AN HISTORICAL ANALYSIS OF POLICY DECISIONS AND THE FISCAL EQUITY OF SCHOOL FUNDING IN OHIO: 1980—2003

DISSERTATION

SUBMITTED TO

College of Education

ASHLAND UNIVERSITY

In Partial Fulfillment of the Requirements for

The Degree

Doctor of Education in Educational Leadership

Robert Frederick Hill, III, B.A., M.Ed.

ASHLAND UNIVERSITY

ASHLAND, OH

2008
A Dissertation

entitled

An Historical Analysis of Policy Decisions and the Fiscal Equity of School Funding in Ohio: 1980—2003

by

Robert Frederick Hill, III

In Partial Fulfillment of the Requirements for The Degree Doctor of Education in Educational Leadership

Carla Edlefson, Ph.D., Committee Chair Date

Larry Cook, Ph.D., Committee Member Date

John Fraas, Ph.D., Committee Member Date

David Lifer, Ph.D., Committee Member Date

Jim Van Keuren, Ph.D., Committee Member Date

Harold E. Wilson, Ph.D., Director of Doctoral Studies Date

Ann Shelly, Ph.D., Dean, College of Education Date

Wm. Gregory Gerrick, Ph.D., Dean of Graduate School Date

Ashland University
May 2008
AN HISTORICAL ANALYSIS OF POLICY DECISIONS AND THE FISCAL EQUITY OF SCHOOL FUNDING IN OHIO: 1980—2003

By

Robert Frederick Hill, III

ASHLAND UNIVERSITY, 2008

Carla Edlefson, Ph.D.

An ex-post facto approach was used to construct a history of Ohio school finance from 1980-2003 to show links between policy decisions and changes in the equity of the system. Through economic analysis, litigation analysis, and review of literature, the effect of education funding policy changes in the state of Ohio between 1980 and 2003 were examined. The research began with determination of years of major policy changes and was followed by assembly of the database, including the Adjusted Current Expenditures (ACE) for school districts in the state of Ohio. Adjusted Current Expenditures (ACE) for each school district in each year was calculated using a formula similar to the formula used by Arbogast (2005). The measures of equity chosen were the Gini coefficient and the McLoone index. The Gini coefficient and the McLoone index values were analyzed to determine if the trends in those values changed between successive time periods of the four periods marked by FYs 1980-83, 1984-91, 1992-97, and 1998-2003. The analysis was conducted using multiple linear regression models. The findings suggest that the passage of the state income tax in 1983 increased equity levels, as measured by the McLoone index. In addition, in Period 3, the equity fund increased the equity trend, as measured by the Gini coefficient and, as measured by the McLoone index of per pupil spending for Ohio school districts.
DEDICATION

To my beautiful wife Rachel, who was my guiding light throughout the process of writing this dissertation. Thank you for being there in every possible capacity and helping me reach this dream. I also want to thank my parents for supporting me throughout my many years of formal education. Without their love, guidance, and support, this would not have been possible.
ACKNOWLEDGEMENTS

I express my sincere appreciation to Dr. Carla Edlefson for her guidance throughout this entire process. I also express my sincere appreciation to Dr. John Fraas, Dr. David Lifer, and Dr. Jim Van Keuren for their guidance and insight into this study. Each member’s expansive knowledge served as a guide to further my research.
# TABLE OF CONTENTS

## CHAPTER

### I. Introduction
- Purpose and Significance of the Study ........................................... 7
- Research Methodology ................................................................. 8
- Delimitations .................................................................................. 10
- Terminology ................................................................................... 11

### II. Review of the Literature
- Litigation History ................................................................. 36
- Summary ................................................................................ 54

### III. Methodology
- Purpose of the Study ............................................................. 56
- Analytical Concepts ................................................................. 56
- Data ........................................................................................ 61
- Variables for Research Questions 1 and 2 ................................. 65
- Hypotheses .............................................................................. 67
- Summary of Methodology ...................................................... 77

### IV. Results
- Introduction ............................................................................... 78
- Results of the Analyses of the Multiple Linear Regression Models.................................................................................. 79
LIST OF TABLES

Table 1: Comparison of Pooling Options Through Modified Basic Aid Formula and By Valuation ..................................................33

Table 2: Symbol and Value Ranges for Criterion and Predictor Variables .................................................................68

Table 3: Full Model 1G and Restricted Model 1G.................................................................82

Table 4: Full Model 2G and Restricted Model 2G.................................................................83

Table 5: Full Model 3G and Restricted Model 3G.................................................................84

Table 6: Full Model 1M and Restricted Model 1M.................................................................87

Table 7: Full Model 2M and Restricted Model 2M.................................................................88

Table 8: Full Model 3M and Restricted Model 3M.................................................................89

Table 9: Full Summary of Results.........................................................................................105
LIST OF FIGURES

Figure 1: Graphical representation of the Ohio funding formula....................25
Figure 2: Gini coefficient values with best-fit lines, by period.........................80
Figure 3: McLoone index values with best-fit lines, by period..........................85
CHAPTER I

Introduction

Former president Lyndon B. Johnson, in an address before the 200th anniversary convocation at Brown University stated, “At the desk where I sit, I have learned one great truth. The answer for all our national problems—the answer for all the problems of the world—comes down to a single word. The word is ‘education’” (Bohle, 1972, p. 136). The history of public education funding in the state of Ohio serves as a unique example of the struggles that national and state governments, as well as local districts, face to provide and fund a system of education for all citizens of the United States. Ohio is of interest as a case in the history of school funding, because of the size of the state (approximate population of 11.5 million people), the large number of public districts (614), and its school finance litigation (Cincinnat i v. Walter, 1979; DeRolph IV, 2002). Thus, the purpose of this study was to construct a history of school finance from 1980-2003 to show the links between policy decisions and changes in the equity of the system. Ohio is a large and diverse state incorporating 614 k-12 public school districts in settings ranging from urban, to suburban, to rural. Total fall student enrollment in 2006-2007 was approximately 1.8 million students; total expenditures for elementary and secondary schools in 2005-2006 were approximately $15.4 billion. The Ohio Biennial budget for 2006-2007 allocated approximately 27.2% for FY2006 and 27.3% for FY2007 of the total state budget to education, compared to 27.4% for FY2004 and 27.0% for FY2005 (Ohio Office of Budget and Management, 2007). Ohio ranked 16th among the states, spending $8,632 per pupil in 2003 (Edwards, 2006).
Large differences exist among Ohio school districts in regards to ethnicity, population, median income, and land wealth. The largest district in the state, Cleveland Municipal, reported a student population of approximately 60,000 in 2006, while the smallest district, Kelley’s Island Local, reported a student population of 26 students in 2006. The state median enrollment was approximately 2,800 students (ODE, 2007). Further complicating the funding issue in the state of Ohio is the large disparity in funding between the wealthiest district and the least wealthy district. In 2005 the wealthiest district, Indian Hills, reported a per pupil assessed property valuation of $591,422, while the least wealthy, Trimble Local, reported a per pupil assessed property valuation of $40,141, a ratio of 14:1 (ODE, 2007).

Background

The school funding system in Ohio underwent many changes after the implementation of the 1975 foundation and power equalization program. The initial program required districts to levy 20 mills ($2.00 per $100) of local tax effort. The Ohio Constitution requires all millage above ten to be approved by voters through referendum. In an effort to equalize the disparities among district tax revenues due to assessed valuation, any millage between 20 and 30 was power equalized so that identical millage would raise identical funds per pupil, regardless of the property tax base or student enrollment. In 1976, House Bill 920 limited the revenue received from voted millage. The new law created a reappraisal and update cycle, specifying that a reduction in effective millage rates occur after each reassessment cycle. The reduction in millage was to yield revenue equal to the amount of revenue from the initial levy, despite increases in
real property values due to inflation (Edlefson, 1983). In 1980, Ohio voters made H.B. 920 part of the Ohio Constitution.

The Ohio foundation program continued to evolve with the elimination of the power equalization portion of the formula in 1981. By 2001, the foundation formula specified a district’s required effort as 23 mills multiplied by assessed valuation. Throughout the years, there have been additions to the formula in an effort to address issues such as special education and poverty. However, due to the limitations of H.B. 920 on property tax revenue and the rising cost of education, many districts faced constant financial concerns. In 2006, according to ODE, districts placed 4,500 different tax issues, known as levies, on the ballot, of which 2,519 passed, a dismal 55.9 percent. Most districts in Ohio needed regularly to seek voter approval of tax rates in order to maintain existing program levels.

Further complicating the issue of funding and calling for increased funds to meet growing student needs was the passage of the Federal No Child Left Behind Act of 2001 (NCLB), which marked a new era in required levels of accountability and standards for all public school districts in the United States of America. As legislation such as NCLB becomes more common, school districts in the state of Ohio will continue to seek revenue through referendum.

The high number of districts in the state of Ohio that were placed in “fiscal watch,” “fiscal caution,” and “fiscal emergency” by the state auditor, demonstrated the urgency of the problem. Ohio has traditionally had relatively strict laws requiring balanced school district budgets. Beginning in 2006, the ODE placed a district in fiscal watch when the operating deficit exceeded two percent, but was less than eight percent.
The state superintendent placed a district in fiscal caution for the following reasons, as defined in ORC 3316.031: (a) identification of fiscal practices and conditions that could lead to fiscal watch or emergency, (b) examination of the five-year forecast indicating the possibility of fiscal watch or emergency, (c) an operating budget deficit greater than two percent, but less than eight percent from the previous year, but not placed in fiscal watch by the state auditor, and (d) not making reasonable proposals to correct financial problems. Finally, district placement in fiscal emergency occurred when the certified operating deficit exceeded 15 percent of the district’s general fund revenue and the voters of the district had not passed a levy to eliminate the deficit for the following year.

According to the ODE (2007), 15 districts were in fiscal watch, 21 were in fiscal caution, and eight were in fiscal emergency for FY2006.

Ohio Litigation

Minorini and Sugarman (1999) contend that early litigation for school funding focused on the equity of school resources and educational opportunities. Maxwell and Sweetland (2002) define equity as “fairness, impartiality, justice, or anything that is fair or equitable” (p. 312).

The definition of equity differs greatly from that of adequacy, which Minorini and Sugarman (1999) suggest is the educational resources necessary to provide students with the opportunity to reach desired educational outcomes. In recent funding litigation adequacy has been defined as the appropriate level of funding per pupil required for a student to reach state accountability standards. As Minorini and Sugarman contend, truly defining adequacy requires specifying resource levels that will produce desired educational outcomes. However, the specific levels of resources cannot waste resources
unneeded for the production. The problem is determining what specific level of resources is required to reach adequate outcomes.

Ohio has had three major school finance lawsuits, challenging both the equity and adequacy of the system. The first legal challenge to the Ohio school funding system occurred in *Miller v. Korns* (1923), resulting in a definition of the “through and efficient” clause in the Ohio Constitution. *Miller* held that

A thorough system could not mean one in which part or any number of school districts of the state were starved for funds. An efficient system could not mean one in which part or any number of the school districts of the state lacked teachers, buildings, or equipment. (p. 17)

Thus, the *Miller* decision viewed equity as a system of common schools where no district needed additional resources to provide students with a common statewide education, as stipulated by the Ohio Constitution. This decision reaffirmed differences of funding levels in Ohio school districts. Due to the different amounts of revenue raised in different Ohio school districts, the Court held that it was Constitutional to disburse varying levels of funding based on the current funding formula.

The next challenge to the Ohio school finance system occurred in the case of *Cincinnati v. Walter* (1979). This case challenged the constitutionality of Ohio’s funding system based on violations of the thorough and efficient and equal protection clauses of the Ohio Constitution. The Court (*Cincinnati v. Walter*, 1979) addressed the issue of adequacy stating

The number of dollars guaranteed at the 20-mill level has been determined to be sufficient to assure that all school districts are given the means to comply with the
State Board of Education Minimum Standards, which describe a program of “high quality” pursuant to R.C. 3301.07(D). (p. 382)

Arguably, the disparities that existed were a result of the Ohio system, but the disparities were determined by the Court to be not so great as to deny a thorough and efficient program of education as set by the Ohio Constitution. Further, the Court found that preserving local control, as prescribed by the Ohio Constitution, was the reason that equal spending was not required. Maxwell and Sweetland (2002) note the extreme cost of the litigation to the Cincinnati Board of Education, as well as to the state. They further discuss that the case had little impact on any equalization efforts for the state funding system.

The third case in Ohio School funding litigation was *DeRolph v. Ohio* (*DeRolph I, DeRolph II, DeRolph III, DeRolph IV, DeRolph V*, 2003). The *DeRolph* case was filed in 1991 in the Perry County Court of Common Pleas under the oversight of Judge Linton Lewis. *DeRolph* litigation spanned nearly a decade and four Supreme Court decisions that reiterated that the Ohio funding system was unconstitutional. However, the Court relinquished jurisdiction of the case, even though the state had not reformed the system sufficiently to meet constitutional requirements.

The *DeRolph* cases serve as a strong point of reference when discussing the history of Ohio School funding. Writing for the majority in the initial Ohio Supreme Court ruling, Judge Francis Sweeney (*DeRolph I*, 1997) stated

> Today, Ohio stands at the crossroads. We must decide whether the promise of providing to our youth a free, public elementary and secondary education in a “through and efficient” system has been fulfilled. This case involves a wholesale
constitutional attack on Ohio’s system of funding public elementary and secondary education. (p. 197)

A major finding of the Court was that Ohio’s funding system relied too heavily on property taxes. Further, the disparities that existed among districts were not caused by the unwillingness of localities to pass levies, but by problems with the system itself. The final edict of the Court involved instructions to the General Assembly to create a new statewide system of funding.

The DeRolph litigation created some lasting effects for funding in the state. First, the General Assembly provided increased funds for schools, but due to the inequities caused by the heavy reliance on property taxes, the funding increases did not equalize funding in all school districts. Second, the General Assembly created the Ohio School Facilities Commission to build new school facilities in response to DeRolph. Last, the litigation serves as a guide for other states in the never-ending school funding battle. In-depth discussion of the DeRolph litigation will occur in Chapter II.

Purpose and Significance of the Study

The purpose of this study was to construct a history of school finance from 1980-2003 to show the links between policy decisions and changes in the equity of the system. Through economic analysis, litigation analysis, and review of literature, the effect of education funding policy changes in the state of Ohio between 1980 and 2003 were examined. This study of Ohio school finance over a 24-year period, describes changes in funding equity among districts, in anticipation of providing insights for improving the current system. The importance of this study is that no previous study has examined the
effects of litigation and funding policy changes over this period of the history of Ohio’s school funding formula.

Research Methodology

The research began with determination of years of major policy changes and was followed by assembly of the database, including the Adjusted Current Expenditures (ACE). Fiscal years (FY) 1980-2003 were used for this study. School finance data prior to 1980 were not comparable or attainable due to changes in state reporting methods and terminology. In Ohio, the fiscal year runs from July 1 to June 30. Fiscal year 1980 is the base line year for the study because of the availability of data. The database ended in FY 2003 because the consensus opinion in the policy-making community was that following the decision in DeRolph IV in December 2002, the state legislature no longer felt compelled to follow the mandates set forth in the DeRolph litigation. The following fiscal years affected school funding or marked a significant change to school funding in Ohio: FY 1984, FY 1992, and FY 1998.

Adjusted Current Expenditures (ACE) for each school district in each year was calculated using a formula similar to the formula used by Arbogast (2005). The following expenditure line items (defined in Chapter III) from the yearly “District Profile Report” (formerly known as the CUPP Report, ODE, 2007) for all school districts in the state were combined: (a) instruction cost; (b) pupil and instructional support cost; (c) administration cost; (d) business, central cost; (e) non-instructional cost; and (f) then federal dollars were subtracted from the total cost. The result was reported as total expenditures.
The total expenditures for each school district was divided by the Average Daily Membership (ADM) reported to the state in October of each school year, which resulted in the Adjusted Current Expenditure (ACE) amount. By completing this division, all children were considered, with each student treated as mathematically equal.

The measures of equity chosen were the Gini coefficient and the McLoone index because Berne and Stiefel (1984) recommend using more than one measure of horizontal equity. In their concluding comparison of Michigan and New York, Berne and Stiefel used the coefficient of variation because it is of interest to readers in school finance, and because empirically it resembles other measures in its group. This study used the Gini coefficient as one of the measures of horizontal equity, because it is widely used in studies of income distribution, and is familiar to many readers. Theoretically, it is akin to the coefficient of variation, and empirically, it showed similar patterns in the Berne and Stiefel data.

Further, in their analysis of New York and Michigan data, Berne and Stiefel (1984) used the McLoone index because it gives more emphasis to the bottom half of the distribution and because courts and policy makers are often interested in bringing up the bottom half of the distribution closer to the median. Additionally, both the McLoone index and the Gini coefficient are appropriate for use with nominal dollars over a period of time, because they are not affected by inflation (pp. 23-25). Statistics for the Gini coefficient and the McLoone index were calculated according to the formulas presented in Chapter III, for each year, FY 1980 through FY 2003. The results are presented in Appendix A. The research questions that guided the study were:
Research Question 1: Do the Gini Coefficient values show that improvements in equity are associated with various policy changes since 1980?

Research Question 2: Do the McLoone index values show that improvements in equity are associated with various policy changes since 1980?

The Gini coefficient and the McLoone index values discussed in the previous section formed the criterion variables. These Gini coefficient values and the McLoone index for the fiscal years 1980 through 2003 were analyzed to determine if the trends in those values changed between successive time periods of the four periods marked by FYs 1980-83, 1984-91, 1992-97, and 1998-2003. The analysis was conducted using multiple linear regression models.

Delimitations

This study dealt only with policy changes and funding equity issues in the state of Ohio. Complicating generalizability is the availability of data for the technical adjustments made to the ACE. Not all states may have similar or equal financial data available.

Berne and Stiefel (1984) suggest a delimiting factor to equity studies is the framework of the study chosen by the author. A study can focus on one of two groups of concern for funding issues, taxpayers, or children. This study chose children as the group of study by examining the ACE per pupil of each school district. Once chosen, the appropriate group may be limited by distinctions made among groups, objects of concern, equity principles applied, and the statistical measures of these principles (p. 43). Berne and Stiefel (1984) further suggest that a researcher must decide on each of these areas of study based on careful research and analysis, as opposed to value judgments (i.e.
selection of equity goals). Research can inform choices, but the value-laden questions surrounding the selection of equity goals must include input from legislatures, educators, and researchers.

The focus of this study relies on the creation of a formula for ACE. By choosing specific areas of expenditure that are common among all districts in the state of Ohio, subtracting federal funds, and dividing by the ADM, this study assumes all students are equal for analysis. However, all students are not equal. If students with special needs, who may require increased funding levels to educate them, were equally distributed among districts, the assumption of student equality would not be a problem. However, that is not the case, so the assumption of student equality is a delimitation of the study. Further, this study did not analyze facility funding in Ohio, which is a delimiting factor.

Terminology

School Finance Terms

*Average Daily Membership (ADM).* Average daily membership was the official measure Ohio used to represent the number of students in a school district for calculating state aid. Membership was measured by actual enrollment in the first full week of October (Maxwell & Sweetland, 2002).

*Allocation Formula.* The allocation formula was a mathematical formula used to determine the resources received by a particular school. In Ohio, the amount allocated was based on a school’s enrollment, a per-pupil guaranteed dollar amount, a cost-of-doing business factor, assessed valuation yield for 23 mills, and other factors (Maxwell & Sweetland, 2002).


*Categorical Aid.* In Ohio, categorical aid was funding provided by the state to school districts for specific categorical expenditures such as the following: pupil transportation, programs for the gifted, school lunches, special education programs, and vocational programs. Specific criteria had to be met in order to receive aid (Maxwell & Sweetland, 2002).

*Equal Yield Formula.* The equal yield formula was used from 1975 to 1980 to determine how much money each school district received from the state in basic program support. The formula insured that every district received a set amount of money per pupil for each mill of local support (Maxwell & Sweetland, 2002).

*Fiscal Equity.* Fiscal equity is a standard of equalization that insures that the total amount of resources available to a student is the same statewide (Maxwell & Sweetland, 2002).

*Fiscal Neutrality.* Fiscal neutrality is a negative standard stating that current operating expenditures per pupil cannot be related to a school district’s adjusted valuation per pupil (Berne & Stiefel, 1984).

*Fiscal Year.* A fiscal year is a twelve-month period with a starting date selected by the state and used as the period to be covered by the budget. In Ohio, the fiscal year started on July 1 and ran through June 30 (Maxwell & Sweetland, 2002).

*Mill.* The mill is the basic unit for computing local property taxes and is equivalent to one tenth of a cent (Maxwell & Sweetland, 2002).
CHAPTER II

Review of the Literature

It is appropriate to develop briefly a national historical point of view of the system of education in the United States. This history provides a base for and details about the ongoing national debate regarding the funding of public education. The responsibility of educating the masses began well before the adoption of the United States Constitution. The first instance of the delegation of education to lower-level government occurred with the Law of 1642. This law, backed by punitive fines, placed educational responsibility on parents in the Massachusetts colony. The educational responsibilities included the teaching of religion and reading, the primary rules of law, as well as the learning of a trade (Maxwell & Sweetland, 2002).

Following the Law of 1642, the Law of 1647, passed by the Massachusetts Legislature, required all towns of 50 residents or more to appoint an elementary teacher, funded through public tax dollars. The primary responsibility of these newly employed individuals was the teaching of reading and writing. Further, towns of 100 or more residents were also required to employ secondary teachers, schooled in the areas of Latin and grammar. Arguably, this law represents the first initial requirement for the funding of education through tax dollars (Alexander & Salmon, 1995).

Over one hundred years later, in 1751, the American Academy was formed. Founded by Benjamin Franklin, the American Academy allowed for the formation of local boards of trustees to purchase land, construct buildings, employ teachers, and manage the affairs of the school. This academy concept required tuition for attendance,
which limited attendance of students from non-wealthy families (Maxwell & Sweetland, 2002).

Walter and Sweetland (2003) suggest that government involvement in schools developed from two competing rationales. The first was the need to promote schooling in communities that were unable or unwilling to complete this task themselves. The second was the promotion of specific types of schooling. To meet these competing rationales, a major milestone in the history of education occurred. Enacted in 1878, The Northwest Ordinance required the reservation of 640 acres of land in every township for educational use. This land was free of restraints regarding its use, which allowed for the construction of schools, as well as the selling or renting of the land to raise proceeds for the funding of education. The Northwest Ordinance applied only to the Northwest Territories, which are comprised of Ohio, Indiana, Illinois, Michigan, and Wisconsin today. This ordinance further established that education was the responsibility of the government.

Because the states held sole responsibility for the use of the educational land, they were free to utilize it as desired. Unfortunately, because the states faced little federal oversight, some misuse of land, as well as of funds occurred. Further, Walter and Sweetland (2003) discuss the different qualities of school systems created among communities. They suggest that communities with adequate funding not only met schooling standards set forth by the government, but often exceeded them, as still occurs today. Alexander and Salmon (1995) contend that the structure of the funding system created an absence of equal opportunity for students due to the variations in the taxing ability of localities.
The 20th century served as a breakthrough period in the history of education funding. Beginning with the National Education Defense Act of 1958, the federal government asserted a more specific direction for education funding, opposite of the hands-off policy of involvement practiced since the ratification of the Constitution. The National Education Defense Act, in response to the Russian flight of Sputnik, served as a catalyst to improve science education through direct federal funding. In 1965, the Elementary and Secondary Education Act further improved education funding by creating a program labeled Title I, which provided funding for economically disadvantaged students. In 1975, the Education for All Handicapped Children Act provided that all handicapped children receive a “free appropriate public education” (Maxwell & Sweetland, 2002). The Education Amendments of 1978 followed, which provided a framework for the financial relationship between the federal government and local schools.

This brief history of the many legislative acts involved in the history of education funding in the United States demonstrates the ongoing relationship between the federal, state, and local authorities. Education funding began as a function of local government and continues as so, with little federal assistance except for special programming. Ohio functions within this system of education funding. Ratified in 1802, Article VI §2 of the Ohio Constitution states, “The general assembly shall make such provisions, by taxation, or otherwise, as, with the income arising from the school trust fund, will secure a thorough and efficient system of common schools throughout the state” (Ohio Constitution, 1802, p. 23). This Constitutional provision allowed for the creation of the current Ohio education system consisting of over 600 public school districts, which in
2005 educated nearly 2 million students in grades k-12. The total number of school facilities maintained for Ohio public school districts included over 3,600 buildings, and districts employed over 100,000 teachers. Often described as having one of the most complex school funding systems in the nation, Ohio spent over $15 billion per year on elementary and secondary education. The state share of over $7 billion was approximately 1/4 of the total state budget (Stabile, 2005).

The funding of education in the state of Ohio has changed many times since the ratification of the Ohio Constitution. Throughout state history, the Ohio legislature played a major role in funding schools, beginning with the General Assembly requirement in 1825 that each district levy a tax for the funding of schools. Funds raised from this legislation, redefined in 1838 to require a half-mill ($0.50 per $1,000) general property tax, were redistributed to schools based on the number of white youth between the age of four and twenty. The practice of distributing education funds based on this enumeration method continued until 1900 when a new method provided a distribution of state funding based on $1.45 per youth between the ages of four and twenty-six, an amount that increased to $2.00 per youth by 1920 (Maxwell & Sweetland, 2002, p. 12).

The enumerated system of funding is comparable to the foundation program at the basic level of recent years. The property tax basis of this system faced scrutiny after the stock market crashed in 1929 as citizens had limited funds to pay taxes. In response to financial concerns, an amendment to the Ohio Constitution occurred in 1933. Article XII § 2 of the Constitution (Ohio Constitution, 1802) stated,

No property, taxed according to value shall be so taxed in excess of one per cent of its true value in money for all state and local purposes, but laws may be passed
authorizing additional taxes to be levied outside of such limitations, either when approved by at least a majority of the electors of the taxing district voting on such proposition, or when provided for by the charter of a municipal corporation (p. 59).

This amendment to the Ohio Constitution changed the amount of effective inside mills, mills that can be levied without voter approval, from 15 to 10 mills. The reduction in mills reduced property tax revenue by approximately one-third. In the 1970s, the legislature further limited property tax revenue by granting property owners a 10% rollback on tax bills and adjustment of voted mills annually to produce only the amount specified by the original levy.

The first foundation program was enacted in 1935. The program provided payments for average daily membership of students attending grades one through eight, a different amount for kindergarten, and a third amount for grades nine through twelve. Each district payment was also based on the school term and size of the district. Upon calculation of these payments, the amount of funds raised from three mills on the assessed property valuation of the district, was added. To counteract the inability of some districts to meet minimum operating costs through this calculation, some districts were entitled to additional state aid. Further allocation of funds occurred for maintenance of pupil transportation. This system was built on the concept that education funding is a shared responsibility between the state and each local district. Clearly, the local district had to levy a minimum number of mills to receive state money. However, the amount of revenue raised by one mill of local effort varied greatly among districts, which highlighted disparities between districts (Maxwell & Sweetland, 2002).
In 1954, the state of Ohio conducted a comprehensive study of public education in the state. This study of elementary and secondary education included topics such as personnel, teacher education, the Ohio Department of Education, facilities, transportation, and finance. According to Maxwell and Sweetland (2002), over 25% of the text of the report dealt with the topic of finance. Of the 28 major recommendations, the following ten dealt with finance:

15. Permissive legislation should be enacted to permit boards of education to pay dues to school board associations.

16. A plan must be found for assisting school districts in meeting building needs which cannot be financed from legally available local sources. This need might be met by one of the following plans: (a) a substantial increase in the biennial state appropriations for buildings, (b) creating a state school building authority, (c) a state bond issue, (d) an increase in the 8.0% debt limitation, or (e) a separate foundation program for capital outlay.

17. State allocations for transportation should include an allowance for depreciation to be applied to the purchase of board owned busses.

18. The formula used for calculating state aid for transportation should be revised.

22. The foundation program should be based on the number of “teacher units” rather than the number of pupils.

23. The state’s share of the foundation program should be increased. At the present time Ohio provides 25% of school costs from state funds; the
national average is over 40%. Ohio should raise its level of support to around 40%, but at no time should exceed the national average.

24. The survey committee approves the foundation program as recommended by the finance study committee, exclusive of the capital outlay provision.

25. School districts should be permitted to vote extra levies for operating purposes for five years at special elections and ten years at regular elections. Voters should be permitted to approve for an indefinite period the millage required for participation in the foundation program.

26. State payment for tuition should be abolished.

27. Boards of education should consider adopting salary schedules, which will reward outstanding achievement as well as college training and experience (Manahan, 1955, p. 210-211).

The findings of the report resulted in a revised foundation program based on teacher units. The units were based on the total number of pupils divided by a factor of 30, plus special and vocational units, as well as factors for administration, special instruction, and supervision. Calculation of an exact dollar amount available to each district occurred by considering the following factors: (a) salaries based on the training of all certificated personnel, number of days worked, and administrative responsibilities; (b) 10% of the salary calculation for retirement and substitute teachers; (c) approved transportation; (d) operational expenditures based on each approved teacher unit. The district was then charged an amount equal to 10 mills multiplied by assessed valuation to be subtracted from the state dollar amount for the district. All districts were guaranteed a
minimum funding amount. This plan remained in effect until approximately 1967 (Maxwell & Sweetland, 2002).

A second study was conducted in 1962 by the Ohio Education Association (OEA). This study reinforced the findings of the Manahan Report suggesting that the state should lower the pupil divisor for determining basic teacher units; increase the number of special education and vocational units; decrease the divisor for determining support teachers, supervisors, and administrative personnel; and stating a need for a capital outlay factor in the formula (Flesher, 1962). Estimated cost of the program was an additional $200 million. However, the OEA believed the amount was too high to accept and reduced it to $130 million. After taking office in 1963, Governor Rhodes claimed that Ohio was in a financial crisis and could not afford the proposed increase in education spending. This financial crisis resulted in school districts receiving less state money in 1965 and 1966. However, the Manahan Report and the OEA study did help improve the funding of education in the state. The programs resulted in better teacher training, expanded vocational and special needs programs, and employment of additional supervisors, administrators, and support personnel (Maxwell & Sweetland, 2002).

Hurst, Tan, Meek, and Sellers (2003) classify state aid programs into five different categories. The first category of Full State Funding (excluding federal funds) is utilized only by Hawaii. This method provides an equitable distribution of resources, but takes away any local voter control of education funds. The second type of system, Flat Grants, was only used by Delaware as of the 2004-2005 school year. This method funds schools on a measure of perceived need, but does not take into account the district’s ability to pay. The third method, Foundation Funding, considers both a district’s need and
ability to pay. The foundation funding method guarantees districts a foundation level, if the district raises a minimum local amount, generally through voter approval of a tax levy. As of the 1998-1999 school year 44 states funded education through foundation programs, with 37 states requiring some type of local effort. States in the fourth category, Percentage Equalizing Programs, provide matching funds for districts at specific rates, according to fiscal capacity of the district. As of the 1998-1999 school year, New York was the only state utilizing this program. The final type of system, Guaranteed Tax Base/Guaranteed Tax Yield Programs, guarantees that districts have equal ability to raise revenues, despite differences in tax bases. In this system, districts possess the ability to generate revenues as if they had a state-specified tax base, guaranteeing generation of given revenue for a specified tax rate. As of the 1998-1999 school year Georgia, Indiana, and Wisconsin utilize this type of funding program (Hurst, et al., 2003, p. 36).

In addition to the different state approaches to funding basic education, all but two states utilize some type of categorical grants to fund specific programs and student groups, such as special education and gifted and talented. Edwards (2006) found that since 1994 per pupil expenditures across the nation rose from $6,633 per pupil to $8,041 per pupil in 2004. Ohio ranked 16th of the states, spending $8,735, adjusted for regional cost differences. Further, 54.9% of Ohio school districts spent above the national average of $6,786 per pupil².

Between 1975 and 2006, Ohio’s annual growth rate of state budget monies allocated for primary and secondary education averaged an increase of 6.2% per year. In FY 2006-2007, Ohio was set to allocate 27.4% of the total state budget to primary and
secondary education (Ohio Office of Budget and Management, 2005). Several key events marked significant changes in Ohio’s funding of education. A major change to the system occurred in 1975 when the Ohio General Assembly introduced the equal yield formula, which may be categorized as a guaranteed tax base/yield program. The equal yield formula was designed to guarantee every child an adequately financed education regardless of the property wealth of the district. The value of each mill, up to the first 20 mills levied by the district, guaranteed $48 per pupil. Each mill levied between 20 and 30 mills guaranteed $42 per pupil. The equal yield formula then called for the state to make up the difference between the amount raised from the local property tax and the guaranteed amount. However, due to state budget constraints and the high cost of the new program, the state did not fully implement the program until FY 1979.

In 1978, an additional cost to the state budget occurred when lawmakers created the emergency loan fund. This fund prevented financially troubled districts from closing and forced many of them further into debt, which suggests inequities in the funding system. Between 1978 and 1990, 262 loans were approved from the fund, totaling over $138 million. However, of the 262 loans, more than 100 were not taken due to passage of local levies or expenditure reductions. The cost of the equal yield program continued to raise concern in the legislature and the equal yield formula was discarded in 1981 with a return to a foundation program (Maxwell & Sweetland, 2002). These changes are reflected in the percentage of change for education to the state budget. Between 1979 and 1980, the annual rate of growth for primary and secondary budget allocations was 15%, and K-12 schools received 42.2% of the overall state budget. After the equal yield formula was discarded, the annual growth rate for the education budget was only 2.4%

Due to high levels of inflation in property values, the legislature enacted House Bill 920 in 1976, which was later amended to the Ohio Constitution in 1980. Ohio Revised Code (ORC) §3319.301 allowed for the reduction of effective millage to produce the same number of dollars each year from the same properties. This statutory procedure, effectively limited the growth of local revenue in a school district regardless of increased property valuation. The reduction factor associated with the bill affected school districts greatly due to their reliance on property taxes for revenue. House Bill 920 resulted in an effect often referred to as “phantom revenue.” Phantom revenue resulted from increases in property valuation.

To understand the phenomenon of phantom revenue, the Governor’s Blue Ribbon Task Force on Financing Student Success (2005) provided the following example. Local district A has 30 voted mills. The first 23 mills generated is the local districts’ contribution to the foundation formula. When combined with the state contribution, the resulting amount is the basic aid amount for district A. The additional revenue raised from the remaining seven mills is used for additional programs and services above the basic aid amount.

Every three years, the county auditor reappraises or updates property values. Usually property values increase with each cycle. The increased value would then force the taxpayer to pay higher levels of property tax, which would provide additional revenue to district A. However, due to House Bill 920, the county auditor is required to roll back
the millage rate so that the property tax revenue does not increase beyond the level generated by the original voted millage. The auditor effectively reduces the millage rate on existing property to a rate yielding only the amount of revenue generated from the original millage rate. The reduced rate is known as effective millage.

In district A, the auditor may roll back the 30 voted mills to 26 effective mills to comply with House Bill 920. Due to the roll back, district A now collects revenue on 26 mills rather than 30 mills. Further, due to increased property values, the 23 mill local contribution is now greater for district A. Thus, the increased local contribution equates to a smaller state basic aid amount. The result is that district A receives no additional property taxes and its state contribution is reduced. This process repeats every three years, which further shifts revenue from additional voted millage to the local share of the foundation amount, thus reducing the state basic aid. After the next reappraisal or update cycle, the county auditor may reduce district A’s effective mills to 23, further reducing the state basic aid amount. Fleeter (1996) analyzed the impact of phantom revenue using 1993 financial data. He estimated that $492,985,621 was lost due to this phenomenon (p. 357). Further, he suggested that suburban and wealthy districts lost the most revenue on average.

A second kind of phantom revenue problem exists in many districts. The state of Ohio’s funding formula assumes that 23-mills multiplied by assessed property valuation of a district is the amount of revenue the district actually collects. However, some school districts levied less than 23 mills, and several were at the state minimum 20-mill floor, thus producing less revenue than the 23-mill charge off assumed. According to the Ohio Department of Taxation (2007), in FY 2005, 117 districts were at the state minimum 20-
mill floor. These districts have actual local revenue less than the 23-mills assumed in the formula, putting them at a funding disadvantage in relation to state basic aid and the foundation level. The General Assembly raised the charge-off to 23 mills in 1993. Beginning in FY1998, partially in response to the *DeRolph I* decision, the General Assembly added the charge-off supplement, known as “gap aid,” to the formula providing additional funds for those districts that levied less than 23 mills of property tax.

Maxwell (2004) explains the Ohio Funding Formula in the following illustration:

![Figure 1. Graphical representation of the Ohio funding formula.](image)

House Bill 694, passed in 1981, permitted local boards of education to place a local income tax before voters. ORC §5748.02 allowed local boards of education to levy this tax at rates of .25% to 1.0% in increments of .25%. Upon passage of this bill, six districts passed local income tax initiatives. However, Amended Substitute House Bill 291, passed in 1983, repealed any authority to propose school district income taxes. In 1989, the legislature passed another law permitting voters to approve school district income taxes. ORC §5748.01-06 again allowed districts to place school district income tax requests before voters in increments of .25%. In addition, Ohio’s legislature increased the income tax approximately by 3.5% in 1983, resulting in an annual growth rate
between 1983 and 1984 of the primary and secondary education budget of 28.7% (Ohio Legislative Service Commission, 2007).

In 1984, another change occurred in the funding of Ohio’s schools, a decrease in the tangible personal property tax, which was a tax applied to machinery, equipment, and inventories held by Ohio companies. In addition to monies collected through individual property taxes, a portion of taxes collected for funding of education came from tangible personal property. The legislature passed an exemption for the first $10,000 of taxable value for Ohio companies. The local revenue lost due to this change was to be reimbursed by the state, effectively adding an additional cost to the state budget. The Ohio Department of Taxation calculated the loss caused by this exemption at $843.3 million in 1984. Further, the total amount reimbursed to local governments was $45 million. H.B. 66, passed in 2005, began a four-year phase out of the tangible personal property tax, further reducing local tax dollars for the funding of education (Ohio Department of Taxation, 2007).

In testimony before the Ohio Senate, Phillis (1990) suggested that the structure of the funding system in Ohio caused inequalities among districts. In FY 1989 expenditures per pupil ranged from $2,807 to $11,106, a large disparity. In analyzing equity among districts, Phillis ranked Ohio districts by property valuation per pupil from low to high for 1980 and 1990, respectively. The rankings were divided into five quintiles containing approximately 20% of students in the state. Quintile 1 contained the poorest 20% of students, quintile two the next 20%, and so on to quintile five. Many disparities or possible inequities were apparent when comparing the two years. For example, in 1980 the first 20 mills of local revenue raised an average of $396 per pupil in quintile one and
$1,078 in quintile five, a ratio of 2.72. Similarly, in 1990 the first 20 mills of local revenue raised an average of $704 per pupil in quintile one and $2,246 in quintile five, a ratio of 3.19. A second example occurs when comparing assessed valuation per pupil. In 1980 the average value in quintile one was $19,789 compared to $53,886 in quintile five, almost three times the value of quintile one. In 1990 the average assessed value per pupil of property in quintile one was $35,189 compared to $112,284 in quintile five, approximately three times the assessed valuation per pupil in quintile one (Phillis, 1990).

The data indicated that variation existed in each measured category between the lowest and highest quintiles, suggesting that strong inequalities existed between rich and poor school districts. Phillis (1990) stated, “If we assume that equity means providing the same dollar amounts for each pupil regardless of the property wealth of their school district, the data… indicate a movement away from equity over the past decade” (p. 6).

Further highlighting perceived disparities in equity of Ohio public school finance, Alexander and Salmon (1990) conducted an equity study for the Coalition of Rural and Appalachian Schools. The study addressed four questions in order to investigate the status of school finance equity in Ohio. The first question focused on the fiscal inequalities caused by variations in local property tax. The authors found that a range of 45:1 existed between the highest and lowest wealth districts, suggesting an effect of purchasing power for educational programs and services of over $60,000 per classroom (p. 111). Alexander and Salmon concluded that large fiscal capacity differences existed among school districts, which was reflected by school revenues. Further, they concluded that the quality of a child’s education is primarily a function of the fiscal ability of the local school district.
The second question addressed by Alexander and Salmon (1990) focused on whether expenditure patterns reflect the disparities in revenue. The authors found that low fiscal capacity schools, with lower levels of funding, expended fewer funds in all budgetary expenditure categories (p. 111). Further, the authors found that low fiscal capacity districts were more likely to spend revenue on essentials (teacher salary, regular instruction) versus instructional enrichment, other instructional costs, general administration, and extra-curricular activities. This spending pattern suggested that low fiscal capacity districts, with less revenue per pupil, denied many educational enrichment programs and services, thus only offering a basic and lower quality education than more wealthy districts (p. 112).

The third question addressed by Alexander and Salmon (1990) sought to determine whether expenditure patterns in the high fiscal capacity school districts resulted in a better and more extensive educational courses and programs than in the low fiscal capacity school districts (p. 112). Through curriculum survey data taken from a sample of high and low fiscal capacity school districts, the authors found that substantial differences existed in the extensiveness and quality of high school programs, including the availability of quality course offerings between the high and low fiscal capacity school districts. Further, the authors found prominent differences with regard to the availability and number of course offerings for college preparatory and advanced placement courses. The number of quality course offerings resulted in students from the high fiscal capacity school districts being twice as likely to attend college.

The final question addressed by Alexander and Salmon (1990) sought to determine whether state and local fiscal resources were apportioned to the most or least
able students. The authors found that differences existed between high fiscal capacity school districts and low fiscal capacity school districts in graduation rate, as well as dropout rates. Further, noticeable differences existed in average personal income, indicating that students from low fiscal capacity school districts entered school with less advantage and greater needs. Additionally, a significant difference in achievement test scores existed between the 50 high and 50 low capacity school districts (p.113).

In a similar study of the equity of the distribution of spending and resource allocation in Ohio school districts, Timar (1996) analyzed local and state basic aid revenues, excluding outliers² at the top of the distribution. The author found that differences existed between the lowest- and highest-wealth districts. The range of average local and state basic revenue between the highest and lowest quartile in 1979 was $1,577, compared to $1,458 in 1991 (p. 180). This slight variation is significant because per-pupil spending increased by 43% in the lowest quartile and 32% in the highest quartile. Further, between 1979 and 1991 mean per-pupil state basic aid in the highest-revenue-quartile increased by 37% (adjusted for inflation) compared to a 62% (adjusted for inflation) increase in the lowest-revenue-quartile (p.181). Therefore, it appears that the state interventions attempted to decrease funding disparities among high- and low-wealth districts.

Timar (1996) also analyzed the relationship between basic aid and assessed property valuation. The author notes that in both 1979 and 1991, the lowest spending per pupil districts received a higher share of state basic aid and as assessed valuation increased, state basic aid decreased. The correlation between foundation aid and per-pupil assessed valuation was -.52 in 1979 and -.65 in 1991, which equates to 27% of the
variation in basic aid being explained by differences in assessed valuation in 1979, compared to 42% in 1991. Therefore, the author suggested that state policy moved toward easing the relationship between property wealth and state foundation support.

Timar (1996) further examined the Ohio data utilizing standard statistical measures of school finance equity, noting that the distribution of funding improved somewhat between 1979 and 1991. He suggested that state policy intervention (increased foundation support) did improve revenue levels in low wealth districts. However, when comparing the 1979-1991 data, the 1991 McLoone index value of .91 equates to approximately $270 million in basic aid that would have been needed to bring districts below the per pupil spending median up to the state median. Additionally, funding to the poorest districts grew at a faster rate than funding to the wealthiest districts. However, the disparity between mean per-pupil revenues in the first and fourth quartiles increased from $582 in 1979 to $629 in 1991 (p.184). Timar suggested that by relative measures, funding equity did not deteriorate and that it could be argued that the Ohio system was constitutional under the standard imposed by the Walter decision, which called for a thorough and efficient program of education as set by the Ohio Constitution.

In a similar study, Alexander and Salmon (1995) conducted a cross-time equity analysis utilizing evidence presented in the DeRolph litigation. The authors applied several horizontal and vertical equity statistics to Ohio school district current per-pupil expenditure data minus federal revenue, adjusted to 1990-91 constant dollars. They suggested that between 1981 and 1991 that the level of equity for the Ohio system deteriorated, although they noted that the statistics point to steady improvements in equity between 1981 and 1987.
Alexander and Salmon (1995) analyzed several statistics and suggested that improvement was made over the decade. Mean per-pupil spending rose from $3,245 in 1981 to $4,237 in 1991. The range grew from $6,626 in 1981 to $8,739 in 1991, suggesting a decline in equity. Additionally, the restricted range grew from $1,951 in 1981 to $2,320 in 1991, further suggesting a decline in equity. However, the federal range ratio (per-pupil inputs at the 95th percentile minus per-pupil inputs from the 5th percentile, divided by per-pupil inputs at the 5th percentile) .7959 in 1981 decreased to .7346 in 1991, suggesting an increase in equity. Conversely, Alexander and Salmon found that the McLoone index fell from .89 in 1981 to .87 in 1991, suggesting a decline in equity (p. 240). The authors suggested that a strong relationship between fiscal capacity and student-inputs continued to exist; however, movement toward fiscal neutrality occurred between 1983 and 1991.

Due to technical adjustments made to each study, differences existed in the reported statistical results. Timar (1996) analyzed local and state basic aid revenues, which make up over 80% of total district revenue, but exclude revenue from property tax millage above 20. Alexander and Salmon (1995) analyzed total current expenditures minus federal funds. Although the differences in data resulted in slight variances in the equity statistics, both studies indicated decreased equity among districts, yet a movement toward fiscal neutrality.

In 1991, the legislature again attempted to modify the funding formula through proposed S.B. 170. The bill would have phased out the basic aid guarantee, equalized categorical assistance for disparities in district property wealth, added an income factor to the formula’s property wealth measure, and increased the millage rate charge-off from 20
to 25 mills. Additionally, the proposal would have pooled 50% of the growth in local nonresidential, non-public utility property tax revenues at the county level, and 50% of the growth in local public utility tax revenues at the state level. Two years of debate followed and resulted in proposed S.B. 237 in November of 1993. Differences in the two bills existed in the approach to categorical funding and an increased minimum foundation level of $4,000 per pupil (Fleeter, 1995). Neither of these bills was ever enacted.

Fleeter (1995) analyzed revenue-pooling options available under proposed S.B. 237. He discussed three pooling approaches: pooling a portion of property wealth from all districts (base millage pooling); pooling only from districts with “excessive” property wealth (excess value pooling); and pooling a percentage of future growth in property wealth (growth pooling) (p. 277). Under proposed S.B. 237, Ohio considered the growth pooling option as applied to revenue growth, as opposed to valuation growth. Fleeter notes that that the distinction between revenue growth versus valuation growth is significant because revenue can increase because of both increased valuation and as a result of increased local millage (p. 281). Thus, if a district experienced decreased property valuation, but passed local property tax levies, revenue growth still occurred.

Fleeter (1995) compared several pooling options distributed through the modified aid formula (see Table 1). Line one of Table 1 summarizes the performance of the state formula for FY 1992. The second and third line of Table 1 summarizes the impact of adding $500 million in additional state funding to the formula and redistributing the existing level of funds (approximately $2.8 billion) through a modified foundation formula with an increased local charge-off and elimination of the basic guarantee. Each change increases the equity of the funding system, as demonstrated through the equity
statistics. Perfect system equity yields a McLoone index of 1.0 and a Gini coefficient of 0.0. Further, the data suggest that the modified aid formula reduces the correlation between property wealth and district revenues. Fleeter suggested that adding state support works to level-up the equity of the bottom half of the distribution. Conversely, modification of the formula levels down, reducing the link between wealth and revenue (p. 298). However, the author concludes that neither approach significantly reduces the link between district wealth and district revenue, which may result in decreased system equity as wealth disparities increase over time (p.300).

Table 1

*Comparison of Pooling Options Through Modified Basic Aid Formula and By Valuation Weighted ADM, FY 1992*

<table>
<thead>
<tr>
<th>Type of Pooling</th>
<th>Avg. Rev. Per Pupil</th>
<th>Median Rev. Per Pupil</th>
<th>Gini Coef.</th>
<th>McLoone Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual 1992 Aid Formula</td>
<td>$4456</td>
<td>$4126</td>
<td>.070</td>
<td>.918</td>
</tr>
<tr>
<td>Add $500 Million to 1992 Formula</td>
<td>$4797</td>
<td>$4507</td>
<td>.056</td>
<td>.929</td>
</tr>
<tr>
<td>Modified Aid w/$52M Equity Fund</td>
<td>$4612</td>
<td>$4265</td>
<td>.029</td>
<td>.907</td>
</tr>
<tr>
<td>Growth Pooling Cnty Pooling, Weighted ADM</td>
<td>$4493</td>
<td>$4285</td>
<td>.020</td>
<td>.907</td>
</tr>
<tr>
<td>Growth Pooling, State Pool, Weighted ADM</td>
<td>$4532</td>
<td>$4350</td>
<td>.013</td>
<td>.904</td>
</tr>
<tr>
<td>Growth Pooling, State Pool, Thru Formula</td>
<td>$4638</td>
<td>$4409</td>
<td>.026</td>
<td>.909</td>
</tr>
</tbody>
</table>

(Fleeter, 1995, p. 289)
In June of 1992, the 119th Ohio General Assembly passed Sub. H.B. 671. The new law created an equity program with specific funds set aside for property poor school districts. The program was designed to ensure that each additional mill above the 23-mill charge-off (up to 13-mills) levied by a school district would result in a specified revenue amount. In the first year of the new program, FY 1993, the state distributed $43.75 million to qualified districts. The equity program allowed the state to distribute $60 million in FY 1994, $75 million in FY 1995, $90 million in FY 1996, and $100 million in FY 1997 (Zhan, 1997, p. 67).

The equity aid program consisted of two components from FY 1993 to FY 1995, small district aid and low wealth aid. Small district aid was distributed to districts with fewer than 1,000 total students (ADM) and a valuation per-pupil below the state median, while low wealth aid was distributed to districts below the state median. Under Sub. H.B. 117, the 121st General Assembly separated small district aid from the equity aid program, thus reserving equity aid specifically for low wealth districts after FY 1996 (Zhan, 1997).

Zhan (1997) summarized the equity aid formula as follows: Equity Aid = 

\[(\text{Threshold} – \text{Adjusted Valuation per Pupil}) * .013\] * Basic ADM (p. 68). The state set the initial threshold valuation per pupil amount as $54,000 (increases each year) in FY 1993. Any district with an adjusted valuation per pupil below the threshold was eligible for the program. The calculation for adjusted valuation per pupil was as follows:

\[
\text{Adjusted Valuation per Pupil} = \text{Valuation per Pupil} – \{30,000 * [1 – (\text{District Median Income}/\text{State Median Income})]\}. 
\]

In order to arrive at the eligible revenue amount for the district, the threshold valuation per pupil was subtracted from the adjusted valuation per pupil.
pupil. The difference was then multiplied by 13 mills. Last, this calculated amount was multiplied by the basic ADM of the previous year to obtain a total low wealth aid amount for the qualifying district (Zhan, 1997).

Zhan (1997) provided the following example of the effect of equity aid on Districts A, B, and C. In District A, the adjusted valuation per pupil is $40,000 and the district receives $376 per pupil in equity aid. In District C, the adjusted valuation per pupil is $30,000 and the district receives $506 per pupil in equity aid. In District B, the adjusted valuation per pupil is $30,000 and the district receives the same equity aid amount as District A of $376. However, District B levied seven additional mills above the 23-mill charge off, which gave them 30 mills. The seven additional mills generated $294 ($42 per mill) in District B without equity aid. Because the district is eligible for equity aid, the additional $376 is given to the district, which produced $496 ($71 per mill) in per pupil revenue. Because District A did not levy additional local mills, District B received total revenue per pupil of $4,170 versus $3,876 in District A. Thus, the program provided low wealth districts with per pupil revenue equal to the difference between the threshold and the adjusted valuation per pupil multiplied by 13 mills. Equity aid then guaranteed that each additional mill levied (up to 13 mills) by a low wealth district generated per pupil revenue equal to the threshold valuation per pupil multiplied by one mill (p. 68).

Zhan (1997) suggested that the Ohio Equity Aid Program succeeded in reducing the per pupil spending gap between low and high wealth districts. She divided the state’s school districts into four tiers based on valuation per pupil. Tier 1 schools consisted of the 225 schools eligible for equity aid. In FY 1995, the average per pupil expenditure in
eligible equity aid districts would have been 3.84% less, $4,717 versus $4,906, without equity aid (p. 72). Thus, equity aid accounted for an average expenditure increase of $188 per pupil in the eligible districts, which demonstrates the effectiveness of equity aid in narrowing the gap in per pupil expenditures between low and high wealth districts.

Zhan (1997) concludes that the per pupil valuation gaps between Tier 1 and Tier 2 had grown in FY 1989 from $16,081 to $23,680 in FY 1995. However, per pupil expenditure gaps between Tier 1 and Tier 2 decreased from $417 in FY 1989 to $298 in FY 1995 (p. 73). Thus, the equity aid program effectively decreased wealth-based disparities in per pupil expenditures among school districts. Nevertheless, equity aid was eliminated from the state formula in FY 2006.

The tide of Ohio School funding changed on December 19, 1991 when the Coalition of Rural and Appalachian Schools (CORAS) filed suit in DeRolph v. State on behalf of the Northern Local School District in Perry County. In January of 1992, five additional school districts were added to the complaint. Over the years, school funding litigation was common and occurred in several states. The following section will focus on the effect of litigation on Ohio school funding.

Litigation History

The second wave of litigation from 1973 to 1989 challenged based on equity and the Equal Protection Clause of state Constitutions, as demonstrated in *Serrano v. Priest II*. The third wave of litigation from 1989 to present found base in the concept of adequacy, as addressed in education clauses found in state constitutions and demonstrated in *Rose v. Council for Better Education* (1989) (Roelke, et al. 2004). Obhof (2005) suggested that the third wave litigation focused on the distribution of expenditures that allow all students to receive a base level of educational quality, which often requires additional funds for the poorest school districts to reach a minimum level as mandated in state constitutions. Each wave of litigation led to distinct policy changes in state education funding to meet the mandates of various courts. It is appropriate to develop briefly a history of several ground-breaking school funding cases, which help provide background leading to the *DeRolph* decision in Ohio.

The first ground-breaking case occurred in 1971. *Serrano v. Priest* was filed in California by a class action of several Los Angeles County public school students and their parents, marking the first successful state court case of education funding. The California Supreme Court held that property-rich districts had greater resources than property-poor districts, resulting in unequal quality of education, and ruled the state’s funding formula unconstitutional. Further, the Court contended that the funding system was unconstitutional based on the 14th Amendment to the U.S. Constitution, as well as the equal protection clause of the California Constitution. The California legislature responded to the ruling by increasing foundation levels for poorer districts and imposing spending limits on all districts. Proposition 13, which passed by voter initiative in 1978, further complicated funding in the state. This legislation effectively shifted the
responsibility for education funding from local school districts to the state (Minorini & Sugarman, 1999). As of 2006, California ranked 43rd among the states, spending $6,765 per pupil (Edwards, 2006).

The Serrano decision, based on equity and fiscal neutrality standards, in which the “distribution of the… educational services is determined solely by the preferences of the taxpayers for education, and not by their ability to pay, as measured by wealth, income, or some broader variable,” had wide-spread effects on future school funding litigation (Berne & Stiefel, 1984, p.13). The Serrano decision led to the second groundbreaking case, Robinson v. Cahill, which occurred in New Jersey. The New Jersey Supreme Court held that the state’s school funding system resulted in property poor districts spending substantially less than property-wealthy districts, a violation of the New Jersey Constitution. The Court based its decision on the education clause of the New Jersey Constitution, which guaranteed a “thorough and efficient” system of education (Minorini & Sugarman, 1999). The battle to fix the New Jersey funding system continued and in 1998, the Court ruled in Abbott v. Burke that the state must enact a specific education reform package.

The New Jersey reform package resulted in a foundation formula titled the “T&E amount” referring to the thorough and efficient clause of the state constitution, which was reviewed and adjusted each biennium for inflation, with specific categorical aid additions. The dollar amount associated with this formula was based on weighted student enrollment and a dollar amount determined by the “Governor’s Report on the Cost of Providing a Thorough and Efficient Education” (Edwards, 2006). Districts were required to produce a local effort, which if greater than the state budgeted T&E amount, resulted
in no state foundation aid. As of 2006, New Jersey ranked second among the states spending $10,908 per pupil\(^2\) (Edwards, 2006).

The third ground-breaking case in the history of school funding occurred in Texas. After an initial 1973 Texas Supreme Court ruling upholding the constitutionality of the state’s school funding system, the Court ruled in *Edgewood v. Kirby* that the system was unconstitutional based upon the education clause. Per-pupil spending in the state ranged from $2,212 to $19,333, indicating large wealth-based disparities (Minorini & Sugarman, 1999). The legislature enacted a unique system of funding, which modified the existing two-tier system. The first tier provided a guaranteed base, funded by a tax of $0.86 per $100 of property value. The second tier resulted in a guaranteed yield from the state for every cent levied above the state mandated minimum. Additionally, a wealth equalizing function of the current system stated that if a district’s per-pupil adjusted property wealth exceeded $305,000, the district was required to adhere to one of the following mandates: consolidate with another district, return revenue to the state, educate students from another district, or consolidate its tax base with another district (Minorini & Sugarman, 1999).

In 2004, the Texas Supreme Court again ruled the system of school funding unconstitutional and gave the legislature one year to find a solution. The new system called for districts to adopt two property tax rates, one for maintenance and operations, which could not exceed $1.50 per $100 of taxable value and a second for debt service, which could not exceed $0.50 per $100 of taxable value. The Foundation School Program allocated funds to districts based on need. As of 2006, Texas ranked 46th among the states, spending $7,570 per pupil\(^2\) (Edwards, 2006).
The final milestone case before *DeRolph* occurred in Kentucky in 1989. In *Rose v. Council for Better Education* (1989) the Kentucky Supreme Court ruled the state’s system of school finance unconstitutional in accordance with “efficiency” language of the state constitution. The Kentucky Constitution required that the state provide equal education opportunities to all students. The Court (*Rose*, 1989) declared that the state must,

provide each and every child with at least the seven following capacities: (i) sufficient oral and written communication skills to enable students to function in a complex and rapidly changing civilization; (ii) sufficient knowledge of economic, social, and political systems to enable the student to make informed choices; (iii) sufficient understanding of governmental processes to enable the student to understand the issues that affect his or her community, state, and nation; (iv) sufficient self-knowledge and knowledge of his or her mental and physical wellness; (v) sufficient grounding in the arts to enable each student to appreciate his or her cultural and historical heritage; (vi) sufficient training or preparation for advanced training in either academic or vocational fields so as to enable each child to choose and pursue life work intelligently; and (vii) sufficient levels of academic or vocational skills to enable public school students to compete favorably with their counterparts in surrounding states, in academics or in the job market. (p. 110).

The court nullified all of the education statutes, requiring a complete redesign of the entire education system.
In *Rose*, the Court provided guidelines to the legislature, which included characteristics of an adequate education. The characteristics were as follows:

1. The establishment, maintenance, and funding of common schools in Kentucky is the sole responsibility of the General Assembly.
2. Common schools shall be free to all.
3. Common schools shall be available to all Kentucky children.
4. Common schools shall be substantially uniform throughout the state.
5. Common schools shall provide equal educational opportunity to all Kentucky children, regardless of place of residence or economic circumstance.
6. Common schools shall be monitored by the General Assembly to assure that they are operated with no waste, no duplication, no mismanagement, and with no political influence.
7. The premise for the existence of common schools is that all children in Kentucky have a right to an adequate education.
8. The General Assembly shall provide funding which is sufficient to provide each child in Kentucky an adequate education.
9. An adequate education is one, which has as its goal the development of the seven capacities recited previously (*Rose*, 1989, p. 76).

The legislature responded by enacting the Kentucky Education Reform Act, which included a new foundation program that increased minimum per-pupil expenditure dramatically. Further reforms included a performance-based assessment system, a statewide curriculum, and an accountability system to provide rewards and sanctions to
public schools in the state. As of 2006, Kentucky ranked 38th among the states spending $7,451 per pupil² (Edwards, 2006).

The historic DeRolph case began in the Perry County Court of Common Pleas in 1991. The plaintiffs argued that the Ohio funding system violated the state Constitution, basing arguments on “equal protection” and “thorough and efficient”, as utilized in Cincinnati v. Walter (1979). Judge Linton Lewis (DeRolph, 1994, p. 460) found in favor of the plaintiffs in 1994, requiring a system with “Facilities in good repair and supplies, materials and funds necessary to maintain these facilities in a safe manner applicable with all local, state, and federal requirements.” The educational opportunities that Judge Lewis ruled appropriate to meet the “thorough and efficient” clause of the Ohio Constitution included an array of items such as written and communication skills, knowledge of government, sufficient levels of academic or vocational skills, and support and guidance of school personnel. Reaction to the decision from the Governor was swift. Governor Voinovich, in a press conference (Schrag, 2003) held days after the Court decision, stated that the decision

Is a thinly veiled call for a massive, multi-billion-dollar tax increase…a meat axe approach… [by judicial activists] decided they wanted to act in place of the General Assembly and in place of the administration. They have created the basis for litigation for years to come. (p. 129)

Governor Voinovich appealed the case on behalf of the state to the Fifth District Court of Appeals. In a 2-1 ruling, the District Court ruled for the state, stating that the funding system was flawed, yet it met constitutional requirements. Judge Wise stated, “every statute is presumed constitutional and is invalid only when its unconstitutionality
is shown beyond a reasonable doubt” (DeRolph, 1995, p. 8). After the issuance of this ruling, the Ohio Coalition for Equity and Adequacy in School Funding appealed to the Ohio Supreme Court. In July of 1997, after months of proceedings, the Ohio Supreme Court handed down a decision in favor of the plaintiffs.

The Ohio Supreme Court held that the Ohio school funding system violated article VI, section 2 of the Ohio Constitution, which mandates a thorough and efficient system of common schools in the state. The syllabus of the law in DeRolph I (1997) is as follows:

We therefore hold that Ohio’s elementary and secondary public school financing system violates Section 2, Article VI of the Ohio Constitution, which mandates a thorough and efficient system of common schools throughout the state. The following specific provisions are unconstitutional:

(a) R.C. 133.301, granting borrowing authority to school districts;
(b) R.C. 3313.483, 3313.487, 3313.488, 3313.489, and 3313.4810, the emergency school assistance loan provisions;
(c) R.C. 3317.01, 3317.02, 3317.022, 3317.023, 3317.024, 3317.04, 3317.05, 3317.051, and 3317.052, the school foundation program;
(d) R.C. Chapter 3318, the Classroom Facilities Act, to the extent that it is underfunded. (p. 47)

The Court expressed specific concern regarding the condition of school facilities throughout the state, citing the 1990 Ohio Public Schools Survey, which called for approximately $10.2 billion for facility repair and construction (Obhof, 2005).
The state foundation program was also of particular concern to the Court, which stated that “the formula amount has no real relation to what it costs to educate a pupil” \((\text{DeRolph I}, 1997, \text{p. 208})\). Additionally, the Court found problems with the categorical aid program, the Disadvantaged Pupil Impact Aid provisions, the guarantee aspect of the formula, the tax reduction factor associated with H.B. 920, and the cost of doing business factor (McKinley, 2005a).

The majority decision of the Court concluded with specific instructions for the Ohio General Assembly. The General Assembly was given 12 months to find a solution to the funding issue. The Court \((\text{DeRolph I}, 1997)\) stated,

\begin{quote}
We do not instruct the General Assembly as to the specifics of the legislation it should enact. However, we admonish the General Assembly that it should create an entirely new school financing system. It is a statewide system. (p. 212-213)
\end{quote}

The Court further stipulated that they were aware that creating a new funding system would take time, thus allowing the General Assembly 12 months to work on a solution. The Court gave jurisdiction to Judge Lewis for the next year.

In response to the Court order, the legislature enacted and Governor George Voinovich signed House Bill 412 and Senate Bill 55. H.B. 412, the School District Fiscal Accountability Act, required budget reserves to be maintained by school districts, as well as set aside funds for textbooks, building maintenance, and emergencies (Obhof, 2005, p. 115). The second bill, Senate Bill 55, increased graduation requirements, modified the state proficiency test, established state report card standards, and required fourth grade students to pass a proficiency test prior to promotion to the fifth grade.
In 1997, Ohio hired Dr. John Augenblick to create a base funding model designed to provide an adequate education to students in the state. Augenblick determined that adequate education could be measured by identifying districts who achieved seventeen of the eighteen state accountability standards. In Ohio, 169 districts met this criterion. After the top 5% and bottom 5% of districts in property value per pupil and median income were eliminated, the final sample included 102 districts. Augenblick determined a cost per pupil to provide an adequate education by calculating total expenditures in each of the 102 districts and then dividing by the total number of students. The result projected a base cost of $4,901 for FY 2004 (First & De Luca, 2003). In 1997 the Ohio General Assembly enacted a modified form of Augenblick’s formula. The modified formula included the same 169 model districts. However, the top 10% of districts with the highest median income and the bottom 10% of districts with the lowest median income were excluded, which lowered the base cost that resulted from the calculation. Further, the statewide base cost estimate was based on 103 model districts, as opposed to the 102 utilized by Augenblick.

In response to the DeRolph litigation, H.B. 650 and H.B. 770 passed in February of 1998 and June of 1998, changed the state’s basic funding formula. The new base cost per pupil was $4,063 for FY 1999, adjusted for inflation at an annual rate of 2.8%. However, the passage of the two bills did not meet the court-mandated establishment of an entirely new funding system. Despite opposition from state education organizations and the Coalition, the legislature attempted to raise additional funds for education by placing Issue 2, a one-cent state sales tax increase with a property tax decrease, on the ballot in May of 1998. The issue was projected to raise approximately $1.1 billion
annually, some of which would have funded the property tax cut, but was defeated by a margin of four-to-one (Obhof, 2005).

According to Edlefson (1998), additional changes occurred in the following areas in response to the DeRolph litigation: (a) Fiscal accountability, (b) Academic accountability, (c) Expanded choice, and the (d) Funding Formula. In the area of fiscal accountability, major highlights of H.B. 412 included giving the state auditor the authority to conduct performance audits on fiscal watch districts. Additionally, school districts were required to set aside 4% of their general fund for textbooks and instructional materials, as well as capital projects and facility maintenance. One percent was also required for placement in a budget reserve fund. The last highlight of the bill called for mandatory local 5-year financial projections (Edlefson, 1998).

In the area of academic accountability, highlights from Senate Bill 55 included an increase in the number of credits required for high school graduation from 18 to 21 and performance rating standards for school districts, with state intervention if necessary. Additionally, restrictions were placed on fourth and sixth grade proficiency testing in regards to advancing to the next grade level, and a requirement for districts to offer summer school to students failing three sections of the fourth or sixth grade test was established. Further, H.B. 215, the biennial appropriation, provided expanded choice to students in grades 9 through 12 in the form of post-secondary options (Edlefson, 1998).

As discussed briefly, H.B. 650 enacted major changes to the school funding formula. The legislature established a methodology for determining the cost of an adequate education, which set the base cost in FY 1999 to $3,851 per pupil. It also required the 2000-2001 biennial budget for education be separate from the rest of the
budget. Additionally, a cost adjustment factor in the form of a subsidy was added to the formula that would power equalize millage between 23 and 25 for districts below the state average assessed valuation per pupil. Further, the phasing out of equity aid would occur as the higher foundation level phased in. A phase out of the formula wealth adjustment also occurred (Edlefson, 1998).

Additional changes under H.B. 650 included the end of categorical unit funding, replacing it with a weighted pupil system for special and vocational education students. The transportation subsidy also received a new formula based on a statistical model, which accounted for efficiency. Disadvantaged pupil impact aid (DPIA) changed to an index based system that accounted for a district’s proportion of students coming from families receiving public assistance. Another important provision of the bill introduced “Gap Aid” in which the state would make up the difference in revenue if a district’s local tax effort generated less than its assumed share of the formula aid plus its assumed share of basic special education weighted aid. Finally, instead of guaranteeing just basic aid, districts were held harmless to FY 1998 levels of “fundamental” state aid (state share of base cost + special education + gifted education + DPIA + equity aid) or the per pupil fundamental amount, whichever was less (Edlefson, 1998, p. 6).

In 1999, under newly elected Governor Robert Taft, the state took additional steps toward meeting the mandates of DeRolph I (1997). Governor Taft signed into law H.B. 282 and 283 in June of 1999. H.B. 282 marked the first Ohio budget dedicated exclusively to education. Further adjustments were made to the per-pupil funding formula and additional money was dedicated to improving technology. In addition, H.B. 283 allocated the state budget surplus of $325.7 million toward school construction and repair.
The legislation passed between *DeRolph I* and *DeRolph II* appropriated approximately $2 billion toward school facilities (Obhof, 2005, p. 120). Edlefson and Barrow (2001) suggest that Ohio made more progress in school facilities than in the other court-mandated areas, due to the reasonably clear court directions for legislative action. Further, they point out that funding of facilities is based on the concept of adequacy rather than equity, and that it is easier for the public to recognize inadequate facilities than inadequate operating funds among districts.

In August of 1999, Judge Lewis convened a hearing for the state to present the actions taken to create a constitutional funding system. Through the course of the 9-day hearing, the state attempted to illustrate that the implemented changes occurred to meet the “thorough and efficient” mandate set forth in *DeRolph I*. Upon conclusion of the testimony, Judge Lewis found that the state failed to present sufficient evidence that a complete overhaul of the funding system had occurred. This ruling resulted in another appeal to the Ohio Supreme Court in November of 1999.

The Ohio Supreme Court delivered their opinion in May of 2000 and again ruled the state’s funding system unconstitutional (*DeRolph II*, 2000). The decision, cited an over-reliance on property taxes, unfunded legislative mandates, an inadequate basic aid formula, and forced borrowing. Judge Alice Robie Resnick delivered the opinion of the court. First, *DeRolph II* (2000) added to the definition of “thorough and efficient”. Judge Resnick stated,

> This court observed that a school system could not be thorough and efficient if any school district in Ohio was receiving so little local and state revenue that the students were effectively being deprived of educational opportunity. (p. 5-6)
McKinley (2005b) notes that Resnick utilized definitions from both *Miller v. Korns* (1928) and *Cincinnati v. Walter* (1979) to define the characteristics of a thorough and efficient education. Further, Resnick stressed that “thorough and efficient” is not an unchanging concept.

The Court found that none of the factors that ultimately caused the funding system to be ruled unconstitutional in *DeRolph I* had been eliminated. Despite increased state investment in facilities construction and repair, the state had made limited progress in achieving the mandates stipulated in *DeRolph I*. In particular, the legislature failed to address the over-reliance on property tax of the school funding system. The Court further contended that several acts by the legislature, including the phase out of the inventory tax and House Bill 455 and Senate Bill 55 would force districts to levy additional taxes for set-asides (*DeRolph II*, 2000, p. 1014). Justice Resnick’s (*DeRolph II*, 2000) summarized as follows:

> The most glaring weakness in the state’s attempts to put in place a thorough and efficient system of education is the failure to specifically address the over reliance on local property taxes. If this problem is not rectified, it will be virtually impossible for the revised school funding system to be characterized as thorough and efficient. (p. 33)

She provided additional insight into problem areas that the General Assembly must solve by identifying deficiencies in the basic aid formula, problems with the school solvency fund, unfunded mandates, phantom revenue, and the development of specific academic guidelines (McKinley, 2005b).
Following *DeRolph II* (2000), political tensions began to rise between the governor’s office and the majority leadership. Part of the division occurred because Governor Taft supported legislation to provide additional funds to schools, a trend that the majority leadership did not face under former Governor Voinovich. Further political tensions occurred in the 2000 Ohio Supreme Court election, where a movement to unseat Judge Resnick took place, an apparent reaction to the *DeRolph* decisions (McKinley, 2005b). Such political divisions continued due to the controversy caused by *DeRolph* over the years. Schrag (2003) suggested that in Ohio, as well as in the 37 other states where supreme court justices are elected by referendum, judges may be attuned to constituents and their wants, with hopes of future reelection, thus prompting them to rule against school funding litigation that may increase taxes.

Governor Taft developed a plan for state funding of school facilities. H.B. 640 passed in June of 2000 and provided an additional $1.1 billion for school construction. Additionally, Senate Bill 272 increased facilities funding to urban districts and provided natural disaster assistance to schools. H.B. 94, passed in 2001, established a basic aid foundation of $4,814 per pupil for FY 2002, which increased the aid amount, but did not change the foundation formula, with 2.8% increases each year thereafter. In addition, H.B. 94 established a charge off rate of 23 mills (the required local effort) and a new categorical, gap aid, to districts not able to fund their local share (Obhof, 2005, p. 132).

The Ohio Supreme Court heard arguments in September of 2001 in what is known as *DeRolph III* (2001). The Court held that the Ohio funding system was still unconstitutional. However, the court stated that many of the changes that occurred in the 1990s helped move the system toward becoming constitutional. The Court stated,
We observe that the state has chosen to retain a foundation program of funding primary and secondary public education. We find that, having so elected, it must, in order to meet the requirements of *DeRolph I* and *DeRolph II*, formulate the base cost of providing an adequate education using all schools meeting twenty of the twenty-seven performance standards as set forth by the General Assembly without adjustment to exclude districts based on wealth screens, without rounding adjustments to include additional lower-spending districts, beginning effective July 1, 2001. (p. 1201)

With this statement, the Court called for another formulation of the base cost for an adequate education.

Obhof (2005) suggested that the action taken by the Court angered dissenters and stretched the limits of judicial authority by requiring three specific changes to the funding program by the General Assembly prior to the system becoming constitutional. First, the Court mandated that the richest and poorest 5% of districts must be included in calculation of the base cost (*DeRolph III*, 2001, p. 1200). Second, the Court criticized the state’s use of inflation-adjusted spending data from 1996 or actual expenditure data from 1999, whichever amount was lower, to calculate base cost (*DeRolph III*, 2001, p. 1200-01). Third, the Court mandated that the parity aid program receive full state funding by 2004, rather than 2006 as planned (*DeRolph III*, 2001, p. 1201). The Court held that the meeting of these three criteria would make the funding system constitutional.

In summary, the Court relinquished jurisdiction over the *DeRolph* litigation. Justice Moyer (*DeRolph III*, 2001) stated,
A climate of legal, financial, and political uncertainty concerning Ohio’s school funding system has prevailed at least since this court accepted jurisdiction of the case. We have concluded that no one is served by continued uncertainty and fractious debate. In that spirit, we have created the consensus that terminates the role of the court in this case. (p. 1-13)

Obhof (2005) suggested that the decision to relinquish jurisdiction over the case was a compromise between the Court’s moderate and conservative Republicans.

In response to DeRolph III (2001), the state of Ohio filed a motion to reconsider with the Supreme Court. The state’s main objection was the Court mandate eliminating “wealth screening”, which required inclusion of the wealthiest and poorest 5% of school districts in the base cost formula. The state contended that inclusion of these districts skewed the base cost calculation to a substantially higher value. Further, the state estimated the cost of the DeRolph III decision as costing the state a yearly budget increase of $1.2 billion. The Court initially referred the case to a mediator, but neither side agreed to a compromise.

In December of 2002, the Ohio Supreme Court reached a final decision in DeRolph IV. The syllabus of law stated, “Current school-funding system is unconstitutional. Complete systematic overhaul of school-funding system needed. General Assembly directed to enact a school-funding scheme that is thorough and efficient” (p. 1). Simply stated, the Court vacated the syllabus of law in DeRolph III (2001) and returned to the mandate of DeRolph I and DeRolph II requiring the state to create a funding system that would meet the thorough and efficient language found in the Ohio Constitution. Phillis (2005) suggested that by relinquishing jurisdiction of the case,
the Ohio Supreme Court allowed the state of Ohio to continue to operate an unconstitutional funding system. Further, *DeRolph V* (2003) enforced a writ of prohibition that effectively ended jurisdiction of Judge Lewis of the Perry County Court of Common Pleas in overseeing any type of compliance conference as requested by the Ohio Coalition (McKinley, 2005b).

In response to the *DeRolph IV* (2003) decision, Governor Taft created the *Blue Ribbon Task Force*. The 33-member task force was composed of education groups, legislators, school superintendents, school treasurers, business officials, the president of the state board of education, and the state superintendent of public instruction. The governor (as cited in Blue Ribbon, 2005) directed the task force to create a funding system that met the following guidelines:

1. Promotes reaching a higher level of student achievements and complements and supports the reforms recommended by the Governor’s Commission for Student Success and the Governor’s Commission on Teaching Success.

2. Provides funding for school districts that is stable and grows appropriately.

3. Is predictable—not just within any particular biennial period, but sufficiently into the future to allow districts to make medium-term planning decisions.

4. Includes a methodology for calculating per-pupil funding levels that ensure that all students, including regular, special education,
disadvantaged, gifted, and career-technical students, have an opportunity to succeed.

5. Ensures that all students have the opportunity to succeed, regardless of the property wealth of the school district.

6. Is affordable within the context of the state’s economy.

7. Includes features that promote the effective use of resources toward the goal of helping every child achieve academic success. (p. 5)

The task force began the task of creating a finance system to meet these directives, in hopes of improving the overall system of education in Ohio and ensuring that students are adequately prepared to succeed in high school and beyond.

Summary

Many policy changes occurred between 1980 and 2003 that affected school funding and the funding formula. The first major policy change occurred in 1983, when the state income tax increased by 3.5%. Although this change occurred in 1983, any increase in state revenue or change in Adjusted Current Expenditure (ACE) would not occur until FY 1984. The second major policy change occurred when an equity fund for poorer schools was created in the 1992-1993 budget, which would produce increased funding and changes in ACE for FY 1992 and beyond.

The third major policy change, in response to the DeRolph I ruling, occurred in 1997. Policy changes included H.B. 650 and 770, passed in 1998, which changed the state’s basic funding formula. The passage of this legislation should affect ACE for FY 1998 and beyond. DeRolph IV in December 2002 marked the end of an era. The Ohio Supreme Court relinquished jurisdiction of the case. Even though the Court never
declared that the school funding system met constitutional standards, the pressure was off
the General Assembly to make further changes. Fiscal year 2003 was in many ways the
last to be affected by the *DeRolph* litigation.

Each major policy change identified represents a possible change in the equity of
per pupil funding levels in Ohio school districts. The major change events will serve as
hypotheses for the analysis of this study to answer the research questions presented in
Chapter I.
CHAPTER III

Purpose of the Study

The purpose of this study was to construct a history of school finance from 1980-2003 to show the links between policy decisions and changes in the equity of the system. The research questions that guided the study were:

Research Question 1: Do the Gini Coefficient values show that improvements in equity are associated with various policy changes since 1980?

Research Question 2: Do the McLoone index values show that improvements in equity are associated with various policy changes since 1980?

Analytical Concepts

Using Berne and Stiefel’s (1984) framework guiding equity analysis in school finance, several choices were made in the design of the study. First was the choice of “equity for whom?” (p.7). Equity for children, rather than equity for taxpayers was the focus of the study, because the DeRolph court decisions used equity for children as their primary standard. The Court (DeRolph I, 1997) stated,

...we must ensure that there is enough money that students have the chance to succeed because of the educational opportunity provided, not in spite of it. Such an opportunity requires, at the very least, that all of Ohio’s children attend schools which are safe and conducive to learning. At the present, Ohio does not provide many of its students with even the most basic of educational needs. (p. 15)

The second decision in the Berne and Stiefel framework was what measure would represent the object that should be equitably distributed. Possible choices include expenditures per pupil, revenues per pupil, and resource measures such as teacher-pupil
ratio. Adjusted Current Expenditures (ACE) per pupil was selected because the data for Ohio were readily available. Berne and Stiefel recommend a consistent measure when comparing equity across states, and ACE has been used in other states (e.g., Arbogast, 2005). Finally, Berne and Stiefel found that expenditures were more likely than revenues to show improvements in equity (p. 281).

The third decision in the Berne and Stiefel framework was what equity principle would be the focus of this study. Berne and Stiefel (1984) discuss horizontal equity, vertical equity, and equal opportunity. Horizontal equity means the equal treatment of equals. These measures capture the dispersion of a distribution, where perfect equity exists when every school district is able to make the same per pupil expenditure. The use of horizontal equity measures allows for the determination of how far the distribution is from perfect equality. Horizontal equity was chosen as the focus of this study because DeRolph emphasized a system of common schools where no district needed additional resources to provide students with a common statewide education, as stipulated by the Ohio Constitution.

Berne and Stiefel (1984) discuss vertical equity as the unequal treatment of unequals. Vertical equity recognizes the differences between students, which may require different treatment. The authors further suggest that differences are value-based and categorized as (a) child-based characteristics, (b) district-based characteristics, or (c) program-based characteristics. Over the course of the 24 years that are the focus of this study, Ohio made many changes to the programs that provide funding for the different educational needs of students. Assembling student data for the analysis of vertical equity was beyond the scope of this study.
Berne and Stiefel (1984) discuss equal opportunity as the idea that no differences should exist according to characteristics that they define as illegitimate (i.e., property wealth per pupil, household income, fiscal capacity, or sex). Thus, under the equal opportunity principle, no relationship should exist between expenditures, resources, programs, outcomes, and per-pupil wealth or fiscal capacity (p. 17). Berne and Stiefel discuss four types of measures: correlation, slopes, elasticities, and adjusted relationship measures. Examination of these measures of equal opportunity was beyond the scope of this study.

The fourth decision in the Berne and Stiefel framework was what measure of equity would be used. In order to answer Research Question 1 and 2 in the present study, the Gini coefficient and the McLoone index were used to determine if funding equity increased or decreased over the time of the study. In their concluding comparison of Michigan and New York, Berne and Stiefel used the coefficient of variation because it is of interest to readers in school finance, and because empirically it resembles other measures in its group. This study used the Gini coefficient as one of the measures of horizontal equity, because it is widely used in studies of income distribution, and is familiar to many readers. Theoretically, it is akin to the coefficient of variation, and empirically, it showed similar patterns in the Berne and Stiefel data.

Alexander and Salmon (1995) describe the Lorenz Curve and the Gini Coefficient. The Lorenz Curve is created by plotting cumulative proportions of pupils (horizontal axis) and cumulative proportions of per-pupil inputs (vertical axis) on coordinate axis. If per-pupil inputs were equal for all districts (perfect equity) the plotted curve would be a 45-degree straight line. The Gini Coefficient is recognized as the area
below the plotted curve and the 45-degree line, expressed as a fraction of the total area below the 45-degree line.

Berne and Stiefel (1984) describe the Gini Coefficient as showing how far the distribution of adjusted current expenditures is from providing each proportion of students with equal proportions of the expenditures and is based on the Lorenz Curve. This value ranges from zero (perfect equality) to one (perfect inequality). As this value increases, equity decreases. The formula for the Gini coefficient is as follows:

\[
\frac{\sum_{i=1}^{N} \sum_{j=1}^{N} P_i P_j |X_i - X_j|}{2 \left( \sum_{i=1}^{N} P_i \right)^2 \bar{X}_p}
\]

Where:

1. \( P_i \) represents student enrollment in district \( i \).
2. \( P_j \) represents student enrollment in district \( j \).
3. \( X_i \) represents adjusted current expenditures per-pupil in district \( i \), \( X_j \) represents adjusted current expenditures in district \( j \).
4. \( \bar{X}_p \) represents the mean adjusted current expenditures per-pupil for all pupils.

Berne and Stiefel (1984) recommend using more than one measure of horizontal equity. In their analysis of New York and Michigan data, they used the McLoone index as well, because it gives more emphasis to the bottom half of the distribution and because courts and policy makers are often interested in bringing up the bottom half of the distribution closer to the median. The McLoone index is both empirically and theoretically different from other measures of horizontal equity. Additionally, both the
McLoone index and the Gini coefficient are appropriate for use with nominal dollars over a period of time, because they are not affected by inflation (pp. 23-25).

Berne and Stiefel (1984) describe the McLoone index as the ratio of the actual sum of per-pupil adjusted current expenditures for pupils below the median to the sum of per-pupil adjusted current expenditures that would exist if each pupil below the median were at the per-pupil adjusted current expenditure. The values range from zero to one and as they increase, equity increases for the lower half of the distribution.

The formula for the McLoone index is as follows:

\[
\frac{\sum P_i X_i}{\sum P_i \text{med}}
\]

Where:

1. The numerator is the sum of all adjusted current expenditures per-pupil of the districts below the state median of adjusted current expenditures per-pupil and \( i \) represents the districts below the state median adjusted current expenditure per-pupil.
2. \( P_i \) represents the enrollment of school district \( i \).
3. \( X_i \) represents adjusted current expenditures per-pupil in school district \( i \).
4. Med represents the median adjusted current expenditures per-pupil for all students.

Common measurers such as range, restricted range, and federal range ratio are highly sensitive to inflation, even if there are no policy changes, and were not appropriate for this study (Berne & Stiefel, 1984, p. 283). Berne and Stiefel (1984) used graphs showing levels and trends of equity measures over time in Michigan and New York State. They used the graphs to compare visually the various equity measures. They found erratic
patterns in the trends, and they found that levels of equity were about the same at the end of the periods studied as they were at the beginning. The present study builds upon those comparisons of equity measures in one state over time using multiple linear regression models. Instead of merely visually comparing graphic representations of trends, the present study will test hypotheses that policy changes were associated with the changes in the equity measures in various time periods from fiscal years 1980 to 2003.

Data

School Districts and Time Periods

A database was assembled for K-12 school districts in Ohio for the fiscal years 1980 to 2003, inclusive. Joint Vocational School Districts (JVSD) and Educational Service Centers (ESC) were not included in the database because JVSDs and ESCs are funded through different mechanisms than K-12 districts. In addition, the analyses in this study used student equity as the goal, and all students in Ohio are assigned to a K-12 district for purposes of funding.

All K-12 districts were included, except: (a) College Corners, (b) Kelly’s Island, (c) North Bass, (d) Middle Bass, and (e) Put-in-Bay. College Corners is only partly in Ohio and partly in Indiana. The other districts are islands in Lake Erie, and in some years, they have expenditures, but no students. Additionally, due to the unavailability of data for multiple years included in the study, the following districts were removed from the database: (a) Adena Local, (b) Coshocton City, (c) Grand Valley Local, (d) Lakeview Local, (e) Norwood City, (f) Paint Valley Local, (g) Princeton City, (h) Rock Hill Local, and (i) Upper Arlington City. The total number of districts in the database differed
slightly from year to year, ranging from 598 to 602, because some districts were split off from others or consolidated with others.

Fiscal years (FY) 1980-2003 were used for this study. School finance data prior to 1980 were not comparable or attainable due to changes in state reporting methods and terminology. In Ohio, the fiscal year runs from July 1 to June 30. Fiscal year 1980 is the base line year for the study because of the availability of data. The database ended in FY 2003 because the consensus opinion in the policy-making community was that following the decision in DeRolph IV in December 2002, the state legislature no longer felt compelled to follow the mandates set forth in the DeRolph litigation. The following fiscal years affected school funding or marked a significant change to school funding in Ohio: (a) FY 1984, (b) FY 1992, and (c) FY 1998.

Data Used to Form the Predictor Variables

The 24 years in the database were divided into periods marked by major policy changes, as follows:

1. The period that contained the fiscal years 1980 through 1983 was identified as the Period 1. These years served as the base period for the analysis.
2. The period that contained the fiscal years 1984 through 1991 was identified as Period 2. This period contained the eight fiscal years after the passage of a state income tax increase in 1983.
3. The period that contained the fiscal years 1992 through 1997 was identified as Period 3. This period contained the six fiscal years beginning with FY1992, when the Equity Fund was added to the school finance program.
4. The period that contained the fiscal years 1998 through 2003 was identified as Period 4. This period began with FY1998, the effective date of reforms to the school finance program enacted in response to the *DeRolph I* court decision. This period ended in FY 2003 because the consensus opinion in the policy-making community was that following the decision in *DeRolph IV* in December 2002, the state legislature no longer felt compelled to follow the mandates set forth in the *DeRolph* litigation.

Data Used to Form the Criterion Variable

The database identified the school districts by name, county, and by a unique identification number, the IRN, assigned by the Ohio Department of Education (ODE). The following six variables for each district were reported for each year: (a) the Average Daily Membership (ADM), which is the ODE measure of enrollment; (b) assessed valuation per pupil, the measure of property wealth; (c) revenue from federal sources; (d) total expenditures; (e) Adjusted Current Expenditures (ACE), which was total expenditures excluding federal dollars; and (f) ACE/ADM, or adjusted current expenditures per pupil. The following expenditure line items (reported by the state of Ohio as total district expenditures, as well as per pupil expenditures in each area) from the yearly “District Profile Report” (formerly known as the CUPP Report, ODE, 2007) for all school districts in the state were combined and reported as Adjusted Current Expenditures/ADM (per pupil ACE) for purposes of analysis:

1. *Administration expenditure*- covers all expenditures associated with the day to day operation of school buildings and the central office as far as the administrative personnel and functions are concerned. Items of expenditure in
this category include salaries and benefits provided to all administrative staff as well as other associated administrative costs.

2. **Building Operation Expenditure**- covers all items of expenditure relating to the operation of school buildings and central office. These include the costs of utilities and maintenance and upkeep of physical buildings.

3. **Instructional Expenditure**- includes all costs associated with the actual service of instructional delivery to students. These items strictly apply to school buildings and do not include costs associated with the central office. They include the salaries and benefits of teaching personnel and other instructional expenses.

4. **Pupil Support Expenditure**- includes expenses associated with the provision of services other than instructional that tend to enhance the developmental process of students. These cover a range of activities such as student counseling, psychological services, health services, social work services etc.

5. **Staff Support Expenditure**- includes all costs associated with provision of support services to school district staff. These include in-service programs, instructional improvement services, meetings, payment for additional trainings and courses to improve staff effectiveness and productivity.

6. **Total Expenditure**- is the combination of all of the components of expenditure listed above

7. **Federal Revenue**- is the total revenue coming from federal sources (Ohio Department of Education, 2007).
Adjusted Current Expenditures (ACE) for each school district in each year were calculated using a formula similar to the formula used by Arbogast (2005). The expenditure line items discussed in the previous section were combined, minus federal revenue and reported as total expenditure.

The total expenditure for each school district was divided by the Average Daily Membership (ADM) reported to the state in October of each school year, which resulted in the Adjusted Current Expenditure (ACE) amount. By completing this division, all children were considered, with each student treated as mathematically equal.

Data Analysis

Variables for Research Questions 1 and 2

The methodology chosen to complete the data analysis was suggested by Suits, Mason, and Chan (1978). The Gini coefficient and the McLoone index values discussed in the previous section formed the criterion variables. These Gini coefficient values and the McLoone index values for the fiscal years 1980 through 2003 were analyzed to determine if the trends in those values changed between successive time periods of the four periods discussed in the previous section. The analysis was conducted through the use of multiple linear regression models. The following variables were created for the various linear regression models:

1. One criterion variable, which was represented by the symbol \( Y_1 \), consisted of the Gini Coefficient values for each of the 24 fiscal years.

2. The second criterion variable, which was represented by the symbol \( Y_2 \), consisted of the McLoone index value for each of the 24 fiscal years.
3. A dummy predictor variable, which was represented by the symbol $X_1$, consisted of the values 0 and 1. The value of 1 was assigned for every fiscal year in period 1 (FY80-FY83), and a value of 0 was assigned for all other years.

4. A dummy predictor variable, which was represented by the symbol $X_2$, consisted of the values 0 and 1. The value of 1 was assigned for every fiscal year in period 2 (FY84-FY91), and a value of 0 was assigned for all other years.

5. A dummy predictor variable, which was represented by the symbol $X_3$, consisted of the values 0 and 1. The value of 1 was assigned for every fiscal year in period 3 (FY92-FY97), and a value of 0 was assigned for all other years.

6. A dummy predictor variable, which was represented by the symbol $X_4$, consisted of the values 0 and 1. The value of 1 was assigned for every fiscal year in period 4 (FY98-FY03), and a value of 0 was assigned for all other years.

7. A variable was designed to reflect the chronological nature of the data. This variable contained a number for each of the fiscal years, beginning with the value of 1 for FY80 and ending with the value of 24 for FY03. This variable, which was assigned the symbol of $X_5$, is referred to as the trend variable.

In order to isolate the trends in the Gini Coefficient and McLoone index values for each time period, four additional predictor variables were generated from the five
predictor variables (X₁ through X₅). These variables, which were formed by multiplying each of the dummy variables by the trend variable, are as follows:

1. The product of X₁ and X₅ was labeled X₆.
2. The product of X₂ and X₅ was labeled X₇.
3. The product of X₃ and X₅ was labeled X₈.
4. The product of X₄ and X₅ was labeled X₉.

The statistical testing of the hypotheses contained in this study, which are presented in the following section, required that restrictions be placed on certain coefficients estimated by the models. If the trends did not differ between two successive time periods, the trend variables for those two time periods were combined to create the restricted trend variables. To implement these restrictions, the following three additional predictor variables were generated:

1. The addition of X₆ and X₇ formed variable X₁₀.
2. The addition of X₇ and X₈ formed variable X₁₁.
3. The addition of X₈ and X₉ formed variable X₁₂.

The symbols and value ranges for the criterion variable and the 12 predictor variables are listed in Table 2.

Hypotheses

Research Question 1 was: Do the Gini index values show that higher levels of equity are associated with various policy changes since 1980? And Research Question 2 was: Do the McLoone index values show that higher levels of equity are associated with various policy changes since 1980? If the answers to Research Questions 1 and 2 were yes, the Gini coefficient and the McLoone index values, which are the criterion variable
values, following any of the three events identified in this study should change from the corresponding values of the previous years. These changes could be reflected in one

Table 2
Symbol and Value Ranges for Criterion and Predictor Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Variable Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y₁</td>
<td>0 to 1 (Expressed as a decimal)</td>
<td>Gini Coefficient</td>
</tr>
<tr>
<td>Y₂</td>
<td></td>
<td>McLoone Index</td>
</tr>
<tr>
<td>X₁</td>
<td>0 or 1</td>
<td>Dummy Predictor Variable for Period 1</td>
</tr>
<tr>
<td>X₂</td>
<td>0 or 1</td>
<td>Dummy Predictor Variable for Period 2</td>
</tr>
<tr>
<td>X₃</td>
<td>0 or 1</td>
<td>Dummy Predictor Variable for Period 3</td>
</tr>
<tr>
<td>X₄</td>
<td>0 or 1</td>
<td>Dummy Predictor Variable for Period 4</td>
</tr>
<tr>
<td>X₅</td>
<td>1 through 24</td>
<td>Trend Variable for Year</td>
</tr>
<tr>
<td>X₆</td>
<td>0 or 1-4</td>
<td>Trend Predictor Variable</td>
</tr>
<tr>
<td>X₇</td>
<td>0 or 5-12</td>
<td>Trend Predictor Variable</td>
</tr>
<tr>
<td>X₈</td>
<td>0 or 13-18</td>
<td>Trend Predictor Variable</td>
</tr>
<tr>
<td>X₉</td>
<td>0 or 19-24</td>
<td>Trend Predictor Variable</td>
</tr>
<tr>
<td>X₁₀</td>
<td>0 or 1-12</td>
<td>Restricted Trend Variable</td>
</tr>
<tr>
<td>X₁₁</td>
<td>0 or 5-18</td>
<td>Restricted Trend Variable</td>
</tr>
<tr>
<td>X₁₂</td>
<td>0 or 13-24</td>
<td>Restricted Trend Variable</td>
</tr>
</tbody>
</table>

of two ways. First, the slope of the trend line in the criterion values for the years prior to a given event and the years after the event would differ. If the slope of the trend line did not differ, the change in the criterion values could manifest itself as a change in the
intercept point of the trend lines of the two periods. If neither the slope of the trend line differed nor the intercept points differed, the data would not support the claim that the events were associated with changes in the equity measure.

The first set of hypotheses formed to assess the differences among the Gini coefficient values for Periods 1 and 2 was as follows:

1H$_0$: The slopes of the trend lines of the Gini coefficient values for Periods 1 and 2 do not differ.

1H$_1$: The slopes of the trend lines of the Gini coefficient values for Periods 1 and 2 do differ.

If the analysis of the multiple linear regression models designed to test 1H$_0$ indicated that this null hypothesis could not be rejected, the following set of hypotheses were tested:

2H$_0$: The y-intercept values of the trend lines of the Gini coefficient values for Periods 1 and 2 do not differ.

2H$_1$: The y-intercept values of the trend lines of the Gini coefficient values for Periods 1 and 2 do differ.

The second set of hypotheses formed to assess the differences among the Gini coefficient values for Periods 2 and 3 was as follows:

3H$_0$: The slopes of the trend lines of the Gini coefficient values for Periods 2 and 3 do not differ.

3H$_1$: The slopes of the trend lines of the Gini coefficient values for Periods 2 and 3 do differ.

If the analysis of the multiple linear regression models designed to test 3H$_0$ indicated that this null hypothesis could not be rejected, the following set of hypotheses were tested:
4H₀: The y-intercept values of the trend lines of the Gini coefficient values for Periods 2 and 3 do not differ.

4H₁: The y-intercept values of the trend lines of the Gini coefficient values for Periods 2 and 3 do differ.

The third set of hypotheses formed to assess the differences among the Gini coefficient values for Periods 3 and 4 was as follows:

5H₀: The slopes of the trend lines of the Gini coefficient values for Periods 3 and 4 do not differ.

5H₁: The slopes of the trend lines of the Gini coefficient values for Periods 3 and 4 do differ.

If the analysis of the multiple linear regression models designed to test 5H₀ indicated that this null hypothesis could not be rejected, the following set of hypotheses were tested:

6H₀: The y-intercept values of the trend lines of the Gini coefficient values for Periods 3 and 4 do not differ.

6H₁: The y-intercept values of the trend lines of the Gini coefficient values for Periods 3 and 4 do differ.

The first set of hypotheses formed to assess the differences among the McLoone index values for Periods 1 and 2 was as follows:

7H₀: The slopes of the trend lines of the McLoone index values for Periods 1 and 2 do not differ.

7H₁: The slopes of the trend lines of the McLoone index values for Periods 1 and 2 do differ.
If the analysis of the multiple linear regression models designed to test \( H_0 \) indicated that this null hypothesis could not be rejected, the following set of hypotheses were tested:

\( H_0 \): The y-intercept values of the trend lines of the McLoone index values for Periods 1 and 2 do not differ.

\( H_1 \): The y-intercept values of the trend lines of the McLoone index values for Periods 1 and 2 do differ.

The second set of hypotheses formed to assess the differences among the McLoone index values for Periods 2 and 3 was as follows:

\( H_0 \): The slopes of the trend lines of the McLoone index values for Periods 2 and 3 do not differ.

\( H_1 \): The slopes of the trend lines of the McLoone index values for Periods 2 and 3 do differ.

If the analysis of the multiple linear regression models designed to test \( H_0 \) indicated that this null hypothesis could not be rejected, the following set of hypotheses were tested:

\( H_0 \): The y-intercept values of the trend lines of the McLoone index values for Periods 2 and 3 do not differ.

\( H_1 \): The y-intercept values of the trend lines of the McLoone index values for Periods 2 and 3 do differ.

The third set of hypotheses formed to assess the differences among the McLoone index values for Periods 3 and 4 was as follows:

\( H_0 \): The slopes of the trend lines of the McLoone index values for Periods 3 and 4 do not differ.
11H₁: The slopes of the trend lines of the McLoone index values for Periods 3 and 4 do differ.

If the analysis of the multiple linear regression models designed to test 11H₀ indicated that this null hypothesis could not be rejected, the following set of hypotheses were tested:

12H₀: The y-intercept values of the trend lines of the McLoone index values for Periods 3 and 4 do not differ.

12H₁: The y-intercept values of the trend lines of the McLoone index values for Periods 3 and 4 do differ.

Multiple Linear Regression Models Used to Statistically Test the Null Hypotheses

Each null hypothesis that dealt with possible changes in the slopes of the estimated regression lines for the criterion variables was statistically tested through the analysis of two multiple linear regression models. The Full Models used in the testing of 1H₀ and 7H₀ allowed separate trends in the criterion values for each of the four time periods. The criterion variable for Full Model 1G consisted of the Gini coefficient values, while the criterion variable for Full Model 1M consisted of the McLoone index values.

Thus, the Full Models for 1H₀ and 7H₀ were as follows:

\[ Y_{1 \text{ or } 2} = \beta_0 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \varepsilon \]

Where:

1. \( \beta_0 \) was the estimated y-intercept value for the Period 1 trend line.
2. \( \beta_2 \) was the estimated difference between the y-intercept point of the trend line of Period 1 compared to the y-intercept point of the trend line of Period 2.
3. $\beta_3$ was the estimated difference between the y-intercept point of the trend line of Period 2 compared to the y-intercept point of the trend line of Period 3.

4. $\beta_4$ was the estimated difference between the y-intercept point of the trend line of Period 3 compared to the y-intercept point of the trend line of Period 4.

5. $\beta_6$ was the estimated slope of the trend line for Period 1.

6. $\beta_7$ was the estimated slope of the trend line for Period 2.

7. $\beta_8$ was the estimated slope of the trend line for Period 3.

8. $\beta_9$ was the estimated slope of the trend line for Period 4.

9. $\epsilon$ was the error term.

Full Model 2G and Full Model 2M, which were used in the testing of $3H_0$ and $9H_0$, respectively, were as follows:

$$Y_{1 \text{ or } 2} = \beta_0 + \beta_1X_1 + \beta_3X_3 + \beta_4X_4 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \epsilon$$

The criterion variable for Full Model 2G consisted of the Gini coefficient values, while the criterion variable for Full Model 2M consisted of the McLoone index values. Because variable $X_1$ has been entered in these models and the variable $X_2$ has been eliminated from them, as compared to Full Models 1G and 1M, the following should be noted for these models:

1. $\beta_1$ was the estimated difference between the y-intercept point of the trend line of Period 1 compared to the y-intercept point of the trend line of Period 2.

2. $\beta_3$ was the estimated difference between the y-intercept point of the trend line of Period 3 compared to the y-intercept point of the trend line of Period 2.

3. $\beta_4$ was the estimated difference between the y-intercept point of the trend line of Period 4 compared to the y-intercept point of the trend line of Period 2.
Full Model 3G and Full Model 3M, which were used in the testing of $5H_0$ and $11H_0$ were as follows:

$$Y_{1 \text{ or } 2} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_4 X_4 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \varepsilon$$

The criterion variable for Full Model 3G consisted of the Gini coefficient values, while the criterion variable for Full Model 3M consisted of the McLoone index values.

Because variable $X_2$ has been entered in these models and variable $X_3$ has been eliminated, as compared to Full Models 2G and 2M, the following should be noted for this model:

1. $\beta_1$ was the estimated difference between the $y$-intercept point of the trend line of Period 1 compared to the $y$-intercept point of the trend line of Period 3.

2. $\beta_2$ was the estimated difference between the $y$-intercept point of the trend line of Period 2 compared to the $y$-intercept point of the trend line of Period 3.

3. $\beta_4$ was the estimated difference between the $y$-intercept point of the trend line of Period 4 compared to the $y$-intercept point of the trend line of Period 3.

These six full multiple linear regression models were constructed to reflect the six research hypotheses (i.e., $1H_1$, $3H_1$, $5H_1$, $7H_1$, $9H_1$, and $11H_1$) that allowed separate trend lines. The Restricted Models 1G and 1M were used to test $1H_0$ and $7H_0$, which required the slopes for the trend lines of Periods 1 and 2 to be equal. This restriction placed in each of these models required that $X_6$ and $X_7$ be replaced in the corresponding full models by $X_{10}$. Thus, the Restricted Models 1G and 1M, which reflected $1H_0$ and $7H_0$, respectively, were as follows:

$$Y_{1 \text{ or } 2} = \beta_0 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \varepsilon$$
In each of these restricted models, \( \beta_{10} \) was equal to the combined slope for Periods 1 and 2. That is, the two slopes were forced to be equal.

The Restricted Models 2G and 2M, which were used in the testing of 3H_0 and 9H_0, required the slopes for the trend lines of Periods 2 and 3 to be equal. This restriction required that \( X_7 \) and \( X_8 \) be replaced by \( X_{11} \) in the corresponding Full Models 2G and 2M. Thus, the Restricted Models 2G and 2M, which reflected the conditions stated in 3H_1 and 9H_1, respectively, were as follows:

\[
Y_{1\text{ or }2} = \beta_0 + \beta_1X_1 + \beta_3X_3 + \beta_4X_4 + \beta_6X_6 + \beta_9X_9 + \beta_{11}X_{11} + \varepsilon
\]

In each of these restricted models, \( \beta_{11} \) was the estimated combined slope for Periods 2 and 3. That is, the two slopes were forced to be equal.

The Restricted Models 3G and 3M, which were used to test 5H_0 and 11H_0, required the slopes for the trend lines of Periods 3 and 4 to be equal. This restriction required that \( X_8 \) and \( X_9 \) be replaced by \( X_{12} \) in the corresponding full model. Thus, the Restricted Models 3G and 3M, which reflected the conditions contained in 5H_1 and 11H_1, respectively, were as follows:

\[
Y_{1\text{ or }2} = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_4X_4 + \beta_6X_6 + \beta_7X_7 + \beta_{12}X_{12} + \varepsilon
\]

In each of these restricted models, \( \beta_{12} \) was the estimated combined slopes for Period 3 and 4. That is, the two slopes were required to be equal.

To statistically test each of the null hypotheses that addressed the trend issues (i.e., 1H_0, 3H_0, 5H_0, 7H_0, 9H_0, and 11H_0) an \( F \) test was calculated for the differences between the \( R^2 \) values of the corresponding full and restricted models. The formula for the \( F \) test is as follows:
\[ F = \frac{(R^2_F - R^2_R)}{df_n} / \frac{(1-R^2_F)}{df_d} \]

Where:
1. The \( R^2_F \) and \( R^2_R \) values are the \( R^2 \) values for the full and restricted models, respectively.
2. \( df_n = \) number of X variables deleted from the full model to form the restricted model.
3. \( df_d = n - (\) number of X variables in the full model plus 1\( )\)

A significant \( F \) test indicated that the difference in the trends of the criterion values for the two successive periods was statistically significant. The alpha level was set equal to 0.05 for each \( F \) test.

If the difference of the slopes in the trend lines of the criterion values for two successive time periods was not statistically significant, the corresponding restricted model was used to determine if the difference between the y-intercept values for the trend lines combined slopes of the two given time periods was statistically significant. For each of the null hypotheses \( 2H_0 \) and \( 8H_0 \), the value for \( \beta_2 \) was equal to the difference between the y-intercept points of the regression lines for Periods 1 and 2, with their slopes being combined, that is, set equal to each other. The \( t \) test of the \( \beta_2 \) value indicated whether this difference was statistically significant. The alpha level was set equal to 0.05 for this \( t \) test and all following \( t \) tests of the regression coefficients.

For each of the null hypotheses \( 4H_0 \) and \( 10H_0 \), the value for \( \beta_3 \) was equal to the difference between the y-intercept points of the regression lines for Periods 2 and 3, with
their slopes being combined, that is, set equal to each other. The $t$ test of the $\beta_3$ value indicated whether this difference was statistically significant.

For each of the null hypotheses $6H_0$ and $12H_0$, the value for $\beta_4$ was equal to the difference between the y-intercept points of the regression lines for Periods 3 and 4, with their slopes being combined, that is, set equal to each other. The $t$ test of the $\beta_4$ value indicated whether this difference was statistically significant.

Summary of Methodology

This chapter explained the methods used in this quantitative study of the court decisions and legislative policy changes to the education funding system in Ohio and their effect on levels of equity among districts. Twelve hypotheses were designed to test the two research questions posed in this study. Full and restricted multiple linear regression models were designed and tested to determine whether the slopes in the regression lines for the Gini coefficient and McLoone index values changed between time periods. Multiple linear regression models were also designed and tested to determine whether the y-intercept points in the regression lines for the Gini coefficient and the McLoone index values differed between time periods. The next chapter presents the results obtained with those methods.
CHAPTER IV

RESULTS

Introduction

The purpose of this study was twofold. First, this study was undertaken to provide a history of school finance from 1980-2003 in the state of Ohio. This discussion of the history of Ohio school financing was presented in Chapter II.

Second, this study examined possible links between policy decisions and changes in the equity of the system in Ohio. The research questions that guided this portion of the study are:

Research Question 1: Do the Gini Coefficient values show that improvements in equity are associated with various policy changes since 1980?

Research Question 2: Do the McLoone index values show that improvements in equity are associated with various policy changes since 1980?

If the trends or levels of the Gini coefficient and the McLoone index values, which constitute the criterion variable values in the quantitative examination of these questions, change beyond what can be attributed to random variation following any of the three identified school funding changes in Ohio, Research Questions 1 and 2 will be answered in the affirmative. A change in the trends of either of these two criterion variables would be reflected by a change in the slope of the trend line for the years prior to a given event and the years after the event. If the slope of the trend line did not change between the time periods for two successive events, a change in either of the criterion variable values would be manifested by a change in the intercept point of the trend lines. If neither the slope of the trend line differed nor the intercept points differed, the data
would not support the claim that the events were associated with changes in a given equity measure.

This chapter presents the results of the analyses of the multiple linear regression models, including the results of the statistical tests of the 12 null hypotheses introduced in Chapter III. If any of the six null hypotheses that addressed the possible differences among trends in either the Gini coefficient values or the McLoone Index values could not be rejected, their corresponding null hypotheses were statistically tested to determine if a change occurred in the y-intercept values of the trend lines of the Gini coefficient or the McLoone index values.

This chapter is divided into two sections. The first section presents the results of the statistical tests of the multiple linear regression $R^2$ values and regression coefficients that were used to test the null hypotheses. The second section contains a summary of the analysis of the results presented in this chapter.

Results of the Analyses of the Multiple Linear Regression Models

*Testing the Estimated Trends in the Gini Coefficient Values*

If the trends or levels of the Gini coefficient value change beyond what can be attributed to random variation following any of the three identified school funding changes in Ohio, Research Question 1 will be answered in the affirmative. As demonstrated in Figure 1, a change in the trends of the Gini coefficient value would be reflected by a change in the slope of the trend line for the years prior to a given event and the years after the event. If the slope of the trend line did not change between the time periods for two successive events, a change in the Gini coefficient value would be manifested by a change in the intercept point of the trend lines. If neither the slope of the
trend line differed nor the intercept points differed, the data would not support the claim that the events were associated with changes in the given equity measure.

As discussed in Chapter III, the Gini coefficient values range from zero (perfect equality) to one (perfect inequality). As demonstrated by the best-fit lines for the Gini coefficient values in Figure 2, which were estimated by the ordinary least squares procedure, the slope and y-intercept points appear to change between periods. The function of the statistical tests of the Null Hypotheses 1H0 through 6H0 is to determine whether these changes are statistically significant.

Figure 2. Gini coefficient values with best-fit lines, by period.

The $R^2$ values of Full Model 1G and Restricted Model 1G were used to statistically test 1H0. In the restricted model, the slopes of the regression lines of the Gini coefficient values for Periods 1 and 2 were assumed to be equal. The analyses of these two models are listed in Table 3. The slopes of the trend lines for Periods 1 and 2 were .004 and .001, respectively. The difference between these slopes was statistically tested by conducting an $F$ test of the difference between the $R^2$ values of Full Model 1G and Restricted Model 1G, which were .89 and .87, respectively. The difference between
these two $R^2$ values, which was .02, was not statistically significant at the .05 level ($F(1, 16) = 2.02, p = .17$). Thus, the difference between the trends in the Gini coefficients for Periods 1 and 2 was not statistically significant at the .05 alpha level.

Because $H_0$ was not rejected, $2H_0$, which stated that the y-intercept points of the trend lines for Period 1 and Period 2 are not equal, was tested. It should be noted that the slopes of the trend lines for Periods 1 and 2, which were not statistically significant, were set equal for this test. The difference between the y-intercept points of the two trend lines was estimated by the regression coefficient of the Period 2 variable in Restricted Model 1G (see Table 3). The value of this coefficient was -.001, which indicates that the y-intercept point of the trend line for Period 2 is -.001 of a point lower than the y-intercept point of the trend line for Period 1. The $t$ test of this coefficient indicated ($t(16) = -0.28, p = .78$), however, that this difference is not statistically significant at the .05 alpha level.

Thus, the statistical test results of $H_0$ and $2H_0$ indicate that neither the trends nor the levels of the Gini coefficients for Periods 1 and 2 differed.

The difference in the $R^2$ values of Full Model 2G and Restricted Model 2G were used to statistically test $H_0$. In the restricted model, the slopes of the regression lines of the Gini coefficient values for Periods 2 and 3 were assumed to be equal. The analyses of these two models are listed in Table 4. The slopes of the trend lines for Periods 2 and 3 were .0006 and -.0062, respectively. The difference between these slopes was statistically tested by conducting an $F$ test of the difference between the $R^2$ values of Full Model 2G and Restricted Model 2G, which were .89 and .76, respectively. The difference between these two $R^2$ values, which was .13, was statistically significant at the .05 level.
Table 3

Full Model 1G and Restricted Model 1G

<table>
<thead>
<tr>
<th>Variables</th>
<th>Full Model 1G(^a)</th>
<th>Coefficient</th>
<th>t</th>
<th>Restricted Model 1G(^b)</th>
<th>Coefficient</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 2 (X₂)</td>
<td>.010</td>
<td>0.99</td>
<td></td>
<td>-.001</td>
<td>-0.28</td>
<td></td>
</tr>
<tr>
<td>Period 3 (X₃)</td>
<td>.103</td>
<td>4.68</td>
<td></td>
<td>.095</td>
<td>4.33</td>
<td></td>
</tr>
<tr>
<td>Period 4 (X₄)</td>
<td>-.026</td>
<td>-0.90</td>
<td></td>
<td>-.035</td>
<td>-1.17</td>
<td></td>
</tr>
<tr>
<td>Time*Period 1 (X₆)</td>
<td>.004</td>
<td>1.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time*Period 2 (X₇)</td>
<td>.001</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time*Period 3 (X₈)</td>
<td>-.006</td>
<td>-4.66</td>
<td></td>
<td>-.006</td>
<td>-4.52</td>
<td></td>
</tr>
<tr>
<td>Time*Period 4 (X₉)</td>
<td>.001</td>
<td>0.44</td>
<td></td>
<td>.001</td>
<td>0.42</td>
<td></td>
</tr>
<tr>
<td>Time*Period 1-2 (X₁₀)</td>
<td></td>
<td></td>
<td></td>
<td>.001</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.104</td>
<td>15.19</td>
<td></td>
<td>.113</td>
<td>31.55</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) R\(^2\) = .89; F (7, 16) = 18.08, p < .01

\(^b\) R\(^2\) = .87; F (6, 16) = 19.58, p < .01

\(\Delta R^2 = .02; F (1, 16) = 2.02, p = .17\)

\((F (1, 16) = 18.40, p = .001)\). Thus, the difference between the trends in the Gini coefficients for Periods 2 and 3 was statistically significant at the .05 alpha level. Because 3H₀ was rejected, 4H₀, which dealt with the y-intercept points of these two regression lines, was not statistically tested.

The difference in the \(R^2\) values of Full Model 3G and Restricted Model 3G were used to statistically test 5H₀. In the restricted model, the slopes of the regression lines of the Gini coefficient values for Periods 3 and 4 were assumed to be equal. The analyses of
these two models are listed in Table 5. The slopes of the trend lines for Periods 3 and 4 were -.006 and .001, respectively.

Table 4

*Full Model 2G and Restricted Model 2G*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Full Model 2Ga</th>
<th>Coefficient</th>
<th>t</th>
<th>Restricted Model 2Gb</th>
<th>Coefficient</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1 (X1)</td>
<td>-.010</td>
<td>-0.99</td>
<td>-.027</td>
<td>-2.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period 3 (X3)</td>
<td>.093</td>
<td>4.17</td>
<td>.001</td>
<td>0.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period 4 (X4)</td>
<td>-.037</td>
<td>-1.23</td>
<td>-.054</td>
<td>-1.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time*Period 1 (X6)</td>
<td>.004</td>
<td>1.75</td>
<td>.004</td>
<td>1.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time*Period 2 (X7)</td>
<td>.001</td>
<td>0.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time*Period 3 (X8)</td>
<td>-.006</td>
<td>-4.66</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time*Period 4 (X9)</td>
<td>.001</td>
<td>0.44</td>
<td>.001</td>
<td>0.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time*Period 2-3 (X11)</td>
<td></td>
<td>-.001</td>
<td>0.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.114</td>
<td>15.02</td>
<td>.132</td>
<td>14.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*R² = .89; F (7, 16) = 18.08, p < .01
*R² = .76; F (6, 16) = 8.91, p > .01
*ΔR² = .13; F (1, 16) = 18.40, p = .001

The difference between these slopes was statistically tested by conducting an F test of the difference between the R² values of Full Model 3G and Restricted Model 3G, which were .89 and .80, respectively. The difference between these two R² values, which was .09, was statistically significant at the .05 level (F (1, 16) = 12.97, p = .002). Thus, the difference between the trends in the Gini coefficients for Periods 3 and 4 was statistically...
significant at the .05 alpha level. Because $H_0$ was rejected, $H_0$, which dealt with the y-intercept points of these two regression lines, was not statistically tested.

Table 5

**Full Model 3G and Restricted Model 3G**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Full Model 3G $^a$</th>
<th>Restricted Model 3G $^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient $t$</td>
<td>Coefficient $t$</td>
</tr>
<tr>
<td>Period 1 ($X_1$)</td>
<td>-.103 -4.68</td>
<td>-.050 -2.34</td>
</tr>
<tr>
<td>Period 2 ($X_2$)</td>
<td>-.093 -4.17</td>
<td>-.040 -1.83</td>
</tr>
<tr>
<td>Period 4 ($X_4$)</td>
<td>-.130 -3.64</td>
<td>-.003 -0.40</td>
</tr>
<tr>
<td>Time*Period 1 ($X_6$)</td>
<td>.004 1.75</td>
<td>.004 1.34</td>
</tr>
<tr>
<td>Time*Period 2 ($X_7$)</td>
<td>.001 0.70</td>
<td>.001 0.54</td>
</tr>
<tr>
<td>Time*Period 3 ($X_8$)</td>
<td>-.006 -4.66</td>
<td></td>
</tr>
<tr>
<td>Time*Period 4 ($X_9$)</td>
<td>.001 0.44</td>
<td></td>
</tr>
<tr>
<td>Time*Period 3-4 ($X_{12}$)</td>
<td>-.003 -2.28</td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.207 9.92</td>
<td>.154 7.95</td>
</tr>
</tbody>
</table>

$^a R^2 = .89; F(7, 16) = 18.08, p < .01$

$^b R^2 = .80; F(6, 16) = 11.11, p < .01$

$\Delta R^2 = .09; F(1, 16) = 12.97, p = .002$

**Testing the Estimated Trends in the McLoone Index Values**

If the trends or levels of the McLoone index value change beyond what can be attributed to random variation following any of the three identified school funding changes in Ohio, Research Question 2 will be answered in the affirmative. As demonstrated in Figure 3, a change in the trends of the McLoone index value would be
reflected by a change in the slope of the trend line for the years prior to a given event and
the years after the event. If the slope of the trend line did not change between the time
periods for two successive events, a change in the McLoone index value would be
manifested by a change in the intercept point of the trend lines. If neither the slope of the
trend line differed nor the intercept points differed, the data would not support the claim
that the events were associated with changes in the given equity measure.

As discussed in Chapter III, the McLoone index values range from zero to one
and as they increase, equity increases for the lower half of the distribution. As
demonstrated by the best-fit lines for the McLoone index values in Figure 3, which were
estimated by the ordinary least squares procedure, the slope and y-intercept points appear
to change between periods. The function of the statistical tests of the Null Hypotheses
7H₀ through 12H₀ is to determine whether these changes are statistically significant.

Figure 3. McLoone index values with best-fit Lines, by period.

The R² values of Full Model 1M and Restricted Model 1M were used to
statistically test 7H₀. In the restricted model, the slopes of the regression lines of the
McLoone index values for Periods 1 and 2 were assumed to be equal. The analyses of these two models are listed in Table 6. The slopes of the trend lines for Periods 1 and 2 were .001 and -.00005, respectively. The difference between these slopes was statistically tested by conducting an $F$ test of the difference between the $R^2$ values of Full Model 1M and Restricted Model 1M, which were .85 and .85, respectively. The difference between these two $R^2$ values, which was $< .005$, was not statistically significant at the .05 level ($F(1, 16) = .794, p = .39$). Thus, the difference between the trends in the McLoone index for Periods 1 and 2 was not statistically significant at the .05 alpha level.

Because $H_0$ was not rejected, $8H_0$, which stated that the y-intercept points of the trend lines for Period 1 and Period 2 are equal, was tested. It should be noted that the slopes of the trend lines for Periods 1 and 2, which were not statistically significantly different, were set equal for this test. The difference between the y-intercept points of the two trend lines was estimated by the regression coefficient of the Period 2 variable in Restricted Model 1M (see Table 6). The value of this coefficient was .013, which indicates that the y-intercept point of the trend line for Period 2 is .013 of a point higher than the y-intercept point of the trend line for Period 1. The $t$ test of this coefficient indicated ($t(16) = 3.29, p = .004$), however, that this difference is statistically significant at the .05 alpha level. Thus, the statistical test results of $7H_0$ indicated that the McLoone index trends between Period 1 and Period 2 do not differ. However, the levels of the McLoone index values for Periods 1 and 2 differed.

The $R^2$ values of Full Model 2M and Restricted Model 2M were used to statistically test $9H_0$. In the restricted model, the slopes of the regression lines of the McLoone index values for Periods 2 and 3 were assumed to be equal. The analyses of
these two models are listed in Table 7. The slopes of the trend lines for Periods 2 and 3 were -.00008 and .003, respectively. The difference between these slopes was statistically tested by conducting an $F$ test of the difference between the $R^2$ values of Full Model 2M and Restricted Model 2M, which were .85 and .79, respectively. The difference between Table 6

*Full Model 1M and Restricted Model 1M*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Full Model 1M</th>
<th>Restricted Model 1M</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1Ma</td>
<td>1Mb</td>
</tr>
<tr>
<td>Coefficient</td>
<td>t</td>
<td>Coefficient</td>
</tr>
<tr>
<td>Period 2 (X₂)</td>
<td>.018</td>
<td>2.63</td>
</tr>
<tr>
<td>Period 3 (X₃)</td>
<td>-.031</td>
<td>-2.12</td>
</tr>
<tr>
<td>Period 4 (X₄)</td>
<td>-.018</td>
<td>-0.90</td>
</tr>
<tr>
<td>Time*Period 1 (X₆)</td>
<td>.001</td>
<td>0.89</td>
</tr>
<tr>
<td>Time*Period 2 (X₇)</td>
<td>-8.3 E-.05</td>
<td>-0.14</td>
</tr>
<tr>
<td>Time*Period 3 (X₈)</td>
<td>.003</td>
<td>3.05</td>
</tr>
<tr>
<td>Time*Period 4 (X₉)</td>
<td>.002</td>
<td>2.16</td>
</tr>
<tr>
<td>Time*Period 1-2 (X₁₀)</td>
<td>8.443</td>
<td>0.16</td>
</tr>
<tr>
<td>Intercept</td>
<td>.909</td>
<td>198.70</td>
</tr>
</tbody>
</table>

$^a R^2 = .85; F (7, 16) = 13.26, p < .01$

$^b R^2 = .85; F (6, 16) = 15.52, p < .01$

$\Delta R^2 = <.005; F (1, 16) = .794, p = .39$

these two $R^2$ values, which was .06, was statistically significant at the .05 level ($F (1, 16) = .699, p = .02$). Thus, the difference between the trends in the McLoone index for Periods 2 and 3 was statistically significant at the .05 alpha level. Because $H₀$ was
rejected, 10H₀, which dealt with the y-intercept points of these two regression lines, was not statistically tested.

Table 7

*Full Model 2M and Restricted Model 2M*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Full Model 2Mᵃ</th>
<th>Restricted Model 2Mᵇ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>t</td>
</tr>
<tr>
<td>Period 1 (X₁)</td>
<td>-.018</td>
<td>-2.63</td>
</tr>
<tr>
<td>Period 3 (X₃)</td>
<td>-.049</td>
<td>-3.32</td>
</tr>
<tr>
<td>Period 4 (X₄)</td>
<td>-.036</td>
<td>-1.80</td>
</tr>
<tr>
<td>Time*Period 1 (X₆)</td>
<td>.001</td>
<td>0.89</td>
</tr>
<tr>
<td>Time*Period 2 (X₇)</td>
<td>-8.3 E-.05</td>
<td>-0.14</td>
</tr>
<tr>
<td>Time*Period 3 (X₈)</td>
<td>.003</td>
<td>3.05</td>
</tr>
<tr>
<td>Time*Period 4 (X₉)</td>
<td>.002</td>
<td>2.16</td>
</tr>
<tr>
<td>Time*Period 2-3 (X₁₁)</td>
<td>.001</td>
<td>1.32</td>
</tr>
<tr>
<td>Intercept</td>
<td>.927</td>
<td>182.69</td>
</tr>
</tbody>
</table>

ᵃ R² = .85; F (7, 16) = 13.26, p < .01
ᵇ R² = .79; F (6, 16) = 10.58, p < .01
Δ R² = .06; F (1, 16) = 6.98, p = .02

The R² values of Full Model 3M and Restricted Model 3M were used to statistically test 11H₀. In the restricted model, the slopes of the regression lines of the McLoone index values for Periods 3 and 4 were assumed to be equal. The analyses of these two models are listed in Table 8. The slopes of the trend lines for Periods 3 and 4 were .003 and .002, respectively. The difference between these slopes was statistically
tested by conducting an $F$ test of the difference between the $R^2$ values of Full Model 3M and Restricted Model 3M, which were .85 and .85, respectively. The difference between these two $R^2$ values, which was .00, was not statistically significant at the .05 level ($F(1, 16) = .396, p = .54$). Thus, the difference between the trends in the McLoone index for Periods 3 and 4 was not statistically significant at the .05 alpha level.

Table 8

*Full Model 3M and Restricted Model 3M*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Full Model 3M</th>
<th>Restricted Model 3M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1 ($X_1$)</td>
<td>.031</td>
<td>.025</td>
</tr>
<tr>
<td>Period 2 ($X_2$)</td>
<td>.049</td>
<td>.043</td>
</tr>
<tr>
<td>Period 4 ($X_4$)</td>
<td>.013</td>
<td>-.001</td>
</tr>
<tr>
<td>Time*Period 1 ($X_6$)</td>
<td>.001</td>
<td>.001</td>
</tr>
<tr>
<td>Time*Period 2 ($X_7$)</td>
<td>-8.3 E-.05</td>
<td>-8.312</td>
</tr>
<tr>
<td>Time*Period 3 ($X_8$)</td>
<td>.003</td>
<td>3.05</td>
</tr>
<tr>
<td>Time*Period 4 ($X_9$)</td>
<td>.002</td>
<td>2.16</td>
</tr>
<tr>
<td>Time*Period 3-4 ($X_{12}$)</td>
<td></td>
<td>.002</td>
</tr>
<tr>
<td>Intercept ($X_{13}$)</td>
<td>.878</td>
<td>63.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>$t$</th>
<th>Coefficient</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period 1 ($X_1$)</td>
<td>.031</td>
<td>2.13</td>
<td>.025</td>
</tr>
<tr>
<td>Period 2 ($X_2$)</td>
<td>.049</td>
<td>3.32</td>
<td>.043</td>
</tr>
<tr>
<td>Period 4 ($X_4$)</td>
<td>.013</td>
<td>0.02</td>
<td>-.001</td>
</tr>
<tr>
<td>Time*Period 1 ($X_6$)</td>
<td>.001</td>
<td>0.89</td>
<td>.001</td>
</tr>
<tr>
<td>Time*Period 2 ($X_7$)</td>
<td>-8.3 E-.05</td>
<td>-0.14</td>
<td>-8.312</td>
</tr>
<tr>
<td>Time*Period 3 ($X_8$)</td>
<td>.003</td>
<td>3.05</td>
<td></td>
</tr>
<tr>
<td>Time*Period 4 ($X_9$)</td>
<td>.002</td>
<td>2.16</td>
<td></td>
</tr>
<tr>
<td>Time*Period 3-4 ($X_{12}$)</td>
<td></td>
<td>.002</td>
<td>3.76</td>
</tr>
<tr>
<td>Intercept ($X_{13}$)</td>
<td>.878</td>
<td>63.05</td>
<td>.884</td>
</tr>
</tbody>
</table>

$^a R^2 = .85; F(7, 16) = 13.26, p < .01$

$^b R^2 = .85; F(6, 16) = 15.97, p < .01$

$\Delta R^2 = .00; F(1, 16) = .396, p = .54$

Because $11H_0$ was not rejected, $12H_0$, which stated that the y-intercept points of the trend lines for Period 3 and Period 4 are not equal, was tested. It should be noted that
the slopes of the trend lines for Periods 3 and 4, which were not statistically significantly different, were set equal for this test. The difference between the y-intercept points of the two trend lines was estimated by the regression coefficient of the Period 4 variable in Restricted Model 3M (see Table 8). The value of this coefficient was -.001, which indicates that the y-intercept point of the trend line for Period 3 is .001 of a point lower than the y-intercept point of the trend line for Period 4. The $t$ test of this coefficient indicated ($t(16) = .334, p = .74$), however, that this difference is not statistically significant at the .05 alpha level. Thus, the statistical test results of $11H_0$ and $12H_0$ indicate that neither the trends nor the levels of the McLoone index for Periods 3 and 4 differed.

**Summary**

Twelve null hypotheses were posed in this study to determine whether the Gini coefficient and McLoone index values show that higher levels of equity are associated with various policy changes since 1980. If the trends or levels of the Gini coefficient and the McLoone index values changed beyond what can be attributed to random variation following any of the three identified school funding changes in Ohio, Research Questions 1 and 2 will be answered in the affirmative.

Based on the results of the testing of the six initial null hypotheses, that is, the ones that dealt with changes in trend lines, three of the null hypotheses that dealt with differences in the y-intercept points of the trend lines, were tested. Thus, a total of nine of the original 12 null hypotheses were tested.

The $R^2$ values of Full and Restricted Models 1G were used to statistically test $1H_0$. The difference between the $R^2$ values, which was .02, was not statistically
significant at the .05 level ($F(1, 16) = 2.02, p = .17$). Because $H_0$ was not rejected, $H_0$ was tested. The difference between the \textit{y}-intercept points of the two trend lines was estimated by the regression coefficient of the Period 2 variable in Restricted Model 1G, which resulted in a coefficient value of -.001. The \textit{t} test of this coefficient indicated ($t(16) = -0.28, p = .78$), however, that this difference is not statistically significant at the .05 alpha level. Thus, the statistical test results of $H_0$ and $H_0$ indicate that neither the trends nor the levels of the Gini coefficients for Periods 1 and 2 differed. Therefore, there was no change in the equity, as measured by the Gini coefficient, between Periods 1 and 2.

The $R^2$ values of Full Model 2G and Restricted Model 2G were used to statistically test $H_0$. The difference between the $R^2$ values of Full Model 2G and Restricted Model 2G, which was .13, was statistically significant at the .05 level ($F(1, 16) = 18.40, p = .001$). Therefore, the equity trends increased, as measured by the Gini coefficient in Period 3, which followed the six fiscal years after the equity fund was added to the school finance program in 1992.

In order to statistically test $H_0$, the $R^2$ values of Full Model 3G and Restricted Model 3G were tested. The difference between these two $R^2$ values, which was .09, was statistically significant at the .05 level ($F(1, 16) = 12.97, p = .002$). The decreased equity trend in Period 4, as measured by the Gini coefficient, followed the \textit{DeRolph} litigation.

The $R^2$ values of Full Model 1M and Restricted Model 1M were used to statistically test $H_0$. The difference between these two $R^2$ values, which was <.005, was not statistically significant at the .05 level ($F(1, 16) = .794, p = .39$). Because $H_0$ was not rejected, $H_0$ was tested. The difference between the \textit{y}-intercept points of the two trend lines was estimated by the regression coefficient of the Period 2 variable in Restricted
Model 1M, which resulted in a coefficient value of .013. The \( t \) test of this coefficient indicated \( t (16) = 3.29, p = .004 \), however, that this difference is statistically significant at the .05 alpha level. Thus, the statistical test results of 7H\(_0\) indicated that equity levels, as measured by the McLoone index, increased in Period 2, which followed the passage of an increased state income tax in 1983.

To statistically test 9H\(_0\), the \( R^2 \) values of Full and Restricted Models 2M were tested. The difference between these two \( R^2 \) values, which was .06, was statistically significant at the .05 level \( F (1, 16) = .6.99, p = .02 \). Thus, it appears that the equity trend increased in Period 3, which followed the addition of the equity fund in 1992.

The \( R^2 \) values of Full Model 3M and Restricted Model 3M were used to statistically test 11H\(_0\). The difference between these two \( R^2 \) values, which was .00, was not statistically significant at the .05 level \( F (1, 16) = .396, p = .54 \). Because 11H\(_0\) was not rejected, 12H\(_0\) was tested. The value of the regression coefficient was -.001, which indicates that the y-intercept point of the trend line for Period 3 is .001 of a point lower than the y-intercept point of the trend line for Period 4. The \( t \) test of this coefficient indicated \( t (16) = .396, p = .54 \), however, that this difference is not statistically significant at the .05 alpha level. Thus, the statistical test results of 11H\(_0\) and 12H\(_0\) indicate that no change in equity trends or equity levels occurred, as measured by the McLoone index, between Periods 3 and 4.
CHAPTER V

SUMMARY AND DISCUSSION

Introduction

The purpose of the final chapter is to provide an overview of the study with an emphasis on the results as they relate to school funding in Ohio. This chapter is divided into two sections. The first section restates the research problem, reviews the methodology, summarizes the results, and discusses the implications of the study. The discussion section focuses on the interpretation of the findings and possible implications for educators, as well as legislators. The second section addresses recommendations for future research.

With state and federal government reforms focusing more and more on student achievement goals, the issue of the education dollar continues to arise. Odden (2007) suggests that in order to meet these goals, districts must examine current funding practices to determine if the education dollar is effectively collected and utilized. He further states that education funding has risen at an annual rate of 3.5% over the past 100 years. However, Ohio continues to face issues of equity in per pupil expenditure levels, which is associated with the ability to generate local revenue for funding. In 2005 the wealthiest district\(^1\), Indian Hills, reported a per pupil assessed property valuation of $591,422, while the least wealthy, Trimble Local, reported a per pupil assessed property valuation of $40,141, a ratio of 14:1 (ODE, 2007).
Problem and Review of the Methodology

The purpose of this study was to construct a history of school finance from 1980-2003 to show the links between policy decisions and changes in the equity of the system. This study of Ohio school finance over a 24-year period described changes in funding equity among districts, in anticipation of providing insights for improving the current system.

A database was assembled for K-12 school districts in Ohio for the fiscal years 1980 to 2003, inclusive. Joint Vocational School Districts (JVSD) and Educational Service Centers (ESC) were not included in the database because JVSDs and ESCs are funded through different mechanisms than K-12 districts. In addition, the analyses in this study used student equity as the goal, and all students in Ohio are assigned to a K-12 district for purposes of funding. The total number of districts in the database differed slightly from year to year, ranging from 598 to 602, because some districts were split off from others or consolidated with others.

The 24 years in the database were divided into periods marked by major policy changes, as follows: (a) Fiscal years 1980 through 1983 were identified as the Period 1 (base period), (b) Fiscal years 1984 through 1991 were identified as Period 2 (following passage of 1983 state income tax increase), (c) Fiscal years 1992 through 1997 were identified as Period 3 (following the addition of the Equity Fund), and (d) Fiscal years 1998 through 2003 were identified as Period 4 (effects of DeRolph litigation).

Full and restricted multiple linear regression models were designed and tested to determine whether the slopes in the regression lines for the Gini coefficient and McLoone index values changed between time periods. Multiple linear regression models were also
designed and tested to determine whether the y-intercept points in the regression lines for the Gini coefficient and the McLoone index values differed between time periods. The dependent and independent variables were identified and described in Table 2, which was presented in Chapter III.

Summary of the Results

The research questions that guided the study were:

Research Question 1: Do the Gini Coefficient values show that improvements in equity are associated with various policy changes since 1980?

Research Question 2: Do the McLoone index values show that improvements in equity are associated with various policy changes since 1980?

The goal of this study was to construct a history of school finance from 1980-2003 to show the links between policy decisions and changes in the equity of the system.

Summary of the Estimated Trends in the Gini Coefficient Values

The Gini coefficient was statistically tested using multiple linear regression models. The equity trend was statistically significantly greater in Period 3 than in Period 2. The increased equity trend between Periods 2 and 3 followed the addition of the equity fund in 1992. Additionally, the equity trend in Period 4 was statistically significantly less than in Period 3. The decreased equity trend between Periods 3 and 4 followed FY 1998, the effective date of reforms to the school finance program enacted in response to the DeRolph I court decision (See Table 9).
Table 9

Summary of Results

<table>
<thead>
<tr>
<th>Research Hypothesis</th>
<th>Interpretation</th>
<th>H₀ Rejected?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1H₁</td>
<td>The equity trends indicated by the Gini coefficients in Periods 1 and 2 are different.</td>
<td>No.</td>
</tr>
<tr>
<td>2H₁</td>
<td>The levels of equity indicated by the Gini coefficients in Periods 1 and 2 are different.</td>
<td>No.</td>
</tr>
<tr>
<td>3H₁</td>
<td>The equity trends indicated by the Gini coefficients in Periods 2 and 3 are different.</td>
<td>Yes. The equity trend improved more in Period 3 than in Period 2.</td>
</tr>
<tr>
<td>5H₁</td>
<td>The equity trends indicated by the Gini coefficients in Periods 3 and 4 are different.</td>
<td>Yes. The equity trend decreased more in Period 4 than in Period 3.</td>
</tr>
<tr>
<td>7H₁</td>
<td>The equity trends indicated by the McLoone indices in Periods 1 and 2 are different.</td>
<td>No.</td>
</tr>
<tr>
<td>8H₁</td>
<td>The levels of equity indicated by the McLoone indices in Periods 1 and 2 are different.</td>
<td>Yes. The level of equity in Period 2 is higher than in Period 1.</td>
</tr>
<tr>
<td>9H₁</td>
<td>The equity trends indicated by the McLoone indices in Periods 2 and 3 are different.</td>
<td>Yes. The equity trend improved more in Period 3 than in Period 2.</td>
</tr>
<tr>
<td>11H₁</td>
<td>The equity trends indicated by the McLoone indices in Periods 3 and 4 are different.</td>
<td>No.</td>
</tr>
<tr>
<td>12H₁</td>
<td>The levels of equity indicated by the McLoone indices in Periods 3 and 4 are different.</td>
<td>No.</td>
</tr>
</tbody>
</table>

Summary of the Estimated Trends in the McLoone Index Values

The McLoone index was statistically tested using multiple linear regression models. The difference between the trends in the McLoone index values was not statistically significant between Periods 1 and 2. However, the level of equity in Period 2
is statistically significantly higher than in Period 1. Thus, it appears that equity increased between the two periods for the lower half of the distribution, which followed the increased income tax in 1983. Further, the equity trend improved more in Period 3 than in Period 2, which followed the addition of the equity fund in 1992. Additionally, the difference between neither the trends nor the levels in the McLoone index values was statistically significant between Periods 3 and 4 (See Table 9).

Discussion and Implications

The findings suggest that the passage of the state income tax in 1983 increased equity levels, as measured by the McLoone index, for Ohio school districts. The reported value of the regression coefficient of the Period 2 variable was .013, which indicates that the y-intercept point of the trend line for Period 2 is .013 of a point higher than the y-intercept point of the trend line for Period 1. The statistically significant difference in y-intercept points suggests that the passage of the income tax preceded statistically significant improvements in the equity levels of per pupil spending for Ohio school districts.

In Period 3, the addition of the equity fund increased the equity trend, as measured by the Gini coefficient and, as measured by the McLoone index of per pupil spending for Ohio school districts. The reported slope values in Period 3 for the Gini coefficient and the McLoone index were -.006 and .003, respectively. The slope values suggest that the addition of the equity fund in Period 3 preceded statistically significant improvement in the equity trend and the equity level of per pupil spending for Ohio school districts. Specifically, after Governor Voinovich proposed and the General
Assembly enacted the addition of the equity fund to the funding formula, the slope values of Period 3 showed a significantly improving equity trend than the other periods.

Conversely, in Period 4, the equity trend decreased. The reported slope values for the Gini coefficient in Periods 3 and 4 were -.006 and .001, respectively. The significantly different slope values between Periods 3 and 4 for the Gini coefficient suggest that reforms enacted after the DeRolph I decision decreased the horizontal equity of the system.

The infusion of money into the funding system related to the increased income tax in 1983 and the addition of the equity fund in 1992 appear to have had greater influence on the equity of the funding system than the reforms enacted following the DeRolph I decision. Additionally, increasing the charge-off to 23-mills in Period 3 may have strengthened the equity trend in that period. In response to the DeRolph I decision, the legislature hired consultant John Augenblick to develop a rationale for the base amount in the school aid formula. However, the legislators chose a base funding amount significantly lower than the amount recommended by Augenblick (1997). They also phased out the equity fund, which may be associated with the difference in equity between Periods 3 and 4. Atkins (2007) found that Ohio actually spent $1,324 per pupil more in 2004 than projections based on growth trends before the Court mandate. In light of this increased spending, the DeRolph litigation appears to have had an effect on the level of education funding in Ohio if not the equity.

According to Atkins (2007), since 1977, 27 state courts have held their respective school funding methods to be unconstitutional. These court rulings led to an additional $34 billion in additional spending, which equated to a national average of $976 per pupil
Ohio ranked tenth in total cost of legislative compliance to meet the Court mandates in *DeRolph* at a total cost per-pupil of $1,109. Following the *DeRolph* litigation, it appears that the state of Ohio improved the level of per pupil expenditures. However, the state did not improve the overall equity of per pupil expenditures (Gini coefficient) or equity for the lower half of the distribution (McLoone index).

**Implications**

Because of the data analysis, it is evident that the funding equity among districts in the state of Ohio showed significant change over the course of this study. However, this improvement was inconsistent for each time period. It appears that significant improvements in equity occurred after the increase in the state income tax in 1983 and the addition of the equity fund in 1992. As discussed in Chapter II, Fleeter (1995) analyzed the addition of an equity fund. As he predicted in his analysis of revenue-pooling options available under proposed S.B. 237 (Table 1), the addition of a $52 million equity fund increased the equity of the funding system, as demonstrated by the equity statistics.

The Ohio school funding formula has changed dramatically since the introduction of the equal-yield formula in 1980. Unfortunately, the changes in the formula have not resulted in a more equitable system of funding education. Edlefson and Barrow (2002) reported that the legislature improved education funding as a proportion of total state spending after the 1997 *DeRolph I* decision. However, other forces such as increased millage rates in districts that were able to pass levies and tax relief also affected the equity of the system.
In order for equity to improve, the Ohio General Assembly must heed the results of the *DeRolph* litigation, which found the Ohio funding system to be unconstitutional. Adjustments must be made to the funding system that lowers the relationship between the fiscal capacity of a district and adjusted current expenditures per-pupil. It is clear that the current system relies heavily on local revenue, which is raised through property taxes, to fund school districts. In 2006, according to ODE, districts placed 4,500 different tax issues on the ballot of which 2,519 passed, a dismal 55.9%. Most districts in Ohio needed regularly to seek voter approval of tax rates in order to maintain existing program levels. Further, due to the unequal ability of districts to produce local funds and the continuing struggle districts face to approve new millage, disparities and inequity continue to occur.

In 2004, residential and agricultural property accounted for 59.3% of all property taxes (Ohio Department of Taxation, 2007, p. 2). Additionally, the two phases of tangible property account for only 19.6% of all taxes. As the state completes the phase-out of the tangible property tax, the tangible property tax will make up approximately six percent of total property taxes. These percentages indicate that the property tax burden on business is declining, while the burden on homeowners and voters is increasing. Unfortunately, the increased burden on homeowners and voters may result in the need for additional levies, which are becoming increasingly more difficult to pass.

The Gini coefficient values showed an increased equity trend for Period 3, but a decrease in Period 4, which demonstrates decreased equity when comparing all districts in the state. The policy objectives for the Gini coefficient and the McLoone index differ. The Gini coefficient is concerned with providing each proportion of students with equal proportions of expenditures over the entire distribution. Conversely, the McLoone index
is the ratio of the actual sum of per-pupil adjusted current expenditures for pupils below
the median to the sum of per-pupil adjusted current expenditures that would exist if each
pupil below the median were at the per-pupil adjusted current expenditure. However, it is
interesting to note that both measures of equity showed improvements following the
addition of the equity fund.

In 1980, primary and secondary education funding represented approximately
42% of the overall state budget, compared to approximately 39% in 2007 (Ohio
Legislative Service Commission, 2007). The three percent decrease in the proportion of
the state budget for education over the course of 28 years seems contradictory for a
funding system that was ruled unconstitutional through the DeRolph litigation. Further,
due to reduction factors associated with H.B. 920, as of 2005, 384 (62.5%) school
districts were at the 20-mill floor (Ohio Department of Taxation, 2007, p. 8). By reaching
the 20-mill floor, no further reductions in the effective tax rate can occur. Once a district
reaches the 20-mill floor, the district can obtain additional funds through an emergency
levy or an income tax. In 2005, 69% of the districts at the 20-mill floor had either
property tax levies or income taxes as part of their funding (p. 9). In the current political
climate, where reduced taxation recurs as a theme, the reliance on voter approval of
additional taxes to increase funding is a difficult prospect.

School leaders and the Ohio General Assembly must work collaboratively to
create a funding system that does not force districts to rely heavily on local tax dollars.
Further, the issue of “phantom revenue” caused by the reduction factor in H.B. 920 must
be addressed. It is contradictory for a property tax system that restricts local growth to be
associated with a funding formula that assumes such growth. Historical attempts to
address this issue (i.e., gap aid, the reappraisal guarantee, recognized value) have inherently failed to improve the overall equity of the system, as demonstrated by this study. It appears that equity becomes one policy goal in a list of ever-competing demands for the legislature. As long as members of the legislature continue to face the re-election process, funding equity for Ohio’s schools will continue to compete with all other funding interests.

Recommendations for Future Research

A historical study of this nature had not previously been conducted for the 24-year span of this study. Events were identified that may have related to an increase or decrease in equity for a given time period. Although this study concentrated on a 24-year time span for per-pupil funding in the state of Ohio, further data could be gathered from 2004 forward. Additional events could also be identified that may have resulted in a change in equity.

It may be important for future research to focus on the concept of adequacy. Adequacy is the premise that a specific funding level is associated with the opportunity for all students to meet the academic expectations set before them. A future study could focus on funding dollars and their respective output levels (i.e., graduation rate, proficiency test scores, average yearly progress, etc.) to determine if the funding received by school district was adequate.

Summary

The ever-increasing number of Ohio school districts forced to place school levies on the ballot to meet budgeting needs resulted in a need to reexamine the current funding formula. A historical analysis of the current system and the identification and statistical
testing of major events that may have changed the overall equity of the system (i.e., litigation, major policy changes) may help educational leaders and policy makers gain a better understanding of possible changes needed to improve the overall equity of the current system of funding.

The results of this study reveal that differences in trends and levels of the Gini coefficient and McLoone index values were associated with the identified major events. It is clear that it requires a major increase in monies and the targeting of monies to lower-spending districts to improve equity among all districts in the current funding system. In order for changes to occur, it requires a collaborative effort between school leaders and policy makers to improve the equity of the system.
End Notes

1. This statement regarding the wealthiest district excludes Kelley’s Island and Put-In Bay because they have student populations of less than 100 students.

2. These students are excluded because 5% of the students from the wealthiest districts are atypical and skew the data.

3. Adjusted for regional price differences and receiving weights of 1.2 for students in poverty and 1.9 for special needs students.

4. Data reported in 1990-91 constant dollars.
References


Augenblick, J. (1997). *Recommendations for a Base Figure and Pupil Weighted Adjustments to the Base Figure for Use in a New School Finance System in Ohio*. Report presented to the School Funding Task Force. Ohio Department of Education, Columbus, OH.


DeRolph I. (1997). No. 95-2066, Supreme Court of Ohio, 78 Ohio St. 3d 193; 1997 Ohio 84; 677 N.E.2d 733; 1997 Ohio LEXIS 687.

DeRolph II. (2000). No. 99-570, Supreme Court of Ohio, 89 Ohio St. 3d 1; 2000 Ohio 437; 728 N.E.2d 993; 2000 Ohio LEXIS 994.

DeRolph III. (2001). No. 99-570, Supreme Court of Ohio, 93 Ohio St. 3d 309; 2001 Ohio 1343; 754 N.E.2d 1184; 2001 Ohio LEXIS 2190.

DeRolph IV. (2002). No. 1999-0570, Supreme Court of Ohio, 97 Ohio St. 3d 434; 2002 Ohio 6750; 780 N.E.2d 529; 2002 Ohio LEXIS 3025.


Edgewood v. Kirby, No. C-8353, Supreme Court of Texas, 777 S.W.2d 391; 1989 Tex. LEXIS 129.


*Miller v. Korns*, Nos. 17725, 17724, Supreme Court of Ohio, 107 Ohio St. 287; 140 N.E. 773; 1923 Ohio LEXIS 280; 1 Ohio L. Abs. 308.


http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODEDetail.aspx?page=3&
TopicRelationID=1214&ContentID=26549&ContentID=30595


http://tax.ohio.gov/divisions/tax_analysis/tax_data_series/tangible_personal_property/pd16/pd16cy84.stm


http://www.lbo.state.oh.us/fiscal/budget/testimony/126ga/AgencyHistoricalExpenditures2006-09.pdf

Testimony presented to the Senate School Finance Task Force and the Select Committee to Study Ohio’s School Foundation Program and Distribution of State Funds to School Districts. Columbus, OH.


APPENDIX A

GINI COEFFICIENT AND MCLOONE INDEX VALUES 1980-2003
# Appendix A

## Gini coefficient Values 1980-2003

<table>
<thead>
<tr>
<th>Year</th>
<th>Gini Coefficient</th>
<th>Year</th>
<th>Gini Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>.105934984</td>
<td>1993</td>
<td>.121294054</td>
</tr>
<tr>
<td>1982</td>
<td>.121353033</td>
<td>1994</td>
<td>.117671199</td>
</tr>
<tr>
<td>1983</td>
<td>.121650560</td>
<td>1995</td>
<td>.105299255</td>
</tr>
<tr>
<td>1984</td>
<td>.123553175</td>
<td>1996</td>
<td>.099009857</td>
</tr>
<tr>
<td>1985</td>
<td>.123462900</td>
<td>1997</td>
<td>.096215066</td>
</tr>
<tr>
<td>1986</td>
<td>.116305742</td>
<td>1998</td>
<td>.091132354</td>
</tr>
<tr>
<td>1987</td>
<td>.108106868</td>
<td>1999</td>
<td>.088378114</td>
</tr>
<tr>
<td>1989</td>
<td>.123666869</td>
<td>2001</td>
<td>.086265919</td>
</tr>
<tr>
<td>1990</td>
<td>.127350234</td>
<td>2002</td>
<td>.092833570</td>
</tr>
<tr>
<td>Year</td>
<td>McLoone Index</td>
<td>Year</td>
<td>McLoone Index</td>
</tr>
<tr>
<td>------</td>
<td>---------------</td>
<td>------</td>
<td>---------------</td>
</tr>
<tr>
<td>1980</td>
<td>0.91446641</td>
<td>1992</td>
<td>0.912201706</td>
</tr>
<tr>
<td>1981</td>
<td>0.908607042</td>
<td>1993</td>
<td>0.913692033</td>
</tr>
<tr>
<td>1982</td>
<td>0.908152591</td>
<td>1994</td>
<td>0.921713807</td>
</tr>
<tr>
<td>1983</td>
<td>0.919590669</td>
<td>1995</td>
<td>0.922142605</td>
</tr>
<tr>
<td>1984</td>
<td>0.925577009</td>
<td>1996</td>
<td>0.927905216</td>
</tr>
<tr>
<td>1985</td>
<td>0.921375086</td>
<td>1997</td>
<td>0.922669058</td>
</tr>
<tr>
<td>1986</td>
<td>0.930055258</td>
<td>1998</td>
<td>0.926231021</td>
</tr>
<tr>
<td>1987</td>
<td>0.930337510</td>
<td>1999</td>
<td>0.930801417</td>
</tr>
<tr>
<td>1988</td>
<td>0.929875951</td>
<td>2000</td>
<td>0.934000481</td>
</tr>
<tr>
<td>1989</td>
<td>0.922619576</td>
<td>2001</td>
<td>0.932578294</td>
</tr>
<tr>
<td>1990</td>
<td>0.925234107</td>
<td>2002</td>
<td>0.933567049</td>
</tr>
<tr>
<td>1991</td>
<td>0.925075788</td>
<td>2003</td>
<td>0.938372819</td>
</tr>
</tbody>
</table>