

**A LONGITUDINAL ANALYSIS OF THE EQUITY OF PUBLIC SCHOOL  
FUNDING IN THE COMMONWEALTH OF PENNSYLVANIA**

by

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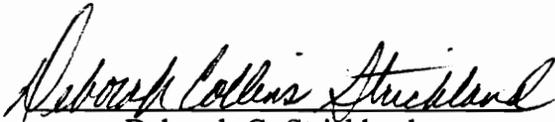
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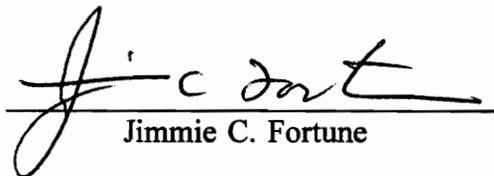
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(ABSTRACT)

The purpose of this study was to analyze commonly used indices of public school funding equity for the Commonwealth of Pennsylvania for the school years 1982-83 through 1992-93. The variables of market value of property, actual instructional expense (AIE), local plus state revenue (revenue), average daily membership (ADM) and weighted average daily membership (WADM) were collected for five hundred similarly operated school districts.

Equity statistics on the variables were generated using a program developed by Verstegen and Stevens (1991). The relationship between the equity statistics generated and legislative actions associated with school funding for the Commonwealth were analyzed. Additionally, an alternative method of funding schools in the Commonwealth was developed based on the 1992-93 school year data.

In general, the statistics generated showed a decrease in equity of AIE and revenue distributions from the 1982-83 school year through 1989-90. The last few years studied indicated improvement in the distributions, with the primary source of improvement being a change in the method of state support for special education. The

legislative efforts to improve overall support for school districts, especially those found at the less wealthy end of the wealth spectrum, were diminished by the funding formula methodology. This methodology has since been eliminated, and replaced with a guaranteed foundation level of funding, which is still hampered by political considerations.

The system of funding public schools in the Commonwealth of Pennsylvania has changed dramatically in the last several years in an attempt to meet the educational mandate found in the constitution of the Commonwealth. The equity statistics and analyses presented here indicate that the system has fallen short of meeting that goal during the period studied.

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# CHAPTER I

## INTRODUCTION

The efficacy of public school funding around the United States has been under tremendous scrutiny for the last several years. Numerous states have had their statutory funding provisions challenged in court, with several being found inadequate. Courts frequently have mandated new methods of funding to augment the educational opportunity of pupils attending schools in districts that are financially unable to offer at least minimum levels of opportunity. One of the tools used by the courts to determine equity of a funding system has been through the use of equity statistics.

The field of public school finance has generated numerous methods of analysis, among which equity statistics of various types have been widely used. The basic thrust of most equity statistics has been to measure the disparities, or differences, in input variables among a states' school districts. A smaller number of statistics have been used to measure the strength of the relationship that exists between the fiscal capacity and the several inputs of school districts.

### **Purpose**

The purpose of this research is to apply and analyze selected equity statistics over an eleven-year period, from the 1982-83 school year through 1992-93, for the Commonwealth of Pennsylvania. Legislative changes during this eleven-year period will be identified and examined pursuant to their effects on the equity statistics scores.

Finally, an alternative method of funding will be analyzed and proposed. Where appropriate, the analyses and discussion will incorporate the existing constitutional provisions and how they might be interpreted in order to improve the level of equity provided by the state system of funding.

### **Significance**

Few studies have analyzed school funding data over extended periods of time to determine equity trends. The results of this study will hopefully further the understanding of public school funding, state funding formulas, and how legislation affects the entire process and is an integral part of the process, at least for the Commonwealth of Pennsylvania. The results of this study may have some effect on the interpretation of how well the educational mandate for the Commonwealth of Pennsylvania has been carried out during the period studied.

### **Limitations and Delimitations of the Study**

This study does not address the issue of what constitutes funding adequacy. While adequacy and equity are inter-related and cannot be totally separated from each other, this study only analyzes the equity of expenditure and revenue distributions for the Commonwealth of Pennsylvania.

This study does not attempt to determine exactly where funds have been spent, or how they may be more efficiently spent to improve educational opportunity for the pupils of Pennsylvania. It is assumed that additional revenues and expenditures

allocated to improve educational opportunities would be done so efficiently, and would result in improved educational outcomes.

The alternative funding scheme proposed in Chapter VI assumes average state revenue levels would support an adequate educational opportunity for the pupils of Pennsylvania. This alternative funding scheme is certainly not the only alternative to the ESBE in place during the study period, or the new system put in place for the 1993-94 school year, but is one developed by the researcher.

The Commonwealth of Pennsylvania changed accounting policy in the 1991-92 school year concerning what constituted state revenue to the 500 districts in the study. Prior to the 1991-92 school year, funds for special education were handled separately, and were not included as state revenue to the districts. In the 1991-92 school year, the Pennsylvania Department of Education chose to send approximately \$500 million of special education funds directly to the 500 districts as part of state revenue assistance. This study did not remove those funds, as they were reported on the annual financial report (AFR) tapes in a manner consistent with the previous years in the study. The effect of this accounting change on the equity indices is discussed.

### **Organization of the Study**

This study has been organized into six chapters. Chapter I contains a brief introduction, purpose and significance of the study, as well as limitations and delimitations. Chapter II discusses related issues to the analysis of equity in public

school funding. Chapter III explains the methodology of the study conducted, including the choice of variables used and their origin.

Chapter IV uses text and graphics to show the results of the equity analyses, while Chapter V discusses the implications of the results and how legislation has affected, or caused, those results. An alternative funding scheme developed by the researcher to improve the equity of funding for the Commonwealth of Pennsylvania is given in Chapter VI.

## CHAPTER II

### DISCUSSION OF RELATED ISSUES

The Constitution of the United States does not mention education, thereby reserving the power to the individual states to determine how best to govern, promote and fund education. As each state developed their own constitutional provisions, supplemented over time by statutory and common law, the governance of education has evolved to become a very complex, constantly changing, societal issue.

At the center of this issue is not the concept that in the United States all children are entitled to an education for the betterment of themselves and society, but the quality of that education. Should a pupil be entitled to an equivalent education of another pupil found in a different part of the same governing body, in this case, the state? Musgrave (1959) in his classic writings on public finance refers to social policy requiring equality of opportunity, which can be measured by various wealth measures. He also refers to horizontal and vertical equity of wealth, and that they are "but different sides of the same coin" (p. 160). The concept of horizontal equity refers to people in equal positions being treated equally. The concept of vertical equity refers to people in different positions being treated fairly and equally in relation to their position. Musgrave provides a basis in 1959 for the current reform efforts underway today to resolve inequality in resource allocations in support of education when he said, "If there is no specified reason for discriminating among unequals, how can there be a reason for avoiding discrimination among equals? Without a scheme of vertical

equity, the requirement of horizontal equity at best becomes a safeguard against capricious discrimination--a safeguard which might be provided equally well by a requirement that taxes be distributed at random" (Musgrave, 1959, p. 160). This concept of public finance theory supports the societal desire to have a basically equivalent educational opportunity for all children. Since the jurisdiction over education resides with each state, each state must devise its own method of achieving this goal. To perform this task, each state has depended on legislative and judicial interpretation of their respective constitutions as to how education will be funded. When society, represented typically by school districts that are less wealthy, feels that educational opportunity is lacking for some pupils, a reform effort is begun. This reform effort sometimes takes the form of a legal complaint, requiring judicial inspection of the existing method of financing public education. This inspection requires that a state involved in such a reform effort refer to their constitution, and determine if the current system of school funding does indeed meet the requirements found in it.

### **Education as a Fundamental Right**

The states are split in their interpretation of constitutional provisions on the issue of education being a fundamental right. The states in which the supreme court has ruled on this issue slightly favor the right to be a fundamental one, that is, a right to be expressly protected by the constitution (Appendix B).

Prior to a 1973 United States Supreme Court decision (San Antonio Independent School District v. Rodriguez), several cases concerning the right to an equal education were tried in the federal judicial system. Complaints of disparate or unequal educational opportunities were filed under the Equal Protection Clause of the United States Constitution. However, in 1973, the United States Supreme Court made it clear that education was not a fundamental right under federal protection, that education was primarily a state issue, and therefore requires clarification at the state level (Rodriguez). From this case, a three part test has been established to determine the level of scrutiny that legislative actions regarding education are subject to, and to determine if individual rights are subject to protection. This three part test has been utilized by states to review their actions in light of their own equal protection clauses.

The Supreme Court in Rodriguez appeared to distinguish the importance of state control over the funding of education from the importance of racial segregation issues argued in the Brown case in 1954. The Brown court felt that education was fundamental at the federal level, while the Rodriguez court left the establishment of educational funding and fundamentality to the individual states. Due to the current finance reform litigation present, the Supreme Court may be called upon to clarify this issue.

### **Rational, Intermediate and Strict Scrutiny**

The rational basis test, which is the lowest level of scrutiny, will be used if and when the affected individuals are not from a suspect class, such as race, or when

fundamental rights have not been violated. In Pennsylvania and most states, legislation will not fail the rational basis test if the action or legislation proposed is related to a legitimate government interest. This level of scrutiny is the easiest to pass, as the actions of the legislature need only be rationally, or to some, only remotely related to the constitutional goal of providing an education to the citizens of the state. At the other end of the spectrum legislation faces what is known as strict scrutiny. Under this level, legislative actions must be for a compelling state purpose. Individuals affected may be in suspect classes or have some rights placed in jeopardy if the state can show, under strict scrutiny, that the legislation in place has the least impact on protected classes while achieving the desired goal or objective. It is difficult for legislative action to pass this level of inspection.

The third level of judicial oversight falls between the other two, and is known as the intermediate standard. The level of scrutiny is higher than under the rational basis test, but not as great as under the strict scrutiny test. This level is used when a sensitive class of individual may lose important interests, or rights, but has the opportunity to challenge the legislation and show that the state interest is not furthered by the denial of their rights.

Education in American society has enjoyed a certain level of protection at the federal level since Brown v. Board of Education. A now famous quote from that case establishes the importance of education to Americans: "In these days, it is doubtful that any child may reasonably be expected to succeed in life if he is denied the opportunity of an education. Such an opportunity, where the state has undertaken to provide it, is

a right which must be made available to all on equal terms" (347 U.S. at 493, 1954). While Brown was based on a racial issue, the concept of equal terms was established. The 1973 Rodriguez case mentioned earlier places the burden on the states, not the federal government, to be "equal" regarding educational rights.

### **Wealth Disparity**

The individual state constitutions therefore are relied upon to determine the rights of pupils to an education, and the composition of that education. As each state has dealt with education and the funding of education differently, numerous challenges to the appropriateness and constitutionality of those efforts have occurred. Most of the challenges involve the level of funding and support that each pupil receives, either comparatively or in absolute terms. Funding of education varies greatly from state to state, depending on a multitude of factors, including the relative wealth of the state. Some states force localities to pay for the vast majority of the expenses associated with education, such as New Hampshire, which funds less than ten percent of total revenue (National Education Association, 1993-94, p. 38). Other states assume the burden of paying for the majority of educational expenses. The state of Hawaii, composed of a single district, collects funds and then distributes them to individual schools, thus establishing a system that is ostensibly equitable. In between the two extremes can be found the efforts of most states, with the percentages of state support varying based on the formulas and programs of the individual states. Several different types of programs exist, such as flat grants, matching grants, and equalization programs,

including foundation programs, to support the funding of education, many of which are extremely complex and tedious to compute. In general, however, as the percentage of state support increases, the equitable treatment of pupils in the entire state, related to funding, also increases. States that support education financially to a lesser degree, depending instead on localities to do so, introduce the opportunity of greater disparities, or unequal funding of pupils across the state. **This is not to say that the funding in either case is adequate to meet the needs of the pupils within the state.**

Taken to the extreme, a state may spend one dollar on the education of each pupil found within its borders. This would be exactly equal treatment of each pupil, but undoubtedly would not meet the requirement of funding an adequate, or even a minimal, education. Further, pupils are not identical in their needs as well, requiring school districts to spend varying amounts to meet those needs. In these situations, a complaint filed in court would involve the adequacy of the entire funding scheme to provide an appropriate educational opportunity for all pupils, not just those found at the lower end of the wealth spectrum.

As states shift the burden to localities to fund educational opportunity, the potential for a wide range of funding levels to exist increases. Localities typically depend on property tax to generate local revenue. This source is augmented in some states and localities by various other taxes, such as personal property and income taxes. The value of these taxed assets can, and does, vary tremendously among the states' local school districts. Regional industry, slumping or soaring property values, unemployment rates and numerous other factors dictate the current wealth of any

locality. Further complicating the problem, a state may impose a standard method of real estate assessment, but in practice statewide uniformity of property valuation is difficult to achieve. This varied wealth of localities often leads, depending on the state method of funding education, to tremendous variation in resources available to the several school districts in each state.

In a recent law review article, Banks (1992) analyzed several public school reform cases in an attempt to determine patterns of success or failure in the legal challenge of different state funding systems. The basic reasoning for litigation over state school financing schemes, according to Banks, centers on the lowered achievement of pupils from poorer families and poorer regions, and their subsequent inability to compete in the employment sector. Not all state supreme courts have accepted the relationship between financial inputs and pupil achievement, however. The Colorado and Idaho supreme courts found evidence of such a relationship to be inconclusive, and cited the controversy among educators concerning inputs and achievement (Banks, 1992). Since the court rulings in Colorado and Idaho, however, the controversy among researchers and educators as to the relationship between revenues and, especially, expenditures and achievement test results has subsided. Numerous studies have now shown that increased expenditures on education, as allowed by increased revenue, do have a positive effect on the achievement of pupils.

The distinction between fiscal capacity and wealth needs to be made. According to Alexander and Salmon (1995), fiscal capacity is the tax base of a governmental entity, typically measured by personal income and real property

valuations. This base is used to generate the financial support of public education. Whereas income is a flow of wages, measures such as real and personal property represent the value of the stock of all assets, physical and financial, held at a particular time represent wealth (Alexander & Salmon, 1995, p. 162, endnote 10). A wealthy district in terms of real property may actually be unable to support a quality education due to the inability to pay high taxes due to a low level of personal income. This situation primarily arises in agricultural districts where personal incomes may be low, but property values are high. Typically, however, districts that are wealthy, and therefore have a high fiscal capacity, support education at a higher monetary level than districts having low fiscal capacity. This result occurs even when high capacity districts exert low effort, due to the extreme wealth found in those districts.

As a result of the acceptance of wealth indicating greater educational opportunity, states have been forced to examine the constitutional provisions for education to determine the outcomes of challenges to state funding methodologies. The typical approach has been to challenge funding schemes on the basis of the individual states equal protection clause, education clause, or both. As mentioned above, the early efforts to challenge state programs of funding under the Federal Constitution Equal Protection Clause ended, at least temporarily, with the United States Supreme Court decision in Rodriguez in 1973.

The variability of local wealth, as measured in property value and personal assets, coupled with the numerous state methods of funding education, which in turn are dependent on legislative and judicial interpretation of state constitutions, have lead

to the numerous efforts to reform and revise educational funding in this country. The Court Cases: A History and Discussion section will address briefly the litigation that has attempted to address the issues of adequate or, for this study more importantly, equal funding of educational opportunity for pupils within a state.

### **Court Cases: A History and Discussion**

This section is included to summarize the current reform effort waged in the judicial system concerning public education funding. As discussed earlier, the constitutional and statutory provisions for education vary considerably among the fifty states. As a result, litigation pursued for the purpose of improving funding for education, specifically for those pupils found in the less wealthy districts, has succeeded or failed depending on the interpretation and strength of the particular state provisions. Even when successful, however, litigation does not result in immediate financial benefit for plaintiff districts. If the plaintiff group is successful at the lower court level, the state, which is usually the ultimate defendant, typically appeals to a higher court. An appeal by either side may force the process to continue for several years. If the plaintiff group continues to be successful through the court of last resort, then the process takes a different course.

The state and successful plaintiffs then begin the process of devising a remedy, or solution, based on the decision handed down by the court. This process may take several years to be completed, as negotiations between the two sides are necessary to form a remedy. The devised remedy must also pass judicial scrutiny and be accepted

prior to implementation. Due to the time frame involved and the tremendous monetary ramifications involved, plaintiff districts should not expect immediate and bountiful benefits from litigation. In some cases, however, the threat of litigation or actual filing of papers may have some beneficial consequences as the defendant attempts to prevent or settle litigation through additional or supplemental funding for especially needy districts. This effort usually is of a short term nature, and may only slow the overall reform process that is necessary to achieve fundamental equity among the state's districts.

Due to the inherent similarities involved in a challenge to state funding schemes, either under equal protection (as a fundamental right) or the education clause (minimum adequacy or equity issues), or both, certain generalities have evolved. The attempt to have less wealthy districts, or the poor families residing in them, classified as a "suspect class" and therefore due equal protection under state constitutional provisions typically have been defeated. For example, Colorado found their clause to refer to individuals, not groups, and also found the poor as a group to be "an amorphous group that varies by time and place" (Lujan, 649 P.2d at 1201) and not subject to protection.

The classification of education to be a fundamental right under state constitutions has not been accepted by many courts, although it has been a strategy employed by many challenges. As mentioned previously, listed in Appendix B are those states that have found education to enjoy this elevated status. It is not a coincidence that in those states finding education to be a fundamental right, the

plaintiffs predominantly have succeeded in having the funding schemes found unconstitutional. The nature of a fundamental right requires that stricter scrutiny be given to any legislative action, and as mentioned earlier, it is much more difficult for legislation to pass such scrutiny. The Supreme Court of California found education to be a fundamental right in Serrano v. Priest both before and after the United States decision mentioned earlier in Rodriguez. The West Virginia Supreme Court found the wording in the education clause of their constitution, "thorough and efficient" to be sufficiently strong to grant fundamental status to education. The same wording in Pennsylvania's constitution has not been interpreted the same way, however.

### **Education Clause Language**

The language of the educational clauses found in state constitutions differ, but typically follow three distinct patterns. The first type of education clause contains historical foundation, and broadly supports the concept of education being beneficial. The terms of cherish and virtuous are used while "extolling" the benefits of education (Alexander & Salmon, 1995, p. 33). The next type of education clause provision typically uses the term "system" without saying what kind of system will be maintained. Finally, the last type of constitutional clause relating to education contains adjectives such as efficient, general and uniform, adequate, thorough and efficient, and thorough and uniform, as well as other combinations of these (Alexander & Salmon, 1995, p. 34).

Under the education clauses found in state constitutions, challenges attempt to show educational opportunity is required, or that it is a fundamental right. Challenges to funding schemes also attempt to argue that when disparities exist, even if education is not a fundamental right, that minimal standards are not being met, as required by the state constitution, on behalf of the less wealthy districts and the pupils residing in them. This challenge has been difficult to show conclusively in some states, especially in light of the reluctance of courts to interfere due in part to their lack of expertise in school funding.

This lack of ability to show disparity has led to the development of numerous statistical measures and indices over the last decade or so. These measures assist the courts and others to determine, among other reasons, whether or not a state system has satisfied the scrutiny of minimum educational standards under their constitution.

Contained in Appendix B is the compilation of school finance constitutional litigation as of March, 1995. This listing, compiled by Hickrod, Lenz and Minorini (1995) places the cases into six distinct groups, depending on the current disposition of each case. Due to the nature of litigation, this listing is subject to frequent change. The individual state classification of education as a fundamental right or not is also part of Appendix B. Currently, thirteen states have had education declared to be a fundamental constitutional right at the supreme court level, thus qualifying for greater protection and scrutiny. Ten state supreme court decisions have not afforded education this greater level of protection. The lower courts in six other states have sided with the thirteen above, declaring education to be a fundamental constitutional right, while

two lower courts have stated that education is not a fundamental right. The supreme court of Pennsylvania, in Danson v. Casey, has declared education to not be a fundamental constitutional right.

After analyzing numerous challenges to state financing methods, Banks (1992) basically has found that results are unpredictable. Logically, analysis of state constitutions would predict that similar wording among the states would yield similar results when challenged. In theory, constitutions awarding the greatest protection under the education clauses would yield the most successful challenges. In fact, states with some of the weakest clauses have had to reform their funding schemes due to successful challenges, while states with strong education clauses have found ways to defeat challenges to their systems. Banks theorizes that several factors are at work, primarily the ability, or more appropriately, the inability, of a particular state legislature to pass effective remedial legislation (Banks, 1992, pp. 154, 155). When this history of failure presents itself the courts will intervene and force a solution on the legislature to remedy perceived inadequacies. In addition, the method of judge appointment may play a large factor in the success or failure of a particular challenge. Judges may be more reluctant to find for the plaintiff group if their position may be jeopardized by doing so. Banks also points to the historical social values of a state as being predictive of the outcome of school financial reform. A state that has shown repeatedly they value education highly may be more supportive of challenges that indicate the system is not working as hoped or expected.

The largest factor, however, as alluded to earlier, appears to be the premise that school finance belongs under the guidance and control of the legislature until such time as the legislature of a particular state fails to even remotely address the needs of pupils within the state. At this time, when pupils suffer from the lack of funds, or suffer from a lack of educational opportunity or quality, the courts have reluctantly stepped in. As an example of this legislative frustration, in Rose v. The Council, the Kentucky Supreme Court stated "In spite of the past and present efforts of the General Assembly, Kentucky's present system of common schools falls short of the mark of the constitutional mandate of 'efficient'" (p. 213).

### **Constitutional Provisions in Pennsylvania**

The Pennsylvania Constitution, Article III, § represent wealth represent wealth 14 states: "The General Assembly shall provide for the maintenance and support of a thorough and efficient system of public education to serve the needs of the Commonwealth." Cases within the Commonwealth of Pennsylvania have declined to make education a fundamental right, which allows the constitutional section above to be viewed under a rational basis test, or a lower level of scrutiny.

To date, the most recent decision governing public school finance in Pennsylvania is Danson v. Casey, a complaint filed by parents of children in the Philadelphia school district. Here, the supreme court of Pennsylvania refused to strictly scrutinize legislation directing the funding scheme of public education. This decision resulted in the finding that the current funding scheme was reasonably related

to the objective of a thorough and efficient system, and therefore was constitutional. This same court rejected the concept of education being a fundamental right, which would have forced the use of the stricter scrutiny standard. In fact, the use of the reasonable relationship standard goes back to a 1938 case, Malone v. Hayden, in which the court set up two additional tests to determine constitutionality of funding schemes. In addition to the reasonable relation standard, the court must determine if the legislation circumscribes the education clause, or if future legislation would be hampered by the current legislation. If, after the initial review of a reasonable relationship is passed, either of the other two conditions exist, then the legislation must be found unconstitutional. The Malone court found that these conditions were absent, and therefore found the legislation to be acceptable. More recent cases have depended on the Malone and Danson decisions to refuse to recognize the education clause of the Pennsylvania constitution as mandating education to be a fundamental right. The 1987 case of Bensalem Township School District v. Commonwealth relied on this premise to subject legislation to the rational basis test only, which again found a reasonable relationship to the constitutional objective of a thorough and efficient system. The decision to hold educational legislation to rational basis scrutiny only has not been unanimous, however. In Danson, Judge Manderino, with Judge Nix supporting him, dissented and felt that strict scrutiny should be the test used, in which case the legislative actions would likely have been found unconstitutional. Manderino felt that the equal protection clause of the state constitution, Article III, § 32, forces the state funding of public education to be strictly scrutinized. The Commonwealth of

Pennsylvania would have been required to prove that a compelling state interest, that of funding the public schools, was being carried out in the least harmful way. This burden would be difficult to prove and more easily attacked by complaints. One of the major points of the argument in Danson was that Philadelphia as a school district was being singled out and discriminated against as they were the only district in the Commonwealth that was unable to levy tax for school purposes. All taxing decisions were made by the City Council, which then directed the school district what was available.

Further, it has been made clear through Pennsylvania case history that the constitution has imposed upon the General Assembly the obligation to perform the task of funding public schools. This obligation cannot be ignored or set aside. This fact has lent additional support to the argument that judicial review of education legislation should be strict.

Nevertheless, legislation in the Commonwealth of Pennsylvania relating to education currently must only bear some reasonable relation to the objectives of the constitution. That is, legislation must be related to achieving a thorough and efficient system of education. If legislative efforts are found to be reasonably related to this objective, the courts will not interfere or find them unconstitutional.

### **Thorough and Efficient**

With this in mind, the definition of a thorough and efficient system of education, the primary language in the education clause for the Commonwealth of

Pennsylvania, and several other states, must be established. Guy (1992) researched the history and development of the term thorough and efficient as it has been used in numerous state constitutions governing education. O'Grady (1994) similarly researched the historical background of the language as found in the education clause of Pennsylvania's constitution. Courts often will refer to the constitutional debates surrounding an area that requires clarification in an attempt to determine the intent of the framers of the constitution. This has been the case in numerous states regarding the education clauses and finance reform.

The history of Pennsylvania's clause reveals that "a thorough and efficient system of public education" should uniformly provide for a "good" education to the citizens of the commonwealth, while allowing for individual systems to supplement revenue through local taxes (O'Grady, 1992, p. 633). Even prior to the 1873 Constitutional Convention that established their education clause, the Pennsylvania legislature had established a system of common schools (O'Grady, 1994, p. 633). While noting the desire to have better schools and a relatively uniform system, historical perspectives describe a system filled with great disparity, even within the same county. The debates surrounding the establishment of an education clause are filled with words and phrases such as "treat them all alike," "keep the common branches of education uniform," and "good and proper" education (O'Grady, 1994, p. 634).

The concept of an equal or uniform education to some has meant exactly equal expenditures for all pupils in the state. However, educators recognize that all pupils

cannot be given a good education with the same level of inputs. Courts have struggled with the concept of determining whether equal inputs would be constitutionally acceptable, or whether the measurement of achievement, the final outcome of an education, would be the proper measure of a good education.

With the development of equity measures and indices, the level of inputs has become more easily measured and determined. The outcome, learning, which should be the result of an education, is still relatively difficult to measure, however. Input measurement can be achieved relatively quickly and easily, but may not result in meaningful educational improvement. Outcome measurement, which is much more difficult and time consuming, may point to ways of improving educational attainment. Some authors, including O'Grady, suggest that courts define a level of education as guaranteed by the education clause of the state constitution to include both input and outcome indices. This approach would allow for a funding system to be found inadequate and unconstitutional if either funding were to be found lacking, or if pupils were failing to achieve the minimum standards, or levels, of learning required.

Two states with similar wording to that found in Pennsylvania's education clause have begun to define what a "thorough and efficient system" means. West Virginia and New Jersey are both further along in the reform process than Pennsylvania. In New Jersey, the Supreme Court in Abbott v. Burke found that while they were unable to define exactly what all pupils needed to reach a minimum level of learning, they were able to establish that disadvantaged pupils were not receiving anywhere close to the level of funding that advantaged pupils were receiving. This

situation was deemed unconstitutional. The court found that disadvantaged pupils should at least receive what the parents of advantaged pupils wanted their children to receive.

The West Virginia Supreme Court in Pauley v. Kelly actually identified eight separate capabilities that would be the result, or outputs, of an adequate education. The eight measures are: 1) literacy; 2) ability to add, subtract, multiply and divide numbers; 3) knowledge of government to the extent that the child will be equipped as a citizen to make informed choices among persons and issues that affect his own governance; 4) self-knowledge and knowledge of his or her total environment to allow the child to intelligently choose life work--to know his or her options; 5) work-training and advanced academic training as the child may intelligently choose; 6) recreational pursuits; 7) interests in all creative arts, such as music, theater, literature, and the visual arts; and 8) social ethics, both behavioral and abstract, to facilitate compatibility with others in this society (Pauley at 877). If children graduate with these capabilities, the argument would be that the state had fulfilled the constitutional requirement of a good education.

The same court also listed several input factors that, if absent for some pupils, would indicate an unconstitutional situation existed. Those inputs are: "1) good physical facilities, instructional materials and personnel; 2) careful state and local supervision to prevent waste and to monitor pupil, teacher and administrative competency" (Pauley at 877).

O'Grady's law review goes into great detail concerning the reasoning for the rejection of the term "uniform" in the education clause of Pennsylvania. At the time of the debates, the mid to late 1800s, there was concern that a mandated uniform system would actually reduce the quality of some of the existing systems. This concern no longer exists today due to the concept that the educational system is indeed a state responsibility. Considerable support and precedent has been established to show the intent of the constitution to be a state-wide, uniform system that should provide a good education for all pupils (see generally O'Grady, 1994). According to O'Grady, the summary of the review of the intent of the framers of the constitution, case law and existing amendments would indicate that Pennsylvania guarantee a "thorough and efficient system of public education" and that the state has the "primary responsibility for providing a good education uniformly throughout the state, but allows districts to fund additional services at their own option" (O'Grady, 1994, p. 645). This interpretation is supported by the court opinions of West Virginia and New Jersey, that have the same "thorough and efficient" language as Pennsylvania. Those courts expressly stated that the state has the responsibility of an adequate education, but that the localities may supplement that effort to have a more than adequate education through local taxes. The New Jersey court, however, warned that "excess spending must not dilute the constitutional obligation" (Abbott at 369). In other words, if poorer districts cannot prepare their pupils to effectively compete with the richer district pupils, then the constitutional obligation has been defeated by the excess spending of the richer districts.

With the background and court suggested criteria established in other states, is the system in Pennsylvania "thorough and efficient?" Would the Pennsylvania system pass a constitutional challenge? As indicated in West Virginia, the two-part test of adequate inputs and adequate success, or outputs, should both be present for a thorough and efficient system to exist. The use of equity statistics and indices, to be discussed and presented below, indicate the level of equitable distribution of resources, or inputs, that would be indicative of a "thorough and efficient" system that uniformly provides an adequate education for the pupils of Pennsylvania.

### **Pennsylvania's Approach to Equalization**

This section will briefly explain how the Commonwealth of Pennsylvania attempts to equalize the funding of education for the over five hundred districts that exist. During the period of study, 1982-83 through 1992-93, the Commonwealth of Pennsylvania utilized a basic funding formula called the Equalized Subsidy For Basic Education (ESBE) (Pennsylvania School Boards Association, 1987). As the name suggests, this formula was an attempt to equalize the resources available to the districts within the Commonwealth. The name also suggests that this subsidy would, or should, meet the requirements of the constitution to supply a basic education. The actual formula (Appendix A) is derived from information maintained by the Department of Education.

The weighted average daily membership (WADM) figure is required, as well as a legislatively-derived Factor for Education Expense (FEE), and a formula driven

variable known as the Market Value Personal Income Aid Ratio (MVINCR). A district's WADM is generated by multiplying the levels of pupils by various factors related to the relative expense of educating that level of pupil. High school pupils, the most expensive level to educate, have a factor of 1.36, while one-half day kindergarten pupils have a factor of 0.5. All other pupils are multiplied by a factor of one. In essence, the creation of a WADM figure increases the Average Daily Membership (ADM) figure of a district for calculation of the ESBE.

The FEE, established annually by the legislature, originally was intended to reflect the average actual expense to educate each WADM within Pennsylvania (O'Grady, 1994, p. 651). In practice, however, the FEE has been set arbitrarily by the General Assembly, and bears little resemblance, except for being significantly less, to actual costs.

The Aid Ratio, more accurately entitled the Market Value Personal Income Aid Ratio (MVINCR), establishes the position within the Commonwealth for each district relative to the wealth of the district. The market value of property (per pupil), which is the major tax base within each district, is compared to the market value per pupil for the entire Commonwealth. This factor is weighted and added to a similar factor for personal income within each district and the entire Commonwealth. The weighting factor for market value is 0.6, while that of personal income is 0.4. Thus, the MVINCR formula generates a fraction for each district, and the ratios, or fractions, that are larger indicate a district that is relatively poorer in wealth per pupil than another district. These fractions, multiplied by the WADMs for each district, is then

multiplied by the annual FEEs established by the legislature and determines the basic subsidies for the several districts.

There are several flaws associated with this methodology, however. In fact, a report requested by the Commonwealth points out several flaws, and indicates that the equalization effort is filled with "political accommodations" which lead to "an inefficient use of state monies" (National Conference of State Legislatures, 1992, p. 13). Some of the basic flaws are obvious. The FEE, because it is set arbitrarily by the legislature, cannot adequately compensate districts for expenses incurred. For example, the FEE set in 1988-89 was \$2,330. The FEE set for the 1991-92 school year was \$2,550, and was scheduled to increase to \$2,655 for the 1992-93 school year (Pennsylvania School Boards Association, 1987, update 2/92). Districts may find their subsidies fall millions of dollars short of full funding, thereby lessening the equalizing aspect of the Aid Ratio. The political nature of the FEE is also a detrimental factor to be considered. Additionally, the methodology for calculation of the Aid Ratio for all districts is marred due to the artificial minimum floors established by the legislature. All districts, even those that are so wealthy that a negative Aid Ratio would be the mathematical results of the calculations, are guaranteed ratios of at least 0.15. In essence, the state sends certain portions of state monies to districts that are so wealthy that they could fund all of their educational expenses without any state support at all, and do so well above the state average while generating less than average fiscal effort.

The sending of funds to districts not requiring them, or requiring them to a much lesser extent, further increases existing disparities. The practice of guaranteeing

a minimum increase in ESBE support each year of two percent also increases disparity. While wealthy districts are guaranteed a two percent increase annually, poor districts that are falling farther behind are prevented from catching up by placing maximum yearly increases on ESBE support. Depending on the year in question, maximum increases ranged from seven to nine percent. Actual legislative impact on equity measures will be discussed later in more detail. During periods of this study, the actual calculated ESBE was also capped at various percentages of a "full funded" level, further reducing the relationship between actual expenses and the FEE established.

The use of WADM is also suspect regarding the factors used. For example, a rural district may have a small high school, where expenses actually are greater than the 1.36 factor dictated. At the same time, a wealthy district may have substantially larger high schools where economies of scale drive the actual cost of education below the 1.36 factor. This situation creates even larger disparities and inefficient use of state funds ostensibly intended to equalize educational opportunities. Another problem related to the use of WADM can be attributed to the increased drop-out problem in less wealthy, disadvantaged districts. With fewer higher level pupils to serve, a district may become further disadvantaged by losing the benefit of pupils weighted at the 1.36 level.

In addition to the calculated basic ESBE above, the Commonwealth of Pennsylvania has adopted numerous categories of supplemental aid, depending on various criteria. Some other funding efforts are tied to district size, poverty levels

within the district, district density, taxing effort, transportation and special education. In several instances, the funding mechanisms are politically motivated, or based on inappropriate methodology, such as using state averages to determine the amount of special education funding each district should receive. O'Grady (1994) goes into detail on how these subsidies are flawed as well and create greater disparities among the districts.

### **The Need for Equity Statistics**

This section will review briefly the assumption that additional resources, or funding, can make a difference in the outcomes of pupils. This concept in turn necessitates the development and use of sophisticated techniques for measuring inputs as they relate to an entire population of pupils within a state. The use of these tools then allow for a quantitative understanding of the equitable, or inequitable, distribution of resources to the pupils within a particular state. Several of the indices may also be useful in making inter-state comparisons. Some researchers now feel that a quality education can be compared across state lines, and should be, as competitive job skills, one of the goals of a good and proper education, are needed in today's society. The competitive nature of employment today does not allow or promote the concept that an education received in the Commonwealth of Pennsylvania will necessarily guarantee a job within, let alone outside, the borders of Pennsylvania.

The concept of transferring locally generated funds from wealthier districts to poorer districts is known as recapture. When done by a state on a large scale, this

effort would defeat the purpose of allowing local discretion in education funding, which is a highly visible factor in Pennsylvania. Instead, the call is for more state funds to be given to the less fortunate, less wealthy districts, or any district not supplying an adequate level of education, in order to raise the level of educational opportunity to that required by constitutional mandate. However, the use of small recapture provisions in state formulas can assist in the adequate funding of all districts.

Arguments during the early years of finance reform centered on the questionable benefits of additional funding for education. One of the major proponents of this view, Eric A. Hanushek, has written several pieces attempting to show that additional funds will not alter the educational outcomes of children, or at best, do not systematically support this concept. Hanushek admits, however, that "there seems little question that money could count, but within the current organization of schools, it does not do so systematically" (Hanushek, 1991 at 439). Additionally, critics of the Hanushek studies report that proper statistical controls were not used, thereby allowing the effects of additional funds to be masked, or missed, entirely.

The performance of pupils is not dependent on the addition of funds alone, however. Other factors such as where the funds will be used, economies of scale, and the efficiency with which additional funds are used also can affect the performance of pupils. This fact was noted in the Danson case previously discussed.

It is also interesting to note that districts with sufficient funding, the wealthier districts, typically support the state, or the defendant, in challenges to funding schemes.

The wealthier districts fight very hard to keep what they have, and are afraid of losing any of their financial support (O'Grady, 1994, p. 647).

The Texas finance reform case data analysis showed that additional funds allowed for better, more experienced teachers to be hired, which in turn raised achievement levels of pupils in those classes. This evidence, reported by Ferguson (1991), also shows that optimal pupil to teacher ratios of eighteen to one can only be achieved by hiring additional teachers, which takes additional funds. This same pattern emerged in a national study interpreted by Murnane (1991), where "men who were educated in states with relatively small public school classes and with relatively high teacher salaries earned more in the labor market than men educated in states with larger classes and lower teacher salaries" (p. 460). While the outcome measure in this study was not achievement test scores or some other typically used pupil achievement measure, wages would fit the criteria established or specified by the West Virginia court in Pauley v. Kelly discussed above.

Ferguson (1991) addressed the need for additional funding to be spent wisely so that significant benefits can be derived from the additional expenditures. As courts attempt to determine the adequacy of state funding schemes in relation to the mandates of their constitutions, these concerns arise. When a plaintiff group is successful in showing a system is inherently unconstitutional, the concern of how to improve the system surfaces. Either a total revamping of the system, the addition of significant funding, or some combination of both will be required to bring the system within the constitutional framework of that state. As mentioned previously, the process of

developing a remedy can be as protracted as the litigation that forced it. Both efforts are part of the reform process, and are necessary for any meaningful change to occur.

## **CHAPTER III**

### **METHODOLOGY**

#### **Equity Statistics**

The Commonwealth of Pennsylvania Department of Education supplied data tapes for the years 1982-83 through 1992-93. One tape, known as the equalized subsidy for basic education (ESBE) tape, contained the following variables: district unit number, market value of property for each district, weighted average daily membership per district (WADM), average daily membership per district (ADM), and actual instructional expense (AIE) per district. All variables will be precisely defined later. The tape also contained variables that were not used in the application of equity statistics, such as the market value personal income aid ratio (MVINCR), that will be discussed at length as they pertain to the methodology of state funding. This variable is also known as the aid ratio (Appendix A).

The selection of the variables to be analyzed was relatively simple except for the expenditure variable. Due to the large nature of the Pennsylvania system, with 500 districts identified as being similar in nature for the study, accounting practices were not always uniform for all expense categories found on the annual financial report (AFR) tapes. After consulting with both the Pennsylvania Department of Education and the Pennsylvania State Education Association, the best and most readily available expenditure figure was determined to be the Actual Instructional Expense (AIE) variable found on the ESBE tape for all districts. Of the expenditure categories, this

variable was found to be reported uniformly by the 500 districts, thereby allowing an accurate depiction of the expenditure distribution to be made.

Annual financial report (AFR) tapes were utilized to generate revenue data per district. Local revenue generated by property taxes were added to the state support per district to create a single revenue variable used in the equity statistics. The revenue variable generated does not include any federal revenues. The data sets were merged by unit number to ensure the integrity of the generated data set, which was made up of the following variables: district unit number, WADM, ADM, revenue, AIE and market value of property. A total of five hundred school districts were found to meet the proper criteria for inclusion in the analysis for each of the eleven years studied.

A district was not included in the study if found to be of an unusual nature, or unusual type of district. Pennsylvania had a small number of different types of districts that automatically fell out of consideration for inclusion. Special districts established for the benefit of multiple districts were not included, such as intermediate units, special education and vocational units, and contracting districts that had all their pupils educated in other districts were not included. These districts were identified by several means. Any district without their own market value of property, revenue, AIE, WADM or ADM variable was not included. Further, districts identified as special districts by their unit number were not included. Non-operating districts were not included. The resulting pool of five hundred districts for each of the eleven years studied had the same operating characteristics and would therefore allow reliable conclusions to be drawn from the applied statistics.

Due to the unreadable nature of AFR tapes for the years 1982-83 through 1985-86, revenue data were not retrievable for those years. Therefore, the corresponding application of equity statistics utilizing revenue data were not performed. Appropriate data for all other years were intact for all variables.

For each year analyzed, a file was generated that included the following data: unit number of the district, either revenue or actual instructional expense, WADM or ADM, and market value of property. Therefore, for each year analyzed, a total of four files were created. Each of the four files contained two identical columns that included unit number and their respective market values of property. Additionally, one file contained revenue and WADM, one file contained revenue and ADM, one file contained AIE and WADM, and the fourth file contained AIE and ADM. The exception as noted earlier was for the revenue files from the years 1982-83 through 1985-86. A total of thirty-six files were created, each having 500 records and four variables.

Each file was formatted properly and the equity statistic program created and copyrighted by Deborah Verstegen and Nancy Stevens (1991) entitled "Fiscal" was applied. The results of each computer analysis were compiled, and placed in Tables 1 through 4, depending on the variables analyzed. For each combination of variables, Freelance Graphics charts were generated for the selected equity statistics in order to depict longitudinal equity trends.

Nine statistics were collected from each of the thirty-six computer analyses. The statistics are listed alphabetically below and described as to how they indicate

equitable or inequitable distributions of revenue or expenditure. Following the brief descriptions, Figure 1 shows the mathematical formulas for several of the equity statistics used, and are adapted from Berne and Stiefel (1984, p. 20).

### **Equity Statistic Explanations**

**Coefficient of Variation (CV):** The coefficient of variation is the standard deviation of the distribution divided by the mean, expressed as a percentage. The CV means variability in the expenditure (or revenue) distribution around the mean observation. As the equity of the distribution improves, the value of the CV will decrease.

**Federal Range Ratio:** The federal range ratio is the difference between the per pupil expenditure (or revenue) at the 95th and the 5th percentiles of the distribution, divided by the value at the 5th percentile. As the equity of the distribution improves, the federal range ratio value will decrease.

**Gini Index:** The Gini index indicates how far the distribution of expenditures (or revenues) is from providing each proportion of pupils with equal proportions of expenditures (or revenues). The Gini index contrasts the actual distribution of expenditure (or revenue) with absolute fiscal equity. This measure ranges from zero to one. As the equity of the distribution improves, the Gini value will decrease.

**McLoone Index:** The McLoone index measures the equity of the lower one-half of the expenditure (or revenue) distribution only. The McLoone index is expressed as a ratio of the actual expenditure (or revenue) of all pupils below the

The Gini coefficient

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

The McLoone index

$$\frac{\left( \sum_{i=1}^J P_i X_i \right)}{\left( M_p \sum_{i=1}^N P_i \right)}$$

where districts I through J are below  $M_p$

Theil's measure

$$\frac{\left( \sum_{i=1}^N P_i \left( X_i \log_e X_i - \bar{X}_p \log_e \bar{X}_p \right) \right)}{\left( \bar{X}_p \sum_{i=1}^N P_i \right)}$$

The restricted range

$X_i$  at or above which 5 percent of the pupils lie  
-  $X_i$  at or below which 5 percent of the pupils lie.

The federal range ratio

$$\frac{\text{(restricted range)}}{\left( X_i \text{ at or below which 5 percent of the pupils lie} \right)}$$

The coefficient of variation

$$\frac{\sqrt{\frac{\sum_{i=1}^N P_i \left( \bar{X}_p - X_i \right)^2}{\sum_{i=1}^N P_i}}}{\bar{X}_p}$$

Note: The following symbols are used in the formulas above:  $P_i$  = number of pupils in district  $i$ ;  $N$  = number of districts;  $X_i$  = average revenues (expenditures) per pupil in district  $i$ ;  $X_p$  = mean revenues per pupil for all pupils;  $M_p$  = median revenues per pupil for all pupils.

### Formulas For Revenue And Expenditure Equity Indices (Pupil Unit of Analysis)

Figure 1

median relative to the total expenditure (or revenue) these pupils would receive if they were at the median per pupil expenditure (or revenue) level in the state. The McLoone index ranges from zero to one. As equity for the lower one-half of the distribution improves, the value of the McLoone index will increase.

**Pearson R:** The Pearson R measure, or the correlation coefficient, describes the strength of the linear relationship between two variables. The value of this statistic ranges between negative one and positive one, with values closer to the extremes indicating a greater relationship, either negative or positive. The variables related in school equity are expenditures (or revenue) per pupil, and the market value of property per pupil. As the linear relationship between expenditures (or revenues) per pupil and the wealth measure of market value of property per pupil becomes stronger, the value of Pearson R approaches positive one. This increased relationship would indicate an increased probability of disparity in funding, or decreased equity.

**Restricted Range:** The restricted range is the difference between the expenditure (or revenue) per pupil at selected percentiles. This study utilized the fifth and ninety-fifth percentiles for the restricted range measure. Conceptually, the restricted range is a measure that ignores the upper and lower tails of the expenditure (or revenue) distribution. As the equity of the distribution improves, the value of the restricted range decreases.

**R Square:** The R square measure, or the coefficient of determination, ranges from zero to one, and is the percent of variation in a distribution explained or accounted for by the regression of certain variables. As the R square measure

approaches one, more and more of the variability is explained by the independent variables used. In the study performed, the distribution of expenditures (or revenues) per pupil have more of the variability explained by the use of market value of property per pupil as R square approaches one.

**Slope:** The slope shows the size of the change in the dependent variable (per-pupil inputs) associated with a one-unit change in the independent variable (fiscal capacity indicated by market value of property) in absolute terms. The slope may vary from 0.0 to any amount. A slope of 0.0 would indicate that there was no relationship between fiscal capacity and per-pupil inputs, and as the slope increases, the level of fiscal neutrality decreases (from Alexander & Salmon, 1995, p. 239).

**Theil Index:** The Theil index is an overall measure of variation in resource distribution across all observations of expenditure (or revenue) per pupil. A decrease in the Theil index indicates the equity found in the distribution has increased.

### **Wealth Indices**

In addition to the equity analyses designed above, four measures indicating wealth (real property), personal income, expenditures (AIE) or revenue (local plus state) were determined for certain districts found in the Commonwealth of Pennsylvania. All 500 districts identified above as meeting the selection criteria were ranked by the Market Value Income Aid Ratio (MVINCR), or simply, the Aid Ratio. The total pupil count, using ADM and WADM respectively, was determined for the state by summing all 500 districts. After calculating the total state pupil population,

approximately five percent of the pupils represented by whole districts were determined at both ends of the continuum as ranked by the Aid Ratio.

The Commonwealth of Pennsylvania's aid ratio formula has an artificial floor of 0.15. That is, the wealthiest districts in the state, based on the Aid Ratio, are guaranteed at least some state assistance, regardless of their fiscal capacity to generate local revenue. All of the districts having an Aid Ratio of 0.15 were accounted for within five percent of the state pupil population. The district bringing the pupil count closest to five percent determined the group of districts from the wealthy end of the state continuum as ranked by the Aid Ratio. As closely as possible while still keeping districts intact, a matching five percent was determined at the opposite end of the Aid Ratio continuum. This group represents the less wealthy, or poorer, districts as determined by the Commonwealth of Pennsylvania Aid Ratio. Based strictly on pupil counts, the two groups were compared in order to select a near perfect match. If the inclusion or exclusion of one more district brought the two groups closer together by pupil count, then that district was either included or excluded accordingly. The group representing the wealthier districts always included all of the Aid Ratios of 0.15, and for most years included several districts above this ratio to reach a five percent of the state pupil population.

After the two groups were determined at each end of the Aid Ratio continuum, the corresponding measure of personal income, market value of property, AIE and revenue (local plus state) were summed for the entire five percent group. This group

total was divided by the respective group ADM or WADM, depending on the analysis performed, to determine the corresponding average group value per pupil.

This was performed for each school year that equity statistics were generated. In addition, each of these values was adjusted for inflation by using the Consumer Price Index (CPI) as found in the 1993 Digest of Education Statistics. Finally, for each year and measure, the poor group average was divided by the wealthy group average to determine a percentage.

To display the data, charts were developed using Freelance Graphics. For each measure and pupil count (ADM or WADM) the values of income per pupil, market value of property per pupil, AIE per pupil, and revenue per pupil were tabulated. For visual inspection, a chart was created showing the difference over time between the two groups. Each measure was determined using ADM and WADM, as well as unadjusted, adjusted and poor group as a percentage of rich group. This resulted in twenty-four charts being generated.

### **Alternative Funding**

Using the last year of audited data (1992-93), an alternative formula in support of public school education in Pennsylvania was developed. The intent was to create a system that would reduce the inequity of the current system, while improving the quality of education for the less wealthy districts. Further, the amount of additional funds required from the state was kept at a minimum due to the political implications of increasing educational support.

Using state averages of revenue (local plus state) as a guide for an adequate educational opportunity, the total state revenues needed to meet this level for all pupils was generated. The state market value of property total was utilized to project the local tax millage necessary to generate the necessary funds at various levels of state support. The intent here is to have all districts put forth the same effort to reach an adequate level of education. Districts would not be prevented from expending greater effort to improve the educational opportunity beyond an adequate level.

After this initial determination, the affect on all 500 districts was determined. Adjustments were made in the process to not only minimize the additional state funds required, but also the affect on the districts themselves. Based on the results of this procedure, a determination as to the best type of financing scheme was made, with the implications for the state and individual districts discussed.

## CHAPTER IV

### RESULTS

#### Equity Measures

Nine different commonly accepted equity measures were analyzed. The order in which they will be discussed is as follows: Gini Index, McLoone Index, Theil Index, Restricted Range, Federal Range Ratio, Coefficient of Variation (CV), R Square coupled with its corresponding slope and the Pearson R. Additionally, for each measure, different variables were used to create four sets, or combinations. The first group used state and local revenue added together to generate a new "revenue" number, with the weighted average daily membership (WADM) and market value of property. WADM is counted by weighting one-half day kindergarten pupils at 0.5, high school pupils at 1.36, and all others at 1.0. Contained in Table 1 are the numerical results of this series of charts. The second group of nine charts used the same variables, but substituted average daily membership (ADM) for WADM. Displayed in Table 2 are the numerical results of this group of charts. The third group of charts contains actual instructional expense (AIE), WADM and market value of property, while the last group of nine charts contains AIE, ADM and market value of property for the 500 districts analyzed. The numerical results of these charts can be found summarized in Tables 3 and 4, respectively.

Table 1

Revenue and WADM Equity Analyses Results

| Year | Gini   | McLoone | Theil  | Resrict.<br>Range | Federal<br>Range<br>Ratio | CV     | R<br>Square | Slope  | Pearson |
|------|--------|---------|--------|-------------------|---------------------------|--------|-------------|--------|---------|
| 1983 |        |         |        |                   |                           |        |             |        |         |
| 1984 |        |         |        |                   |                           |        |             |        |         |
| 1985 |        |         |        |                   |                           |        |             |        |         |
| 1986 |        |         |        |                   |                           |        |             |        |         |
| 1987 | 0.1073 | 0.87920 | 0.0190 | 2332.97           | 0.8754                    | 20.032 | 0.5313      | 0.0139 | 0.7289  |
| 1988 | 0.1088 | 0.87882 | 0.0193 | 2649.62           | 0.9067                    | 20.202 | 0.5581      | 0.0130 | 0.7470  |
| 1989 | 0.1067 | 0.87699 | 0.0190 | 2829.16           | 0.8839                    | 20.085 | 0.6131      | 0.0139 | 0.7830  |
| 1990 | 0.1061 | 0.88073 | 0.0186 | 3052.32           | 0.8754                    | 19.814 | 0.6055      | 0.0118 | 0.7781  |
| 1991 | 0.1037 | 0.88547 | 0.0177 | 2990.73           | 0.8135                    | 19.340 | 0.6474      | 0.0119 | 0.8046  |
| 1992 | 0.0982 | 0.89416 | 0.0162 | 3296.36           | 0.8026                    | 18.474 | 0.6088      | 0.0100 | 0.7803  |
| 1993 | 0.0983 | 0.91628 | 0.0163 | 3254.81           | 0.7698                    | 18.601 | 0.6225      | 0.0104 | 0.7890  |

Table 2

Revenue and ADM Equity Analyses Results

| Year | Gini   | McLoone | Theil  | Resrict.<br>Range | Federal<br>Range<br>Ratio | CV     | R<br>Square | Slope  | Pearson |
|------|--------|---------|--------|-------------------|---------------------------|--------|-------------|--------|---------|
| 1983 |        |         |        |                   |                           |        |             |        |         |
| 1984 |        |         |        |                   |                           |        |             |        |         |
| 1985 |        |         |        |                   |                           |        |             |        |         |
| 1986 |        |         |        |                   |                           |        |             |        |         |
| 1987 | 0.1080 | 0.88720 | 0.0193 | 2805.26           | 0.9256                    | 20.254 | 0.5460      | 0.0141 | 0.7389  |
| 1988 | 0.1089 | 0.88457 | 0.0196 | 2960.94           | 0.9009                    | 20.343 | 0.5675      | 0.0131 | 0.7538  |
| 1989 | 0.1063 | 0.88328 | 0.0191 | 3241.74           | 0.8897                    | 20.166 | 0.6198      | 0.0139 | 0.7873  |
| 1990 | 0.1051 | 0.88580 | 0.0185 | 3498.21           | 0.8875                    | 19.809 | 0.6094      | 0.0118 | 0.7807  |
| 1991 | 0.1029 | 0.89148 | 0.0176 | 3447.06           | 0.8321                    | 19.287 | 0.6487      | 0.0119 | 0.8054  |
| 1992 | 0.0968 | 0.89562 | 0.0159 | 3706.59           | 0.7975                    | 18.329 | 0.6070      | 0.0100 | 0.7791  |
| 1993 | 0.0964 | 0.91139 | 0.0159 | 3662.52           | 0.7648                    | 18.370 | 0.6185      | 0.0103 | 0.7865  |

Table 3

AIE and WADM Equity Analyses Results

| Year | Gini   | McLoone | Theil  | Resstrict. Range | Federal Range Ratio | CV     | R Square | Slope  | Pearson |
|------|--------|---------|--------|------------------|---------------------|--------|----------|--------|---------|
| 1983 | 0.1075 | 0.8594  | 0.0191 | 1360.52          | 0.8943              | 20.128 | 0.5292   | 0.0127 | 0.7274  |
| 1984 | 0.1108 | 0.8538  | 0.0198 | 1469.11          | 0.8835              | 20.276 | 0.4924   | 0.0115 | 0.7017  |
| 1985 | 0.1122 | 0.8607  | 0.0202 | 1599.79          | 0.8729              | 20.576 | 0.4823   | 0.0119 | 0.6945  |
| 1986 | 0.1131 | 0.8672  | 0.0204 | 1810.12          | 0.9072              | 20.609 | 0.4907   | 0.0111 | 0.7005  |
| 1987 | 0.1144 | 0.8635  | 0.0208 | 1817.61          | 0.8522              | 20.799 | 0.5199   | 0.0116 | 0.7210  |
| 1988 | 0.1176 | 0.8641  | 0.0221 | 2183.20          | 0.9504              | 21.506 | 0.5428   | 0.0111 | 0.7368  |
| 1989 | 0.1172 | 0.8644  | 0.0219 | 2312.64          | 0.9270              | 21.372 | 0.5719   | 0.0115 | 0.7563  |
| 1990 | 0.1188 | 0.8672  | 0.0224 | 2443.65          | 0.8948              | 21.623 | 0.5901   | 0.0104 | 0.7682  |
| 1991 | 0.1156 | 0.8680  | 0.0214 | 2665.92          | 0.9106              | 21.169 | 0.5954   | 0.0103 | 0.7716  |
| 1992 | 0.1136 | 0.8716  | 0.0210 | 2719.62          | 0.8930              | 21.058 | 0.5712   | 0.0086 | 0.7558  |
| 1993 | 0.1128 | 0.8682  | 0.0205 | 2610.69          | 0.8277              | 20.741 | 0.5678   | 0.0087 | 0.7535  |

Table 4

AIE and ADM Equity Analyses Results

| Year | Gini   | McLoone | Theil  | Resstrict. Range | Federal Range Ratio | CV     | R Square | Slope  | Pearson |
|------|--------|---------|--------|------------------|---------------------|--------|----------|--------|---------|
| 1983 | 0.1103 | 0.8524  | 0.0202 | 1620.34          | 0.9334              | 20.731 | 0.5506   | 0.0131 | 0.7420  |
| 1984 | 0.1137 | 0.8565  | 0.0209 | 1810.40          | 0.9521              | 20.980 | 0.5128   | 0.0118 | 0.7161  |
| 1985 | 0.1144 | 0.8597  | 0.0211 | 1931.21          | 0.9203              | 21.057 | 0.5028   | 0.0122 | 0.7091  |
| 1986 | 0.1145 | 0.8642  | 0.0210 | 2161.99          | 0.9492              | 20.937 | 0.5085   | 0.0113 | 0.7131  |
| 1987 | 0.1150 | 0.8646  | 0.0211 | 2118.52          | 0.8722              | 21.014 | 0.5347   | 0.0118 | 0.7312  |
| 1988 | 0.1178 | 0.8667  | 0.0223 | 2492.79          | 0.9555              | 21.651 | 0.5522   | 0.0112 | 0.7431  |
| 1989 | 0.1167 | 0.8678  | 0.0218 | 2611.62          | 0.9270              | 21.397 | 0.5801   | 0.0116 | 0.7617  |
| 1990 | 0.1178 | 0.8735  | 0.0222 | 2774.31          | 0.8958              | 21.566 | 0.5958   | 0.0104 | 0.7719  |
| 1991 | 0.1149 | 0.8734  | 0.0212 | 2992.87          | 0.9062              | 21.113 | 0.5971   | 0.0103 | 0.7727  |
| 1992 | 0.1120 | 0.8788  | 0.0206 | 3024.53          | 0.8801              | 20.875 | 0.5708   | 0.0086 | 0.7555  |
| 1993 | 0.1110 | 0.8736  | 0.0200 | 2872.75          | 0.8029              | 20.506 | 0.5646   | 0.0086 | 0.7514  |

### **Intrastate Discussion**

The statistics found for the Commonwealth of Pennsylvania presented below are difficult to put in perspective without some benchmark comparison to other states. Few studies have performed or collected data across the states due to the complexity of the different state systems and the associated validity problems. Alexander and Salmon (1995, pp. 240, 241, 242 and 245) include the results of studies performed on distributions found in Rhode Island and Ohio for the 1990-91 school years. Pennsylvania statistics for the same year are generally the same or less equitable than those found for Ohio, and much less equitable than those found for Rhode Island.

Riddle (1993, p. 13) placed Pennsylvania in the sixth worst position when he ranked the states on expenditure differences found between the 95th and the 5th percentiles. This statistic is the restricted range measure described in this study. Riddle (1993, p. 14) ranked Pennsylvania to have the eighth least equitable coefficient of variation (CV) among the fifty states. Both statistics were for the 1989-90 school year.

Wyckoff (1992) reported equity statistics for one of the years included in this study, that of 1986-87. For that year, expenditure Gini coefficients ranged from a high of 19.0 in Montana to a low of 2.5 for Nevada. He found Pennsylvania to have a Gini of 10.4, the seventh least equitable for the states analyzed. Wyckoff (1992) also summarized the CV and Theil equity indices, and found much the same result as Riddle, with Pennsylvania ranking eighth in least equitable CV with a value of 20.4 (1986-87 current expenditures) and a Theil of 0.0174, ranked twelfth least equitable.

Moskowitz (1988) ranked the states on several of the indices for the 1984-85 school year. For that year, he found Pennsylvania to rank 38th in the Federal Range Ratio statistic, 34th in CV, and 40th in the McLoone Index. The higher the number in ranking, the less equitable is the statistic in the state comparison.

These comparisons indicate Pennsylvania to be at the least equitable end of the spectrum when all states are considered.

### Revenue Charts

#### Charts using WADM

The Gini Index indicates how far the actual distribution of revenue or expenditure is from providing each proportion of pupils with equal proportions of revenue or expenditure. It contrasts the actual distribution with absolute fiscal equality. The Gini ranges from zero to one, with values approaching zero being more equitable than values approaching one. Results contained in Chart 1, entitled "Gini Index using Revenue and WADM," indicate the changes in the Gini Index from the school year 1986-87 through 1992-93 when revenue was analyzed with WADM as the pupil count. The seven-year inequity peak occurred in 1988, with a Gini value of 0.1088. The Gini Index subsequently showed slight improvement each year through 1992, when a low of 0.0982 was reached. The next school year, 1992-93, showed a slight decrease in equity as measured by the Gini Index with a value of 0.0983. The seven year change from 1986-87 to 1992-93 resulted in an improvement of 9.65 percent in the Gini Index when revenue and WADM were the variables used.

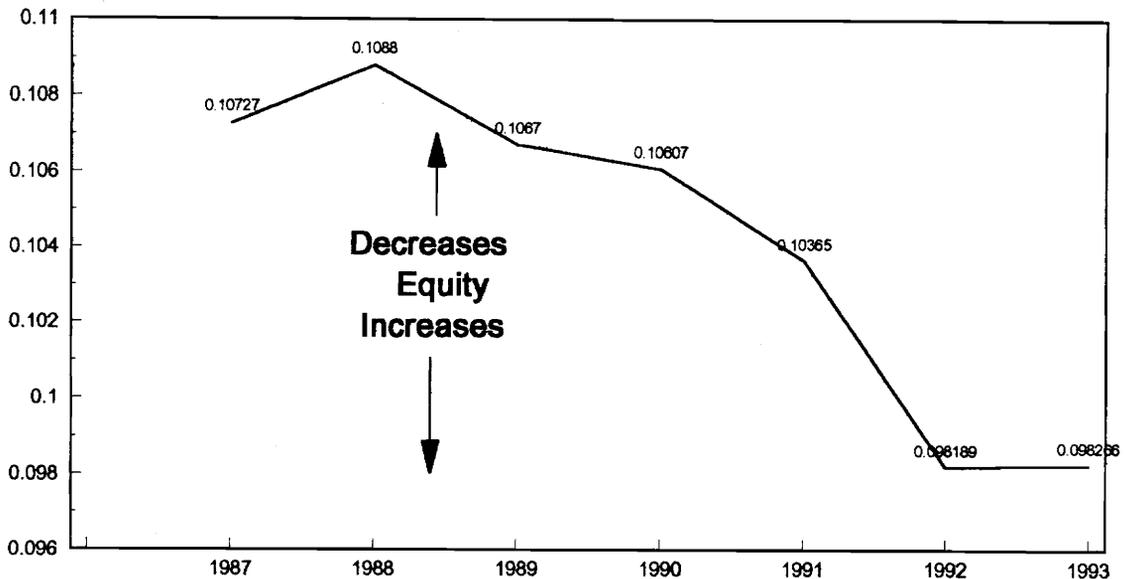


Chart 1 Gini Index using Revenue and WADM

Chart 2, entitled "McLoone Index using Revenue and WADM," indicates the changes in the McLoone Index equity measure from 1986-87 to 1992-93. The McLoone Index measures the equity of the lower one-half of the revenue or expenditure distribution only. It is expressed as a ratio of the actual revenue or expenditure of all pupils below the median relative to the total revenue or expenditure those pupils would receive if they had been at the median per pupil revenue or expenditure level in the state. This measure ranges from zero to one, with higher values depicting greater equity for the lower one-half of the distribution. The value of the McLoone Index changed from 0.8792 in 1986-87 to 0.9163 in 1992-93, an improvement of 4.22 percent. The lowest value for this chart occurred in 1988-89, with a value of 0.8770, indicating the year of greatest inequity for this particular measure and set of variables.

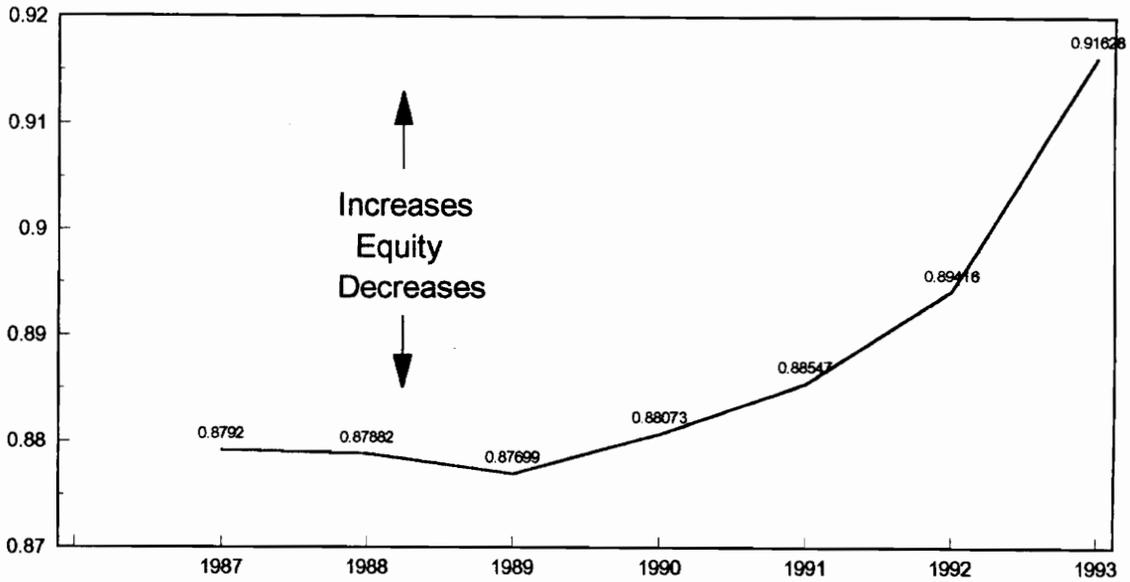


Chart 2 McLoone Index using Revenue and WADM

The Theil Index is an overall measure of variation in resource distribution across all observations. Lower values indicate greater equity. The results of equity analyses contained in Chart 3, entitled "Theil Index using Revenue and WADM," indicate a slight equity improvement of 14.21 percent from the 1986-87 school year to the latest year analyzed, 1992-93. The least equitable year as indicated by this particular measure occurred in 1987-88 with a value of 0.0193. The most equitable Theil distribution for the 500 districts when revenue and WADM were used occurred in 1991-92, with a value of 0.0162.

The next equity measure discussed, the Restricted Range, represents the difference in dollars between the revenue or expenditure per pupil at the 95th percentile (higher end) and the 5th percentile (lower end). Conceptually, the restricted range is a measure that ignores the upper and lower tails of the distribution.

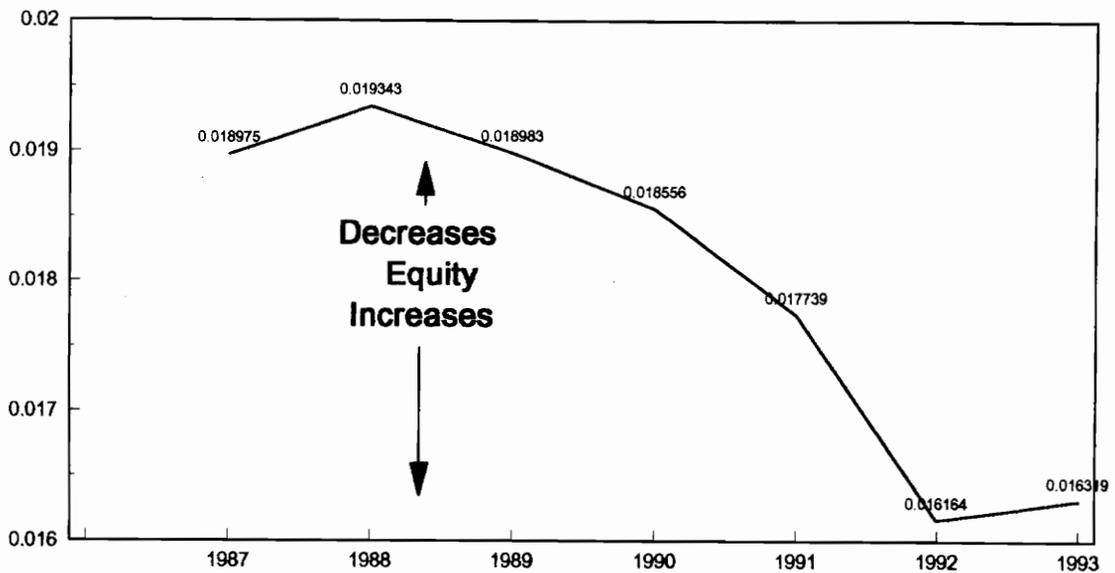


Chart 3 Theil Index using Revenue and WADM

Contained in Chart 4, entitled "Restricted Range using Revenue and WADM," analysis results indicate the dollar differences found in the school years 1986-87 through 1992-93. The smallest, or most equitable, difference between the 95th and 5th percentile pupils was found in 1986-87, when \$2,332.97 in revenue per pupil separated the respective percentiles. The least equitable, or greatest difference, restricted range value occurred in 1991-92, with a value of \$3,296.36 per pupil. For the entire seven year period, a decline in equity of 39.53 percent occurred when the restricted range was calculated using revenue and WADM.

The next statistic applied was the Federal Range Ratio, which is the difference between the per pupil revenue or expenditure at the 95th and 5th percentiles (the Restricted Range), divided by the value at the 5th percentile. As the Federal Range Ratio decreases, equity increases. A value exceeding 1.0 would indicate that the 95th

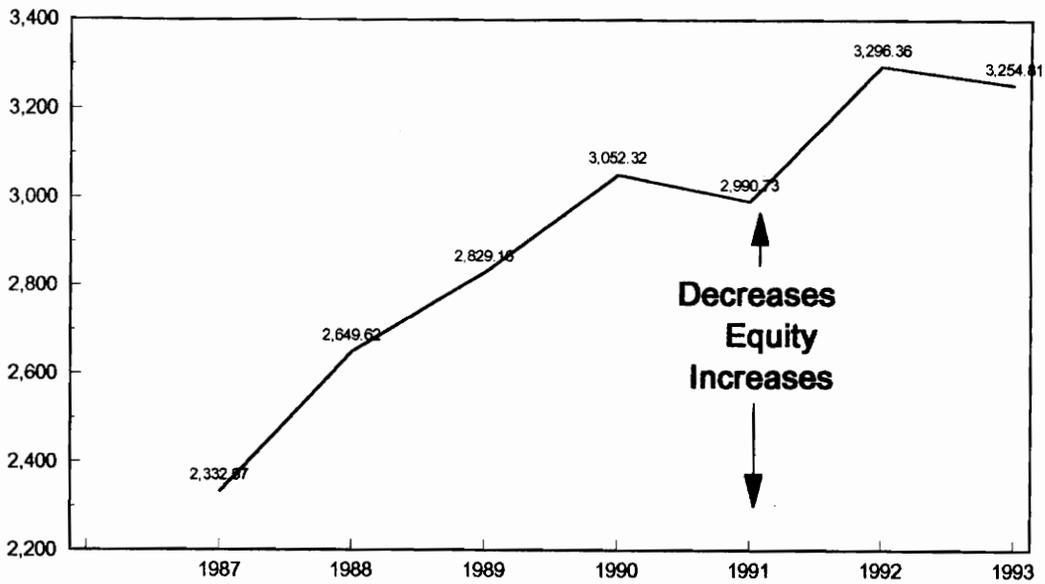


Chart 4 Restricted Range using Revenue and WADM

percentile had revenue or expenditures at least double that of the 5th percentile.

Depicted in Chart 5, and entitled "Federal Range Ratio using Revenue and WADM," contains the change from 1986-87 to 1992-93 for this measure. The least equitable revenue difference occurred in 1987-88 with a value of 0.9067. The most equitable year for this statistic occurred in the 1992-93 school year, when a value of 0.7698 was generated. The improvement from 1986-87 to 1992-93 for the Federal Range Ratio was 12.06 percent.

The standard deviation of a distribution divided by the mean of that distribution, expressed as a percentage, is known as the Coefficient of Variation, or CV. The CV assesses the variability in the per pupil revenue or expenditure distribution around the mean. As the CV decreases, equity increases for the distribution. In the Commonwealth of Pennsylvania for the school years 1986-87

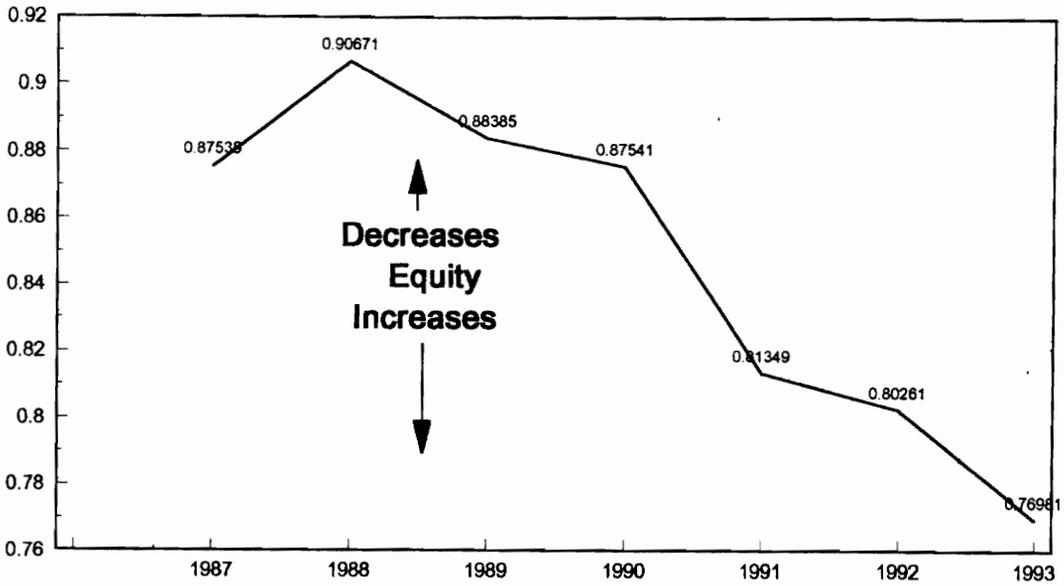


Chart 5 Federal Range Ratio using Revenue and WADM

through 1992-93, the least equitable revenue distribution as indicated by Chart 6, entitled "Coefficient of Variation using Revenue and WADM," occurred in 1987-88 with a value of 20.20 percent. The most equitable year found in Chart 6 was the 1991-92 school year with a value of 18.47 percent. The percentage difference from 1986-87 to 1992-93 of 1.43 represents an improvement of 7.14 percent over the CV found in 1986-87.

Chart 7, entitled "R Square using Revenue per WADM and Market Value of Property per WADM" depicts the coefficient of determination, which ranges from 0.0 to 1.0. This equity measure is the percent of variation explained or accounted for by the regression of two variables. As R Square approaches 1.0, more and more of the variability in one variable is explained by the other variable used. In the case of revenues per pupil (dependent variable), more of the variance in the distribution of

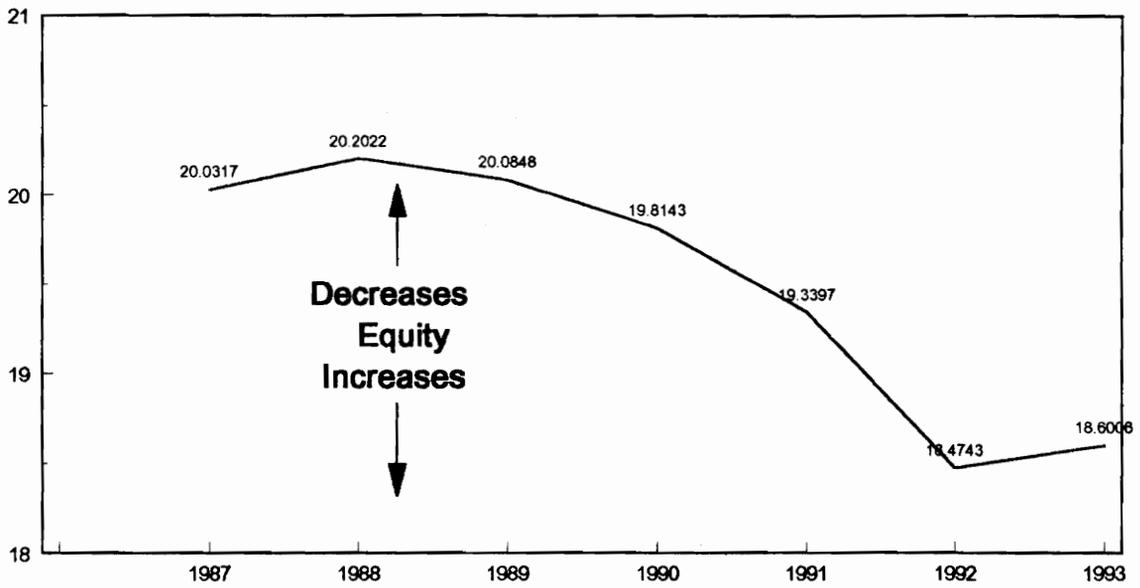


Chart 6 Coefficient of Variation using Revenue and WADM

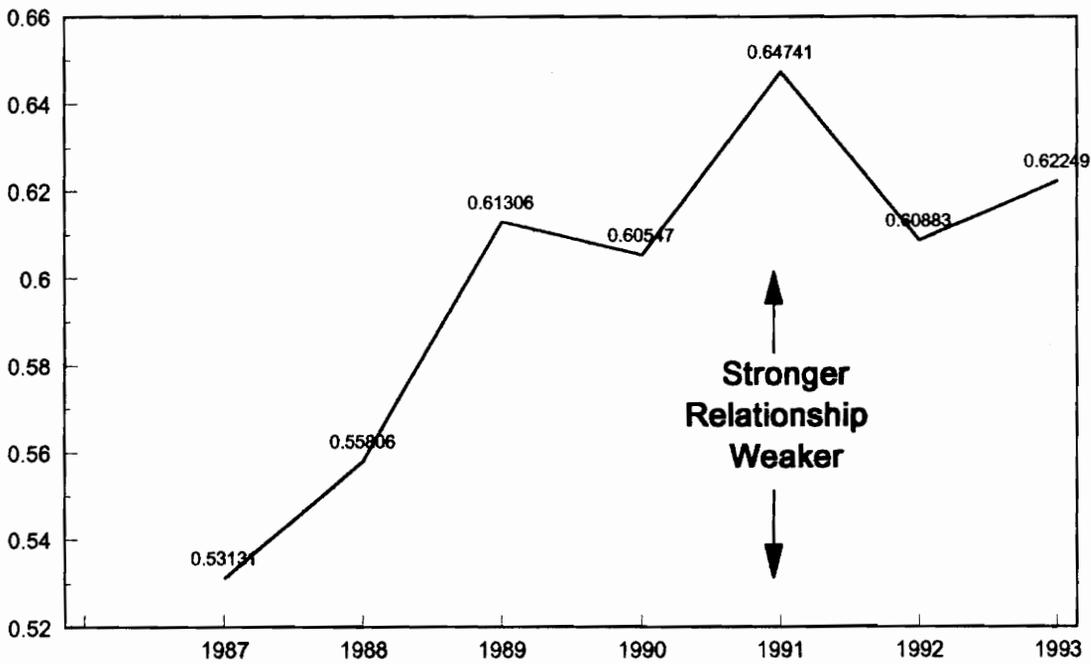


Chart 7 R Square using Revenue per WADM and Market Value of Property per WADM

revenues for the 500 districts is explained by the market value per pupil (independent variable) distribution as R Square approaches one. Chart 7 indicates the greatest explanation occurring during the year 1990-91 with an R Square value of 0.6474. The least amount of explanation of variance occurred during the 1986-87 school year, with a value of 0.5313. For the seven-year period, a change in R Square of 9.12 percentage points (0.6225 minus 0.5313) represents an increase in explanatory power of the variance in revenues by 17.17 percent.

Chart 8, entitled "Slope using Revenue per WADM" ranges from a high value of 0.0139 in the 1986-87 school year, to a low of 0.001 in the 1991-92 year. The value increases slightly the following year to 0.0104. The slope measure helps to clarify the R Square measure previously discussed. The slope may vary from 0.0 to infinity, and indicates the magnitude of change in the relationship between per-pupil inputs (dependent variable) and fiscal capacity indicated by market value of property (independent variable). As the value rises above 0.0, equity of the distribution decreases. Overall, the change in revenue due to a one-unit change in market value of property as indicated in Chart 8 decreased during the study period.

The last equity index that utilized revenue and WADM as the variables was the Pearson R measure. Chart 9, entitled "Pearson R using Revenue per WADM and Market Value of Property per WADM" parallels the R Square high and low years, as Pearson R squared equals the R Square measure previously discussed. Pearson R, or the correlation coefficient, describes the strength of the linear relationship between two variables. The value of this statistic ranges between -1.0 and +1.0, with values closer

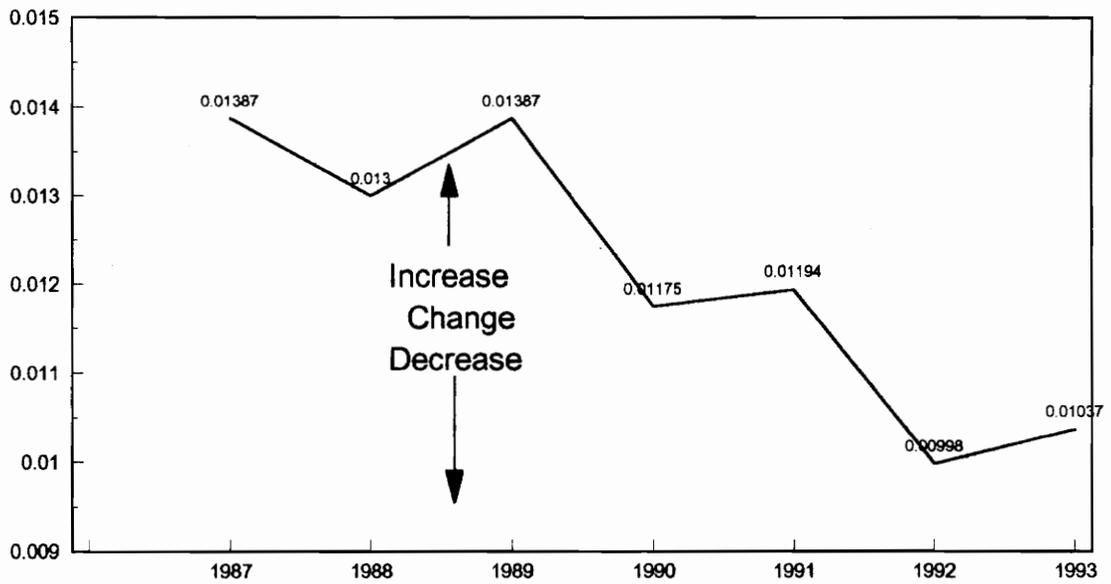


Chart 8 Slope using Revenue and WADM

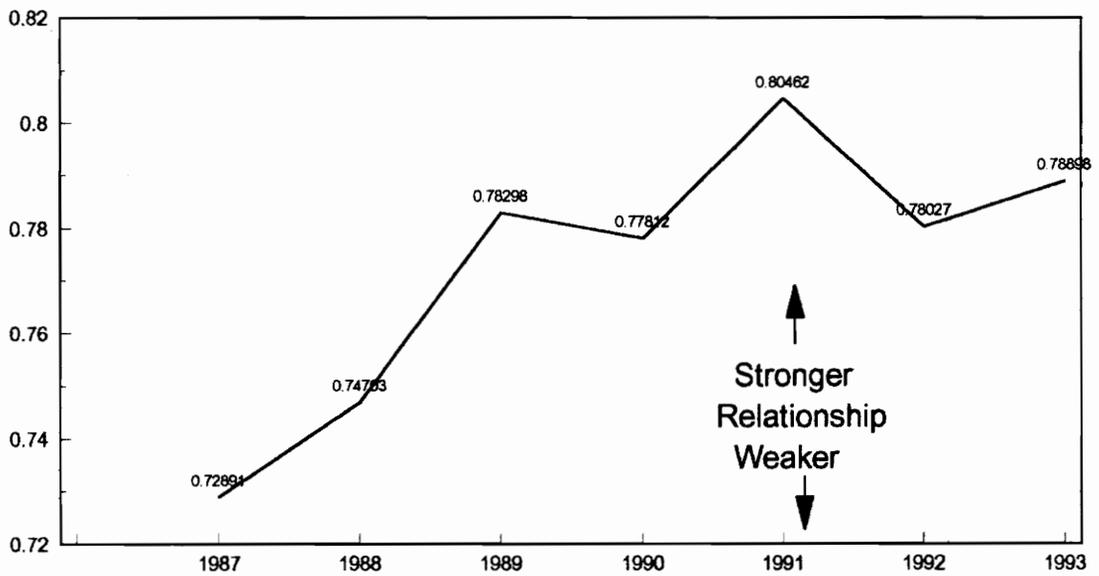


Chart 9 Pearson R using Revenue per WADM and Market Value of Property per WADM

to the extremes indicating a greater relationship, either positive or negative. The variables related here are revenues per pupil and market value of property per pupil. As Pearson R approaches +1.0, the likelihood of an inequitable distribution increases as revenues are strongly correlated to the wealth of the district. The school year having the lowest Pearson R value, or lowest correlation between revenues and market value of property, occurred in 1986-87 with a value of 0.7289. The greatest correlation value of 0.8046 occurred in the 1990-91 school year. The change from 1986-87 to 1992-93 represented an increased correlation over the base year of 8.25 percent.

#### Charts using ADM

The next set of nine charts also used revenue as one of the variables, but substituted average daily membership (ADM) for weighted average daily membership (WADM). As the WADM for each district was inflated relative to ADM, values per pupil obviously were mathematically greater when ADM was used. A district with a greater proportion of high school pupils in its ADM than another district would therefore realize a greater increase in its per pupil measures when changed from WADM to ADM in the denominator. Stated conversely, a district with a greater proportion of high school pupils would realize greater decreases in per pupil measures than another district when WADM replaced ADM in the denominator.

Chart 10, entitled "Gini Index using Revenue and ADM" indicates the statistic values generated for the seven-year period 1986-87 to 1992-93. Equity, as determined

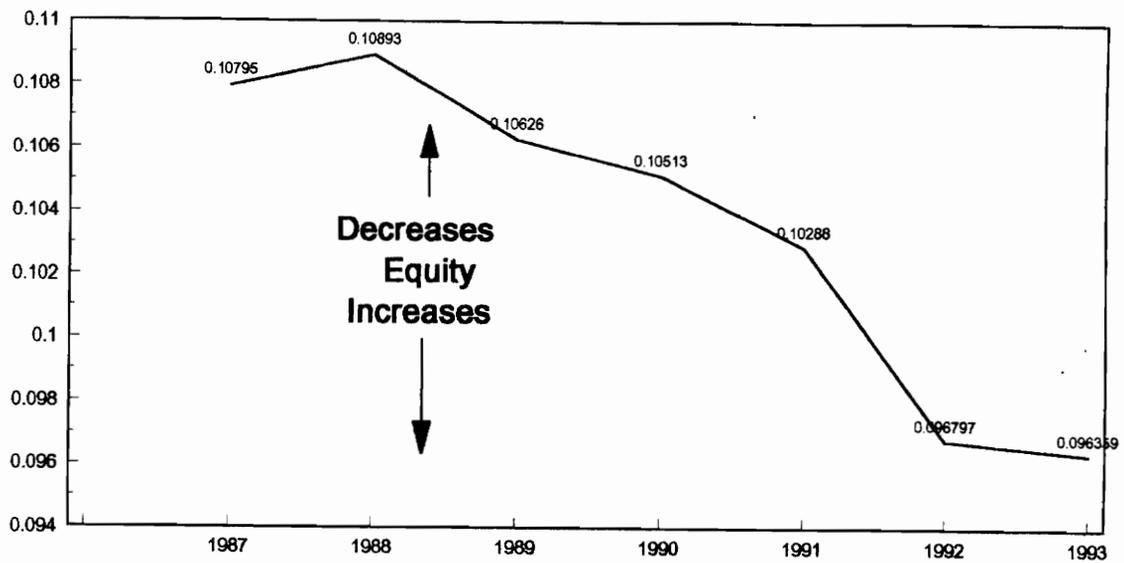


Chart 10 Gini Index using Revenue and ADM

by the Gini Index, improved slightly from the least equitable value of 0.1089 found in 1987-88 to the most equitable value of 0.0964 found in 1992-93. The percent improvement from the oldest year (1986-87) to the latest year was 10.74 percent. The values for the Gini Index were slightly better when ADM was used for the last five years analyzed as compared to when WADM was used. The use of WADM generated a slightly more equitable Gini Index for the earliest two years of the analysis.

The McLoone Index indicates a slight improvement in the equitable distribution of revenue for the last four years when ADM was used. The school year 1988-89 had the lowest McLoone value of 0.8833, climbing to a high of 0.9114 in Chart 11, entitled "McLoone Index using Revenue and ADM." Except for the 1992-93 year, the McLoone Index that relied on ADM had higher values than the corresponding WADM chart for McLoone when revenues were the distribution analyzed.

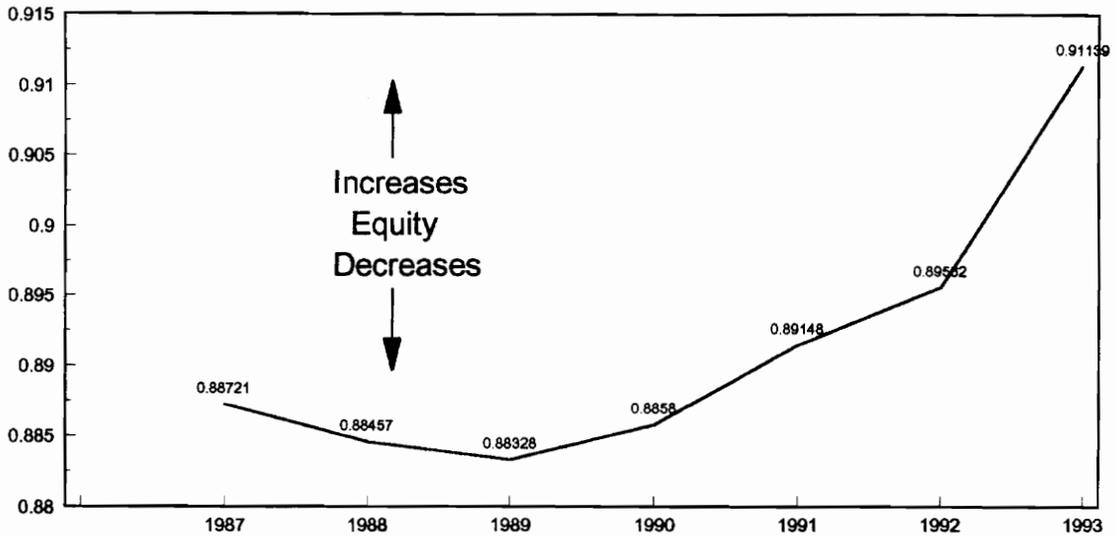


Chart 11 McLoone Index using Revenue and ADM

Chart 12, entitled "Theil Index using Revenue and ADM" ranges from a more equitable low value in 1991-92 of 0.0159 to a former high value of 0.0196 in the 1987-88 school year. The trend since the highest value has been toward greater equity as measured by the Theil, with a gradual improvement until the last year. 1992-93 was virtually the same as the lowest year, with a difference detectable only in the sixth decimal place. When the Theil Indices were calculated through use of revenue for both ADM and WADM, the first three years were higher for ADM, and the last four years were higher for WADM. The year the reversal occurred was 1989-90.

Chart 13, entitled "Restricted Range using Revenue and ADM" depicts the dollar difference between the 95th and 5th percentiles for the years 1986-87 to 1992-93. The smallest difference in revenue per pupil occurred in 1986-87 with a value of \$2,805.26. The greatest revenue per pupil difference between the restricted percentiles

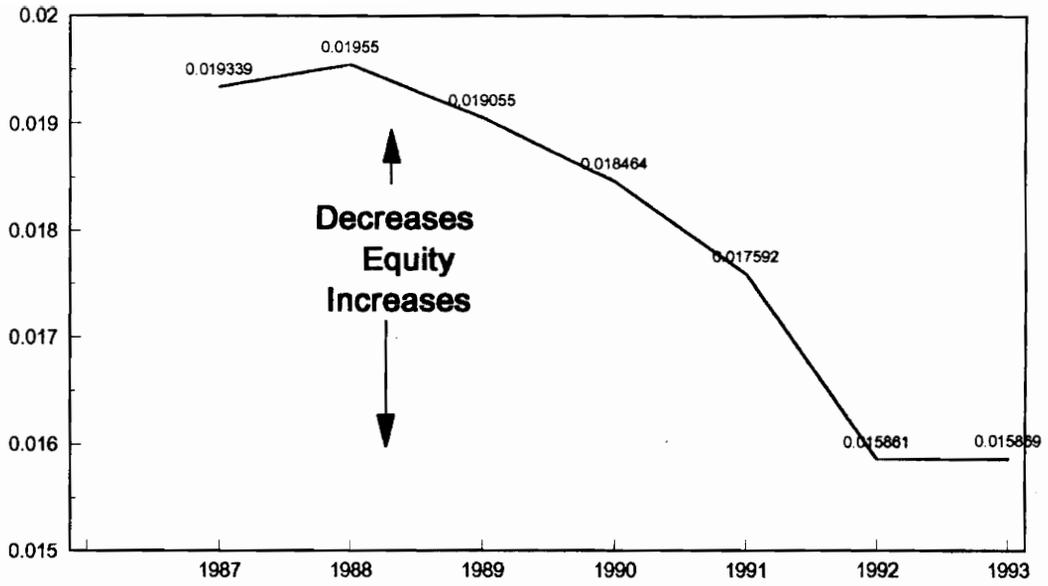


Chart 12 Theil Index using Revenue and ADM

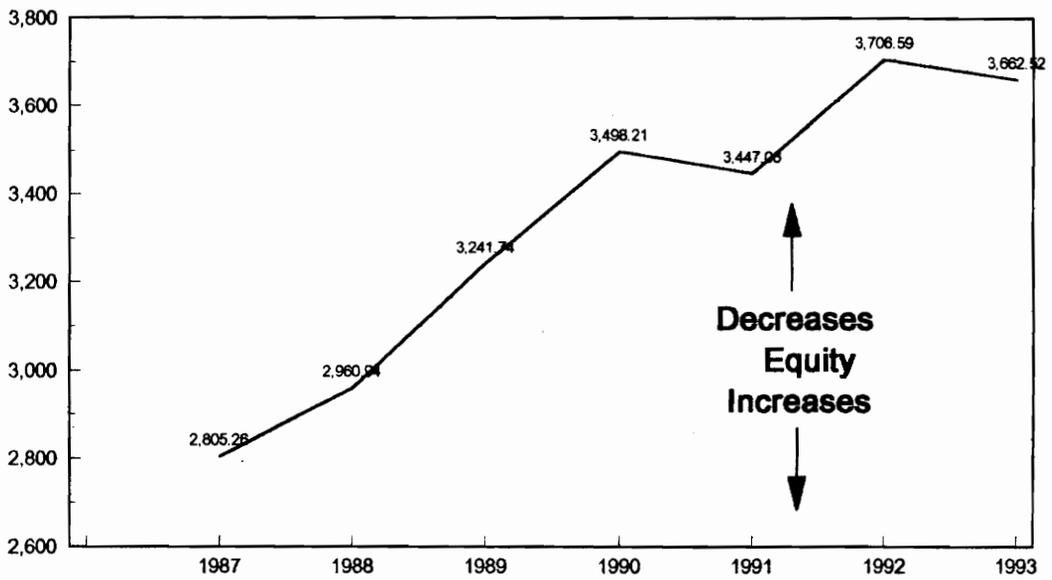


Chart 13 Restricted Range using Revenue and ADM

occurred in 1991-92 with a value of \$3,706.59. As noted earlier, the values found per pupil are all higher when ADM was used. The comparison of WADM and ADM shows, however, that the difference between 1986-87 and 1992-93 was greater for WADM than ADM. The ADM seven-year variance was \$857.26 per pupil, while the WADM variance was \$921.84 per pupil.

The Federal Range Ratio statistic depicts a gradually improving index for the seven-year period when ADM was used. Chart 14 goes from a high, or less equitable value of 0.9256 in 1986-87 to a low, or more equitable, value of 0.7648 in 1992-93. The rate of improvement was very slow from 1986-87 to 1989-90, with a more marked improvement from 1989-90 to 1992-93. The amount of improvement for the first period over the base year of 1986-87 was 4.12 percent. The amount of improvement for the second grouping over the base year of 1989-90 was 13.83 percent. There was not a similar pattern for the Federal Range Ratio when WADM was used.

Chart 15, entitled "Coefficient of Variation using Revenue and ADM" shows a high value of 20.34 in 1987-88, and a low value of 18.33 in 1991-92. The improvement from the oldest year to the most current year was 1.88 percent, which was 9.31 percent of the 1986-87 year value of 20.25. The CV values for revenue and ADM are higher than those for the corresponding WADM CV's for the years prior to 1989-90. From 1989-90 to 1992-93, the CV's using revenue and WADM were higher.

Chart 16, entitled "R Square using Revenue per ADM and Market Value of Property per ADM" shows a gradual increase over the seven-year period, depicting

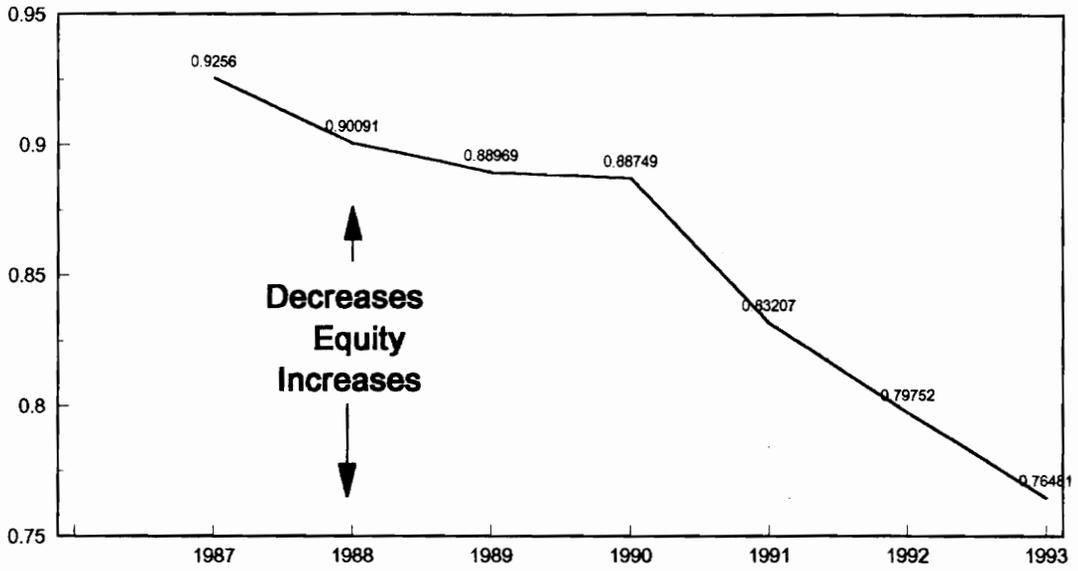


Chart 14 Federal Range Ratio using Revenue and ADM

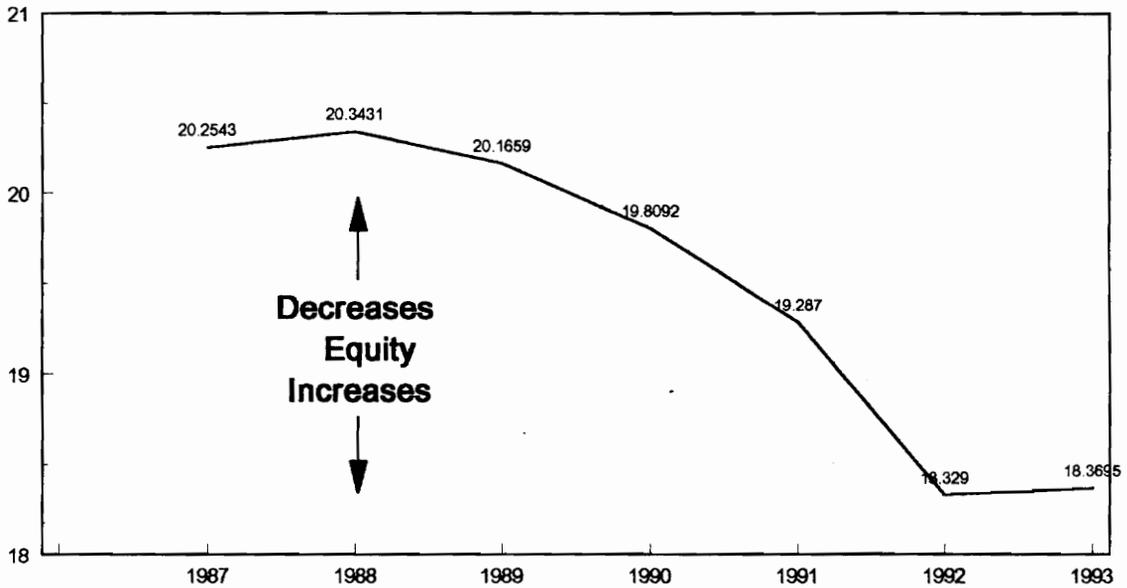
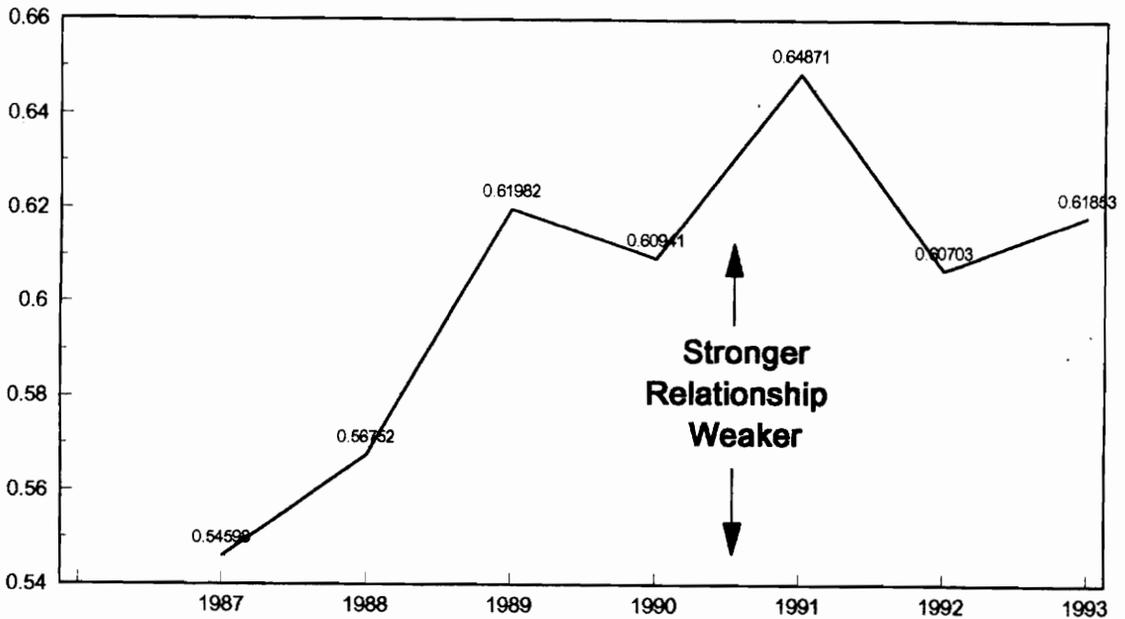


Chart 15 Coefficient of Variation using Revenue and ADM



**Chart 16 R Square using Revenue per ADM and Market Value of Property per ADM**

greater explanation of the variance in the revenue distribution. Analysis of the 1986-87 data resulted in an R Square of 0.5460, while the 1992-93 year resulted in a value of 0.6185 when ADM was used. Values for the ADM R Square displayed in Chart 16 were higher in all years except for the most recent two years where WADM R Square values were slightly higher.

Chart 17, entitled "Slope using Revenue per ADM" ranges from a high value of 0.0141 in the 1986-87 school year, to a low of 0.0099 in the 1991-92 year. The value increases slightly the following year to 0.0103. The slope measure helps to clarify the R Square statistic previously discussed, by showing the magnitude of change in revenue, per unit change in market value of property. The trend found in the slope

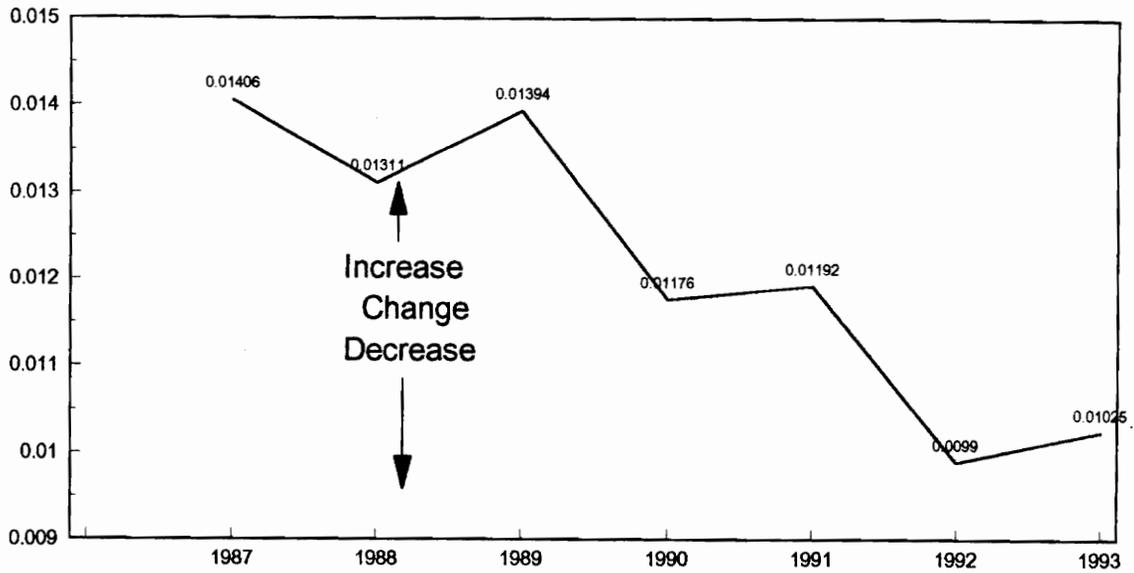


Chart 17 Slope using Revenue and ADM

statistic when ADM has been substituted for WADM is the same, with generally smaller incremental change found in subsequent years.

As mentioned with the first set of charts, Pearson R parallels the pattern of R Square due to the relationship of the two measures. Chart 18, entitled "Pearson R using Revenue per ADM and Market Value of Property per ADM" shows the same trend of slightly increased correlation coefficients from the first year to the latest year analyzed. The lowest value of 0.7389 for Pearson R occurred in 1986-87, indicating greater equity. The least equitable year, or highest correlation coefficient occurred in 1990-91, with a value of 0.8054. The first five years of the chart indicate a higher correlation between revenue and market value of property when ADM was used, with the last two years reversing to a higher correlation coefficient when WADM was used.

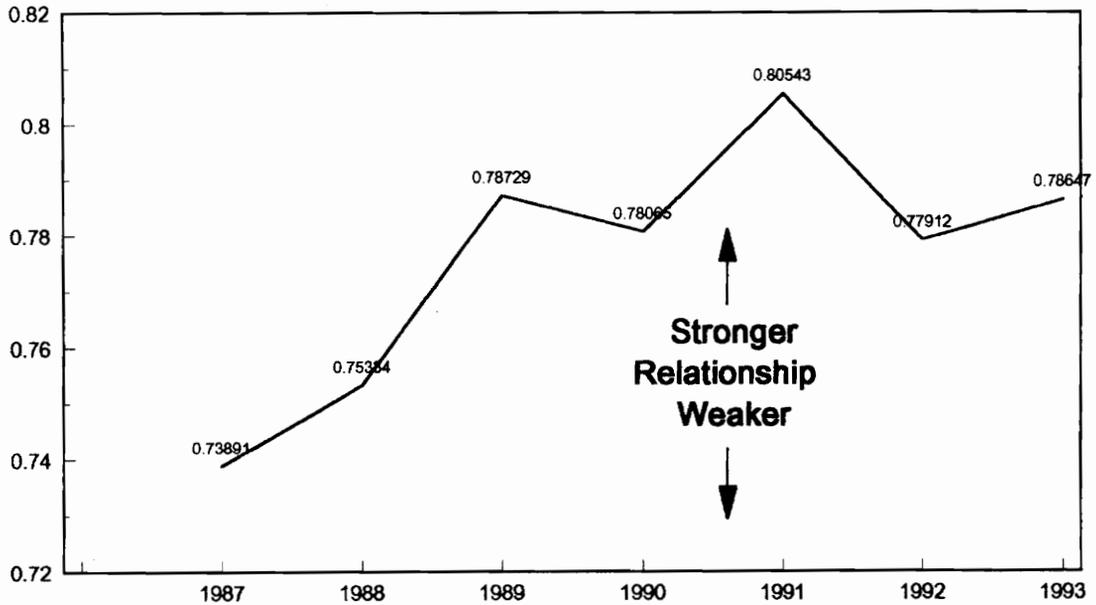


Chart 18: Pearson R using Revenue per ADM and Market Value of Property per ADM

Actual Instructional Expense Charts

Charts using WADM

Chart 19, entitled "Gini Index using AIE and WADM" shows the eleven-year pattern of equity as measured by the Gini Index. This statistic steadily worsened from the 1982-83 school year when the value was 0.1075 to the 1989-90 school year when the value peaked at 0.1188. The Gini Index has indicated improved equity for the 500 districts analyzed since the 1989-90 year, to a value of 0.1128 in 1992-93. The value in 1992-93, while improved over the worst year of 1989-90, still shows a decline in equity as measured by the Gini of 4.98 percent when the 1982-83 year is used as a base.

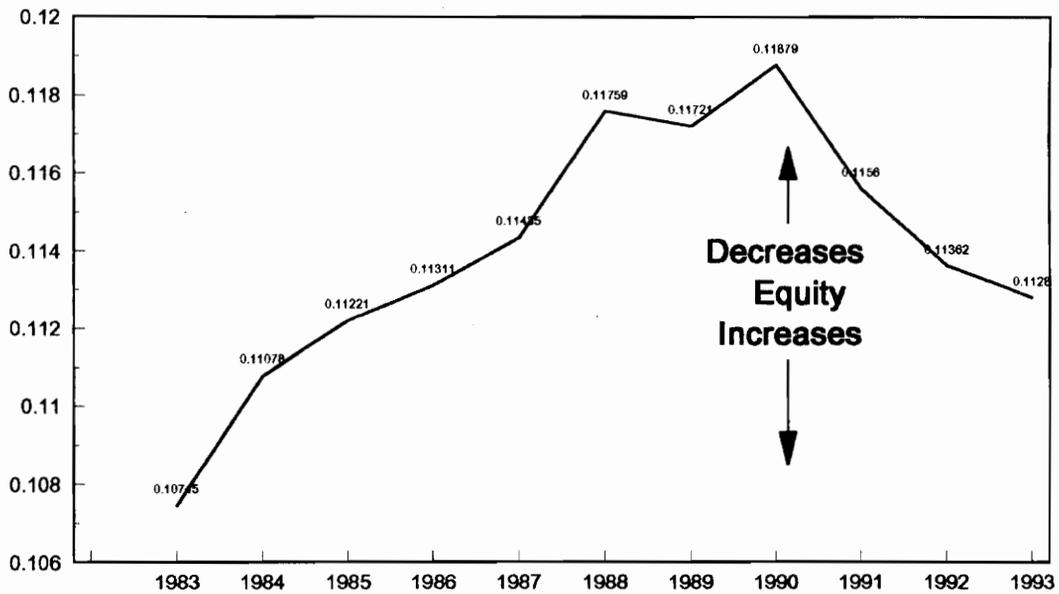


Chart 19 Gini Index using AIE and WADM

The trend of the McLoone Index when AIE and WADM are the chosen variables can be seen in Chart 20. This statistic indicates the ratio of the actual instructional expenditures of all pupils below the median per pupil expenditure of the entire distribution to the expenditure of the lower one-half of the 500 districts had they received the median of the state. The equity as measured by the McLoone improves for the lower one-half of the state distribution as the value increases. In the 1983-84 school year, the least equitable AIE distribution was found, with 85.36 percent of the median AIE having been expended on the lower one-half of the distribution. The most equitable year of the eleven years analyzed occurred in 1991-92, when the lower one-half of the distribution spent 87.156 percent of the median AIE of the state.

Chart 21, entitled "Theil Index using AIE and WADM" depicts the change in resource distribution for the years 1982-83 through 1992-93. The most equitable year

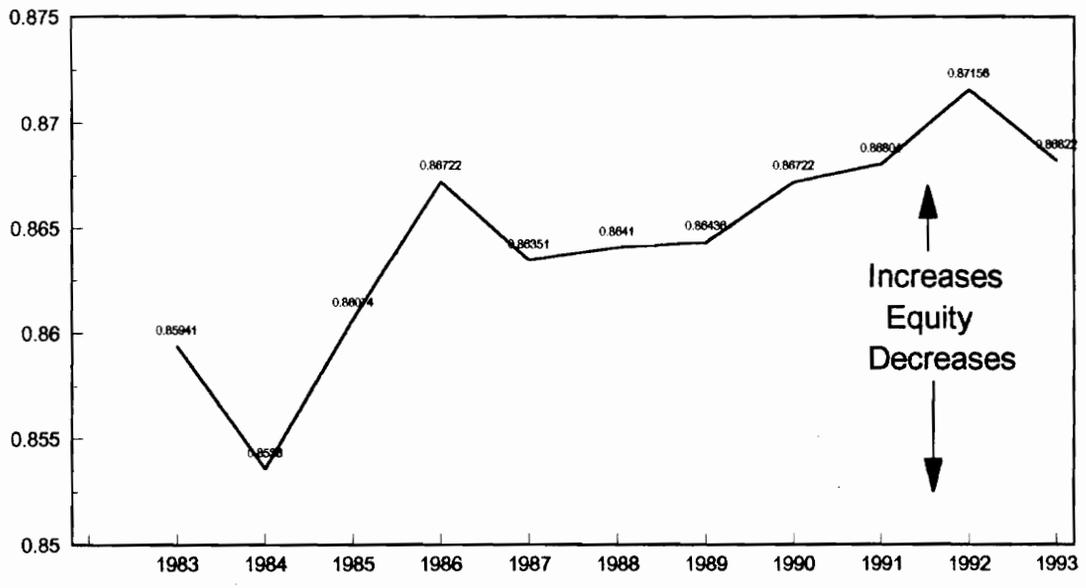


Chart 20 McLoone Index using AIE and WADM

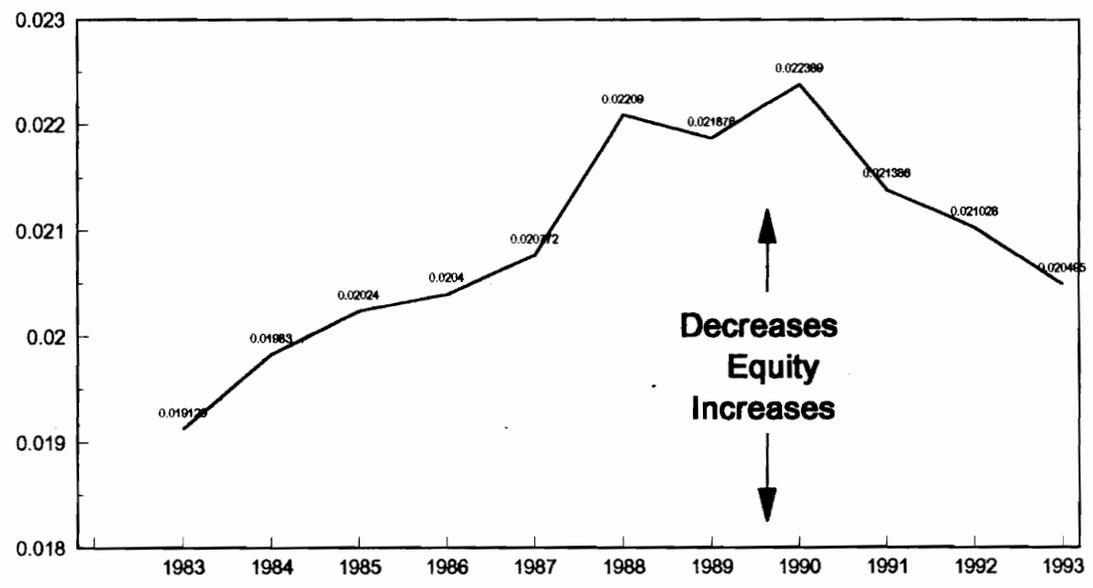


Chart 21 Theil Index using AIE and WADM

for the Commonwealth of Pennsylvania, as measured for these variables by the Theil Index, occurred in the first year of the series, with a value of 0.0191. The Theil Index steadily worsened through the 1989-90 year, to a value of 0.0224. This indicated a decline in the Theil Index of 17.04 percent over the base year of 1982-83. The value of the Theil Index improved to 0.0205 in the 1992-93 year, still 7.14 percent worse than the base year.

Actual dollar differences between the 95th and 5th percentiles were measured in Chart 22 entitled "Restricted Range using AIE and WADM." In 1982-83, the districts found at the 95th percentile spent \$1,360.52 more for AIE than the districts found at the 5th percentile. This difference had increased to \$2,610.69 by 1992-93. The previous two years, 1990-92, had even worse differences in AIE than the last year of audited data analyzed.

The Federal Range Ratio statistic, as depicted in Chart 23, fluctuated from a more equitable value of 0.8278 in the 1992-93 school year to a least equitable value of 0.9504 in 1987-88. The Federal Range Ratio is the Restricted Range Value divided by the value found at the 5th percentile. A value of 1.0 would indicate the AIE expenditure level found at the 95th percentile was exactly double of the AIE dispersed at the 5th percentile. This level of disparity was approached in the 1987-88 school year.

The coefficient of variation (CV) is the standard deviation of a distribution divided by the mean of that distribution, expressed as a percentage. This statistic indicates variability around the mean. The greater the value, the lower the equity of

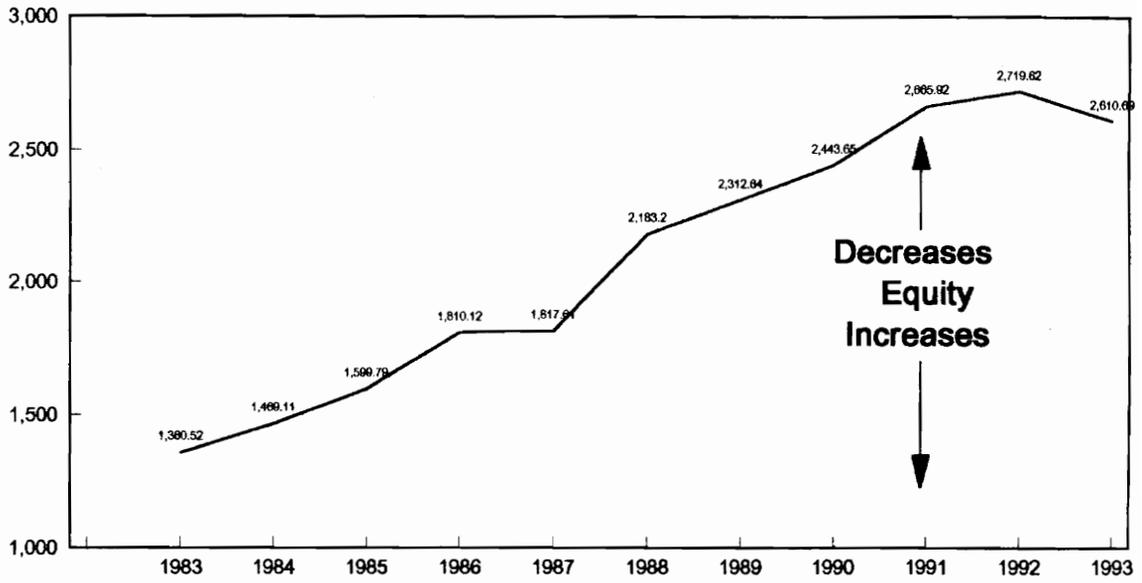


Chart 22 Restricted Range using AIE and WADM

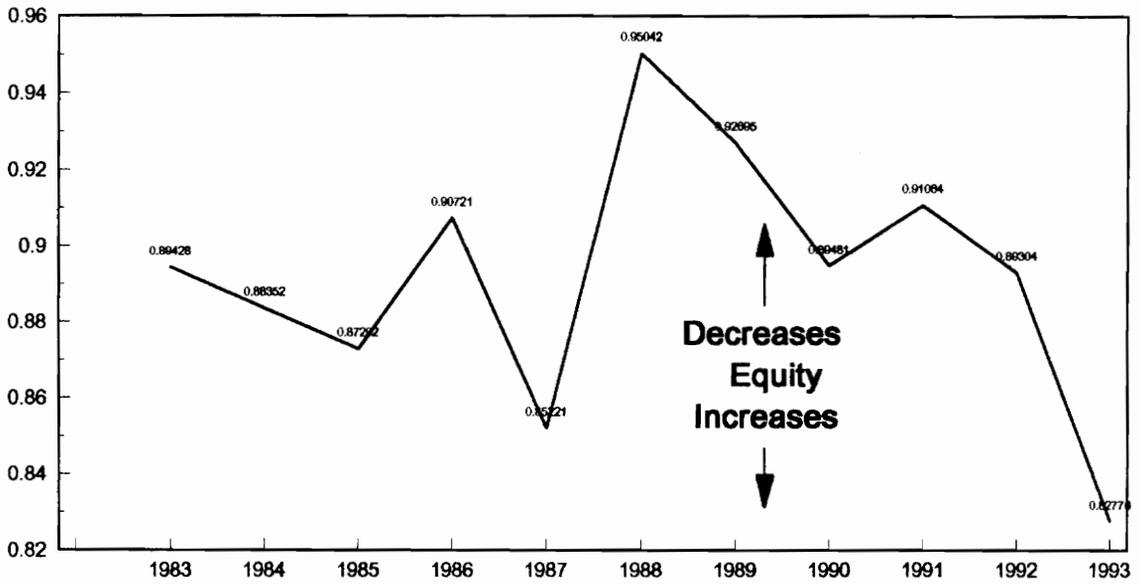


Chart 23 Federal Range Ratio using AIE and WADM

the distribution. In Chart 24, entitled "Coefficient of Variation using AIE and WADM," all values exceeded 20 percent. The lowest CV was calculated for the first year of the analysis, 1982-83, yielding a value of 20.1279. The least equitable year based on these variables and the CV equity statistic occurred in 1989-90, with a value of 21.6229. The overall pattern for the CV worsened from 1982-83 to the 1989-90 school year, then improved through the 1992-93 school year.

Chart 25, entitled "R Square using AIE per WADM and Market Value of Property per WADM" is similar to Chart 7 except for the use of AIE instead of revenue (local plus state). Market value of property explains a relatively high portion of the variability in AIE for the 500 district distribution over the entire eleven-year period analyzed. The lowest R Square occurred in 1984-85, with a value of 0.4823, and ranged to a high value of 0.5954 in 1990-91. The greater the value for R Square, the stronger is the relationship between wealth (in this case market value of property) and AIE.

Chart 26, entitled "Slope using AIE per WADM" ranges from a high value of 0.0127 in the 1982-83 school year, to a low of 0.0086 in the 1991-92 year. The value increases slightly the following year to 0.0087. The slope measure helps to clarify the R Square measure previously discussed. As the R Square of Chart 25 increased gradually, the corresponding slope values of Chart 26 gradually decreased. This indicates that while the relationship between AIE and wealth was becoming stronger, the size of the change in AIE expected from each unit increase of wealth was

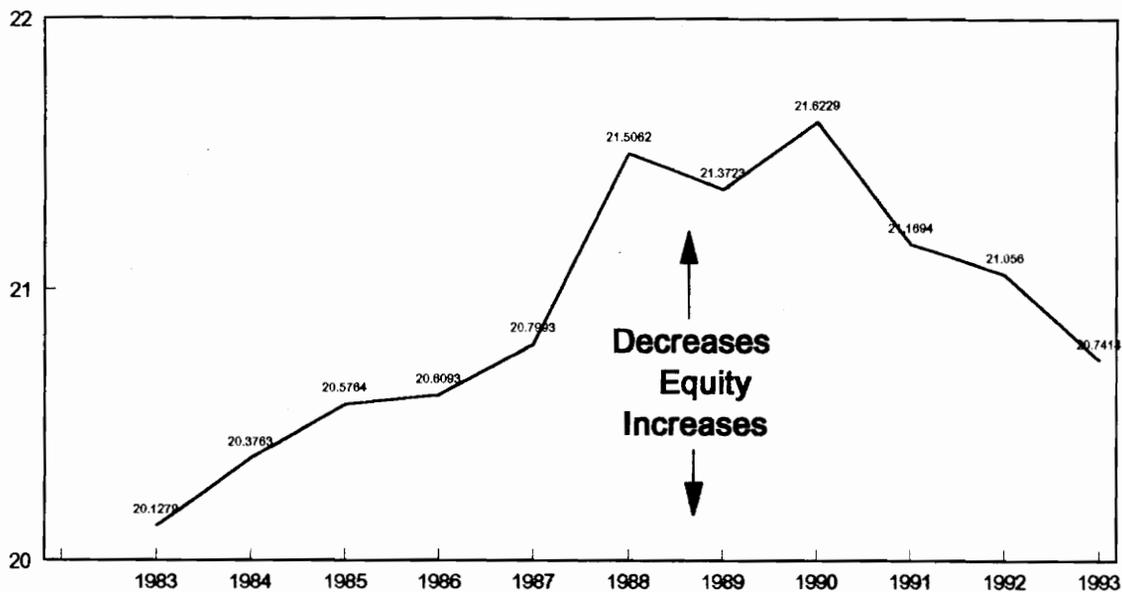


Chart 24 Coefficient of Variation using AIE and WADM

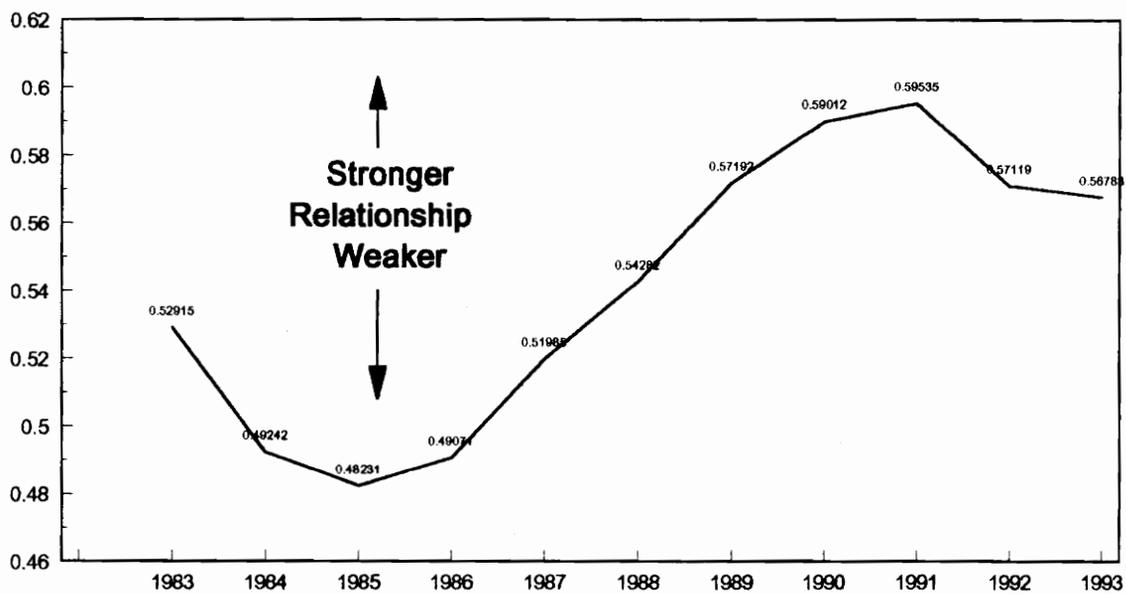


Chart 25 R Square using AIE per WADM and Market Value of Property per WADM

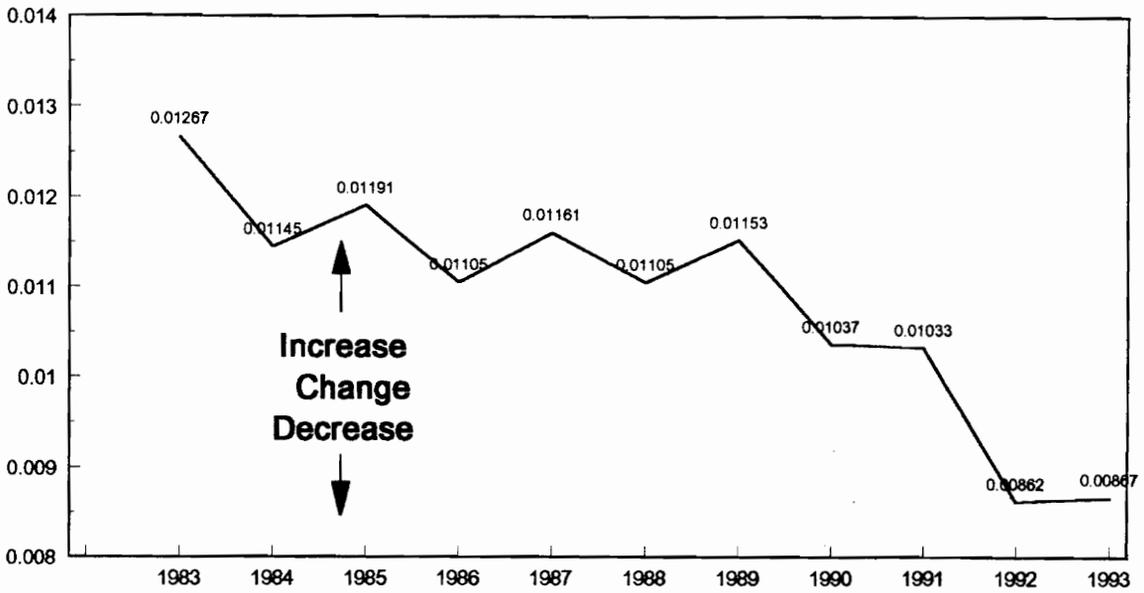


Chart 26 Slope using AIE and WADM

decreasing. A large change occurred in the 1991-92 year, which will be discussed in the Conclusions section.

Chart 27, entitled "Pearson R using AIE per WADM and Market Value of Property per WADM" shows the eleven-year trend of the linear correlation coefficient between AIE and market value of property. A strong positive relationship, or positive value that approaches 1.0, would indicate the amount spent in AIE per pupil would be very closely tied to the amount of wealth found in that district. The values found in Chart 27 indicate a high positive relationship, with values ranging from 0.6945 in 1984-85 to 0.7716 in 1990-91.

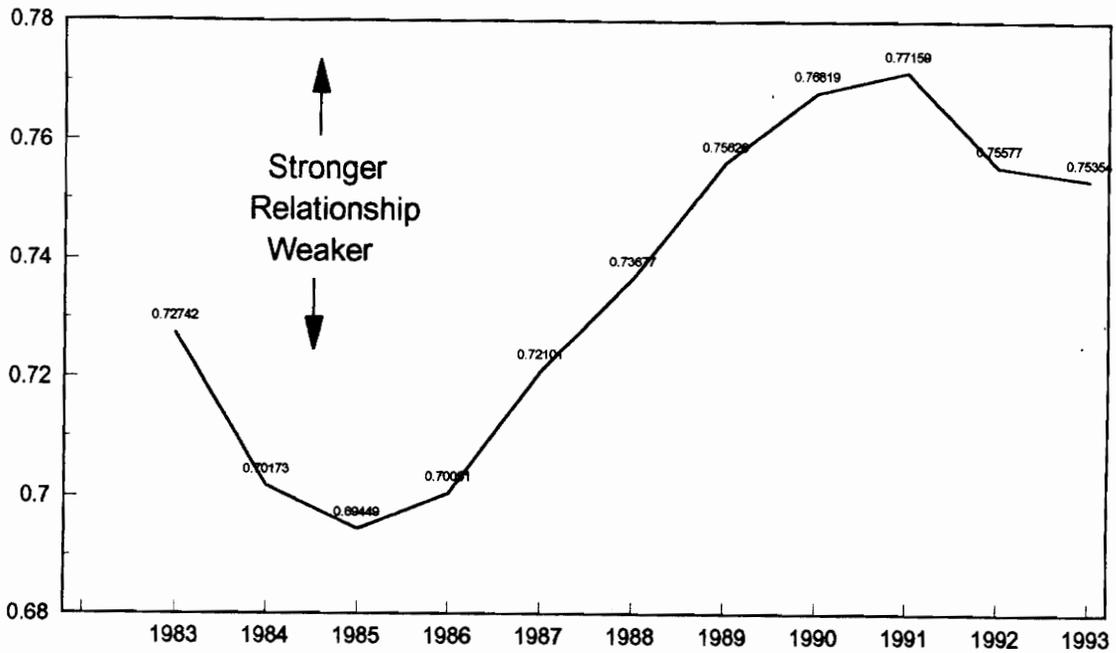


Chart 27 Pearson R using AIE per WADM and Market Value of Property per WADM

Charts using ADM

Chart 28, entitled "Gini Index using AIE and ADM," is similar to Chart 19 but replaces WADM with ADM. For the years when equity decreased, 1982-83 through 1989-90, the chart using ADM had higher, or less equitable Gini values. For the years immediately following 1989-90 when equity was improving gradually, the Gini values using ADM as a variable were lower. The Gini Index ranged from a low, or more equitable, value of 0.1103 in 1982-83 to a high, less equitable, value of 0.1178 in 1989-90 when AIE and ADM were the variables used.

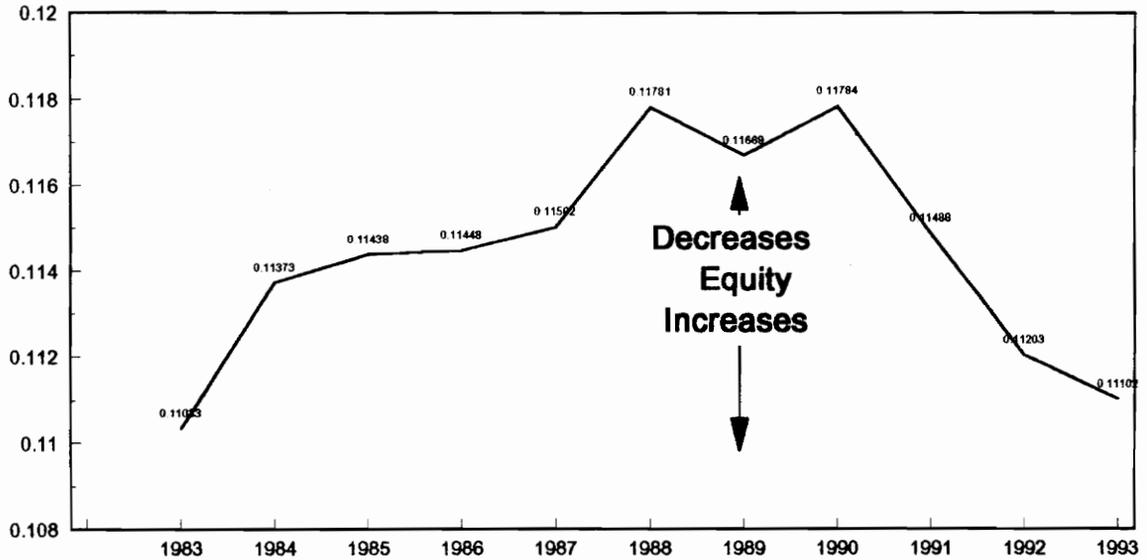


Chart 28 Gini Index using AIE and ADM

The lower one-half of the actual instructional expense distribution measured by the McLoone Index in Chart 29 has shown a very small, incremental improvement over the eleven-year period analyzed. The lowest equity measure of 0.8524 in 1982-83 improved by 2.50 percent by the 1992-93 year to a value of 0.8736. This means that the lower one-half of the entire 500 district distribution expended 87.36 percent of the state median AIE level.

The Theil Index showed improvement over the last three-year period of the eleven years analyzed and are depicted in Chart 30. For the years 1982-83 through 1992-93 when AIE and ADM were the variables used, an improvement of 1.22 percent occurred over the base year. Compared to the Theil Index when WADM was used, 1987-88 was the last year that the Theil Index was higher for ADM. From 1988-89

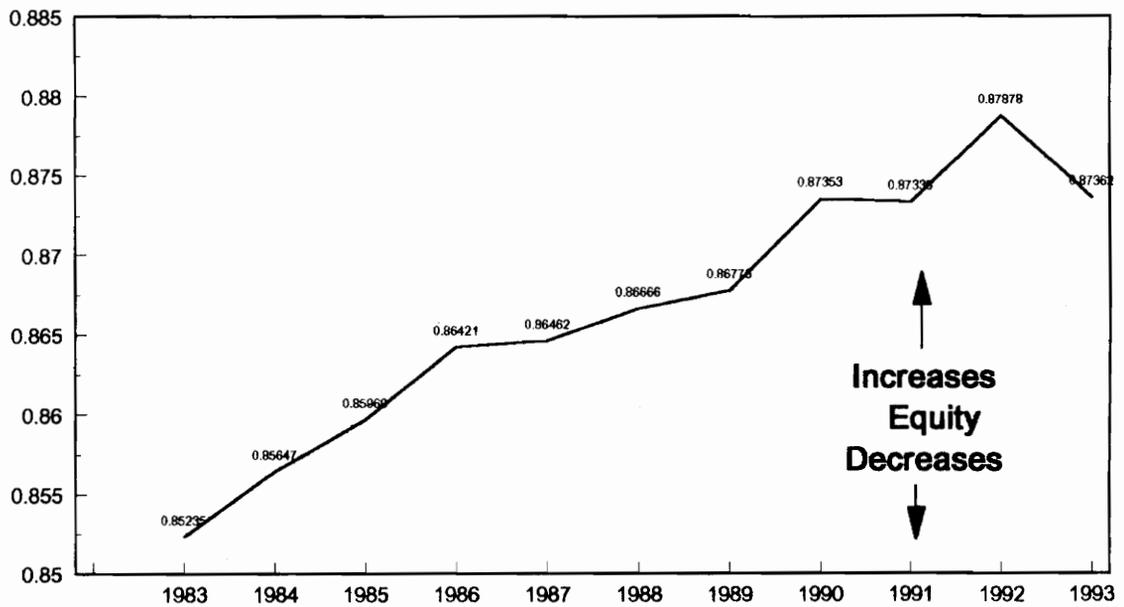


Chart 29 McLoone Index using AIE and ADM

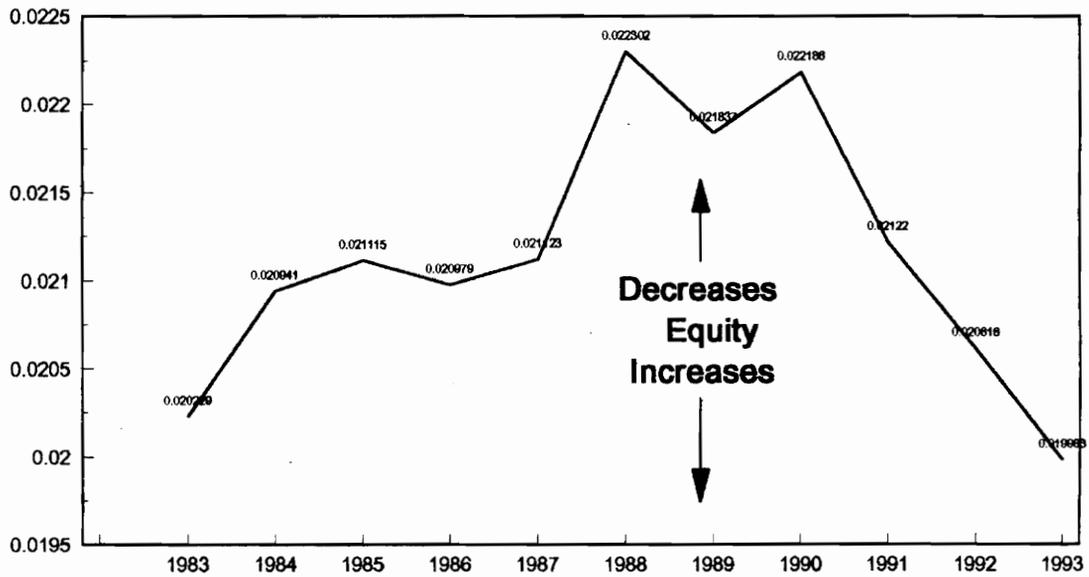


Chart 30 Theil Index using AIE and ADM

to the 1992-93 year, values for the Theil Index were higher, or less equitable, when WADM was the pupil measure.

Chart 31, entitled "Restricted Range using AIE and ADM" shows a steady decline in equity over the eleven years analyzed. The smallest difference in dollars expended in AIE between the 95th and the 5th percentiles occurred in 1982-83 with a value of \$1,620.34. This difference had climbed to \$3,024.53 in 1991-92, before dropping slightly to \$2,872.75 in 1992-93. Due to the smaller denominator of ADM, all differences were greater using ADM than found in the comparable WADM chart.

The Federal Range Ratio as depicted in Chart 32 showed marked improvement over the last two-year period analyzed. When the value of 0.8029 found in 1992-93 was compared to 0.9334 for the base year 1982-83, an improvement of 13.98 percent was found. The value of 0.8029 found in the 1992-93 year indicates that 80.289 percent of the 5th percentiles' AIE was the difference in AIE dollars between the 95th and 5th percentiles.

The Coefficient of Variation, calculated by dividing the standard deviation of a distribution by the mean of the same distribution and further described as a percentage, is depicted in Chart 33. For all years, the CV exceeded 20.5 percent for both AIE and ADM. The worst year for equity when measured by the CV occurred in 1987-88, which yielded a value of 21.6509 percent. The last three years of the eleven years studied resulted in slightly improved CV's. The lowest value of the chart occurred in 1992-93 with a value of 20.5064 percent.

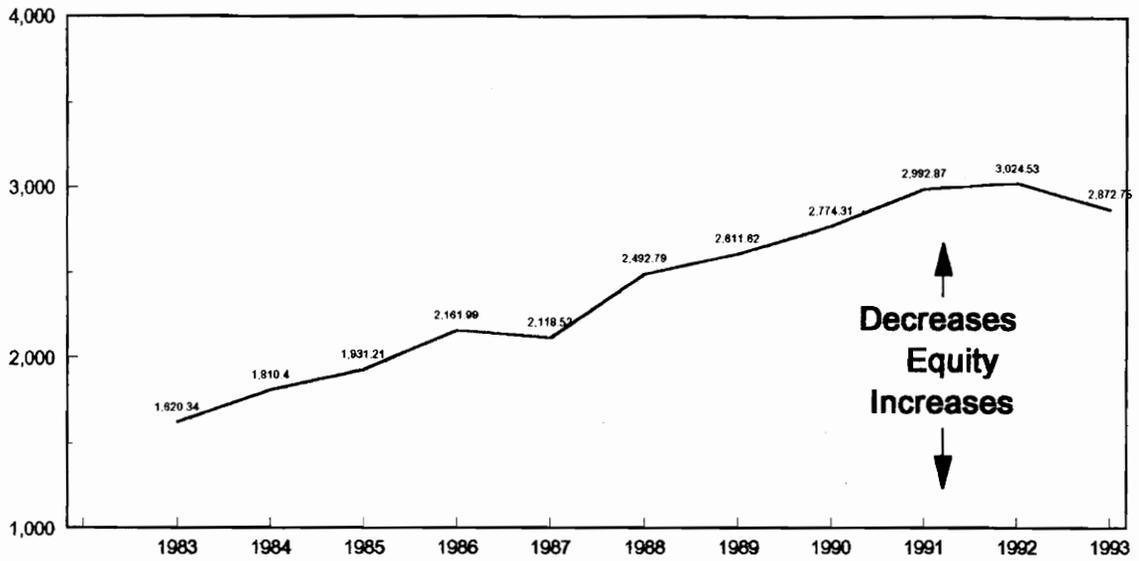


Chart 31 Restricted Range using AIE and ADM

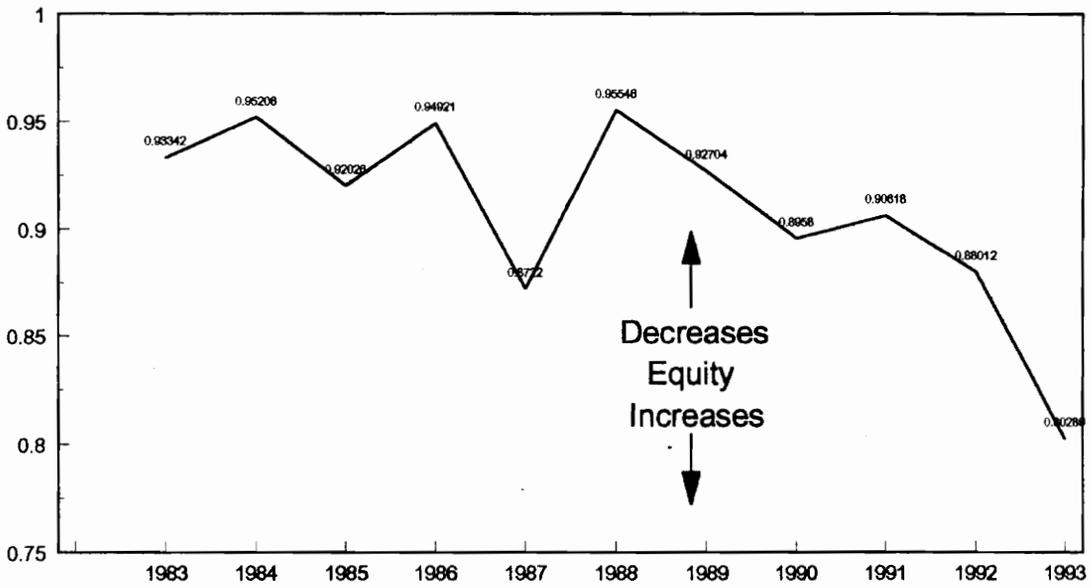


Chart 32 Federal Range Ratio using AIE and ADM

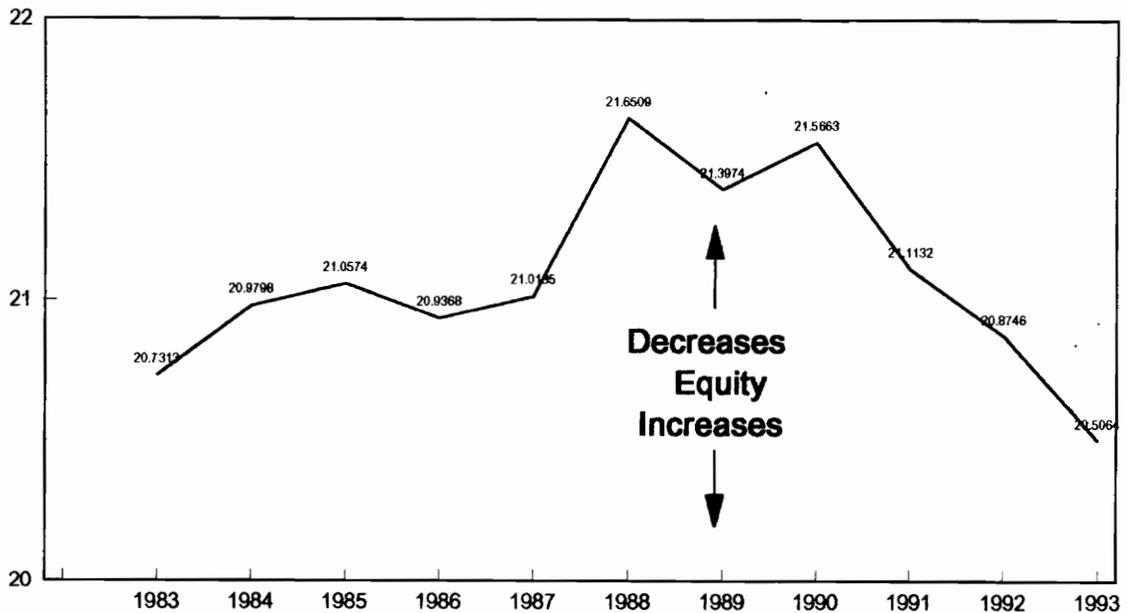


Chart 33 Coefficient of Variation using AIE and ADM

Chart 34, entitled "R Square using AIE per ADM and Market Value of Property per ADM" indicates the amount of variance found in the AIE distribution that can be explained by the market value of property found in each district. The lowest R Square, 0.5028, occurred in 1984-85. The greatest R Square, 0.5971, occurred in 1990-91. This statistic indicates a stronger relationship between AIE and market value of property in 1992-93 than that found in 1982-83.

Chart 35, entitled "Slope using AIE per ADM" ranges from a high value of 0.0131 in the 1982-83 school year, to a low of 0.0086 in the 1991-92 year. The value increases slightly the following year. The slope pattern found in Chart 35 is similar to the pattern and explanation described for Chart 26.

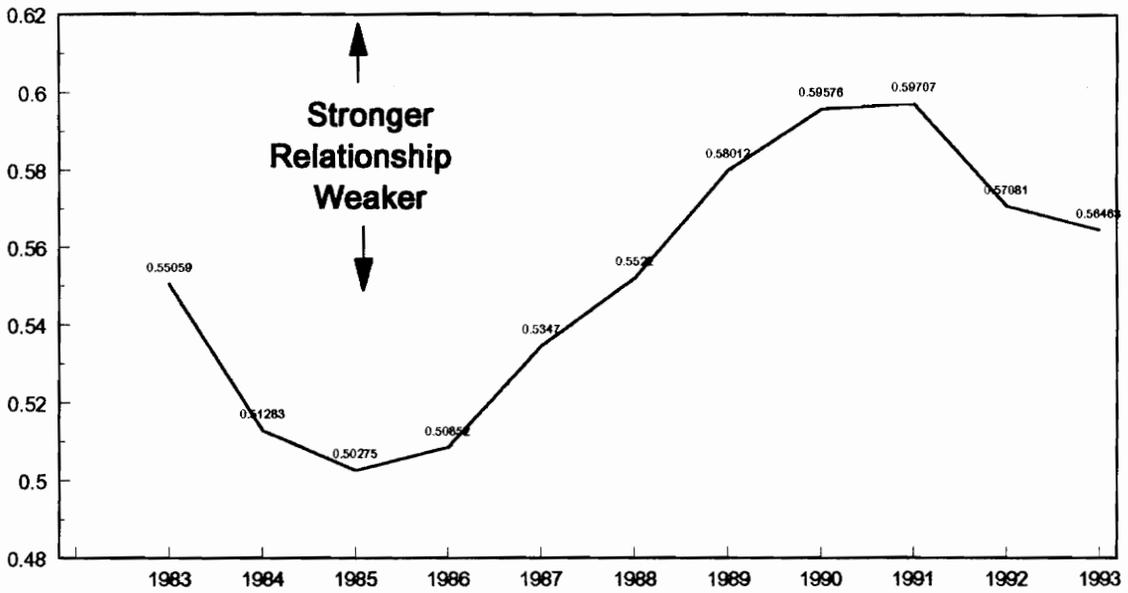


Chart 34 R Square using AIE per ADM and Market Value of Property per ADM

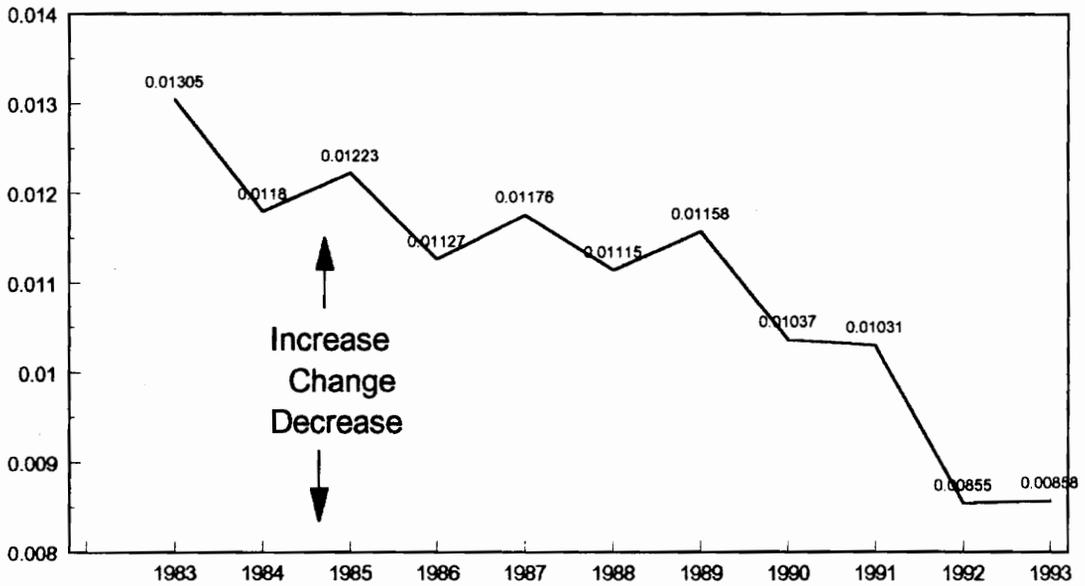


Chart 35 Slope using AIE and ADM

Chart 36 indicates the value of Pearson R, which depicts the linear correlation coefficient between AIE and market value of property. Simply the square root of R Square, the trend shown parallels R Square from the previous chart. The greatest positive relationship between AIE and market value of property occurred in 1990-91, with a value of 0.7727.

### **Fiscal Capacity Measures**

The next series of charts depicts the differences over time between the high and low fiscal capacity districts when the various measures are analyzed on a per pupil basis. Each measure will be discussed, with the unadjusted, adjusted and percentage charts reviewed by pupil count type.

#### Average Personal Income Found in Five Percent Groups

Personal income is one of the measures used by the Commonwealth of Pennsylvania in determining the Aid Ratio for each district. The higher the personal income total for a district, the presumed greater fiscal capacity of that district, and the greater ability to support education for that district. The weighting of personal income in the calculation of the aid ratio (MVINCR) is 0.4. The weight assigned to market value of property is 0.6.

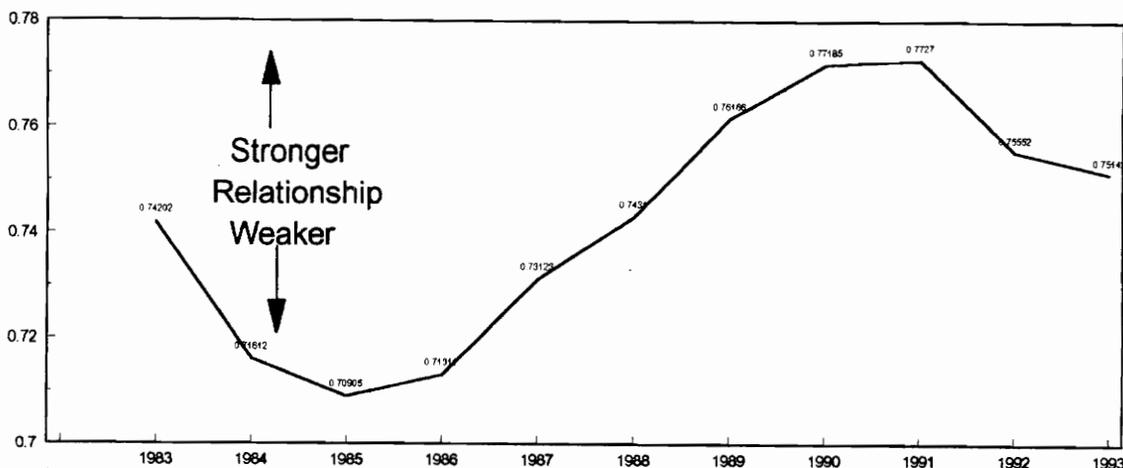
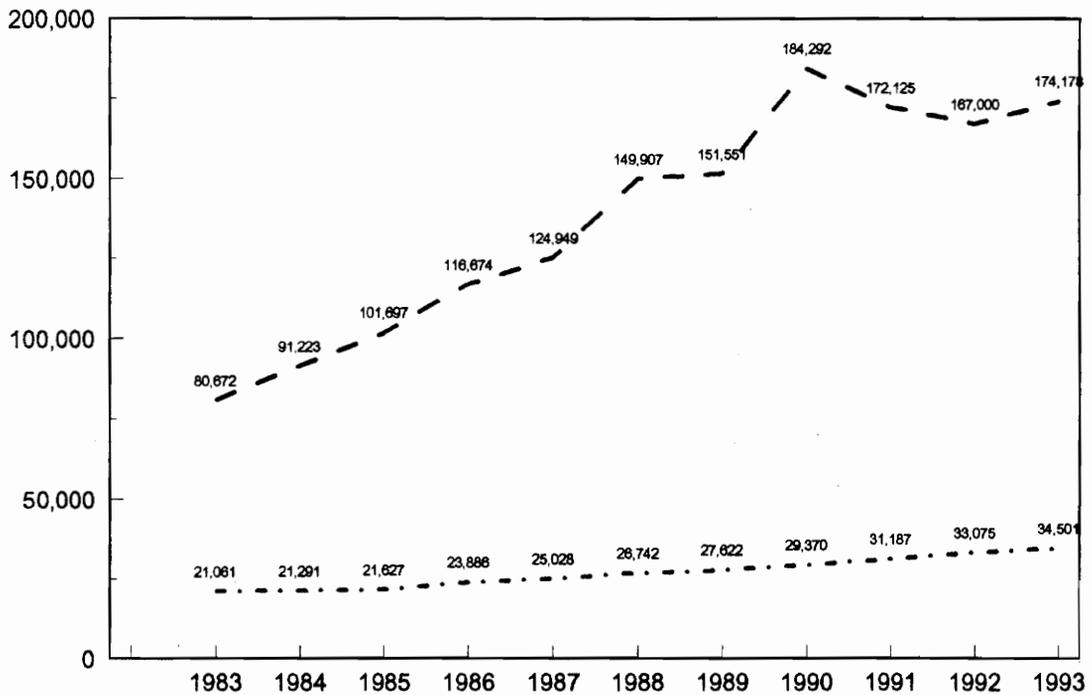


Chart 36 Pearson R using AIE per ADM and Market Value of Property per ADM

### Charts using WADM

The chart entitled "Chart 37: Average Personal Income per WADM found in 5 Percent of State WADM at each end of continuum, Unadjusted" depicts the eleven-year period from 1982-83 through 1992-93. The top dashed line represents the higher capacity districts group average personal income, in dollars, per pupil, using WADM as the pupil count. The figures in this chart are unadjusted for inflation. The smallest difference in unadjusted dollars per pupil occurred in the 1982-83 school year. The higher capacity districts had \$80,672 in per pupil personal income, a total of \$59,611 greater than the lower capacity district average of \$21,061 per pupil personal income.



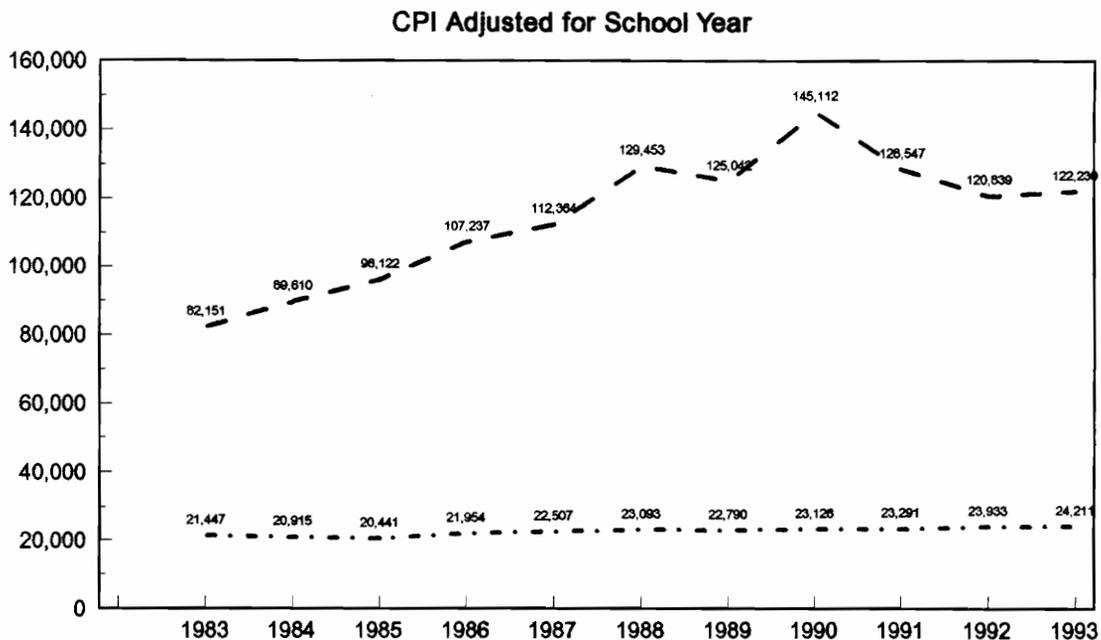
**Chart 37 Average Personal Income per WADM found in 5 Percent of State WADM at each end of continuum, Unadjusted**

The year of greatest difference occurred in the 1989-90 school year, which is the same year that the high capacity districts average peaked at \$184,292 per pupil personal income. During that year, the low capacity districts per pupil personal income average was \$29,370, or \$154,922 less per pupil. Over the entire eleven-year period, the higher capacity districts' average personal income increased from the low of \$80,672 to \$174,178 in 1992-93. This change was \$93,506, for an increase of 115.9 percent in available per pupil personal income. Over the same time period, the lower capacity district average per pupil personal income went from \$21,061 to \$34,501. This change was \$13,440 in unadjusted dollars, for an increase of 63.8

percent over the base year. The magnitude of change between high and low capacity districts, as shown in this chart for the five percent groups, was almost seven to one. This was calculated by dividing the higher group average change of \$93,506 by the lower group average change of \$13,440.

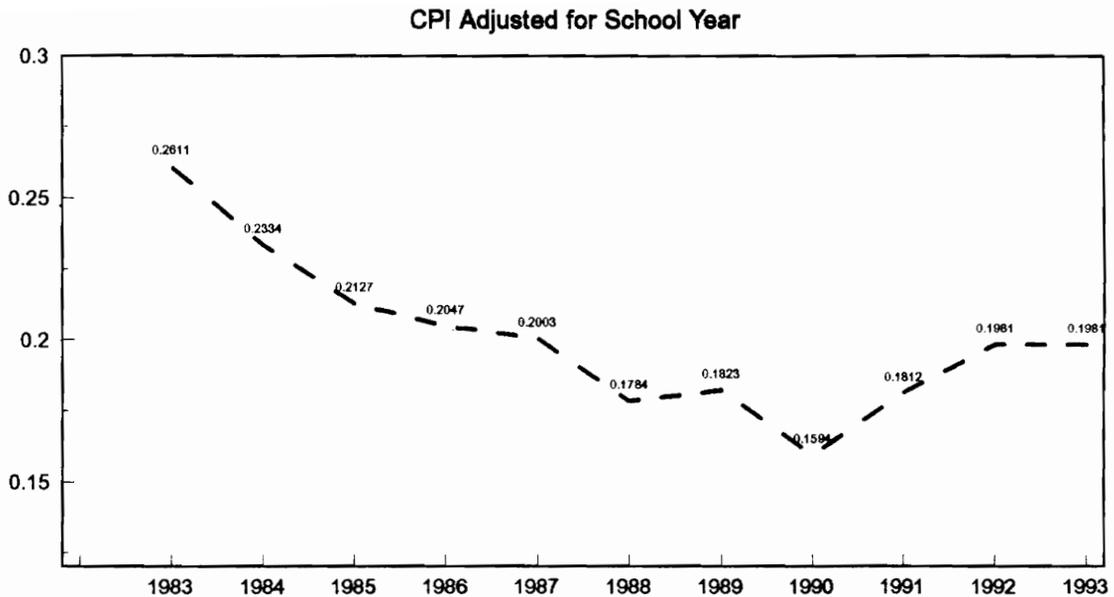
When the dollars found in Chart 37 were adjusted by the Consumer Price Index (CPI), the result was Chart 38, entitled "Average Personal Income per WADM found in 5 Percent of State WADM at each end of continuum: CPI Adjusted for School Year." The high capacity districts increased their per pupil personal income average from \$82,151 to \$122,230, a change of \$40,079. When Chart 37 is examined, it can be seen that four years actually had higher averages than the final year of 1992-93. The school years 1987-88 through 1990-91 all had higher adjusted averages, with the peak being found in 1989-90, with an average per pupil personal income of \$145,112. When adjusted, the high capacity district group average improved by 48.79 percent from the first year of 1982-83 to the last year shown.

In comparison, the low capacity district group average began at \$21,447 and gradually improved until it peaked at \$24,211 in per pupil personal income during the 1992-93 school year. The absolute change for these districts was \$2,764, or an improvement of 12.89 percent over the first year of 1982-83. When the adjusted dollar change in personal income per pupil for the high capacity group of \$40,079 was divided by the low capacity group average change of \$2,764, the result indicates the high fiscal capacity group average change to be over 14.5 times that of the low fiscal capacity group.



**Chart 38 Average Personal Income per WADM found in 5 Percent of State WADM at each end of continuum: CPI Adjusted for School Year**

The final chart of the personal income/WADM series is entitled "Chart 39: Average Personal Income per WADM found in 5 Percent of State WADM at each end of continuum: Low Capacity Districts as a Percent of High Capacity Districts." This chart depicts the percent of the high capacity districts average personal income per pupil available to the low capacity group districts. The values ranged from a high of 26.11 percent in 1982-83 to a low of 15.94 percent in 1989-90. In essence, during the 1989-90 school year, five percent of the entire state pupil population had an average personal income, as an indicator of fiscal capacity, of 15.94 percent of the pupils found in the highest five percent. This number for the last six years depicted never exceeded 20 percent.



**Chart 39 Average Personal Income per WADM found in 5 Percent of State WADM at each end of continuum: Low Capacity Districts as a Percent of High Capacity Districts**

Charts using ADM

Due to the smaller pupil count when ADM was used, the values found per pupil obviously were higher when the same capacity measure was used. Chart 40, entitled "Average Personal Income per ADM found in 5 Percent of State ADM at each end of continuum, Unadjusted," indicated the high capacity districts average per pupil personal income changed from a low of \$94,553 in 1982-83 to \$195,988 in 1992-93. The peak value was found in 1989-90, with high capacity districts averaging \$208,597 in per pupil personal income. The dollar change over the eleven years shown for the

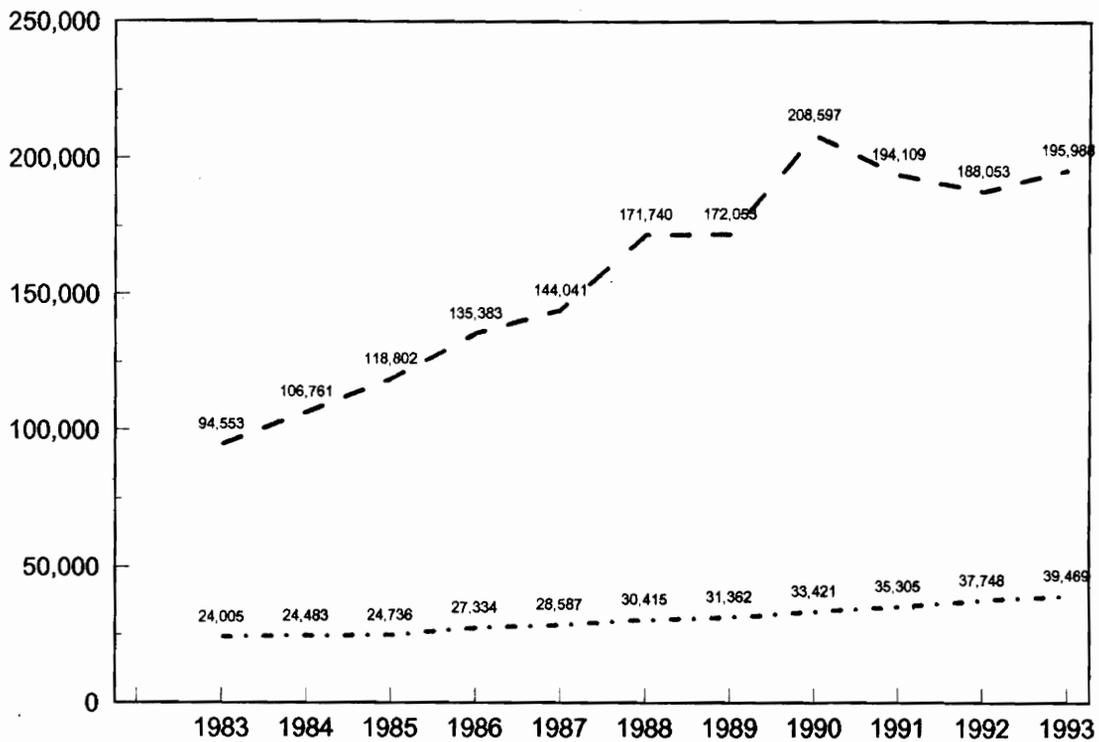


Chart 40 Average Personal Income per ADM found in 5 Percent of State ADM at each end of continuum, Unadjusted

higher capacity districts was \$101,435. This represented an improvement of 107.3 percent over the initial year of the study.

During the same period of time, the per pupil personal income of the lower capacity districts changed from \$24,005 to \$39,469. The total dollar change of \$15,464 represented an improvement of 64.4 percent. The magnitude of total dollar change in comparing high capacity districts to low, \$101,435 as compared to \$15,464, was 6.56 times.

When adjusted by the CPI, the numbers above result in Chart 41, entitled "Average Personal Income per ADM found in 5 Percent of State ADM at each end of

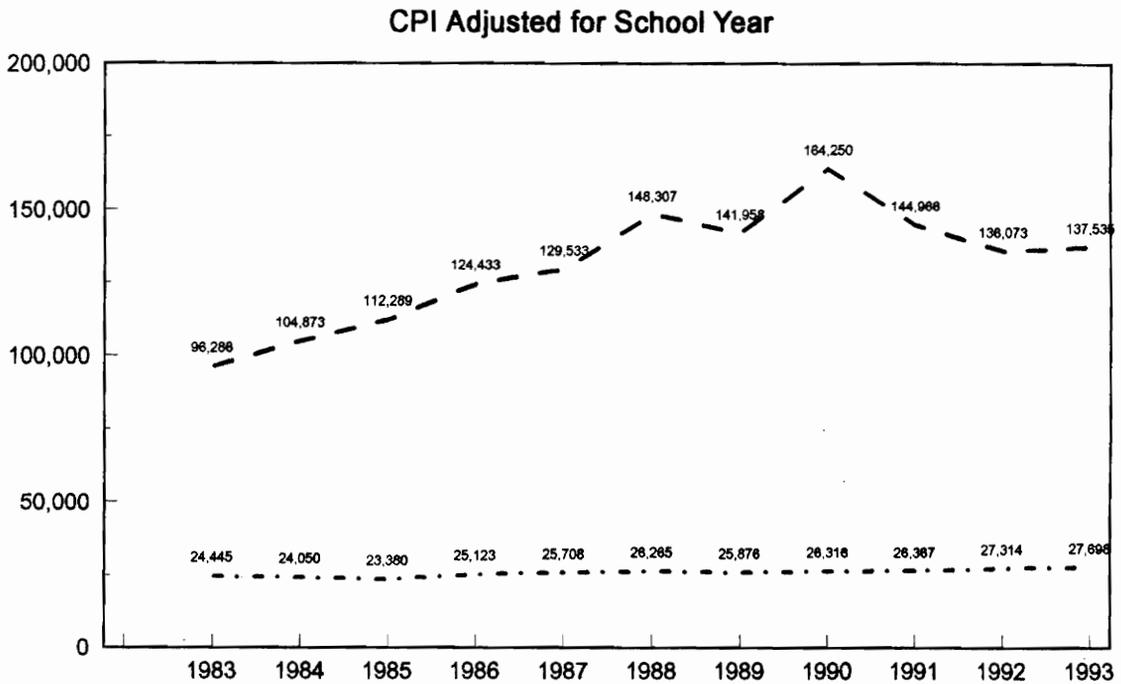


Chart 41 Average Personal Income per ADM found in 5 Percent of State ADM at each end of continuum: CPI Adjusted for School Year

continuum: CPI Adjusted for School Year." In this chart, the high capacity districts per pupil personal income average changed from \$96,286 in 1982-83 to \$137,535 at the end of the eleven-year period. This adjusted change of \$41,249 represents an improvement of 42.8 percent over the initial year value.

The low capacity group average as shown by the bottom line in Chart 41 changed from \$24,445 to \$27,698, an improvement of \$3,253, or 13.3 percent. **The dollar change for the high capacity group was 12.68 times greater than the dollar change for the low capacity group of districts.**

The final chart in the personal income/ADM series is entitled "Chart 42: Average Personal Income per ADM found in 5 Percent of State ADM at each end of continuum: Low Capacity Districts as a Percent of High Capacity Districts." During the 1982-83 school year, those pupils found in the lowest capacity districts capturing five percent of the state total ADM averaged 25.39 percent of the personal income per pupil that the highest capacity group averaged. This percentage steadily decreased until reaching 16.02 percent in the 1989-90 school year. The chart indicates a slight improvement during the last three years studied. The percentages shown for the last seven years are all lower than the first four years analyzed.

Average Market Value of Property in Five Percent Groups

Taxes on the value of real property typically generate the vast majority of local revenue for educational purposes. For this reason, the market value of property has been a reliable indicator, or wealth measure, of a district's ability to fund education. The Commonwealth of Pennsylvania weights the market value of property in their Aid Ratio formula at 0.6 as compared to personal income being weighted by 0.4.

Charts using WADM

The chart entitled "Chart 43: Average Market Value per WADM found in 5 Percent of State WADM at each end of continuum, Unadjusted" depicts the eleven-year period from 1982-83 through 1992-93. The top dashed line represents the wealthier districts group average market value of property, in dollars, per pupil, using

CPI Adjusted for School Year

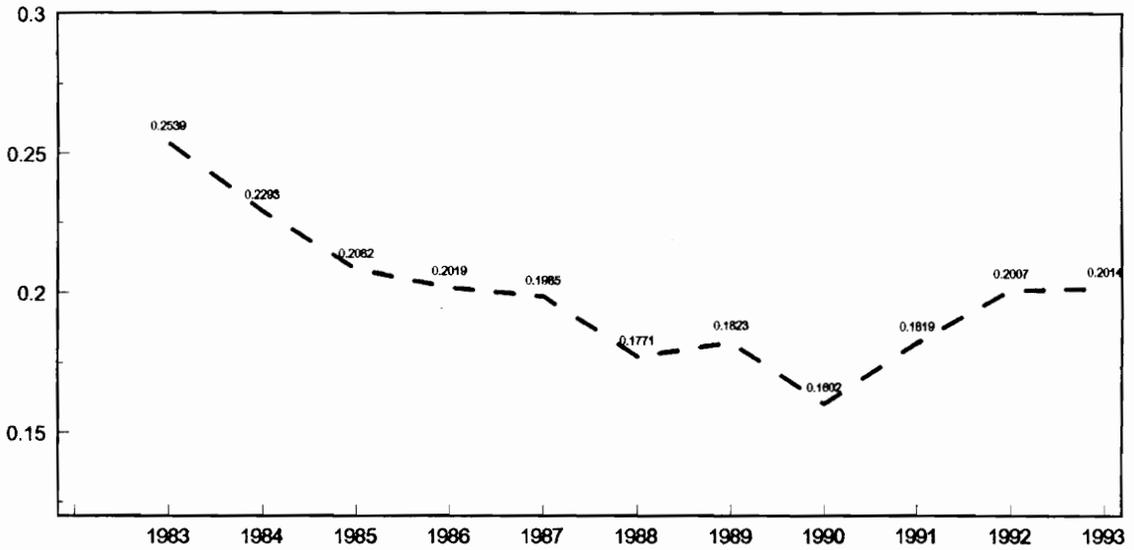


Chart 42 Average Personal Income per ADM found in 5 Percent of State ADM at each end of continuum: Low Capacity Districts as a Percent of High Capacity Districts

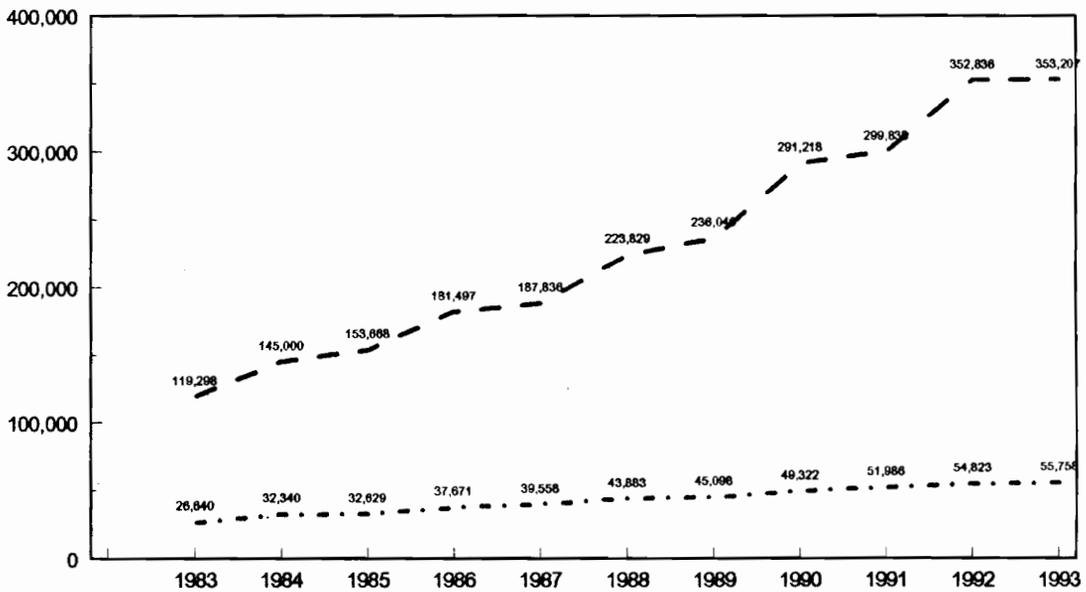
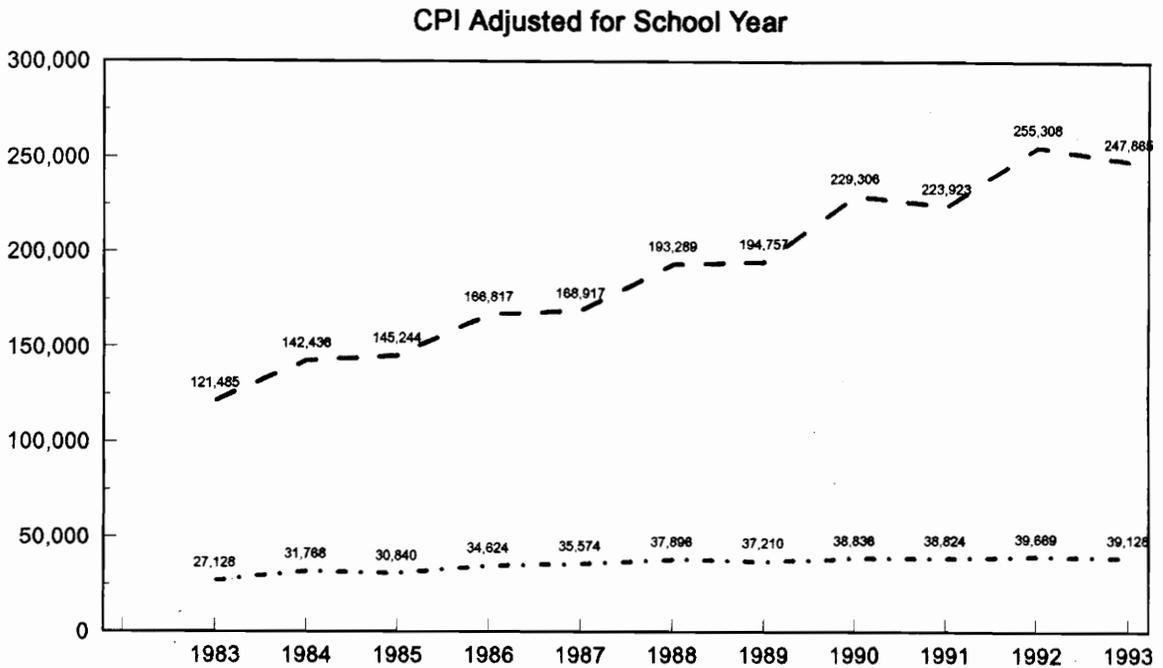


Chart 43 Average Market Value per WADM found in 5 Percent of State WADM at each end of continuum, Unadjusted.

WADM as the pupil count. The figures in this chart are unadjusted. The smallest difference in unadjusted dollars per pupil occurred in the 1982-83 school year. The wealthier districts had \$119,298 in per pupil market value of property, a total of \$92,658 greater than the poorer district average of \$26,640 per pupil market value of property.

The year of greatest difference occurred in the 1991-92 school year, when the wealthier districts averaged \$352,836 per pupil market value of property. During that year, the poorer districts per pupil average measure was \$54,823, or \$298,013 less per pupil. Over the entire eleven-year period, the wealthier districts average increased from the low of \$119,298 to \$353,207 in 1992-93. This change was \$233,909, for an increase of 196.07 percent in per pupil market value of property. Over the same time period, the poorer district average per pupil measure went from \$26,640 to \$55,758. This change was \$29,118 in unadjusted dollars, for an increase of 109.3 percent over the base year. **The magnitude of change between wealthier and poorer district averages, as shown in this chart for the five percent groups, was over eight to one.** This was calculated by dividing the wealthier group average change of \$233,909 by the poorer group average change of \$29,118.



**Chart 44 Average Market Value per WADM found in 5 Percent of State WADM at each end of continuum: CPI Adjusted for School Year**

When the dollars found in Chart 43 were adjusted by the Consumer Price Index (CPI), the result was Chart 44, entitled "Average Market Value per WADM found in 5 Percent of State WADM at each end of continuum: CPI Adjusted for School Year." The wealthier districts increased their per pupil market value of property average wealth measure from \$121,485 to \$247,865, a change of \$126,380. When looking at the chart, the previous year actually had a higher average than the final year of 1992-93. When adjusted, the wealthier district group average improved by 104.03 percent from the first year of 1982-83 to the last year shown.

In comparison, the poorer district group average began at \$27,128 and gradually improved until peaking at \$39,669 in per pupil market value of property during the 1991-92 school year. The absolute change for the poorer districts was \$12,000, or an improvement of 44.23 percent over the first year of 1982-83. When the adjusted dollar change for the wealthier group of \$126,380 is divided by the poorer group average change of \$12,000, the result indicated the wealthier group average change to be over 10.5 times that of the poorer group.

The final chart of the market value of property/WADM series is entitled "Chart 45: Average Market value per WADM found in 5 Percent of State WADM at each end of continuum: Poor Districts as a Percent of Rich Districts." This chart depicts the percent of the wealthy districts average market value of property per pupil available to the poor group districts. The values ranged from a high of 22.33 percent in 1982-83 to a low of 15.54 percent in 1991-92. In essence, during the 1991-92 school year, five percent of the entire state pupil population had an average market value of property, as a wealth measure, of 15.54 percent of the pupils found in the wealthiest five percent. This number for the last six years depicted never exceeded 20 percent.

#### Charts using ADM

Chart 46, entitled "Average Market Value per ADM found in 5 Percent of State ADM at each end of continuum, Unadjusted," indicates the wealthier districts average per pupil market value of property changed from a low of \$139,825 in 1982-83 to \$397,434 in 1992-93. The dollar change over the eleven years shown for the wealthier

CPI Adjusted for School Year

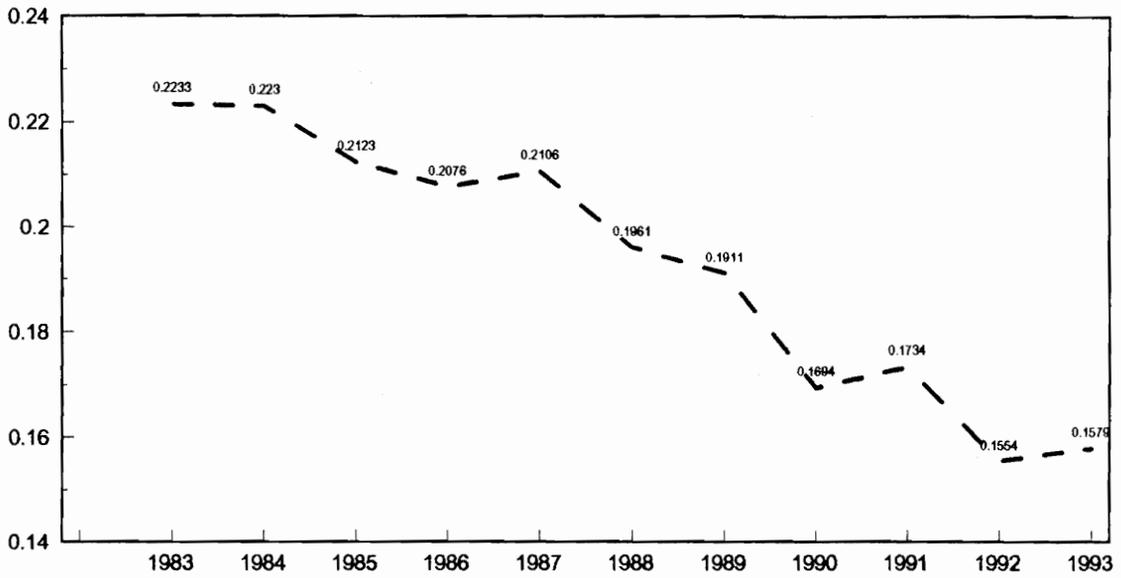


Chart 45 Average Market Value per WADM found in 5 Percent of State WADM at each end of continuum: Poor Districts as a Percent of Rich Districts

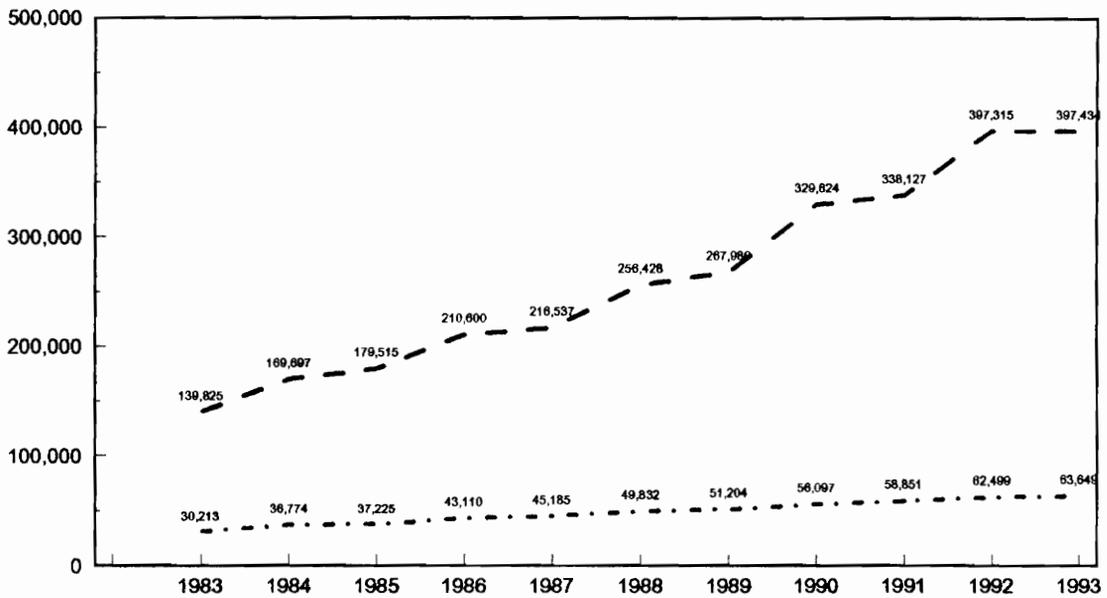


Chart 46 Average Market Value per ADM found in 5 Percent of State ADM at each end of continuum, Unadjusted.

districts was \$257,609. This represented an improvement of 184.2 percent over the initial year of the study.

During the same period of time, the per pupil measure of the poorer districts changed from \$30,213 to \$63,649. The total dollar change of \$33,436 represented an improvement of 110.7 percent. The magnitude of total dollar change in comparing wealthier to poorer, \$257,609 as compared to \$33,436, was 7.7 times.

When adjusted by the CPI, the numbers above result in Chart 47, entitled "Average Market Value per ADM found in 5 Percent of State ADM at each end of continuum: CPI Adjusted for School Year." In this chart, the wealthier districts per pupil market value of property average changed from \$142,388 in 1982-83 to \$278,901 at the end of the eleven-year period. This adjusted change of \$136,513 represents an improvement of 95.9 percent over the initial year value.

The poorer group average as shown by the bottom line in Chart 47 changed from \$30,767 to \$44,666, an improvement of \$13,899, or 45.2 percent. The dollar change for the wealthier group was 9.82 times greater than the dollar change for the poorer group of districts.

The final chart in the market value of property/ADM series is entitled "Chart 48: Average Market Value per ADM found in 5 Percent of State ADM at each end of continuum: Poor Districts as a Percent of Rich Districts." During the 1982-83 school year, those pupils found in the poorest districts capturing five percent of the state total ADM averaged 21.61 percent of the market value of property per pupil that the wealthiest five percent averaged. This percentage steadily decreased until reaching

CPI Adjusted for School Year

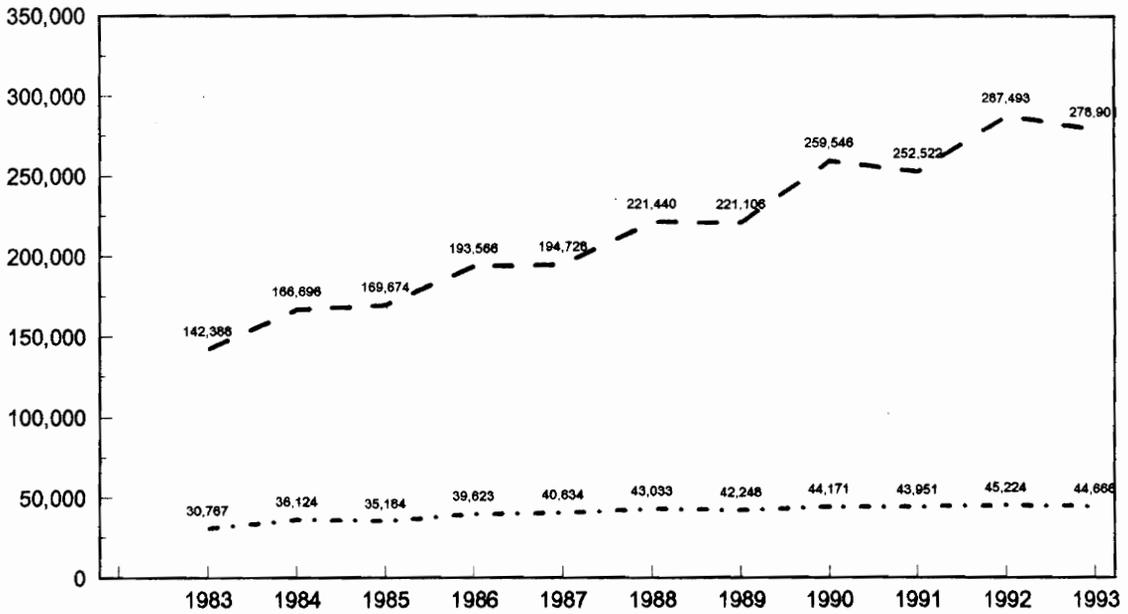


Chart 47 Average Market Value per ADM found in 5 Percent of State ADM at each end of continuum: CPI Adjusted for School Year

CPI Adjusted for School Year

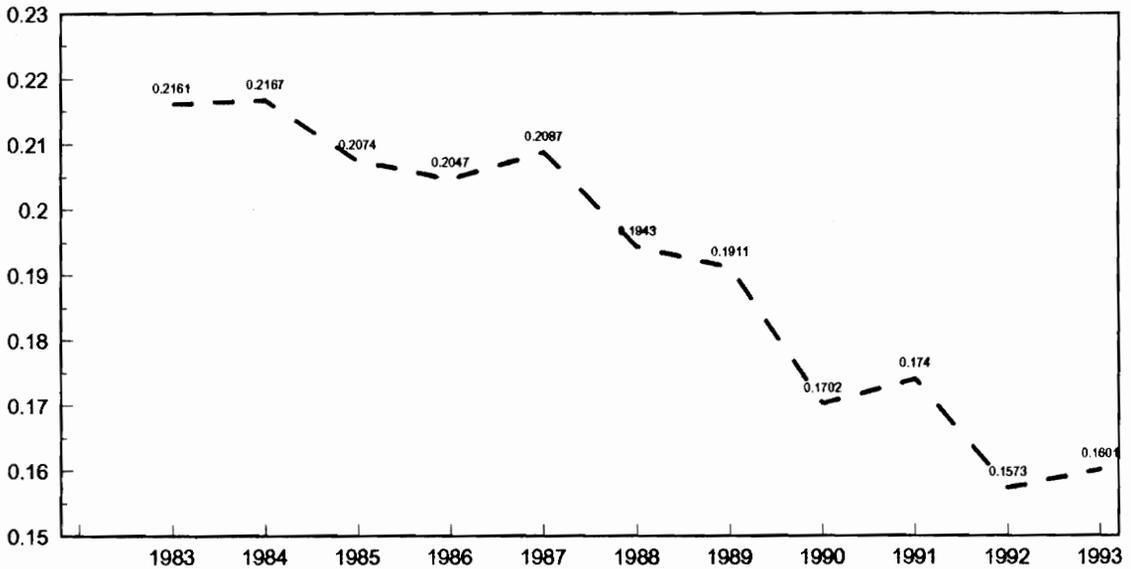


Chart 48 Average Market Value per ADM found in 5 Percent of State ADM at each end of continuum: Poor Districts as a Percent of Rich Districts

15.73 percent in the 1991-92 school year. The chart indicates a slight improvement during the last year studied. The percentages shown for the last six years are all lower than the first four years analyzed.

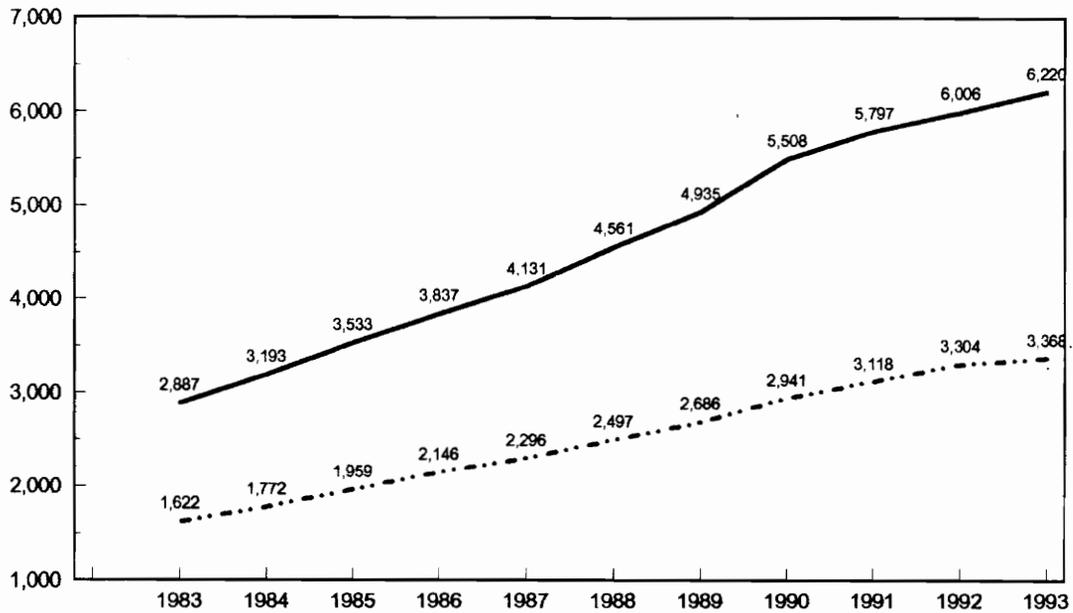
#### Average AIE Found in Five Percent Groups

Actual Instructional Expense, or AIE, is typically a very stable measure of the money spent per pupil over time. This measure does not fluctuate as greatly as revenue figures subject to market conditions. Teacher salaries make up a large component of AIE, and they generally are predictable and subject to modest changes.

#### Charts using WADM

The chart entitled "Chart 49: Average Actual Instructional Expense per WADM found in 5 Percent of State WADM at each end of continuum, Unadjusted" depicts the eleven-year period from 1982-83 through 1992-93. The top solid line represents the wealthier districts group average AIE, in dollars, per pupil, using WADM as the pupil count. The figures in this chart are unadjusted. The smallest difference in unadjusted dollars per pupil occurred in the 1982-83 school year. The wealthier districts had \$2,887 in per pupil AIE, a total of \$1,265 greater than the poorer district average of \$1,622 per pupil AIE.

The year of greatest difference occurred in the 1992-93 school year, which is the same year that the wealthier districts average peaked at \$6,220 per pupil AIE. During that year, the poorer districts per pupil AIE average was \$3,368, or \$2,852 less



**Chart 49 Average Actual Instructional Expense per WADM found in 5 Percent of State WADM at each end of continuum, Unadjusted**

per pupil. Over the entire eleven year period, the wealthier districts average increased from the low of \$2,887 to \$6,220 in 1992-93. This change was \$3,333, for an increase of 115.4 percent in per pupil AIE. Over the same time period, the poorer district average per pupil AIE went from \$1,622 to \$3,368. This change was \$1,746 in unadjusted dollars, for an increase of 107.6 percent over the base year. The magnitude of change between wealthier and poorer district averages, as shown in this chart for the five percent groups, was over 1.9 to one. This was calculated by dividing the wealthier group average change of \$3,333 by the poorer group average change of \$1,746.

When the dollars found in Chart 49 were adjusted by the Consumer Price Index (CPI), the result was Chart 50, entitled "Average Actual Instructional Expense per WADM found in 5 Percent of State WADM at each end of continuum: CPI Adjusted for School Year." The wealthier districts increased their per pupil AIE average measure from \$2,940 to \$4,365, a change of \$1,425. When adjusted, the wealthier district group average improved by 48.47 percent from the first year of 1982-83 to the last year shown.

In comparison, the poorer district group average began at \$1,652 and gradually improved until peaking at \$2,391 in per pupil AIE during the 1991-92 school year. The absolute change for the poorer districts, measured as the change from the first to the last school year, was \$712, or an improvement of 43.1 percent over the first year of 1982-83. **When the adjusted dollar change for the wealthier group of \$1,425 is divided by the poorer group average change of \$712, the result indicates the wealthier group average change in AIE per pupil to be over two times that of the poorer group.**

The final chart of the AIE/WADM series is entitled "Chart 51: Average Actual Instructional Expense per WADM found in 5 Percent of State WADM at each end of continuum: Poor Districts as a % of Rich Districts." This chart depicts the percent of the wealthy districts average AIE per pupil spent by the poor group districts. The values ranged from a high of 56.18 percent in 1982-83 to a low of 53.4 percent in 1989-90. In essence, during the 1989-90 school year, five percent of the entire state

CPI Adjusted for School Year

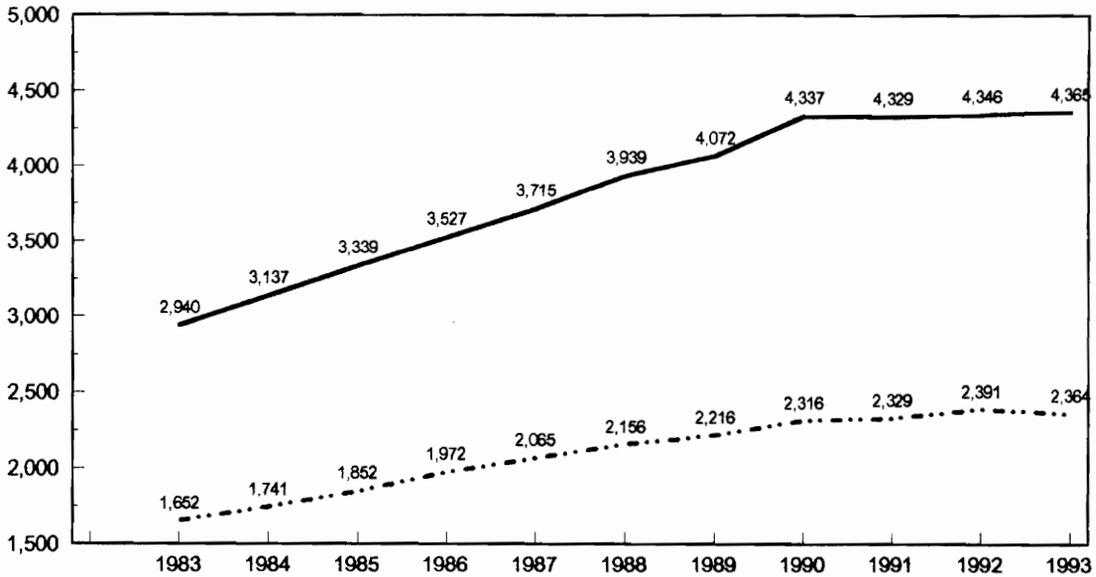


Chart 50 Average Actual Instructional Expense per WADM found in 5 Percent of State WADM at each end of continuum: CPI Adjusted for School Year

CPI Adjusted for School Year

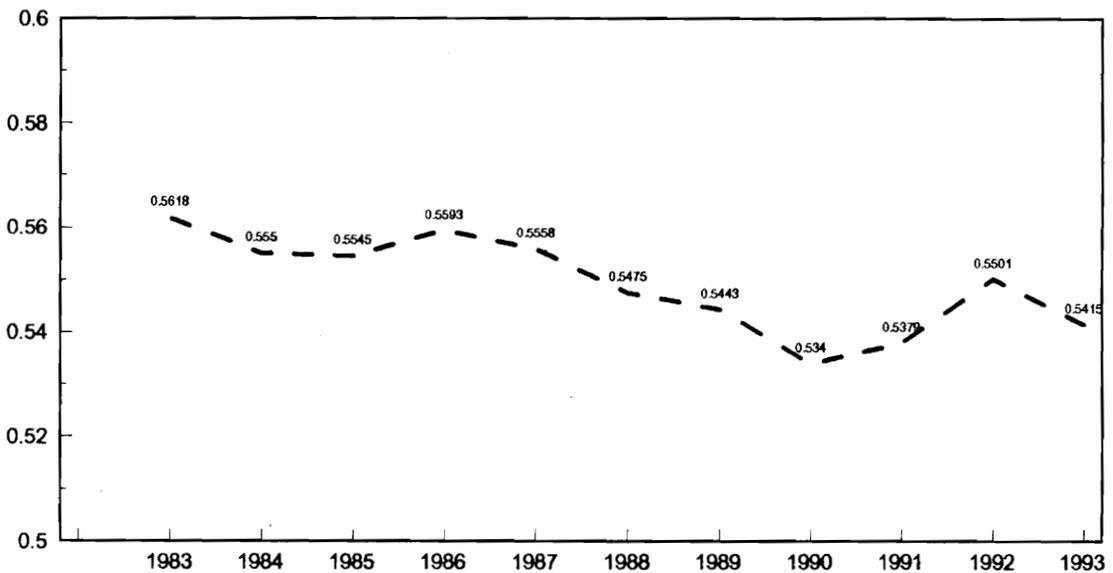


Chart 51 Average Actual Instructional Expense per WADM found in 5 Percent of State WADM at each end of continuum: Poor Districts as a Percent of Rich Districts

pupil population had an average AIE that was 53.4 percent of the AIE per pupil found in the wealthiest five percent.

### Charts using ADM

Due to the smaller pupil count when ADM was used, the values found per pupil obviously were higher when the same measure was used. Chart 52, entitled "Average Actual Instructional Expense per ADM found in 5 Percent of State ADM at each end of continuum, Unadjusted," indicates the wealthier districts average per pupil AIE changed from a low of \$3,383 in 1982-83 to \$6,999 in 1992-93, which was the peak value found during the study. The dollar change over the eleven years shown for the wealthier districts was \$3,616. This represented an improvement of 106.9 percent over the initial year of the study.

During the same period of time, the per pupil AIE of the poorer districts changed from \$1,854 to \$3,833. The total dollar change of \$1,979 represented an improvement of 106.7 percent. The magnitude of total dollar change in comparing wealthier to poorer, \$3,616 as compared to \$1,979, was 1.83 times.

When adjusted by the CPI, the numbers above result in Chart 53, entitled "Average Actual Instructional Expense per ADM found in 5 Percent of State ADM at each end of continuum: CPI Adjusted for School Year." In this chart, the wealthier districts per pupil AIE average changed from \$3,445 in 1982-83 to \$4,912 at the end of the eleven-year period. This adjusted change of \$1,467 represents an improvement of 42.58 percent over the initial year value.

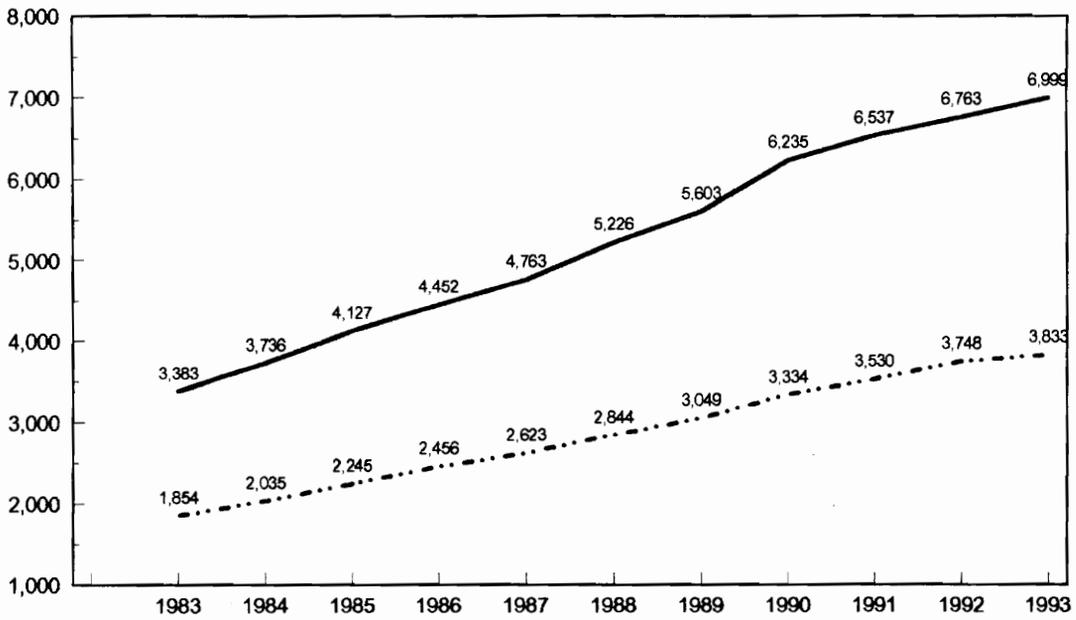


Chart 52 Average Actual Instructional Expense per ADM found in 5 Percent of State ADM at each end of continuum, Unadjusted

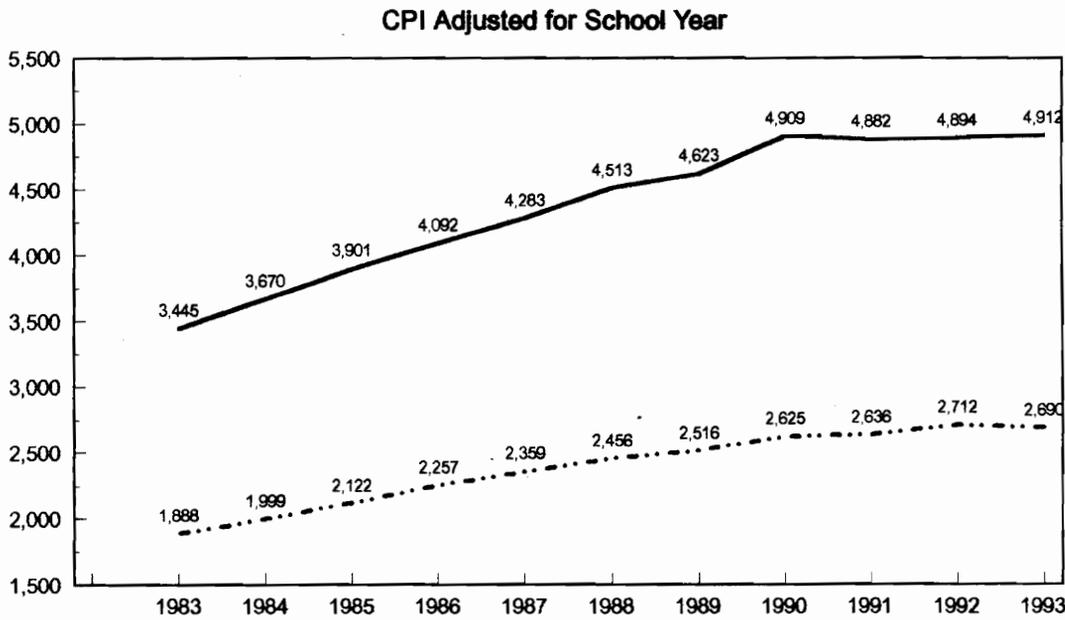


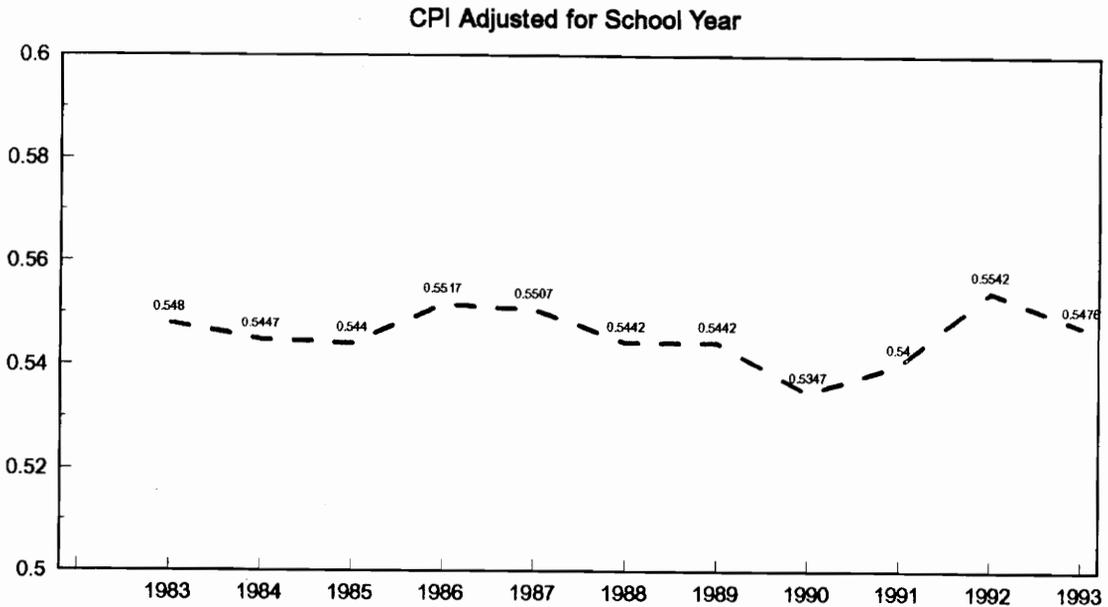
Chart 53 Average Actual Instructional Expense per ADM found in 5 Percent of State ADM at each end of continuum: CPI Adjusted for School Year

The poorer group average as shown by the bottom line in Chart 53 changed from \$1,888 to \$2,690, an improvement of \$808, or 42.48 percent. The dollar change for the wealthier group was 1.82 times greater than the dollar change for the poorer group of districts.

The final chart in the AIE/ADM series is entitled "Chart 54: Average Actual Instructional Expense per ADM found in 5 Percent of State ADM at each end of continuum: Poor Districts as a Percent of Rich Districts." During the 1982-83 school year, those pupils found in the poorest districts capturing five percent of the state total ADM averaged 54.8 percent of the AIE per pupil that the wealthiest five percent averaged. This percentage fluctuated slightly until reaching 54.76 percent in the 1992-93 school year. The chart indicates a slight decrease during the last year studied. The percentages shown for the entire eleven year study are all within a two percent range.

#### Average Revenue Found in Five Percent Groups

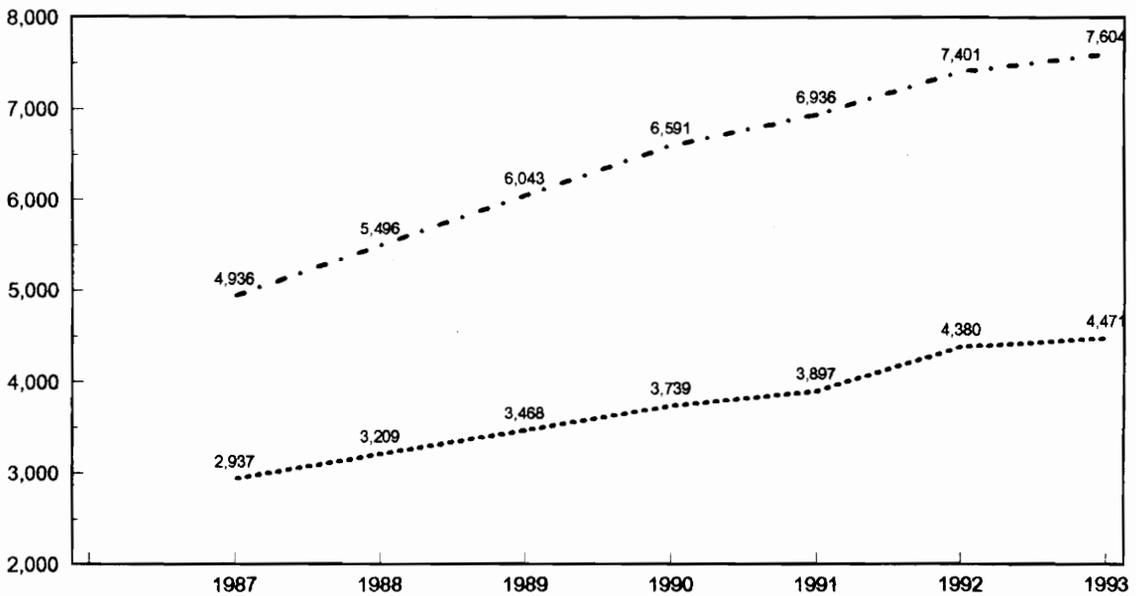
The revenue measure used was comprised of local revenue generated primarily from local real estate taxes, and the subsidy from the state to each district, not including any special funds or federal money. This measure fluctuated due to economic conditions to a greater extent than expenditure measures. The aid ratio, which used market value of property and personal income in its calculation, helped determine the state portion of this revenue measure.



**Chart 54 Average Actual Instructional Expense per ADM found in 5 Percent of State ADM at each end of continuum: Poor Districts as a Percent of Rich Districts**

Charts using WADM

The chart entitled "Chart 55: Average Local and State Revenue per WADM found in 5 Percent of State WADM at each end of continuum, Unadjusted" depicts the seven-year period from 1986-87 through 1992-93. The top dashed line represents the wealthier districts group average revenue, in dollars, per pupil, using WADM as the pupil count. The figures in this chart are unadjusted. The smallest difference in unadjusted dollars per pupil occurred in the 1986-87 school year. The wealthier districts had \$4,936 in per pupil revenue, a total of \$1,999 greater than the poorer district average of \$2,937 per pupil revenue.



**Chart 55 Average Local and State Revenue per WADM found in 5 Percent of State WADM at each end of continuum: Unadjusted**

The year of greatest difference occurred in the 1992-93 school year, which is the same year that the wealthier districts average peaked at \$7,604 per pupil revenue. During that year, the poorer districts per pupil revenue average was \$4,471, or \$3,133 less per pupil. Over the entire seven-year period, the wealthier districts average increased \$2,668, for an increase of 54.05 percent in per pupil local plus state revenue. Over the same time period, the poorer district average per pupil revenue went from \$2,937 to \$4,471. This change was \$1,534 in unadjusted dollars, for an increase of 52.23 percent over the base year. The magnitude of change between wealthier and poorer district averages, as shown in this chart for the five percent groups, was 1.74 to

one. This was calculated by dividing the wealthier group average change of \$2,668 by the poorer group average change of \$1,534.

When the dollars found in Chart 55 were adjusted by the Consumer Price Index (CPI), the result was Chart 56, entitled "Average Local and State Revenue per WADM found in 5 Percent of State WADM at each end of continuum: CPI Adjusted for School Year." The wealthier districts increased their per pupil revenue average from \$4,439 to \$5,336, a change of \$897. When adjusted, the wealthier district group average improved by 20.2 percent from the first year of 1986-87 to the last year shown.

In comparison, the poorer district group average began at \$2,641 and gradually improved until peaking at \$3,169 in per pupil revenue during the 1991-92 school year. The absolute change for the poorer districts, the change from the first to the last year of the study, was \$497, or an improvement of 18.82 percent over the first year of 1986-87. When the adjusted dollar change for the wealthier group of \$897 is divided by the poorer group average change of \$497, the result indicates the wealthier group average change to be over 1.8 times that of the poorer group.

The final chart of the local and state revenue/WADM series is entitled "Chart 57: Average Local and State Revenue per WADM found in 5 Percent of State WADM at each end of continuum: Poor Districts as a Percent of Rich Districts." This chart depicts the percent of the wealthy districts average revenue per pupil received by the poor group districts. The values ranged from a high of 59.5 percent in 1986-87 to a low of 56.19 percent in 1990-91. In essence, during the 1990-91 school year, five

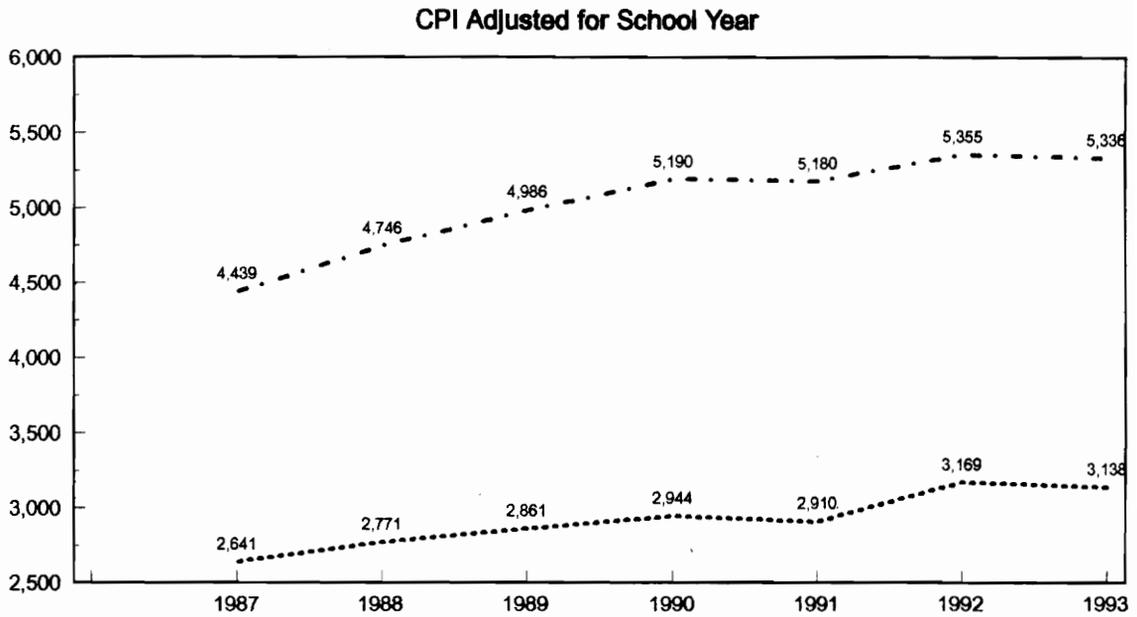


Chart 56 Average Local and State Revenue per WADM found in 5 Percent of State WADM at each end of continuum: CPI Adjusted for School Year

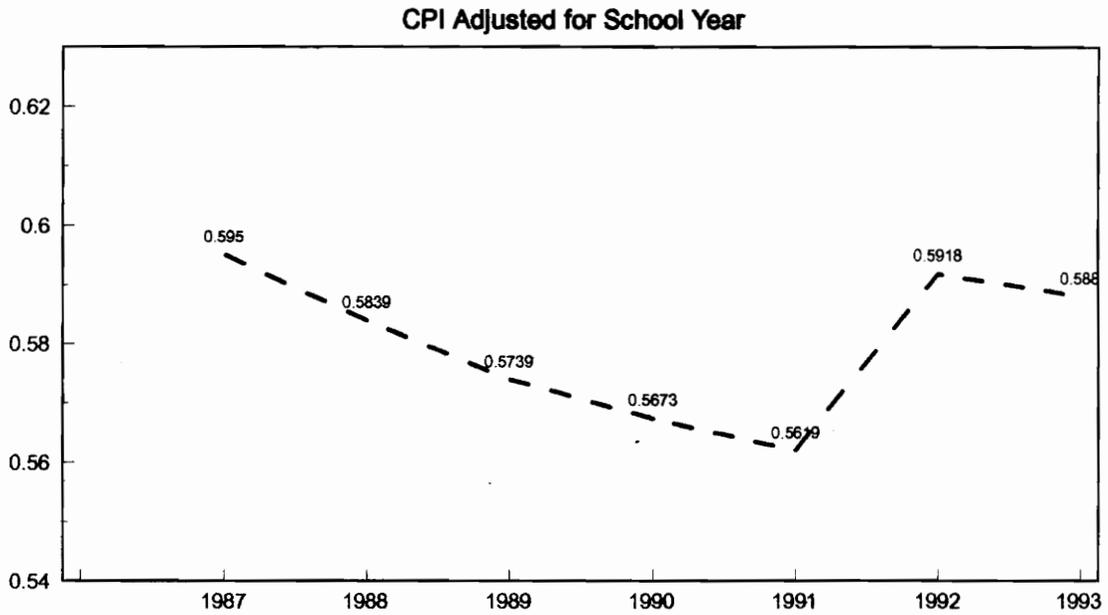


Chart 57 Average Local and State Revenue per WADM found in 5 Percent of State WADM at each end of continuum: Poor Districts as a Percent of Rich Districts

percent of the entire state pupil population had an average revenue that was 56.19 percent of the revenue found in the wealthiest five percent.

### Charts using ADM

Due to the smaller pupil count when ADM was used, the values found per pupil obviously were higher when the same measure was used. Chart 58, entitled "Average Local and State Revenue per ADM found in 5 Percent of State ADM at each end of continuum, Unadjusted," indicates the wealthier districts average per pupil revenue changed from a low of \$5,690 in 1986-87 to a peak of \$8,556 in 1992-93. The dollar change over the seven years shown for the wealthier districts was \$2,866. This represented an improvement of 50.36 percent over the initial year of the study.

During the same period of time, the per pupil revenue of the poorer districts changed from \$3,355 to \$5,089. The total dollar change of \$1,734 represented an improvement of 51.68 percent. The magnitude of total dollar change in comparing wealthier to poorer, \$2,866 as compared to \$1,734, was 1.65 times.

When adjusted by the CPI, the numbers above result in Chart 59, entitled "Average Local and State Revenue per ADM found in 5 Percent of State ADM at each end of continuum: CPI Adjusted for School Year." In this chart, the wealthier districts per pupil revenue average changed from \$5,117 in 1986-87 to \$6,004 at the end of the seven-year period. This adjusted change of \$887 represents an improvement of 17.33 percent over the initial year value.

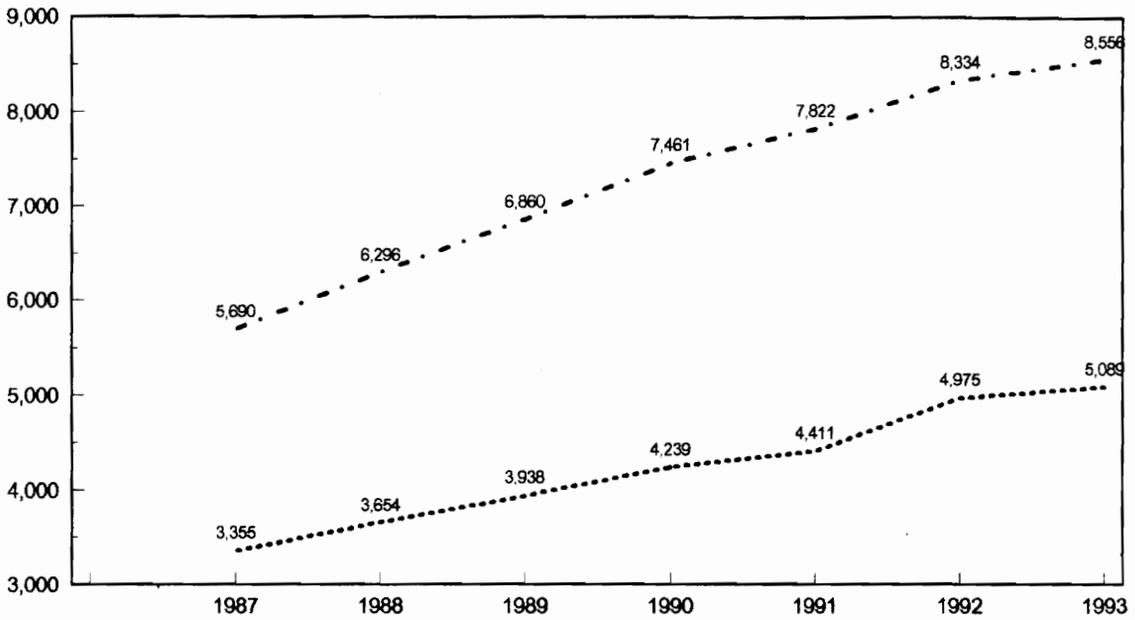


Chart 58 Average Local and State Revenue per ADM found in 5 Percent of State ADM at each end of continuum: Unadjusted

CPI Adjusted for School Year

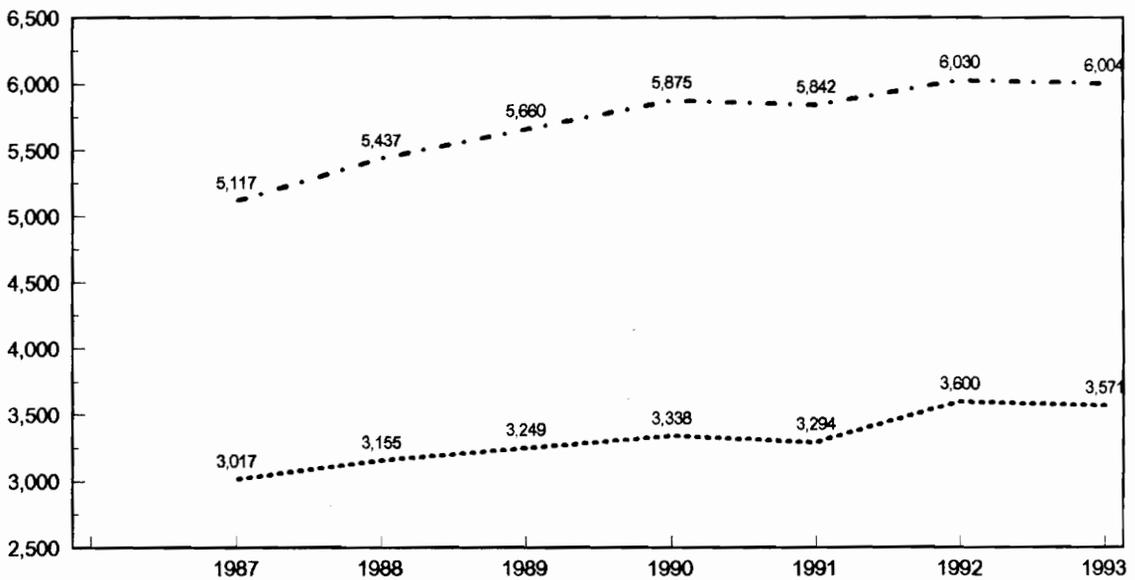
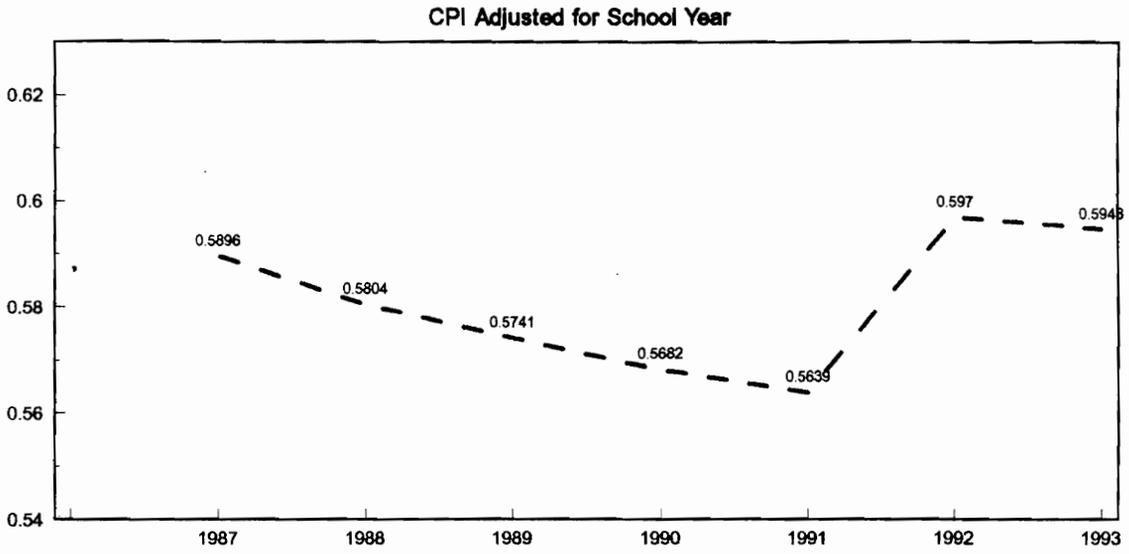


Chart 59 Average Local and State Revenue per ADM found in 5 Percent of State ADM at each end of continuum: CPI Adjusted for School Year

The poorer group average as shown by the bottom line in Chart 59 changed from \$3,017 to \$3,571 in the final year of the study, an improvement of \$554, or 18.36 percent. The dollar change for the wealthier group was 1.6 times greater than the dollar change for the poorer group of districts.

The final chart in the local and state revenue/ADM series is entitled "Chart 60: Average Local and State Revenue per ADM found in 5 Percent of State ADM at each end of continuum: Poor Districts as a Percent of Rich Districts." During the 1986-87 school year, those pupils found in the poorest districts capturing five percent of the state total ADM averaged 58.96 percent of the revenue per pupil that the wealthiest five percent averaged. This percentage steadily decreased until reaching 56.39 percent in the 1990-91 school year. The chart indicates a slight improvement during the next two years studied. The percentages shown are all within a narrow range of approximately three percent.



**Chart 60 Average Local and State Revenue per ADM found in 5 Percent of State ADM at each end of continuum: Poor Districts as a Percent of Rich Districts**

## CHAPTER V

### DISCUSSION OF RESULTS AND CONCLUSIONS

The final report on the Education of Equity in Pennsylvania (National Conference of State Legislatures, 1992) basically stated that the system existing at the time of the report was not meeting the mandate of providing a "thorough and efficient" system of education.

The ESBE distribution system certainly provides more state funds to districts that are comparatively poor but it also assures that all districts, regardless of wealth, receive some state support. Non-ESBE funds essentially provide a flat grant to all districts; even assuming that the funds are distributed appropriately in response to different needs among school districts, because such aid is not sensitive to the wealth of the districts, it neutralizes some of the impact of ESBE. The fact that districts can generate large amounts of local revenue, primarily from property taxes, and that wealthy districts can generate such revenue at relatively low tax rates, overwhelms the impact of ESBE. If ESBE did not provide funds to very wealthy districts, if ESBE funds were a higher proportion of all revenues, if non-ESBE funds were wealth equalized, or if local revenues were generated in proportion to tax effort, the results produced by the system, taken as a whole, could be very different. (p. 10)

This statement summarized the findings of the panel of specialists looking into the equity situation in Pennsylvania, primarily in response to a legal challenge to the funding scheme in place. The equity statistics analyzed in this research effort indicate the same result, as do other research efforts performed concurrently. Cooley and Pomponio (1993) have performed a series of research efforts designed to educate the citizens of Pennsylvania about the equity debate.

Specifically, ESBE had the base component for instruction, plus a supplement for districts based on low-income families and population density (Pennsylvania School Boards Association, 1987, p. 31). While these components favored poorer school districts and allowed for greater state funds to be supplied to them, the ability of wealthy districts to raise local funds far outweighed the advantage to poor districts derived from the ESBE in the form of higher state payments. State payments for non-ESBE supplements such as transportation, vocational, and special education were more similar to flat grants based on state averages, and therefore reduced the affect of the ESBE payments. The nature of the districts, that is, poorer districts having greater special education needs and having greater percentages of poor families, allows the system of non-ESBE funding to favor the wealthier districts at the expense of the poorer districts.

### **Fiscal Strain**

The concept of fiscal strain has been clearly shown by Cooley and Pomponio's research, and is supported by the analyses performed here. That is, while poor, less wealthy districts are experiencing slow growth in terms of wealth, they are also experiencing declines in enrollment that negatively affect the funds they ultimately receive from the state (Cooley & Pomponio, 1993, p. 9). This phenomenon occurs in conjunction with increased tax effort for the poorer, less wealthy districts. These districts are just not capable of funding an adequate education on their own, and the

system in place simply does not supply enough state funds to perform the mandated function found in the constitution.

### **Wealth Indices**

Charts 37 through 60 collectively show that the five percent group of pupils residing in the low wealth districts are not keeping pace with the five percent group of pupils residing in the wealthy districts. This can also be seen in Table 6 of Cooley and Pomponio for the entire state. This table shows the percent change from 1986 to 1991 in tax effort and measures of wealth by twenty percent groupings within the state. While districts comprising the upper sixty percent of market value of property wealth reduced tax effort during this period, the lowest forty percent increased their tax effort. The change in market value of property was much greater for the wealthier districts than for the poorer districts during this time period. The combination of these factors allowed the wealthier districts to generate greater local revenue while reducing taxes. As discussed previously, this fact alone is not indicative of an unconstitutional system. The Pennsylvania Constitution does not require all districts and pupils to enjoy the exact same resources. The charts do indicate and support the fact that a system based on funding being tied to wealth measures of property and income needs to take into account the vast differences that exist.

The charts showing the various measures of poor district wealth as a percentage of rich district wealth (Chart 39, 42, 45, 48, 51, 54, 57 and 60) clearly indicate a system that allows for disparate support and treatment of pupils. Further, the disparate

treatment and support differentials have been increasing for the period studied, also indicated by Cooley and Pomponio.

### **ESBE Failure**

During this period of time, the state methodology of funding, known as ESBE, has not been adjusted adequately to compensate for the growing differences in local wealth. In fact, as alluded to earlier in the Introduction, the ESBE itself is partially at fault for the differentials found in the revenue support for the districts. As the FEE has been arbitrarily set, and reflects the general well-being and economy of the Commonwealth, the relative prosperity of the state in turn has dictated the relative increases in the FEE in support of education. As the Commonwealth has been inclined or able to increase the FEE substantially during any given year, the benefit to poorer districts has been improved. As the ability or inclination of the state to support education has dropped, reflected in a lower FEE increase, the support for poorer districts has also decreased, relatively, at a time when the local districts may require even greater support due to fiscal strain.

Table 5 shows the FEE schedule for the period studied, with the dollar change as well as the percent change from the previous year indicated. The affect that FEE changes have made are masked partially by the complex nature of the ESBE formula that has been used by the Commonwealth, as well as other legislative actions. Appendix A shows how the formula is calculated and indicates that when the wealthy districts enjoy an increase in market value of property at a greater rate than poorer

districts, the poorer districts aid ratio and subsequent state support increases. The same situation exists for the personal income portion of the formula. As personal income for the wealthier districts has increased at a greater rate, the aid ratio for the poorer districts have increased, resulting in greater portions of state funds being directed to more needy districts. The formula, however, does not allow for marked changes to occur, as the entire state values are involved in addition to various weighting factors. As a consequence, yearly changes in state support to an individual district are relatively minor.

Table 5

The Factor for Educational Expense in Dollars per Year and Amount of Change Per Year

| School Year | FEE Amount | Dollar Change | Percent Increase |
|-------------|------------|---------------|------------------|
| 1982-83     | 1656.      |               |                  |
| 1983-84     | 1725.      | 69.           | 4.167            |
| 1984-85     | 1875.      | 150.          | 6.667            |
| 1985-86     | 1970.      | 95.           | 5.067            |
| 1986-87     | 2125.      | 155.          | 7.868            |
| 1987-88     | 2230.      | 105.          | 4.941            |
| 1988-89     | 2330.      | 100.          | 4.484            |
| 1989-90     | 2380.      | 50.           | 2.146            |
| 1990-91     | 2550.      | 170.          | 7.143            |
| 1991-92     | 2655.      | 105.          | 4.118            |
| 1992-93     | 2655.      | 0.            | 0                |

However, this mechanism over a very long period of time, should allow poorer districts to receive greater shares of state funds to supplement their locally generated funds. Unfortunately, other factors have intervened to prevent poorer districts from

catching up, or even keeping pace with the ability of wealthier districts to generate funds. The state code in support of public education (Title 24, Chapter 1, Article 25, §§ 2501 and 2502) has established the floor of 0.15 for aid ratios, allowing even the wealthiest districts to receive state funds. The same code has over the last several years adjusted the minimum increase, and maximum increase, any school district would receive in state funds for a given year. For example, prior to Act 43 of 1989, districts were guaranteed a two percent increase in state ESBE basic support, but were capped at eight percent. Additionally, districts had been guaranteed at least eighty percent (Act 93 of 1984), but later changed to ninety percent (Act 50 of 1987), of what would constitute full funding from the basic ESBE calculation. This limitation, or cap on funding, was eliminated in Act 43. The effect of most of this legislation clearly has been to the detriment of poorer districts.

### **Impact of Legislation**

Appendix D gives a hypothetical, but a certainly plausible situation that depicts the fiscal effect of the various legislative changes on the subsidy that two similar districts, except for wealth as shown by the aid ratio, would receive. This table spans a time period that includes the equity study performed here. A poorer district with an aid ratio of 0.75 and 2000 pupils (WADM) would have not received over this time period, in essence lost, state support in excess of \$3,500,000. This loss does not take into consideration compounding or the affect of the lowered levels each year feeding

into the next year. This calculation is based on the base ESBE component, and does not include other supplements.

The wealthy district in Appendix D, as depicted by an aid ratio of 0.15, also did not receive full state funding, but a much lower dollar reduction. This "hypothetical" district did not receive over \$700,000 from the state that the base formula would have indicated they were due. At the same time, however, this district was guaranteed a two percent increase for many years and was guaranteed an aid ratio floor of 0.15 for many years that, depending on the wealth of this district, may have been more appropriately given to less wealthy, high effort districts.

As mentioned above, wealthy districts that have not needed state assistance to generate sufficient funds due to rapid growth in personal income and property values have still received a minimum of a two percent increase, and are guaranteed a floor of a .15 aid ratio. The inner workings of the basic ESBE subsidy, WADM times FEE times Aid Ratio, has aided wealthy districts. Wealthier districts typically have larger pupil populations, and typically have more high school pupils. The impact of these circumstances create a WADM figure that benefits wealthy districts to the detriment of poorer districts. Further, any funds going to wealthy districts, especially in periods of economic stagnation or decline, are necessarily going to reduce the amount of funds going to poorer districts that are less able to generate sufficient local funds.

When the state has a certain amount of funds available or projected to be available to support education, and the number of pupils is fairly predictable, the affect on the ESBE formula also is predictable. When the ESBE formula dictates a

necessary increase to wealthy districts, these resources cannot be allocated to poorer districts, regardless of the need or current level of total funding available in the low capacity districts. Due to political considerations, the most wealthy districts have been allocated space in the state funding formula.

The cap of eight percent, coupled with a full funding guarantee of only ninety percent, has held back the funding of districts that have most needed additional funding. The removal of these caps in Act 43 of 1989 has probably been the major contributing factor to the improvement of several of the equity measures as shown in Charts 1 through 36. While the plaintiffs in the Bensalem case (1987) did not prevail in their attack on funding caps, the legislature apparently was persuaded to change funding statutes two years later as seen in ACT 43, which effectively removed funding caps within the ESBE.

### **Equity Measures**

As the FEE has fluctuated, and as the legislation has changed the basic ESBE funding, so have the indices measuring equity. The Gini, McLoone, Theil, Federal Range Ratio and the Coefficient of Variation have shown, overall, a gradual improvement in equity of funding and expenditures since the removal of the eight percent cap. The indices of R Square and Pearson R, that indicates the relationships between either revenue or AIE and market value of property, have increased in general, showing a stronger relationship to exist. The restricted range measure has shown a pattern of increased disparity between wealthy and less wealthy districts as

found in Charts 37 through 60. Without exception the several wealth measures have shown that the gap between the high and low capacity districts are increasing dramatically. The wealthier districts are improving their ability to generate funds at a much faster pace than are the poorer districts. The state system has not provided sufficient compensation for this occurrence.

The Charts showing R Square (9, 16, 25 and 34) all depict a lessening in the strength of the relationship during the last two years of audited tapes (1991-92 and 1992-93). This trend is more clearly seen in the longer longitudinal study involving AIE (Charts 25 and 34). Table 6 shows the dollar amounts and percent changes in market value for the entire state, not just the wealthiest and poorest districts, during the period studied. A close analysis of this table shows that market value of property has followed a two year cycle of large and small increases, which would be expected due to the laws governing when real estate valuations can be made. Real estate gets re-assessed every two years, with only new properties or properties involved in transactions being added in the odd years. When this pattern has coincided with other factors as addressed above, such as Act 43 of 1989, the impact on equity indices can be seen. The greatest impact has been the removal of state funding caps as addressed above, however. Several of the equity measures indicate improvements for the last several years of the study, with a leveling off in 1992-93, as funding levels were basically frozen for that year. This followed a large increase in state support for the 1991-92 school year, as can be seen in Table 7, that allowed for considerable improvement in the measures indicating equity when the entire distribution was the

unit of analysis. The measures tied to the upper and lower ends of the wealth spectrum continued to show disparity, as seen by the Restricted Range growing over the period of study.

Table 7 also indicates that state revenue to the 500 districts increased by 17.6 percent during the 1991-92 school year. The explanation for this was an adjustment in the types of funds included as "state" support to the 500 districts. Monies that had been sent to intermediate districts or special education units on behalf of the 500 districts was sent to the districts themselves in the 1991-92 year, artificially inflating the amount of state support for that year (Pennsylvania Department of Education, 1993). In fact, the 1992-93 year percentage increase in state support was the lowest of the period studied. The equity statistics for the 1991-92 year and the 1992-93 year should ideally be re-run excluding the dollars designated for this purpose, to determine the true pattern of fund and expenditure distributions. Further research will allow for the removal of these dollars.

Table 8 shows the dollar change per year and the percent change per year for the entire state AIE. The trend for AIE growth follows that of revenue, with smaller increases each year. Of interest, however, is the fact that the AIE percentage increase in three of the last four years has been greater than the revenue percentage increase for the same year. The school districts as a whole are spending more on AIE than the increased revenue would dictate. The assumption would be that other services performed by the districts are being reduced to allow for this increase.

Table 6

State ADM and Market Value of Property: Totals and Percent Change by Year

| Year    | ADM         | % Change | Year | Market Value | % Change |
|---------|-------------|----------|------|--------------|----------|
| 1982-83 | 1765172.641 |          | 1981 | 116363717100 |          |
| 1983-84 | 1722161.151 | -2.4370  | 1982 | 132780174900 | 14.1079  |
| 1984-85 | 1689818.664 | -1.8780  | 1983 | 135328822100 | 1.9194   |
| 1985-86 | 1670746.673 | -1.1129  | 1984 | 154893653900 | 14.4573  |
| 1986-87 | 1659543.931 | -0.6710  | 1985 | 160276380000 | 3.4751   |
| 1987-88 | 1649396.378 | -0.6110  | 1986 | 181836366400 | 13.4518  |
| 1988-89 | 1645221.131 | -0.2530  | 1987 | 188908209700 | 3.8891   |
| 1989-90 | 1636069.580 | -0.5560  | 1988 | 217171563100 | 14.9614  |
| 1990-91 | 1652779.817 | 1.0214   | 1989 | 225754192200 | 3.9520   |
| 1991-92 | 1679752.447 | 1.6320   | 1990 | 261306756900 | 15.7484  |
| 1992-93 | 1705836.174 | 1.5528   | 1991 | 270408379100 | 3.4831   |

Table 7

Local, State and Total Revenue for All 500 Districts with Yearly Percent Change

| Year    | Local Revenue | % Change | State Revenue | % Change | Total Revenue | % Change |
|---------|---------------|----------|---------------|----------|---------------|----------|
| 1986-87 | 3950517465    |          | 2769684122    |          | 6720201587    |          |
| 1987-88 | 4245650785    | 7.5      | 3000731568    | 8.3      | 7246382353    | 7.8      |
| 1988-89 | 4601201462    | 8.4      | 3222624948    | 7.4      | 7823826409    | 8.0      |
| 1989-90 | 5026704325    | 9.2      | 3378147440    | 4.8      | 8404851765    | 7.4      |
| 1990-91 | 5449110186    | 8.4      | 3475558271    | 2.9      | 8924668457    | 6.2      |
| 1991-92 | 5851713432    | 7.4      | 4087367742    | 17.6     | 9939081174    | 11.4     |
| 1992-93 | 6216950855    | 6.2      | 4167785510    | 2.0      | 10384736365   | 4.5      |

Table 8

Actual Instructional Expense for All 500 Districts with Yearly Dollar and Percent Change

| Year    | AIE           | Dollar Change | Percent Change |
|---------|---------------|---------------|----------------|
| 1982-83 | 4,095,228,254 |               |                |
| 1983-84 | 4,456,264,536 | 361,036,282   | 8.816          |
| 1984-85 | 4,787,188,709 | 330,924,173   | 7.426          |
| 1985-86 | 5,152,209,388 | 365,020,679   | 7.625          |
| 1986-87 | 5,474,830,267 | 322,620,879   | 6.262          |
| 1987-88 | 5,867,268,279 | 392,438,012   | 7.168          |
| 1988-89 | 6,328,420,111 | 461,151,832   | 7.860          |
| 1989-90 | 6,885,414,221 | 556,994,110   | 8.802          |
| 1990-91 | 7,351,720,465 | 466,306,244   | 6.772          |
| 1991-92 | 7,775,990,212 | 424,269,747   | 5.771          |
| 1992-93 | 8,150,934,811 | 374,944,599   | 4.822          |

Table 9 contains the personal income total per year for the entire 500 districts analyzed during the eleven years studied. Due to the lag time in record keeping, the calendar year-end of personal income was used for Aid Ratio (MVINCR) calculations to fund the school year beginning the following fall. The pattern found in the data is much less predictable than the totals found for market value of property (Table 6), local and state revenue (Table 7), or AIE (Table 8).

The personal income increases per year range from a low of 2.78 percent (1987 compared to 1986) to a high of 10.45 percent (1988 compared to 1987). While market value of property increases were tied to re-assessment every two years, creating a pattern of high and low increases in alternate years, personal income did not follow such a pattern for the entire eleven-year study. A similar pattern was found, however, from 1983 through 1989. A small increase in 1983 of 3.70 percent was followed by

alternating high and low increases until the pattern was broken for the 1990 personal income state total.

As personal income values generated forty percent of the calculated MVINCR (see Appendix A), the use of personal income introduced greater volatility into the funding scheme of Pennsylvania for the period studied, based on the values found in Table 9.

Table 9

Actual Instructional Expense for All 500 Districts with Yearly Dollar and Percent Change

| Income (School) Year | Personal Income | Dollar Change  | Percent Change |
|----------------------|-----------------|----------------|----------------|
| 1981 (1982-83)       | 79,433,746,143  |                |                |
| 1982 (1983-84)       | 82,498,329,418  | 3,064,583,275  | 3.86           |
| 1983 (1984-85)       | 85,552,131,981  | 3,053,520,508  | 3.70           |
| 1984 (1985-86)       | 93,690,652,489  | 8,138,520,508  | 9.51           |
| 1985 (1986-87)       | 98,708,210,003  | 5,017,557,531  | 5.36           |
| 1986 (1987-88)       | 107,730,789,534 | 9,022,579,531  | 9.14           |
| 1987 (1988-89)       | 110,726,700,763 | 2,995,911,229  | 2.78           |
| 1988 (1989-90)       | 122,296,142,025 | 11,569,441,262 | 10.45          |
| 1989 (1990-91)       | 125,796,670,258 | 3,500,528,233  | 2.86           |
| 1990 (1991-92)       | 129,999,469,866 | 4,202,790,608  | 3.34           |
| 1991 (1992-93)       | 136,811,559,622 | 6,812,098,756  | 5.24           |

Both WADM and ADM pupil counts were utilized to determine if there were any appreciable differences in equity measures as a result. When a particular index is compared, such as the Gini in Chart 1 and 10, the patterns are virtually identical, and the values are quite similar. The use of WADM numbers resulted in slightly less equitable results when the overall equity trend was towards improvement (Chart 1,

1989-93). The use of ADM resulted in less equitable Gini numbers when the trend was towards less equity (Chart 10, 1987-88). This same pattern can be seen to some extent in the other charts that relied on state and local revenue as the variable.

A more interesting result exists between the equity values when AIE is compared to revenue. For example, using Chart 1 and Chart 19 for this comparison resulted in much higher, less equitable Gini indices. When AIE, or expenditures, are the variables as they are in Chart 19, the Gini Index ranged from six percent to over fifteen percent greater than Gini Indices calculated for identical years in Chart 1. Expenditures are more stable from year to year than are revenues, which are more volatile due in part to political actions as well as economic events. Additionally, Chart 19 indicates a lag in the improvement of equity when compared to using revenue in Chart 1. The peak year, or the least equitable year for AIE in Chart 19 occurred in 1990, two years after the least equitable year for the revenue distribution found in Chart 1. This trend can also be seen when the Theil index is compared between Charts 3 and 21.

### **The New "ESBE"**

Whether as a result of existing litigation or the mounting evidence suggesting that the system in the Commonwealth of Pennsylvania was not performing to expected standards, the legislature did away with the ESBE system for the 1993-94 school year and beyond. The equity statistics resulting from this change should be monitored closely as audited tapes become available. The major effects of this change in the

financing of public K-12 education for the Commonwealth of Pennsylvania have been predicted by the Pennsylvania State Education Association, and are summarized here.

An increase in state support of 2.7 percent, or \$131 million, for K-12 education over the 1992-93 data analyzed here was to be directed primarily at the identified less wealthy, poorer districts of the Commonwealth. The bulk of this increase, \$93 million as an equity supplement, is to be directed to 225 districts that qualify based on three criteria. Each qualifying district must have an aid ratio equal to or greater than 0.5000, a tax effort of 19.5 mills or greater, and total expenditures of greater than \$6,193 per ADM pupil. Total expenditures include transportation, debt service and health services in addition to AIE.

The 225 qualifying districts split the \$93 million equity supplement based on their ADM times aid ratio product in proportion to the entire pool of 225 districts. Clearly these funds are directed to districts that have not been able to fund an adequate education on their own. Additionally, a poverty supplement in excess of \$10 million was to be directed to districts that did not qualify for the equity supplement yet had 35 percent or more of their ADM from AFDC families. Pittsburgh and Philadelphia fall into this category.

The next major component of the legislative action that did away with the ESBE formula is a foundation guarantee, raising all districts to at least a level of expenditure per ADM pupil of \$3,875. This increase amounted to \$18.5 million for the 1993-94 education budget, and 68 districts qualified based on several criteria. If the base subsidy (frozen 1992-93 ESBE component), plus the current equity

supplement and local revenue if taxed at 19.5 mills would not generate sufficient revenue to allow for expenditures of at least \$3,875 per pupil, the state would fund the difference.

Another \$5.5 million was set aside in the 1993-94 budget to reduce the affect of ADM growth in excess of 4.5 percent, when also tied to the aid ratio of the district.

A basic review of these changes, and other educational legislation for the 1993-94 year, yields several conclusions. The elimination of ESBE was necessary as it was not producing a "thorough and efficient" system of education as seen by the equity statistics and measures discussed in this research. While the 1993-94 budget goes a long way to improve the shortcomings of ESBE, the inevitable political compromise tempered by economic reality can be seen.

ESBE created, or more appropriately allowed, the tremendous disparity in funding and expenditure levels among the 500 districts to exist. Yet, this was the base subsidy starting point for the legislation enacted to attempt to ensure a "thorough and efficient" system of education. Additionally, the originally proposed level of \$4,000 in per pupil (ADM) spending was reduced to \$3,875 for the foundation guarantee portion, still below the state average per pupil expenditure level.

Other components of the 1993-94 education legislation continue the same problems identified in the previous ESBE system. That is, other subsidies by the state outside of the attempts at equitable distribution and a "thorough and efficient" system continue to undermine the improved methodology. As before, certain subsidies such as that for special education, are in the form of flat grants, that make payments

regardless of the fiscal capacity of districts and their actual needs. Recalling that the Pennsylvania Supreme Court in Danson and the United States Supreme Court in Rodriguez did not require equal levels of money to be spent on behalf of pupils, the allocation of funds to high capacity districts not requiring that level of special education funding cannot be "efficient." Attempts to identify actual needs for the various "flat grant" subsidies would allow for greater support to go towards funding an adequate, and "thorough and efficient" system of education. In fact, the legislature has directed the Department of Education to define certain types of special education pupils, and collect information on them in order to assist in future funding.

As discussed in previous sections, the affect of the ESBE system was undermined by non-ESBE funding similar to the flat grant type of subsidy discussed here. Over time, unless continual adjustments are made to improve the system, coupled with analysis to indicate effectiveness, the affect of this newer funding methodology may create similar results as the ESBE.

### **Implications of Results**

The equity trends for the period of the study as indicated by the indices utilized depict little if any improvement during the eleven years analyzed. Several measures indicate less equitable distributions at the end of the study period than they were at the beginning of the study. All of the wealth and fiscal capacity trends as indicated by Charts 37 through 60 show markedly greater disparities at the end of the study period.

The implication of these results would support the contention that the system was not efficient, indicated by great disparities, during the period studied, and allowed inefficiencies to continue in spite of legislative efforts to correct them. Based on this, the system in place during the period of study may not have passed constitutional scrutiny, even at the lowest level of a rational relationship to the thorough and efficient language present in the education clause of the Pennsylvania Constitution.

### **Continued Research Efforts**

The research effort here did not go into enough depth to determine if the increased equity in expenditures as indicated by AIE, was directed toward more teachers, greater teacher salaries, or better materials for instruction. This research effort did not address or look into the best area to place limited resources to have the greatest affect on pupil outcomes. This area of research has recently become the focus of numerous studies in connection with the debate on whether money matters in the education of pupils. Further production function research is needed, as well as ongoing research of the type performed here to determine if the systems in place are indeed producing the expected results required by the constitutions of the states.

Analysis of the audited reports for the "new" system should be performed as well, to determine if improvements have indeed been made in the equitable distribution of resources to the pupils of the Commonwealth. Efforts should also focus on the definition of an adequate education, and the expenditures and revenues required to supply such an education to each and every pupil of the Commonwealth.

## CHAPTER VI

### ALTERNATIVE FUNDING DISCUSSION

Whereas legal precedent in the Commonwealth of Pennsylvania has precluded the presumption of attempting to totally equalize funding of education for all pupils, the constitutional mandate does require an adequate, or thorough and efficient education. The Danson court as discussed earlier did not find education to be a fundamental right. Further, Pennsylvania has historically promoted the concept of local control over education, and has forced localities to pay for most of the educational opportunities that currently exist. Therefore, any supposed finance reform methodology must meet the criteria of the existing legal and political system. Localities must still have some say, and the court will not force a totally uniform funding system on the legislature.

Most importantly a definition of an adequate education that will meet the needs of the Commonwealth and her citizens, and what such an education costs within the Commonwealth needs to be developed. This effort is beyond the scope of this research. Certain assumptions can be made, however, as to what might constitute the revenues necessary to fund an adequate education. As outlined briefly in the methodology section, the state average total revenue per pupil for the last audited year, 1992-93, was derived from existing tapes. The figure of \$6,087 for purposes of this discussion is rounded to \$6,000 as a proxy for an "adequate" education level of funding. The argument put forth is that the Commonwealth as a whole, for all 500

districts analyzed and the 1,705,836 pupils served in 1992-93, have established this as an average level. Average may or may not be the same as adequate, but will be used as such in the development of an alternative funding methodology.

Making another assumption, that the state should fund at least one-half of the total revenue required for an "adequate" educational opportunity, the local effort and state effort required to reach \$6,000 in revenue per pupil will be split equally in this example. For the local districts, as a whole, the equalized millage required to reach their one-half of the revenue is rounded to 19 mills. When this is done, the state portion, using the ADM from the 1992-93 year, comes to \$949,723,012.31 more than they actually allocated that year. . The proposed system generates this in several ways.

At the 19 mill level, based on 1992-93 numbers, forty-seven of the 500 districts would have to increase their levels of effort. That is, they would need to tax local property, primarily, at a higher rate to generate their mandated portion. This represents fewer than ten percent of all districts. The average increased millage to do this would be just over one-half of a mill (0.00055) for the forty-seven districts. The average district size of the forty-seven affected by this increased effort is 7,122.191 in ADM, which is relatively large for Pennsylvania. The average market value of property for the forty-seven districts is \$204,053.66 per ADM, also in the upper quartile of the Commonwealth.

Along with the mandated millage of 19, a provision for recapture should be imposed, helping to distribute state resources to those less wealthy districts. Of the 500 existing districts, twenty-one would be required to send funds to the state for re-

distribution, or 4.2 percent of all districts. Of these, twelve districts actually would be faced with increasing their tax effort to the 19 mills, and be subject to recapture. This portion of the alternative funding scheme would face political challenges from these areas of the state, but these twelve districts represent only 2.4 percent of all districts. The duty of a thorough and efficient system lies with the state, not the individual districts. Further, of the twelve, ten currently enjoy the mandated artificial floor of a 0.15 aid ratio, guaranteeing them a small amount of state aid although their tax effort has been lower due to their tremendous wealth. The two districts that would be required to increase their tax effort and be subject to recapture that do not have the artificial floor are Conestoga Valley School District (aid ratio of 0.1784) and the Jim Thorpe Area School District (aid ratio of 0.2957). While not at the mandated artificial floor, these two districts are at the wealthy end of the 500 district spectrum.

To assist the necessary increase in state funding to reach the almost one billion dollars in additional funds required, this plan would propose a state income tax increase. The increase necessary, based on the personal income of the state for the 1992-93 year, would amount to less than one percent of the personal income total. Ideally, as similarly put forth by other suggested alternative funding schemes, any increase in taxes should be progressive in nature. Even if the legislature were to impose a flat increase on personal income, which would be regressive in nature, the overall new system would be more progressive than the existing one.

The state average local effort for the 1992-93 school year was almost 23 mills. As the suggested system would mandate a first tier effort of 19 mills to reach the fifty-

fifty split with the state to reach the \$6,000 "adequate" level, an overall average savings of 4 mills would result. The districts benefitting the most from this savings would be those requiring the greatest relief, the less wealthy systems exerting extraordinary tax effort. This high tax effort still has not adequately funded their children's education, which is why a new system needs to be put in place for the Commonwealth of Pennsylvania.

The 4 mill savings in total state local effort would in turn represent a local tax savings of \$1,081,633,516.40. Again, this savings offsets the suggested state income tax increase, and would be a progressive type of savings for the districts needing it the most. This basic system would transfer some of the cost of education from low capacity districts to the state and higher capacity districts by redistribution.

The Commonwealth has shown a reluctance, both in the courts and legislatively, to curtail the individual local efforts of school districts to fund an above "adequate" education. Therefore, any suggested alternative system should allow for local effort to rise above the mandated state level required to reach an "adequate" level. Concurrently, the system should still attempt to meet the constitutional requirements of an "efficient" system. It is suggested here that an efficient system does not take state funds and send them to localities that have the ability to raise their own funds beyond that required when other localities are unable to do the same. Another tier of funding should therefore be established that encourages localities to exceed the adequate level, and do so with matching effort levels and state support.

Alexander and Salmon (1995) illustrate the above district-power equalization plan in their text (p. 208). The basic plan allows for the Commonwealth to meet their constitutional obligation of funding an adequate, "thorough and efficient" system of education, without totally curtailing local district desires and discretion. The intent of such a system is not to totally equalize funding, but establish a minimum level required, and to make sure all pupils within the Commonwealth have access to the education that a minimum level of funding would allow.

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**Appendix A**  
**Commonwealth of Pennsylvania Market Value**  
**Personal Income Aid Ratio Calculation**

Market Value Aid Ratio Calculation:

$$A = \frac{\text{district market value/district WADM}}{\text{state market value/state WADM}}$$

$$1-(A*.50)= \text{MVAR};$$

Personal Income Aid Ratio Calculation:

$$B = \frac{\text{district personal income/district WADM}}{\text{state personal income/state WADM}}$$

$$1-(B*.50) = \text{PIAR};$$

Market Value Personal Income Aid Ratio Calculation:

$$(.6 * \text{MVAR}) + (.4 * \text{PIAR}) = \text{MVINCR}$$

**Appendix B**

**Status of School Finance Constitutional Litigation.**

**Compiled by G. Alan Hickrod, Robert Lenz,  
and Paul Minorini of the Center for Education Finance,  
Illinois State University, March, 1995.**

I. Plaintiffs won at state supreme court level:

|                            |   |
|----------------------------|---|
| Washington                 | <u>Seattle v. Washington</u> , 1978.                                |
| Kentucky                   | <u>Rose v. The Council</u> , 1989.                                  |
| Connecticut                | <u>Horton v. Meskill</u> , 1977;<br><u>Sheff v. O'Neill</u> , 1992. |
| Tennessee                  | <u>Tennessee Small School Systems v. McWherter</u> , 1993.          |
| Massachusetts              | <u>McDuffy v. Secretary of Education</u> , 1993.                    |
| Arizona                    | <u>Roosevelt Elem. School Dist. 66 v. Bishop</u> , 1994.            |
| Texas                      | <u>Edgewood v. Kirby</u> , 1989, 1990, 1991, 1992, 1995*.           |
| New Hampshire <sup>3</sup> | <u>Claremont, New Hampshire v. Gregg</u> , 1991.                    |

II. Plaintiffs won at the state supreme court level, but further compliance litigation was also filed:

|               |   |
|---------------|---|
| California    | <u>Serrano v. Priest</u> , 1971, 1977.  |
| Wyoming       | <u>Washakie v. Hershler</u> , 1980.   |
| West Virginia | <u>Pauley v. Kelly</u> , 1979, 1988.<br><u>Pauley v. Gainer</u> , 1994.                                     |
| Montana       | <u>Helena School District v. Montana</u> , 1989, 1993;<br><u>Montana Rural Ed Assoc. v. Montana</u> , 1993. |
| New Jersey    | <u>Robinson v. Cahill</u> , 1973;<br><u>Abbott v. Burke</u> , 1985, 1990, 1994.                             |
| Arkansas      | <u>Dupree v. Alma School District</u> , 1983;<br><u>Lake View v. Arkansas</u> , 1994.                       |

III. Plaintiffs lost at supreme court level and there has been no further complaints filed or further complaint lost also:

|              |   |
|--------------|---|
| Michigan     | <u>Milliken v. Green</u> , 1973.  |
| Idaho        | <u>Thompson v. Engelking</u> , 1975;<br><u>Frazier et al. v. Idaho</u> , 1990.                      |
| Georgia      | <u>McDaniels v. Thomas</u> , 1981.  |
| Colorado     | <u>Lujan v. State Board of Education</u> , 1982.  |
| Wisconsin    | <u>Kukor v. Grover</u> , 1989.  |
| Oregon       | <u>Olsen v. Oregon</u> , 1979;<br><u>Coalition for Ed. Equity v. Oregon</u> , 1991.                 |
| Minnesota    | <u>Skeen v. Minnesota</u> , 1993.   |
| North Dakota | <u>Bismark Public Schools v. North Dakota</u> , 1993.**   |
| Nebraska     | <u>Gould v. Orr</u> , 1993.   |
| Virginia     | <u>Alleghany Highlands v. Virginia</u> , 1991 (Withdrawn 1991);<br><u>Scott v. Virginia</u> , 1994. |

IV. Plaintiffs lost at supreme court level, but there have been further complaints filed:

|                             |   |
|-----------------------------|---|
| Pennsylvania                | <u>Danson v. Casey</u> , 1979, 1987;<br><u>Pennsylvania Association of Rural and Small Schools v. Casey</u> , 1991.   |
| Ohio <sup>5</sup>           | <u>Board of Education v. Walter</u> , 1979;<br><u>Howard v. Walter</u> , 1991;<br><u>Thompson v. State of Ohio</u> , 1991;<br><u>DeRolph v. State</u> , 1992. |
| New York <sup>2</sup>       | <u>Board of Education v. Nyquist</u> , 1982, 1987;<br><u>Reform Educational Financing Inequities Today (R.E.F.I.T.) v. Cuomo</u> , 1991.                      |
| Maryland                    | <u>Hornbeck v. Somerset County</u> , 1983;<br><u>Bradford v. Maryland State Board of Education</u> , 1994.  |
| South Carolina              | <u>Richland v. Campbell</u> , 1988.<br><u>Lee County v. Carolina</u> , 1993.  |
| North Carolina <sup>1</sup> | <u>Britt v. State Board</u> , 1987;<br><u>Leandro v. State</u> , 1994.  |

V. Litigation is present, but no supreme court decision has been rendered:

|                           |  |
|---------------------------|--|
| Illinois <sup>4</sup>     | <u>The Committee v. Edgar</u> , 1990.  |
| Alabama <sup>5</sup>      | <u>Alabama Coalition for Equity v. Hunt</u> , 1990;<br><u>Harper v. Hunt</u> , 1991. |
| Alaska                    | <u>Matanuska-Susitna Borough v. Alaska</u> , 1989.                                   |
| South Dakota <sup>6</sup> | <u>Bezdichek v. South Dakota</u> , 1991.   |
| Rhode Island <sup>5</sup> | <u>City of Pawtucket v. Sundlun</u> , 1992.  |
| Maine <sup>2</sup>        | <u>M.S.A.D.#1 v. Leo Martin</u> , 1992.  |
| Missouri                  | <u>The Committee v. Missouri and Lee's Summit P.S.U. v. Missouri</u> , 1994.***      |
| Louisiana                 | <u>Charlet v. Legislature of State of Louisiana</u> , 1992.                          |
| Florida <sup>2</sup>      | <u>Coalition v. Childs</u> , 1995.   |

VI. No litigation is present or case is dormant:

|            |  |
|------------|--|
| Delaware   | Mississippi  |
| Hawaii     | Nevada   |
| Iowa       | Utah   |
| New Mexico | Vermont  |
| Indiana    | <u>Lake Central v. Indiana</u> , 1987 (Withdrawn). |
| Oklahoma   | <u>Fair School v. State</u> , 1987.                |

Kansas

Consolidated:

Unified School District 229, et al. v. State, 1992;  
Unified School District 244, Coffey County, et al.  
v. State;  
Unified School District 217, Rolla, et al. v. State.

Notes:

- \* System found constitutional on latest supreme court decision.
- \*\* Majority (3) ruled in favor of plaintiff, but North Dakota requires four justices to declare a statutory law unconstitutional.
- \*\*\* After a trial on the merits, the trial court rendered a decision for the plaintiffs, but reserved many issues for a later hearing. The defendants appealed the trial court's decision, and on June 21, 1994, the Missouri Supreme Court dismissed that appeal on the grounds that the judgement below was not final.
- 1 Win for plaintiffs at district on motion to dismiss.
- 2 Win for defendants at district on motion to dismiss.
- 3 Win for plaintiffs at appeals on motion to dismiss.
- 4 Win for defendants at appeals on motion to dismiss.
- 5 Win for plaintiffs at district on merits.
- 6 Win for defendants at district on merits.

Category A: States in which the State Supreme Court has declared that education is a fundamental constitutional right.

|               |  |
|---------------|--|
| Arizona       | <u>Shofstall v. Hollins</u> , 1973.                        |
| Wisconsin     | <u>Busse v. Smith</u> , 1976.                              |
| California    | <u>Serrano v. Priest</u> , 1977.                           |
| Connecticut   | <u>Horton v. Meskill</u> , 1977.                           |
| Washington    | <u>Seattle v. Washington</u> , 1978.                       |
| Wyoming       | <u>Washakie v. Hershler</u> , 1980.                        |
| West Virginia | <u>Pauley v. Bailey</u> , 1984.                            |
| Montana       | <u>Helena v. State</u> , 1989.                             |
| Kentucky      | <u>Rose v. The Council</u> , 1989.                         |
| Minnesota     | <u>Skeen v. Minnesota</u> , 1993.                          |
| Massachusetts | <u>McDuffy v. Secretary of Education</u> , 1993.           |
| Tennessee     | <u>Tennessee Small School Systems v. McWherter</u> , 1993. |
| Virginia      | <u>Scott v. Virginia</u> , 1994.                           |

Category B: States in which the Supreme Court has declared that education is not a fundamental constitutional right.

|              |                                      |
|--------------|--------------------------------------|
| New Jersey   | <u>Robinson v. Cahill</u> , 1973.    |
| Michigan     | <u>Milliken v. Green</u> , 1973.     |
| Idaho        | <u>Thompson v. Engelking</u> , 1975. |
| Oregon       | <u>Olsen v. State</u> , 1976.        |
| Pennsylvania | <u>Danson v. Casey</u> , 1979.       |
| Ohio         | <u>Board v. Walter</u> , 1979.       |
| New York     | <u>Levittown v. Nyquist</u> , 1982.  |
| Colorado     | <u>Lujan v. Colorado</u> , 1982.     |
| Georgia      | <u>McDaniel v. Thomas</u> , 1982.    |
| Arkansas     | <u>Dupree v. Alma</u> , 1983.        |

Category C: Lower court decision on education as a fundamental right.

1. States in which a circuit or appellate court has declared that education is a fundamental right.

|              |   |
|--------------|---|
| Alabama      | <u>Alabama Coalition for Equity v. Hunt</u> , 1990.   |
| Missouri     | <u>Committee v. Missouri</u> , 1993.                  |
| Minnesota    | <u>Skeen v. Minnesota</u> , 1992.                     |
| North Dakota | <u>Bismark Public Schools v. North Dakota</u> , 1993. |
| Washington   | <u>Tronsen v. State of Washington</u> , 1991.         |
| Ohio         | <u>DeRolph v. State</u> , 1992.                       |

2. States in which a circuit or appellate court has declared that education is not a fundamental right.

|               |  |
|---------------|--|
| Illinois      | <u>Committee v. Edgar</u> , 1992.                |
| New Hampshire | <u>Claremont, New Hampshire v. Gregg</u> , 1991. |

**Appendix C**  
**Glossary of Terms**

**Actual Instructional Expense (AIE):** The net cost of instruction in a school district.

**Aid Ratio (MVINCR):** The result of the formula which reflects a district's wealth in relation to all other districts in the state. Used to help determine state aid to districts.

**Assessed Valuation:** The official valuation of property for the purpose of taxation. The valuation is determined by the assessors of the district.

**Average Daily Membership (ADM):** Aggregate number of school days represented by all pupils on the active roll divided by the number of days school is in session.

**Base Earned for Reimbursement:** Calculated reimbursement for instruction based on the cost of instruction and the local tax effort.

**Equalized Mills (EM):** A measure of the local tax effort calculated by dividing the local taxes by the market value of property multiplied by 1,000.

**Full Valuation:** The current market value appraisal or estimate of what a property would sell for in a transaction between a willing buyer and a willing seller.

**Income:** Personal income of the district; a measure of wealth.

**Income Effort:** Local revenue divided by income.

**Local Revenue:** District revenue derived from local sources, typically property tax.

**Market Value:** The value of taxable real property within a school district as determined by the State Tax Equalization board; a measure of wealth.

**Market Value Aid Ratio (MVAR):** A fraction used to calculate the state's share of instructional costs.

**Market Value Effort:** Local revenue divided by market value.

**Market Value-Personal Income Aid Ratio (MV-PIAR):** A factor used to determine the state's share of instructional costs.

**Personal Income Aid Ratio (PIAR):** A fraction used to determine the market value personal income aid ratio. Same as Aid Ratio (MVINCR).

**State Revenue:** District revenue derived from state sources.

**Tax Levy:** The total dollar amount to be raised by tax.

**Tax Rate/Mill:** The tax levy divided by the total taxable assessed value of the district, usually stated as dollars per thousand or per hundred of assessed value.

**Total Effort:** 0.6 times market value effort plus .4 times income effort.

**Total Revenue:** Sum of state and local revenues.

**Weighted Average Daily Membership (WADM):** The number of weighted pupils in average daily membership. It is calculated by multiplying the ADM by a differential weighting factor at each level of instruction: one-half day kindergarten at 0.5, high school at 1.36, all other at 1.0.

## **Appendix D**

### **Example of Funding Losses As a Result of Capping State Aid Formulas**

Both Districts have 2000 Pupils in WADM

| School Year | District with .75 Aid Ratio |                  |              | District with .15 Aid Ratio |                  |              |
|-------------|-----------------------------|------------------|--------------|-----------------------------|------------------|--------------|
|             | Subsidy w/o Cap             | Subsidy (Actual) | Subsidy Loss | Subsidy w/o Cap             | Subsidy (Actual) | Subsidy Loss |
| 1976-77     | 1,125,000                   | 1,125,000        |              | 225,000                     | 225,000          |              |
| 1977-78     | 1,440,000                   | 1,254,604        | 185,396      | 288,000                     | 258,920          | 29,080       |
| 1978-79     | 1,515,000                   | 1,366,834        | 148,166      | 303,000                     | 273,366          | 29,634       |
| 1979-80     | 1,728,000                   | 1,499,108        | 228,892      | 345,600                     | 299,822          | 45,778       |
| 1980-81     | 1,878,000                   | 1,554,858        | 323,142      | 375,600                     | 310,972          | 64,628       |
| 1981-82     | 2,112,000                   | 1,728,201        | 383,799      | 422,400                     | 345,640          | 76,760       |
| 1982-83     | 1,828,741                   | 1,828,741        |              | 365,478                     | 365,478          |              |
| 1983-84     | 2,484,000                   | 1,993,328        | 490,672      | 496,800                     | 398,665          | 98,135       |
| 1984-85     | 2,587,500                   | 2,152,794        | 434,706      | 517,500                     | 430,558          | 86,942       |
| 1985-86     | 2,812,500                   | 2,334,705        | 477,795      | 562,500                     | 466,940          | 95,560       |
| 1986-87     | 2,955,000                   | 2,498,134        | 456,866      | 591,000                     | 499,626          | 91,374       |
| 1987-88     | 3,187,500                   | 2,868,750        | 318,750      | 637,500                     | 573,750          | 63,750       |
| 1988-89     | 3,345,000                   | 3,177,750        | 167,250      | 669,000                     | 635,550          | 33,450       |
| 1989-90     | 3,495,000                   | 3,495,000        |              | 699,000                     | 699,000          |              |
| 1990-91     | 3,570,000                   | 3,570,000        |              | 714,000                     | 714,000          |              |
| 1991-92     | 3,825,000                   | 3,825,000        |              | 765,000                     | 765,000          |              |
| 1992-93     | 3,825,000                   | 3,825,000        |              | 796,000                     | 796,000          |              |
| 1993-94*    | 4,225,000                   | 4,225,000        |              | 796,000                     | 796,000          |              |
| Total Loss  |                             |                  | 3,615,435    |                             |                  | 723,091      |

Note: No compounding or loss of interest included in calculations of base subsidy.  
\*frozen ESBE base plus equity supplement

Source: Pennsylvania Association of Rural and Small Schools Solicitation Packet, 1993.

## VITA

### Education

Richard Berton Hiller was born April 8, 1954, in Ramsey, New Jersey. In 1972, he graduated from Towson Senior High School in Towson, Maryland. He then entered Virginia Polytechnic Institute and State University (VPI&SU) and in 1976 earned a Bachelor of Science degree in Forestry and Wildlife. In 1978, he received the Master of Science degree in Wildlife Management, from the same institution. In 1979 he began the Master of Business Administration degree at Virginia Commonwealth University (VCU) in Richmond, Virginia, and completed the requirements for this degree in 1982 at VPI&SU. He completed requirements for the Doctor of Philosophy in Educational Administration at VPI&SU in the Spring of 1995.

### Experience

Upon completion of his M.S. from VPI&SU in 1978, he moved to Richmond, Virginia, and began work in the Zoology Department of King's Dominion, Doswell, Virginia. After six months, he was promoted to Zoology supervisor, at which time he began classes at VCU. In 1981 he moved to Blacksburg, Virginia, to complete the requirements for the MBA degree. In 1983 he began work for Air-Tite Insulation, Inc. of Christiansburg, Virginia, as general manager. In 1987 he transferred to a sister corporation, HICO, Inc., as general manager. In 1989 he was promoted to Chief Operating Officer for HICO, Inc., a position he held until 1991, at which time he became an adjunct instructor of Management at Radford University (RU), Radford,

Virginia. While at RU, he taught Principles of Management, Management Information Systems and Management Science. While teaching at RU, he consulted for HICO, Inc., to assist in the management transition. He began his doctoral program in the summer of 1992.

While a doctoral student, he was a graduate assistant for Dr. M. David Alexander and Dr. S. Kern Alexander. He consulted for Education Policy Research, Inc. (EPR) during his tenure as a doctoral candidate as well.

### Personal

Richard Berton Hiller was married to Janine Foote Snead on August 12, 1978. He has three children named Shannon, Erin and Daniel, and lives in Shawsville, Virginia.

A handwritten signature in black ink that reads "Richard B. Hiller". The signature is written in a cursive style with a horizontal line underneath it.

Richard Berton Hiller