AN EXAMINATION OF VERTICAL EQUITY FUNDING POLICIES IN URBAN DISTRICTS WITHIN ELEMENTARY SCHOOLS

By

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ABSTRACT

No Child Left Behind has brought with it political pressure on school and district personnel to increase student performance. This legislation has made individual school accountability a focus by attempting to mandate the reduction of the achievement gap between various groups of students. As a function of this pressure, more and more researchers and government officials have focused attention on various inequalities in resource allocation. One focal point has been the call to improve the equity within a district (intra-district) rather than spend more time and resources on equity issues between districts (inter-district). To that end, the weighted student funding (WSF) model for allocating school budgets has been considered by several authorities, both educational and political, as the answer to the question of equity. The goal of this dissertation is to evaluate the vertical equity of districts utilizing a weighted student funding model when compared to like districts in the same state. Some evidence from this dissertation reveals that when using regression models for school level expenditures, teacher quantity, and teacher quality measures, districts utilizing a weighted student funding mechanism may be more successful at enabling vertical equity than similar districts not using this funding model. Further evidence suggests that while districts utilizing a WSF mechanism may be targeting funds to schools, they may be doing so utilizing non-human resources. Based on the results, the dissertation concludes with a profile of districts that may enable more vertical equity than WSF districts when utilizing a funding mechanism other than weighted student funding.

An Examination of Vertical Equity Funding Policies in Urban Districts within Elementary Schools

Chapter 1 – Introduction

1.1 Introduction

Since the mid 1990's there has been growing support for a financial distribution system that more equitably allocates resources among schools. This growing tide of support seemed to peak in June of 2006 with the release of a report from the Fordham Institute, "Fund the Child, Tackling Inequality and Antiquity in School Finance". *Fund the Child* called for a change to the mechanism of school funding due to the "current systems fail(ing) miserably to meet both the challenges and opportunities our schools face"[1]. This "manifesto" as it as been referred to, has been signed and supported by three (3) former U.S. Secretaries of Education, a former Secretary of the Treasury, former Chief of Staff to President Clinton, two (2) prominent former state governors, and sixty-nine (69) other business leaders, politicians and educators. These educators, business men and women and political players have declared weighted student funding the mechanism with which to secure the vertical equality so badly needed to improve access to resources; by typically targeting funds to students with specific challenges and/or disabilities[2]. Weighted student funding formulas

[1] Fund the Child, page 1-2.

[2] States generally fund students in various categories at higher rates than other students. In both Texas and Ohio, states studied in this dissertation, there are weights associated with special education students, including gifted, students in poverty (usually reflected as numbers of students participating in free and/or reduced lunch programs), and students participating in vocational programs. Other weights that may be present are ones associated with students requiring bilingual or English as a Second Language services, economies of scale (size), and/or weights for districts that have to transport students greater distances.

utilize varying weights assigned to student characteristics in order to more accurately represent the demographic make up of the students served by the school (or district). These weightings are used to estimate school based budgets that more accurately reflect student needs across an entire building or school district. *Weighted Student Funding (WSF)*[3] is a process by which the school district assigns a weight to each student demographic category. These weightings are typically an extension of weights assigned in state educational funding policy. For example, in Kansas the at-risk or poverty weight assigned by the state legislature within the state formula for 2006-2007 was 0.193 (Kansas Cost Study Analysis, 2006). This resulted in school districts receiving 1.193 times the base state aid[4], or $5249 in FY2008, for each student participating in the federal free/reduced lunch program. School districts such as Houston, Cincinnati, and Seattle have adopted this philosophy in order to require dollars, specifically targeted by the state legislature, to address various student characteristics. These dollars are provided to the school level in accordance with the percentage of students participating in the federal free and/or reduced lunch program. This results in schools with a higher population of poor students receiving more dollars than schools with fewer poor students. Weights vary from state to state. In Ohio in 2000, a state included in this study, the weight for a disabled student was 0.22, 3.01, or 6.02 depending on the nature and severity of the disability. In Texas, another state in the study, the weight of a student with a

[3] The concept of weighted student funding may encounter various forms of similar names including student based budgeting, student based allocations, or student weighted allocations. This list is not an all inclusive list.

[4] Base state aid was $4374 in FY2008 in Kansas.

disability is 0.1 if the student is mainstreamed in a general education classroom. For students needing support in either a resource rooms or a self-contained environment, a weight of 3.0 is applied. There is often no educational rationale that articulates the value of a particular weight. Districts seem to define weights for various student groups that are the same as or slightly less than the corresponding student weight assigned at that state level. Under a weighted student funding mechanism districts (in Kansas, Ohio, and Texas) would fund individual schools at the same or similar weighting for all students identified in a particular student group including, but not limited to students in poverty, disabled students, bilingual students, and/or students who are defined as highly mobile[5].

There are some who would argue that in an era of *No Child Left Behind (NCLB)*, with greater state and district accountability, test scores should not be the only tool used to foster district accountability. Financial accountability for all levels of educational stakeholders – states, districts, and schools – has begun to be a rallying cry for many researchers and policy makers. In fact, according to many of these same people, it is the (current) financial system that is keeping scores low and the achievement gap between student groups wide (Carr, Gray, and Holley, 2007; Fund the Child, 2006). While it is appropriate to note the current focus of professional politicians is school accountability, in the form of standardized test scores, it does not necessarily indicate the current situation to

[5] In 1995 the Texas Legislature passed the Texas Education Code 42.152 which set the weight for students in poverty, referred to as Compensatory Weighting, at 0.2 of the base. Based upon the published minutes on bills considered by the Texas House, both HB 91 (a bill related to school finance was offered during the 79th session of the legislature) and HB 3456 (a similar bill offered during the 80th session of the legislature) were referred to but never brought out of the House committee on education. HB 91 would have increased the weight for poverty to .22 during 2007-2008 and .24 during 2008-2009. Instead the Texas House called for a cost analysis to be presented to the legislature no later than January 1, 2009.

be a product of mismanagement of funds by the schools or districts themselves as some authors suggest (Carr et. al, 2007). However, if we accept the concept that district accountability should be measured by financial means as well as through test score analysis, then the first question that should be addressed by the educational community is whether the current system of funding schools is any more or less equal to alternative funding methods such as WSF.

In recent literature supporters of weighted student funding have begun to intensify their efforts to promote this alternative funding mechanism (Fund the Child, 2006; School Finance Reform Project, 2008). There exists only limited evidence on the basic question of whether public school districts adopting school level weighted funding formulas have achieved any greater degree of within district funding equity. That is, are funds distributed any more equally between schools in districts using a weighted student funding mechanism?

In order to address this basic question, one of the first tasks is a discussion of what is meant by equity. When evaluating equity the most commonly used description and analysis is that of Berne and Stiefel (1984). In this pivotal work, they defined vertical equity, along with two other equity principles - equal opportunity and horizontal equity. Although equal opportunity and horizontal equity will not be of major concern herein, it would be beneficial to briefly underscore their importance to the overall analysis of equity as described by Berne and Stiefel.

The concept of equity begins with equal opportunity. In simple terms, equal opportunity is defined as the opportunity for all students to be successful.

That is, success must be within the control of the student. In more analytical terms, there should be a relationship between a student's success and that same student's personal characteristics. These characteristics could include personal drive, aspirations, and/or effort. From another perspective, students' ability to be successful in school should not be related to characteristics outside of their control. That is, student success should not be defined by a student's race, gender, ethnicity, disability, socio-economic level or national origin. Where school funding is concerned, equal opportunity has been applied to students' socio-economic conditions; specifically, that quality education not be based upon the property wealth within a particular student's district. This has been described as wealth neutrality.

Horizontal equity is the idea that all students identified within a particular category, or districts with similar characteristics are funded or treated equally. Relevant literature may use horizontal equity and the term "equal treatment of equals" interchangeably (Toutkoushian and Michael, 2007). When the term is applied to education funding it is important to realize that funding streams come from various sources. Local funds, for instance, are generated through local decision making processes, whereas state and federal funding are provided to the local districts in the form of either general education funding or other streams such as transportation, Title II funding, or special education funding. In order to determine horizontal equity within a given system, these funds must be kept segregated in order to analyze similar students qualifying for particular funds. In such a system, if all general education students across various districts are

receiving dollars at the same or similar level, the districts are seen as having horizontal equity.

The final concept covered by Berne and Stiefel was vertical equity. Vertical equity occurs where students are treated appropriately based on varying educational needs that a student or group of students may have. For instance, it is widely accepted that in order for a student with a disability to reach the same educational outcome as a non-disabled student, more dollars must be spent. These dollars are spent in order to help the student to overcome the disability and achieve the same or similar access to a quality education of a non-disabled student. Similar arguments, for different treatment of students based upon a category, exist. Various student categories or classifications might include poor or at risk students, gifted students, or vocational students, just to name a few. This different treatment for different students is often referred to as the appropriately unequal treatment of unequals.

As more studies examine resources at the building level, one would be hard pressed to make the argument that all schools are equal. Each school, like each child, has its own challenges and obstacles; just as individual students vary from one another, student populations also vary from one school to another. It is widely accepted that there exists an achievement gap between various student groups. This acceptance of achievement gaps between student groups has been recorded in law under the federal *No Child Left Behind* legislation. Put simply, the legislation requires schools to address the achievement gap that exists between student groups including any achievement gap between “major

racial and ethnic subgroups". Since nearly all the requirements of the law were left to the states to define many states have identified similar subgroups or student groups. These include African American, Hispanic, Asian, Caucasian, students qualifying for free and/or reduced lunch, students with disabilities and those students identified as Limited English Proficient (these students may also be referred to as English Language Learners (ELL) or as English for Speakers of Other Languages (ESOL) students). To date, there have been cost study analyses in thirty-nine (39) states; in each there exists a recommendation by the different authors to apply varying weights to students based on a variety of student need categories that include students qualifying for the federal free or reduced lunch program, students with special needs, or students at-risk of dropping out of high school[6]. All of these studies concede that in order to effectively educate students with identified needs such as those listed above, states must increase the amount of money allocated to students in order for them to achieve at the same level as their peers. Vertical equity then is achieved when students with various needs receive unequal (more) resources to meet the same academic achievement levels as their classmates without those same needs. In order to observe the level of vertical equity between specific schools within districts, I will use regression models to analyze the role of the various student needs mentioned above – special education, ELL, free or reduced lunch

[6] These thirty-nine states account for sixty-two cost studies completed by a variety of researchers. All conceded that students with special needs, socio-economic status, race and ELL ability each impact a student's ability to access education. In Washington, Vermont and South Carolina researchers did not quantify the weight or specific dollar amount for these student groups due to the calculation method used. Oregon acknowledged that small class sizes equate to higher achievement for minority and free/reduced students while using a weighted daily average membership to catch special needs and at-risk students when computing its state base aid per pupil.

– in school level expenditure per pupil. This same method was initially proposed and utilized by Berne and Stiefel (1984) and has been applied in numerous other studies through the years (Berne & Stiefel, 1994; Rubenstien, 1998; Stiefel, Rubenstien, & Berne, 1998; Iatarola & Stiefel, 1999; Baker, Green, & Fusarelli, 2003; Rubenstien, et. al, 2004; Miles & Roza, 2006; Baker & Thomas, 2007; Baker, 2007; Toutkoushian & Michael, 2007; Baker & Arbuckle, 2008).

In this dissertation, I intend to expand on the existing research on the role of student group population characteristics and the effect they have on per pupil expenditures in districts utilizing a weighted student funding formula at the school level and compare those findings to districts not using a weighted student funding formula at the school level. Specifically, I am interested in a comparison of similar urban public school districts in Ohio and a comparison of similar urban public school districts in Texas to evaluate the claims that weighted student funding creates more vertical equity than other funding mechanisms at the school level.

1.2 Description of Problem

Intra-district and inter-district equality have been defined and illustrated both qualitatively and quantitatively in several studies over the last two and a half decades (Stiefel, Rubenstein, and Berne, 1998; Burke, 1999; Roza and Hill, 2004; Hawley-Miles and Roza, 2006; Miller and Rubenstein, 2007; Roza, Guin, Gross, and Deburgomaster, 2007). These studies have done much to expose various inequalities in resource allocation. While it has become a federal

mandate that districts and schools attempt to use only scientifically proven successful classroom practices, politicians and district leaders have not viewed school finance practices in the same way. This may not be for a lack of want on the part of educational decision makers. District leaders wanting to use evidence to support their choice of mechanism for funding schools would be hard pressed to find it. This dissertation serves to help fill that void by offering a comparison of schools within three urban districts in Ohio and a comparison of four urban districts in Texas. In this study, I will build upon the foundation laid by other authors and extend their analysis to quantitatively compare districts within the same state in order to ascertain whether a district, such as Houston – a district that espouses the benefits of a weighted student funding mechanism at the building level – is better at moving financial resources and teachers to those students who need them the most (vertical equity) than is Austin – a district not using a similar type of student weighting formula at the school level.

In this era of federal accountability legislation such as the 2001 Reauthorization of the Elementary and Secondary Education Act of 1965, also known as *No Child Left Behind*, political pressure has been brought to bear on faculty and staff at both the district and school levels to increase student performance in an effort to meet standards set at the state level. This legislation has made individual school accountability a focus by attempting to mandate the reduction of the achievement gap between various groups of students. This has forced professionals in the areas of public education and higher education, along with elected offices to search for methods of focusing resources in an attempt to

improve student achievement. For example, in response to a March 2008 announcement as well as a follow up letter by the U.S. Secretary of Education, Margaret Spellings, outlining a plan for what she referred to as Differentiated Accountability[7], chief state school officers in seventeen (17) states[8] outlined plans that would give their states the increased latitude "for categorizing identified schools and determining the interventions required for each category" as stated by the secretary. After reviewing each state plan, a peer-review committee offered guidance by stating each state should make a "…strong commitment to improve both access (to) and quality…" of school wide interventions to all students but in particular to those in minority groups. This is done by focusing on global and transformative interventions, specifically in the areas of professional development, leadership training, and instructional specialists, as well as comprehensive evaluation plans for any plan or program in place. The peer-review staff cited Maryland and Ohio as high quality examples in this area. The Maryland plan calls for improving staff, training, and supplying multiple new resources including the use of the state's Breakthrough Center for supplemental help in analyzing performance data. The Ohio plan outlines a strategy to ensure teacher equity across core content areas (using teacher experience and teacher quality as the comparing characteristics), especially those teachers working with minority and students in poverty. The Ohio plan also

[7] For more information on Secretary Margaret Spellings plan for Differentiated Accountability, refer to http://www.ed.gov/admins/lead/account/differentiatedaccountability/index.html.

[8] The seventeen states included: Alaska, Arkansas, Florida, Georgia, Illinois, Indiana, Louisiana, Maryland, New Jersey, New York, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, and Virginia. Six state plans were accepted including Florida, Georgia, Indiana, Illinois, Maryland, and Ohio (one of the states studied in this dissertation).

calls for incentive pay, examination of individual principal effectiveness and professional development plans following a standards-based rubric for development produced by the state. As illustrated in these examples, the resources mentioned above may be monetary, human, or knowledge-based.

Legislation has not been the only avenue pursued in an attempt to guarantee vertical equity. Along with legislation, litigation has played a major role in articulating, as well as ensuring vertical equity over the last 160 years. Equity litigation began in Boston in 1849 with a prelude to *Plessy*[9]. The first segregated school was established in the city of Boston in 1798 in response to the harassment and prejudice experienced by African-American students. In 1849 parents of African-American students sued the city to reintegrate the public school system. The court cited the equivalent quality of teachers and resources as well as the fact that the segregated system had been established at the request of African-American parents in the community as reason to deny the request.

The question of equity has evolved and taken multiple forms since 1798 but the foundation of the equity question remains the same. Are all students being treated equally? To address this question, we have to return to the previous discussion on equity definitions. This dissertation examines equity primarily in terms of vertical by analyzing data from selected districts in both Ohio and Texas in an effort to shed light on funding mechanisms at the school level. Since 1970, funding equity issues have resulted in lawsuits in forty-five (45)

[9] Roberts v. City of Boston, 5 Cush. 198.

states[10]. These lawsuits have been undertaken to question the constitutionality or fairness of a particular state's school finance system. Nearly half of these challenges have occurred since 1990[11]. A current variant of the vertical equity discussion, coupled with the requirement of NCLB, seems to be focused on how district leaders allocate fiscal resources to schools at the building level. One view seems to be that if district leaders would allocate to buildings in the same manner states allocated to district then equality issues would be resolved.

This view is encapsulated in the September 20, 2007 Policy Report issued by the Buckeye Institute for Public Policy Solutions. The fundamental theme of the report focuses attention on Ohio school finance issues and agues the state's primary concern should be to improve the equity within a district (intra-district) rather than spend time and resources on equity between districts (inter-district) as each district has more than the amount of money needed to fund education (Carr et. al, 2007). In an effort to support their claim, the authors use average per pupil spending for both high and low poverty districts. By claiming that average per pupil spending has risen since 1995, the authors argue spending has increased to appropriate levels while achievement in reading proficiency has declined. The authors conclude from these data that it is the funding practices of local districts that are responsible for the downturn in reading proficiency scores (Carr et. al). They also state that using a weighted student funding (WSF) model in the states districts for intra-district allocations will effectively end the

[10] www.schoolfunding.info – the five states with no filed court cases have been filed challenging the state's system of funding education. The five states include Delaware, Hawaii, Mississippi, Nevada, and Utah.
[11] The 23 states were Alabama, Arkansas, California, Connecticut, Illinois, Indiana, Iowa, Kansas, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, Texas, Virginia, West Virginia, and Wisconsin.

misappropriation of funds within each individual district. The authors even go so far as to use the term "guarantee" to describe fixing these within district inequalities (Carr et. al, pg. 1).

In a response to the Buckeye Report for the Educational Policy Studies Laboratory, Baker points out the errant issues with the report's conclusions by performing a qualitative analysis utilizing Ohio district and school expenditure data from 2005-2006 using the methods proposed by Berne and Stiefel[12] in an effort to evaluate vertical equity in the allocation of both state to district and district to school financial resources. The expenditure data were examined along with district and school demographic data, and evaluated for vertical equity in the distribution of state-to-district, and district-to-school resources. Baker's analysis calls into question the declaration at the heart of Carr's conclusions. While his analysis does show some level of targeting funds to high poverty students on the part of the state to the district, the regression analysis does not indicate the kind of inter-district predictability the authors of the Buckeye Report might expect (Baker, 2007). Baker's analysis includes a comparison of Cincinnati[13] data, with that of the Akron, Cleveland and Columbus school districts. Baker's analysis indicate that these four districts are not better than but also not any worse than

[12] Berne, R., and Stiefel, L. (1984) *The Measurement of Equity in School Finance*. Baltimore, MD. Johns Hopkins Press.

[13] Cincinnati Public Schools is currently the only large public school district in Ohio to use the weighted student funding mechanism. This analysis is critical in support or refutation of the bold claims made in the Buckeye Report.

the state at directing financial resources to the students with the most need where poverty is concerned[14].

Further study, utilizing data from both Texas and Ohio has also been performed. Baker and Arbuckle (2008) showed that Houston (when compared to like districts in Texas) and Cincinnati (when compared to like districts in Ohio) faired as well as or better than like districts in regard to within district allocations, but spending was more predictable and positively associated with poverty and at risk measures in non-weighted student funding districts within each state[15].

The work done in the Buckeye Report and the arguments made in publications and work from Fund the Child, along with the work of Baker (2007), and Baker and Arbuckle (2008) illustrate the need for further analysis before championing the cause of weighted student funding. From a public relations and/or a school district view point, the movement of Seattle, the pioneer of weighted student funding in school districts across the nation, from a weighted student funding (which funnels more dollars to schools with more needy students) to a weighted staffing model (a model that funnels more instructional positions to schools with more needy students) should also give educational and public policy leaders pause. This dissertation will take this opportunity in time to attempt a full analysis of weighted student funding and to advance the work of not only those researchers cited above but of others in the field.

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[14] The basis of the Buckeye Report was that the state of Ohio had succeeded in its duty to fund Ohio school districts at an adequate level to ensure vertical equity. The authors went on to claim that it was the fault of individual districts for not funding schools properly that was the explanation of the inequality that existed vertically.

[15] Columbus in the state of Ohio and Austin in the Texas analysis

1.3 Purpose of the Study

From a public policy perspective, it is important that financial efficiency in education be both studied and implemented. There are two related questions from this perspective. The first is, given a series of student and school variables, does the weighted student funding model have a measurable effect on the level of per pupil expenditures at the school level in such a way as to improve vertical equity, dollars going to the students most in need, than funding mechanisms used by similar school districts?

The second question can be seen as an extension of the first. Literature cited below illustrates the practice of less qualified teachers working in the poorest schools. The goal of this dissertation is to determine whether teacher quality is distributed in a manner that is more vertically equal among schools in districts utilizing the weighted student funding model as opposed to similar districts within the same state.

1.4 Research Questions

The analyses herein apply school level data from large metropolitan areas in Ohio and Texas to address the following questions:

1. *Are urban districts that utilize a weighted student funding mechanism enabling more vertical equity in same-grade level elementary schools than urban districts not utilizing this funding mechanism when the districts are in the same state?*

2. *Are teacher qualifications in urban districts that utilize a weighted student funding mechanism distributed more equally in same-grade level elementary schools than urban districts not utilizing this funding mechanism when the districts are in the same state?*

That is, the first task at hand is to evaluate whether districts widely reported as successfully implementing *Weighted Student Funding* show any greater degree of vertical equity in their district-to-school allocation of resources than comparable districts. For comparability, I evaluate large urban districts within the same state. This ensures the districts being compared are operating under the same state policy structures for both budgeting and accountability. I focus specifically on large cities in Ohio and Texas, where Cincinnati and Houston are frequently cited *Weighted Student Funding* success stories in states where school level budget data have previously been evaluated.

A commonly cited equity concern in within district resource allocation is that staffing assignment models are too susceptible to seniority based teacher preferences that are either built into collective bargaining agreements or it is the driving force behind the informal power structure of school districts (Carr et al., 2007). While some academics and politicians argue that weighted student funding necessarily solves this problem, there exists little evidence to this effect, and significant evidence that weighted formulas in practice fail to make substantial headway in redistributing teacher qualifications across schools even if the formulas do redistribute financial resources (Baker and Thomas, 2006). Another danger in calculating staff resource allocations to individual buildings is

uncovered where district-level average salaries are used in place of real salaries when attempting to measure teacher quality (Berne and Stiefel, 1994; Wohlstetter and Van Kirk, 1995; Rubenstien, 1998; Condron and Roscigno, 2003, Baker and Thomas, 2006). The use of average district data may be used as a district level tool to mask quality differences of classroom teachers from one building in the district to another. Under the second question, regarding teachers, I ask first whether teacher quantity is targeted to higher need schools by evaluating the relationship between pupil to teacher ratios and student need measures. Next, I ask whether teacher qualifications are equitably distributed across schools by student populations. The desired condition is that teacher quantities should be targeted and predictable as a function of student need, and teacher quality should be equal, or at least that I not find higher numbers of novice teachers or higher numbers of teachers failing pedagogical exams in higher poverty, higher minority schools. I conduct this analysis only in Texas, as Ohio data on teachers were insufficient to the task.

1.5 Significance of the Study

This study is important for a couple of reasons. First, although there have been several studies since 1998 concerning within district funding, none have done what is being proposed in this study. Studies that have examined intra-district funding have typically done so by coupling the analysis with an examination of decentralized decision making (Wohlstetter and Van Kirk, 1995; Goertz and Hess, 1998; Goertz and Stiefel, 1998; Hawley-Miles and Roza, 2006;

Miller and Rubenstein, 2007; Roza, Davis, and Guin, 2007). While there have been a number of other studies[16] on within district resource allocation, this study is unique in that it attempts to compare intra-district equity across similar districts in the same state at the same point in time using similar schools.

Secondly, this study deals with a topic that is a continually emerging area of research than can, and possibly should, be used in educational policy decisions at both the state and local level. While several authorities in the matter, both educational and political, espouse the benefits of this type of targeted funding, it may not be the panacea of equity its supporters claim. It is our duty as professional educators to analyze the foundations of these claims and report to the greater community our interpretations of such claims. This study comprises an attempt to add to the body of information as well as increase the knowledge base so that professional educators as well as communities can make informed decisions.

[16] Ajwad, 2006; Burke, 1999; Stiefel, Rubenstein, and Schwartz, 2004; Stiefel, Rubenstein, and Berne, 1998; Berne & Stiefel (1994); Clark and Toenjes (1996); Rubenstein (1998); Iatarola and Stiefel (2003); Condron & Roscigno (2003); Roza, Guin, Gross, and Deburgomaster (2007); West & Shen (2003) ; Hill ed. (2008); Miller and Rubenstein (2008)

Chapter 2 – Literature Review

2.1 Introduction

The literature review is presented in several parts regarding previous work in the following areas: intradistrict resource allocation, teacher qualifications and their impact on school funding, as well as decentralization and the role it has played in school funding decisions. Further, a review of weighted student funding, both in academic research and in practice, will be offered.

2.2.0 Intradistrict Resource Allocation – A Historical Perspective

Equity issues have been a concern of the state and local community since 1642 and the first Massachusetts Bay School Law. This first attempt at educational equity came in the form of the law passed in 1642 making "selectmen" responsible for the education of apprentices and children in order that they would be literate, able to participate in governance, and knowledgeable about the Bible. The reason given within the law for such a document was "the parents & masters (who) are too indulgent and negligent of their duty" to provide a good education to children of the commonwealth. When the law of 1642 was largely ignored, and in an effort to promote equity across the colony, the colonial leadership passed the Massachusetts Bay School Law of 1647 (Farrand, 1929), making education a function for any community of fifty households or greater. While equity in education was access in the seventeenth century, for the majority of the twentieth century the examination of educational equity has focused on resource allocation - whether in dollars, positions such as teaching or

administrative, or facilities - has been conducted at the district level. For the last quarter of the twentieth century, fiscal and other resource analysis have begun to be more prevalent within the collection of research on equity at the state, local, and school level. Intradistrict analysis or the analysis of spending at the building level has begun to slowly take form. This type of analysis was first applied in 1967 in *Hansen v Hobsen* which involved *de facto* segregation in Washington D.C[17]. The plaintiff's argument attempted to prove that African-American children were being discriminated against due to the large numbers of minority students in basic level courses, while a majority of white students were in courses designed to prepare them for college[18]. The case centered on the interpretation of a single table[19] that descriptively articulated three advantages to living in a certain portion of the city, known as the Rock Creek Park area. The information contained in the plaintiff's argument indicated a pupil/teacher ratio for the area identified in the case as west of Park Street, or the predominantly white section of town, to be 18.1 to 1. The ratio for the rest of the city was 20.9 to 1 thus providing 15.5% smaller class sizes to white students as opposed to minority students. The plaintiff's case also went on to show an average teacher cost of 9.7% greater in the predominately white area of the city, as well as teacher expenditures that were 26.7% greater in this same area when compared to the rest of the city. The argument from the plaintiffs was that this was a system of inequality and discrimination against minority students.

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[17] Hansen v. Hobsen, 327 F.Supp. 844 (D.D.C 1971)

[18] For a more detailed account of the argument of both the Plaintiff and the Defendant, see the Journal of Human Resources, Summer, 1976.

[19] The information concerning the table is taken from "An Introductory Note" written by William Clune

After the 1954 Brown decision, the Washington D.C. school district instituted a desegregation plan for its students. Within a year the district became concerned with the number of African-American students scoring poorly on tests. The district instituted a system of achievement, or ability, grouping. The district courses at the tenth grade level were stratified to include a range from basic to honors. The primary concern within *Hobson* was the sheer number of African-American students assigned to courses identified as basic. During the 1966-1967 school year eighty-one percent (81%) of the district's elementary schools were between 85% -100% African-American (Moulton, 1968). Of all students assigned to the basic courses, ninety-five percent (95%) were African-American in a district that was ninety percent (90%) black (Reschly & Bersoff, 1999). The schools in the Rock Creek Park area were considered to be seventy-four (74%) percent white by the court, while the rest of the city was ninety-eight percent (98%) black. In order to achieve the twenty-six percent (26%) African-American population in these schools, the school district had instituted a transportation system to bus minority students into the schools identified in the legal action[20] (Clune, 1972). In those schools, classrooms were smaller when considering student/teacher ratio, teachers were paid more, and student expenditures were also higher. The primary question to be resolved was whether the expenditures for white students were considered discriminatory toward black students (Knoff, 2003).

[20] Overcrowding among other schools in the district was another reason provided for the busing of African American students into mostly white schools in the Rock Creek Park area.

Judge J. Skelly Wright was not able to draw a final conclusion based upon the evidence presented (Clune, 1972; Knoff, 2003). The court determined that it was the ability grouping based on unqualified tests that was discriminatory and thus ended the practice. This left the cost, quality, and economies of scale debate, which was widely argued and rebuked by Judge Wright, still unresolved. A similar case, *Serrano v. Priest*[21], was taken up by the California Supreme Court four years later. In this case the court determined that spending inequalities between districts due to local tax base differentials was unconstitutional and thus the funding system of California's schools was unconstitutional. While *Serrano* was concerned with equity between districts, the issue in *Hobsen* was equity within districts. It has been written that what Serrano did for spending differences between districts, *Hobsen* did for spending differences between schools in a single district based upon race and wealth (Clune, 1972).

After *Hobsen*, work on intradistrict allocations was slow to develop (Summers and Wolfe, 1976; Ginsburg et al, 1981) but the courts had recognized this was an area of educational finance that would need clarification. It has just been within the last decade that allocations within districts have begun to get significant attention. The remainder of this section is an evaluation of previous research done in the area of resource allocation and paint a picture for why this study is important.

[21] 5 Cal.3d 584 (1971)

2.2.1 Literature on Intradistrict Resource Allocation

It is appropriate to begin this review by briefly setting the boundaries within which I will view resource allocation. Resource allocation has and continues to be examined for both its horizontal and vertical equity.

Horizontal equity, or the equal treatment of equals, tends to provide valid and important information in a study when analyzing a single value such as general education funding (Berne and Stiefel, 1994). In the case of resource allocation – whether that be dollars, quality teachers, or any other educational resource – horizontal equity would be met in a district if all students were randomly and equally distributed and each school had the same or similar resources. Although this factor for equity remains a vital and important measure, in the regression model of equity focused on in this study, it is more appropriate to focus attention on measures of vertical equity.

Vertical equity can be defined as the appropriately unequal treatment of unequals. That is, certain students have varied needs that require more resources than an average student. Vertical equity can be thought of using the following illustration: certain students may have unique challenges, such as a disability or language acquisition (ESL), that require more resources and thus more dollars to achieve a comparable educational outcome as other students without the unique challenge in question. In this example, for these students to receive equality (the educational end) it is necessary to spend more dollars on them then another student. A different dollar amount is spent but it achieves a comparable result.

Research on the allocation of various resources at the school level has been fairly consistent. The study of resource allocation has produced a mixed bag of results with very few articles offering hard and fast conclusions about the issue of resource equity at the building level (Berne and Stiefel, 1994; Rubenstien, 1998; Stiefel, Rubenstien and Berne, 1998).

Berne and Stiefel (1994) completed an analysis of allocations at the school level within thirty-two New York City community school districts, to which the authors referred as sub-districts. Their analysis occurred at both the sub-district and school level for the city of New York during the 1991-1992 academic school year. The authors utilized financial data from both the general education fund, that is dollars that are used for the educational betterment of all students in the district, and reimbursable program funds, or funds from programs that are funded by the federal or state government above and beyond the general fund allocation. An example of these funds would include Title I monies. In order to assess the equity impacts on schools serving populations of students living in high poverty areas Berne and Stiefel defined high poverty as schools serving populations with eighty percent (80%) in poverty. Low poverty was defined as schools with thirty percent (30%) of their students living in poverty. When analyzing data at the sub-district level, Berne and Stiefel found budgets that were allocated such that high poverty sub-districts got higher per pupil allocation amounts but expenditures per pupil were inversely related to poverty[22]. The authors also analyzed the relationships at various schooling levels. Within sub-

[22] The authors did not find either relationship particularly strong with a slope of .480 and an r^2 value of .013 for budget per pupil. Expenditures per pupil was found to have a slope of -.786 and an r^2 value of .017.

districts at the elementary level, both budgets and expenditures were delivered in higher per pupil amounts in low poverty schools. When analyzed at the school level the relationship was similar to what was found at the sub-district level. When separated by educational levels, sub-district and school level, the per-pupil expenditure in high poverty sub-districts receive slightly more per pupil of the total budget, while at the elementary school level high poverty schools receive slightly less.

In another study, this one examining the equity of resource allocations at the school level in the Chicago Public School system from 1994-1995, Rubenstien (1998) found that elementary schools received more funding for specific students such as students with special needs. This funding, called categorical funding refers to dollars that are targeted or increased to help districts educate students with disabilities, students in poverty or English language learners. Although Chicago Public Schools received a higher dollar amount of categorical funding during the school year studied, this increased amount was offset by a lower than average allocation of general funds. The result was a weak, though somewhat positive, relationship between total funding and student poverty. Rubenstien hypothesized that the lower then average general fund allocation may be a result of the employment of less experienced teachers in higher poverty elementary schools.

Using school level data from a variety of years[23] Stiefel, Rubenstein, and Berne (1998) found vertical equity inconsistencies within New York and Chicago as well as funds not necessarily strategically targeted within the various districts studied nor targeted to different educational levels. Of their own admission the authors were not provided adequate expenditure data by individual programs, including regular education, special education, and English language learners. In order to generate expenditure data by program, the authors utilized the revenue streams that funded each individual program for analysis. The general fund utilized for the investigation included revenues from state aid as well as local fiscal input used for regular education, which are not funds targeted at a particular student group. In three of the districts, general or regular education funds could not be separated out of the data provided, thus for New York the authors relied on the total of all funds – regular education, special education, bilingual education – for their analysis.

Within the New York and Rochester school districts the authors found a stronger positive relationship between total funds and percent poverty at the middle school level than at either the elementary[24] or high school[25] levels. In Chicago elementary schools, Stiefel et al. found a negative relationship between poverty and dollars allocated from the general fund, while seeing a positive relationship between poverty and dollars in the total budget. The authors also saw mixed results when comparing per-pupil funding to percentage of non-white

[23] Varied years were used as the authors reported they had difficulty acquiring school level data from the districts in the study. The districts and academic school year included in the study were Chicago (1994-1995), New York City (1991-1992), Rochester (1992-1993), and Ft. Worth (1993-1994).
[24] This relationship at the elementary level was weak but slightly negative.
[25] The relationship in Rochester high schools was described as very weak and negative.

students in Chicago schools with some relationships positive and some negative but all weak in nature. In Rochester the relationship between dollars per pupil and percentages of non-white students was positive and moderately strong for elementary schools in the district while mixed and weak at other levels. In Ft. Worth, Stiefel et al. found a moderately positive relationship between expenditures per-pupil and black students. It should be noted that where Stiefel et al. evaluated general funds only, there was a negative relationship between poverty and dollars allocated, however, when the authors utilized the total dollars spent, the relationship tended to be positive in nature. This would indicate that these districts may have used the supplemental or compensatory funds to supplant needed funds from the general revenue stream to help support students in poverty.

In another study analyzing data at the school level Ajwad (2006) found discretionary resources of districts in Texas were skewed toward those schools in low-income, higher minority schools. Ajwad found, however, the proportion of funds targeting economically disadvantaged students and students with limited English proficiency to be statistically insignificant. Funds were also skewed toward neighborhoods with a higher educated populace to a significant degree. In real dollars a change of one standard deviation in the percentage of college educated adults resulted in an increase of $75 in total spending per pupil.

Iatarola and Stiefel (2003) studied 840 elementary and middle schools[26] in New York City for 1997-1998. When analyzing operating funds, which serve as the base funding for all students in the New York City schools, the authors

[26] The schools in the study were composed of 664 elementary schools and 186 middle schools.

interpreted a coefficient of variation of 0.126 at the elementary school level as horizontal inequity. Where Stiefel et. al (1998) used a coefficient of variation threshold of 0.15 to determine equality, Iatarola and Stiefel (2003) utilized the interpretation from the work of Odden and Picus (2000) in which they advocate a threshold of ten percent (10%) as the coefficient of variation for determining equality. This ten percent is the point in which ninety-five percent (95%) of the samples fall within two standard deviations and sixty-six percent (66%) of the samples fall within one standard deviation of the mean of the sample. Iatarola and Stiefel also found a negative statistically significant relationship between operating funds and percent free and reduced lunch. A negative statistically significant[27] relationship between operating funds and percent non-white also existed. Taken together, the more poor, minority students attending elementary and middle schools the less the school is funded on a per-pupil basis. This equates to funding the neediest students with the least.

Stiefel, Rubenstein, and Schwartz (2004) studied schools in New York City[28], Cleveland and Columbus[29], Ohio to analyze the relationship between school level expenditures and student characteristics. In New York City elementary schools, they found that schools with a higher percentage of poor students spend more money per pupil, at a significance level of 0.01%. A similar relationship existed between expenditures and special needs students as well as expenditures and percent limited English proficient. While the significance level for special needs students was 0.01%, the significance level for limited English

[27] All significance levels in the Iatarola and Stiefel study was as a 5% or lower significance level.
[28] Data from New York City was for 2001.
[29] Data from both Columbus and Cleveland was for 1997.

proficient students was 0.05%. Spending was also directly related to the proportion of students in special education, although not consistently significant, and with the percentage of students with limited English proficiency. The relationships in Cleveland and Columbus were very similar to those seen in New York. Schools with higher proportions of poor students tended to spend more money per pupil; however the results were not significant at any level. Neither Ohio district provided data on special education or limited English proficient students but only data for percent free lunch.

Condron and Roscigno (2003) analyzed eighty-nine (89) public elementary schools in Columbus, Ohio. This analysis revealed considerable disparities in spending within the district, which the authors indicate are linked to local patterns of racial and socio-economic stratification as well as racial and socio-economic concentration. This conclusion was supported by a significant negative correlation between adjusted instructional per-pupil expenditures and percent of students eligible for free or reduced lunch[30] as well as the percent of non-white students[31]. The percentage of students who received free or reduced lunch was significantly negatively correlated[32] with per pupil expenditures within the operations and maintenance allocations. The data suggest that the schools with the poorest students spend significantly less on the operations and upkeep of those buildings. The authors show that while spending on the operation and maintenance of specific buildings does not have a direct effect on student achievement, it does have an effect on teacher quality. When converting these

[30] At the 0.01 level…
[31] At the 0.10 level…
[32] At the 0.001 level…

figures to real dollar amounts spent at the building levels, Condron and Roscigno computed the average spending equated to $302,570 less for high poverty schools as compared to their lower poverty counterparts. Further, they show that total spending coming from local sources was inversely relational to both poverty and minority concentration and thus federal dollars don't make up the inequality of spending but merely supplant it.

In their recent work, Miller and Rubenstein (2008) examine the magnitude of intradistrict resource allocation disparities in New York State. Miller and Rubenstein studied four sample districts from the state of New York. These districts, identified only as A, B, C, & D were chosen because they were large enough to have an adequate number of schools within the district to support and warrant analysis and had heterogeneous student populations. The authors chose four districts in order to balance the need for an appropriate sample size and the prohibitive cost of doing a larger study. These districts[33] had at least ten schools with a measurable variation in the distribution of student need across all schools.

One purpose of choosing districts meeting the above criteria was to complete the analysis using what the authors referred to as mid-sized districts. The authors specifically and purposefully chose not to use the New York City school district due to its size and exposure in previous studies. During the qualitative analysis of their work Miller and Rubenstein suggest that budgeting systems in these mid-sized New York districts did not often allow for a single person to make choices concerning building allocations with full knowledge of

[33] Collectively all four districts serve approximately 83,000 students in over 120 schools.

choices other individuals might be making. In other words there are multiple people making allocation decisions and in most cases any single decision maker was making decisions independently of any other decision maker. This fragmentation of decision making in turn would limit the ability of district level administrators to consider the entire resource picture by school. The result of this disjointed allocation system was the creation of situations that were inequitable at the building level. Other factors that played an important role in resource allocation in the districts studied included political influence and historical precedent. Political pressure might range from superintendent initiatives to organized pressure from parent advisory groups, while historical precedent simply meant funding a program during the current year because it was funded in a previous year. This effect would be captured by a single school in a district receiving federal, state, or local grant dollars for a particular at-risk program. After the grant was completed, it would be difficult to remove the program completely from the school. The authors point out that these two factors, historical precedent and political pressure, may not be factored into the formal mechanism or formula for resource allocation and can easily become add on dollars to the building budget. This can lead to unequal intra-district funding that may be inappropriate based upon the needs of the school.

West & Shen (2003) performed similar analyses on the seven largest districts in Massachusetts. They were also interested in comparisons of the Boston Public School system with six other districts. This comparison was particularly interesting to the authors due to the differences between Boston and

the other districts, including higher percentages of minority students, students in poverty, students with disabilities and English language learners. Their study utilized instructional expenditure data from 2000-2001. The sample included 272 schools of which 224 were of the primary grades. When analysis of individual district distribution variation was computed the coefficients of variation for per-pupil expenditure had a range of 0.12 to 0.2. In order to adequately measure intradistrict variation and focus the analysis, West and Shen began by assessing variation across all districts. Their findings suggest larger schools tend to spend less per pupil on instruction to a significant degree. Higher populations of students in special education are directly proportional to expenditure per pupil. A relatively small increase in the number of special education students would equate to a relatively large amount of money. West and Shen found that one standard deviation increase in special education population resulted in approximately a $350 increase, while as the limited English proficient student population increases with each standard deviation the school received approximately $100 per pupil. While economies of scale seem to be at work in these individual districts, the results seem to indicate the value placed on educating a special needs student is at a higher level than a student whose first language is not English. This may be a result of other funds available to support special education such as federal and state funds.

As the pair continued their analysis, they also compared Boston schools with schools outside of the Boston school system. Within Boston the authors saw a 7.4% increase in special education students equate to a spending

increase of $600 per pupil, while outside of Boston a 5% increase resulted in an increased expenditure of $250 per pupil. When the focus turned to students who were of limited English proficiency (LEP) in Boston schools an increase of 17.2% resulted in a $200 per pupil increase in expenditures, while there existed no relationship between expenditure per pupil and LEP population outside the Boston school system. When the authors applied their model and considered race as a student factor within the Boston school district, they found a slight negative, though not significant, relationship between race and spending. Schools outside of the Boston area spent approximately $130 per pupil more in schools with high minority concentrations. Boston schools with low income students spend significantly less than schools outside of Boston, at a rate of about $135 per pupil less. Within Boston, schools seemed to be funded at a lower rate, in terms of local funding while federal grant funds were dispersed equally. This equal dispersion however may not have been enough to overcome the lower level of locally funded dollars (West & Shen, 2003).

2.2.2 Interdistrict vs. Intradistrict Resource Allocation

Spending equity has long been an issue of concern at the state and district level[34]. The legal and policy implications have played themselves out for more than four decades. One area that researchers have attempted to quantify and compare is variation within states, between districts as well as within

[34] For further review see Picus and Fazal, "Why Do We Need to Know What Money Buys? Research on Resource Allocation Patterns in Elementary and Secondary Schools," in Where Does the Money Go? Resource Allocation in Elementary and Secondary Schools, eds., Picus and Wattenbarger (Thousand Oaks, CA: Corwin Press, 1996), 1-19.

individual districts between schools in an attempt to further refine the landscape that is education finance and resource allocation. Using a sampling of 1,204 school districts across 37 states and six years, Burke (1999) attempted to measure variation in the allocation of educational resources at the intra-state, inter-district, and intra-district levels by utilizing the gini coefficient. The gini coefficient is a measure used in educational finance analysis to measure horizontal equity in a given system. In her study of horizontal equity Burke's results suggest the existence of variation but ultimately concluded that the horizontal equity between districts within the same state was relatively level.

Burke goes on to make a crucial, and in the view of this author, faulty assumption. Burke assumes that district boundaries equate to dividing states into what is called equality groups and that the members of the groups are equal within, while being unequal to other groups in the same state. She then attempts to use a technique to decompose the intra-state gini coefficient into a mathematical term that can be used to identify vertical equity. By doing so, according to Burke, this would allow for the quantification of the role both vertical and horizontal equity had in the inequality of the entire distribution. This is a challenge as the gini coefficient is, by definition, a mathematical tool for quantifying horizontal inequality.

Using the method she described in the article, Burke arrived at similar findings as others from previously cited works. Burke concluded that vertical inequality played a major role in the variation of the overall resource distribution within an educational system. Burke also concluded that vertical equity was a

dominant force in the level of equality within the overall level of inequality, thus indicating vertical equity may be a legitimate concern in the sample. While the method in arriving at these results is questionable to this author, the conclusions do seem worth at least pointing out here.

More recent studies have supported the notion that variation exists within districts and in some cases that the variation is larger within districts than between. In their work with school level data from districts with more than 25,000 students in Texas, Roza, Guin, Gross, and Deburgomaster (2007) found variation in funding within districts to be higher than variation between districts for the period studied[35]. By comparing school ratios of individual school funding to the average for the district, Roza et al. were able to analyze intradistrict variation by creating a Weighted Student Index (WSI). The weighted student index is a ratio of the funding a school receives to the funding the school might have received based on the number of students identified within a particular student group. That is, the denominator was the amount of money the school should have received based on the special needs – special education, English language learners, etc – of its student population if the school had received the same amount of money for each student within the need group identified (pg. 71). The student need groups identified in their work included: students eligible for free and/or reduced lunch, students eligible for bilingual education, students with disabilities, gifted students and students in vocational programs. Roza et al. first found base funding, or funding not targeting specific student needs, between

[35] Roza, Guin, Gross, and Deburgomaster (2007) used data from the decade of years from 1993-1994 to 2002-2003.

schools *within* Texas districts was considerably less equal than base funding *between* districts[36]. Coefficients of variation in Houston ranged from between 0.2 and 0.25 for all years but one. The Houston findings were second only to Roza et al.'s findings of inequity in Dallas (with a CV of 0.3 for the majority of the study). When controlling for school level, total enrollment, percentage of students that are white, average teacher experience and student achievement Roza et al. accounts for only one-third of the variation between school level allocations of resources within a single district. When they included total spending and reanalyzed the data, the authors found that the results were relatively unchanged and were consistent with the results of base funding. The authors then turn their attention to Weighted Student Formulas. In the article, the authors claim that were the districts in the study to adopt a funding allocation system such as a strict weighted student funding system there would be no inequities in fiscal resources between schools and the variation zero. According to Roza et al.'s analysis, when categorical (targeted) funding was included the effect on the variation in base funding was unaffected. In this case, the type of funding that was supposed to help erase inequality was not successful.

2.3 Literature on Teacher Qualifications

Variation in teacher quality within districts has been well documented. Studies indicate teacher quality is inversely related to student poverty and/or minority students (Berne & Stiefel, 1994; Brent, Roellke, and Monk, 1997; Stiefel,

[36] Roza et al. point out they were deliberate in also running the analysis without the states' four largest districts and only with the four largest districts.

Rubenstein, and Berne, 1998; Condron & Roscigno, 2003; Iatarola and Stiefel, 2003; Roza and Hill, 2004; Stiefel, Rubenstein, and Schwartz, 2004; Baker & Thomas, 2006; Miller and Rubenstein, 2008). Teacher quality has been defined in terms of subject matter knowledge, as well as years of experience and pedagogical training (Darling-Hammond, 2000).

Brent, Roellke, and Monk (1997) studied resource allocation devoted specifically to the area of human resources. In a study of New York districts and schools, they found substantial differences existed in human resource allocation between schools. They found that poor schools consistently spent less money on certain curricular areas than their wealthy counterparts. The study also examined resource allocations to programs. Brent et al. found higher levels of resource allocation being made to remedial programs in poorer schools when compared to resources allocated to more advanced programming. Likewise, they also found that in wealthy schools there existed higher levels of human resource allocation for advanced programs as compared to human resource allocations for remedial programming.

Recent work has supported and reinforced earlier findings that school demographic characteristics may play a vital role in the quality of teachers a particular school receives. Miller and Rubenstein (2008) find budgeting practices in the four New York districts studied allowed for more highly qualified and more experienced teachers to wind up in low-need schools. Miller and Rubenstein calculated coefficients of variation for teacher experience, teacher certification and average salary for all four districts. Variation for average salary ranged from

0.02 to 0.08. Variation for teacher certification ranged from 0.01 to 0.16. Variation for teacher experience ranged from 0.17 to 0.22. Across the four districts variation in teacher experience and certification existed at higher levels than variation within average salary. Free and reduced lunch levels in the four districts ranged from 52% to 73%. These levels are commonly associated with poverty. In two of the four districts studied teacher salary is significantly negatively related to student poverty. Schools with higher populations of LEP students were found to have less experienced and lower salaried teachers. This relationship was not as strong as the relationship experience and salary had with poverty. When the two were compared poverty had a coefficient that was approximately 0.2 higher than with LEP.

Other research has been dedicated to teacher salary comparison as well. Stiefel, Rubenstein, and Berne (1998) found a moderately strong negative relationship at the school level between average teacher salary and percent of Hispanic students in a data set from Ft. Worth Texas[37]. In an analysis of New York City school districts and sub-districts, Berne & Stiefel (1994) found teacher salaries show a strong negative relationship to poverty, but there may have been some masking of variation at the school level because each sub-district assigned an average teacher salary for the sub-district to each teacher at the school level as opposed to the actual teacher salary within each school. This points to another mechanism that may serve to manipulate building budgetary totals, average teacher salary versus actual teacher salary (Koppich, 2007).

[37] 1993-1994

Koppich, in her work on resource allocation under traditional and reform collective bargaining agreements wrote that under traditional contracts all teachers are treated equally but teachers have various skills and qualifications that differentiate them from one another. If researchers are not able to or choose not to take those differences into consideration then the conclusions they may draw from the data may not be as reliable as they might believe. In the current study it is important that for the information to be valid and reliable, the data must reflect as closely as possible what is happening at the level closest to the student. In this study that is the school level.

Roza and Hill (2004) had similar findings to those of Miller and Rubenstein (2008) when they constructed district budgets from real personnel salaries rather than average salaries in large urban districts that included Baltimore, Cincinnati, and Seattle. They found teacher qualifications not evenly distributed throughout schools in large urban districts in their study. In Seattle, this uneven distribution caused published budgets attributed to individual schools to be off by $72,500. That is the average school budget in Seattle was an amount either higher or lower than published by this amount merely by changing calculations from average district teacher salary to actual teacher salary attributed to specific teachers in that school. In the case of both Baltimore and Baltimore County, the figures were even more dramatic with individual school budgets being impacted by $100,000 and $120,000, respectively. These differences were given clearer meaning as Roza and Hill began to identify which schools were feeling the effects the most. They saw teachers with lower than average salaries were

placed in the lowest-performing schools. These patterns were consistent across all districts in the study. They also saw large urban districts sometimes using federal dollars, not to supplement, but to supplant general education dollars and thus actually funneling resources away from the students who need them the most (Roza and Hill, 2004).

Iatarola and Stiefel (2003) studied New York City schools and found both vertical and horizontal equity lacking in elementary schools within the city district. Specifically, Iatarola et al. found inequality in the distribution of teacher resources and operating funds per general education students across schools. In using the coefficient of variation within the model, they found a negative relationship existing for free/reduced lunch, limited English proficiency and percent non-white.

Stiefel, Rubenstein, and Schwartz (2004) used similar data from New York City schools for 2001. Their work suggests poor schools receive more money per pupil but have lower teacher qualifications and salaries, thus calling into question the level of teacher quality at individual schools. This trend was most evident particularly in schools serving the city's most disadvantaged students. Similar findings existed in Condron & Roscigno (2003) in which they found the most highly credentialed teachers were concentrated in high-SES, white schools with higher per-pupil expenditures.

In summary, the above illustrates that teacher quality matters when school level data is taken into consideration. First, a focus of the literature is to show that those students who are in the most need are receiving teachers that are not as qualified as students of less need. It is a need to attempt to ensure that

teacher quality is a resource that is shared equally across schools and thus students. Second, the literature illustrates the need to analyze the data from a more focused vantage point, that of the school level. By reviewing data from the school level, the conclusions drawn from the data can more accurately reflect what is truly happening where direct student contact is made. In this dissertation a question to satisfy is whether or not teacher quality is more equitable in districts that use weighted student funding versus other districts in the same state.

2.4 Literature on Decentralized Decision Making

The current wave of school finance reform is one that seeks to focus attention at the school level in an effort to equalize funding across schools. This current reform wave is promoted as having both liberal and conservative political appeal by combining *Weighted Student Funding (WSF)* with decentralized governance including site based budgeting and management (Fund the Child, 2006). Weighted student funding formulas are used to estimate school-based budgets based on the different needs of children across schools and decentralized governance intended to provide school leaders – principals and school-based planning teams – greater latitude over the use of those funds. From a liberal perspective, the provision of need-based aid directly to schools can resolve substantial within district, cross-school disparities in resources that have been documented for decades. From a conservative perspective, decentralized governance is perceived to promote efficiency and foster school choice. These two movements of the reform are not mutually exclusive as can be

seen in multiple examples (Wohlstettler and Van Kirk, 1995; Goertz and Hess, 1998; Goertz and Stiefel, 1998; Houston Finance Handbook, 2007). In fact, when decentralized management occurs, weighted student funding does not necessarily follow, but authority over individual budgets is typically one of the first functions of decentralization (Clune and White, 1988; David, 1990; Hatry et al., 1993). One emphasis that can be taken from the articles listed above is the presence of boundaries set by central office administrators on site-based leadership that serves the purpose of constraining any resource allocation type decision that might be made at the building level.[38]

Wohlstettler and Van Kirk (1995) studied eighteen schools across nine school districts, seven of which were in the U.S., one in Canada, and one in Australia. The authors found district, and in some instances state or provincial, constraints present in nearly all the schools they studied. During the time of the study, Milwaukee school administrators had budget authority over individual line items but could only spend money in ways that were approved by district administrators. In the Australian district administrators were given authority to allocate various funds, curriculum, administration, and facilities; however the dollar amount of the funds were finite and unchangeable. In other words, building administrators did not have authority to transfer money from one fund to another. In addition, the funds represented in these three areas constituted approximately ten percent (10%) of the total school budget. Even districts that were budgeting in what the authors considered the best manner in the study (that

[38] Marzano and Waters (2006) refer to this as defined autonomy. This concept will be more fully explored in the end of this section.

is districts that were allocating approximately 85% - 95% of the school budgets) had constraints that in effect tied the hands of building leaders. For instance, very little discretionary money remained in most school budgets after salaries were paid and district constraints such as class size were brought into focus. There were other such limitations on the ability of building leaders to offer flexibility in allocation areas. Teaching positions, for instance, was one such area. Most districts allocated funds for teaching positions as a district wide average thus discouraging schools from attempting to save money by hiring less expensive teachers.

Goertz and Hess (1998) analyzed decisions within school based budgeting frameworks in four large districts in the United States. Those four districts included Chicago, Fort Worth, New York City, and Rochester, New York. Goertz and Hess found district limitations on schools' discretion to allocate funds and personnel within buildings. They had similar findings to Wohlstettler and Van Kirk in that in the four districts studied, district and sometimes state policies dictated staffing. For instance, Rochester and Chicago schools are required by either state law or union agreement to have various positions staffed in building[39]. If a school has needs that change, they do not have the flexibility to change staffing allotment if the need arises. Actual building level discretion is a rare commodity. Most of the discretion in Rochester came in the form of funds allocated for substitute teachers as well as a small amount for per-pupil allocations. In Chicago, discretionary spending was limited to funds allocated for

[39] In Chicago, for instance, elementary schools are required to employ a librarian and a physical education teacher, while Rochester requires an art, music and physical education teachers.

students who qualified for free and/or reduced lunch, while in both New York and Fort Worth, responsibility in allocating funds was restricted to instructional materials and supplies.

In a separate article written with LeAnna Stiefel, Goertz and Stiefel (1998) continued to analyze the same four large districts listed above. Included in their findings in this article was the conclusion that school based decision making was not an impetus to spend money or do business in any novel ways. In fact, their findings suggest that schools used whatever flexibility they had where budgeting was concerned to address issues in traditional ways, such as the reduction of class sizes, expanding social services, supporting existing art, reading, and/or music programs; as well as purchasing new curricular and professional development materials. During the qualitative portion of the study, Goertz and Stiefel administered a survey to thirty (30) selected individuals as well as performed personal interviews with ten (10) members of each school who had knowledge of budgeting procedures. None of the schools investigated were engaged in any major restructuring of any kind.

The above is in direct contrast with the findings of Roza, Davis and Guin (2007) and others[40] who have also studied decentralized decision making. In their work Roza et al. show that funds are used differently in schools that have greater autonomy. They cite principals who are "entrepreneurial" that is principals who are willing to take risks or are independent thinkers. The primary

[40] Other research done in the area of decentralization and its impact on student achievement include Murnane and Levy (1996), a study of Texas schools, principal performance and student achievement; Bryk, Camburn, and Louis (1999) which evaluated school level resource use and its impact on student achievement; and Tung, Ouimette, and Feldman (2004) comparing Boston student performance in decentralized schools to student performance in Boston schools with a more centralized approach.

focus of their study is the allocation of resources, particularly human resources. Roza et al. show that across all categories of schools[41], schools with centralized governance and leaders who are not entrepreneurial had the lowest FTE per 300 students. Roza et al. suggest that reducing student teacher ratio is a type of risk taking behavior. This is a contention that is debatable as this is a behavior that Goertz and Stiefel describe as traditional. One area of agreement however, does seem to be that constraints on school level decision making does matter. Although Roza, Davis, and Guin do find differences between schools with decentralized autonomy and schools without centralized autonomy that they claim are significant, there are concerns that the sample size of entrepreneurial schools is inadequate to draw the conclusions made in the study. It is unclear as to whether or not the findings Roza et al. made would be considered non-traditional approaches based upon Goertz and Stiefel's definition of traditional.

It should be noted that where an increase in the level of decentralized decision making may allow building leaders to be entrepreneurial, it may not transfer into high student achievement. In a working paper, and again in a recently published book, Marzano and Waters (2006, 2009) show a positive correlation between building autonomy and student achievement (0.28), yet a negative correlation between student achievement and site-based management (-0.16). This dichotomy was explained by the authors as "defined autonomy". This was defined as the ability of building leadership to make decisions in light of a defined vision and mission for the school district. This defined autonomy

[41] The classification and number of schools included schools in centralized districts (302 schools), schools in centralized districts with entrepreneurial principals (9 schools), schools in decentralized districts (57 schools), charter schools (81 schools), and private schools (68 schools)

seems to explain the presence of boundaries alluded to at the beginning of this section. While these boundaries may be impacting a building's ability to utilized funding resources in a manner they see fit, they seem to be serving to allow all buildings (in a district) to be moving in the direction the district has defined.

2.5 Literature on Weighted Student Funding

Since the mid 1990's there has been growing support within the educational and political arenas for school districts to adopt a system that more equitably distributes financial resources to schools. The current reform wave, promoted as having both liberal and conservative political appeal combines an approach called *Weighted Student Funding (WSF)* with decentralized governance including site based budgeting and management (Fund the Child, 2006). States such as Texas, Ohio, and Kansas use a system at the state level to determine cost of students who have a variety of needs. These needs may be a disability, living in poverty, giftedness, students who are bilingual or others. In this model, these states drive dollars to districts by funding these students above and beyond the normal base aid per-pupil. These students are weighted to cost more than an average student. In a district utilizing weighted student funding money is allocated to individual schools in the same manner. I have examined in a more specific manner decentralization and site based management within earlier sections. This section will focus on WSF, its examination in the literature, and how and where it is currently being used, considered or phased out and why.

In the study *First Steps to a Level Playing Field*[42] commissioned by the School Communities That Work National Commission, in which Hawley-Miles and Roza were contributors, the task force demonstrates the inequities in specific urban schools in Cincinnati. In that district, researchers found a discrepancy of $6000 per pupil between the highest funded and lowest funded schools. In a follow up article Hawley-Miles, Ware & Roza (2003) summarized the process Cincinnati utilized to move to a weighted student funding mechanism. The district first adopted a strategic reform plan they referred to as "Students First". As part of this plan each school was required to adopt a comprehensive school design model from a list approved by district administrators. A member of the school board interviewed by Hawley-Miles et al. indicated that fiscal equity was not a primary purpose for adopting a weighted student funding, or what the Cincinnati district referred to as student based budgeting allocation model. The primary purpose was to increase the level of decentralized decision making within the district as well as becoming more transparent concerning resource issues. As district officials found some inequities can be more easily defended than others. For instance, utility costs in older more worn buildings can often exceed those of newer more energy efficient buildings. However, other resource inequity issues may be products of mathematical formulas, political influence, historical tradition or the special interest of a district administrator or school board member (Hawley-Miles et al. 2003).

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[42] Summarized from School Communities That Work, *Portfolio for District Redesign* (Providence Annenberg Institute for School Reform, Brown University, 2002).

In their work from 2007, Miller and Rubenstein found that district size was a factor in the allocation of resources within four mid-size New York state school districts, particularly where teacher quality resources were concerned. From their work, it seems that the most unequally defined factors across schools were teacher experience and certification status. In the study, they found the two small districts accepted the notion that teacher quality was equal across the district since all teachers met the "highly qualified" standard set forth by NCLB, while the two larger districts suggested they did take into consideration equity across schools where teacher quality was concerned. However, district leaders conceded they had limited control of the allocation process to schools that would have impacted teacher quality. The focus for equality within the four districts studied seemed to be consistent class sizes rather than resource allocation. In fact, no district within the study attempted to ensure uniform distribution of teacher quality, either because district leaders felt it wasn't needed or the leaders within the district indicated they had little real control over the allocation process. Furthermore, in a qualitative review of school-based budgeting in these same districts, Miller and Rubenstein identified key factors that contributed to the success of school based budgets. These included the organizational structure of the finance department within the district, the political influences exerted by departments within districts as well as from outside individuals or organizations and fiscal transparency at the building level. During the qualitative portion of the study a district administrator cited the difference in district size for varying political pressure. As districts grow larger and district administrators tend to

become insulated from the public at large, the political pressure on those administrators becomes more organized and less formal. In smaller districts where administrators were less isolated the pressure may come in the form of a visit at a local business establishment. Fiscal transparency was an important factor as it could work to the disadvantage of district administrators. When school budgets are published, school leaders, parents and other stakeholders can hold district administrators accountable and use the information to drive more resources into the schools they worked with. However, the single most important mechanism to allocating teacher resources remained, what Miller and Rubenstein referred to as, the average class size formula[43].

In a study that included two districts included in the present study, Houston ISD and Cincinnati Public Schools, Hawley-Miles and Roza (2006) examined the movement to student-weighted allocations and its effect on resource allocation within each district. In general, Hawley-Miles and Roza found the move to student-weighted allocations to have increased the equity within each of the two districts when comparing coefficients of variation across school years that included 1998-2003. Prior to the implementation of student-weighted funding, the coefficient of variation for Houston was 0.11 and 0.26 in Cincinnati. Four years later the same level of variation for Houston was 0.09 with no variation in Cincinnati. The authors also found that In Houston the lowest funded school rose from 0.46 of the district average allocation to 0.96. Hawley-Miles

[43] In this formula teachers were allocated by average class sizes that would vary intentionally by grade level. While two districts did state they reduce class sizes in schools with high English language learners and/or poor academic performance, the other two districts attempted to keep class sizes equal across all schools. (Miller and Rubenstein, 2007)

and Roza devoted enough space in the article to point out the obvious differences in weight categories that existed. For example, the authors cited the weighting level of bilingual education when compared to gifted education. In Houston ISD schools received a weighting of .10 for students qualifying as bilingual, while in Cincinnati the weighing for this student group is at .50. Gifted students received a higher weighting than bilingual students in Houston but a lower weighting than bilingual students in Cincinnati. The article does not seem to adequately address the base funding issue. Although the authors allude to the fact that even with weights that are equal, dollar amounts will be dependent upon the base funding for general education students. The article does not take into consideration at what level the general education student with no weights is being funded nor how the weights impact that foundational level.

Houston has been operating under a student-weighted allocation formula since the 1999-2000 school year, (Hawley-Miles, 2006) but according to the district's own Resource Allocation Handbook, began making decisions that led to student-weighted allocations to buildings in 1991 (Houston ISD, 2007)[44] As with other initiatives at the district level, Houston ISD began the move to a student-based allocation formula as an outgrowth of its efforts to decentralize. A secondary goal to this decentralization was improving perceived inequity in resource distribution (Houston ISD, 2007). Weights used by Houston ISD to fund schools within the district and weights used by the state to fund school districts in the state of Texas are listed in Table 1. Schools in Houston were to be budgeted

[44] Houston ISD, Resource Allocation Handbook, 2007-2008. Dr. Abelardo Saavedra, Superintendent of Schools.

real dollars and then given authority to spend them under certain parameters set by district officials. This highlights, again, that the desire to decentralize is not unconstrained. On the contrary, officials at the district level attempt to retain some level of control by containing those building level decisions to within the boundaries district administrators are willing to accept.

Other districts from around the nation that have adopted school-based budgeting have begun to re-evaluate those decisions in the face of fiscal uncertainty[45] and overall complexity[46]. The Cincinnati Public School district has been using weighted student funding, or as the district refers, student-based budgeting since 1999-2000 and like the Houston ISD, Cincinnati schools had to adopt a school design from a pre-approved list that had been identified by district officials (Hawley-Miles and Roza, 2003). Weights for funding students at the school level were also established. These weights appear in Table 2[47]. As noted from above, Cincinnati Public Schools in cooperation with union leaders have temporarily suspended student-based budgeting for 2008-2009 and schools will work with district officials to ensure funds are appropriately targeting student educational needs (CPS News Release, 2008).

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[45] Cincinnati Public Schools have chosen to suspend student-based resource allocation in an effort to cut back on the overall dollars spent within the system. (Cincinnati Public Schools News Release, 2008)

[46] Seattle Public Schools have decided to move to what the district states is a simpler less complex method of funding called Weight Staffing Allocation (WSA). In the FAQ document released by the district, officials claim the move was at the urging of several groups and adopted by District's Budget Advisory Team. Reasons for this move provided by the district include less complex, less cumbersome and WSA allows the district to coordinate efforts to reach students. (Seattle Public Schools WSA FAQ, 2007)

[47] Ohio funds schools through defined instructional and/or support positions. Districts are funded for teachers at a ratio of one teacher for every 20 students at a rate of $54,941 per position for FY07. There are also funds made available to districts for support positions, professional development, intervention (at-risk), and data driven decision making (technology). Other dollars are provided for LEP students, school size and urban districts. Special education funding is provided based on disability and is funded at 90% of the cost of special needs services in 2001-2002.

Table 1

Houston ISD and Texas State Student Group Funding Weights (1998-1999)

The Per Unit allocation for elementary schools in 2007-2008 was $3,071		
Factor	District Weight	State Weight
Mobility (> than 40%)	1.10	cost per mile
Poverty (50% Free/Reduced Lunch, 50% At-Risk)	1.15	1.2 above or 2.41 if pregnant
Gifted & Talented	1.12 funded at 100%	1.12 above for up to 5% of ADA
Vocational Education (CATE)	1.35	1.37
Bilingual	1.10	1.10
Technology	n/a	$30 per ADA
Small School Subsidy	$1,116 per student under threshold of 500 students[48]	1.00025 per student under district threshold of 1600
Capital Outlay	$10 per pupil	Application process approval by state legislature needed[49]
Special Education	1.15	1.1 or varied weights listed below…[50]
		Homebound 5.0 Hospital class 3.0 Speech therapy 5.0 Resource room 3.0 Self-contained 3.0 Self-contained 3.0 Off home campus 2.7 Nonpublic day school 1.7 Vocational adjustment class 2.3

[48] Small school allocation is capped at the lower of 20% of Base Allocation or $300,000. During the year studied 132 elementary schools in Houston qualified for the small school subsidy from the district.

[49] In 1997-1999 the state approved $200 million worth of capital outlay projects including 267 applications from 228 districts, and $150 million in 1999-2001.

[50] These weights apply only if the student involved has been identified as a special needs student and is being served on an Individual Education Plan at the time of enrollment.

Table 2

Cincinnati District Student Group Funding Weights

Factor	District Weight
High School	1.20
Poverty	1.05
English Language Learners	1.48
Gifted	1.29
Vocational Education	1.60

Beginning with the 1997-1998 school year, Seattle Public Schools chose to move to a weighted student funding mechanism. The district promoted the weighted allocation model in an effort to improve both equity and efficiency (Seattle WSF Committee Report, 1997). The formula began with a foundation level that was a combination of staff based allocations (for administrative and other support staff) and was followed up with per-pupil funding allocations base upon student need (weights for various need categories including special education and student performance). These allocations were somewhat deceiving in that the district offered only minimal financial weighting for schools not performing well as to not "create a disincentive to improve performance" (1997, slide 63). There was also no weighting for elementary schools with higher numbers of students living in poverty because the level set for the foundation factor (dollar amount) was at such a high threshold that the high dollar amount of a foundation caused a level of remaining resources that were so small that elementary students living in poverty could not be addressed at that time (1997, slide 64).

Beginning with the 2008-2009 school year, the Seattle school district will move from *Weighted Student Funding* to *Weighted Staffing Standards (WSS).* Although an in-depth description and discussion of WSS is beyond the scope of this dissertation, suffice it to say here that WSS returns to funding specific staffing positions for schools instead of allocating dollars and then allowing particular buildings to spend the dollars as they saw fit. In other words, over the past decade individual schools in Seattle had some freedom to staff the building to meet the needs of their individual students. This freedom has in essence been curtailed and staffing has been set at a fixed level that is determined by the size of the school.

2.6 Literature Summary

In summary, the above discussion of the relevant literature suggests several key points. First, intra-district resource allocation research and study began slowly over forty (40) years ago but has picked up both momentum and importance over the last decade. Second, resource allocation is not uniform. In the majority of studies listed here, many of them using data from urban areas such as New York, Cincinnati, Houston, Cleveland, Boston and others, district resources were provided in most abundance to those students who showed no particular need for additional resources. That is, resources tended to flow to low poverty, non-special needs students. When dollars were provided at higher levels to those students with more needs, the studies were considering total dollars in the analysis thus showing a tendency to supplant state dollars with

federal monies for those in need. Third, resource allocation is related to teacher qualifications in that teacher quality is inversely related to student characteristics such as poverty and minority status. This would indicate that resources, both financial and human, are not evenly distributed among schools. This inequality in resources is compounded and supported by districts, such as Seattle and Baltimore that utilize average teacher salaries instead of actual teacher salaries. In some cases, this simple change in computation manifest itself in budgets not being accurate to a degree of between $72,000 and $100,000 per school. Next, weighted student funding has been and continues to be used as a means of attempting to improve equity across schools, and a few articles indicate the mechanism may have been successful at improving equity in the districts it has been implemented. Finally, building leaders may be limited in their ability or freedom to target funds to particular students due to restrictions placed on them by district level administrators.

The above synthesis of research indicates that whether the analysis is concerned with intra-district resource allocation, allocation of teacher equity, or of weighted student funding one thing is clear – vertical equity issues exist. The central claim of weighted student funding and its supporters is the ability of this funding mechanism to improve equity for all students by funding students with certain needs at higher levels. While there has been one study cited that analyzed specific district pre-WSF and post-WSF (Hawley-Miles and Roza, 2006), there has been little work done to answer the central question cited earlier, are expenditures at the school level more equal in districts using a

weighted student funding model when compared to like districts in the same state?

Chapter 3 – Methodology

3.1 Research Questions and Processes

There are two questions central to this dissertation. The first is a research question focusing on the predictability of per-pupil expenditures when using WSF as opposed to other methods of funding at the building level. The question is:

> *Q1: Are urban districts that utilize a weighted student funding mechanism enabling more vertical equity in same-grade level elementary schools than urban districts not utilizing this funding mechanism when the districts are in the same state?*

To address question one, the following process was used. In order to adequately address the central issue in question one, it is important that the results be applicable across various districts and states. To accomplish application of the results across funding situations, two states were chosen that included multiple large urban districts with one district utilizing a weighted student funding model. Both Houston, Texas and Cincinnati, Ohio used weighted student funding during the years analyzed. Houston, along with Dallas, San Antonio and Austin in the state of Texas and Cincinnati, along with Columbus and Cleveland in Ohio are used for the purposes of this evaluation.

A data set was created for each district in the study. For the Ohio districts the data used included data from years 2002 to 2007 and for the districts in Texas the data used included data from 2005 to 2007. The data set included school level data for each district identified. Only data from elementary schools within the districts was used. Each data set allowed for the comparison of the

non-weighted funding district with Houston, in the case of Texas and Cincinnati in Ohio.

To fully address the question of district equity above, it had to be divided into its relative parts. First, it was determined to what extent there was variance across schools in the districts in question. This was addressed by deriving summary statistics including mean, standard deviations, and coefficients of variation in per-pupil spending across regular elementary schools within each of the districts in question. Secondly, the question of predictability and comparability arises. Specifically, are per-pupil expenditures or the variation across regular elementary schools, predictable as a function of various student characteristics? These expenditure functions were predicted using regression equations in which school level spending data are the dependent variable and various school cost and student need related cost measures are included as independent variables.

The second question is one focusing on the equitable distribution of classroom teachers at those same schools. The primary purpose is to add a context through which to view the information from both questions. The question is:

> *Q2: Are teacher qualifications in urban districts that utilize a weighted student funding mechanism distributed more equally in same-grade level elementary schools than in urban districts not utilizing this funding mechanism when the districts are in the same state?*

To address question two, the following process was used.

A data set was created for each district from Texas in the study. For these districts in Texas the data used included data from 2005 to 2007. The data set included school level data for each district identified. Only data from elementary schools within the districts was used. Each data set allowed for the comparison of the non-weighted funding district with Houston.

There are two types of results that can come from such a question about teacher qualifications. First, the observation that might be expected is a stratification of teacher quality in such a way that has more highly qualified teachers in schools with the most needs. Second, students may be distributed among schools in such a way that equalization of teachers is unnecessary as there is no overwhelming need centered in any one school. Teacher quality was identified using regression models with student teacher ratio as the dependent variable in a model that included an at-risk measurement[51] and children with disabilities as the independent variable.

3.2 Data and Models

Data for this study are taken from two separate sources. Texas data were procured from the Texas Education Research Center, which serves as the data repository and includes financial, student and staff data for pre-kindergarten through twelfth grade. Ohio data were taken from the statewide data warehouse

[51] Cleveland claims a 100% poverty rate within their student population. This causes any calculation that includes poverty to be skewed. In an effort to produce reliable and valid information, an at-risk measurement was contrived. This will allow me to take into account the variation that does exist within the population and more accurately reflect differences between schools.

located within the Ohio Department of Education. The focus is exclusively on regular elementary schools in the largest city school districts in Ohio and Texas. These cities include Cincinnati, Cleveland and Columbus in Ohio and Austin, Dallas, Houston and San Antonio in Texas. For Ohio, I utilized data from 2002 to 2007 and for Texas from 2005 to 2007.

In order to answer question one, it is necessary to use an expenditure regression model in order to estimate school level expenditures within the individual districts. This model uses data on the regular elementary schools within each large urban core district and I estimate an expenditure function (using operating funds per-pupil in Texas and current expenditure per-pupil in Ohio) where the goal is to determine whether existing variation in spending across schools within districts is a predictable function of major cost factors including economies of scale, or school size and student population composition. I also included a dummy variable in order to compare the two districts used in each analysis. In each analysis using Texas data, Houston has the value of “1” while the districts it is being compared to have a value of “0”. Three such analyses are run. A similar method is used in the data from Ohio with Cincinnati having a value of “1” and the comparing districts a value of “0”. Two such analyses are run. Student population characteristics include poverty, disability, and English language proficiency.

3.2.1 Expenditure Models

Capturing variations in student population composition at the school level within large, poor urban districts is problematic. All of the elementary schools in the urban core districts analyzed have very high rates of children qualifying for free and reduced lunch. During 2007, the final year of data used for this study, all Cleveland elementary schools reported 100% qualifying for free and reduced lunch. The schools however are substantively and statistically different from one another when considering a wider array of student population characteristics and multiple years of data. In an attempt to better capture student population variation across schools, it is necessary to estimate a separate model across all schools in the sample (urban core and others in the metro area) across metropolitan areas within state, and over multiple years, to generate a predicted At Risk index[52] for each school. It is necessary to estimate separate models for Texas and for Ohio metropolitan areas. The functional description of the model is as follows:

$$\mathbf{At\ Risk_s} = f(\mathbf{\%Black_s}, \mathbf{\%Hispanic_s}, \mathbf{\%ELL_s}, \mathbf{Income_d}, \mathbf{College_d}, \mathbf{CBSA})$$

where

- $AtRisk_s$ – a predicted subsidized lunch rate across schools within the core based statistical area
- $\%Black_s$ – is the population percentage of African-American students within the individual school
- $\%Hispanic_s$ – is the population percentage of Hispanic students within the individual school
- $\%ELL_s$ – is the population percentage of students whose first language is not English within the individual school (Ohio only)

[52] This model was first utilized in Baker and Arbuckle (2008) in an effort to capture real differences in school demography in relation to student poverty.

- $Income_d$ – is the median household income at the district level
- $College_d$ – is the population percentage of adults with a college education at the district level
- *CBSA* – a Core Based Statistical Area fixed effect for each Core Based Statistical Area within the state (in Ohio the effect was 3, in Texas – 4)

This model served to predict an at-risk index in the midst of districts with a high rate of reported free and reduced lunch population while teasing out the differentiating aspects from each school within the district.

The expenditure functions evaluating the current rationality of spending variation across schools may be expressed as:

$$\mathbf{Expend_s} = f(\mathbf{Size_s}, \mathbf{Disability_s}, \mathbf{At\ Risk_s}, \mathbf{VE_{xy}})$$

where

- $Expend_s$ – is a predicted value of spending per-pupil at the school level
- $Size_s$ – is the size of the elementary school measured in number of students
- $Disability_s$ – percent of the student population within the school that have a recognized disability
- $At\ Risk_s$ – the predicted at-risk measure
- VE_{xy} – a dummy variable to enable a comparison between two individual districts[53]

Spending per-pupil is expected to vary as a function of differences in the percent of children with disabilities across schools, differences in the percent of children on subsidized lunch or the at-risk index, and school size. The model

[53] In each Texas case Houston was assigned a value of "0" while the district compared against was assigned a value of "1". In Ohio, Cincinnati was assigned a value of "0" with the other districts in each analysis assigned a value of "1".

includes two school size categorical variables[54], because spending per-pupil is often a significant function of economies of scale. Extensive reviews of economies of scale in education suggest an optimal elementary school size between 300 and 500 students (Andrews, Duncombe and Yinger, 2002). That said, within any large urban school district, there may exist excessively costly small schools. These are arguably unnecessary and may create significant inequities across the population.

3.2.2 Teacher Quantity Models

To evaluate the distribution of staffing across students in schools, it is necessary to first ask whether additional quantities of staff have been allocated to schools with more needy students, defined as students who are at-risk, students with limited English proficiency and students with disabilities. This is an important question as the expectation would be that if educational equity were occurring across schools within a district, teacher qualifications would be horizontally distributed as well. That is, higher quality teachers working in schools of the greatest need. Alternatively, district policies could spread out the students by needs, such that targeting of resources is unnecessary.

To evaluate the distribution of teacher quantities in Texas, school districts regression models were estimated using pupil to teacher ratios as the dependent variable. The models of pupil-to-teacher ratio were estimated as a function of the predicted at-risk measure and students with disabilities. In order to answer the

[54] In Ohio, Columbus has only five elementary schools with and enrollment of under100 students. Thus the analysis was done twice, once with the five schools dropped and once as a category identified apart from the other schools.

question directly, a second model is used to enable a comparison between two individual districts.

$$\mathbf{TQuant} = f(\mathbf{At\ Risk,\ Disability})$$

$$\mathbf{TQuant}_{xy} = f(\mathbf{At\ Risk,\ Disability,\ VE}_{xy})$$

It should be remembered that the at-risk variable is a component variable itself created to explain the variation that exists in district schools separate from the federal free and/or reduced lunch numbers reported by the districts themselves. Dallas and San Antonio schools claim a ninety percent (90%) and ninety-three percent (93%) free and/or reduced lunch. This does not mean, however that all schools have a rate this high and may in fact mask true differences among schools. The expectation in these models is that teacher quantities will be predictable as a function of at-risk students and disability student percentage, with lower pupil-to-teacher ratios in schools with higher percentages of at-risk students and students with disabilities. It should be noted that this regression analysis is only performed with the districts from Texas due to the lack of data available from Ohio.

3.2.3 Teacher Quality Models

Once teacher quantity across schools has been identified it is appropriate to turn attention to quality measures. Thus evaluation of whether equity in teacher quality is retained across schools within individual districts is the next logical step. Teacher quality measures in Texas were determined by analyzing the percent of teachers in a school who are novice teachers, that is teachers with

less than four years experience, and the percent of teachers who failed the state pedagogy exam for certification one or more times. Fuller, Baker and Young (2007) have found each of these measures to be associated with school level performance outcomes in Texas schools and Hanushek and Kain (2007) raise specific concerns regarding the distribution of inexperienced teachers across black and white schools in Texas.

The model utilized for each teacher quality measure is first run as a function of the predicted at-risk measure and disability concentrations at the school level and then run again to include the variable for comparison between districts.

$$\mathbf{TQual} = f\,\mathbf{(At\ Risk,\ Disability)}$$

$$\mathbf{TQual}_{xy} = f\,\mathbf{(At\ Risk,\ Disability,\ VE}_{xy}\mathbf{)}$$

In the initial run the expectation is that the variations in teacher quality will not be predictable as a function of student population characteristics, or at least that we will not find higher shares of novice teachers and higher shares of teachers who failed certification exams in higher poverty, higher minority schools. In the latter model the expectation is that in districts using a weighted student funding model, teacher quality will be consistent with comparable districts or that higher quality teachers are in higher poverty schools. It should be noted that the regression analysis is only performed with the districts from Texas due to the lack of data available from Ohio.

Chapter 4 – Results

4.1 Description of the Data

It is first appropriate and vital to have knowledge about each district descriptively and how they compare to one another prior to analysis. From Table 3, it is apparent that in both the Ohio and Texas districts, there exist high percentages of students in poverty. It is important, however, to remember that these figures are aggregated at the district level. As these data are reviewed it seems evident that the data reflected in Cleveland for instance may not be fully understood from this descriptive table. It should be understood that the characteristics of the sixty-two (62) schools within the Cleveland district are not identical across schools. On the contrary, these schools have varied needs, spending habits, educational foci, and staff characteristics. In order to more fully understand what is happening across the district, it is vital that the district is analyzed more fully by subjecting the district and its various elementary schools to scrutiny under the research questions proposed in section 3.1, and again in section 4.2.

Additionally the districts examined in Ohio are above or equivalent to both the state and national average for special education students. The state average for special needs students across Ohio is 15%, while the national average is 12%[55]. All districts analyzed in Texas are below both the state and national average. Hispanic students in Ohio are similar to the national average in

[55] Both the state and national averages for special needs students, African American students, and Hispanic students in Texas and Ohio was calculated from the 2007 Common Core of Data located at the National Center for Education Statistics at www.nces.ed.gov/ccd.

Cincinnati while Columbus has three times the state average and Cleveland has five times the Hispanic population as the state. In Texas, all districts at the focus of the study are higher than the state average for Hispanic students with San Antonio at nearly twice the state average of 47%. African American students make up 16% of the student population in the state of Ohio, while in the districts examined the population is nearly four to five times the state average. The Texas districts vary in their comparison to the state average. While Austin is equivalent to the state average, Dallas and Houston are nearly double while San Antonio is less than half.

When the data for each state are taken together, nearly all districts in the study have high levels of students in poverty, increased population of minority students; yet the special needs population is similar to or less than the state overall population (by percentage).

Table 3

Descriptive Statistics on Elementary School Matched Panels

State	**Ohio (2002 to 2007)**			**Texas (2005 to 2007)**			
City	**Cincinnati***	**Cleveland**	**Columbus**	**Austin**	**Dallas**	**Houston***	**San Antonio**
Elem Schools in District [1]	40	62	76	56	110	140	54
Students (2007)	17,079	26,658	25,116	34,016	70,834	86,155	27,167
Demographics							
% Special Education	19%	15%	14%	9%	7%	8%	9%
%Free/Reduced	72%	100%	67%	82%	90%	86%	93%
% Black	73%	73%	58%	16%	30%	33%	6%
% Hispanic	1%	8%	6%	70%	66%	59%	91%
Mean Spending in District	$10,680	$9,994	$11,588	$6,519	$5,041	$6,030	$5,956
Coefficient of Variation	**10%**	**23%**	**36%**	**17%**	**22%**	**12%**	**11%**

4.2 Research Question 1

The first question evaluated is question one. Question one states:

> *Are urban districts that utilize a weighted student funding mechanism enabling more vertical equity in same-grade level elementary schools than urban districts not utilizing this funding mechanism when the districts are in the same state?*

To address question 1 I examined the output for the model and each run including output for the individual district(s). To begin, it is important to have a starting point for each district. For this to occur, the model was run initially without the dummy $\mathbf{VE_{xy}}$ variable. This allows me to establish a baseline for each district data set. Table 4 illustrates a vertical equity analysis for the studied districts in Texas designed to reflect the starting point for each district in 2007. Table 4 indicates both Houston and Austin are allocating increased operating dollars per pupil for both at-risk students and students with disabilities. Higher dollar amounts are also being directed to small schools (schools with an enrollment under 300 and 500 students). The coefficient for the operating funds per-pupil is positive to a significant degree in San Antonio for disabled students and for small schools. There seems to be no relationship between the number of at risk students and operating funds per-pupil. In Dallas there seems to be an inverse relationship between the number of at-risk students and dollars per pupil, with both small school variables exerting a positive effect on the dependent variable. This inverse relationship in combination with the non-significant

spending levels within special education might indicate a lack of targeted funding at the district level to compensate for differences among and between schools.

A final point of importance from the analysis is found in the R-squared values. The variables included in the model explain only thirty-four percent (34%) of the variation in spending within Dallas ISD. This is the smallest R-squared of the four urban districts within the study, while the San Antonio district had the largest R-squared with the variables explaining variation in spending at 0.64. Houston, the WSF district in the Texas analysis has an R-squared value of 0.45.

The pattern of vertical equity funding from the literature seems to be reflected in both Austin ISD and Houston ISD as those districts seem to have significant relationships established between operating funds per-pupil and students in poverty, disabled students and students in elementary schools with fewer than 500 students.[56] While San Antonio ISD had strong relationships with each variable with the exception of percent at-risk students, the table does show the strongest R-squared coefficient at 0.64, indicating that these variables alone account for 64% of the variation that exists in operating funds per pupil in San Antonio ISD.

Table 5(a) and Table 5(b) highlight a similar model run for Ohio districts to establish baseline data for three urban districts within the study. A finding that becomes clearly evident concerns school size. School size has been cited in various studies and literature reviews but the pivotal work for school size was

[56] Schools with an enrollment of less than 100 were not included in the model as the districts in the study within Texas had no schools with this enrollment size.

completed in 1996 by Kathleen Cotton. Cotton reviewed 31 studies on school size and its effect of student achievement and teacher attitude. Approximately half of the studies examined showed no difference between achievement scores in small and large elementary schools. The other half found small schools more beneficial and improved student achievement more than large schools. In none of the studies did the large schools out perform small schools.

Another more recent work, that of Andrews, Duncombe and Yinger (2002), examined twelve (12) production function studies focused on analyzing economies of scale and their role in the efficient running of elementary schools. After extensive review of studies that included data from both the school and/or district level, Andrews, Duncombe, and Yinger state "moderately sized elementary schools (300 – 500 students) ….may optimally balance economies of size with the negative effects of large schools."

A version of the regression model (Table 5b) for Ohio districts includes a variable for small schools with an enrollment size of less than one hundred. Neither Cincinnati nor Cleveland have schools of one hundred students or less, while Columbus funds these schools at a significantly lower funding rate than larger schools. On the other hand, Cincinnati, the weighted student funding district in the Ohio study, does not fund schools at a significantly different level when considering size. Since the Cincinnati district does not have any schools with enrollment of less than one hundred, the district then seems to fund all schools at relatively a similar level.

Table 4

Sensitivity of Spending in Texas District Operating Funds

	Austin			Dallas			Houston*			San Antonio		
DV = Operating Funds per Pupil	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	1543.17	348.97	**	-2059.14	731.1	**	822.65	182.94	**	1718.22	893.6	
% Special Education	9863.06	1504.26	**	4264.87	2221.31		7864.17	913.88	**	9032.52	1496.97	**
Enrollment of 100 to 300	1886.19	189	**	2219.88	380.45	**	1099.18	205.04	**	1602.15	126.08	**
Enrollment of 301 to 500	899.32	142.42	**	1265.77	138.03	**	688.54	53.64	**	645.01	67.94	**
Constant	3853.31	316.06	**	6415.49	722	**	4306.94	181.66	**	3152.92	852.04	**
R-Squared	0.63			0.34			0.45			0.64		

Table 5 (a)

Sensitivity of Spending in Ohio Expenditures

	Cincinnati*			Cleveland			Columbus		
DV = Current Expenditure per Pupil	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	5984.75	746.84	**	1533.35	684.38		4426.44	1110.93	**
% Special Education	5064.21	1344.07	**	23653.45	1150.07	**	22764.75	1111.02	**
Enrollment of 100 to 300	490.61	277.26		2946.91	310.97	**	3919.02	546.95	**
Enrollment of 301 to 500	51.60	173.35		695.44	139.73	**	1776.87	526.68	**
Constant	5601.84	427.57	**	3770.26	482.88	**	1812.91	907.64	
R-Squared	0.38			0.73			0.54		

Table 5 (b)

Sensitivity of Spending in Ohio Expenditures

	Cincinnati*			Cleveland			Columbus		
DV = Current Expenditure per Pupil	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	5984.75	746.84	**	1533.35	684.38		5032.89	1079.46	**
% Special Education	5064.21	1344.07	**	23653.45	1150.06	**	27992.96	1410.31	**
Enrollment under 100		*Dropped*			*Dropped*		-10809.83	1889.08	**
Enrollment of 100 to 300	490.61	277.26		2946.91	310.97	**	2961.19	554.75	**
Enrollment of 301 to 500	51.60	173.35		695.44	139.73	**	1022.03	526.10	
Constant	5601.84	427.57	**	3770.26	482.88	**	1549.93	878.88	
R-Squared	0.38			0.52			0.57		

Table 6 represents the regression results from this model for the districts in Texas. Recall that this model incorporated the variable $\mathbf{VE_{xy}}$ to account for the differences between the two districts analyzed.

From Table 6, it is apparent that there is a true difference between the operating funds per pupil in Houston and those in Austin, Dallas, and San Antonio. Remember from section 3.2 that the WSF comparison variable is a dummy variable assigning a number of either “1” or “0” to each school within the two districts analyzed. This allows for a head-to-head comparison of the two districts within the model. The WSF district was assigned the value of “1”. By examining the value and direction of this variable, some conclusions are able to be drawn from the interaction in the model. What we see from the model is that while the interaction between Austin and Houston results in a positive value, the interaction between Dallas and Houston as well as the interaction between San Antonio and Houston result in negative values. In each case a negative value indicates the WSF district (in this case Houston) has a lower level of average spending than the district assigned the value of “0”. A positive value indicates the opposite; the district assigned a value of “0” has a lower level of average spending than the district assigned a value of “1”.

In an effort to draw out the impact these districts were having on vertical equity compared to one another, I ran a third model that allowed for an interaction between the WSF variable and the at risk variable. Table 6a is the result of that model. Drawing focus on the at-risk interaction indicates that Austin ISD is, in fact, enabling more money to flow to students who are considered to be

at-risk. The table also indicates that Houston ISD is, in fact enabling more money to flow to students in their schools who are considered to be at-risk.

Each model was also run for the three Ohio districts comparing the results of non-weighted student funding districts to the results of the weighted student funding district, Cincinnati. Table 7 and Table 7a list the results from that model. Here, it seems that the comparison of Cleveland and Cincinnati shows that Cincinnati's expenditures per pupil are higher than Cleveland's when taking into consideration the at-risk population, the special education population and size in the equation. Table 7a, however, goes on to indicate that the level of vertical equity concerning at-risk students is not significant. Columbus on the other hand results in a positive value when compared to Cincinnati, thus indicating Columbus enables more vertical equity with school funding than does the district utilizing weighted student funding. Both Columbus and Austin seem to be targeting funds toward poor and/or disabled students in a manner that is more vertically equitable than the comparable districts, Houston and Cincinnati.

From these two tables it would seem that a weighted student funding mechanism may be effective for improving the amount of money allocated to students with disabilities, students considered at-risk, and students in smaller schools under certain circumstances or environments. A question that will be addressed at some length in a following section is to consider the characteristics of districts or communities that could see success using a weighted student funding formula. From this data it would seem that districts such as Dallas ISD, San Antonio ISD, and Cleveland, Ohio might benefit from a weighted student

funding model, while districts such as Austin ISD and Columbus seem to be targeting dollars to the students in most need at least as well as their peer districts that utilize a weighted student funding model. A weighted student funding model may allow some districts to better target funding to schools with the most number of students in need.

Table 6

Comparison of School Level Spending in Texas
Operating Funds within Districts

	Austin/Houston			Dallas/Houston			San Antonio/Houston		
DV = Operating Funds per Pupil	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	1088.09	168.36	**	149.37	251.26		842.01	172.3	**
% Special Education	8988.85	790.34	**	7042.6	1089.19	**	8025.47	777.66	**
Enrollment of 100 to 300	1672.8	125.19	**	1682.05	216.39	**	1432.7	116.17	**
Enrollment of 301 to 500	732.57	54.32	**	936.3	65.28	**	675.62	42.91	**
WSF District Comparison	-390.5	57.26	**	570.82	58.1	**	206.79	47.07	**
Constant	3965.17	164.01	**	4868.88	247.63	**	4276.13	167.49	**
R-Squared	0.58			0.42			0.50		

Table 6a

Comparison of School Level Spending in Texas
Operating Funds within Districts with WSF/At-Risk Interaction

	Austin/Houston			Dallas/Houston			San Antonio/Houston		
DV = Operating Funds per Pupil	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	1552.89	281.02	**	-2315.09	548.27	**	1546.53	1031.69	
% Special Education	8921.86	788.81	**	6485.25	1077.48	**	8026.33	778.01	**
Enrollment of 100 to 300	1668.51	124.86	**	1651.75	213.02	**	1437.60	116.43	**
Enrollment of 301 to 500	736.04	54.20	**	900.01	64.64	**	674.03	42.99	**
WSF District Comparison	187.04	285.79		-2172.91	547.80	**	884.35	979.38	
Interaction - % At Risk	-721.94	350.03	**	3077.03	610.99	**	-724.42	1045.91	
Constant	4002.91	236.66	**	6574.59	516.31	**	3409.16	971.18	**
R-Squared	0.58			0.44			0.50		

Table 7

Comparison of Spending in Ohio District Expenditures

	Cleveland/Cincinnati			Columbus/Cincinnati		
DV = Current Expenditure per Pupil	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	2177.49	568.94	**	3509.96	797.11	**
% Special Education	18181.65	979.08	**	23454.46	1130.30	**
Enrollment under 100		*Dropped*		-7920.42	1600.68	**
Enrollment of 100 to 300	2005.27	234.84	**	1827.84	335.05	**
Enrollment of 301 to 500	459.37	125.12	**	54.88	282.65	
WSF District Comparison	650.54	144.92	**	-604.26	222.24	**
Constant	4990.86	349.48	**	3490.26	562.69	**
R-Squared	0.57			0.50		

Table 7a

Comparison of School Level Spending within Districts in Ohio with WSF/At-Risk Interaction

	Cleveland/Cincinnati			Columbus/Cincinnati		
DV = Current Expenditure per Pupil	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	2304.39	755.28	**	4876.30	966.90	**
% Special Education	18184.72	979.91	**	24070.07	1153.24	**
Enrollment under 100		*Dropped*		-8387.08	1605.88	**
Enrollment of 100 to 300	2013.42	237.17	**	1826.57	333.82	**
Enrollment of 301 to 500	459.26	125.21	**	70.17	281.68	
WSF District Comparison	831.69	723.09		1925.15	1044.73	
Interaction - % At Risk	-282.57	1105.01		-4220.76	1703.71	**
Constant	4249.10	537.77	**	3117.96	706.92	**
R-Squared	0.58			0.51		

4.3 Research Question 2

The second research question focuses on a quantitative as well as a qualitative measure of teacher effectiveness in the same districts as utilized in question one (1). Specifically question two (2) reads as follows:

> *Q2: Are teacher qualifications in urban districts that utilize a weighted student funding mechanism distributed more equally in same-grade level elementary schools than urban districts not utilizing this funding mechanism when the districts are in the same state?*

To address the above question only data from Texas districts was available. To that end, this analysis was performed with this data and results described based on evaluation of this analysis. Question two essentially has two parts. Part one allows for the analysis of a common measure of the number of teachers within each district, or the pupil/teacher ratio. This measure will help to define the district in terms of the focus of the district to provide smaller classrooms, a common characteristic associated with higher student achievement.

Part two of question two allows for the analysis of two separate measures of teacher quality. One such measure is the percent of teachers failing their respective pedagogical state exams. This measure provides a sense of the teaching prowess of the individual teacher with the expectation that failing the exam represents a teacher candidate who is less qualified than a candidate who passes his/her exam. Another such measure of teacher quality that is widely

accepted throughout the educational community is teaching experience. Thus to evaluate the percent of novice teachers within a given district (or school) is to attempt to measure the amount of teaching expertise within. While the assertions that failing the pedagogical exam or the length of teaching experience may not be a true measure of the quality of an individual teacher, the two characteristics are well evaluated in research reviewed in chapter two and will not be further debated here.

Table 8 contains district data for all four Texas districts. From the table, it is evident that only Austin ISD has a lower pupil/teacher ratio at a significant level as the percentage of at-risk students increase. From question one, we remember that Austin and Houston were the only two districts spending a significantly larger amount of money (operating expenses per pupil) as the percentage of at-risk pupils increased; however, from this equation we see that Houston does not have a significantly lower pupil/teacher ratio. This would seem to indicate dollars are utilized in some other way than putting more teachers in the classroom[57]. As might be expected, it seems that all four districts have a lower pupil/teacher ratio when the percentage of special needs students is increased. Variation in pupil/teacher ratio explained by the percentage of at-risk students and the percentage of special needs students is relatively low in all four districts as well. Austin ISD had an $r^2 = 0.35$, more than twice the variation in any

[57] This finding seems to support similar findings from Brent, Roellke, and Monk (1997) cited in chapter two. Brent et. al found that more money was going into poorer schools for programs while less money was spent on human resources such as classroom teachers. Other options cited in some of the budget documents that will impact human capital would include hiring certified substitute teachers to work with at-risk high school students in small group settings.(Dallas ISD Budget, 2007, pg 208)

of the other three districts. Clearly, some characteristic other than the two analyzed is driving this teacher quantity lever.

Since the question is, essentially are teacher qualifications (and in this case, quantity) distributed more equally in WSF districts than in other districts, the model was run again with the dummy variable allowing for this comparison. Table 9 contains the results of this model run. As is evident from the table, this analysis is only significant for two of the three non-WSF districts. The focus from Table 9 is the WSF comparison coefficient. The WSF district comparison coefficient for the Austin/Houston model is positive thus indicating a lower per-pupil teacher ratio in Austin when controlling for the percent of at-risk students and the percent of special education students. While the Dallas/Houston comparison coefficient is also positive, the variation in pupil/teacher ratio is nearly four times lower than either of the other two models. While the model does indicate a slightly lower pupil/teacher ratio in Dallas than Houston, the overall variation in pupil/teacher ratio explained by the two variables from the model is relatively low. Again, this would indicate other factors are influencing the pupil/teacher ratio. The final model run comparing San Antonio and Houston produced a difference that was non-significant.

In order to expose the pupil/teacher ratio with the at-risk population when the WSF variable is added, a model was run that allowed for this interaction. Table 9a is that model run. While the information from Table 9 concerning Dallas was confirmed, Table 9a indicates that the relationship in Austin (uncovered in

the initial run from Table 9) may be not significant where the at-risk population is concerned.

Table 8

Distribution of Teacher Quantities Across Schools within Districts

	Austin			Dallas			Houston*			San Antonio		
DV = Pupil/Teacher Ratio	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	-1.69	0.65	**	3.11	1.53		-0.41	0.64		-5.18	2.75	
% Special Education	-23.48	2.56	**	-28.44	4.5	**	-16.41	3.11	**	-18.05	4.61	**
Constant	17.69	0.58	**	15.28	1.51	**	18.47	0.63	**	23.13	2.63	**
R-Squared	0.35			0.15			0.06			0.1		

Table 9

Comparison of Teacher Quantity Across Schools within Districts

	Austin/Houston			Dallas/Houston			San Antonio/Houston		
DV = Pupil/Teacher Ratio	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	-0.91	0.48		0.35	0.62		-0.55	0.59	
% Special Education	-19.74	2.15	**	-22.18	2.61	**	-16.73	2.61	**
WSF District Comparison	2.49	0.16	**	0.97	0.14	**	-0.06	0.16	
Constant	19.17	0.47	**	18.3	0.61	**	18.62	0.57	**
R-Squared	0.45			0.12			0.07		

Table 9a

Comparison of Teacher Quantity Across Schools within Districts with WSF/At-Risk Interaction

	Austin/Houston			Dallas/Houston			San Antonio/Houston		
DV = Pupil/Teacher Ratio	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	-1.69	0.80	**	3.82	1.37	**	-5.15	3.51	
% Special Education	-19.64	2.15	**	-21.20	2.62	**	-16.73	2.60	**
WSF District Comparison	1.53	.82	*	4.83	1.37	**	-4.48	3.33	
Interaction - % At Risk	1.20	1.003		-4.33	1.53	**	4.73	3.56	
Constant	17.27	.68	**	14.12	1.29	**	22.98	3.30	**
R-Squared	0.45			0.13			0.07		

Teacher quality was the second type of analysis performed as a part of analyzing question two. It should be recalled that the model for quality was run multiple times with the dependent variable defined as the percent of teachers failing the pedagogical exam and then again as the percent of novice teachers. Table 10 illustrates the results of the percent of teachers failing their pedagogical exams. The R-squared values concerning the overall variation in the percent of teachers failing their pedagogical exams in the four district evaluated is relatively low. In both Dallas and San Antonio the variation explained by the number of at-risk students and the number of disabled students is 0.04, while the variation in Houston is 0.16. Nearly twenty percent (20%) of the variation of teachers failing pedagogical exams in Austin is explained by these two factors.

In all districts studied, less qualified teachers (as measured using the failure rate) are working with higher populations of at-risk students. This would seem to indicate that schools with higher numbers of at-risk students have more teachers that are less qualified. Remember from the model, the at-risk variable is a mathematical function of several variables including the percent of African-American students, percent of Hispanic students, the median household income and the percentage of adults with a college education living within the district. Taken together, it is appropriate to state that based on these data, schools with the most needy students living in the poorest least educated school attendance zones receive educational services from the least qualified teachers. In San Antonio, while this is true, this circumstance may be related to chance and not

any kind of coordinated effort. That is to say the model, when applied to San Antonio, indicates levels of significance above the 0.5 threshold.

Houston seems to have a similar challenge, as well, where special education students are involved. In Houston as the percent of special needs students increased so to do the numbers of less qualified teachers. In Houston this variable was nearly twice as strong as the percent of at-risk youth. Teachers failing exams in Austin ISD, the only other district with a significant relationship in this run, show a negative relationship with the percent of special education students. This indicates that as the number (or percent) of disabled students increased the number (percent) of teachers failing pedagogical exams decreased. Schools with higher numbers of disabled students had more qualified teachers.

When this model was run again to include the variable to allow for comparison across two districts, all three non-weighted student funding districts have slightly fewer teachers failing the pedagogical exams than does the weighted student funding district, Houston ISD. Table 12 illustrates the results from this analysis.

When analyzed further, in Table 12a, it seems this relationship uncovered in Table 12 that Houston has slightly fewer qualified teachers, seems to only hold at a significant level when compared to Austin ISD.

Table 10

Distribution of Teacher Attributes Across Schools within Districts

Percent of Teachers Failing Pedagogical Exams

	Austin			Dallas			Houston*			San Antonio		
DV = % Failed Pedagogical Exams	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	0.18	0.03	**	0.21	0.07	**	0.4	0.05	**	0.53	0.23	
% Special Education	-0.45	0.14	**	-0.35	0.22		0.75	0.23	**	0.52	0.38	
Constant	0.03	0.03		0.06	0.07		-0.12	0.05	**	-0.35	0.22	
R-Squared	0.19			0.04			0.16			0.04		

Table 11

Distribution of Teacher Attributes Across Schools within Districts

Percent Novice Teachers

	Austin			Dallas			Houston*			San Antonio		
DV = % Novice Teachers	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	0.45	0.04	**	0.58	0.08	**	0.15	0.05	**	-0.24	0.19	
% Special Education	-0.33	0.16		-0.22	0.24		-0.5	0.22		-0.21	0.31	
Constant	-0.06	0.04		-0.27	0.08	**	0.13	0.05	**	0.41	0.18	
R-Squared	0.43			0.15			0.04			0.01		

The second and final measure of teacher quality utilized in this study focused on teaching experience. To that end, I was interested in the percent of novice teachers employed in various schools within the districts. Table 11 is a summary of the data concerning novice teachers in the Texas districts.

As is visible from the table, the percent of novice teachers working in schools with higher percentages of at-risk students is significantly higher in three of the four districts in the study. Only San Antonio is not statistically significant in this area. In the other three districts, more at-risk students is linked to more inexperienced teachers.

Special needs students show a different effect. The data indicate that while special needs students might work with slightly more experienced teachers, this was not significant and thus could not be identified as a factor.

The R-squared value for Table 11 should also be noted. The independent variables in the model explain only 4% of the variation in the number of novice teachers in Houston ISD. The variation in percent novice teachers in Dallas only increases to 15%. Austin ISD has the highest percentage of variation explained using the two dependant variables at 43%.

Table 13 summarizes the data from the comparison of the three not using a weighted student funding mechanism to the weighted student funding district identified in Texas. The point of interest here is that Houston teachers have slightly more experience than teachers in Austin when controlling for disabled students and students considered at-risk, while San Antonio mirrors that example. San Antonio teachers have slightly more experience than teachers in

Houston when controlling for the same independent variables. There is no significant difference between Dallas ISD and Houston ISD.

The model was further analyzed with a focus on the WSF variable and the percent of students at-risk. Table 13a shows the result of that model. From Table 13a, the comparison including Dallas and Houston indicates a significant, yet small number of teachers more experienced working with at-risk students in Dallas. The relationship within the San Antonio/Houston comparison became not significant when focusing on the experience of teachers working with at-risk students.

Table 12

Comparison of Teacher Attributes Across Schools by District
Percent of Teachers Failing Pedagogical Exams

	Austin/Houston			Dallas/Houston			San Antonio/Houston		
DV = % Failed Pedagogical Exams	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	0.31	0.03	**	0.37	0.04	**	0.4	0.04	**
% Special Education	0.18	0.15		0.34	0.016		0.7	0.2	**
WSF District Comparison	0.14	0.01	**	0.07	0.01	**	0.12	0.01	**
Constant	-0.004	0.03		-0.06	0.04		-0.12	0.04	**
R-Squared	0.36			0.15			0.20		

Table 12a

Comparison of Teacher Attributes Across Schools by District Percent of Teachers Failing Pedagogical Exams with WSF/At-Risk Interaction

	Austin/Houston			Dallas/Houston			San Antonio/Houston		
DV = % Failed Pedagogical Exams	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	0.18	0.06	**	0.28	0.09	**	0.53	0.26	**
% Special Education	0.20	0.15		0.31	0.16	*	0.7	0.2	**
WSF District Comparison	-0.02	0.06		-0.03	0.09		0.25	0.25	
Interaction - % At Risk	0.21	0.07	**	0.11	0.10		-0.14	0.27	
Constant	-0.05	0.05		-0.05	0.08		-0.37	0.25	
R-Squared	0.36			0.15			0.20		

Table 13

Comparison of Teacher Attributes Across Schools by District
Percent Novice Teachers

	Austin/Houston			Dallas/Houston			San Antonio/Houston		
DV = % Novice Teachers	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	0.26	0.03	**	0.23	0.04	**	0.14	0.04	**
% Special Education	-0.4	0.15	**	-0.48	0.16	**	-0.45	0.18	
WSF District Comparison	-0.07	0.01	**	-0.004	0.01		0.07	0.01	**
Constant	0.03	0.03		0.06	0.04		0.14	0.04	**
R-Squared	0.12			0.07			0.08		

Table 13a

Comparison of Teacher Attributes Across Schools by District
Percent Novice Teachers with WSF/At-Risk Interaction

	Austin/Houston			Dallas/Houston			San Antonio/Houston		
DV = % Novice Teachers	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*	*Coef.*	*Std. Err.*	*P>t*
% At Risk	0.45	0.06	**	0.56	0.09	**	-0.25	0.25	
% Special Education	-0.42	0.15	**	-0.39	0.16	**	-0.45	0.18	**
WSF District Comparison	0.17	0.06	**	0.36	0.09	**	-0.31	0.24	
Interaction - % At Risk	-0.30	0.07	**	-0.41	0.10	**	0.40	0.25	
Constant	-0.04	0.05		-0.24	0.08	**	0.43	0.23	*
R-Squared	0.15			0.09			0.08		

Chapter 5 – Conclusions

5.1.1 Conclusions on Question 1

Recall that question 1 asked the following:

> *Are urban districts that utilize a weighted student funding mechanism enabling more vertical equity in same-grade level elementary schools than urban districts not utilizing this funding mechanism when the districts are in the same state?*

The following seems reasonable to conclude with respect to question 1.

1. School districts utilizing a weighted student funding mechanism may enable more vertical equity among students in urban elementary schools than some districts not utilizing a similar funding model. In the model, the Houston school district allowed for more dollars to flow into smaller schools with higher percentages of poor and/or disabled students than did Dallas ISD. Other districts utilized returned a non-significant relationship. Within the model only Austin ISD and the Columbus City Schools targeted more dollars in strategic ways to address the needs of poor and/or disabled students. Possible reasons for this departure from the model will be explored in a later section.
2. Using similar logic to that used in Iatarola and Stiefel (2003) when the coefficient of variation is taken into account, we see that Houston has less variance between schools (horizontal equity). When the

coefficient of variation is combined with the finding from above, it seems that as a district Houston is targeting funds in an organized fashion designed to allow dollars to be spent on the neediest students. Cincinnati shows a similar pattern with a much lower coefficient of variation than the Columbus or Cleveland, however the results from both the Ohio model and the Texas model are not overly conclusive.

3. While the variation between schools within Houston ISD and Cincinnati schools is relatively low, so too is the amount of variation explained by the independent variables utilized in the model. The percent of at-risk students, percent of special education students, and school size explain only 45% of variation in operating funds per pupil in Houston and 38% of the variation in current expenditures per pupil in Cincinnati. Other independent variables effecting the overall variation will be examined in a latter section in this chapter.

5.1.2 Conclusions on Question 2

Recall that question 2 asked

> *Q2: Are teacher qualifications in urban districts that utilize a weighted student funding mechanism distributed more equally in same-grade level elementary schools than urban districts not utilizing this funding mechanism when the districts are in the same state?*

As noted above, question two has two separate parts: teacher quantity as well as the quality of those teachers. It should also be noted that only data from Texas

was available and utilized. On part one of question two, the following conclusions were developed.

1. Teacher quantity across the four urban districts analyzed in question two indicates a lower pupil teacher ratio in Dallas ISD than in Houston ISD. However, we must remember from question one that Houston ISD targets dollars toward schools with higher percentages of at-risk and/or disabled students. When these two results are taken into consideration in tandem, it seems that while Houston may be targeting funds to schools it is doing so utilizing non-human resources.
2. When examining the districts individually, only Austin ISD reduces the pupil/teacher ratio as the at-risk population increases, while all four districts reduce the pupil/teacher ratio in schools with higher percentages of disabled students. This finding also supports the conclusion noted above that differences in spending to achieve greater vertical equity in Houston ISD are accomplished using resources other than human capital.
3. Another finding with significance of its own is the variation in pupil teacher ratio explained in the Houston model. The at-risk and special needs population only explains .06 of the variation that actually exists in the pupil teacher ratio. Adding various student demographic data beyond that reported did little to change the variation explained. This would indicate that the pupil teacher ratio in Houston ISD is less dependent on student characteristics then on other factors.

Remember that in order to measure teacher qualifications, models were built to include the percent of teachers failing pedagogical exams as well as the percent of novice teachers in the classroom. Conclusions that seem warranted for part two of question two include the following:

1. Houston seemed to have slightly fewer qualified teachers (as defined by the percent of teachers failing pedagogical exams) in the elementary classrooms when compared to Austin ISD. Teachers in Houston, Dallas, and San Antonio seemed to be similar in quality. It should be noted that the variation explained in each of the individual districts was extremely low (.16 in Houston, .19 in Austin and .04 in both Dallas and San Antonio).
2. The percent of teacher failing pedagogical exams increased significantly in all districts, save San Antonio, as the numbers of at risk students increased and in Houston the percent of teachers failing pedagogical exams increased as the number of special needs students increased. Houston was the only district in which this happened thus indicating that the neediest students had the least qualified teachers.
3. In Houston, Dallas and Austin, the percent of novice, or inexperienced teachers, was positively correlated to the number of students at risk. In Houston ISD the variation explained in the percent novice teachers in the elementary school classroom has an r^2 value of 0.04. This indicates teacher experience is shared throughout the district and is

not concentrated in schools with higher percentages of at-risk or special education students.

4. When the weighted student funding district, Houston, was compared to the other three districts, Houston ISD seemed to have slightly more experienced teachers in the classroom than Austin and Dallas; however Houston had slightly less experienced teachers than did San Antonio. Again in all three analysis, the r^2 values were relatively low, with each being 0.15 or below.

5.2 Summary of Conclusions

Based on the data and findings referenced above, I conclude districts using a weighted student funding mechanism may, and in one of the cases cited above do, enable more vertical equity within urban elementary schools than do similar districts utilizing a non-weighted student funding mechanism. This finding, however, is not overly conclusive. At best the results above seem mixed and leave the door open for weighted student funding to be an effective strategy for districts to utilize. Based on the findings above, further research would need to occur in order to determine under what conditions the weighted student funding model might be most effective. Out of this analysis, however, there does seem a possible profile of districts that may, or in the case of Austin ISD, may not benefit from such a funding mechanism. Remember from question one that Austin ISD and Columbus City School District enabled a higher level of vertical equity within elementary schools than did Houston ISD or Cincinnati schools, the

two districts utilizing weighted student funding. The question borne of such a finding is simply; what would allow for this deviation in the model?

The answer may lie within the cities themselves. Table 14 is a summary of further descriptive statistics for the four Texas districts used in this analysis. From Table 14 we see the median family income is nearly $14,000 more per year in Austin than in Houston. Another variable that is apparent is the difference in the percentage of college educated adults with nearly 1.5 times the number of college educated adults in Austin than in Houston. A factor that impacts this number may be that the flagship university within the Texas system of higher education resides in Austin. The University of Texas boasts a current enrollment of over 48,000 students. According to the Bureau of Labor Statistics, during 2005 to 2007, 45% of the occupations in the Austin labor market fell in the areas of government, professional and business services, and education and health services. During this same time the number of positions in these same three areas was 40% in the Houston labor market. This is an important contrast as it is within these three labor areas that the majority of positions requiring college educations fall. This conclusion is also supported by the percentage of college educated adults residing in Austin and Houston. Again, Table 14 points out that the percentage of college educated adults in Austin is nearly 48% compared to the 32.6% rate in Houston. Taken together, one could conclude there is a more intense focus on public education in Austin than in Houston due to community perceptions of education and its benefits.

Table 15 has a similar analysis of the three metropolitan areas from Ohio used in this study. While the median family income does not show the same relationship as was seen from the Texas data, there is a similar relationship between Columbus and Cincinnati in terms of higher education. The Ohio State University, a campus of over 56,000, locates its main campus in Columbus, Ohio. Also, again according to data retrieved from the U.S. Bureau of Labor Statistics, when evaluating employment positions in the same three sectors mentioned above, Columbus had 43% of its positions in the workforce located in these areas, while Cincinnati's labor market was 40%. However, data from the U.S. Census bureau lists a 0.73% difference in the number of college educated adults between the two regions.

One other potentially relevant point remains to be examined. There also seems to be a similarity between the two districts utilizing the weighted student funding model. From both Table 14 and Table 15, we see that median home price is similar in both school districts at approximately $125,000. This is simply an observation but one that certainly raises another question: Does median home price in the district (or in each elementary attendance zone) impact the amount of variation explained by any of the dependant variables analyzed in this study, whether it be of teacher quality, teacher quantity, or fiscal in nature.

Table 14

Demographic Data on Texas Cities

	San Antonio		Houston*		Dallas		Austin	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Median Family Income	$29,279		$38,896		$38,164		$52,692	
Per Capita Income	$12,411		$21,115		$20,579		$23,716	
District Total Enrollment	55,933	440.54	205,635	2451.03	157,537	1983.68	80,660	755.97
Male Population (18 to 64)	90,675		414,645		329,535		211,715	
Male Population (over 65)	16,400		46,985		33,595		16,380	
Female Population (18 to 64)	92,715		396,120		301,265		193,775	
Female Population (over 65)	26,780		71,140		55,525		24,625	
Teacher Average Salary	$43,155	1890.08	$43,697	1988.40	$43,809	1867.61	$43,260	2021.86
Average Enrollment (per building)	508	144	625	203	696	237	609	209
Median Home Price*	$65,700		$125,200		$114,700		$177,500	
Total Population*	320,990		1,263,405		983,781		604,424	
College Educated Adults*	11.17%		32.46%		28.89%		47.66%	

*Data taken from 2005-2007 American Community Survey, Public Use Microdata Set at the U.S. Census Bureau

Table 15

Demographic Data on Ohio Cities

	Cleveland		Cincinnati*		Columbus	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Median Family Income	$21,710	201.51	$25,762	529.8	$25,540	350.04
Total District Enrollment	30,818	1979.54	19,444	453.02	45,297	1920.75
Average Enrollment (per building)	475.49	141.04	433	108.76	344	91.74
Median Home Price*	$88,900		$124,000		$114,900	
Total Population*	407,704		337,571		444,931	
College Educated Adults*	14.38%		31.75%		32.48%	

*Data taken from 2005-2007 American Community Survey, Public Use Microdata Set at the U.S. Census Bureau

5.3 Policy Implications of this Research

The perspective held by advocates of weighted student funding mechanisms is that by advocating or in some cases forcing school districts to allocate financial resources in a way that allows for the neediest students to get the most dollars spent on their education will assist schools in improving education for all students. While this sentiment may be accurate in its purest sense, the implementation of such a mechanism may or may not be advantageous in all environments. It has been shown in works by various authors (DeRoche, Cooper, Ouchi, and Segal, 2003; Miles and Roza, 2006; and Archer, 2005) that school districts using a weighted student funding mechanism were able to increase equity across the district when compared to previous years in the same district under a different funding mechanism. This analysis seeks to ask questions about weighted student funding districts when compared to like

districts in the same state at the same time. The answer to this seems to be mixed and somewhat individualized at the district level. While there is evidence that a weighted student funding mechanism may allow for more equity across schools than other mechanisms in certain urban elementary school conditions, there is also evidence in some urban areas – Austin, Texan and Columbus, Ohio – that a model other than a weighted student funding model may be appropriate for ensuring vertical equity. While national reports such as Fund the Child (2006) and the School Finance Reform Project (2008) call for and in some cases explain how a weighted student funding mechanism could work, there seems to be a danger in having a one size fits all model. If the analysis contained in this dissertation is beneficial at any level, then there are several issues that would require action on the part of various policy makers.

The first area of concern is to address the small but vocal groups calling for comprehensive change in the way schools are funded. Based on the analysis herein, the need for funding change should not be made hastily and it should be made at the local district level and not by state and/or federal mandate. As has been seen in this dissertation, there appear to be districts, perhaps even a profile of districts that are able to facilitate vertical equity in a way that may adequately meet the needs of students. Certainly while weighted student funding districts may do a better job at enabling vertical equity than the masses of districts that exist, there do seem to be select districts that are facilitating more vertical equity when compared to districts using a weighted student funding model.

Another concern for policy makers comes in the form of staffing at the local building level. Fund the Child calls for flexibility at the building level for staffing structures and decisions; however the report does not seem to deal with the real life application of such a model. Specifically, while student populations change from year to year, staff characteristics may not respond as quickly. While many districts have procedures for the moving of faculty and staff to respond to student quantity issues (i.e. transfers of teachers between elementary buildings due to enrollment numbers), there is less flexibility for similar movement at the secondary level due to the reduced number of secondary buildings in many districts. For administrative staff to respond in a timely manner to changes in student needs, state laws and/or local policies may need to be written in such a way as to address annual changes in both student numbers as well as student needs within the district and between schools. This however, would not address teacher moral issues that might exist in a district or building where little stability exists. If educators believe they may be relocated from year to year, this alone may cause a competitive advantage for the services of teachers to tip in favor towards a non-WSF district.

If a district were to adopt a weighted student funding mechanism and offer school choice to students, the often used district policy of compensating all teachers in a similar fashion, based on experience and education, would need to be evaluated. Fund the Child makes the assertion that “under WSF, schools will have powerful incentives to serve more disadvantaged students”. This seems a faulty assumption unless the instrument for compensating teachers was to

change. Disadvantaged students tend to move into schools with disadvantaged students. The most evident reason for this is found in median home prices and the geographical structure of single family houses versus rental properties. Local districts then would need to couple any movement toward a weighted student funding system with a system that attracts qualified teachers to the schools were the students are.

As cited in section 2.4 herein relating to previous research on decentralized decision making and its relationship to school level funding, this too is an area district level policy makers need to concern themselves with. As noted, various authors[58] have shown that while there is control at the building level to make decisions and pursue various courses of action, these steps are sometimes limited by district level personnel in an effort to influence the progress of the building. Remembering the work of Marzano and Waters (2006, 2009) it seems that this "defined autonomy" actually has a positive impact on student learning. The vision created and the non-negotiable principals set by district superintendents help to foster high achieving schools. If districts want to continue to push for equity for all students, then it seems all districts need to facilitate district level policies consistent with the findings noted above.

[58] These authors include Wohlstettler and Van Kirk (1995); Goertz and Hess (1998); Goertz and Stiefel (1998); Houston Finance Handbook (2007), Clune and White(1988); David (1990); Hatry et al. (1993), Murnane and Levy (1996), Bryk, Camburn, and Louis (1999), and Tung, Ouimette, and Feldman (2004).

5.4 Limitations of the Study

The largest single limitation to this research analysis is the small size of the sample examined. While each individual district offered a large enough sample of elementary schools to draw from, the small number of individual districts examined limits the wide application of this analysis. As indicated previously, the largest amount of popular press devoted to the issue of weighted student funding has historically focused on Houston, Cincinnati, or Seattle. With Seattle moving away from the weighted student funding model in the last two years, this is a limitation that may not soon be overcome.

Availability of Ohio data also served to limit the scope of this dissertation. While teacher level data was available and utilized for the Texas districts in question two, similar data on Ohio teachers was not available. This allowed for the extension of question two only to Texas teachers. A similar analysis of Ohio teachers could be helpful in understanding some of the intricacies at work within the three Ohio districts.

This research should be seen as exploratory in nature and certainly not a definitive evaluation of whether or not each and every school district should adopt a weighted student funding model. At best, this analysis should add to the dialogue concerning this topic. There is certainly much more to be done with this topic in an effort to fully understand its implications and how this model might best be used by policy makers and educational leaders to meet the needs of all students.

5.5 Opportunities for Further Research

Since the inception of this topic and dissertation a prominent district that utilized weighted student funding through the last two decades has ceased using the model and moved to what they have referred to as a Weighted Staffing Standards model. The Seattle School District describes this method as a funding formula for buildings that is more efficient and more centralized than the weighted student funding model while retaining the ability to effectively target funds to the neediest students and schools. District documents indicate the change to a weighted staffing model was done at the behest of the community, building level and district level administrators as well as other members of the district's budget advisory team.

The Weighted Staffing Model was identified by the superintendent for recommendation in October 2007 to replace the weighted student model because the "WSF formula was not transparent and did not adequately fund resources required by schools to achieve academic success. It gave the illusion of allowing schools to vary resources…while in reality most funding sources were restricted…" A comparison of the current Seattle model in a similar fashion as performed herein would be an important step to understanding how and whether this now current model is more or less effective than the traditional staffing models used in a majority of districts across the nation.

Other questions arise when reviewing the teacher quantity and quality data from Texas. The regression model applied to the individual districts in Texas attempted to illustrate baseline data associated with the model and the

various districts. When the model was run for Houston ISD it explained very little variation within the dependent variables in the model. Specifically, student demographic data seemed to explain very little variation in the pupil-teacher ratio of the district. The model as run only resulted in an r^2 value of 0.06. There was a similar result when the model was run for the dependent variables of percent of teachers failing pedagogical exams ($r^2 = 0.06$) and the percent of novice teachers ($r^2 = 0.04$). If student demographics tell so little of the variation within the dependent variables studies, what independent variables do describe the variation within the Houston district? The data alone indicates that it isn't the students driving the model but something else.

Variation in spending levels within Houston ISD and Cincinnati Public Schools is another factor to be considered. Reviewing Table 4 and Table 5, we see that less than fifty percent (50%) of the variation within the dependent variables was explained by the percent at-risk population, the percent special education population, and school size. Determining what factors account for the remaining fifty-five percent (55%) or sixty-two percent (62%) respectively would go a long way to better understanding the funding system.

One could say there is a myriad of reasons for the existence of public schools. A primary reason is to meet the needs of all students in a manner that assists the student in being successful. Districts often put a focus on the use of teaching strategies, coherent and viable curricula, valid student assessments and meeting adequate yearly progress. While these areas are important for a well structured and functioning educational organization, so to is an adequate funding

mechanism at the school level that helps building administrators and teachers meet the needs of students. This is an idea not often talked about but vital to the mission of educating all students.

REFERENCES

Ajwad. (2006) Is Intrajurisdictional Resource Allocation Equitable? An Analysis of Campus-Level Spending Data for Texas Elementary Schools. *Quarterly Review of Economics and Finance*, (2) 552-564.

Andrews, Duncombe, and Yinger. (2002) Revisiting Economies of Size in American Education: Are We Any Closer to a Consensus? *Economics of Education Review*, (21) 245-262.

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

Baker (2007) Review of "Shortchanging Disadvantaged Students: An Analysis of Intra-district Spending Patterns in Ohio". A review for the Educational Policy Research Unit . Retrieved from http://epsl.asu.edu/epru/ttreviews/EPSL-0710-245-EPRU.pdf

Baker and Arbuckle. (2008) *Within district budgeting policy and the allocation of resource across schools: What do we really know?* Paper presented at the annual meeting of the American Education Finance Association, Denver, CO.

Baker, Green, and Fusarelli. (2003) *Tricks of the Trade: State Legislative Actions in School Finance Policy that Perpetuate Race-Related Disparities in the Post-Brown Era.* Paper presented at the Annual Meeting of the University Council for Educational Administration, Portland, OR.

Baker and Thomas. (2006) Review of Hawaii's Weighted Student Formula 2006-07.

Berne and Stiefel. (1994) Measuring Equity at the School Level: The Finance Perspective. Educational Evaluation and Policy Analysis (16) 4, 405-421.

Bryk, A. S., E. Camburn, and K.S. Louis. 1999. Professional Community in Chicago Elementary Schools: Facilitating Factors and Organizational Consequences. *Educational Administration Quarterly*, 35(5): 751-781

Burke. (1999) An Analysis of Resource Inequality at the State, District, and School Levels. Journal of Education Finance, (24) 4, 435-458.

Carey. (2002) State Poverty-Based Education Funding: A Survey of Current Programs and Options for Improvement. Paper completed for the Center on Budget and Policy Priorities, Washington D.C. Retrieved from www.cbpp.org

Carr, Gray, and Holley. (2007) Shortchanging Disadvantaged Students: An Analysis of Intra-District Spending Patterns in Ohio. The Buckeye Institute for Public Policy Solutions Policy Report, (14)

Cincinnati Public Schools. (2008) *CPS Revises School Budget Process to Preserve Equity Temporary Move Prompted by Financial Challenges.* News Release from the Public Affairs Department, Cincinnati Public Schools.

Clark. (2000) Texas Public School Finance. Retrieved from http://nces.ed.gov/edfin/pdf/StFinance/Texas.pdf

Clark and Toenjes. (1996) Exploring Alternatives for School-Based Funding. U.S. Department of Education, National Center for Educational Statistics. Selected Papers in School Finance, NCES 98-217, edited by Fowler, W.J., 1998

Clune. (1972) Law and Economics in Hobson v. Hansen: In Introductory Note. The Journal of Human Resources, (7) 3, 275-288.

Clune and White. (1988) School-Based Management: Institutional variation, Implementation, and Issues for further research. New Brunswick, NJ: Eagleton Institute of Politics, Center for Policy Research in Education.

Condron and Rosigno. (2003) Disparities Within: Unequal Spending and Achievement in the Urban School District. Sociology of Education, (76) 1, 18-36.

Cooper, DeRoche, and Ouchi. (2004) When Dollars Follow Students. School Administrator (61) 7, 10-16.

Downes (2004) What is Adequate? Operationalizing the Concept of Adequacy for New York State. http://www.albany.edu/edfin/Downes%20EFRC%20Symp%2004%20Single.pdf

Farrand. (1929) Introduction In the Laws and Liberties of Massachusetts: reprinted from the copy of the 1648 edition in the Henry E. Huntington Library. Cambridge: Harvard University Press, 1929, p. v-ix.

Fund the Child. (2006) Tackling Inequity & Antiquity in School Finance. Thomas F. Fordham Institute, Retrieved from www.edexcellence.net/institute

Goertz and Hess. (1998) Processes and Power in School Budgeting Across Four Large Urban School Districts. Journal of Educational Finance, (23) 4, 490-506.

Goertz and Stiefel (1998) School-Level Resource Allocation in Urban Public Schools. Journal of Educational Finance, (23) 4, 435-446.

Gronberg, T., Jansen, D., Taylor, L., Booker, K. (2004) *School Outcomes and Schools Costs: The Cost Function Approach*. (College Station, TX: Busch School of Government and Public Service, Texas A&M University). Retrieved March 1, 2006 from http://bush.tamu.edu/research/faculty/TXSchoolFinance/papers/SchoolOutcomesAndSchoolCosts.pdf

Hadderman (1999) School Based Budgeting. ERIC Digest, EDO-EA-99-7, Retrieved from http://eric.uoregon.edu

Hansen, Marsh, Ikemoto, and Barney. (2007) School Finance Systems and Their Responsiveness to Performance Pressure: A Case Study of Texas. RAND Education Working Paper Series, No WR-453-WA. Retrieved from http://www.crpe.org/cs/crpe/view/csr_pubs/169

Hawley-Miles, Ware, and Roza. (2003) Leveling the Playing Field: Creating Funding Equity Through Student-Based Budgeting. Phi Delta Kappan, (85) 2, 114-119.

Hawley-Miles and Roza. (2006) Understanding Student Weighted Allocation as a Means to Greater School Resource Equity. Peabody Journal of Education, (81) 3, 39-62.

Hill. (2008) The School Finance Redesign Project: A Synthesis of the Work to Date. Report prepared for the Center on Reinventing Public Education at the University of Washington.

Hoff. (2006) Call for 'Weighted' Student Funding Gets Bipartisan Stamp of Approval. Education Week, (25) 42, 1 & 30.

Houston Resource Allocation Handbook. (2007)

Houston Resource Allocation Handbook. (2008)

Iatarola and Stiefel. (2001) Intradistrict equity of public education and performance. Economics of Education Review, (22) 69-78.

Koppich, (2007) Resource Allocation in Traditional and Reform-Oriented Collective Bargaining Agreements. RAND Education Working Paper Series, No WR-453-WA. Retrieved from http://www.crpe.org/cs/crpe/view/csr_pubs/177

Kramer. (2002) Achieving Equitable Education Through the Courts: A Comparative Analysis of Three States. Journal of Law and Education. (31) 1, 1-51.

Ladd, Chalk, and Hansen. (1999) Equity and Adequacy in Education Finance: Issues and Perspectives. Committee on Education Finance, National Research Council.

Maryland State Department of Education. (2008) Maryland Application for NCLB Differentiated Accountability Pilot.

Marzano and Waters. (2006) School District Leadership that Works: The Effect of Superintendent Leadership on Student Achievement: A Working Paper. Retrieved from www.mcrel.org/pdf/leadershiporganizationdevelopment/4005RR_Superintendent_leadership.pdf: Denver CO: Mid Continent Research for Education and Learning.

Marzano and Waters. (2009) *District Leadership that Works: Striking the Right Balance.* Bloomington, Ind.: Solution Tree

Michelson. (1972) For the Plaintiffs – Equal School Resource Allocation. The Journal of Human Resources. (7) 3, 283-306.

Miller and Rubenstein. (2007) Examining the Nature and Magnitude of Intra-District Resource Disparities in Four Mid-Size New York State School Districts. Paper prepared for the Education Finance Research Consortium.

Monk, Roelke, and Brent. (1996) What Education Dollars Buy: An Examination of Resource Allocation Patterns In New York State Public School System. Paper prepared for the Consortium for Policy Research in Education.

Moulton. (1968) Hobson v. Hansen: The De Facto Limits on Judicial Power. Stanford Law Review. (20) 6, 1249-1268.

Murnane, R. J., and F. Levy. 1996. *Teaching the New Basic Skills: Principles for Educating Children to Thrive in a Changing Economy.* New York: Free Press.

Ohio Department of Education. (2008) Ohio Application for NCLB Differentiated Accountability Pilot.

O'Neill, Gray, and Horowitz. (1972) For the Defendants – Educational Equality and Expenditure Equalization Orders. The Journal of Human Resources. (7) 3, 307-325.

Owens and Maiden. (1999) A Comparison of Interschool and Interdistrict Funding Equity in Florida. Journal of Educational Finance. (24) 4, 503-518.

Picus and Odden (2005) *An Evidence-Based Approach to Recalibrating Wyoming's Block Grant School Funding Formula*. Report prepared for the Wyoming Legislative Select Committee on Recalibration.

Roza and Hill. (2004) How Within District Spending Inequities Help Some Schools Fail. Brookings Papers on Education Policy: 2004, 201-227.

Roza, Guin, Gross, and Deburgomaster. (2007) Do Districts Fund Schools Fairly? In Texas, Differences are Larger Within Districts than Between. Education Next. Fall 2007, 68-73.

Roza, Davis, and Guin. (2007) Spending Choices and School Autonomy: Lessons from Ohio Elementary Schools. RAND Education Working Paper Series, No WR-453-WA. Retrieved from http://www.crpe.org/cs/crpe/view/csr_pubs/181

Roza, Guin, and Davis. (2007) What is the Sum of the Parts? How Federal, State, and District Funding Streams Confound Efforts to Address Different Student Types. RAND Education Working Paper Series, No WR-453-WA. Retrieved from http://www.crpe.org/cs/crpe/view/csr_pubs/168

Rubenstein. (2008) Resource Equity in the Chicago Public Schools: A School Level Approach. Journal of Education Finance. (23) 4, 468-489.

Rubenstein, Schwartz, and Stiefel. (2006) Rethinking the Intradistrict Distribution of School Inputs To Disadvantaged Students. Paper prepared for the "*Rethinking Rodriguez: Education as a Fundamental Right*.

Rubenstein, Schwartz, Stiefel, and Bel Hadj Amor. (2007) From Districts to Schools: The Distribution of Resources Across Schools in Big City School Districts. Economics of Education Review. (26), 532-545.

School Communities that Work. (2002) First Steps to a Level Playing Field: An Introduction to Student-Based Budgeting. Report prepared for the Annenberg Institute for School Reform at Brown University.

Seattle Public Schools. (2008) A New Funding Model for Schools. PowerPoint presentation downloaded from http://www.seattleschools.org/area/media/WSS/wss.html

Smith. (1944) Budgeting in Public Schools. Review of Educational Research. (14) 2, 151-154.

Smith. (1947) Budgeting in Public Schools. Review of Educational Research. (17) 2, 143-146.

Stiefel, Rubenstein, and Berne. (1998) Intra-District Equity in Four Large Cities: Data, Methods, and Results. Journal of Educational Finance. (23) 4, 447-467.

Summers and Wolfe. (1976) Intradistrict Distribution of School Inputs to the Disadvantaged: Evidence for the Courts. The Journal of Human Resources. (11) 3, 328-342.

Sweetland. (2000) Ohio Public School Finance. Retrieved from http://nces.ed.gov/edfin/pdf/StFinance/Ohio.pdf

Toutkoushian and Michael. (2007) An Alternative Approach to Measuring Horizontal and Vertical Equity in School Funding. Journal of Education Finance. (32) 4, 395-421.

Tung, R., M. Ouimette, and J. Feldman. 2004. *How Are Boston Pilot School Students Faring? Student Demographics, Engagement, and Performance 1998-2003*: Center for Collaborative Education.

U.S. Department of Education. (2008) Key Policy Letters Signed by the Education Secretary. Letter accessed on http://www2.ed.gov/policy/elsec/guid/secletter/080320.html

West and Shen. (2003) An Evaluation of Intradistrict Equity in Massachusetts. Pioneer Institute for Public Policy Research, Harvard University. Research Brief No. 1.

Wohlstetter and Van Kirk. (1995) *School Based Budgeting: Organizing for High Performance.* Paper presented to the annual meeting of the American Educational Research Association.