 (0.01)	-.011 [0.36]	-0.311 (0.02)	-.059 [2.04]*
Hispanic	-0.058 (0.02)	-.140 [3.26]**	-0.025 (0.02)	-.053 [1.31]
African-American	-0.062 (0.03)	-.062 [2.01]**	-0.053 (0.03)	-.046 [1.60]
R^2	.295		.349	
F Change	5.59**		0.844	

Note. Standard error estimates are in parentheses and *t*-statistics are in brackets.
[a]*SE* equals *SD* / $\sqrt{N}$, thus estimates of standard errors less than 0.000 may be a function of sample size.
*p < .05. ** p < .01. ***p < .001.

R^2 were observed. For example, in Model 3 R^2 = .289 for grade 5 in 2006-2007, with the inclusion of ethnicity in Model 4 the R^2 value for the same subset of data increased to R^2 = .303. This resulted in a 1.4% increase in variance from 28.9 % in Model 3 to 30.3% in Model 4. As reflected in Table 17, this was highest increase in variance that produced a statistically significant increase.

Cross-sectional regression coefficients revealed both the percent of African-American and Hispanic students in a school district exhibited a negative correlation to grades 5 and 8 TAKS performance. Standardized beta coefficients ranged from β = -.051, p < .01 to β = -.173, p < .001, but corresponding *t*-statistics ranging from t = 1.76 to t = 4.43 revealed a very low magnitude effect on predicting grades 5 and 8 TAKS performance. In the cross-sectional regressions it is interesting to note the percent of special education students in a school district, as demonstrated by the standardized beta coefficients, were statistically significant for grade 8 TAKS performance, ranging from β = -.051, p < .001

to $\beta = -.096$, $p < .001$ in four of the five years included in the study. However, no statistically significant results were found among the percent of special education students in school districts and grade 5 TAKS performance.

Summary of Vertical Equity

Hierarchical regression analysis revealed specific characteristics of school districts account for a significant amount of variability in TAKS performance for both grades 5 and 8. The regression analysis model demonstrated an increased predictive power for grade 8 TAKS performance versus grade 5. The R^2 values for each of the four models were consistently higher for grade 8 TAKS performance than grade 5. As the predictor variables (revenue, school district finances, school district demographics, and school district ethnicity) were added progressively the predictive power of revenue per WADA at the compressed rate diminished. The school district finance characteristics of property wealth per WADA and M&O tax rate expressed no significant effect on predicting TAKS performance. As the school district demographics of the percentages of economically disadvantaged and at-risk students for school districts were input into the model, these two characteristics dramatically increased the predictive power by accounting for an increased percentage in variance. These two characteristics demonstrated a statistically significant amount of the variability in TAKS performance. School district ethnicity based on the percent of African-American and Hispanic students exhibited negative relationships to TAKS performance and nominally increased the predictive power of the Model 4.

Chapter Summary

The analysis of fiscal neutrality, horizontal equity, and vertical equity utilized commonly accepted methods of statistical analysis to assess of health of school funding mechanisms in Texas since 2006. The assessment of fiscal neutrality through regression analysis illustrated a school district's property wealth per WADA explained a significant amount variance in the revenue a school district was able to generate. A school district's M&O tax rate also explained a significant amount of variation in the revenue per WADA at the compressed rate for those school districts taxing above $1.04. When school districts tax above $1.04 a negative relationship was shown to exist to the amount of total combined state and local revenues they receive. The utilization of the Verstegen Index to assess horizontal equity determined disproportionate amounts of revenue were found to exist in the top half of the distribution of resources. Until 2010-2011, all measures included in the study (range, restricted range, the coefficient of variation, Gini Coefficient, McLoone Index, and Verstegen Index) confirmed a weakening in horizontal equity among public school districts in Texas. Vertical equity analysis through hierarchical regression illustrated a school district's decreased performance on TAKS are primarily linked to students who are classified as economically-disadvantaged, at-risk, Hispanic, or African-American. The vertical equity analysis results clearly point to a deficiency in funding for economically disadvantaged and at-risk students.

CHAPTER 5

INTERPRETATIONS AND RECOMMENDATIONS

Introduction

The purpose of this study was the assessment of the provision of an equitable system of education by analyzing the methods through which financial resources were allocated to school districts in Texas (2006-2007 through 2010-2011 school years). Berne and Stiefel (1984) proposed three principles to determine the equity within a school funding system: fiscal neutrality, horizontal equity, and vertical equity. Specifically, this study assessed school finance funding mechanisms as impacted by House Bill 1 (2006), which include the hold harmless provisions and their effect on fiscal neutrality, horizontal equity, and vertical equity within the system. This study utilized established statistical methods to measure the degree of fiscal neutrality and equity of the school finance funding system in Texas (Berne & Stiefel, 1984; Brownson, 2002; Odden & Picus, 2004; Neymotin, 2010).

Fiscal neutrality examined relationships between the revenue a school district generates and the property wealth plus M&O tax rate utilized to support school districts. As outlined by Odden and Picus (2004), commonly accepted statistical dispersion methods evaluated the horizontal equity of the TEA's FSP. The assessment of vertical equity occurred through the use of regression analysis to measure the efficiency and adequacy of funding formulas accounting for differences among school districts in the students they are responsible to educate.

The current school funding mechanisms are the result of the court case *West Orange-Cove et al. v. Neely et al.* (2004) in which a Travis County District Court found

that Senate Bill 7 (1993) comprising the then-applicable statutory basis for the state's FSP was unconstitutional since many districts were at the maximum tax rate and no longer had local discretion. The State of Texas filed a direct appeal of the trial court's judgment to the Texas Supreme Court (*Neeley et al. v. West Orange-Cove et al.*, 2005). The Supreme Court affirmed the trial court's ruling of local property taxes being the equivalent of a state property tax. As a result, in an exchange for the mandatory reduction of a district's M&O tax rate, school districts would receive a target revenue funding based on the state and local M&O tax revenue the district would have received if their tax rate was not compressed (Daniels et al., 2011). The lowering of tax rates has created the target revenue system the state of Texas currently uses to fund school districts through the TEA's FSP. For the 2011-2012 school year, 86% of school districts are being funded through the target revenue system and only 141 school districts are strictly funded through the tier funding formulas in the FSP (Texas Taxpayers and Research Association, 2012). Therefore, the prevailing tenet of this study was the assessment of the current target revenue system's ability to provide an equitable allocation of resources to fund school districts in Texas.

Summary of Research Questions

Fiscal Neutrality

Research Question #1

> Have school finance reform measures been associated with the degree of fiscal neutrality among school districts in Texas since House Bill 1 (2006)?

Upon review of the findings the mechanisms by which assessed property values and a school district's M&O tax rate affect the revenue a school district has access to

have created an inequitable system of school finance. This inequity is caused by the heavy reliance on property taxes and the inability of formula mechanisms in the FSP to offset districts with low property wealth and high tax rates. Property wealth per WADA is a measure of school district wealth based on the assessed valuation of property divided by the weighted average daily attendance of students. The calculation of both Tier I and II components of a school district's revenue per WADA at the compressed rate is linked directly to a district's M&O tax rate (Daniels et al., 2011). To assess the degree of fiscal neutrality, regression analysis determined the relationship between the revenue a school district was able to generate was function of both its property wealth per WADA and M&O tax rate. If a state is fiscally neutral, then no relationship exists between a school district's total combined local and state revenue and property wealth of the school district where the child resides (Peterson, 2011).

All school districts analysis. In 2010-2011, property wealth values for school districts ranged from $19,721 to $6,951,489 per WADA. For the same year M&O tax rates had a mean of $1.06 and a standard deviation of $0.07. Regression analysis revealed a correlation between a school district's combined local and state revenue and its property wealth, but not its M&O tax rate.

School districts with higher property values have the ability to generate significantly more revenue. The R^2 value for property wealth per WADA for the all school district analysis (Table 5) explained 45% of the variance in 2010-2011 of a school district's revenue per WADA at the compressed rate. The statistically significant positive standardized beta coefficients for property wealth per WADA confirm a relationship between the revenue per WADA at the compressed rate a school district is able to

generate and its property value per WADA. In the all school districts analysis (Table 5), the predictor variable of M&O tax, when assessed in combination with property wealth per WADA did not increase the predictive power for determining the revenue a school district was able to generate.

School districts with an M&O tax rate equal to or less than $1.04 analysis. When excluding school districts with an M&O tax rate of greater than a $1.04, the variance ($R^2$) and regression coefficients for each year remained statistically significant to property wealth per WADA. Despite the exclusion of school districts with a tax rate greater than a $1.04 for this data subset, the results as shown in Table 6 are analogous to the results in Table 5 (all school districts analysis). Property wealth per WADA values varied significantly across the school districts included in the first two datasets (all school districts and school district equal to or less than a $1.04 tax rate). Property wealth per WADA consistently accounted for variance in the revenue per WADA at the compressed rate. For M&O tax rate this was not the case.

In 2007-2008, of the 904 school districts included in this subset of data,707 were taxing at $1.04. In the last year of the study (2010-2011) of the 753 school districts included in this subset of data, 656 were taxing at $1.04. Due to the large number of school districts taxing at $1.04 with varying property wealth per WADA values associated with this specific tax rate, the ability to utilize M&O tax rate as a predictor variable was compromised for the all school districts analysis (Table 5) as well as in the school districts equal to or less than $1.04 M&O tax rate analysis (Table 6). The artificial truncation (censoring) of the dataset caused by the statutory limitation of the $1.04 M&O

tax rate cap presented a limitation when combining property wealth per WADA and M&O tax rate as predictor variables.

School districts with an M&O tax rate greater than $1.04 analysis. The number of school districts taxing above $1.04 has risen from 121 school districts in 2007-2008 to 271 school districts in 2010-2011. The third dataset in Table 7 included districts taxing above $1.04. As with the first two datasets, property wealth per WADA accounted for a significant amount of variance of the revenue a school district has access to, but the total variance decreased sequentially over the period of study. While the variance of property wealth per WADA decreased, the variance for M&O tax rate increased over the period of study. As of 2009-2010, for school districts taxing above $1.04, the regression analysis revealed M&O tax rate was negatively correlated to the revenue a school district was able to generate.

Despite the increases in M&O tax rates for school districts with lower property values, they do not have access to similar amounts of revenue. For example, in 2010-2011 school districts taxing at $1.04 or less have a mean property wealth per WADA of $383,087 and a revenue per WADA at the compressed rate of $5,555.15. School districts taxing at $1.07 and greater have a mean property wealth per WADA of $188,711 and a mean revenue per WADA at the compressed rate of $5147.81. This is a revenue difference of $407.34 per weighted student. These results confirm Rebell's (2009) assumption that differences in revenue place students who attend school in districts with low property wealth at a disadvantage. This is a prime example of how school districts experience difficulty in raising adequate local revenue with the maximum statutory provisions that are incorporated into House Bill 1 (2006).

Summary of fiscal neutrality. According to Brimley and Garfield (2005), "as a matter of simple fairness, a good tax system distributes the burden it creates among all citizens in an equitable manner" (p. 124). School funding mechanisms in Texas allow local control through the setting of local property (ad valorem) taxes. Local control allows those residents in the community to have input and decide what is in the best interest of its students. Unfortunately, local control may create unequal education opportunities since inequality is fostered as long as revenue for schools is dependent on local property wealth (Peterson, 2011). For the 2010-2011 school year, 214 school districts were had M&O tax rate of $1.17. For the taxpayers in school districts with an M&O tax rate of $1.17 a burden is created for low-income property owners. For school districts taxing above $1.04, the target revenue hold harmless provisions in combination with the funding formulas in the TEA's FSP have compromised their ability to generate revenue.

With the number of districts increasing their tax rate to the maximum statutory amount, school districts have once again lost all meaningful discretion to generate additional revenue. Additionally, the ability to generate substantially equal revenues at similar levels of tax rate is compromised. The Texas Supreme Court previously ruled in *Edgewood II* (1991) that the system in place at that time did not allow for the generation of equal revenues for similar tax rates. Compression of the tax rate as a result of House Bill 1 (2006) and the subsequent raising of tax rates by school districts to generate revenue have led to circumstances analogous to those which comprised the legal findings in previous court cases.

According to the TEA's website, "the FSP, in its current form, is meant to ensure that all school districts, regardless of property wealth, receive substantially equal access to similar revenue per student at similar tax effort" (Texas Education Agency, 2012). The FSP formula system consists of three tiers and a second layer based on the target revenue system initiated by House Bill 1 (2006). The second tier ensures school districts receive state revenue to meet the minimum guarantee. A school district that is unable to generate adequate local revenue from property taxes or meet the minimum guarantee must rely more heavily on state revenue to make up the difference. Despite the provisions in Tier II which equalize a school district's revenue to the minimum guarantee, these school districts in this study as documented above do not receive equal access to similar revenue at a similar tax effort and have substantially lower revenue per WADA at the compressed rate. The FSP was unsuccessful at achieving fiscal neutrality. Specifically, the school districts most affected are those whose M&O tax rate is above $1.04. The relationship between property wealth per WADA and M&O tax rate with total revenue per weighted student for districts taxing above $1.04 demonstrated ineffective fiscal neutrality.

Horizontal Equity

Research Question #2

> How has House Bill 1 (2006) been associated with the overall horizontal equity between Texas school districts?

The analysis of horizontal equity determines the degree upon which school finance systems distribute funds in an equitable manner. An equitable school funding mechanism would provide uniform levels of per-student funding to all school districts

(Odden & Picus, 2004). The selection of horizontal equity as a theoretical framework served to assess the extent of equitable funding mechanisms in Texas. To allow for comparisons across school districts, the use of a school district's revenue based on weighted students reduces the limitation of the horizontal equity framework by addressing the assumption that children are substantially equal. School districts receiving funding on the basis of weighted funding for identified students (Table 3) acknowledges sub-groups for which additional funding is allocated. The analysis of six measures of horizontal equity and the identification of their properties for measuring the degree of dispersion (inequality) within school funding mechanisms determined the extent and the location of the inequity within the system.

Range and restricted range. The analysis of range, which is the difference between the largest and smallest revenue, demonstrated how funding mechanisms are unable to account for school districts whose revenue falls at the opposite ends of the spectrum. Typically, low poverty districts are situated at the bottom of the distribution while school districts whose local revenues are increased by oil wells, large businesses, or high property wealth exist in the very top of the distribution. Despite these few outliers, the FSP formulas unsuccessfully removed inequity. In 2010-2011, the mean revenue per WADA at the compressed rate for school districts in the bottom 20% of the distribution was $4,851. In these same school districts 61% of the students were categorized as economically disadvantaged. In 2010-2011, the mean revenue per WADA at the compressed rate for school districts in the top 20% of the distribution was $6,738. In these same school districts 48% of these students were economically disadvantaged. School districts receive an additional program allotment for the number of economically

disadvantaged students above their base allotment in Tier I. This example illustrates for school districts in the bottom 20% of the distribution that they have considerably less revenue despite on average having higher percentages of economically disadvantaged students. In previous research conducted by Imazecki and Reschovsky (2004) and Gronberg et al. (2004), they described how the costs to meet accountability standards are increased for school districts with higher percentages of economically disadvantaged students. This situation may create difficulties for school districts with student populations that are considered more costly to educate.

The removal of outliers through the measurement of the difference in revenue per WADA at the compressed rate at the 5th percentile and the 95th percentile (restricted range) greatly reduced the discrepancy between school districts in funding. In 2010-2011, the restricted range between the 5th percentile and 95th percentile was $2,203.03. When comparing revenues for 2010-2011 that are statistically closer to the median revenue of $5163.77 at the 25th percentile and 75th percentile range decreases to $591.03. Approximately 500 school districts fall between the 25th and 75th percentiles. Disparity is intensified for the remaining approximate 250 school districts below the 25th percentile as compared to those above the 75th percentile.

Coefficient of variation and the Gini Coefficient. The extent of the variation in revenue per WADA at the compressed rate for school districts was measured by the coefficient of variation. The value of the coefficient of variation of .1 is utilized to establish a cut-off point to separate equitable from inequitable resource allocation distribution methods (Odden & Picus, 2004). The standard of .1 was not met during the period of study. The lowest coefficient of variation value occurred in 2010-2011 with a

value of .166, after successive increases to a maximum value of .252 in 2009-2010. During the period of study from 2006-2007 through 2010-2011 the coefficient of variation values of greater than .1 in Table 10 revealed inequitable distribution of resources as determined by the state's school finance system (FSP).

The Gini Coefficient is a horizontal equity measure that assesses the distribution of revenue. The Gini Coefficient demonstrated a similar trend by increasing each year from .080 in 2006-2007 to .110 in 2009-2010, with 2010-2011 being least inequitable year with a .068 Gini Coefficient. In 2010-2011, the Gini Coefficient of .068 approaches the .05 standard which indicates the FSP is distributing revenues relatively equal across the state. The Gini Coefficient values in the study demonstrated funding formulas in FSP are designed with the policy goal of achieving equal distribution of education resources.

McLoone Index and Verstegen Index. The previous measures of horizontal equity assess the degree of the inequity but are unable to isolate where inequity exists within the system. The McLoone Index analyzed revenue equity in the bottom half of the distribution. This was accomplished by comparing the revenue per WADA at the compressed rate based on the amount of WADA per school district as if school districts were to receive the median revenue. Over the period of study, the McLoone Indices were above the equity standard of .95 in 2006-2007, 2007-2008, and 2010-201l. Despite achieving the acceptable equity standard in these years it should be noted the amount of revenue necessary to increase the McLoone Index in Texas. For example, the amount of funding required to raise the McLoone Index in 2010-2011 from a value of .972 to .982 would require $133,507,008 in additional funding.

The Verstegen Index measured equity in the top half of the distribution. According to Peterson (2011), a value of 1.05 is considered acceptable. Expressed as a percent all school districts combined revenue based on WADA must be within 105% as compared to if all school districts receive median revenue. All values during the period of study were greater than the 1.05 standard, with a value of 1.092 in 2010-2011 being the lowest. As compared to McLoone Index values, greater inequity exists in the top half of the distribution. Over the period of study of the approximately 500 school districts above the median revenue, 346 of these school districts were classified as property wealthy and are subject to the recapture provisions in TEC Chapter 41. The median revenue for school districts above the 80th percentile in 2010-2011 was $6,738.01, which is a noticeable difference from the median revenue of $5163.77.

Horizontal equity summary. The identification of underfunded school districts and the amount of funds required to reduce inequity is challenged by what lawmakers have determined to be politically feasible. According to Imazecki and Reschovsky (2006), the feasibility and elusiveness of a workable solution for funding problems are exacerbated by a strong aversion to taxation in Texas. Unless additional funding is acquired through alternate methods for public schools in the bottom half of distribution, current funding formulas would have to be adjusted to allow for the redistribution of revenue generated by property wealthy school districts. Revenue generated by property wealthy school districts that is subject to the recapture provisions in the FSP is achieved by analyzing equity in the top half of the distribution.

To raise the median revenue per WADA at the compressed rate would require the infusion of additional funding or the redistribution of local revenue generated by

wealthier school districts. Legislators enacted a bill in 2011 that cut more than five billion dollars from public school funding over a two year period. Unless legislators designate additional funds through taxes or alternate methods, the ability to provide school districts whose revenue is below the median level with additional funding will occur through the adjustment of the FSP's formulas to increase recapture amounts.

Vertical Equity

Research Question #3

> Have vertical equity provisions in school funding formulas provided adequate resources for those programs, which have been identified for additional funding by the Texas Education Agency?

The analysis of vertical equity addresses the differences among school districts in Texas, the students they are required to educate to meet performance standards, and the revenue available to accomplish this. The assessment of equitable funding mechanisms is challenged based on the variation in the characteristics of vertical equity in Texas. The differences in vertical equity are illustrated by the widely varying characteristics of students, school districts, and programs. The mechanisms through which vertical equity provisions are implemented are entrenched in the adequacy approach, which is subsequently correlated to student performance on state assessments. Hierarchical regression analysis was utilized to measure the efficiency and adequacy of funding formulas to account for differences across school districts in Texas.

School district finance characteristics. Utilizing the predictor variable of revenue per WADA at the compressed rate demonstrated a statistically significant correlation to student performance on TAKS. Although the revenue a school district

receives is correlated to student performance on TAKS, the results provide only slight evidence the revenue a school district receives affects student performance on TAKS. The predictor variable of revenue per WADA at the compressed rate's ability to predict TAKS performance was nominal.

The addition of school district finance characteristics of property wealth per WADA and M&O tax rate were incorporated with revenue per WADA at the compressed rate in the regression model to ascertain if these combined predictors influence student performance on TAKS. A school district's finance characteristics of property wealth per WADA and M&O tax rate made no significant contribution in the prediction of TAKS performance for grades 5 and 8.

School district demographic characteristics. The addition of school district demographics; specifically, the percentages of students who are classified as economically disadvantaged, at-risk, limited English proficient, and those receiving special education services assessed vertical equity provisions in the FSP. Additional funding allotments are found in Tier I of the FSP for the aforementioned demographic characteristics. The results confirm student performance on TAKS for grades 5 and 8 are proxied by a school district's demographic characteristics. The percentages of students by school district who are classified as economically disadvantaged and at-risk are significantly related to TAKS student performance for grades 5 and 8. There is slight evidence that performance on state assessments is negatively affected for those school districts with higher percentages of special education students.

These results are in accordance with the previous research of Imazecki and Reschovsky (2006), which suggested a significant number of school districts do not

receive sufficient resources to provide an adequate education which is predicated on student's meeting expectations through the state's accountability system. As previously detailed through the analysis of fiscal neutrality, school districts whose revenue is below the median contain higher percentages of economically disadvantaged students. The results provide evidence the allotment for at-risk students (compensatory education), which is determined by a school district's percentage of economically disadvantaged students are inadequate to meet performance standards. The results confirm earlier research of Imazecki and Reschovsky (2003), who found strong evidence that weights and allotments in school finance formulas do not reflect the true costs for reaching student performance standards. Since 2003, inflation and increases in performance standards have occurred; however, revenue available from local and state sources for school districts has remained relatively stagnant.

School district ethnicity characteristics. The inclusion of school district ethnicity by race (Hispanic and African-American) into the hierarchical regression analysis revealed ethnicity as a whole did not significantly increase the ability of the model to predict student performance on TAKS. In the cross-sectional regressions both the percent of Hispanic and African-American students in a school district demonstrated a decrease in performance on TAKS for those districts with higher percentages of these specific ethnicities. Although no vertical equity provisions exist based on ethnicity, minority students comprise higher proportions of underfunded districts.

In 2010-2011, school districts below the median revenue of $5163.77 had a mean population of 39% Hispanic students, as compared to 34% Hispanic students in school districts above the median revenue. The percent of limited English proficient students in

2010-2011 in school districts below the median was 8.7%, as compared to 7.2% in those school districts above the median. The analysis demonstrated that school districts below the median revenue are charged with educating students whose performance on state assessments have exhibited achievement gaps.

Summary of vertical equity. Cross-sectional regressions revealed specific characteristics of school districts were correlated to student performance on TAKS. Particularly, the percentages of economically disadvantaged and at-risk students exhibited the strongest relationship to student outcomes on TAKS. However, the combination of school districts' characteristics revealed only slight evidence that student outcomes are proxied by a school district's financial, demographic, and ethnic distributions.

Implications of Findings Compared to Literature Review

The presence of inequity in each of the three theoretical frameworks, which are comprised of fiscal neutrality, horizontal equity, and vertical equity, presents implications for the school finance system especially in light of previous legislative and judicial rulings. The results from this study revealed that despite an innovative system of school finance that combines a foundation formula, guaranteed tax base, and limits on tax capacity for property wealthy districts, these theoretical frameworks are compromised. The implications of this study's findings were meaningful for superintendents, board trustees, community members, legislators, and those involved in the litigation saga.

Fiscal Neutrality

The heavy reliance on local property taxes to fund public schools in Texas has created a system in which a direct relationship exists between the property wealth of a

school district and the revenue it generates. The goal of fiscal neutrality is to ensure that the inputs into the education process allow for the provision of a quality education equally (Reschovsky, 1994). Funds for the school finance system are dependent on local property wealth, but with so much variation among property wealth among districts, direct effects on the school finance system are observed (Kaufmann, 2009). The data from this research supports this statement from Kaufmann.

Despite the compression of the tax rate in 2006 and the subsequent creation of a school districts ability to have meaningful discretion when setting its M&O tax rate, the relationship between property wealth and the total combined local and state revenue for a school district continues to exist. Since compression of the tax rate in 2006 the number of school districts taxing at capacity ($1.17) continues to increase. The court's holding in *West Orange-Cove et al. v. Alanis et al.* (2003) explained that a single district can state a claim under Article VIII, Section 1-e if it alleges that it is constrained by the state to tax at a particular rate. This holding by the Supreme Court of Texas was based on the court's belief that the state had failed to create a system that allowed for a constitutionally required general diffusion of knowledge for those districts taxing at capacity.

The data in this study revealed the principle of fiscal neutrality is violated through the relationship observed between revenue and a school district's property wealth and corresponding tax rate. Before the provisions of House Bill 1 (2006) were implemented, Imazecki and Reschovsky (2006) warned as property values and tax rates increase, which increases revenue for school districts, these increases from locally generated revenue will result in a reduction of state aid. According Imazecki and Reschovsky (2006), this reduction in state aid would cause school districts to raise local tax rates to minimize the

loss of state aid and meet rising education costs. The restructuring of the school finance system in 2006 through the provisions in House Bill 1 did allow school districts to increase their tax rate by 13 cents above $1.04 if a successful tax ratification election was held. However, the creation of meaningful discretion in the setting of M&O tax rates by school districts to generate additional revenue is minimized by the fact that as of 2011 approximately 900 school districts received funding based on the hold harmless provisions of House Bill 1 (2006). Therefore, school districts are receiving target funding as result of the hold harmless provisions which in effect side step the FSP's guaranteed yield calculations.

The inability of low wealth school districts taxing at capacity to generate median level revenue places these schools at a disadvantage to those wealthier school districts whose property wealth and revenue is substantially higher. Property poor school districts do not have the discretion to set a lower rate. Due to legislative budget cuts in 2011 property poor school districts will be severely challenged to meet the new performance standards associated with STAAR. This issue is one of many that spurred an additional round of litigation that challenges the current methods of school finance.

Horizontal Equity

The assessment of horizontal equity allowed for the determination of not only the extent of the inequity but also the location of the inequity within the school finance system. Equitable funding mechanisms provide uniform-levels of funding to all school districts (Odden & Picus, 2004). The data in this study revealed this was not the case for school districts in the top-half of the distribution. The school finance system in Texas is not required to provide equity in revenue to all school districts as was decided in the

Edgewood I.S.D. et al. v. Meno et al. (1995) [*Edgewood IV*] court case in which the Supreme Court of Texas held that an efficient system of school finance does not require equality of access to revenue at all levels. However, this ruling is contingent on school districts having the ability to provide a constitutionally required general diffusion of knowledge, which hinges on the state's responsibility to provide an efficient school system. Therefore, access to sufficient revenue is complicated by determining what defines a general diffusion of knowledge. The implementation of the state's new testing program (STAAR) and the setting of performance standards further complicate this issue. Student performance on the more rigorous STAAR assessments will replace TAKS assessments in the determination if sufficient revenue is being provided to achieve a constitutionally required general diffusion of knowledge.

The inequity that exists for school district revenue in the top-half of the distribution illustrated that the recapture provisions allow property wealthy school districts to consistently generate more revenue. In 2010-2011, property wealthy districts accounted for 68% of the school districts in the top-half of the distribution. In an attempt to increase funding for those school districts that contain students who are considered most costly to educate, the infusion of resources is considered a bottom-up approach to increasing revenue for school districts below the median. On the other hand, if the goal is to increase revenue for school districts with below-the-median revenue without the infusion of additional resources a top-down approach should be utilized. This process would involve the redistribution of wealth. The redistribution of wealth is a controversial issue in which any increases to the $1.1 billion that was recaptured from 173 school districts in 2011-2012 would be fraught with obstacles and met with considerable

opposition (Texas Taxpayers and Research Association, 2012). The restructuring of a school finance system in which the revenues for school districts above the median are decreased will have severe implications. According to Imazecki and Reschovsky (2006), "because residents of recapture districts receive very little direct benefit from the state aid system, they have a strong incentive to try to influence the political process in a way that minimizes the level of state support for education" (p. 13).

Vertical Equity

Researchers have come to the consensus that additional resources or funding should be allocated to school districts for student populations who are considered more costly to educate (Odden & Picus, 2004; Toutkoushian & Michael, 2007). For the years included in this study, the state and federal accountability systems assess the performance of sub-populations of students. Each identified predictor variable analyzed for school district demographics and populations is assessed through the TEA's Academic Excellence Indicator System (AEIS) or Performance-Based Monitoring Analysis System (PBMAS). AEIS reports are utilized to classify each school district and school as unacceptable, acceptable, recognized, or exemplary. PBMAS reports provide an overall evaluation of school district performance and program effectiveness. For those school districts classified as unacceptable under AEIS or do not meet established criteria in PBMAS, interventions are required. Intervention activities are monitored by the TEA to ensure effective creation of improvement plans, implementation of requirements, selected activities, and accurate data reporting.

The data from the vertical equity hierarchical cross-sectional regressions revealed a negative relationship exists between performance on TAKS and students who are

classified as economically disadvantaged and at-risk. Additionally, in the cross-sectional regressions slight evidence was revealed that decreased student performance by school district was related to the percent of special education students.

The data from this study confirms the research completed by Neymotin (2010), in which the researcher determined a relationship between test scores and the income variables of median family income, fraction on free lunch, and the number in poverty existed. These results are congruent with Figlio's (2004) summarization in which the rating a school receives is highly related to student and family characteristics and the belief that the rating a school receives is based on socioeconomic status rather than performance. These socioeconomic factors lie outside a school district's control and are difficult to factor in when determining appropriate weights and allotments. The costs for school districts to meet performance standards on standardized assessments are considerably higher for students from lower socioeconomic families (Gronberg et al., 2004; Imazecki & Reschovsky, 2004). The evidence points toward the demographic makeup of a school district and the weights and adjustments associated with specific groups being insufficient for these students to meet performance standards. The implication is that school districts with higher percentages of students who are more costly to educate face extreme pressures to meet accountability standards with current levels of funding. The investment of additional funding for weights and allotments is fraught with numerous challenges.

Once sufficient resources are allocated, difficulty arises in the determination of how the funding will be spent to improve student performance. The lack of a significant relationship between spending and achievement presents a challenge in determining the

spending required to achieve adequate levels of student performance (Hanushek & Lindseth, 2009). Secondarily, according to Neymotin, (2010), "it is important to note that the availability and allocation of resources is not equivalent to the ability and means to use these resources" (p. 107).

Policy Implications and Recommendations

The ongoing school litigation narrative in the state of Texas might ultimately lead to the redesign of school funding formulas with consideration given to adequacy, equity, property taxes, and efficiency. First, since wide differences in property values affected a school district's ability to generate revenue, the FSP formulas must be adjusted to reflect these differences. By adjusting a school district's basic allotment in Tier 1, school districts could receive additional funding based on characteristics of that district. Currently, to adjust for varying economic conditions, the state assigned a Cost of Education Index (CEI) based mainly on size of the district, teacher salaries of surrounding districts, and the percentage of low-income students in the district (Daniels et al., 2011). The index has not been updated since 1989-1990. The state should immediately update the CEI to current statistics, include property wealth in determining the CEI, and increase the impact of CEI into the calculation of the basic allotment. These modifications to the CEI would have a two-fold impact in the assessment of equity frameworks and distribution of resources. For the distribution of resources the impact would include the provision of additional funding for school districts with lower property values and those with higher percentages of economically disadvantaged students. Modification to the CEI would affect the theoretical frameworks by reducing fiscal

neutrality, while simultaneously increasing the vertical equity provisions for school districts with high percentages of economically disadvantaged students.

Second, the program allotments for those students who receive specialized or additional services have remained relatively unchanged for 20 years. The state should conduct a study to determine the validity and true costs associated with the education of the currently identified weighted students and adjust the weights accordingly to reduce the financial burden of school districts to meet performance standards for these students. In order to decrease inequality, determining true costs associated with specific populations might enhance a school district's ability to meet performance standards.

Third, the districts most affected by compression of the tax rate by House Bill 1 (2006) are those currently taxing at capacity ($1.17). House Bill 3646 modified Tier II guaranteed yield funding to provide two different levels of combined state and local funding when a school district's M&O tax rate exceeds $1.00 or its compressed tax rate (CTR). Current Level 2 (L2) is generated for pennies of tax effort above its CTR plus six cents. This fixed amount is $31.95 per WADA. By increasing the amount of L2 above the current $31.95, school districts that place a heavy burden on local taxpayers would see an increase in Tier II allotments from the state.

Fourth, the modification of Equalized Wealth Levels (EWLs) is needed to ensure limited access to tax revenue generated by local M&O effort. A school district is subject to the provisions of TEC Chapter 41 if its property wealth exceeds equalized wealth levels set in statute which involve the recapture of revenue (Daniels et al., 2011). The second EWL allows property wealthy school districts to keep all the revenue generated from a tax rate that exceeds the CTR, up to a maximum of six cents. Both property poor

and property wealthy school districts are allowed to generate this revenue equivalent to that raised by Austin I.S.D. based on equalization features designed in Tier II (Daniels et al., 2011). This equalization allows property wealthy school districts to generate greater revenue as compared to a property poor school district. Funding formulas in this recapture mechanism should be adjusted to allow for a reduction or unequalized enrichment generated in the second EWL for property wealthy school districts. Alternatively, the removal of the provision which allows this revenue to be subject to recapture would provide additional funds for redistribution.

Implications for Future Research

While the analysis of the school funding formulas in Texas in this research study revealed considerable inequity within the system, additional research is needed to further determine the impact on school districts that are most affected by inequity. As revealed in the research, a strong negative correlation was found to exist between revenue per WADA at the compressed rate and both property wealth per student and M&O tax rate for those school districts taxing above $1.04. Furthermore, for those school districts taxing at $1.17, a burden is placed on taxpayers who are low-income property owners. Additional research is needed to determine the extent of the burden placed on taxpayers who are required to pay $1.17 per $100 valuation of their property. Future research should assess to determine if a correlation exists between the amount of income generated by a household and the property taxes paid compared to the burden on taxpayers in school districts whose M&O tax rate is $1.04 or below.

Over the period of study for the research (2007-2008 through 2010-2011), mean revenue per WADA at the compressed rate increased 3.3%. These modest increases in

revenue did not take into consideration the impact of inflation. The determination of the provision of an adequate education in future research would address inflation as it pertains to the costs associated for school districts attempting to meet student performance standards.

The vertical equity provisions in the FSP provide additional funding for those students who have been identified as requiring supplemental services to meet performance standards. Future research should address a cost function analysis to determine accurate costs to educate students for which additional funding has been allocated through the vertical equity provisions. Previous research conducted by Imazeki and Reschovsky (2004) concluded that in order for school districts to achieve performance standards the costs are higher for those districts with higher percentages of students from low socioeconomic families. In this example, future research indicating the accurate costs to assist students from low socioeconomic families would prove beneficial in the evaluation of the current allotment for these identified students. This research would allow for the incorporation of itemized district expenditure data correlated to students who received allotments. Taking this future research one step further, by adding components of the successful district approach and the evidence-based approach funding models, those districts that have been identified as successful can be utilized for the evaluation of the current allotments for identified student groups. Researchers would not only need to take into consideration the amount of money spent, but also how the money is spent on instructional and support services.

Along these same lines future research is needed to analyze the costs of educating students from one school district to another. Based on the wealth and geographic

location of school districts in Texas, costs can substantially differ from one district to another. These factors lie outside the school district's control, but can both positively and negatively affect a school district. Potential analysis could include the geographic size of the school districts, the size of the school district as it relates to student enrollment, the property of wealth of the school districts, and various other unique circumstances related to student populations.

Summary

Results from this study clearly point to a system in which inequity exists in the top half of distribution. Property wealth of a school district is correlated to the revenue a school district receives. School districts with higher percentages of students who are considered most difficult to educate are not meeting performance standards with current allotments. Additionally, results from this study confirm there are areas in which the FSP should be restructured to meet its own stated goal of ensuring "that all school districts, regardless of property wealth, receive substantially equal access to similar revenue per student at similar tax effort" (Texas Education Agency, 2012). However, in the attempt to improve fiscal neutrality based on the state's reliance on property taxes to fund school districts, simultaneous modification of vertical equity provisions would counteract any improvements in fiscal neutrality. According to Imazecki and Reschovsky (2006), "changes to the finance system that improve the targeting of funds to high needs districts are also like to result in reduced wealth neutrality and access equality" (p. 31).

The methods by which school districts in Texas are funded through the FSP have been embroiled in litigation for the past 40 years. Litigation which challenged the methods of school finance in October 2011 was based on the state's inability to provide

adequacy, equity, and an efficient method for school funding. This litigation has the potential to change the manner in which public education is funded in Texas. The prudent course of action for the state of Texas is to determine levels of funding (allotments) for those students who are most costly to educate and to restructure the FSP to reduce the correlation between property wealth and the revenue a school district receives. In order to avoid retrospective rationale, which is characterized as raising performance standards without simultaneously considering funding levels necessary to meet new standards (Rees, 2004), the restructuring of school funding mechanisms should proceed hand in hand with the creation of the STAAR assessments and the subsequent setting of performance standards. The development of an effective system of school finance integrated with established performance standards is critical for the success of the state's five million students.

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Appendix A

Epilogue

In the consolidated school finance court case against the state of Texas, Travis County District Court Judge John Dietz ruled the school finance system in Texas unconstitutional on February 4, 2013 (*Texas Taxpayer and Student Fairness Coalition et al. v. Williams et al*., 2012). As previously described, this proceeding consisted of six consolidated entities representing over 800 school districts and charter schools in Texas. The foundation for the trial court's ruling is found in the provisions of the Texas Constitution. Article VII, Section 1 of the Texas Constitution dictates it is the duty of the Legislature to establish and provide for the support and maintenance of efficient system of education (Tex. Const. art. VII, §1). Additionally, as detailed in Article VII, Section 1, the support and maintenance of an efficient system of education is contingent on the Legislature providing a suitable system that allows for a general diffusion of knowledge to be imparted to the students of Texas (Tex. Const. art. VII, §1). Article VIII, Section 1-e sets forth that no state ad valorem taxes shall be levied on any property within the state of Texas (Tex. Const. art. VIII §1-e).

In the ruling by Judge Dietz, he determined the school finance system does not adequately fund school districts and is constitutionally unsuitable for the general diffusion of knowledge under Article VII, Section 1 of the Texas Constitution for the Texas Taxpayer and Student Fairness Coalition., Edgewood I.S.D, Fort Bend I.S.D., and Calhoun County I.S.D. plaintiffs (*Texas Taxpayer and Student Fairness Coalition et al. v. Williams et al.*, 2013). Additionally, Judge Dietz ruled on behalf of these same plaintiffs that since meaningful discretion had been prevented in the setting of school district tax

rates to generate additional resources, the school finance system had created a state ad valorem tax, which is a violation of Article VIII, Section 1-e of the Texas Constitution (*Texas Taxpayer and Student Fairness Coalition et al. v. Williams et al.*, 2013). Judge Dietz declined to declare the issues primarily related to charter schools raised by the Efficiency Intervenors were unconstitutional and were within the discretion of the Legislature in determining policy (*Texas Taxpayer and Student Fairness Coalition et al. v. Williams et al.*, 2013). Additionally, for the Texas Charter School Association plaintiffs the trail court declared that is was within the Legislature's discretion to fund charters differently than traditional school districts (*Texas Taxpayer and Student Fairness Coalition et al. v. Williams et al.*, 2013).

This ruling by Judge Dietz sets the stage for the redesign of the school finance system in Texas. The ruling will provide the impetus for the Legislature to address the inefficient, inequitable, and inadequate components of the school finance system as declared by Judge Dietz. However, pending any appeals by the State of Texas to the Texas Supreme Court or the expediency upon which the Legislature will address the trial court's ruling, school districts in Texas may be faced with operating by the Texas Education Agency's (TEA) Foundation School Program (FSP) (current system of funding) for an indefinite period of time. Based on the results of this study, continued use of the current school funding system will present numerous challenges for school districts with higher percentages of students from low socioeconomic families and for school districts taxing at the Maintenance and Operations (M&O) capacity, as set forth by current statute.