FRACTIONALIZATION AND TAX EFFORT TO FUND ILLINOIS PUBLIC SCHOOLS: AN EQUITY ANALYSIS

BY

DOUGLAS JEFFREY MOELLER

DISSERTATION

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Doctoral Committee:

Professor Kern Alexander, Chair
Professor Carolyn Anderson
Assistant Professor Brad Kose
Professor Carolyn Shields

Abstract

Fractionalization is a quantifiable measure of diversity for a categorical variable within a population. In public education, research supports the sociological benefits of having a diverse student and faculty population. From a school funding perspective, however, a diverse student population may adversely impact a community's property tax effort to fund public education. In Illinois, local property taxes are the primary source of revenue that supports public school expenditures.

Disparities in per pupil expenditures between school districts in Illinois rank among the worst in the nation. These disparities are directly related to this state's heavy reliance on local property taxes. This paper analyzes the extent to which diversity, in terms of racial composition of students, levels of low socioeconomic status, and the proportion of a community that chooses to send their children to nonpublic, and primarily religious schools, affects school district effort to fund public education with local property tax revenue. Descriptive and inferential quantitative statistics are used to determine if a statistically significant correlation exists between Illinois unit school districts' local tax effort to fund education, as measured by the ratio of local revenue per pupil to equalized assessed valuation (EAV), and measures of racial fractionalization, low socioeconomic status, and the proportion of families who choose to send their children to nonpublic schools.

For Christine,…my everything

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Chapter One

Introduction

Fractionalization theory (Alesina & Glaeser, 2004), applied within the context of local tax revenue for public schools, may help explain some of the persistent inequalities that exist in the distribution of educational funding. Public education in the United States has historically been perceived as a means by which people living in poverty can realize upward socioeconomic mobility. Economist Gary Becker (1993) states "inequality in the distribution of earnings and income is positively related to inequality in education and other training" (p. 12). He also acknowledges the existence of a strong inverse relationship between unemployment and education. Further, intergenerational upward socioeconomic mobility notwithstanding, there are adverse societal costs to communities that do not ensure all children receive an adequate education. Psacharopoulos' (2006) research on the value of investment in education discusses both the monetary and social benefits of providing adequate public education. In fact, due to his emphasis on the social returns of education, he advocates providing the "highest priority to funding the lower levels of education" (p. 133).

In the State of Illinois, the current system of supporting public education may actually continue to trap those living in poverty by perpetuating the systemic inequities inherent in this state's school funding formula. Heavy reliance on local property tax to fund public education in Illinois contributes significantly to these inequities. When compared to other states in the nation, Verstegen and Driscoll (2008) note that Illinois contributes only 28.6% of the revenue to fund K-12 public education, which ranks this state 49th out of 50 in the percentage of state revenue supporting public schools (p. 345). Because of this, local property tax is the funding

mechanism that generates the largest proportion of revenue for public schools in Illinois. Not surprising, during the 2004-2005 school year, Illinois ranked behind only the District of Columbia and Nevada in the highest percentage of public school revenue generated from local government (National Education Association, 2006).

Children most at risk of failing to complete a secondary education often have the least amount of resources allocated to them, based on an expenditure per-pupil basis, than their middle- and upper-class socioeconomic peers (Wall, 2006). A large percentage of these students already belong to marginalized groups in American society. For purposes of this discussion, *marginalized* refers to people in our society who historically have had little or no voice in the political decision-making process at any level of governance; in particular, people from low socioeconomic status (SES) families, people of minority race, and people whose primary language is not English.

Thus, by failing to provide adequate funding for the educational needs of marginalized and at-risk students, social mobility is inhibited and current class structures are maintained. The United States, which has one of the highest rates of children living in poverty compared to other major industrialized nations (Alexander & Salmon, 2007), provides little support at the federal level to ensure these children start school on parity with their middle-class peers. With minimal state support for funding public education in Illinois, the primary revenue source for educating the majority of poor children in the state falls on the concomitantly poor local communities. As such, the present system of public school funding in Illinois perpetuates racial and socioeconomic discrimination by denying marginalized children equal access to a quality education.

The disparity in per-pupil expenditures between school districts within the State of Illinois ranks among the worst in the nation. Kozol (2005, p. 321) highlights this disparity in the Chicago metropolitan area by contrasting eight school districts, separated geographically by less than 50 miles, where the per-pupil expenditure in seven suburban Chicago school districts ranges from $2,000 to more than double the per-pupil expenditure in the Chicago Public Schools. These funding disparities are even more egregious if one considers the equity and social justice implications given the affluent demographic composition of students from the seven suburban school districts, versus the more impoverished demographic composition of the students in the Chicago Public Schools (Illinois School District Report Card, 2008). Unlike the seven suburban school districts, the Chicago Public Schools have a significantly higher proportion of children considered to be at risk for failing to complete a secondary education, based upon specific demographic characteristics (Vesely, Crampton, Obiakor, & Sapp, 2008), than do the students from the seven suburban school districts. The costs associated with educating at-risk students to achieve the same academic outcomes as student who are not at risk has been covered extensively in educational funding research. Most of these studies have consistently shown this cost to be significantly higher than the cost of educating students who are not at-risk (e.g., Reschovsky & Imazeki, 1998). If research-based cost differentials for educating at-risk children (Alexander & Wall, 2006) were included in an estimate of required funding to provide all of these students with an education that produced similar levels of achievement, the *required* versus actual expenditure per pupil for the suburban districts and the Chicago Public Schools district would highlight even greater disparities.

If Illinois school districts most in need of higher per-pupil expenditures, due to having relatively large proportions of at-risk students, are also the same school districts least likely to generate local revenue to support their schools, then the equity principle of equal opportunity is violated. For equal opportunity to exist, Verstegen and Driscoll (2008) state there can be "no relationship between assessed values of property among school districts and funding for a child's education" (p. 334).

To date, virtually all research related to the adequacy and equity of specific state's educational funding has been conducted based solely on socioeconomic factors, and in particular, those factors related to local and state funding schemas. Many of these studies demonstrate the existence of funding inequities (e.g., Aleman, 2007; Chambers, Levin, & Parrish, 2006; Driscoll & Salmon, 2008). As such, the historical financial and philosophical tenets on which most states base their public school funding formulas (e.g., local control of schools) create a structure of revenue generation and disbursement that is systematically discriminatory to our most marginalized citizens. This status quo requires corrective action or restitutive equity (Alexander, 2008) where "Morality and justice do require that disparity which emanates from the state such as malapportionment of fiscal resources through government action be corrected" (p. 153).

Examining this issue from a theoretical fractionalization perspective (Alesina & Glaeser, 2004) may highlight a correlation between a community's tax effort to fund public education and the racial composition of the students attending the public schools in that community. Fractionalization is a quantitative index, ranging from zero to one, on the level of diversity for a particular variable of interest, generally a nominal categorical variable,

within a specified population. For example, one could calculate a fractionalization index for personal attributes such as race, religious affiliation, or primary language spoken for every person within the state of Illinois. An index of zero represents a population possessing only one level (category) of the attribute under study. By contrast, a fractionalization index close to one would represent a population with very many levels of the particular attribute.

A large body of research already exists that confirms fractionalization theory as a valid and reliable method to explain not only correlation but, when used in conjunction with qualitative analysis, also establishes a sound basis to assert a causal relationship between the level of racial diversity of a population and that population's willingness to fund public goods as measured as a percentage of gross domestic product (Alesina & La Ferrara, 2000; Esteban & Ray, 2008; Glaeser & Saks, 2006; Lind, 2007). Further, fractionalization theory has been shown to be generalizable from international studies involving dozens of countries to the 50 states within the United States (Alesina & Glaeser, 2004). The primary hypothesis of this study is that fractionalization theory, as applied within the parameters set forth in this dissertation, will also prove to be a valid and reliable means to help understand the micro-political behavior of school boards and their willingness, or effort, to fund public education at the local level of governance.

Fractionalization Overview

Fractionalization theory is a concept used to describe socioeconomic behavior, which is believed to be related to a "measure of diversity" for a particular variable of interest, usually a categorical variable, within a population. This measure of diversity is quantified by

the use of a fractionalization index. This index is calculated using the proportion of the population that possesses each unique category the variable of interest can assume. For example, for the variable "religion," within a particular population, there may be only one religion practiced by the entire population. This would be a perfectly homogeneous population with respect to the variable religion. Another population, however, may have various proportions of Buddhists, Christians, Jews, Muslims, etc. This would be a more diverse population in terms of religion and, possibly, as a result, affect government distribution of fiscal resources.

From a theoretical perspective then, a fractionalization index may be conceptualized as a measure the variability of the categories within the variable under study. The range of a fractionalization index is from zero to one. An index of zero indicates the population is perfectly homogeneous with respect to the variable. An index of one would indicate every person in the population possesses a different category of the variable. The actual calculation for the fractionalization index used in this study is discussed in detail in Chapter 2.

Once a fractionalization index is calculated, proponents of fractionalization theory (e.g., Alesina & La Ferrara, 2000) assert the more diverse a population, as indicated by a relatively larger fractionalization index with respect to a categorical variable such as ethnicity, the lower will be the level of public transfers put back into that population's economy as a percent of gross domestic product (GDP) or some other measure of fiscal capacity. In general then, this theory asserts that an inverse relationship exists between a population's fractionalization index and the percentage of that population's GNP that is put back into the economy in the form of health care, education, and most other public services. A more

detailed explanation of this theory, including the rationale supporting the relationship between these variables, is covered in Chapter 2.

Purpose Statement

The purpose of this study is to examine the extent to which Illinois public school districts' tax effort to locally fund public education is related to measures of racial fractionalization, low socioeconomic status (SES), and the proportion of families who choose to send their children to nonpublic schools, for each district's student population. The theoretical foundation for this study is fractionalization theory and the effect it has on public transfers within a population of interest. This was done by quantifying the extent of racial diversity for each public school district (i.e., by calculating fractionalization indices), in relation to that district's tax effort to fund public K-12 education. The response variable will be the measure of a school district's local tax effort to fund education, which for the purpose of this study will be defined and operationalized to be a district's locally generated revenue per pupil divided by the equalized assessed valuation (EAV) for that school district. The predictor variables are the racial fractionalization index, the level of low SES, and the ratio of nonpublic to public school attendance for each school district. In addition, this study also examined the relationship between the response variable and racial percentages of each district, the proportion of students in each district who attend nonpublic regular education schools, and the percentage of students considered to be of low SES status, as measured by the percentage of students receiving free or Reduced Price Lunch (a generally accepted, but

most likely conservative, measure to determine the percentage of low SES students in a school district).

Research Questions

The research questions for this study, which were investigated by quantitative analysis, address the problem of funding disparities between school districts in the State of Illinois. The primary research question addressed in this dissertation is: What relationship, if any, exists between Illinois public school districts' local tax effort to fund schools, and the racial diversity of students attending these districts' schools?

Although this main research question was addressed using an overall quantitative measure of racial diversity, several other questions were investigated to provide better insight into the nature of the relationship between the predictor variables and the response variable. These subquestions are:

1. Does the specific racial composition of a school district's students affect tax effort to locally fund schools? This question was investigated by a quintile analysis of the percentage of White, Black, and Hispanic students within a school district, compared to quintiles of local tax effort.
2. Is there a statistically significant difference between the local revenue per pupil for White, Black, and Hispanic students when compared to the overall local revenue per pupil within the State of Illinois?
3. What effect does the proportion of *low SES* students within a school district have on a district's tax effort to fund schools?

4. What effect does the ratio of nonpublic school students to public school students within a school district have on a district's tax effort to fund schools?
5. What is the nature of the relationship between the statistically significant predictor variables? That is, what degree of correlation exists between the racial fractionalization index, the percentage of low SES students, and the ratio of nonpublic school student to public school students within school districts.

Limitations and Delimitations

Because the primary source of data for this analysis is the 2009 Illinois School Report Card, the first limitation is the findings of this study may not be generalized to local educational funding in the other 49 states. Further, although research exists that suggests other variables, such as distribution of family income, may affect a community's local tax effort to fund public education, these data are not included in the Illinois School Report Card and as such will not be considered in this study. Also, the racial composition of students' parents and other property owners within a school district is not a variable included in the Illinois School Report Card. Therefore, the last limitation is that student demographics will serve as a proxy for the property tax paying adults in the community.

One other limitation needs to be mentioned. For the analyses in this study using the predictor variable NONPUB, any results and conclusions derived must be viewed with a bit of skepticism. The manner in which the nonpublic regular education school enrollment was allocated to specific public school districts may be distorted. For each school record in the 2009 Nonpublic Regular Education K-12 school data file, the public school district assigned

to the nonpublic school is based upon the physical location of the school, not the public school district (or districts) from where the students attending the nonpublic school reside. For example, St. Edward Central Catholic High School, located in Elgin Illinois, draws students from Elgin School District U-46 as well as from CUSD 300 in Carpentersville and from St. Charles CUSD 303 in St. Charles. Yet all 404 students who attended St. Edward Central Catholic High School during the 2009 school year were allocated to Elgin School District U-46.

There are also a few delimitations that need to be mentioned here. First, this study only included unit school districts within the State of Illinois. This was done to limit variability due to differences in revenue needs, which have long been recognized to exist between elementary, high school, and unit school districts. Second, no provisions were considered to address any possible economies of scale related to the size of the unit school districts. Although this has been a topic of much research, there appears to be no definitive conclusions drawn as to the existence, or quantifiable differences, of economies of scale between small and large unit districts (Andrews, Duncombe, & Yinger, 2002). Third, with the exception of being used in the calculation of a fractionalization index for race, comparisons between races was delimited to White, Black, and Hispanic students. This was done because no unit school district within Illinois had more than 15% of either Asian, Native American, or multiracial students. Fourth, the term "equity" used throughout the literature review in this paper is only used within the context of *fiscal equity*. No discussion on equity, from the body of literature on social justice, was included in this review Finally, the Chicago Public Schools District was not included in this analysis. The mere size of this district would likely skew any

results derived from this study, and the fiscal dependence of this district on the City of Chicago is atypical from virtually all other unit districts within Illinois.

Significance

The method of funding public education in Illinois, with its increasing trend of reliance on local property tax revenue, has been the subject of legal challenges by plaintiffs who believe the funding mechanism is inherently flawed from both an adequacy and/or equity perspective. As in other states, the courts have been reluctant to adjudicate funding formula changes due to this responsibility being under the purview of the state's legislative branch. Only in such cases where the evidence proves to be such that violations of the state's constitution are at issue have the courts mandated changes in funding formulas.

If, as an outcome of the findings in this dissertation, evidence confirms the current funding formula used in Illinois is systematically discriminatory to traditionally marginalized children, then possible grounds for another judicial challenge may be established. But at the least, the results of this study add to the current body of literature that specifically address and highlight the inequitable mechanism by which public schools are funded in Illinois.

More broadly, however, many other states also rely on local property tax revenue to fund public education. In his book *The Good Society: The Humane Agenda*, Galbraith (1996) stated, "A case could be made, and perhaps should be made, that the best in education should be for those in the worst of social situations" (p. 70). This lofty ideal will never be realized in any state where local property tax dollars continue to serve as the primary source of revenue for public schools.

Definitions

Chi-Squared Statistic: A test statistic for categorical variables. It is used for a test of independence between variables, as well as for testing a goodness of fit for a model.

Herfindahl Index: A particular type of fractionalization index named after the researcher who first proposed this formula for calculation.

Local Tax Effort: The willingness of a community to fund public education by means of using local property tax. For this study, local tax effort was operationalized to be each school district's local tax revenue per pupil divided by the equalized assessed valuation (EAV) for that district.

Low Socioeconomic Status (SES) Students: Students who are considered to be living in an impoverished household. Given the data in the *Illinois School Report Card*, there is really no way to quantify household income for students and determine the percentage of these students living below a defined value of household income that would determine if they were living in poverty. A standard method for estimating the percentage of low SES students is to use the percentage of students participating in the Federal Free or Reduced Price Lunch Program as a proxy. Although this is a widely accepted practice, it most likely underestimates the percentage of students living in poverty because the Free or Reduced Price Lunch Program is a voluntary program for which families must apply.

Pearson Correlation: A measure of the degree to which there is a linear relationship between two variables. Although this correlation can be measured for two variables that may have a nonlinear relationship, this correlation is valid only when a straight line is a reasonable model for the relationship between two variables. The range of this correlation is -1 to 1. A

value of -1 implies a perfect inverse, or negative, linear relationship between the two variable, while a value of 1 implies a perfect positive linear relationship between the two variables.

Racial Fractionalization: A fractionalization index calculated for each school district by using its percentages of White, Black, Hispanic, Asian, Native American, and multiracial students as reported in the *2009 Illinois School Report Card.*

Reynal-Querol Polarization Index: Another measure of diversity similar to a fractionalization index. Although, this type of index takes into account the potential "threat" one group may feel from another group. The relative size difference between these two groups determines the extent of the threat level. The greater the size difference the greater the threat to the smaller group.

Spearman Correlation: An ordinal by ordinal measure of association between two variables. The Spearman correlation does not assume any particular theoretical relationship between the two variables. As such, it is more appropriate to use this value rather than the Pearson correlation if the nature of the relationship between the two variables does not appear to be linear. Like the Pearson correlation, the range of the Spearman correlation is -1 to 1.

Chapter 2

Literature Review

The discussion on equity research, especially such research emphasizing problems associated with using local property tax as the primary mechanism for funding public schools, is covered in this chapter. Much of this work focuses on disparities in funding between school districts due to disparities in property values between the respective taxing bodies for these school districts (e.g., Aleman, 2007; Kozol, 2005; Rothstein, 2000). In particular, Illinois has been the subject of equity research because of this state's relatively poor ability to equitably fund school districts when compared to other states (e.g., Lipman, 2005; Wall, 2006). Succinctly stated, Verstegen & Driscoll (2008) observe that:

> The findings show disparities across all types of school districts in Illinois that are egregious. Perhaps even more alarming, however, are the wealth-neutrality statistics that indicate a strong relationship between funding for education and a locality's ability to pay for education. (p. 336)

Such conclusions make Illinois an interesting state for further analysis, especially with a focus on a local school district's ability and/or willingness to fund public education.

The purpose of this literature review is to examine the relevant body of work related to establishing a theoretical foundation on which to base an argument for using racial fractionalization as a predictor for a school district's tax effort to fund public education in the State of Illinois. Research in the area of school funding from a social justice and equity perspective is covered extensively in education finance literature (e.g., Alexander & Wall, 2006; Driscoll & Salmon, 2008; Rothstein, 2004; Verstegen & Driscoll, 2008). Conclusions drawn from much of this research indicate that minority and low SES students often receive

the least amount of educational funding. The rationale for these conclusions are based primarily on demographic and economic indicators demonstrating the inability of the local tax base to effectively fund schools attended by the majority of minority students. What these studies do not address, however, is the possibility that these disparities in funding are related to sociological and/or micro-political factors that may systemically perpetuate these inequities.

Thus, the primary focus of this literature review was to address equity issues related to state and local funding for public schools in Illinois; specifically, the factors that affect a public school district's local tax effort to fund its schools at a particular level. Local tax effort of a school district is operationalized to be the local property tax per pupil, divided by the equalized assessed valuation for the school district. The primary source of information for this literature review were journal articles related to two areas of research that, while not being mutually exclusive, have really not been addressed together in research related to equity of public school funding. These are: equity research, especially that portion of the literature dealing specifically with vertical equity, and racial fractionalization, as measured by the Herfindahl index.

To adequately cover these topics, a review of equity issues related to state and local funding for public schools in Illinois is discussed, with particular attention to the reliance on local property tax as the primary source of revenue. Next, the historical development of fractionalization theory was reviewed, including the various contexts in which it has been used and accepted as a legitimate tool for analysis. Following this is a critique on the applicability of fractionalization theory in an analysis of educational funding in Illinois, with

specific emphasis on sociological and economic factors that may affect a district's local tax effort.

Logical conclusions drawn from a synthesis of these two strands of research offer a compelling argument for a causal link between these two variables if, as an antecedent, a statistically significant correlation between these variables is established by the quantitative statistical methods outlined in Chapter Three.

Equity Research

Most literature related to equity of school funding distinguishes between two types of equity; these are horizontal equity and vertical equity. For the purpose of this study, these definitions were taken from Rolle and Liu (2007). Horizontal equity is "the act of treating students with similar academic qualities in the same manner in order to give them an equal opportunity to compete academically." Vertical equity is "the act of treating students with different socio-demographic characteristics in a different manner in order to give them an equal opportunity to compete academically" (p. 329).

The following discussion covers research on equity issues associated with funding public education, with particular emphasis on the concept of vertical equity. Based on the definition given above, vertical equity advocates the allocation of educational resources to children based on each student's individual needs. For example, students from low SES households, minority students, and students with limited English proficiency are considered to have risk characteristics that would require more educational funding. The understanding of this concept is central to realizing how students most in need of compensatory educational

services, due to factors that place them at risk for academic failure, are quite often the least likely to receive such services.

Equity research: Illinois. From a vertical equity perspective, the Illinois school districts most often in need of higher per-pupil expenditures, due to having relatively large proportions of at-risk students, may be the same school districts least likely to generate revenue to support their schools. Wall (2006) notes that: "Low-performing districts have higher densities of minorities and low-income students also report lower per-pupil state and local revenue" (p. 256). Public education in the United States has historically been perceived as a means by which people living in poverty can realize upward socioeconomic mobility. However, in the State of Illinois, the current system of supporting public education may actually continue to trap those people living in poverty by perpetuating the systemic inequities inherent in this state's school funding formula (Verstegen & Driscoll, 2008).

Within the past few years, a significant amount of school finance literature has specifically addressed the educational funding system in Illinois because this state has one of the largest disparities of per-pupil expenditures between school districts in the nation (Wall, 2006). With the federal government contributing less than 9% of total revenue, local property tax revenue in Illinois accounts for over 63% of public education expenditures. This heavy reliance on local tax revenue as the primary source of educational funding is responsible for significant disparities in per pupil expenditure between school districts within the state. Rothstein (2000) describes the problems associated with heavy reliance on local property tax

revenue as the primary source of educational funding, which he classifies as a Type II inequality.

Heavy reliance on local property tax to fund public education in Illinois contributes significantly to these inequities. When compared to other states in the nation, Verstegen and Driscoll (2008) note that in Illinois the state's level of funding accounts for only 28.6% of the total revenue to fund K-12 public education, which ranks this state 49th out of 50 in the percentage of state revenue supporting public schools (p. 345). Because of this, local property tax generates the largest proportion of public school funding in Illinois. Not surprising, during the 2004-2005 school year, Illinois ranked behind only the District of Columbia and Nevada in the percentage of public school revenue generated from local government (National Education Association, 2006).

As stated earlier, the United States has one of the highest rates of children living in poverty compared to other major industrialized nations (Alexander & Salmon, 2007). There is little support at the federal level to ensure these children start school on parity with their middle-class peers. With minimal state support of public educational funding in Illinois, the primary revenue source for educating the majority of poor children in the state falls on the concomitantly poor local communities (Verstegen & Driscoll, 2008). Thus, the present system of public school funding in Illinois perpetuates racial and socioeconomic discrimination by denying marginalized children equal access to a quality education. This perspective is supported by broader conclusions drawn from Rodgers (1995) regarding the lack of socioeconomic mobility in the United States.

The school funding issues in Illinois has prompted some plaintiffs to seek recourse through the judicial system. The 1999 case of Lewis v. Spagnolo provides a characteristic example of how the courts in Illinois, and as will be discussed in other states, have been reluctant to adjudicate matters related to funding public education.

The plaintiffs in this case were school-age children in East St. Louis. The defendants were the East St. Louis School District, the Illinois State Board of Education, and Joseph Spagnolo, the Illinois State Superintendent of Schools. The students in this case were "seeking injunctive relief pursuant to Federal and State Constitutions, state statutes, and state common law for deprivation of minimally safe and adequate education" (Lewis v. Spagnolo, 1999). Initially filed in the Circuit Court of St. Clair County, the judge dismissed the complaint, and the students appealed.

The disposition of this case was eventually decided based on the precedent set from an earlier Illinois case, Committee for Educational Rights v. Edgar (1996). The rationale used here was that issues related to the quality of a public education were under the purview of the legislative branch rather than the judiciary. In both these cases, neither Circuit Courts nor Appellate Courts wanted to address the issue of defining what constitutes an adequate education.

Illinois courts have no exclusivity in using this argument to dismiss cases filed on behalf of poorly funded school systems. In the following discussion on equity issues with respect to other states, this same rationale will be presented again. This has not, however, completely dissuaded other plaintiffs from filing similar complaints in Illinois.

In the fairly recent 2008 complaint filed for Chicago Urban League and Quad County Urban League v. State of Illinois and State Board of Education, the plaintiffs chose a strategy of making the state system for funding public education a civil rights issue. The first paragraph from the "Nature of Action" of this complaint is stated here:

> The lawsuit is a civil rights action that arises from the State's failed school funding scheme, the discriminatory impact that the scheme has on minority students, especially African American and Latino students and the inadequate educational opportunity it creates for Plaintiffs and thousands of Illinois public school children. The lawsuit challenges the State's method for raising and distributing education funds to local school districts and ISBE's implementation of that fatally flawed system. Together, on behalf of their members and their members' children, Plaintiffs allege that the State's public school funding scheme (1) disparately impacts racial and ethnic minority students who attend Majority-Minority Districts in violation of the Illinois Civil Rights Act of 2003; (2) violates the Uniformity of Taxation provision of the Illinois Constitution; (3) violates Plaintiffs' right to attend "high quality educational institutions" guaranteed by the Education Article under the Illinois Constitution and (4) violates Plaintiffs' right to equal protection under the Illinois Constitution. (Chicago Urban League, 2008)

The complaint continues, citing many of the same facts already discussed in this paper regarding the State of Illinois' poor ranking in the percentage of total revenue to fund public schools, and the underfunding of Majority-Minority school districts. This lawsuit, initially filed in the Circuit Court for Cook County, has yet to be adjudicated. Depending on the disposition, when eventually resolved, this case may be pivotal in the outcome of other such litigation related to inadequate school funding from a civil rights perspective.

Equity Research: Impact of Nonpublic Schools. With regard to the impact on redistribution of wealth in general, Alesina and Glaeser (2004) discuss the role that both political and religious institutions, and in particular Catholicism, played in the development of the philosophical perspectives on public transfers for social services in both Europe and the

United States. Although they contend the religious influence has historically been greater in Europe rather than the Unites States, the effect it has had in the development of nonpublic schools cannot be ignored.

A credible body of literature exists supporting the contention that many political and/or religious organizations are still focusing efforts at undermining the current system of public education. The economic means by which these ends will be realized is through funneling tax revenue away from public schools to support private schools, the majority of which have religious affiliations. Whether in the form of outright subsidies, education tax credits, or school vouchers, Sutton and King (2011) clearly state the equity issues espoused by opponents of such funding measures.

> In contrast, opponents point to the diversion of tax dollars from public schools to support efforts to privatize and abandon the common school just to advance the interests of a small segment of the population. They also view voucher plans as highly divisive in fostering government entanglements with churches and serving as a catalyst for re-segregating public schools. (p. 244)

There is a long history in the United States of both political and judicial activity to resolve this issue. Alexander (2008) contends a series of U.S. Supreme Court decisions, starting during the time when William Rehnquist was Chief Justice, has eroded the separation between church and state. Alexander finds the "bigotry thesis," forwarded by Justice Clarence Thomas (p.158), based on a failed U.S. Constitution amendment, proposed in 1875 by Speaker of the House James G. Blaine with the support of President Grant, to prohibit states from financially supporting Catholic schools is not credible. Although Alexander provides evidence to support the position that the motivation behind this amendment was to promote

nationalism, Thomas's contention is this amendment was prompted by anti-Catholic sentiment.

Bootstrapping from this thesis then, any state with a "no-aid clause" (Sutton & King, 2011) in its state constitution may be perceived as creating such a provision based on bigotry towards religion. According to Alexander (2008), "If any such evidence is garnered, then it is presumed that this Supreme Court will entertain the opportunity to overthrow separation provisions in state constitutions" (p. 161).

The genesis of the issue regarding government funding of nonpublic schools arose from the post-Civil War rise in Catholic schools (McGreevy, 2003). Until this time, Bible readings and hymn singing were common in public schools. With the expansion of Catholic schools, McGreevy contends the lack of governmental support for these schools was motivated by the political goal of unifying the nation after the Civil War. To do so led to a "consequent willingness to sacrifice religious education in public schools to that goal" (p. 115).

To date, only eleven out of the fifty states *do not* contain "no-aid" clauses in their state constitutions (Sutton & King, 2011, p. 247). Illinois *does* have a no-aid provision in its state constitution; however, this does not ensure some type of voucher system cannot be realized through legislative action. Other states with no-aid clauses have recently had this occur. In particular, legislation allowing public tax revenue for vouchers to be used to pay for nonpublic, and primarily religious, schools has occurred in Indiana, Ohio, and Wisconsin. From an equity perspective, the expansion of such nonpublic school funding schemes will

likely cause schools to become more racially segregated (Kozol, 2005). As Alexander and Alexander (2011) state:

> In the modern era, the use of tuition vouchers for private schools did not arise in any significant degree until the public schools were de-segregated and the tuition vouchers were used in the south to circumvent the Equal Protection Clause of the Fourteenth Amendment. (p. 219)

This statement is supported by many others who, while not denying the right for children to attend nonpublic schools for religious beliefs, still feel the idea of the government subsidizing nonpublic schools to any extent is antithetical to the social goals of the civil rights movement. Kozol (2005) discusses the memoirs of former Congressman John Lewis and his position on this issue.

> During the 1990s, he observes, there has been a "rising wave . . . of backlash" against principles that formed the basis of the civil rights campaign. The dismantling of court-ordered integration and the movement towards schools vouchers were, he writes, leading us to "turn away from one another" by retreating "into separate tribes", destroying much of the hope and structure of belief that hold "the most tenuous parts of our society together. (p.313)

Based on this discussion of nonpublic schools within the context of school funding, and especially in light of the highly charged issue of using public tax revenue to support nonpublic schools, how might this affect local tax effort to support public school funding? Given that Illinois currently has no legislation supporting a school voucher system, it seems plausible that people who choose to send their children to nonpublic, and most likely religious, schools would be less likely to support funding public schools.

Equity research: Other states. Children most at risk of failing to complete a secondary education often have the least amount of resources allocated to them, based on a

per-pupil expenditure basis, and less than their middle- and upper-class socioeconomic peers (Welner & Weitzman, 2005). A large proportion of these students already belong to marginalized groups in American society so, by failing to provide adequate funding for their educational needs, social mobility is inhibited and current class structures are maintained.

This situation, however, is not unique to Illinois as school districts in many other states have struggled with similar funding issues. For example, Driscoll and Salmon (2008) discuss the actions taken by many school districts in Virginia when the state legislature approved increased state support for public education in response to significant criticism regarding disparities in per-pupil expenditures between school districts in the state. When analyzing these disparities both before and after the increase in state funding, Driscoll and Salmon found that overall, funding gaps between wealthy districts and poor districts actually widened after the additional infusion of more state revenue. They concluded that in response to increased state support, wealthy school districts used the additional revenue to improve educational services and make needed repairs to school district infrastructures, while the poorer school districts in the state used the additional revenue to offset local revenue by cutting the local tax rate for education. The conclusion of this research was, that in general, the wealthy school districts in Virginia used the additional state revenue to supplement their local funding, while the poorer school districts in the state used the additional revenue to supplant their local funding.

The reasons for this behavior, as offered by Driscoll and Salmon (2008), are the result of the socioeconomic composition of school board members who govern these poorer school districts. Although a school district's population may primarily consist of lower income

families, often there are still some affluent members of the community. These individuals are more likely to be elected to serve on local school boards, and may not have the same priorities for the school district as the poorer members of the community.

This same type of local response to funding education has been shown to occur in Long Island, New York. Singer's (1999) research posits that although White families living in predominantly minority local communities in Long Island where many of these families don't even send their children to public school, they still maintained a disproportionately high level of influence on the funding for local public schools. Similar results, critical of New York State's educational funding system, were found by Chambers, Levin, and Parrish (2006), and research critical of California's educational funding formula for similar reasons is promoted by Grubb, Goe, and Huerta (2004).

One organization with a long history of educational activism on behalf of minority students is the League of United Latin American Citizens (LULAC). In the early 1970s, LULAC filed and won a lawsuit that resulted in Hispanic Americans being defined as a minority for the first time (Cisneros v. Corpus Christi Independent School District, 1971). Shortly thereafter, the LULAC National Educational Service Centers (LNESC) was created to provide educational services to Hispanic students. The rationale supporting the need for such organizations will be discussed in the following Fractionalization Theory section.

Another claim of race being a factor in school funding comes from a study done in Texas by Aleman (2007). He found that an analysis of school funding data from a Critical Race Theory (CRT) or Latina/o Critical perspective offers a much different picture of funding inequities from those derived from "traditional" analysis, which ignores the relationships

between race, social class, and inequity. For social justice goals to be achieved, these alternative perspectives need to be addressed. As Aleman states, "It is a utilization of CRT policy analysis of school finance policy, as well as other educational policies, that will begin to foster change in areas such as student achievement and university access and success" (p. 549). Gomez (2008) cites Aleman's work for his research, and arrives at a similar conclusion.

Further research on the funding public education in Arizona is provided by First (2007). She investigated the relationship between school funding legal cases in Arizona and the extent to which those cases affected the state's school funding formula and the extent to which any of the cited legal cases helped to mitigate funding inequities between school districts in Arizona. Unlike most other research cited here, First used a meta-analysis of all civil lawsuits regarding school funding in Arizona and studied these lawsuits' judgments and the effect of their dispositions on school funding. She found that virtually none of these lawsuits affected school funding within the state. The courts consistently held that school funding was a legislative rather than judicial matter, even in cases where claims of egregious funding inequities were found to be warranted.

These findings in Arizona are characteristic of most other states where similar civil lawsuits have been filed. The judiciary has been reluctant to intervene when state governmental funding is at issue. Although, unlike a few states where such lawsuits have garnered funding reform, Arizona courts have consistently relied upon the precedence of one early legal decision to drive decisions in all subsequent educational funding challenges.

There have been cases in many other states where plaintiffs who allege violations of equal access to an adequate education have sought remedy through the court systems. Stiefel,

Schwartz, Berne, and Chellman (2005) discuss the outcome of such cases in the State of New York and determined, "Our conclusion for the courts was that after controlling for legitimate variables, race was a factor in determining the variation in state aid, and thus there was a disparate racial impact not explained by legitimate policy variables" (p. 168).

Other research by Verstegen, Venegas, and Knoeppel (2006) highlight this problem and find that little has changed with regard to school funding inequities both interstate, and intrastate between school districts. Even where court decisions have prompted a change in various states' educational funding formulas, the heavy reliance on local property tax revenue to support schools continues to be the source of most funding inequities. These researchers state that, "Evidence presented in these cases illustrates savage inequalities and inadequacies that plague America's schools, providing the least resources to those who need them most: low-income students, students of color, and other students with special educational needs" (p. 72).

Equity research: Conclusions. Even so, such court decisions have done little to ameliorate the deeply entrenched philosophy of local public school funding in most states. The method of funding public education in Illinois, with its increasing trend of reliance on local revenue sources, has been the subject of legal challenges (e.g., Committee for Educational Rights v. Edgar, 1996; Lewis v. Spagnolo, 1999) by plaintiffs who believe the funding mechanism is inherently flawed from both an adequacy and equity perspective. As in other states, the courts have been reluctant to adjudicate funding formula changes due to this responsibility being under the purview of the state's legislative branch (McKinley & Phillis,

2008). Only in such cases where the evidence proves to be such that violations of the state's constitution are at issue have the courts mandated changes in funding formulas. And, as was discussed earlier, in the State of Arizona even this was not compelling enough to force judicial action.

For the foreseeable future, aside from scholarly research that continues to be critical of the inequitable educational funding mechanism at work in most states, little progress, either judicial or legislative, is being made to change the inherently discriminatory public education state funding formulas being used in most states across the country. In particular, the focus on funding public schools in Illinois (e.g., Verstegen & Driscoll, 2008) will likely continue to generate more research.

According to Rice (2004), students most at risk for failing to complete a secondary education are the same students who most often have the least amount of resources allocated to them by their public schools. A large proportion of these students already belong to marginalized groups in American society (Rodriquez, 2004), so by failing to provide for their instructional needs, social mobility is inhibited and current class structures are maintained.

Thus far, this review of literature has focused on the topic of public school funding from an equity perspective. This strand of research consistently highlights the systemic problem associated with the concept of local control of public education when funding is at issue. For any state where school districts generate a significant proportion of their revenue from local property tax, funding disparities between school districts are likely to exist. For Illinois in particular, where local school districts are more reliant on local property tax revenue than most other states, these disparities will continue to be even more egregious as

long as this is the mechanism upon which public school districts in Illinois must increasingly rely.

This following section examines the role fractionalization theory may play within the context of local tax effort to fund public education. In particular, sociological and micro-political dynamics are put forth as plausible causal links between student diversity within a school district and that district's local property tax effort to fund education.

Fractionalization Theory

Fractionalization is an index that measures the diversity of a population for a particular characteristic of interest. For example, one could fractionalize a population based on race, religion, languages spoken, etc. This concept traces back to the earliest reference in this review where Taylor and Hudson (1972) define ethno-linguistic fractionalization as "the probability of two people, randomly selected from the population of interest, having *different* (emphasis added) ethno-linguistic backgrounds" (p. 42).

Fractionalization: Derivation of formula. This concept is formally defined mathematically using the following notation. Let n_i denote the *proportion* of the population of size N belonging to group *i*, where $i = 1, 2, \ldots, G$, and G is the total number of different groups in the population. Clearly then,

$$\sum n_i = n_1 + n_2 + \ldots + n_G = 1. \quad (1)$$

Now, the probability of two people randomly selected from the population belonging to different groups, where one person belongs to group n_i is:

$$n_i (1- n_i). \quad (2)$$

Summing this probability over all groups yields the fractionalization index

$$F = \sum n_i (1- n_i) = \sum n_i - \sum n_i^2 = 1 - \sum n_i^2 . \quad (3)$$

Defined in this manner, a fractionalization index will be a number between zero and one, where a value of zero represents a perfectly homogeneous population where there is only one group (i.e., G = 1, so $n_1 = 1$). A value close to one would represent a very diverse population. In the limiting case where F = 1, we would have G = N. That is, every person in the population is in their own unique group.

Properties of fractionalization indices. Esteban and Ray (2008) note four properties of this function F that are helpful in understanding the usefulness of this index. First, any change in population from one group to a smaller group will increase F. Second, for a given number of groups G, F is maximized when each group contains identical proportions of the population. That is, $n_i = n_j$ for all $i,j = 1, 2, \ldots, G$. Third, given that $n_i = n_j$ for all $i,j = 1, 2, \ldots, G$, F increases if the number of groups G increases. Fourth, to split any group with population n into two new groups, $n^{/}$ and $n^{//}$ where $n^{/} + n^{//} = n$, F will increase.

Fractionalization: Discussion. Research using fractionalization indices to understand the rationale for particular economic decision making is extensive, particularly for explaining macroeconomic phenomenon on a national scale. In his research on the level of inefficiencies and corruption in national governments, Mauro (1995) makes an argument that the level of corruption in government, especially in developing third-world countries, is highly correlated

to the degree of ethno-linguistic fractionalization in those countries. He further states that in countries where significant economic growth is taking place, higher levels of "institutional inefficiency" are related to higher levels of ethno-linguistic fractionalization (p. 694).

The vast majority of literature regarding fractionalization theory can be attributed to Alberto Alesina, Professor of Economics at Harvard University. Virtually all research on this topic from the past ten years extensively cites Alesina. This is the case here as well due to the seminal body of research he produced on this topic. Alesina and La Ferrara (2000) discussed the relationship between the level of fractionalization in a community, however defined, and sociological factors such as trust, civic engagement, and other more broadly defined measures of social capital (p. 847). They applied fractionalization theory internationally using Organization for Economic Cooperation and Development (OECD) econometric data, as well as in an analysis of state-by-state econometric data in the United States. A major conclusion of their research states:

The relationship between homogeneity and social capital may not only be a U.S. phenomenon. The five countries with the highest levels of trust are Norway, Finland, Sweden, Denmark, and Canada; the same countries that rank among the top ones for associational activity and norms of civic cooperation. These countries have an ethnically homogeneous population and very low levels of income inequality (Alesina & L Ferrara, 2000, p. 884).

This finding provided much of the impetus for research that followed. Many studies began to use the concept of ethnic or racial fractionalization as an explanation for everything from mistrust and/or corruption of the government sector, to growth in the informal economic sector within a society.

One such study was conducted by Lassen (2007). The primary hypothesis he tested is that the higher the level of ethnic fractionalization in a population, the less likely people are to comply with taxation. Lassen found a statistically significant relationship between ethnic fractionalization and the size of the informal economy. An increase of one standard deviation in ethnic fractionalization corresponds to an increase of 4.7 percentage points in the size of the informal economy. He concludes from this that high levels of ethnic fractionalization, especially in countries with developing economies, will increase the difficulty of establishing and maintaining public sector services due to a loss in tax revenue. Lassen also suggests that public sectors operate less efficiently in countries with high degrees of ethnic fractionalization than would otherwise be found in countries that are more homogeneous.

So far, this literature review of fractionalization appears to provide a comprehensive theory to explain all macroeconomic and social behavior on social transfers. No such luck. Even Alesina begins to doubt the generalized applicability of this construct. In subsequent research, Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003) investigate the effect of ethnic, linguistic, and religious fractionalization on the qualities of institutions in over 190 countries. They also develop a new measure of fractionalization and compare its predictive power to previous measures. Significant amounts of both quantitative and qualitative data were analyzed by multiple indices of fractionalization and measures of standard statistical inferential and descriptive statistics. International economic quantitative data were analyzed along with qualitative measures on quality of life, including "satisfaction with services provided by the government," are developed. Mixed results from several

measures of fractionalization caused the researchers to consider problems in the analysis of data when polarization is present.

Formally defined, polarization occurs in situations when only two or three categories (i.e., groups) of the variable being fractionalized are observed in the population under study and where a vast majority of the population falls into only one of these few categories. Previous research has found fractionalization, as a measure of the extent to which economic forces and governmental efficiencies operate, may not be applicable in limiting cases at either end of measure for this index; although no explicit quantitative measure (e.g., less than 0.10) is given to guide one in determining if polarization may be a problem. In such cases, alternative measures for polarization (e.g., Montalvo & Reynal-Querol, 2005) may be more applicable if it appears underlying assumptions of polarity are in place. In Montalvo and Reynal-Querol's research, they use the Reynal-Querol polarization index, which is defined as:

$$RQ = 4\sum n_i^2 (1 - n_i). \quad (4)$$

If polarization is a characteristic of a school district's racial composition, this may manifest in the analysis as a statistical outlier when this index is compared to the index of fractionalization. The relationship between these two measures will be explored in the Chapter 4 results.

Several researchers, without completely discounting Alesina's work and the general development of the fractionalization indices, begin to see other needed modifications to this model. Lind (2007) argues the conventional measure of fractionalization, the Herfindahl index, is too simplistic to account for the degree to which various racial groups differ with regard to opinions and attitudes. He concludes it is useful to construct measures of intergroup

opinion differences and relative distance fractionalization to account for some of the variation not included in the Herfindahl index. To date, no other researchers have gone down the path that Lind proposes. Because this article was published just three years ago, in will take time to determine if Lind's research becomes more accepted as contributing to the body of knowledge on this topic.

The most compelling and refined research on fractionalization theory was written by Alesina and Glaeser (2004). They investigate the relationship between ethno-linguistic fractionalization and social transfers as a percentage of gross domestic product (GDP). This relationship is researched first on an international basis by examination of data from the Organization for Economic Cooperation and Development (OECD) countries, and then in the United States using state-specific data. Alesina and Glaeser use least squares regression analysis for the majority of quantitative statistics. Along with this, analysis of variance (ANOVA) and other techniques commonly used in inferential statistics are utilized. Descriptive quantitative and qualitative data are also used to investigate the sociological rationale for the phenomenon studied. These researchers found a negative correlation between the measure of racial/ethno-linguistic fractionalization and social transfers in the form of healthcare, education, and investment in governmental infrastructure. They provide compelling evidence to deduce that in general, and holding all other factors constant, the more diverse a population, the lower the percentage of social transfers provided by the government when measured as a percentage of GDP. Alesina and Glaeser conclude that homogeneous societies are more likely to allocate a higher proportion of government sponsored public goods and services then are a more heterogeneous society.

The rationale as to why this phenomenon occurs varies depending on whether the analysis is drawn from international data comparing many countries, or if the analysis involves comparing the fifty states here in the U.S. Alesina and Glaeser (2004) devote several chapters of their book explaining the economic, political, and racial implications on redistribution, and how the "ideology of redistribution" differs between the United States and most European countries. Citing economic facts and international survey respondents' perceptions, these authors state:

> Europeans are much more likely to believe that the poor are trapped in poverty and that their poverty is the result of forces beyond their control. Americans, by contrast, believe that effort, not luck, determines income and that the poor are not trapped. (p.183)

This distinction between European countries and the United States is mentioned here to highlight the pull-yourself-up-by-the-bootstraps mentality, which the authors feel is a pervasive attitude held primarily by people of European descent living in the United States. This mindset, although not specifically addressed in the remaining discussion on the use of racial fractionalization as a legitimate tool for analyzing Illinois schools districts' effort to fund public education, underlies much of the rationale used to explain why increased levels of racial diversity results in lower levels of social transfers. Alesina and Glaeser provide a compelling argument for this hypothesis on a state-by-state analysis of social transfers, and my proposed analysis will also test this hypothesis. However, the unit of analysis will be individual school districts (delimited to unit school districts) within Illinois, where the micro-political dynamics of Boards of Education may affect effort to fund public education.

A few studies on fractionalization theory have been extended to include economic behavior at a local level of public governance (e.g., Alesina & La Ferrara, 2000; Lind, 2007).

After reviewing a few studies that attempt to deal with this topic, one theme was evident. The rationale provided for the applicability of racial fractionalization as an explanatory variable at a local (community) level of governance basically rests on two premises. First, the more racially diverse a community, the less likely people will be involved in civic responsibility (Alesina & La Ferrara, 2000). This civic responsibility includes oversight of local school districts. Specifically, Alesina & La Ferrara concluded the following:

> Our empirical results on U.S. localities suggest that income inequality and racial and ethnic heterogeneity reduce the propensity to participate in a variety of social activities including recreational, religious, civic, and educational groups. Among the various forms of heterogeneity, racial fragmentation seems to have the strongest negative effect on participation. (p. 850)

Secondly, the level of trust in a community decreases as the level of racial diversity increases. Decreased levels of trust are shown to increase both the size of the informal economy and the amount of governmental corruption. On a state-wide basis, Glaeser and Saks (2005) found that "a one standard deviation increase in the degree of racial fractionalization is associated with one half of a standard deviation increase in corruption" (p. 1063). They further surmised that corruption may cause a loss of capital, due to both a lack of investment and increase in the informal economy, which in turn reduces the quality of schools because less funding is available.

Relating this back to a smaller unit of analysis, in Alesina's (2003) work applying fractionalization theory he states, "A large literature on U.S. localities show that in more ethnically fragmented communities, public goods provision is less efficient" and "Evidence that trust does not travel well across racial lines is also supported by experimental evidence"

(p. 156). These are similar conclusions to those based on other research using fractionalization regardless of the level of governmental analysis.

Fractionalization Theory: Critique.

The preceding section provides a fairly comprehensive examination of the literature on fractionalization theory. The rationale for its applicability as an explanatory variable for an analysis of school districts' effort to fund public education within the State of Illinois is appropriate for the following reasons. The conclusions drawn from the majority of research cited thus far have asserted that: general perceptions on social mobility in the U.S. maintain that effort, not luck, determines a person's socioeconomic status; higher levels of racial fractionalization are correlated with lower levels of civic involvement, trust in others, which causes a decrease in social transfers; higher levels of racial fractionalization are correlated with higher levels of corruption and the size of the informal economy, which reduces tax revenues.

To determine if this theory may be applicable in the micro-political realm of local effort to fund public education, the underlying sociological dynamics that provide a plausible causal link between racial fractionalization and political behavior regarding public transfers need to be shown to exist in the arena of local control of public schools. To this end, my contention is that perceptions of social mobility, levels of trust, level of civic involvement, and the propensity to be corrupt are personal attributes. These personal attributes affect individual behavior, which transcends the level of governance in which a person may be serving as an appointed or elected government official. As such, the primary hypothesis of

this study is that there is a negative correlation between the level of racial fractionalization and a school district's tax effort to locally fund public education. This correlation will be dynamically similar to that which has been shown to exist in research literature between racial fractionalization and public transfers in multiple state-wide and country-wide analyses.

Logical conclusions drawn from this synthesis of research offer a compelling argument for a plausible causal link between racial fractionalization and local tax effort to fund public education in Illinois. If a statistically significant correlation between these variables is established by quantitative analysis, although it may not be concluded that a highly diverse school district is an antecedent to poor local effort to fund such a district, it may demonstrate a systemic flaw in using a method for funding public education that relies heavily on local property tax for revenue.

Although this method is used extensively in most states in this country, current literature on school funding is overwhelmingly critical of heavy reliance on local tax revenue because it appears to perpetuate a cycle of poverty and inhibits social mobility. Many people who can afford to send their own children to private schools can see no reason to pay more in local property taxes to support public education. Unless everyone were to become enlightened enough to see the broader social implications of this mindset, nothing will likely change this pervasive attitude. Continued reliance on local sources of revenue to fund public schools will cause us to move closer to a dual system of education across the nation, which can already be seen to exist in many large urban areas such as Chicago (e.g., Lipman, 2005). As Kozol (2005) so poignantly notes, educational segregation by race in the United States has been increasing since the early 1980s. Unlike the legal segregation that existed in this country

before the 1960s, the current trend is solely an economic phenomenon. To those seated in positions of power, this is simply just Adam Smith's "Invisible Hand" at work. Unfortunately, this system operates without consideration for, and independent of, any social or moral obligations to the disenfranchised members of our society.

Chapter 3

Methodology

As stated in the Purpose section of this paper, the goal of this study was to determine the extent to which Illinois public school districts' tax effort to locally fund public education is related to the racial composition of each district's student population. Racial fractionalization provides the theoretical foundation on which this primary research question is based. This type of correlational research design (Creswell, 2005) involves the calculation of both the Pearson and Spearman correlation coefficients. For pairs of variables where either of these statistics were statistically significant, further inferential statistics were calculated in order to better assess the nature of the relationship. In particular, regression analysis, analysis of variance (ANOVA), and correspondence analysis were utilized.

To further investigate statistically significant relationships, three other predictor variables were used. These were: racial percentages of students by school districts, the percent of low SES students by school district, and the ratio of nonpublic school to public school student enrollment by school district. These three variables, along with the primary predictor variable of racial fractionalization and the response variable of local tax effort, were used to address all research questions in this study. Once again, these research questions and the relevant hypotheses are as follows.

The primary research question addressed in this dissertation was: What relationship, if any, exists between Illinois public school districts' local tax effort to fund schools, and the racial diversity of students attending these districts' schools? The statistical method used to

answer this question was correlation analysis. For this question the null and alternative hypotheses are, respectively, H_0: There is no statistically significant correlation between local tax effort and the racial diversity of school districts. H_A: There is a statistically significant correlation between local tax effort and the racial diversity of school districts. In addition, multiple regression analysis was performed to determine the extent to which each of the three predictor variables (i.e., racial fractionalization index, the percent of low SES students by school district, and the ratio of nonpublic school to public school student enrollment by school district) contributed to the overall variance in the model using local tax effort as the response variable.

The five subquestions addressed in this paper are:

1. Although two school districts may have similar fractionalization indices with respect to the race of students enrolled in those particular districts, the racial composition between these districts could differ greatly. Does the specific racial composition of a school district's students affect tax effort to locally fund schools? This question was investigated by a quintile analysis of the percentage of White, Black, and Hispanic students within a school district, compared to quintiles of local tax effort.
2. Is there a statistically significant difference between the mean local revenue per pupil for White, Black, and Hispanic students when compared to the overall local revenue per pupil within the State of Illinois? This question was addressed by constructing a 95% confidence interval for the overall mean local revenue per pupil, and then determining whether or not the mean local revenue per pupil for:

White, Black, and Hispanic students fall within this confidence interval. For this question, the null and alternative hypotheses are, respectively, H_0: There is no statistically significant difference in the mean local revenue if the value falls within the 95% confidence interval for the overall mean. H_A: There is a statistically significant difference in the mean local revenue if the value falls outside the 95% confidence interval for the overall mean.

3. What effect does the proportion of *low SES* students within a school district have on a district's tax effort to fund schools? For this question, the null and alternative hypotheses are, respectively, H_0: There is no statistically significant correlation between local tax effort and the proportion of low SES students within school districts. H_A: There is a statistically significant difference between local tax effort and the proportion of low SES students within school districts.
4. What effect does the ratio of nonpublic school students to public school students within a school district have on a district's tax effort to fund schools? The null and alternative hypotheses for this question are, H_0: There is no statistically significant correlation between local tax effort and the ratio of nonpublic school students to public school students within school districts. H_A: There is a statistically significant difference between local tax effort and the ratio of nonpublic school students to public school students within school districts.
5. What is the nature of the relationship between the predictor variables? That is, what degree of correlation exists between the racial fractionalization index, the percentage of low SES students, and the ratio of nonpublic school student to

public school students within school districts. This question was examined by a correlation analysis between all statistically significant predictor variables in the final multiple regression model. For this pairwise comparison the null and alternative hypotheses were, H_0: There is no statistically significant correlation between the pair of predictor variables. H_A: There is a statistically significant difference between the pair of predictor variables. The analysis to investigate this question will also involve testing for the presence of multicollinearity between the racial percentages for White, Black, and Hispanic students.

Thus, five variables were used to examine the correlation between a school district's tax effort to locally fund public education (EFFORT), which is the response variable, and using the predictor variables: a school district's fractionalization index (FRAC), racial percentages by school district (RACE), percentage of low SES students by school district (LSES), and the ratio of nonpublic school students to public school students in a district (NONPUB).

Study Design

The unit of analysis for this study was public unit school districts. The population of interest is all Illinois public school districts, delimited to unit school districts and excluding the Chicago Public Schools District. This research did not require any type of sampling; the entire population of interest is included in this study. The overall research design will be a quantitative correlational analysis (Creswell, 2005, p.52) using the following variables, which all have a *ratio scale* of measurement (Creswell, 2005, pp.167-168). These are:

1. EFFORT is operationalized to be a district's locally generated revenue per pupil divided by the equalized assessed valuation (EAV) for that school district.
2. FRAC will be calculated for each school district using Equation 3 as defined earlier in Chapter 2. For this data, the index *i* will assume the values *i* = 1, 2, . . ., 6, because the Illinois School Report Card uses six categories to denote a student's race.
3. $RACE_i$ represents the percentage of students in each school district belonging to race *i*, where *i* is a *nominal scale* code for a student's race assigned as 1 = White, 2 = Black, 3 = Hispanic, 4 = Asian, 5 = Native American, and 6 = Multiracial, respectively.
4. LSES is a variable that denotes the percentage of each school district's low income students, operationalized as the percentage of students receiving free or reduced price lunch.
5. NONPUB represents the ratio of nonpublic school students to public school students in a school district.

Part of the analysis involved partitioning each of these variables into quintiles so crosstabulation data could be examined. To do this, ordinal categorical variables (Creswell, 2005, p.167) were created for each of the above named variables. For the variable RACE, there were actually six ordinal variables created; one for each of the six races reported on the Illinois School Report Card data.

The first step was to calculate descriptive statistics (e.g., measures of central tendency and dispersion) for all variables with a brief discussion on notable characteristics of this data.

Next, the concern regarding polarization, as discussed in the literature review, was investigated by determining the relationship between the variable FRAC and the Reynal-Querol polarization index.

To address the primary research question, a scatter plot was created using FRAC on the horizontal axis and EFFORT on the vertical axis to note if any discernable pattern appeared to exist between these two variables. The nature of the relationship was then examined by modeling the data to a theoretical distribution. The model selected for this data was based on both the pattern of the scatter plot and the correlation analysis.

Then, multiple regression analyses were used to determine the best model fit of the three predictor variables on the response variable. To perform these analyses, transformations on the original variables were needed to meet assumptions of normality. These transformations will be thoroughly discussed in Chapter 4.

Throughout this study, the correlation analysis between two variables was examined by calculating both the Pearson correlation, to determine the goodness of fit for a linear model, and Spearman correlation, which measures the correlation on an ordinal by ordinal basis for continuous variables. That is, the Spearman correlation will measure the strength of the relationship between two variables without assuming any particular type of theoretical relationship (e.g., linear, quadratic, or exponential) between the variables.

To answer subquestion one regarding districts having similar values of FRAC but significantly different levels of EFFORT due to differences in the distribution in RACE, quintile distributions for the response variable EFFORT were examined. This method divides the total number of rank-ordered cases for each race into five equal-size groups, and the

quintiles for EFFORT were created within each of these groups. By constructing crosstabulation tables comparing EFFORT to the quintile distributions for White, Black, and Hispanic races, significant differences in funding effort by race may be seen. Also, correspondence analysis was also used here to further investigate the relationship between quintiles of race for White, Black, and Hispanic students with quintiles of effort. Finally, Chi Square tests for independence were performed between race quintiles for White, Black, and Hispanic students, and local tax effort quintiles. The results of the Chi Square tests were used to validate the consistency of findings from the correspondence analysis. No analysis using the remaining races of Asian, Native American, and multiracial was conducted because none of these accounted for more than fifteen percent of the student population in any school district included in this study.

To address subquestion two, a 95% confidence interval for the overall mean local revenue per pupil was constructed, and then determining whether or not the mean local revenue per pupil for: White, Black, and Hispanic students fell within this confidence interval. For those that did fall into this confidence interval, no statistically significant difference in means was found. Conversely, the particular racial mean that fell outside this confidence interval was considered to be statistically significant.

To investigate subquestions three and four, regarding the correlation between EFFORT and the two predictor variables LSES and NONPUB, respectively, scatter plots were created for the response variable EFFORT against the predictor variables LSES and NONPUB to see if these variables were better predictors of a school district's local tax effort than racial fractionalization. Analysis of these scatter plots provided graphical indications as

to which predictor variables, if any, are correlated with the response variable EFFORT. Further, calculation of both the Pearson and Spearman correlation was also examined to quantify the extent to which any of these relationships were statistically significant, and to determine if the relationship is linear or nonlinear in nature.

Further, for subquestion three, a quintile analysis similar to what was done to examine the relationship between RACE and EFFORT was performed. This consisted of dividing the total number of rank-ordered cases for LSES into five equal size groups, and within each of these groups, the quintiles for EFFORT were created. By constructing crosstabulation tables comparing EFFORT to the quintile distributions for LSES, significant differences in funding effort by LSES quintiles may be seen. This also provided the insight to create the variable $TLSES_i = |\ LSES_i$ – mean of LSES| used in the multiple regression analysis.

Next, scatter plots and correlation analysis are presented to address subquestion five, regarding the nature of the relationship between the two statistically significant predictor variables, FRAC and NONPUB, in the multiple regression analysis. The final analysis involved testing for any multicollinearity for the predictor variable RACE between the percentages of White, Black, and Hispanic students.

Data Collection

All data used in this study are from two sources. The first was the *2009 Illinois School Report Card* data, which was summarized at the school district level of reporting and obtained from Dr. Shuwan Chiu, Principal Consultant for Data Analysis at the Illinois State Board of Education (ISBE). The second data file, containing the data for 2009 nonpublic regular

education student attendance by public school district, was also collected by the ISBE and obtained from Dr. Chiu.

The *2009 Illinois School Report Card* data, summarized at the school district level, was imported into an Excel spreadsheet format, and, to ensure the integrity of this data set, all numerical quantitative variables were summed and checked against a published copy of the 2009 Illinois State Report Card. All numerical variable values from the Excel file matched the variable values in the published copy of the 2009 Illinois State Report Card.

Next, because this study was delimited to include only unit districts in Illinois, the Excel file was sorted using the District Type code. After performing this sort, all data for the 390 unit school districts were copied into another spreadsheet. It was also confirmed through the ISBE that there were, in fact, 390 unit school district in Illinois during the 2009 school year. Three school districts were then eliminated from this set. First, the record for the City of Chicago Public Schools District was deleted based on the discussion in the delimitations section of this study. Then, two other districts' records were deleted because there was no financial data reported. This resulted in 387 unit school districts being used in this study.

The 2009 Nonpublic Regular Education K-12 school data file required a bit more labor. There are 1,135 schools listed in this file. For larger public school districts, there were multiple nonpublic schools whose enrollment was allocated to one public school district. The only common variable between this file and the 2009 Illinois State Report Card was the "District Name," so this variable was used to get the nonpublic school enrollment aligned with the appropriate public school district.

Because these data are in the public domain, no extraordinary measures were taken to safeguard it from others. On the contrary, other researchers may wish to access this data and use it to either validate or refute any conclusions drawn from this analysis.

Data Software

Given the nature of the statistical methods discussed in the Study Design section above, SPSS was the primary tool for analysis. This software package includes convenient features for creating scatter plots, and seems particularly well-suited for regression analysis, ANOVA, and hypothesis testing for correlation. It also allows for easy quintile analysis of crosstabulation tables and to represent these data graphically. All of these statistical procedures were used in this study. Also, SPSS efficiently and accurately imports Excel data files.

All correspondence analyses were calculated using STATA (version 10) statistical software. This software was needed because SPSS (GradPack 18) does not have the ability to perform such analyses.

Chapter 4

Results

This chapter presents the results of the statistical analysis outlined in Chapter 3. First, a general discussion on the characteristics of the descriptive statistics for the data is addressed. Next, the issue of polarization being a factor that may impact an analysis based on a fractionalization index was addressed. Then, the primary research question was analyzed using graphical and inferential statistics. Following this, the relevant data for each of the five subquestions were analyzed with commentary on significant findings.

Descriptive Statistics

Table 1 presents the descriptive statistics for all variables on interest for this study. As mentioned earlier, for the 2009 school year there were a total of 390 public unit school districts in Illinois. After delimiting the data set by excluding the Chicago Public Schools District record, two other unit school districts, Flanagan-Cornell District 74 and Prairie Crossing Charter School District, had to be deleted from the data set because neither of these districts' records reported any financial data. Thus, the total number of unit school districts included in this study was 387.

The response variable EFFORT had a relatively broad range based upon the existence of a few outliers. The maximum value for this variable in the data was slightly over 14 standard deviations above the mean. Although, in total there were only four school districts that had a value for EFFORT more than three standard deviations from the mean, which

represents about one percent of the school districts. Even though the values for this variable are not normally distributed, this does not seem unreasonable. For much of the following analysis, the four school districts that had values for EFFORT more than three standard deviations from the mean were excluded.

Table 1

Descriptive Statistics for all Variables

	N	Minimum	Maximum	Mean	Std. Deviation
EFFORT	387	.000001	.001775	.00007590	.000125999
FRAC	387	.000000	.720454	.16219057	.170007222
District White %	387	.00	100.00	87.5992	19.13642
District Black %	387	.00	100.00	4.6517	13.34273
District Hispanic %	387	.00	83.60	4.5023	10.35182
District Asian %	387	.00	17.70	.9455	1.86900
District Native American %	387	.00	1.80	.1643	.24319
District Multiracial %	387	.00	12.10	2.1357	1.95899
LSES	387	2.10	99.70	34.3925	16.76090
NONPUB	387	.0000	1.3236	.048849	.1107001
Valid N (listwise)	387				

For the predictor variable FRAC, there were also only about five values more than three standard deviations from the mean. Although, there are no significant outliers as the largest value was only 3.2 standard deviations above the mean.

The descriptive statistics for student enrollment by race show some interesting demographic patterns. The average unit school district in Illinois for the 2009 school year is predominantly White (almost 88%), with all other races accounting for slightly over 12% of

the student population. There were, however, a few school districts where Black or Hispanic students comprised almost the entire student population. In no school districts did Asians, Native American, or multiracial students account for a significant proportion of the student population.

One last observation regarding race is that for White, Black, and Hispanic students, the range of percentages per school district range from 0% to 100% for Whites and Blacks, and range from 0% to almost 84 % for Hispanics.

The average unit school district had a low SES student population of about 34%. But the interesting fact about this variable is the range. A few school districts had virtually no low SES students while others were close to 100%.

The ratio of nonpublic to public school enrollment by district shows that overall, about 5% of students in each school district attend nonpublic regular education schools. However, this is a limitation because only 141 of the 387 public school districts reported nonpublic enrollment within their district attendance areas. Also, the limitation placed on this NONPUB variable in Chapter 1 may account for the maximum value of this ratio being 1.3236. The interpretation of this statistic would mean there is a public school district where, within its geographical borders, approximately 1.3 students attend nonpublic schools for every 1 student who attends public schools. Although possible, this result should be viewed as skeptical without further investigation.

Polarization Issue

As mentioned in the literature review, fractionalization theory may not particularly applicable for school districts where a significant level of polarization exists for the categorical variable being fractionalized (Esteban & Ray, 2008). To determine if polarization is a problem with this data set, the variable FRAC was plotted with the corresponding values of the Reynal-Querol polarization index (RQPI) as given in Equation 4. The plot of these data are presented in Figure 1.

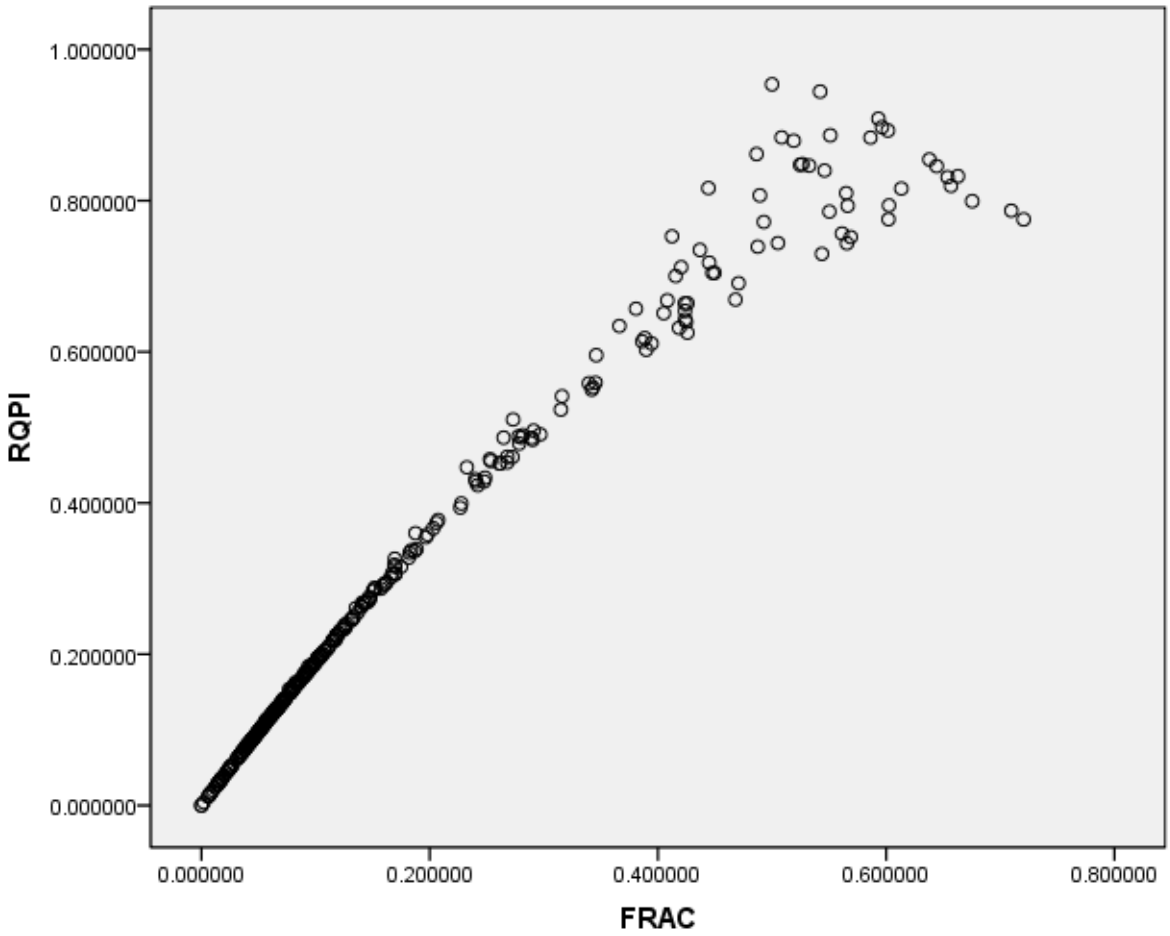

Figure1. Scatter Plot of Racial Fractionalization and Reynal-Querol Polarization Index

For these data, the correlation and the linear model fit are as shown in Table 2 and Table 3, respectively. Both the Pearson and Spearman correlations show a very strong relationship between these two variables. Further, with an R^2 value of .969, a linear model provides an excellent fit to these data. Given this, polarization does not appear to be an issue, so using a racial fractionalization index should not present any problems.

Table 2

Racial Fractionalization and Reynal-Querol Polarization Index

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval Pearson's R	.984	.003	109.909	.000[c]
Ordinal by Ordinal Spearman Correlation	.999	.000	369.709	.000[c]
N of Valid Cases	387			

[a] Not assuming the null hypothesis.

[b] Using the asymptotic standard error assuming the null hypothesis.

[c] Based on normal approximation.

Table 3

Linear Model: FRAC as Predictor, RQPI as Response

Model	R	R Square	Adjusted *R* Square	Std. Error of the Estimate
1	.984[a]	.969	.969	.043249880

Primary Research Question

The primary research question of this dissertation is: What relationship, if any, exists between Illinois public school districts' local tax effort to fund schools, and the racial diversity of students attending these districts' schools? This question will be answered by testing the null hypothesis H_0: There is no statistically significant correlation between local tax effort and the measure of racial fractionalization, against the alternative hypothesis H_A: There is a statistically significant correlation between local tax effort and the measure of racial fractionalization.

The first step to answer this question was to examine a scatter plot of these data with FRAC measured on the horizontal axis and EFFORT measured on the vertical axis. The results of this scatter plot are displayed in Figure 2. As discussed in the descriptive statistics section, there are clearly a few statistical outliers for EFFORT at the low end of the FRAC range. Although there is a large concentration of school districts at the low range of both FRAC and EFFORT, there are more districts with higher values of EFFORT in the lower range of FRAC than in the higher range of FRAC. This suggests a possible inverse relationship between local tax effort and the measure of racial fractionalization.

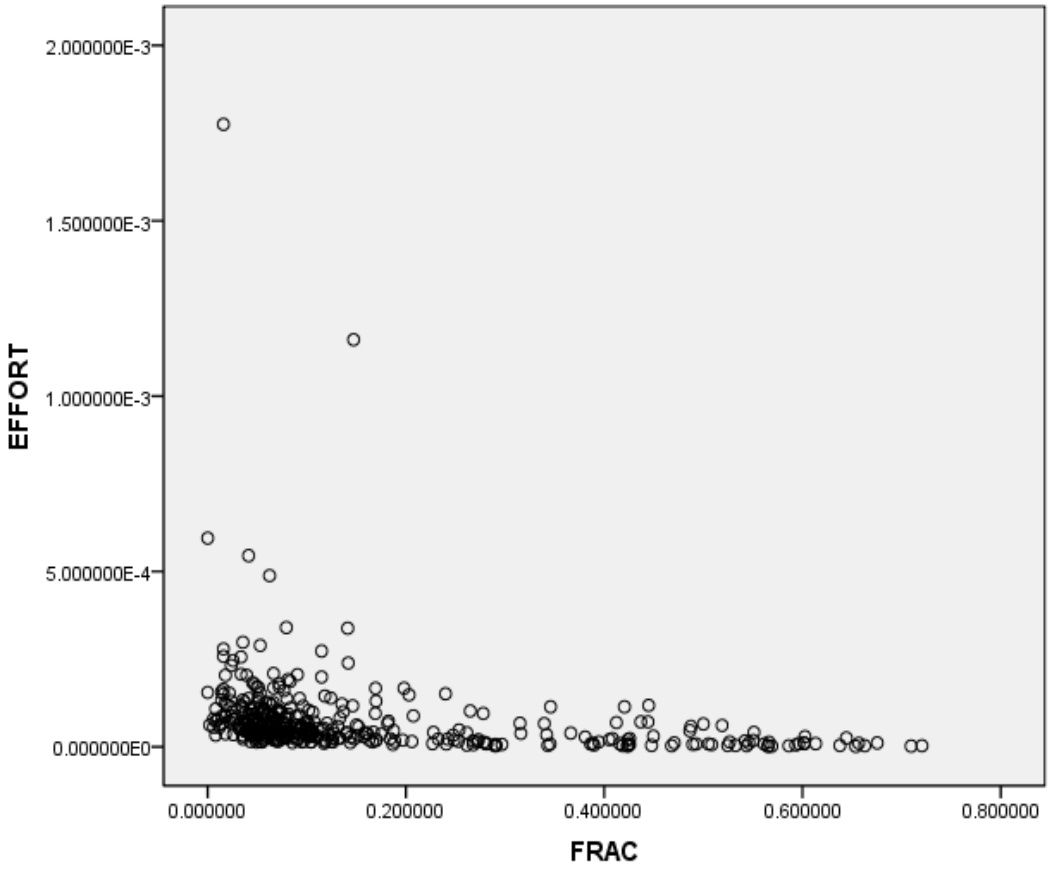

Figure 2.Scatter Plot of Racial Fractionalization and Local Tax Effort

A correlation analysis for these data are presented in Table 4, which confirms the we reject the null hypothesis with a p-value < .01 for both the Pearson and Spearman correlation. The negative sign of these two values validates the inverse nature of the correlation between these two variables. Further, the much higher value (in terms of absolute value) of the Spearman correlation suggests the relationship between FRAC and EFFORT in nonlinear.

Table 4

Racial Fractionalization and Tax Effort Correlation Analysis

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	-.248	.039	-5.025	.000[c]
Ordinal by Ordinal	Spearman Correlation	-.571	.039	-13.640	.000[c]
N of Valid Cases		387			

[a] Not assuming the null hypothesis.

[b] Using the asymptotic standard error assuming the null hypothesis.

[c] Based on normal approximation.

To ensure the nonlinearity of the relationship between these variables is an accurate assumption, the correlation was calculated again excluding the four school districts where the values of EFFORT were more than three standard deviations above the mean. The results of this analysis are listed in Table 5. As expected, the value of the Pearson coefficient significantly increased because the relationship between FRAC and EFFORT is more linear after removing the outliers. The Spearman correlation is virtually the same, and still greater than the Pearson correlation, which confirms that even after removing the outliers, the best model for the relationship between these two variables is nonlinear in nature.

Table 5

Racial Fractionalization and Tax Effort Correlation Analysis: Excluding Four Effort Outliers

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	-.397	.028	-8.454	.000[c]
Ordinal by Ordinal	Spearman Correlation	-.568	.039	-13.460	.000[c]
N of Valid Cases		383			

[a] Not assuming the null hypothesis.

[b] Using the asymptotic standard error assuming the null hypothesis.

[c] Based on normal approximation.

An assumption was then made that the nature of the relationship between these two variables may be exponential. If this assumption was valid, then the correlation between the values of the natural logarithm of the response variable EFFORT should be linearly related to the values of the predictor variable FRAC (Agresti & Finaly, 1997). This was tested and yielded a Pearson coefficient of -.648 with a p-value < .01. These results are presented in Table 6 and support a linear relationship between these two variables, which then supports the contention that an exponential relationship exists between the predictor variable of racial fractionalization and the response variable of local tax effort.

Table 6

Racial Fractionalization and the Natural Logarithm of Tax Effort Correlation Analysis: Excluding Four Effort Outliers

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval Pearson's R	-.648	.033	-16.575	.000[c]
Ordinal by Ordinal Spearman Correlation	-.568	.039	-13.457	.000[c]
N of Valid Cases	383			

[a] Not assuming the null hypothesis.

[b] Using the asymptotic standard error assuming the null hypothesis.

[c] Based on normal approximation.

Thus, a theoretical exponential model of the form

$$E(Y) = \alpha\beta^{X} \qquad (5)$$

was used where Y is the response variable EFFORT, and X is the predictor variable FRAC. The empirical data were then fit to this model using SPSS. The four outlier school districts, with respect to the variable EFFORT, were excluded from this analysis to enhance the graphical representation of this model's fit to the data. Figure 3 below displays this model.

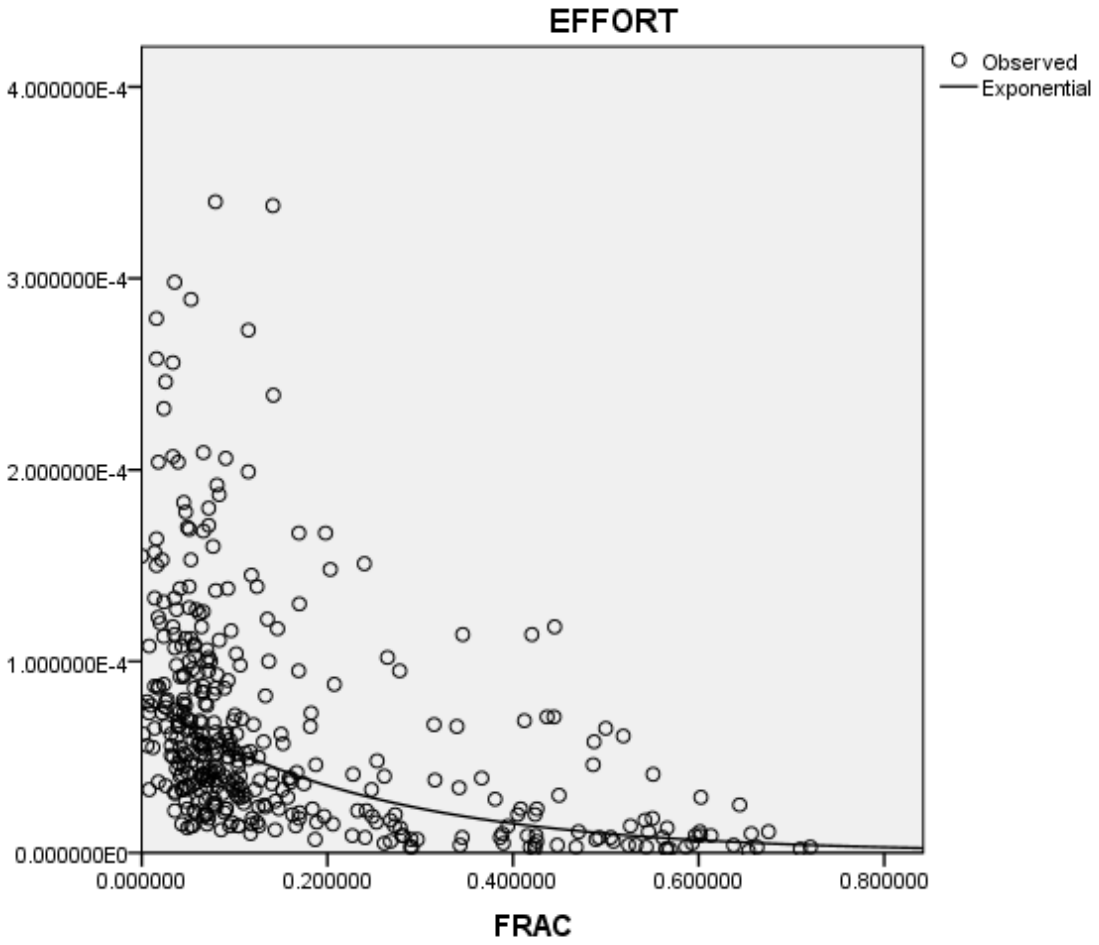

Figure 3. Exponential Model: FRAC as predictor, EFFORT as response.

The model summary and parameter estimates are listed in Table 7, and the ANOVA sum of squares data are presented in Table 8. With an R^2 value of .423, the model does not provide an ideal fit but, given a value of $\beta = -4.156$, the theoretical exponential model is a monotonically decreasing function. Relative to the nature of the relationship between racial fractionalization and local tax effort to fund public education, as the percentage of racial

fractionalization increases, local tax effort decreases. This is assuming, however, all other variables are held constant.

Table 7

Exponential Model: FRAC as Predictor, EFFORT as Response

	Model Summary					Parameter Estimates	
Equation	R Square	F	df1	df2	Sig.	Constant	b1
Exponential	.423	279.064	1	380	.000	8.060E-5	-4.156

Table 8

ANOVA for Exponential Model: FRAC as Predictor, EFFORT as Response

	Sum of Squares	df	Mean Square	F	Sig.
Regression	193.335	1	193.335	278.075	.000
Residual	264.895	381	.695		
Total	458.229	382			

A more sophisticated multiple regression model was created using the three predictor variables FRAC, TLSES, and DNONPUB where TLSES = $| LSES_i$ – mean of LSES| and DNONPUB is the dichotomized variable: DNONPUB = 0 if NONPUB = 0, and DNONPUB = 1 if NONPUB > 0. The normally distributed response variable is ln-EFFORT = the natural logarithm of the variable EFFORT (i.e., link function).

Thus, the generalized multiple regression linear model is given by

$$\text{ln-EFFORT} = b_0 + b_1*\text{FRAC} + b_2*\text{TLSES} + b_3*\text{DNONPUB} \quad (6)$$

Results of the regression are presented in Table 9 and include the unstandardized model coefficients (*B*) and associated standard errors (SE *B*), standardized regression coefficients (β), and t-statistics and significant values for the predictor variables.

R-value for the regression was significantly different from zero $F(3\ 383) = 133.71$, $p < .001$, with $R^2 = .512$ (.508 adjusted) and a 95% confidence interval from .44 to .58. The adjusted R^2 value of .508 indicates that approximately 51% of the variability in the response variable ln-EFFORT was accounted for by the three predictor variables in the model. Two predictor variables in the model were statistically significant, and their associated confidence intervals were calculated. The confidence interval for the coefficient of FRAC was -3.61 to -2.48, and the confidence interval for the coefficient of DNONPUB was -1.04 to -0.67. The squared semi-partial correlation for the predictor FRAC was .144, which indicates this variable contributed 14.4% of unique variance to the model. The squared semi-partial correlation for the predictor DNONPUB was .171, which indicates this variable contributed 17.1% of unique variance to the model. The predictor variable TLSES did not account for any statistically significant contribution to the R^2 value of this model.

The size and direction of the relationship between the significant predictor variables and the response variable ln-EFFORT suggests that LN-EFFORT decreases when values of FRAC and DNONPUB increase. In terms of the original variables, this means *lower levels* of local tax effort are associated with *higher levels* of racial fractionalization and *higher* proportions of students within a school district that attend nonpublic schools.

Table 9

Multiple Regression Results for ln-EFFORT Regressed on Predictor Variables FRAC, TLSES, and DNONPUB as Predictor, EFFORT as Response

Variable	*B*	*SE B*	*β*	*t*	p-value
TLSES	-0.002	0.004	-0.022	-0.570	.569
FRAC	-3.048	0.287	-0.457	-10.620	<.0005
NONPUB	-0.856	0.096	-0.363	-8.910	<.0005
Constant	-9.230	0.070	---	---	---

Model Summary

$F = 133.71$
$N = 387$
$R^2 = .512$
Adjusted $R^2 = .508$

Referring to Table 9, TLSES was not a significant factor. There is no linear relationship between TLSES and EFFORT, therefore a regression or correlation will not work. First, using the raw data, EFFORT and TLSES were not normally distributed, which is a requirement for regression analysis and Pearson correlation. A transformation was performed to ln-EFFORT which then became normally distributed, and this ln-EFFORT variable was used in the regression. TLSES was used in raw form in the regression. As a check, TLSES was made into a normally distributed variable via a square root transformation (i.e., sqrt-TLSES). A regression was attempted with sqrt-TLSES, DNONPUB, and FRAC on the ln-EFFORT response variable, but sqrt-TLSES was still not significant in the model ($p = .299$). The relationship between the transformed variables of sqrt-TLSES and ln-EFFORT remained nonlinear despite both transformed variables now meeting the required assumption of normality. Spearman's correlation did not show any better results. The problem is there is

no relationship between these two variables as can be seen in Figure 4. The regression and correlation test statistics support this assertion.

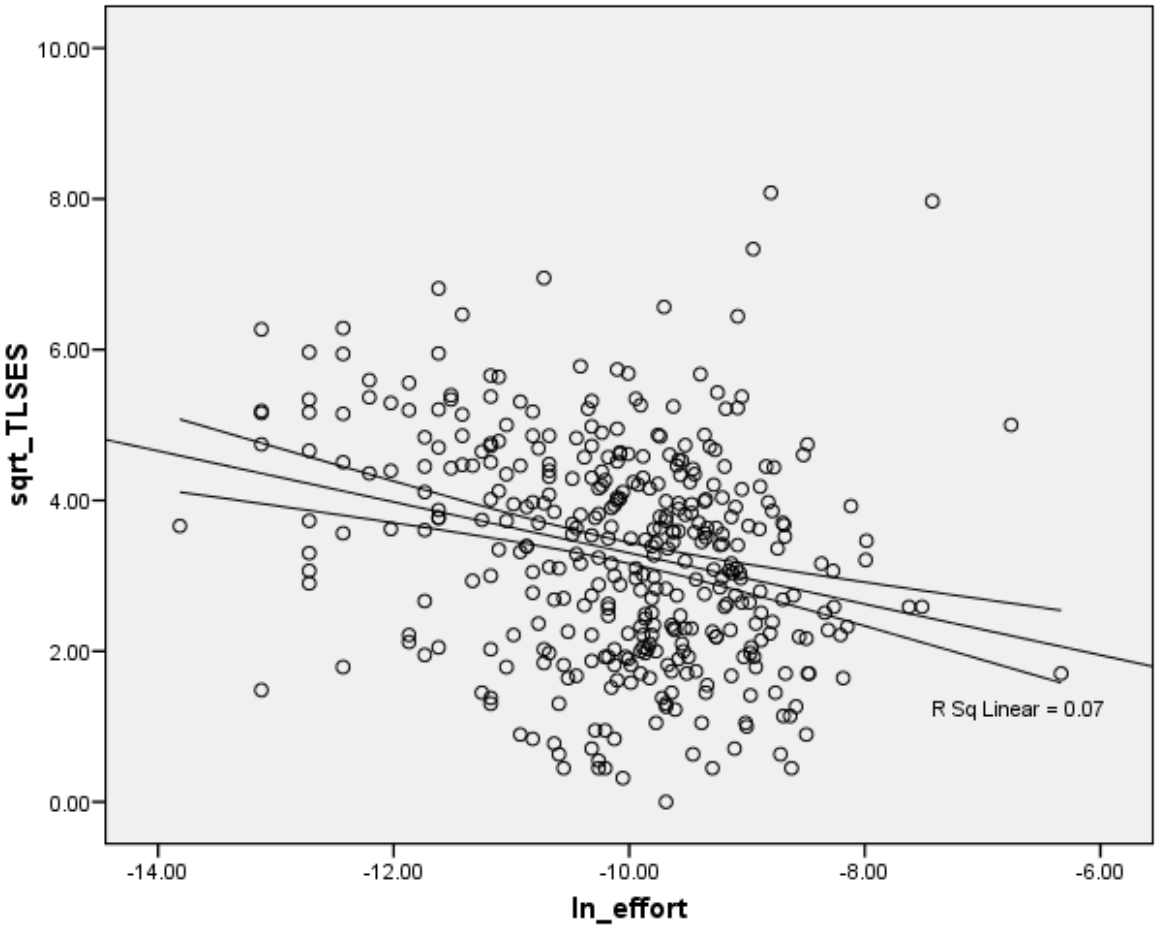

Figure 4. Scatter Plot of ln-EFFORT and sqrt-TLSES with R^2 value of 0.07.

Finally, a generalized linear model regression was performed *without* TLSES, using only FRAC and DNONPUB as predictor variables. The R^2 value was .511 (.509 adjusted) compared to the full model in Table 9, which had an R^2 value of .512 (.508 adjusted). Clearly,

the more simplistic model with only FRAC and DNONPUB as predictors accounts for the overwhelming variability due to the regression, with TLSES adding virtually nothing.

Research Subquestion 1

This section investigates subquestion 1 of this study: Although two school districts may have the same racial fractionalization index, their racial composition could differ greatly. Does the specific racial composition of a school district's students affect tax effort to locally fund schools?

To further analyze the association between race and local tax effort to fund public education, a new ordinal categorical variable named "Local Tax Effort Quintile" was created. As explained in Chapter 3, this was done by rank ordering all school districts in ascending order of their local tax effort, and labeling the lowest twenty percent of school districts with a "1", the next twenty percent with a "2", etc., with the highest twenty percent of districts having a value of "5" for the Local Tax Effort Quintile variable.

In a similar manner then, every district was ranked ordered with respect to the percentage of White, Black, and Hispanic students, and the categorical variables, White Quintile, Black Quintile, and Hispanic Quintile were created. This was not done for the Asian, Native American, or multiracial categories as each of these three races accounted for less than fifteen percent of every districts student population.

Table 10 clearly shows that the school districts in the highest quintiles of effort are also in the highest quintiles for percentage of White students. Similarly, the school districts in the lowest quintiles of effort are also in the lowest quintiles for percentage of White students.

This positive correlation is confirmed in Table 11. A Chi-Square test of independence, shown in Table 12, was performed to further investigate the relationship between White race quintiles and local tax effort quintiles. Results were statistically significant. χ^2 (16, N=387) = 171.190, $p < .001$. The analysis and crosstabulation confirm that higher levels of tax effort are related to higher proportions of White students within a school district. A visual representation of the relationship between quintiles for percentage of White students and local tax effort is shown in Figure 5.

Table 10

*White Quintile * Local Tax Effort Quintile Crosstabulation*

	Local Tax Effort Quintile					
	1	2	3	4	5	Total
White Quintile	50	10	6	6	6	78
	19	18	19	9	12	77
	6	31	14	15	11	77
	3	11	24	20	19	77
	0	7	14	27	30	78
Total	78	77	77	77	78	387

Table 11

*White Quintile * Local Tax Effort Quintile Correlation*

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.504	.041	11.463	.000[c]
Ordinal by Ordinal	Spearman Correlation	.521	.042	11.984	.000[c]
N of Valid Cases		387			

[a] Not assuming the null hypothesis.

[b] Using the asymptotic standard error assuming the null hypothesis.

[c] Based on normal approximation.

Table 12

*Chi-Square Test: White Quintile * Local Tax Effort Quintile*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	171.190[a]	16	.000
Likelihood Ratio	167.499	16	.000
Linear-by-Linear Association	98.219	1	.000
N of Valid Cases	387		

[a] 0 cells (0%) have expected count less than 5. The minimum expected count is 7.76.

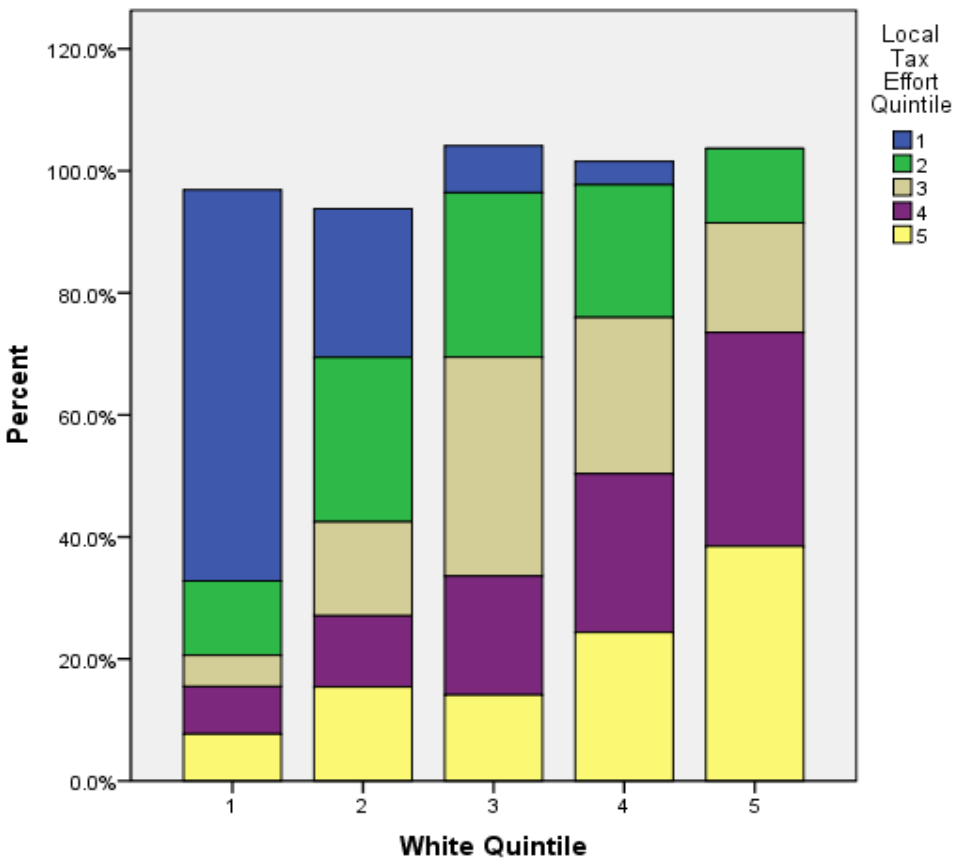

Figure 5. Stacked Local Tax Effort Quintiles by White Percentage Quintiles

The positive relationship seen between quintiles for percentage of White students and quintiles for local tax effort does not hold when we look at a similar analysis for Black and Hispanic students. Looking first at the relationship between quintiles for percentage of Black students against quintiles for tax effort, a very different pattern emerges. Table 13 shows the crosstabulation for this data, and Table 14 confirms the inverse relationship between these variables with a statistically significant negative correlation. That is, the school districts with the highest percentages of Black students have the lowest tax effort. Conversely, the school districts with the lowest percentages of Black students have the highest tax effort. A Chi-

Square test of independence, shown in Table 15, was performed to further investigate the relationship between Black race quintiles and local tax effort quintiles. Results were statistically significant. χ^2 (16, N=387) = 150.423, $p < .001$. The analysis and crosstabulation confirm that lower levels of tax effort are related to higher proportions of Black students within a school district. A visual representation of the relationship between quintiles for percentage of Black students and local tax effort is shown in Figure 6.

Table 13

*Black Quintile * Local Tax Effort Quintile Crosstabulation*

	Local Tax Effort Quintile					
	1	2	3	4	5	Total
Black Quintile	3	15	11	20	29	78
	5	10	15	32	15	77
	9	18	26	12	12	77
	14	17	23	8	15	77
	47	17	2	5	7	78
Total	78	77	77	77	78	387

Table 14

*Black Quintile * Local Tax Effort Quintile Correlation*

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	-.440	.045	-9.622	.000[c]
Ordinal by Ordinal	Spearman Correlation	-.452	.045	-9.953	.000[c]
N of Valid Cases		387			

[a] Not assuming the null hypothesis.

[b] Using the asymptotic standard error assuming the null hypothesis.

[c] Based on normal approximation.

Table 15

*Chi-Square Test: Black Quintile * Local Tax Effort Quintile*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	150.423[a]	16	.000
Likelihood Ratio	136.375	16	.000
Linear-by-Linear Association	72.825	1	.000
N of Valid Cases	387		

[a] 0 cells (0%) have expected count less than 5. The minimum expected count is 7.76.

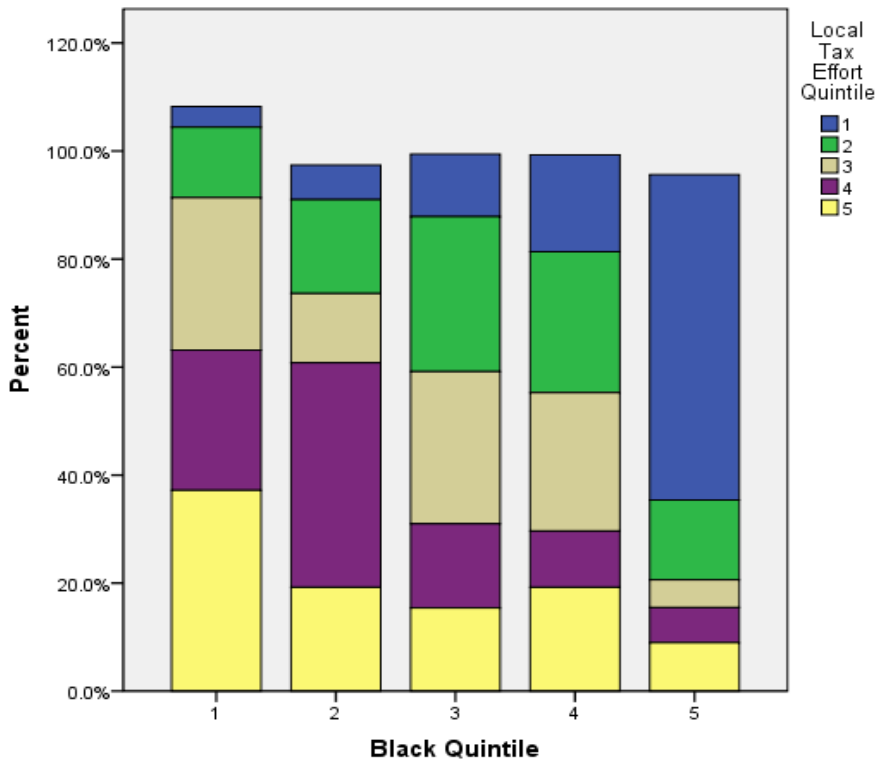

Figure 6. Stacked Local Tax Effort Quintiles by Black Percentage Quintiles

Examining the relationship between quintiles for percentage of Hispanic students and quintiles for tax effort, the pattern is quite similar to that seen for Black students. Table 16 shows the crosstabulation for this data, and Table 17 confirms the inverse relationship between these variables with a statistically significant negative correlation. Similar to the results seen in the analysis for Black students and local tax effort, the school districts with the highest percentages of Hispanic students have the lowest tax effort. Again conversely, the school districts with the lowest percentages of Hispanic students have the highest tax effort. A Chi-Square test of independence, shown in Table 18, was performed to further investigate the relationship between Hispanic race quintiles and local tax effort quintiles. Results were

statistically significant. χ^2 (16, N=387) = 158.948, $p < .001$. The analysis and crosstabulation confirm that lower levels of tax effort are related to higher proportions of Hispanics students within a school district. A visual representation of the relationship between quintiles for percentage of Hispanic students and local tax effort is shown in Figure 7.

Table 16

*Hispanic Quintile * Local TaxEffort Quintile Crosstabulation*

		Local Tax Effort Quintile					
		1	2	3	4	5	Total
Hispanic Quintile	1	0	11	9	26	32	78
	2	1	9	31	20	16	77
	3	10	24	17	10	16	77
	4	20	17	18	14	8	77
	5	47	16	2	7	6	78
Total		78	77	77	77	78	387

Table 17

*Hispanic Quintile * Local Tax Effort Quintile Correlation*

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	-.498	.040	-11.272	.000[c]
Ordinal by Ordinal	Spearman Correlation	-.515	.040	-11.793	.000[c]
N of Valid Cases		387			

[a] Not assuming the null hypothesis.

[b] Using the asymptotic standard error assuming the null hypothesis.

[c] Based on normal approximation.

Table 18

*Chi-Square Test: Hispanic Quintile * Local Tax Effort Quintile*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	158.948[a]	16	.000
Likelihood Ratio	164.503	16	.000
Linear-by-Linear Association	95.785	1	.000
N of Valid Cases	387		

[a]0 cells (0%) have expected count less than 5. The minimum expected count is 7.76.

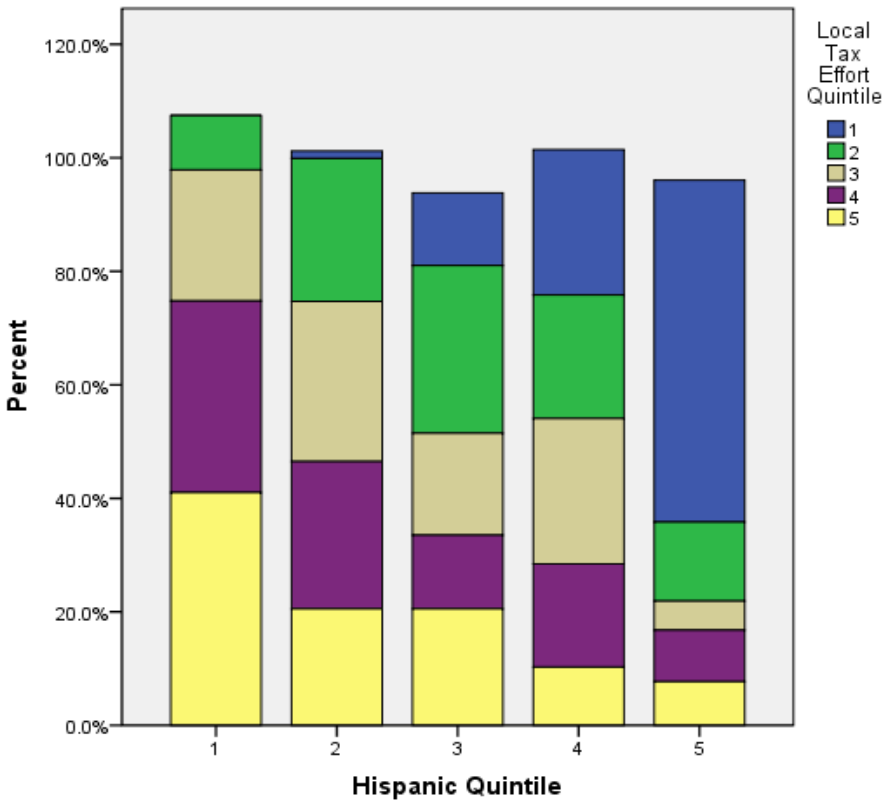

Figure 7. Stacked Local Tax Effort Quintiles by Hispanic Percentage Quintiles

Given the descriptive statistics, which show that Whites constitute 87% of the total unit school district student population, it seems plausible that the range of percentages within each quintile for White, Black, and Hispanic students may vary widely. Table 19 shows the results of this analysis.

Table 19

The Percentile Range by Quintiles for Whites, Blacks, and Hispanics

	Q1	Q2	Q3	Q4	Q5
White	0.0-84.1	84.2-94.2	94.3-96.3	96.4-97.6	97.7-100.0
Black	0.0-0.2	0.2-0.6	0.6-1.0	1.0-3.0	3.0-100.0
Hispanic	0.0-0.3	0.3-0.8	0.8-1.6	1.6-4.6	4.6-100.0

Given these data, the Kruskall Wallis tests were considered for a nonparametric test equivalent to ANOVA. This could not be done for the same reason ANOVA could not be done. Each race category was defined in the dataset as a separate variable. The data have records according to district, and the race variables were related to district data. Therefore, each district could not be classified according to one race as each district contained information for all six races reported on the Illinois School Report Card.

To further confirm the results from correlation analysis and Chi-Square tests, a series of three correspondence analyses were performed for each of the three race groups classified into quintiles with the outcome of local tax effort. Results of these correspondence analyses supported the other findings. All correspondence analyses were performed in STATA v. 10.

A correspondence analysis was performed on the crosstabulation of White race quintiles with local tax effort quintiles. Results were statistically significant. χ^2 (16, N=387) = 171.190, $p < .001$. The significant finding indicated that rows and columns in this analysis were not independent, which means there is a relationship between White race quintiles and local tax effort quintiles. The analysis was two dimensional, with 98.24% of explained inertia in the model. This value indicates a very good quality of results. Figure 8 represents the biplot of White quintiles vs. local tax effort quintiles. It is noted that quintiles move in a like manner, with quintiles of similar value in close proximity to one another (i.e., 1st White quintile close to 1st local tax effort quintile, etc.). These results confirm the findings of the correlation and Chi-Square analyses.

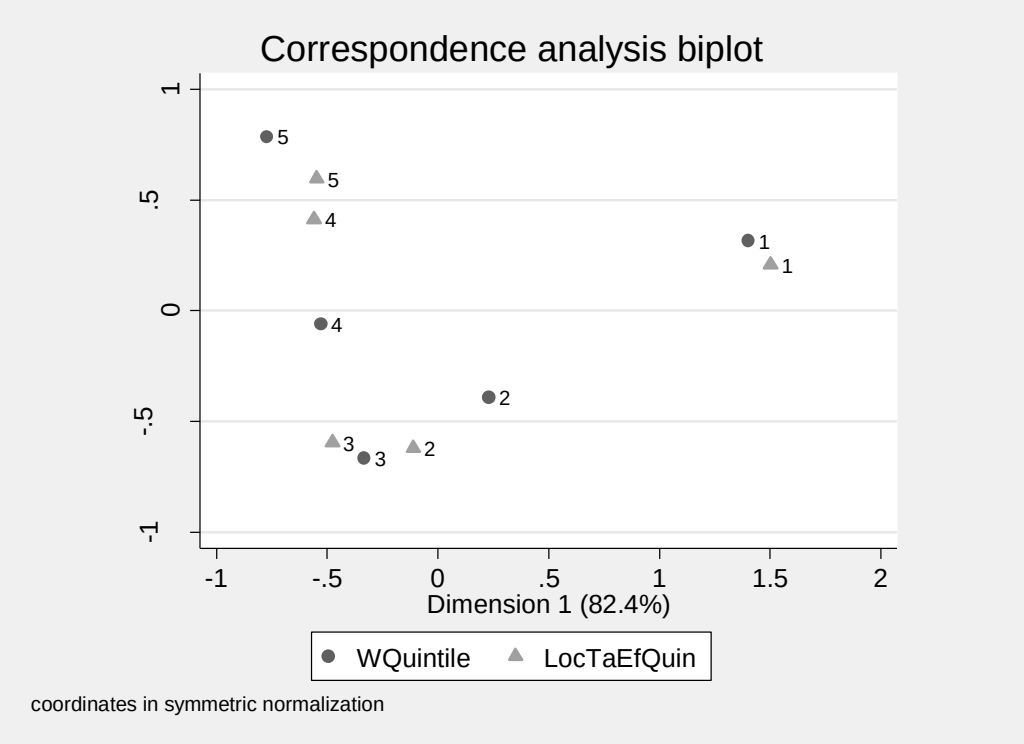

Figure 8. Correspondence Analysis Biplot of White Quintiles and Local Tax Effort Quintiles

A correspondence analysis was performed on the crosstabulation of Black race quintiles with local tax effort quintiles. Results were statistically significant. χ^2 (16, N=387) = 150.42, $p < .001$. The significant finding indicated that rows and columns in this analysis were not independent, which means there is a relationship between Black race quintiles and local tax effort quintiles. The analysis was two dimensional, with 91.04% of explained inertia in the model. This value indicates a very good quality of results. Figure 9 represents the biplot of Black quintiles vs. local tax effort quintiles. It is noted that quintiles move in an opposing manner, with quintiles of opposite value in close proximity to one another (i.e., 1st Black quintile close to 5th local tax effort quintile, etc.). These results confirm the findings of the correlation and Chi-Square analyses.

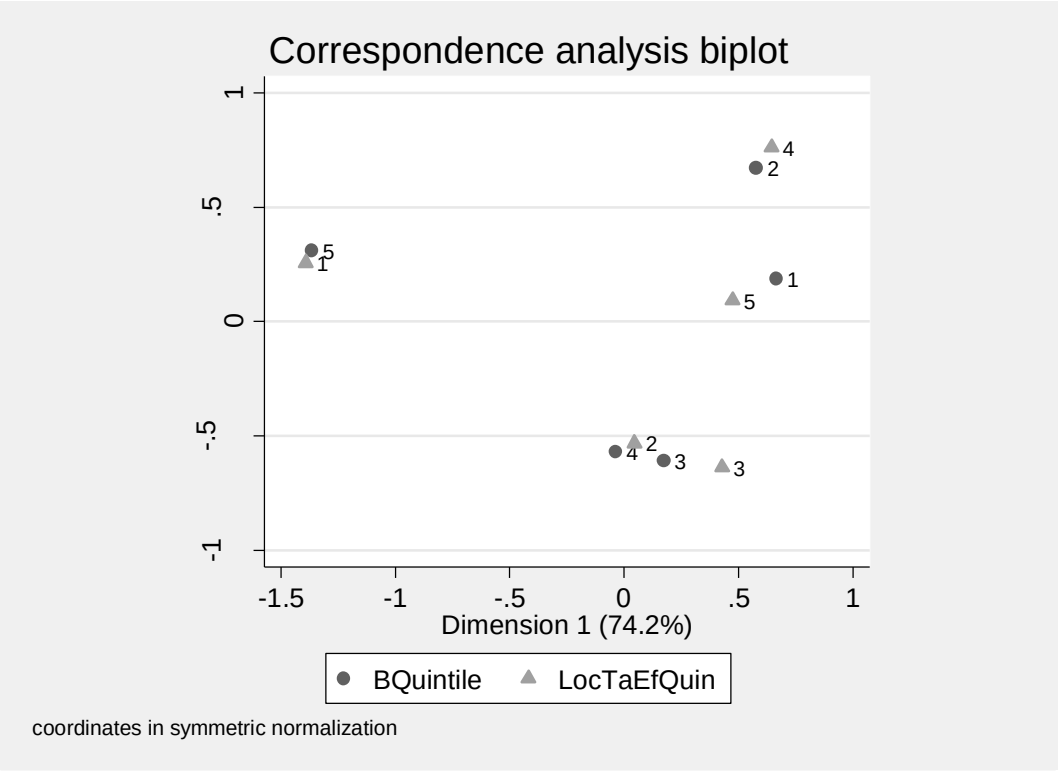

Figure 9. Correspondence Analysis Biplot of Black Quintiles and Local Tax Effort Quintiles

A correspondence analysis was performed on the crosstabulation of Hispanic race quintiles with local tax effort quintiles. Results were statistically significant. χ^2 (16, N=387) = 158.95, $p < .001$. The significant finding indicated that rows and columns in this analysis were not independent, which means there is a relationship between Hispanic race quintiles and local tax effort quintiles. The analysis was two dimensional, with 96.78% of explained inertia in the model. This value indicates a very good quality of results. Figure 10 represents the biplot of Hispanic quintiles vs. local tax effort quintiles. It is noted that quintiles move in an opposing manner, with quintiles of opposite value in close proximity to one another (i.e., 1st Hispanic quintile close to 5th local tax effort quintile, etc.). These results confirm the findings of the correlation and Chi-Square analyses.

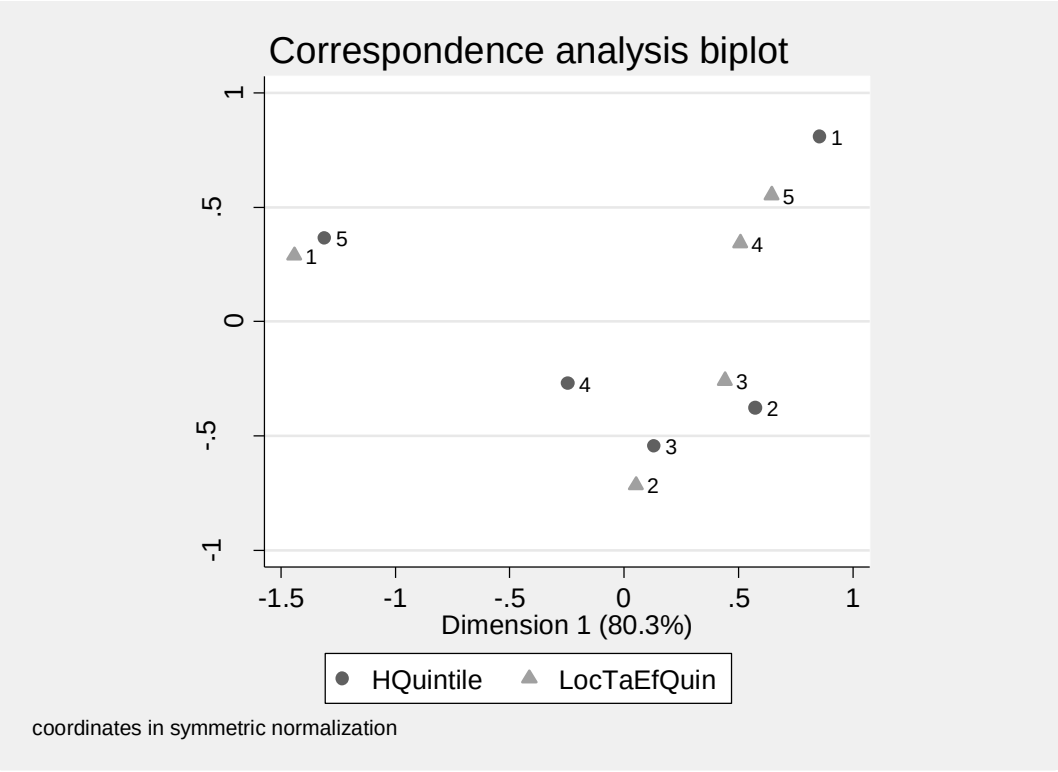

Figure 10. Correspondence Analysis Biplot of Hispanic Quintiles and Local Tax Effort Quintiles

The answer to Subquestion 1 appears quite evident. At least for White, Black, and Hispanic percentage of students, the specific racial composition of a school district's students does correlate with local tax effort to fund schools quite differently. White student percentage quintiles positively correlate with local tax effort quintiles, while Black and Hispanic student percentage quintiles negatively correlate with local tax effort quintiles.

Research Subquestion 2

This section investigates Subquestion 2 of this study: Is there a statistically significant difference by race in the overall local revenue per pupil within the State of Illinois? Table 20 displays means and standard deviations for local tax revenue per pupil overall and by White, Black, and Hispanic race categories from the 2009 Illinois School Report Card.

Table 20

Average Local Tax Revenue Per Pupil by Race

	Mean ($)	Std. Dev. ($)
Overall	5,584	2,261
White	5,557	2,284
Black	5,159	2,248
Hispanic	5,642	2,340

The way in which the data are reported in the Illinois School Report Card does not allow for analysis using ANOVA. There is only one "tax revenue per pupil" for each school

district. Mean revenue per pupil by race was calculated by first creating six columns (one for each race category) and then simply multiplying each district's tax revenue per pupil by the number of students for each race, and entering that value into the appropriate column. Obviously, if there were no students of a particular race in a school district then the column entry for that district's race would be 0. This method appropriately weighted each cell entry for each of the six columns of data to account for the *number of students of each race* that attended each school district. Each of the six columns was then summed and divided by the total number of students for each race to arrive at the mean local revenue per pupil by race.

Theoretically, if all school districts had students from each race category, there would have been 387 x 6 = 2,322 non-zero entries in the table. Because this was not the case, there were only 1945 non-zero entries in the table. Given the format of this data then, a 95% confidence interval for the overall mean was calculated and then it was determined which race(s) mean(s) were or were not within this confidence interval. Those that fell outside this range were considered to be statistically different from the overall mean revenue per pupil.

To test if the mean for each race is significantly different from the overall mean is analogous to constructing a 95% confidence interval for the overall mean, and noting which, if any, of the means by race are outside this confidence interval.

A 95% confidence interval for the overall mean is calculated by the formula:

$$\mu \pm 1.96\ \sigma_y \tag{7}$$

where μ is the overall mean, and

$$\sigma_y = \sigma/\sqrt{n} \tag{8}$$

where σ is the overall standard deviation and n is the sample size.

Thus, 95% confidence interval for the overall mean is: $5584 ± $2261/√1945 = ($5483, $5684). The average local tax revenue per pupil for Black students is statistically significantly lower than the overall mean, while White and Hispanic average local tax revenue per pupil were not significantly different from the overall mean. One interesting anomaly from these results is that the mean local tax revenue for Hispanic students is slightly larger than the mean for White Students. Although this difference is not statistically significant, it does seem counterintuitive given the results found in the quintile analysis for effort by race.

Research Subquestion 3

This question will be analyzed in a manner similar to the primary research question. Again, subquestion 3 is: What relationship, if any, exists between the proportion of low SES students within a school district and that district's tax effort to fund schools? The first inquiry to address this question was to examine a scatter plot of these variables, and also calculate the correlational relationship between them. As can be seen in Figure 11, the outliers values for EFFORT compress the plots. So, these outliers were eliminated for the scatter plot shown in Figure 12.

As seen in Figure 12, there does not appear to be any discernable pattern. The correlation analysis for these data in Table 21 verifies there is no statistically significant linear or ordinal by ordinal relationship between these two values at the 5% level of significance. However, looking at Figure 12, it appears the concentration of school districts with the higher values of local tax effort fall in the 20% to 60% range on the percentage of low SES students in the school district. This may lend some credibility to the idea that the lowest levels of effort

are found in districts with either a large proportion of families living in poverty, or in school districts with large proportions of affluent families.

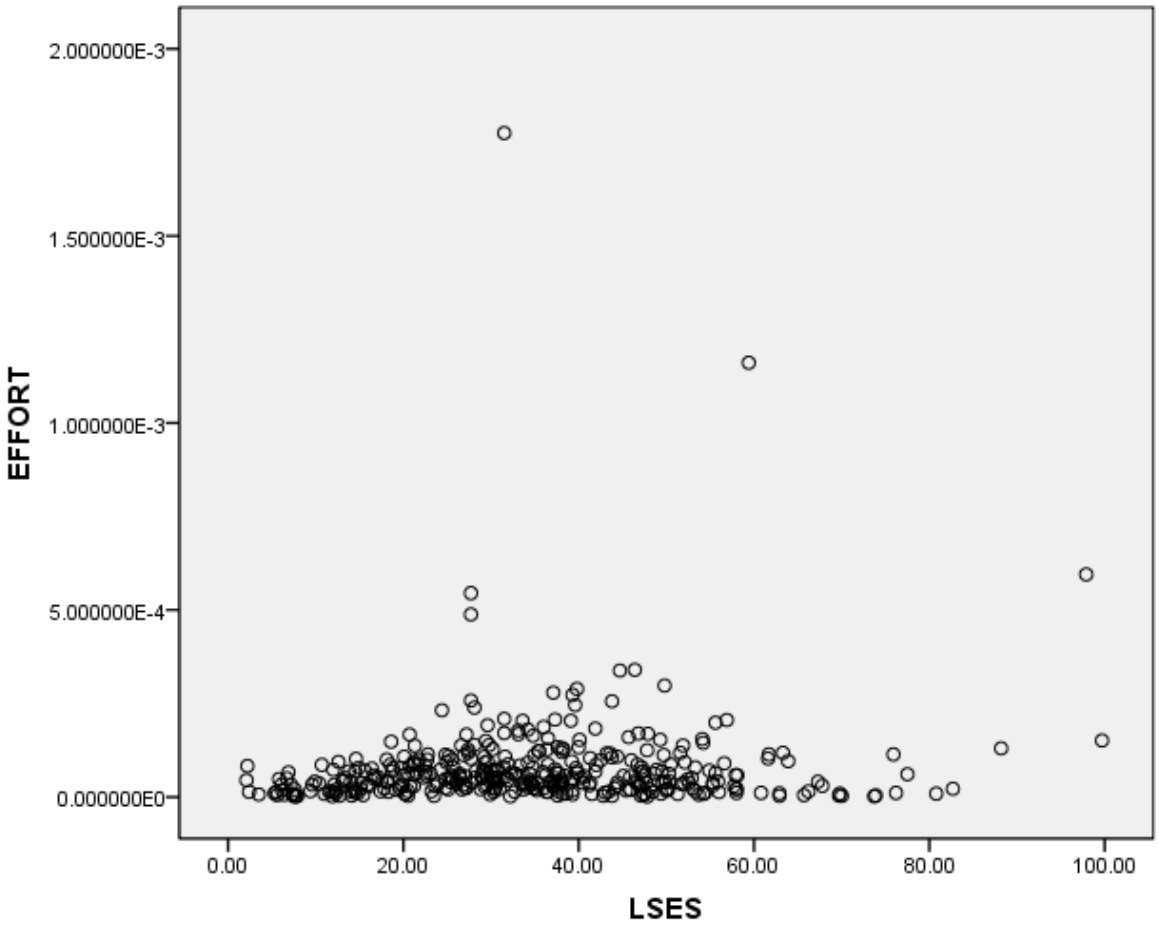

Figure 11. Scatter Plot of Percentage of Low SES and Local Tax Effort

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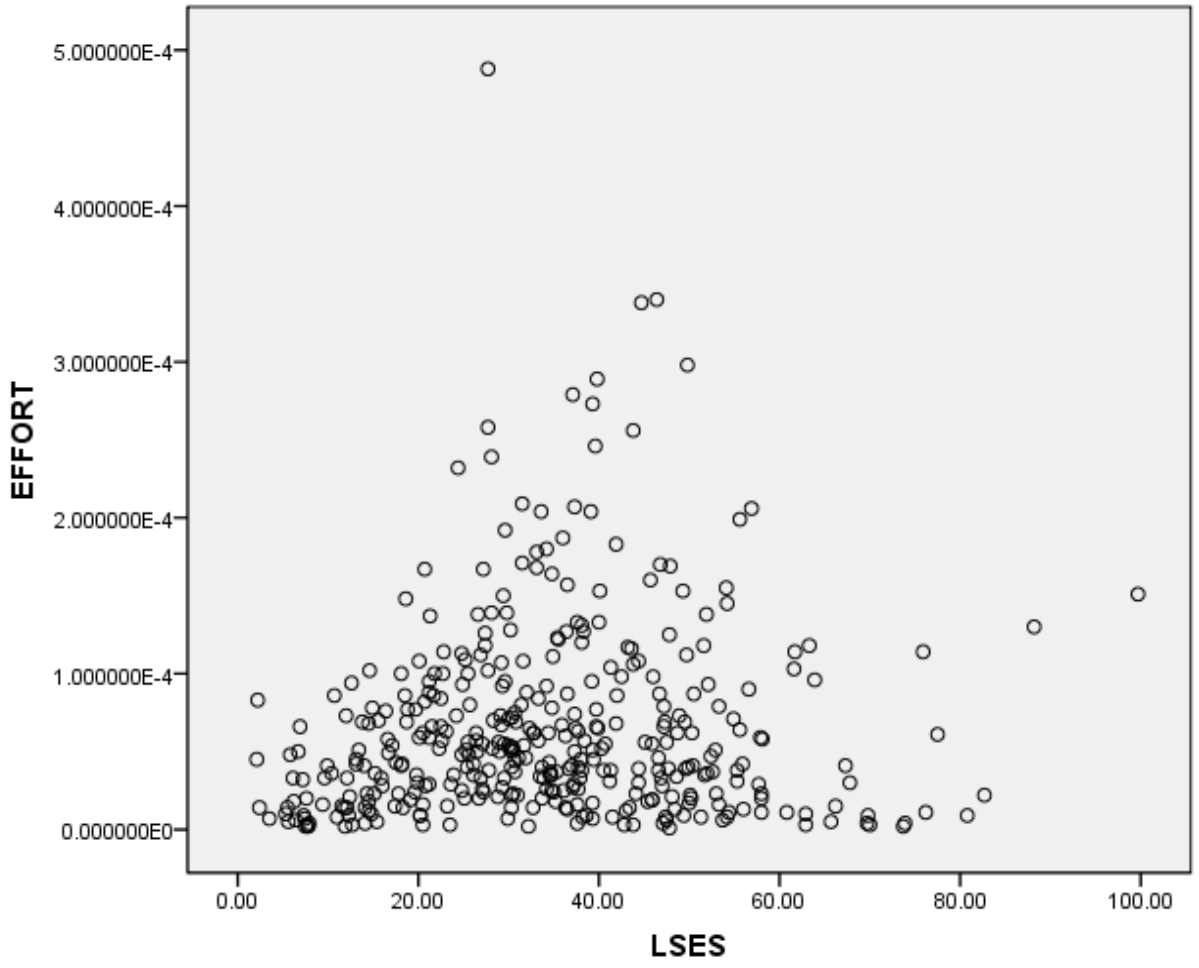

Figure 12.Scatter Plot of Percentage of Low SES and Local Tax Effort Excluding Four Outliers

Table 21

Percentage of Low SES Students and Tax Effort Correlation Analysis

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.097	.044	1.901	.058[c]
Ordinal by Ordinal	Spearman Correlation	.084	.055	1.645	.101[c]
N of Valid Cases		383			

[a] Not assuming the null hypothesis.

[b] Using the asymptotic standard error assuming the null hypothesis.

[c] Based on normal approximation.

To further investigate this relationship, a quintile analysis was performed. The crosstabulation in Table 22 does not appear to show any discernable pattern, which seems consistent with the correlation analysis shown in Table 21. Although, one observation readily seen in Table 22 is that in the first quintile for the variable Low SES, which represents the 78 unit school districts with the *lowest* percentage of students participating in the free or reduced price lunch program (i.e., the school districts with the lowest levels of poverty), only two of these districts are in the highest quintile for tax effort. The stacked bar graph in Figure 13 also shows an interesting result that is not readily seen in the Table 22. The lowest and highest quintiles for low SES contain the largest percentages of school districts that fall into the lowest quintile for tax effort.

Table 22

*District Low SES Quintile * Local Tax Effort Quintile Crosstabulation*

Count		Local Tax Effort Quintile					
		1	2	3	4	5	Total
District Low SES Quintile	1	27	17	16	16	2	78
	2	6	13	20	20	18	77
	3	7	19	16	15	20	77
	4	15	13	14	15	20	77
	5	23	15	11	11	18	78
Total		78	77	77	77	78	387

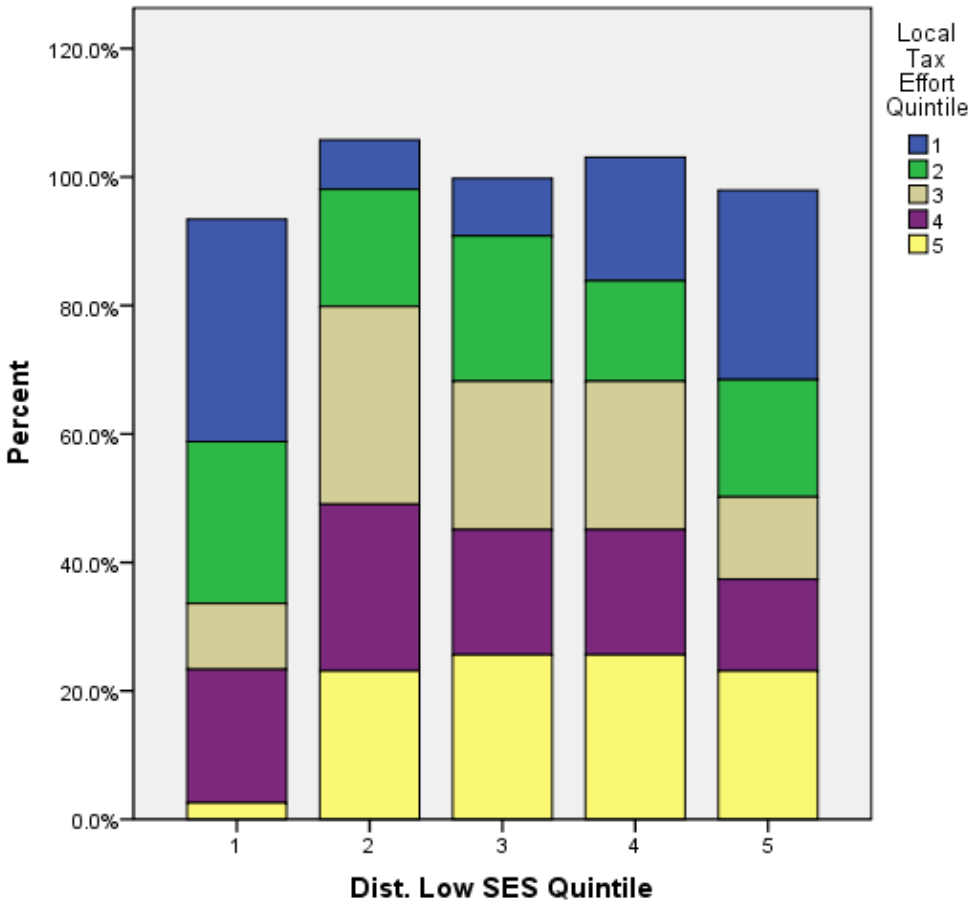

Figure 13. Stacked Local Tax Effort Quintiles by Low SES Quintiles

This observation gave rise to the idea of transforming the variable LSES into TLSES defined as $TLSES_i = | LSES_i - \text{mean of LSES}|$.

Again however, referring to Table 9, TLSES was not a significant factor. There is no linear relationship between TLSES and EFFORT, therefore a regression or correlation will not work. First, using the raw data, EFFORT and TLSES were not normally distributed, which is a requirement for regression analysis and Pearson correlation. A transformation was performed to ln-EFFORT which then became normally distributed, and this ln-EFFORT variable was used in the regression. TLSES was used in raw form in the regression. As a check, TLSES was made into a normally distributed variable via a square root transformation (i.e., sqrt-TLSES). A regression was attempted with sqrt-TLSES, DNONPUB, and FRAC on the ln-EFFORT response variable, but sqrt-TLSES was still not significant in the model (p = .299). The relationship between the transformed variables of sqrt-TLSES and ln-EFFORT remained nonlinear despite both transformed variables now meeting the required assumption of normality. Spearman's correlation did not show any better results. The problem is there is no relationship between these two variables, as can be seen in Figure 4. The regression and correlation test statistics support this assertion.

Research Subquestion 4

This Subquestion is: What effect does the ratio of nonpublic school students to public school students within a school district have on a district's tax effort to fund schools? Once again, an examination of the scatter plot between these two variables was the first step taken. Statistical outliers for these two variables, being defined as those values more than three

standard deviations from the mean, were eliminated so the graph could provide more detail. A total of seven outliers, from the 387 school districts, were identified. These data are displayed in Figure 14.

Clearly, the school districts with the largest values of local tax effort are concentrated on the value of zero for the ratio of nonpublic to public enrollment for school districts. This may indicate that school districts where all students attend public education schools put forth more effort to locally fund education. To further investigate this relationship, the output for the correlation between these two variables was calculated and is shown in Table 23.

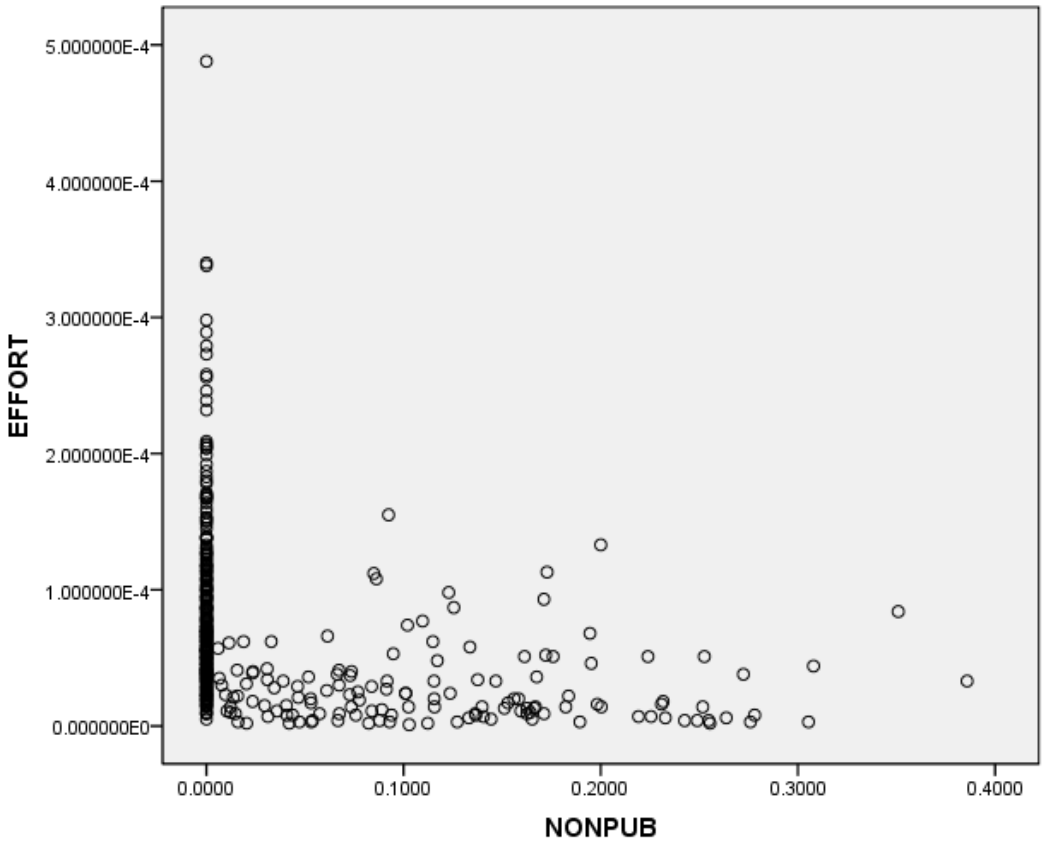

Figure 14. Scatter Plot of Ratio Nonpublic to Public School Enrollment and Local Tax Effort, Excluding Seven Outliers

Table 23

Ratio of Nonpublic to Public School Enrollment and Local Tax Effort Correlation Analysis: Excluding Seven Outliers

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	-.336	.028	-6.944	.000[c]
Ordinal by Ordinal	Spearman Correlation	-.567	.037	-13.368	.000[c]
N of Valid Cases		380			

[a] Not assuming the null hypothesis.

[b] Using the asymptotic standard error assuming the null hypothesis.

[c] Based on normal approximation.

The Spearman correlation of -.567 is similar to the Spearman correlation between racial fractionalization and local tax effort. The Pearson correlation of -.336 shows the linear relationship between the ratio of nonpublic to public school enrollment to local tax effort is not as strong as that seen between racial fractionalization and local tax effort. However, using either the Pearson or Spearman correlation, the null hypothesis is rejected with a p-value less than .01, and conclude there is a statistically significant correlation between these two variables. However, upon examining Figure 14, it does not appear the nature of the relationship is linear even though the Pearson correlation is statistically significant.

Of the 380 school districts included in this analysis, 242 had a ratio of nonpublic to public school enrollment equal to zero. This implies 242 school districts had no students reported to be enrolled in nonpublic regular education schools. Also, of these 242 school districts, 107 had a value for tax effort greater than the mean of 7.59×10^{-5} for this variable, which represents 44% of these school districts. Thus, more than half of the school districts

with no students enrolled in nonpublic regular education schools put forth less local tax effort than the mean value for this variable.

To further investigate this question an independent samples *t*-test was performed with the dependent variable of ln-EFFORT and the independent grouping variable of DNONPUB with two independent groups of (a) some student attend nonpublic schools (coded as DNONPUB=1) vs. (b) all students attend public schools (DNONPUB = 0). Table 24 shows the output for this test.

Levene's test of equal variances returned a significant value ($F = 18.41$, $p < .001$). Therefore, equal variances between the two DNONPUB groups could not be considered equal. SPSS offers an adjustment to the t test statistic and associated degrees of freedom to adjust for non-equal variance, and these numbers were utilized in the results reported below. There was a significant effect for DNONPUB classification, $t(234.55) = 13.28$, $p < .001$, with the districts where all students attending public schools ($M = -9.56$, $SD = 0.82$) having significantly higher values on ln-EFFORT than districts with some students attending non-public schools ($M = -10.95$, $SD = 1.07$).

This provides compelling evidence that school districts where all students attend public schools put forth more local tax effort than school districts where some students attend nonpublic schools. Figure 15 provides a graphical representation of this conclusion.

Table 24

Independent Samples t-test for ln-EFFORT and DNONPUB

	Levene's Test for Equality of Variances		*t*-Test for Equality of Means						
								95% Confidence Interval of the Difference	
Effort	F	Sig	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	18.413	.000	14.261	385	.000	1.38443	.09708	1.19355	1.57530
Equal variances not assumed			13.278	234.548	.000	1.38443	.10426	1.17902	1.58984

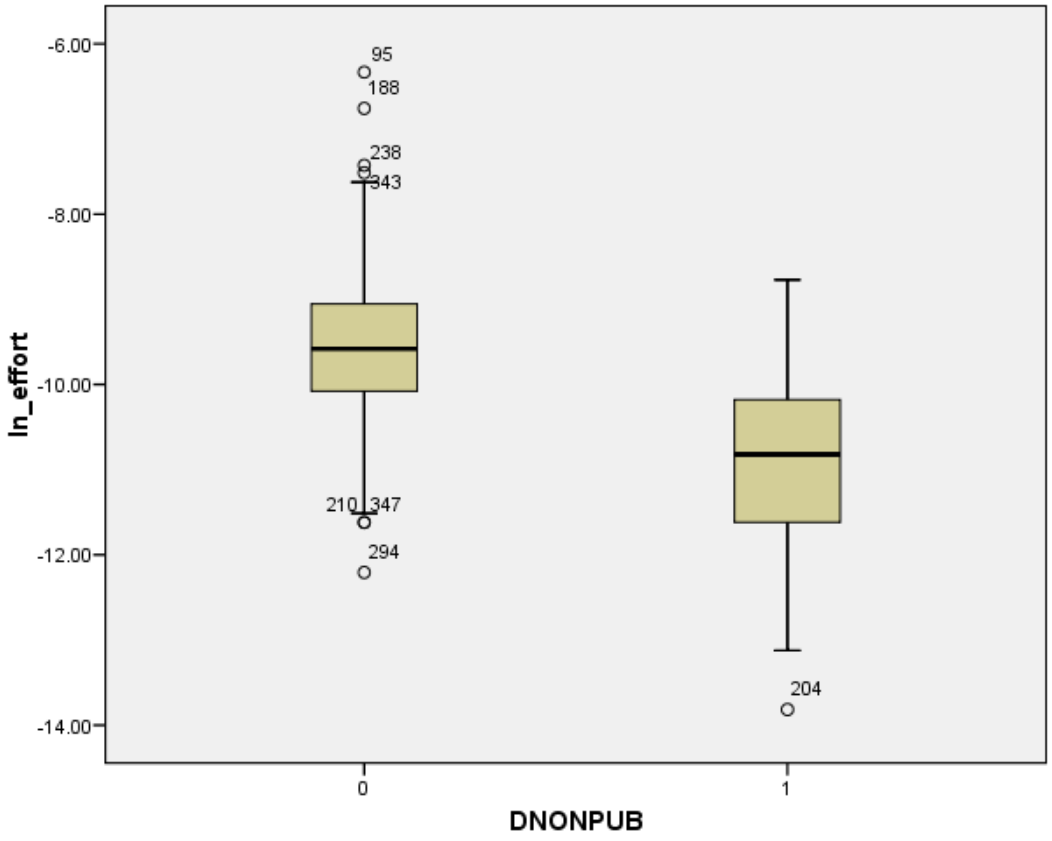

Figure 15. Boxplot of Difference in Mean of ln-EFFORT for Values of DNONPUB

Research Subquestion 5

The final subquestion to be addressed in this paper is: What is the nature of the relationship between the statistically significant predictor variables? That is, what degree of correlation exists between the racial fractionalization index and the ratio of nonpublic school student to public school students within a school district? Further, the analysis to investigate this question will also involve testing for the presence of multicollinearity between these two predictor variables, and between the racial percentages for White, Black, and Hispanic students. To begin, scatter plots for all unique pairs of these variables were created to see if any discernible patterns emerged. Then, correlation analysis was used to test the hypotheses for statistically significant relationships between each pair of variables.

FRAC and DNONPUB. The next analysis evaluates the relationship between the racial fractionalization index and the dichotomized ratio of nonpublic to public school enrollment. Table 25 shows a statistically significant relationship between these two variables with both the Pearson and Spearman correlations significant with $p < .001$. Although, it's clear from the R^2 value of .223 (.231 adjusted) in Table 26 there are no issues with multicollinearity between these two predictor variables. Figure 16 presents a boxplot for these data and the statistically significant difference in the mean values for FRAC at each of the levels of DNONPUB.

Table 25

Correlation Analysis Between FRAC and DNONPUB

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.483	.040	10.811	.000[c]
Ordinal by Ordinal	Spearman Correlation	.403	.046	8.630	.000[c]
N of Valid Cases		387			

[a]Not assuming the null hypothesis.

[b]Using the asymptotic standard error assuming the null hypothesis.

[c]Based on normal approximation.

Table 26

Linear Regression of FRAC and DNONPUB

Model Summary

Model	R	R Square	Adjusted *R* Square	Std. Error of the Estimate
1	.483[a]	.233	.231	.423

[a]Predictors: (Constant), FRAC

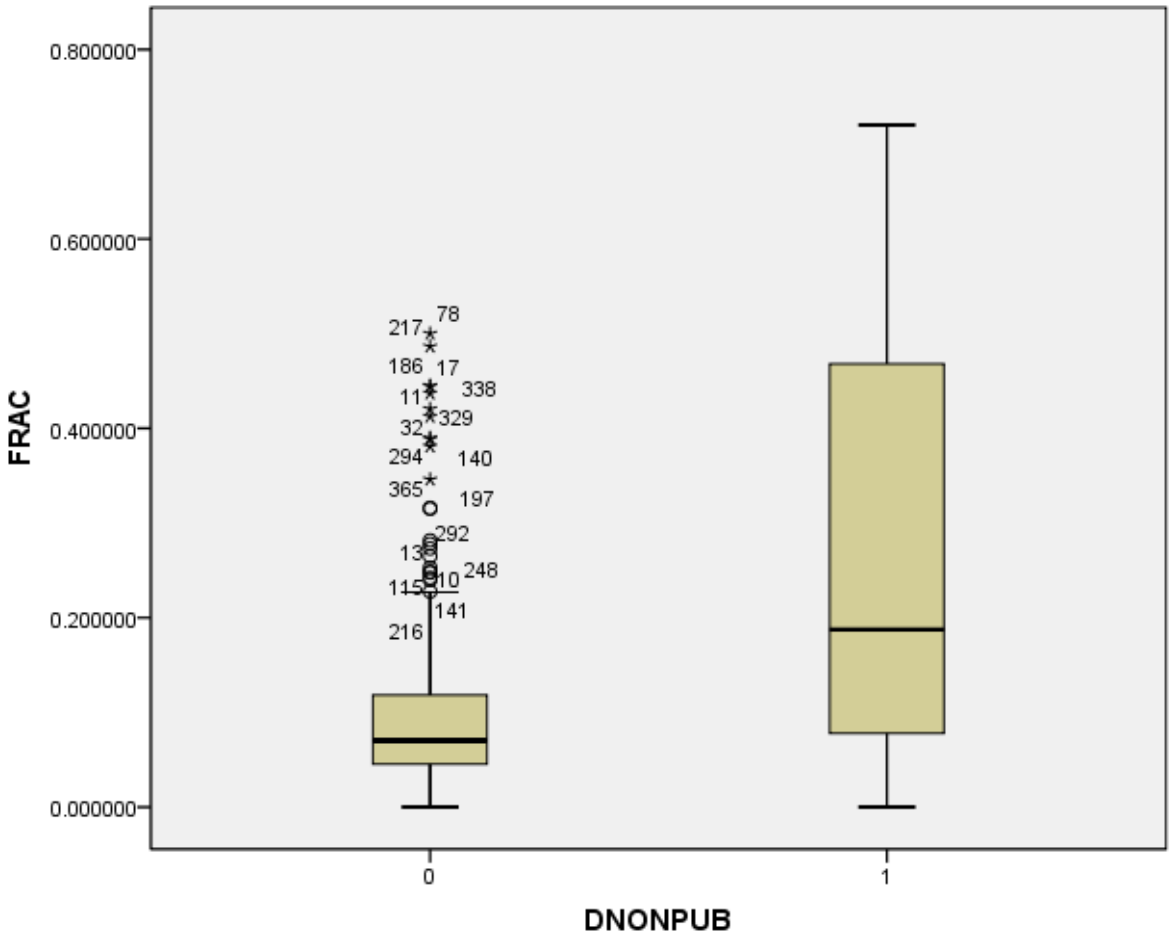

Figure 16. Boxplot of Difference in Mean of FRAC for Values of DNONPUB

Multicollinearity. The last issue to be addressed related to this subquestion will be to examine if there exists any multicollinearity between the percentage of White, Black, and Hispanic students when regressing these predictor variables on local tax effort, the response variable. According to Agresti and Finlay (1997), "A straightforward way to assess whether multicollinearity exists is to regress each explanatory variable on the others in the model. When any of the R^2 values for these equations is close to 1, multicollinearity exists" (p. 542).

The previous analyses conducted in this section have already shown no multicollinearity exists between the variables FRAC, LSES, and NONPUB. Although the variables FRAC and LSES had a linear regression association, the R^2 value was only .057 so there are no multicollinearity concerns with these variables. The other combinations of variables had no significantly significant correlation. Thus, there is no need to test for multicollinearity.

White, Black, and Hispanic. To determine if multicollinearity exist between the three RACE categories White, Black, and Hispanic, a linear association was assumed to exist between these variables. This assumption was made due to the additive nature of these percentages. That is, a very high percentage of one race within a school district necessarily requires very low percentages for the other race categories within this district. Further, because a particular percentage increase in one race requires a similar percentage decrease in the other race percentages, a simple linear relationship would seem to inherently exist.

To test for multicollinearity between the percentages of White, Black, and Hispanic students within school districts, using the Agresti and Finlay (1997) procedure mentioned above, two bivariate linear regressions were conducted. The first was a regression of the percentage of Black students on the percentage of White students, which for this model was be considered to be the response variable. The second similar linear regression involved regressing the percentage of Hispanic students on the percentage of White students. For both of these bivariate models, the R^2 values were evaluated for multicollinearity.

Table 26 and Table 27 display the relevant calculations for this analysis. Because the R^2 values for both of these linear regressions are not close to 1, no multicollinearity appears to

be present between the two pairs of variables in the bivariate models. As such, no multicollinearity exists between the percentage of Black students and the percentage of White students, nor between the percentage of Hispanic students and the percentage of White students.

Table 27

Linear Regression of Percentage of Black Students on Percentage of White Students

Model	R	R Square	Adjusted *R* Square	Std. Error of the Estimate
1	.797[a]	.634	.634	11.58456

[a] Predictors: (Constant), District Black %

Table 28

Linear Regression of Percentage of Hispanic Students on Percentage of White Students

Model	R	R Square	Adjusted *R* Square	Std. Error of the Estimate
1	.680[a]	.463	.461	14.04425

[a] Predictors: (Constant), District Hispanic %

Next, a test was conducted to determine if multicollinearity existed between the percentage of Black students and Hispanic students, when regressed on the percentage of White students, which again was considered to be the response variable. This multiple linear regression model yielded a different result, as can be seen in Table 28.

Table 29

Linear Regression of Percentage of Black and Hispanic Students on Percentage of White Students

Model	R	R Square	Adjusted *R* Square	Std. Error of the Estimate
1	.989[a]	.979	.979	2.79731

[a] Predictors: (Constant), District Hispanic %, District Black %

When the percentage of Black and Hispanic students are regressed on the percentage of White students, the R^2 value of .979 provides compelling evidence that multicollinearity exists between this combination of variables. This result, however, was not surprising. Based on the descriptive statistics presented at the beginning of this chapter, the percentage of White, Black, and Hispanic students account for approximately 96.7% of the public school student population in the State of Illinois. This fact is the reason multicollinearity exists when these three race categories are used together as predictor variables.

Fortunately, this multicollinearity did not affect any of the findings in this dissertation. The only part of this study where these three race categories were used together was in the calculation of the racial fractionalization indices. No analysis in this paper used each of these three race categories as distinct and separate predictor variables in any given regression model.

Summary of Results Chapter

This chapter investigated and displayed the results from the statistical analyses outlined in Chapter 3. The primary research question and all five subquestions were addressed

in the order in which they were first enumerated in Chapter 1. Although some brief commentary was given regarding a few conclusions that could be drawn from these results, the bulk of this discussion is addressed in Chapter 5. The data analysis conducted throughout this chapter yielded some meaningful insights into the nature of the relationships between variables, which helped to provide answers to the research questions. There were, however, a couple questions that the statistical methods used in this chapter did not adequately address. Commentary on these problematic issues is also covered in the next chapter.

Chapter 5

Discussion and Summary

The primary purpose of this study was to determine if fractionalization theory could be used as a predictor for the extent to which a community puts forth local tax effort to fund public education. Although virtually all research using fractionalization theory has been conducted on larger units of analysis (e.g., national economies or states), this study attempted to validate the same sociological and economic dynamics, which provide the rationale for a plausible causal relationship between fractionalization and public transfers within larger governmental units, are just as applicable in the micro-political context of school district governance.

Chapter 1 discussed why school districts in Illinois were particularly appropriate as the unit of analysis for this study. The percentage of local property tax revenue relied upon to fund public education in this state is one of the highest in the nation. Thus, if local property tax effort were associated with the racial fractionalization index of school districts, this could exacerbate the disparities in local tax revenue on a per pupil basis.

Next, the first chapter presented the primary research question as well as the five subquestions. These will be addressed below in the Discussion of Results section. Then, limitations and delimitations were discussed. The most significant limitation is that the results presented in this study may not be generalizable to local school funding in other states. Also, the major delimitation was this study only examined unit school districts within Illinois

excluding the Chicago Public Schools District based on its size and fiscal dependency on the City of Chicago. Finally, relevant definitions were explicitly stated at the end of Chapter 1.

The two prominent areas of research relevant to this study were discussed in the literature review in Chapter 2. The first was equity research, which included an emphasis on the concept of vertical equity. Further, a good portion of the equity research specifically addressed the problems of educational funding in Illinois. The second area of relevant research was fractionalization theory. The history and use of this theory as an explanatory variable for the macroeconomic behavior of social transfers, and the underlying sociological rationale supporting the causal relationship between these variables was discussed in detail.

The research design of this study was covered in Chapter 3. Because the overall research design was a quantitative correlational analysis, most of the hypothesis testing involved the statistical significance of both the Pearson and Spearman correlation coefficients. Formally stated, the null hypotheses were: H_0: There is no statistically significant correlation between the variables, and the alternative hypotheses were H_A: There is a statistically significant relationship between the variables. When the null hypotheses were rejected, further analysis using linear and nonlinear regression analysis, along with ANOVA, were used to gain better insight into the nature of the relationship between variables. If the null hypotheses were not rejected, a conclusion of no significant relationship between the variables was found to exist.

Chapter 3 also discussed the specific statistical methods, the statistical software used to analyze the data (SPSS and STATA), defined all variables used in the analysis, and described how each of the research questions would be addressed. This chapter concluded

with commentary about limitations of the study, especially with regard to the problematic manner in which the ISBE allocates nonpublic regular education enrollment to public school districts.

The results of the analyses conducted in this study were presented in Chapter 4 and will be summarized and discussed in the following section. Although some results provided useful insight into the nature of the relationship between a few variables, the methods used to examine the association between other variables proved to be fruitless and only served to raise more questions rather than providing answers. At a minimum, however, this provided fodder for the discussion in the Implications for Further Research section later on in this chapter.

Summary of Results

This section provides a succinct accounting of the results presented in Chapter 4. Although some commentary was offered in that chapter, more discussion is forthcoming here. As was done throughout this study, this section will address each research question in the order they were presented in Chapter 1. But first, some additional observations need to be made about the descriptive statistics presented in Table 1.

One of the most striking demographic features is that, overall, White students accounted for almost 88% of the student population in this analysis. Although one school district had literally no White students, in most other districts Whites accounted for the largest proportion of student enrollment. When looking at Figure 2, this fact manifests as a large clustering of school districts with a racial fractionalization index range between 0.0 and 0.2. In fact, 291 of the 387 school districts had a racial fractionalization index within this range.

Even though a few school districts had large proportions of either Black or Hispanic students, the proportion of Asian, Native American, and multiracial students in most districts was almost negligible. This fact influenced the extent to which some of these data were analyzed as well as the means of analysis.

Primary Research Question

The primary research question addressed in this paper was: What relationship, if any, exists between Illinois public school districts' local tax effort to fund schools, and the racial diversity of students attending these districts' schools? The first step to investigate this question was to create of these data by graphing racial fractionalization on the x-axis, and local tax effort on the y-axis. Although Figure 2 showed what appeared to be higher levels of effort at the lowest levels of fractionalization, a few outliers compressed the data. These data were graphed again after eliminating four outliers for the variable EFFORT. For this analysis, outliers were considered to be any value of a variable more than three standard deviations above/below the mean.

Eliminating the four outliers not only made the scatter plot pattern more discernable, but it also increased the value of both the Pearson and Spearman correlation as can be seen in Table 4 and Table 5. Even though the data had a statistically significant correlation for both of these statistics when run including the outliers (p-value <.01), both of these statistics had a notable increase in magnitude after excluding the outliers. Thus, the null hypothesis on no correlation was rejected. Further, from the pattern of the scatter plot and the stronger

correlation of the Spearman correlation over the Pearson correlation, a logical conclusion was the nature of the relationship between these two variables was nonlinear.

Given this information, it was found that an exponential regression model provided the best fit to this data. The empirical data and the exponential model fit to this data are displayed in Figure 3. Although the amount of variability in local tax effort accounted for by this model had an R^2 value of .423, it still provided a statistically significant fit, as shown in Table 5.

The conclusion derived from this analysis is the racial fractionalization index for a school district does have a reasonable amount of predictive power for the level of local tax effort put forth by that school district to fund public education. Also, given the reasonable fit of an exponential model to this data with a value of $\beta = -4.156$, the theoretical monotonically decreasing nature of this regression model implies an inverse relationship between these two variable. So, the answer to the primary research question is yes, there is a statistically significant inverse relationship between the level of racial diversity within a school district and that school district's local tax effort to fund public education.

This analysis was taken further to determine if a multiple regression model, using the two other predictor variables of TLSES and DNONPUB, would significantly increase the prediction on the response variable EFFORT. After determining that an assumption of normality was violated with the response variable, a transformation was made using the variable ln-EFFORT, which was then normally distributed. Using a generalized linear model it was seen that the best fit used only the predictor variables FRAC and DNONPUB. This model produced an R^2 value of .511 (.509 adjusted), which showed an inverse relationship between local tax effort to fund public education, with both the racial fractionalization index

and the dichotomized variable related to the proportion of students attending nonpublic schools.

In other words, this regression model showed a statistically significant relationship between not only local tax effort of a school district and the racial fractionalization index for that district, but also between local tax effort of a school district and the proportion of students in that district that attend nonpublic schools. In both cases, these were inverse relationships. Specifically, school districts that serve a more diverse student population, as measured by their respective racial fractionalization index, are the same school districts that put forth less local tax effort than school districts characterized by a more homogeneous student population. Similarly, school districts where at least some students attend nonpublic schools put forth less local tax effort to support public education than those school districts where all students attend public schools.

Subquestion 1. This question addressed the issue of two school districts having similar racial fractionalization indices, but different demographic composition of students with respect to race. Assuming this could occur, this analysis sought to answer: Does the specific racial composition of a school district's students affect the level of local tax effort to fund public education?

A preliminary examination of the percentage of students for each of the six race categories plotted against the local tax effort for each district yielded little information. With the exception of the percentage of White students, most school districts had very low percentages representing the other five race categories, so analyzing this data using the

continuous variables: Percentage of White Students, Percentage of Black Students, etc., did not seem reasonable.

The data for local tax effort were then sorted into ascending order, and categorized into five ordinal values with a "1" assigned to the first quintile, a "2" assigned to the second quintile, etc. This same procedure was carried out for the percentage of students by race for Whites, Blacks, and Hispanics. Because no school district had more than 17% of Asian, Native American, or multiracial students, these races were not included in this analysis.

Now, admittedly, information is lost when continuous variables are transformed into ordinal categorical variables, and this fact is accepted here. But the answer to this question is really about the concentration of each of these three races in school districts, which is not necessarily dependent on the discrete values for each observation of these variables. One must accept this premise to find this analysis valid and meaningful.

The primary conclusion drawn from Table 10, and confirmed by the correlation analysis in Table 11, is that for the percentage of White student quintiles, there is a statistically significant positive relationship with the quintiles for local tax effort. That is, school districts with the lowest percentages of White students also account for the districts in the lowest quintile for local tax effort. Similarly, the school districts with the highest percentages of White students also account for the districts in the highest quintile for local tax effort. This fact is undeniable and is represented visually in Figure 5. Both the Chi-Square test in Table 12 and subsequent correspondence analysis confirm the statistical significance of this result.

The percentage quintiles for both Black and Hispanic students provide a stark contrast to the previous results for White percentage quintiles. The converse of those results can be seen for the percentage quintiles for Black students in Table 13, with confirmation of a statistically significant negative correlation in Table 14. The data for percentage quintiles of Hispanic students has similar characteristics to those for the Black quintiles, as can be seen in Table 16, but the negative correlation is stronger for the Hispanic quintiles, as shown in Table 17. Both the Chi-Square tests for Black and Hispanic students, as seen in Tables 15 and 18, respectively, confirms these statistically significant results, as does the correspondence analyses performed on these data.

So, the data for this analysis, at a minimum, clearly shows that school districts with the highest percentage of White students are the same school districts that put forth the highest tax effort to fund schools. Conversely, the school districts with the highest percentage of Black or Hispanic students are the same school districts that put forth the lowest levels of local tax effort to fund public education.

Although, this analysis has not determined if a statistically significant difference between the mean values for the various quintiles of tax effort exists. This fact needs to be established before any claims of funding inequity by race can be shown to exist. At this point in the study, a test to determine if significant differences existed between the means of the various quintiles for local tax effort was contemplated; in particular, between the means of the first and fifth quartile of tax effort.

Unfortunately, hypothesis testing for the difference in the mean values of local tax effort between the first and fifth quintile cannot be performed to confirm whether these

differences are statistically significant. To perform this type of difference of means test, an assumption of equal variance between quintiles must be valid. Clearly, this is not the case for the percentage of race for White, Black, and Hispanic students in each school district.

As discussed in the Descriptive Statistics section of Chapter 4, for the vast majority of school districts in this study, White students represent the highest proportion of the student population in most districts. Therefore, the 78 school districts in the highest percentage quintile for White students have a much smaller measure of dispersion about their mean than do the 78 school districts in the lowest percentage quintile. The converse of this statement applies to the highest and lowest percentage quintiles for the proportion of Black and Hispanic students in unit school districts throughout Illinois. Although, given the significant relationships between quintiles by race compared to quintiles by tax effort, this is certainly an issue that warrants further investigation.

Subquestion 2. Again, this question is: Is there a statistically significant difference by race in the overall local revenue per pupil within the State of Illinois? Given the way in which the data were collected by the ISBE, there is no direct means to associate the generation of local tax revenue by race. To answer this question one must assume there were no intradistrict revenue generating disparities by race. Thus, average local tax revenue per pupil within a school district was assumed to be uniform across racial demographics.

Two interesting results were derived from this data. First, though not surprising that the average local tax revenue per Asian student was statistically significant and above the mean, the relative magnitude of this mean compared to the other races appears large.

Although, after noting in Table 1 that the total proportion of Asian students in this study is less than 1%, this result was given no further consideration.

A more disconcerting fact, especially given the conclusions drawn in the discussion above in section Subquestion 1, was that the mean local tax revenue per Hispanic student was greater than the mean local tax revenue per White student, even though neither of these were significantly different from the overall mean. This conclusion lends more credence to the statement about Subquestion 1 warranting further investigation.

Subquestion 3. This question prompted an analysis of the correlational relationship between the proportion of low SES students within a school district and that district's local tax effort to fund public education. After eliminating the same four statistical outliers for local tax effort from the data, the scatter plot in Figure 11 shows no discernible pattern. The lack of any statistically significant correlation was confirmed in Table 20. Given only this information, it is easy to dismiss the thought that any meaningful relationship exists between these two variables.

Although, knowing that research exists that supports the contention that, relative to income distributions, the middle class is more likely to support public education than the very poor or very wealthy, there may be more here than meets the eye. The scatter plot appears to show the school districts with the highest levels of local tax effort concentrated between the 20% to 60% range of low SES students.

The quintile analysis for these data provides a bit more support for this idea. The crosstabulation in Table 21 clearly shows that of the 78 school districts with lowest percentages of students participating in the free or reduced price lunch program, only two of these schools are in the highest quintile for tax effort. Further, it can be seen that the largest number of school districts in the lowest quintile for tax effort, fall into the first and fifth quintile for the percentage of low SES students. For this data then, this means the school districts in the highest and lowest quintiles for percentage of low SES students are two quintiles with the lowest level of tax effort. This observation gave rise to the idea of transforming the variable LSES into TLSES defined as $TLSES_i = | LSES_i - \text{mean of LSES}|$. But even analyzing this variable after having it distribute normally by using the transformation variable sqrt-TLSES with the variable ln-EFFORT, no meaningful relationship between these two variables could be found as evidenced by the data in Figure 4.

Subquestion 4. The question addressed here was: What effect does the ratio of nonpublic school students to public school students within a school district have on a district's tax effort to fund schools? This analysis initially proved to be a disappointment when using the variable NONPUB. By transforming this variable into the dichotomized ordinal variable DNONPUB, a much better analysis was achieved. The results of the independent samples *t*-test in Table 23 provides compelling evidence that school districts where all students attend public schools put forth more local tax effort than school districts where some students attend nonpublic schools. Figure 14 provides a graphical representation of this conclusion.

Subquestion 5. The analysis of data to answer this question offered no surprises. To this point in the study, the statistically significant predictor variables were treated as being exogenous from one another. This question addressed the extent to which the racial fractionalization index and the ratio of nonpublic school to public school enrollment co-vary with one another. The issue of multicollinearity between predictor variables was also addressed here.

For the relationship between the racial fractionalization index and the ratio of nonpublic school to public school enrollment, the results were meaningful when using the variable DNONPUB rather than NONPUB. Although, it's clear from the R^2 value of .223 (.231 adjusted) in Table 26 there are no issues with multicollinearity between these two predictor variables, there was a statistically significant correlation for both the Pearson and Spearman correlation coefficients as seen in Table 25. Figure 16 presents a boxplot for these data and the statistically significant difference in the mean values for FRAC at each of the levels of DNONPUB.

Finally, the last analysis checked for the existence of multicollinearity between the race categories White, Black, and Hispanic. Although no bivariate regression of these variables presented any evidence of multicollinearity, when a multiple linear regression model was used with the percentage of Black and Hispanic students as predictor variables, and the percentage of White students as the response variable, Table 28 showed this model had an R^2 value of .979, which is highly indicative that multicollinearity exists. Although. based on the descriptive statistics presented at the beginning of Chapter 4, the percentage of White, Black,

and Hispanic students account for approximately 96.7% of the public unit school district student population in the State of Illinois, this result is not surprising.

Results Compared to Previous Research

Many of the results found in this study are consistent with much of the literature discussed in Chapter 2. Most notably, it was concluded in Chapter 2 that minority students often receive the least amount of educational funding. From the analyses on both the primary research question and subquestion 1, this certainly is the case in Illinois. The exponential regression of local tax effort on racial fractionalization index clearly shows the more diverse a school district is, the less tax effort will be put forth to fund public education. This result is perfectly consistent with the work of Alesina and Glaeser (2004) regarding the relationship between public transfers within a state and that state's racial or ethnic composition. Although no socioeconomic causal link is being forwarded here, the correlational relationships are remarkably similar.

Another result from this study that is consistent with the literature is related to the influence of nonpublic schools. In Chapter 2 it was observed that a credible body of literature exists supporting the contention that many political and/or religious organizations are still focusing efforts at undermining the current system of public education. Again, while asserting no causal link, this study concluded that those school districts where all students attend public schools put forth significantly more local tax effort to fund public education than do those school districts where some students attend nonpublic schools. This conclusion was the direct result of dichotomizing the variable NONPUB into DNONPUB.

Synthesizing the previous two points, if one were to reside in a homogeneous community in Illinois, which, given the demographics, would most likely mean predominantly White, where there is no competition from nonpublic schools, there is a statistically significant likelihood this community would put forth more local tax effort to fund public education than a racially diverse community where ample opportunity exists to seek out nonpublic educational alternatives. In the aggregate, the body of literature reviewed in this study would support this supposition.

Now, unfortunately the same cannot be said for the results of this study between local tax effort to fund public education and the percentage of low SES students within a school district. Contrary to much of the literature, this study found no correlation between the percentage of low SES students within a school district, using the proxy of the percentage of students participating in the federal Free or Reduced Price Lunch Program, and local tax effort to fund public schools. This result was perplexing and certainly warrants further research.

Summary Statement

The intent of this section was to provide further commentary on the primary research question, and all subquestions, which was not discussed in Chapter 4. After addressing these questions in order, some broad conclusions can be made.

First, the analysis to answer the primary research question was fruitful. Not only was a statistically significant association found between the index of racial fractionalization for a school district and that district's local tax effort to fund public school, but insight was also

gained into the nature of the association. A monotonically decreasing exponential regression model provided an adequate fit to the data that accounted for over 40% of the variability, and the theorized inverse relationship between these two variables was confirmed. This supports the contention that the same sociological and economic dynamics that have been offered plausible causal links between these two variables on macroeconomic scale may also provide the same link at a micro-political level of governance.

The theoretical concept of fractionalization, with research supporting the inverse relationship between the diversity of a population and that population's willingness to support social transfers, provided a valid foundation on which to apply racial fractionalization to analyze its relationship with a school district's local tax effort within the State of Illinois. The statistically significant dynamic of local tax effort decreasing as the racial fractionalization index increased is consistent with the results of fractionalization studies discussed in the literature review, which were conducted on both an international and state-wide basis.

Further, the multiple regression analysis using local tax effort as the response variable regressed on the predictor variables of racial fractionalization and the (dichotomized) ratio of nonpublic to public school attendance yielded an R^2 value of .511 (.509 adjusted). Given the negative coefficients for both of the predictor variables in this generalized linear model, as shown in Table 9, a strong inverse relationship exists between these variables and local tax effort to fund public education. l

Although Subquestion 1 was analyzed using a transformation of data from continuous variables to ordinal categorical variables, criticism of this methodology notwithstanding, a statistically significant positive correlation was found to exist between the percentage

quintiles for the proportion of White student enrollment in a school district and that district's percentage quintile to fund public education. Conversely, a statistically significant negative correlation was found to exist between the percentage quintiles for the proportion of both Black and Hispanic student enrollment in a school district and that district's percentage quintile to fund public education. This finding would have a profound impact on funding equity by race if a statistically significant difference in the mean values of the local tax effort quintiles can be shown to exist.

Examining differences in the mean local tax revenue per pupil by race provided one expected result and one unexpected result based on the outcome of the previous subquestion. The expected result was that the mean local tax revenue per pupil for Black students was less than the mean local tax revenue per pupil overall and was statistically significant. The unexpected result was that the mean local tax revenue per pupil for Hispanic students was more than the mean local tax revenue per pupil for White students; however, neither of these means were significantly different from the overall mean local tax revenue per pupil.

No significant relationship was found to exist between a school district's percentage of low SES students and that district's local tax effort to fund public schools. Even after transforming these variables no statistically significant relationship could be found. Although, if this analysis could incorporate data regarding the income distribution of families within each school district, some meaningful insights may be forthcoming.

The analysis of the relationship between the ratio of nonpublic school to public school enrollment and local tax effort did not initially provide any meaningful results. However, after

transforming this predictor variable to a dichotomized variable, there was a statistically significant difference in local tax effort between the two values of the predictor variable.

Also, in the analysis of co-variability between the statistically significant predictor variables in this study, no significant insight was gained. The results turned out to be what one would expect given the nature of the relationships between the two significant predictor variables and the local tax effort response variable based upon the previous analyses.

This same conclusion can be made for the multicollinearity analysis between the three race categories for White, Black, and Hispanic students. Although multicollinearity was an issue when all three of these variables were included in a multiple linear regression model, this result did not affect any other analyses conducted in this study.

Implications for Further Research

The findings related to the nature of the association between racial fractionalization and local tax effort to fund public education in Illinois require further analysis. To legitimately validate that a plausible causal link exists between these variables to account for the quantitative correlation found here would likely require a qualitative study; in particular, an examination into the micro-political realm of local boards of education to determine who has the dominant voice at this level of governance, and do these individuals really have the best interests of *all* students' education at heart. Also, how accurately does the political ideology of board members reflect that of the constituents they profess to represent?

There are likely other quantitative factors affecting tax effort that have not been accounted for in this study. For example, how do changes in the State of Illinois' level of

funding for public education affect local tax effort? Depending on the level of available funding within a school district, Driscoll and Salmon (2008) have shown that well-funded school districts will use infusions of revenue from the state to supplement educational programs, while poorly funded districts may use the revenue infusion to supplant local funding to decrease the property tax rate.

As mentioned earlier, another topic for further research involves the relationship between the specific racial demographic composition of the student population and local tax effort to fund public schools. The quintile analysis in this study showed clear trends in tax effort quintiles based on the racial quintiles for White, Black, and Hispanic student percentages. These results were also verified by Chi-Square tests and correspondence analysis. What needs to be researched is if these trends systemically disadvantage students who attend school districts with a high proportion of students from a particular race.

Related to this is another area for research specific to an anomaly noted in this study. This is the fact that local tax revenue per pupil for White students was lower than the local tax revenue per pupil for Hispanic students, even though the quintile analysis showed a positive trend in tax effort for predominantly White school districts, while higher proportions of Hispanic students in a school district were related to lower levels of local tax effort.

Next, the result of the quintile analysis for the relationship between school districts' percentages of low SES students and the tax effort put forth by these districts yielded some interesting results, even though no correlational relationship between these two variables was shown to exist. Clearly, the school districts in the first and fifth quintile of low SES have the

greatest number of school districts least likely to put forth effort to fund public education. This conclusion certainly warrants further study.

Finally, with regard to the relationship between the ratio of nonpublic to public school students enrolled within a school district and this ratio's effect on local tax funding effort, the dichotomization of this continuous predictor variable clearly showed some significant results. School districts where all students attend public schools put forth significantly more local tax effort to fund public education than did those school districts where some students attend nonpublic schools. An investigation as to why this phenomenon occurs would provide considerable insight into the nature of this relationship.

Conclusion

In the State of Illinois, the correlation between the racial fractionalization index for the student population in a school district is inversely related to that community's local tax effort to fund public schools. Whether a plausible causal link between these two variables will ever be shown to exist is speculative. What is known is that local tax effort to fund schools directly affects the level of resources afforded to the children in school districts. The more dependent school districts in Illinois become on local property taxes as the primary source of revenue, the more the already egregious disparities in expenditures per pupil between school districts will continue to increase.

Further, this study has shown that higher percentage quintiles of White students are positively correlated with higher quintiles of local tax effort to fund public education. Conversely, higher percentage quintiles of Black students are negatively correlated with higher quintiles of local tax effort. The negative correlation by quintile for Hispanic students

is even more profound than that seen for Black students. Overall, this analysis provides evidence that in Illinois unit school districts with a more diverse student population, and especially those with relatively higher proportions of Black and/or Hispanic students, are the least likely to be funded by local property tax revenue due to low effort.

For the hypotheses stated in this research that were found to be valid, this does not imply funding inequities are due to a state-wide governmental conspiracy to keep marginalized children from realizing social mobility so the dominant White culture can maintain its position of power in Illinois. Rather, it may be that long-held concepts on which many states base their funding formulas for education, most notably the idea that school governance should be under local control and, concomitantly, financed locally, causes systemic inequities and decreases the likelihood that minority children and children in poverty will be afforded an education on par with their predominantly White middle and upper class peers.

Equity research cited in this study provides compelling evidence that at-risk students, most of whom are identified as such based on minority racial demographics, low SES, or lack of English language proficiency, require more resources allocated to them to attain the same educational outcomes as their middle-class White peers. This is the concept of vertical equity. The extent to which school district funding is available for at-risk students should *not* be inversely related to the proportion of these students within the school district. This is, in fact, the mechanism that perpetuates the cycle of poverty; the least amount of educational resources are afforded to the students who possess the very same characteristics that place them at risk for academic failure.

References

Agresti, A., & Finlay, B. (1997). *Statistical methods for the social sciences.* London: Prentice Hall.

Aleman, E. (2007). Situating Texas school finance in a CRT framework: How "substantially equal" yields race inequality. *Educational Administration Quarterly, 43*, 525-558.

Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S., & Wacziarg, R. (2003). Fractionalization. *Journal of Economic Growth, 8*(2), 155-194.

Alesina, A., & Glaeser, E. L. (2004). *Fighting poverty in the US and Europe: A world of difference*. New York: Oxford University Press.

Alesina, A., & La Ferrara, E. (2000). Participation in heterogeneous communities. *Quarterly Journal of Economics, 115*(3), 847-904.

Alexander, K. (2008). Public financing of religious schools: James G. Blaine and Justice Clarence Thomas's 'bigotry thesis'. *Journal of Education Finance, 34*(2), 156-178.

Alexander, K. (2008). Concepts of equity in school finance. In K. Alexander (Ed.), *Education and economic growth: Investment and distribution of financial resources* (pp. 149-163). Birmingham, AL: Linton Atlantic Books.

Alexander, K., & Alexander, M. D. (2011). *American public school law* (8th ed.). Belmont, CA: Wadsworth.

Alexander, K., & Salmon, R. G. (2007). Warranting failure: The "system" that breeds poverty and starves public schools. *Journal of Education Finance, 33*(2), 203-220.

Alexander, K., & Wall, A. F. (2006). Adequate funding of educational programs for at-risk children: An econometric application of research-based cost differentials. *Journal of Education Finance, 31*(3), 297-319.

Andrews, M., Duncombe, W., & Yinger, J. (2002). Revisiting economies of size in education: Are we any closer to consensus? *Economics of Education Review, 21*(3), 245-262.

Becker, G. S. (1993). *Human Capital: A theoretical and empirical analysis with special reference to education* (3rd ed.). Chicago: University of Chicago Press.

Chambers, J. G., Levin, J. D., & Parrish, T. B. (2006). Examining the relationship between educational outcomes and gaps in funding: An extension of the New York adequacy study. *Peabody Journal of Education, 81*(2), 1-32.

Chicago Urban League. (2008, Aug. 28). Frequently Asked Questions on Chicago Urban League Lawsuit. Retrieved from http://www.thechicagourbanleague.org

Cisneros v. Corpus Christi Independent School District, 448 F.2d 1392 (1971).

Committee for Educational Rights v. Edgar, 672 N.E. 2d 1178 (1996).

Creswell, J. W. (2005). *Educational research: Planning, conducting, and evaluating qualitative and quantitative research* (2nd ed.). Upper Saddle River NJ: Prentice Hall.

Driscoll, L. G., & Salmon, R. G. (2008). How increased state equalization aid resulted in greater disparities: An unexpected consequence for the Commonwealth of Virginia. *Journal of Education Finance, 33*(3), 238-261.

First, P. F. (2007). Financing Arizona's schools: Faltering steps towards the "good society". *Journal of Education Finance, 32*(3), 373-381.

Esteban, J., & Ray, D. (2008). Polarization, fractionalization, and conflict. *Journal of Peace Research, 45*(2), 163-182.

Galbraith, J. K. (1996). *The good society: The humane agenda.* New York: Houghton Mifflin.

Glaeser, E. L., & Saks, R. E. (2006). Corruption in America. *Journal of Public Economics, 90,* 1053-1072.

Gomez, J. C. (2008). Hope for children trapped in failing schools: The promise of Crawford v. Davy. *Peabody Journal of Education, 83*(2), 297-321.

Grubb, W. N., Goe, L., & Huerta, L. A. (2004). The unending search for equity: California policy, the "improved school finance," and the Williams case. *Teachers College Record, 106,* 2081-2101.

Illinois State Board of Education. (2008). *Illinois School Report Card.* Springfield, IL

Kozol, J. (2005). *The shame of the nation: The restoration of apartheid schooling in America.* New York: Random House.

Krathwohl, D. R. (2004). *Methods of educational and social science research* (2nd ed.). Long Grove IL: Waveland Press.

Lassen, D. D. (2007). Ethnic divisions, trust, and the size of the informal sector. *Journal of Economic Behavior & Organization, 63*(3), 423-438.

Lewis v. Spagnolo, 710 N.E. 2d 798 (1999)

Lind, J. T. (2007). Fractionalization and inter-group differences. *KYKLOS, 60,* 123-139.

Lipman, P. (2005). Metropolitan regions-new geographies of inequality in education: The Chicago metroregion case. *Globalisation, Societies & Education, 3*(2), 141-163.

Mauro, P. (1995). Corruption and growth. *Quarterly Journal of Economics, 110,* 681-712.

McGreevy, J. T. (2003). *Catholicism and American freedom.* New York: W.W. Norton.

McKinley, S. K., & Phillis, W. L. (2008). Collaboration in search of a school funding remedy post DeRolph. *Journal of Education Finance, 33*(3), 311-330.

Montalvo, J. G., & Reynal-Querol, M. (2005). Ethnic polarization, potential conflict, and civil wars. *American Economic Review, 95*(3), 796-816.

National Education Association. (2006). *Rankings & estimates: Rankings of the states 2005 and estimates of school statistics 2006* (NEA Research Publication). Washington, DC.

Pedhazur, E. J. (1997). *Multiple regression in behavioral research: Explanation and prediction.* Toronto: Wadsworth.

Psacharopoulos, G. (2006). The value of investment in education: Theory, evidence, and policy. *Journal of Education Finance, 32(*2), 113-136.

Reschovsky, A., & Imazeki, J. (1998). The development of school finance formulas to guarantee the provision of adequate education to low-income students. In W. J. Fowler (ed.) *Developments in school finance 1997* (pp. 123-148). U.S. Department of Education, National Center for Education Statistics. Washington D.C.

Rice, J. K. (2004). Equity and efficiency in school finance reform: Competing or complementary goods? *Peabody Journal of Education, 79*(3), 134-151.

Rodgers, J. (1995). An empirical study of intergenerational transmission of poverty in the United States. *Social Science Quarterly, 76*(1), 178-194.

Rodriquez, G. M. (2004). Vertical equity in school finance and the potential for increasing school responsiveness to student and staff needs. *Peabody Journal of Education, 79*(3), 7-30.

Rolle, A., & Liu, K. (2007). An empirical analysis of horizontal and vertical equity in public schools in Tennessee. *Journal of Education Finance, 32*(3), 328-351.

Rothstein, R. (2000). Equalizing education resources on behalf of disadvantaged children. In R. D. Kahlenberg (Ed.), *A notion at risk: Preserving public education as an engine for social mobility* (pp. 31-92). New York: Century Foundation Press.

Rothstein, R. (2004). *Class and schools: Using social, economic, and educational reform to close the black-white achievement gap.* New York: Economic Policy Institute & Teachers College.

Singer, A. (1999). American apartheid: Race and politics of school finance on Long Island, NY. *Equity & Excellence in Education, 32*(3), 25-36.

Stiefel, L., Schwartz, A. E., Berne, R., & Chellman, C. C. (2005). School finance court cases and disparate racial impact: The contribution of statistical analysis in New York. *Education and Urban Society, 37*(2), 151-173.

Sutton, L. C., & King, R. A. (2011). School vouchers in a climate of political change. *Journal of Education Finance, 36*(4), 244-267.

Taylor, C. L., & Hudson, M. C. (1972). *World handbook of political and social indicators.* Ann Arbor, MI: Inter-University Consortium for Political and Social Research.

Verstegen, D. A., & Driscoll, L. G. (2008). Educational opportunity: The Illinois dilemma. *Journal of Education Finance, 33*(4), 331-351.

Verstegen, D. A., Venegas, K., & Knoeppel, R. (2006). Savage inequalities revisited: Adequacy, equity, and state high court decisions. *Educational Studies, 40*(1), 60-76.

Vesely, R. S., Crampton, F. E., Obiakor, F. E., & Sapp, M. (2008). The role of states in funding education to achieve social justice. *Journal of Education Finance, 34*(1), 56-74.

Wall, A. F. (2006). Estimating the cost of adequate educational programs: The case of Illinois. *Journal of Education Finance, 32*(2), 237-263.

Welner, K. G., & Weitzman, D. Q. (2005). The soft bigotry of low expenditures. *Equity & Excellence in Education,* 38(3), 242-248.