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A study of equity and adequacy in the Virginia public school finance system from 1979 to 1986

Carr, Edward Walter, Ed.D.

The College of William and Mary, 1987

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A STUDY OF EQUITY AND ADEQUACY IN THE VIRGINIA PUBLIC SCHOOL FINANCE SYSTEM FROM 1979 to 1986

A DISSERTATION

PRESENTED TO

THE FACULTY OF THE SCHOOL OF EDUCATION

THE COLLEGE OF WILLIAM AND MARY IN VIRGINIA

IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE DEGREE

DOCTOR OF EDUCATION

BY

EDWARD W. CARR

A STUDY OF EQUITY AND ADEQUACY IN THE VIRGINIA PUBLIC SCHOOL FINANCE SYSTEM FROM 1979 TO 1986

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Table of Contents

List of Tables

List of Figures

CHAPTER I

INTRODUCTION

Conflicting Values in American Education

Equality of educational opportunity, according to Johns and Morphet (1975) is a concept to which nearly every American citizen has subscribed at one time or another. Practical application, however, is quite a different matter. Numerous, sometimes emotionally charged debates occur periodically in all communities, in every state legislature, and in Congress concerning the desirability of taking constructive steps to implement this concept (p. 177).

The special role education plays in our society is responsible for the range of interest it inspires. Grubb and Michelson (1974) indicate that education is believed not only to transmit the American culture and heritage but also to instill a set of unique values consistent with the preservation of society. Education is endowed with a history which views it as the arena of opportunity, where merit and hard work reap their just reward. Americans continue to demand that their system of education lead the country in solving such complex problems as racial and class segregation, poverty, and technical inefficiency. Is it any wonder, then, that schools receive such attention in times of crisis and that debates over educational policy reflect the deepest differences

within the nation (p. 3)?

Dorfman (1978) suggests that Americans seem to hold more truths self-evident about education than about any other sphere of public life; yet, there is clear evidence of a continual struggle between two opposing views effecting its very existence. One, an expression of American individualism, is that parents have the right to provide as much education for their children as they can afford. The other an expression of the interdependence of all elements of society, is that all children should have an equal access to a meaningful education.

According to Dorfman, the structure of the system which administers American education mirrors this conflict. The states are responsible constitutionally for education but delegate the burden of administering educational programs to local school boards. As a result, school divisions are allowed to be different. This aspect is, of course, one seed of potential inequality. The United States Constitution requires no federal role in education, but such interest does take place, both through new legislation and through guarantees of equal treatment afforded by the Constitution and the judicial system.

The local school district, thus, generally reflects the individual view, and the federal government is a reminder of the importance of interdependence, while the state fluctuates somewhere in the middle. It is not surprising then, that these relationships, so much a part of the American system of public education, can and do give rise to concerns for educational equity (p. 10).

Grubb and Michelson (1974) recall that in recent years there has been a recognition that the results of education often are unequal, in a

non-random way. There is now a better notion of how educational processes and implicit rules favor middle class white children. There is a greater awareness of the kinds of deprivation with which children begin school, and why certain aspects of family background constitute deprivations relative to the operation of schools. Educators are conscious that inequalities in resources tend to parallel other kinds of inequalities (p. 4). Grubb states that:

> Along with new demands has come a re-examination of previous public education; a new educational history is being written, one which provides a better understanding of how various kinds of inequities developed, persisted, and were reinforced despite an ideal and rhetoric of equality (p. 4).

Justice, fairness and equal opportunity in the treatment of individuals are a common value in American society and an accepted goal of education, educational finance and governmental functions in general. Reasonable people, however, differ when equity is viewed in the context of individual freedom and choice.

School Finance Reform Movement

The seeds of the school finance reform movement can be traced most clearly to the mid 1950s, when the United States Supreme Court issued its landmark decision in Brown v. Board of Education (1954). This decision, while not directly concerned with school finance reform, marked a renewed national concern for social equality which was closely tied to equal educational opportunity. Kurland has written that this decision saw the "emerging primacy of equality as a guide to constitutional decision," and spawned the "egalitarian revolution in judicial

doctrine [which] has made dominant the principles to be read into the equal protection clause..." (1964, p. 144). In the early 1960s, Guthrie (1980) cites the writings of Conant and Sexton documenting poverty of cities and the intra-district spending disparity that afflicted Detroit's city schools as creating a public consciousness of the financial inequities in education. Another manifestation of this new sensitivity was the proliferation during the mid-sixties of social legislation sponsored by the Johnson Administration under the "Great Society" and "War on Poverty" banners (1980, p. 6).

During this same period, school finance research conducted by both educators and economists began to gain professional attention. In a comprehensive review of research studies in educational finance between 1959 and 1969, Hickrod (1971) reported on twenty studies which sought to determine the factors which influenced local demand for education. Demand for education was defined as the current operating expenditure per pupil. The results of these early studies established the fact that demand for education is a function of wealth and wealth-related variables (pp. 35-49).

Concurrent with these developments, federal legislation in the form of the Civil Rights Act of 1964 authorized an extensive social science effort directed towards an assessment of equality of educational opportunity. James S. Coleman, a noted sociologist, was selected to conduct the study. In 1966, Coleman issued a controversial report which among other things disputed the significance of unequal resources on student achievement. The entire question of the efficiency of schooling was challenged by the findings of this report. Despite the furor created,

the Coleman Report had the effect of intensifying the concern and attention given to equality of educational opportunity (Guthrie, 1980, p. 7). In 1967, the Commission on Civil Rights added to the concern for equal education by issuing a report entitled "Racial Isolation in the Public Schools". Though not directly concerned with the school equity issue, the thesis of the report included the view that resource equality was a necessary, if not sufficient, prerequisite for equal educational opportunity (U.S. Commission on Civil Rights, 1967).

Analysis by competent legal scholars on school finance systems began to appear in the late 1960s and early 1970s. The work of Wise (1967) and Coons, Clune, and Sugarman (1970) set the stage for the landmark Serrano v. Priest opinion of the California Supreme Court in August of 1971. Wise and the Coons group, working separately, had reached a common conclusion; the widespread inequities of school finance structures between wealthy and poor areas were not likely to be corrected through the legislative process. For years, school districts rich in property wealth had been able, legislatively, to protect their taxing and spending advantages. The most promising reform approach was to seek judicial relief for the perceived inequities.

Arthur Wise expressed this view in his book, Rich Schools, Poor Schools, when he wrote:

> I believe that the revolution in equality cannot be consummated without aid from the judiciary. Put cynically, the self-interest of privileged parents (and the officials who represent them) militates against the achievement of the goal of equality of educational opportunity (1967, p. 7).

Coons, Clune and Sugarman, similarly expressed this thought when they wrote:

> Discrimination in education, on the other hand, is precisely the anticipated consequence of the legislated structure of public education. Far from striving to overcome poverty's effects upon education, the state, in structuring the system, has taken that poverty itself as the measure of quality in education. Such a system bears the appearance of calculated unfairness (1970, p. 7).

Both sets of attorneys based their independent arguments on the U.S. Constitution's Fourteenth Amendment and the education provisions of state constitutions. Each believed that education was of such significance in American society as to have acquired the status of a fundamental interest and, therefore, was deserving of both state and federal constitutional protection. Because education was a fundamental interest, according to their view, then government would have to possess a compelling reason, not simply a rational one, for any such discrimination against individuals. Additionally, under these arguments, strict scrutiny of governmental purposes would be required when suspect classifications such as race, income, or geographic residence are involved as recipients or objects of publicly supported services (Guthrie, 1980, p. 8).

Remedial actions were proposed by each, but Coons, Clune, and Sugarman's approach soon proved to be the more prominent. They developed the principle of fiscal neutrality which stated that: "The quality of public education may not be a function of wealth other than the

wealth of the state as a whole" (1970, p. 2). This principle formed the basis for the Serrano litigation and served as a guide for numerous school finance cases throughout the 1970s and early 1980s. A more detailed analysis of the school finance reform litigation is included in Chapter II: Review of the Literature.

Statement of the Problem

The purpose of the study was to analyze the Virginia system of funding public education from 1979 through 1986 to determine the degree of comprehensive resource equity and funding adequacy for pupils and state public school divisions. Specifically, the study extends prior research by assessing the effectiveness of the system under different levels of state support. In addition, the adequacy of the state funding was analyzed on the basis of student needs and different characteristics of school divisions.

Clarification of the Problem

Operationally, resource equity for children was examined using three principles of equity; horizontal equity, vertical equity, and equal opportunity. Five years of recent resource data were analyzed, beginning with the 1978-79 school year and continuing at two year intervals through the 1984-85 school year. During the course of the study, financial data for the 1985-86 school year became available and this was included in the analysis. In addition to the relative level of equity and adequacy, the trends in these concepts over time were analyzed.

Justification for the Study

In 1971, Virginia voters adopted a revised constitution which significantly strengthened the state's commitment to equal educational

opportunity. The language of the revision sought to ensure an educational program of high quality for all citizens. Upon the recommendation of a special task force, the 1974 General Assembly adopted a new school funding system which included a method of determining the cost of the required educational program and a formula to apportion the established cost equitably between the state and the local communities. The objective of these procedures was the enhancement of equal educational opportunity and the establishment of a system that distributed the cost according to a localities ability to pay.

During this same period, a national movement of school finance reform was sweeping across the country. Judicial rulings in state courts triggered significant changes in public school finance systems in more than half of the states (Odden, 1978, p. 30). The typical result of these reforms was an increase in state aid to public education and a decrease in reliance on local funding sources (Hudgins and Vacca, 1979, p. 130). In Virginia, however, a different pattern developed following the implementation of voluntary reform measures.

In 1983, a staff report prepared for the Joint Legislative Audit and Review Commission (JLARC) disclosed that while state funding of education had increased by 37 percent from 1978 to 1982, it did not keep pace with inflation in government service costs which grew at a rate of 40 percent. In addition to inflation, state funding also lagged behind local support for education which increased during the same period by 63 percent. The overall result of th these factors was a decline in state support for educational expenditures of 3 percent (JLARC, 1983, p. 76).

While inflation masked the effect of state funding support and local expenditures increased, superintendents and local government officials became increasingly dissatisfied. They were concerned that the new state funding system was both inadequate in its amount and inequitable in its distribution. These concerns grew as the state enacted more mandates on local public schools while contributing a declining share of its own resources (See Table 1). The JLARC report also confirmed these attitudes when it compiled the results of an opinion survey it conducted of local officials from 136 cities and counties during this same period. Asked about the adequacy of state education aid, 86 percent of the respondents felt it was inadequate and 80 percent believed it had become less adequate over time (JLARC, 1983, p. 76).

Throughout this period in the late 1970s and early 1980s, several independent studies were conducted on the Virginia school funding system. The focus of each of these efforts was to measure the degree of fiscal equity achieved under the 1975 funding plan. Studies by the United States Department of Health, Education and Welfare with Killalea Associates (1977), Salmon and Shotwell (1978), Vernall (1982) and Jones (1983), each concluded that little if any change in fiscal equity had been achieved. In fact, each study showed that the disparities in per pupil expenditures had actually increased during the intervening years.

These studies, for the most part, were traditional equity analyses based on the principle of horizontal equity and equal opportunity. Equity was assessed by analyses of financial disparity in expenditures and relationship techniques measuring wealth or fiscal neutrality. This

Table 1

Current Expenditures for Public Elementary and Secondary Education as Percent of Personal Income Virginia and Contiguous States for Selected Years

	School Years		
State	1976-77	1978-79	1981-82
Kentucky	4.0	4.1	4.2
Maryland	4.5	4.8	4.3
North Carolina	4.4	4.6	4.8
Tennessee	4.2	4.2	3.9
VIRGINIA	4.4	4.1	4.0
West Virginia	4.4	4.8	5.1
United States	4.7	4.6	4.2

Note: From "Public Elementary and Secondary Education: Economics and Value for the Commonwealth of Virginia" by R. G. Salmon, 1984, Copyright the Rector and Visitors of the University of Virginia. Reprinted by permission.

approach was very consistent with the national trends in school finance and comparable with methodology used in the prominent state court challenges. Each of these Virginia studies compared the current funding system with its immediate predecessor and established the lack of progress towards equal educational opportunity. However, none of the previous studies were designed to examine unique characteristics of

students and localities, nor were they designed to analyze the funding plans reliance on adequate state support.

Currently, a review of the entire eleven year cycle of research demonstrates that the previous periods of analysis were all during times when state funding was considerably lower than originally anticipated. The JLARC Report specifically found that during the 1970s and early 1980s, "state funding of education falls substantially short of the cost of meeting State-imposed Standards of Quality" (JLARC, 1983, p. 81) It could be stated, therefore, that the drop in state funding during this period was an unanticipated factor which may have nullified the equalizing potential of the formula. The findings of these previous studies may, also, have prematurely labelled the equalization formula a failure. At the very least, additional research under more favorable levels of state support should add to a comprehensive assessment of the Virginia funding system and provide a more accurate basis for policy formation.

An additional element in this study is the concept of adequacy. It has been integrated with the more traditional considerations of equity because of the most recent trends in school finance litigation. Adequacy as a concept is clearly different from the concept of equality as considered in a range of equity measures. Both concepts play a part in the fundamental conflict in values between the libertarian and egalitarian points of view previously discussed. The libertarian view in school finance usually is expressed as a belief in freedom of choice or local control, while the egalitarian view is represented by the ideal of equal educational opportunity for all. The resolution of this struggle, over the years, has been resistant to most compromises. The

result has been an uneven landscape of judicial interpretations and political decisions throughout the country.

In reviewing the many rulings and policy decisions in this area of public school finance, one begins to discern a practical trend which may emerge as a possible solution to a reasonable standard of equity. Adequacy as a form of equity holds promise because it has more appeal to those interested in preserving local control than does resource equality. McCarthy and Deignam have identified this standard of equity and traced its antecedents in the following passage:

> A commitment to make educational opportunities equitable among all school districts within a state often results in a reduction in discretionary powers of local school districts to provide educational offerings at a level of their choosing. However, it is possible to mandate that an adequate education be provided throughout a state without equitable opportunities being required. Indeed, this is essentially the position assumed by the United States Supreme Court in Rodriguez. The Court concluded that interdistrict disparities can be overlooked as long as the state ensures that all students receive a minimum education necessary for the exercise of constitutional rights and full participation in the democratic process. (1984, p. 101)

This shift in emphasis from equality to adequacy has been evident in many recent state court decisions. These cases have focused on the interpretation of the appropriate components of an adequate education. Courts, actually, have begun to define adequacy of program as well as funding and maintained jurisdiction over the funding system pending

appropriate legislative action (see Robinson v. Cahill, 1975, and Pauley v. Kelly, 1979).

These recent developments have important implications for Virginia and its funding system. It could certainly be argued that rather than resource equality, Virginia has effectively pursued the provision of an adequate education for all its citizens through the Standards of Quality. The dimension of adequacy has been included in this study to test this contention.

Objectives of the Study

The principle objective of the present study was to analyze the performance of the Virginia public school finance system in terms of several measures of equity and under differing levels of state support. Results of this study should assist local and state officials as they consider changes in current public policy towards the funding of education.

Specific component objectives of this study were to answer the following research questions which are grouped according to equity and adequacy concerns:

1. EQUITY: Is public education in Virginia provided on an equal and an equitable basis?
    a. Has horizontal equity or the principle of equal treatment of equals been achieved in Virginia between 1979 and 1986?
    b. Has the principle of equal opportunity in education been achieved in Virginia's public schools between 1979 and 1986?

c. Is there any evidence to indicate that either or both of these equity principles are influenced by the level of state support over time?

2. ADEQUACY: Has the General Assembly of Virginia, during the years between 1979 and 1985, ensured the provision of an adequate education to all children in the Commonwealth?

   a. Has vertical equity or the principle of appropriate unequal treatment of unequals been achieved in Virginia between 1979 and 1986?

   b. Has there been a differential impact on urban, rural, and suburban school divisions in the State of Virginia, as a consequence of the funding system?

   c. Has state aid for education kept pace, since 1979, with the cost of education at the local level and the state's constitutional commitment to public education?

Scope of the Study

The study was restricted to the Commonwealth of Virginia and confined to an analysis of educational resources from federal, state and local sources which are available to each state public school division for the specific school years of 1978-79, 1980-81, 1982-83, 1984-85, and the most recent financial data for 1985-86. These five years were selected because they represent significant points during the most recent history of the funding system. These five years also represent important points during a unique period of declinging inflation and increasing state financial support.

The study was based on accepted measures of fiscal and resource

equity used in assessing school funding schemes. The study involved examinations of school operating expenditures to include; total operating expenditures (TOE), state and local operating expenditures (SLE), state operating expenditures (SOE), and local operating expenditures (LOE). Federal revenue flows unequally to school divisions and cannot be considered as part of the state and local effort or ability to support public education. Its influence in supporting particularly special need students might substantially effect the results of the analysis, therefore, federal funds are only reflected within the total operating expenditure category (TOE). The recent decline in federal support for education, not only emphasizes the importance of focusing on separate units of funding, but signals that Virginia it cannot rely on the federal government to address state problems.

Definition of Terms

Equity

There are numerous ways to conceptualize equity and adequacy in terms of school finance. The individual method chosen implies a series of value judgments about the worth of the individual and the importance of the educative process. In order to establish a conceptual framework, it is necessary to limit these terms and to define the elements of each as they pertain to the investigation.

Equity

Equity, as explained by Alexander (1982), is a term which encompasses the concepts of justice, equality, humanity, morality and right. Equity can be considered a right or matter of justice where absolute equality is the ultimate measure of such justice. The goals of equal

treatment or equality, then, become a basic standard against which equity may be judges (1982, p. 194).

Equity, however, is usually more than equality. Like justice, equity is more abstract and less susceptible to definition. Equality, on the other hand, is more measurable, and mathematical; a term which conveys division, and redistribution. Equity relates more favorably to justice and suggests an image of fair, unbiased and impartial treatment that flows from either an innate or acquired right (Alexander, 1982, p. 195).

In a functional sense, equity and equality are often used synonymously, however, equity does not always imply identical or even substantially equal treatment. As McCarthy and Deignan (1982) have pointed out:

> It generally is considered fair to treat similarly situated persons equally (horizontal equity); however, persons who are not similarly situated may require unequal treatment for it to be fair (vertical equity) (1982, p. 4).

This more comprehensive use of the term equity is consistent with many judicial opinions and the literature of modern school finance.

Adequacy

Adequacy, while distinct from the concept of equity, does contain a definite area of similarity. Adequacy is defined as "

reasonably

sufficient" (Webster, 1973, p. 14). To give substance to the term, there must be a specified threshold level, above which an entity is judged sufficient for a stated purpose.

McCarthy and Deignan have noted that it is possible to define the threshold standard of adequacy as encompassing the concept of equity; such as, an adequate education might be considered one that is provided equitably to all students. It is true; however, that equity is not a prerequisite to adequacy. On the contrary, an adequate education might be defined as a minimum level of education necessary to satisfy specific state objectives but also could be inferior or superior to other such programs within the state. In the same sense, several schools might offer equal educational opportunities but not provide the adequate required education necessary to satisfy the specified state standards (1982, p. 4).

The grounding of each of these terms must occur within a certain context of individual rights conferred in this case by the federal and state constitutions and applicable statutes. In Virginia, the basis of equity in education must be that which is both the inate and acquired right of every citizen as provided in the state constitution and the Code of Virginia. Adequacy, for the purpose of this study, shall be defined as both the program requirements of the constitutionally derived Standards of Quality and the level of funding necessary to make an appropriate educational program a reality for all pupils.

Other Definitions

In summary, the following definitions will be used throughout this study, unless otherwise noted:

Horizontal Equity. This principle states that all pupils are equal and deserving of equal amounts of educational resources.

Vertical Equity. This principle recognizes that pupils are different and that unequal pupils deserve appropriate unequal amounts of educational resources.

Equal Opportunity. This principle, also referred to as fiscal neutrality, is defined as the absence of a relationship between educational resources and the wealth or fiscal capacity of an individual school division or locality.

Equality. The state of mathematical parity or absolute equal treatment.

Equity. Equity is the concept of fair, unbiased and impartial treatment.

Appropriate. That which is especially suited for a specific purpose.

Adequacy. That state of being sufficient for a specific purpose.

Adequate Education. An appropriate educational program meeting the Virginia Standards of Quality which is provided equitably to all pupils.

Adequate Funding. Sufficient allocations of State and local resources necessary to ensure an adequate education for all pupils.

Limitations of the Study

The research was confined to the Virginia public school finance system from the 1978-79 school year through the 1985-86 school year. Data used in the study were limited to that which is available through the published documents of the State of Virginia, the Department of Education, and the Virginia General Assembly. Complete data were obtained on 133 individual or combined school divisions representing 98 percent of all public school divisions in the state. Three school divisions, Fairfax City, Salem, and South Boston, were omitted from the

study because of incomplete data for a portion of the period of analysis. Pupil data were incorporated into the study and 99 percent of the public school pupils were represented in the analyses.

While pupil equity is the focus of this study, a legitimate and important area for study in school finance was omitted. The equitable distribution of the burdens of education through taxation was not investigated. Differing tax rates are considered as a variable in hypothesis four, however, consideration of taxpayer equity has been generally excluded for several reasons. First, tax equity is an extremely complex area which is deserving of a separate investigation. Secondly, taxpayer equity has been previously examined in Virginia and shown to be slightly improved under the current reform funding system (Jones, H.B., 1984. p. 356).

There is another area of investigation which could not be included in this study but which would be a useful addition to such an analysis. Reference is made to the inequity which may exist in educational costs. Two school divisions may receive equal dollar resources but be unable to purchase comparable or equitable educational services. These uncontrollable price differences can only be addressed through a price of education index applied across a state. As Berne and Steifel (1984) have suggested, such an index should reflect differences in prices that are beyond a school district's control and those that do not reflect differences in the quality of resources or preferences of localities (p. 123). The detailed econometric analysis necessary to provide accurate price adjusted dollar objects is not available for Virginia and could not be undertaken in this study. It remains an area of important future study

and research.

Finally, it is important to emphasize that the study was primarily focused on the outcomes of the total educational funding system in Virginia. Little attempt has been made to tie systematically the intricacies of the state funding system to the resultant educational patterns except in a rather general way. Instead, this study is most concerned with the broad results of the total funding system. The purpose of the study was to describe the current results of the funding scheme and to suggest areas of future policy consideration and research.

Chapter II

REVIEW OF THE LITERATURE

From the very beginning of American public education, a reliance on local resources and a belief in local autonomy were commonly held values. While states played an important role in regulating and encouraging the establishment of public schools, they were not prominent in the financing of the schools particularly in the Northeast. Grubb and Michelson have noted that Massachusetts was an extreme example. Despite the establishment of state aid as early as 1834, state revenue accounted for only 1.6 percent of the total public school revenue in 1834 and 2.8 percent in 1915 (1974, p. 25). In the Northeast, state financing was viewed as an attempt to encroach on local prerogatives of the communities. The South, on the other hand, represented a noticeable exception to this pattern, especially after the Civil War. Education in the southern states was established on a state basis by Reconstruction governments. The view was that public education was necessary to serve as the transmitter of the Northern culture and moral system. Therefore, the South, in contrast to the North and the rest of the country, started from a system of state financing (Grubb and Michelson, 1974, p. 25).

Economic development and the construction of highways and railways were critical elements in the establishment of a pattern of uneven local fiscal resources. As a consequence, the system of reliance on local

initiative began to breakdown. The affluent jurisdictions could provide an educational program with a relatively light tax effort while poorer localities would be required to undertake a disproportionately heavy tax to finance a comparable educational system. Instead of having the educational offerings determined solely by the accident of local ability and initiative, state governments came to adopt equalization provisions for the distribution of state education funds. (Advisory Commission on Intergovernmental Relations, 1969, p. 46).

Definition of School Finance

As Jones has observed, the economics of education involves the allocation of resources among competing uses. School finance, on the otherhand, is concerned with the distribution of educational "benefits and burdens" among population groups. Benefits are defined in terms of dollars spent or services provided to students. The burdens exist in the form of taxes, tuitions, fees or charges required to support the educational program. School finance, then, is concerned broadly with the distribution of the tax burden across income classes, geographic, racial and other groupings and with the methods of passing revenue from individuals to the school districts and schools concerned (Jones, 1985, p. 12).

Theories in School Finance

Both the method of taxation for education and the distribution of the resources has been a matter of considerable study and analysis since the beginning of the 20th century. The early theorists in school finance were all college professors who had a profound influence on political policy formation of state school finance systems. Theory concerning the role of government in equalizing educational

opportunities, the level of education guaranteed in order to promote the general welfare, and the issue of who should control the public schools were all matters of intense analysis and thought during the first three decades of this century.

The first direct expression of the concept of equalization of educational expenditures was made in 1906 by Ellwood P. Cubberley when he suggested that all children of the state are equally important. His philosophy is well represented in the following passage:

> Theoretically, all children of the state are equally important and are entitled to have the same advantages; practically this can never be quite true. The duty of the state is to secure for all as high a minimum of good instruction as is possible, but not to reduce all to this minimum: to equalize the advantages to all as nearly as can be done with the resources at hand; to place premium on those local efforts which will enable communities to rise above the legal minimum as far as possible; and to encourage communities to extend their educational energies to new and desirable undertakings. (1906, p. 17)

The early work of Cubberley in 1905 was the beginning of an era of study and experimentation in devising and using state plans to assure equality of educational opportunity. Cubberley believed in a strong state role in educational finance, the need for equalization, and expansion of educational programs through state incentive grants or rewards for effort. (Cubberley, 1906, p. 17)

Harlan Updegraff, in 1922, expanded Cubberly's definition of the ideal state program of school finance by suggesting that state support should be variable depending on the amount of local effort for schools.

He combined the concepts of equalization and reward for effort within the same basic formula. He noted that the purpose of state aid was to guarantee each child an opportunity equal to that of any other child for the education that will "best fit" the child for life. (Updegraff and King, 1922, p. 95)

In 1923, Strayer and Haig provided new impetus to the concept of fiscal equalization by declaring that state programs should be designed to furnish each child with a "minimum educational opportunity" and that the tax burden for the schools should be borne by citizens in relation to their ability to pay (1923, p. 173). In a study of the school finance program for New York State, they wrote:

> There exists today and has existed for many years a movement which has come to be known as the equalization of educational opportunity....In its most extreme form the interpretation is somewhat as follows: The state should ensure equal educational facilities to every child within its borders at a uniform [tax] effort...Most supporters of this proposition, however, would not preclude any particular community from offering at its own expense a particularly rich and costly educational program. They would insist [only] that there be an adequate minimum offering everywhere, the expense of which should be considered a prior claim on the state's resources. (1923, p. 173)

This adequate minimum program which is the subject of considerable debate today, came to be referred to as the "foundation program". Strayer and Haig were the first to emphasize the equalization of tax burden as well as the equalization of educational opportunity. Their model for state educational support was as follows:

(1) A local school tax in support of the satisfactory minimum offering would be levied in each district at a rate which would provide the necessary funds for that purpose in the richest district.

(2) The richest district then might raise all of its school money by means of the local tax, assuming that a satisfactory tax, capable of being locally administered, could be devised.

(3) Every other district could be permitted to levy a local tax at the same rate and apply the proceeds toward the cost of schools, but

(4) Since the rate is uniform, this tax would be sufficient to meet the costs only in the richest district and the deficiencies would be made up by state subventions. (Strayer and Haig, 1923, pp. 174-175)

In addition to their concepts of the foundation program and equalized tax burden, they vigorously attacked Cubberley's and Updegraff's notions of reward for effort. They described these ideas as inconsistent with the goals of equalization because such plans would invariably channel additional funds to richer more capable school districts.

Paul Mort, a student of Strayer's, in 1924 advanced the Strayer and Haig theory of minimum foundation programs. In clarifying the concept, he identified the important elements which should be included in a satisfactory minimum foundation program as follows:

(1) An educational activity found in most or all communities throughout the state is acceptable as an element of an equalization program.

(2) Unusual expenditures for meeting the general requirements due to causes over which a local community has little or no control may be recognized as required by the equalization program. If they arise from causes reasonably within the control of the community they cannot be considered as demanded by the equalization program.

(3) Some communities offer more years of schooling or a more costly type of education than is common. If it can be established that unusual conditions require any such additional offerings, they may be recognized as a part of the equalization program. (Mort, 1924, pp. 6-7)

Mort sought objective and equitable measures of educational need that could be used by legislators in determining the adequate state appropriation for equalization. He used complicated sets of regression equations to estimate the appropriate level of staffing based on average practice throughout the state (Johns, 1982, p. 11).

In 1929, Mort recognized the effects of including special pupil populations, teacher and program counts in state school finance systems. His concept of "weighting pupils" has since been extended to include weighting students enrolled in vocational education, special education and compensatory education in order to provide the extra costs of these programs (Johns, 1072, p. 12). His enthusiasm for pupil weighting systems, however, was tempered by the realization that during his day, well-off urban school systems were the primary beneficiaries of such systems (Jones, 1985, p. 200).

In 1930, Henry Morrison wrote School Revenue, in which he observed that constitutionally education was a state function and that local school districts had failed to provide that function equitably or

efficiently. He stated that various attempts to provide equal educational opportunities advocated by Mort and others had failed to address the educational needs or to ensure an equitable system of taxation. Morrison proposed a revolutionary model of state support whereby all local school districts would be abolished and the state would become both the unit for taxation and for administration of public schools.

Morrisons ideas were not well received in a political environment which equated democracy with local initiative and home rule. Despite the predominance of theories by Cubberley, Updegraff, Strayer-Haig, and Mort, the defects in a purely local system of education identified by Morrison in 1930 are equally evident today.

Legal Context of School Finance

While the basic theories in school finance were formulated in the first thirty years of this century, the conflicting values inherent in the issues have resulted in limited progress or general acceptance throughout the country. While many states adopted various funding systems which incorporated some of the concepts of Strayer-Haig-Mort, little significant progress can be noted during the Great Depression or throughout the period of World War II. The evolution of school finance policy was heavily influenced by the role of the judiciary. For more than fifty years efforts had been underway to eliminate or reduce disparities in local taxing and spending per pupil. In the late 1960s, these efforts found new allies in reform minded lawyers who carried the policy issues to state and federal courts. The results of school finance litigation is a powerful segment of school finance reform.

In one of the early cases, Hobson v. Hanson (1967), United States Court of Appeals Judge J. Skelly Wright, concluded his opinion with the following "Parting Word":

> It is regrettable, of course, that in deciding this case this court must act in an area so alien to its expertise. It would be far better indeed for these great social and political problems to be resolved in the political arena by other branches of government. But there are social and political problems which seem at times to defy such resolution. In such situations, under our system, the judiciary must bear a hand and accept its responsibility to assist in the solution where constitutional rights hang in the balance. (1967, p. 407)

In 1967, this statement was an incisive description of events soon to occur in public education. Despite the contributions of scholars, federal commissions, and state legislators, the judiciary has been the major medium for equal educational opportunity and school finance reform.

To understand the significance of the role of the judiciary in school finance, one must be acquainted with the areas of concern which are the basis for judicial review. Wise, a University of Chicago legal scholar, expressed the fundamental concern of those seeking school finance reform, when he stated:

> In nearly all states, statutes place primary reliance for financing schools on the local property tax. In effect, the state's school

> finance statutes classify the students in the state on the basis of the school district in which they reside. This classification largely determines the quality of the educational opportunity which the student is to receive. (1967, p. 164)

The U.S. Constitution permits states the authority to make such classifications. The U.S. Supreme Court, however, reviews such classifications and ensures that they relate to a legitimate purpose of law. The question in school finance litigation, then, becomes: Is the classification of pupils according to the wealth or tax base of their residence sufficiently related to the purpose of law to be considered reasonable? Alexander and Alexander have stated that the courts have "steadfastly adhered to the philosophy that an act of the legislature will not be rendered invalid unless the act obviously violates certain proscribed constitutional standards" (1985, p. 917). With respect to school finance plans, courts have only been asked to decide if such systems create unconstitutional classifications or violate equality requirements.

In the early 1960s, Arthur Wise and other legal scholars began to look at school finance systems which had an adverse impact on certain groups of students. In 1965, Wise advanced the theory that education was a constitutionally protected right which must be provided to all on equal terms. Thus, a state that gives fewer dollars for a child in a poorer school district may be held to deny equal protection rights. Specifically, he argued that the state had no reasonable equal

protection basis on which to justify making a child's education dependent on the wealth of the school district (1967, p. 118).

The use of the argument of wealth being a suspect classification was reinforced by previous holdings of the U.S. Supreme Court. In Griffin v. Illinois (1956) the Court ruled that classification on the basis of poverty was unconstitutional and in Baker v. Carr (1962) a similar finding was made where individuals were classified by location, homesite or occupation. On this basis, it was concluded by Wise and others, that the quality of a child's education could not be contingent upon a state and local taxing and fund distribution system that is based on the property wealth of the local school district.

Prior to the late 1960s, school finance litigation usually concerned the inequity of tax collection and distribution schemes. Beginning in the late 1960s, however, fueled by an atmosphere of renewed social consciousness and racial equality, litigation challenging the unequal distribution of financial resources in schools became a national trend (Alexander, Connelly and Salmon, 1984, p. 135).

During this period, educators and constitutional scholars expressed an increasing awareness of the inequities in state school finance systems and the gap between the ideal of equal educational opportunity and its fulfillment especially for racial minorities and the poor. Published articles focused on the needs of the educational disadvantaged youngsters who because of their backgrounds could not effectively compete with more advantaged children. These writers noted that the disadvantaged students typically received fewer educational resources than other students; yet because of their needs, they required more than their well-to-do peers.

According to Browning and Long (1968), these articles were largely responsible for a series of particular law suits filed in the late 1960s challenging the constitutionality of state funding systems. These suits, brought on behalf of poor children, argued that existing school finance systems denied equal educational opportunities because funds were not allocated on the basis of educational needs.

In McInnis v. Shapiro (1968), elementary and high school students from four school districts of Cook County, Illinois, claimed that the school finance statutes of the state violated their fourteenth amendment rights to equal protection and due process because they permitted wide disparity in the expenditures per pupil from district to district. The result is a good education for some and a lesser education for others who have equal or greater educational needs. The plaintiffs claimed to be members of this disadvantaged group. The Court described the main issue as follows:

> The underlying rationale of the complaint is that only a financing system which apportions public funds according to the educational needs of the students satisfies the Fourteenth Amendment. (p. 336)

The Court, while acknowledging fault with the law, found that "the existing school legislation is neither arbitrary nor does it constitute an invidious discrimination, it therefore complies with the Fourteenth Amendment." (1968, p. 336) The court also stated:

> Even if the Fourteenth Amendment required that expenditures be made only on the basis of the pupils' needs, this controversy would be non-justiciable. While the complaint does not pre-

sent a "political question" in the traditional sense of the term, there are not 'discoverable and manageable standards' by which a court can determine when the Constitution is satisfied and when it is violated. (p. 335)

In the end, the three judge federal district court upheld the Illinois school finance system because there was no equal protection requirement for equal spending and the remedy sought by the plaintiffs, a system of educational expenditures made on the basis of need, was judicially unmanageable. The Supreme Court summarily affirmed this decision without opinion.

Soon after the McInnis decision there was a second "educational need" case filed this time in Virginia. Burruss v. Wilkerson (1969) was brought on behalf of students in Bath County Virginia. Bath is a rural county with a higher than average valuation of property but a very high incidence of low income families. Because the state school funding formula was based, at the time, almost entirely on property wealth, Bath received less state funds than it needed to provide adequate educational programs for its low income children.

The court found that the finance system in Virginia was not discriminatory because it operated under a uniform and consistent state plan. With respect to educational need, it commended efforts towards equal educational opportunity but refused to substitute the wisdom of the court in determining appropriate educational need. The opinion stated in part:

The courts have neither the knowledge, nor the means, nor the power to tailor the public moneys to fit the varying needs

of these students throughout the state. We can only see to it that the outlays on one group are not invidiously greater or less than that of another. No such arbitrariness is manifest here. (1969, p. 812)

In Burruss, the court found no violation of either the "efficiency" provision of the Virginia Constitution or equal protection clause of the 14th Amendment. The United States Supreme Court summarily affirmed this decision.

Both of these cases represent examples of what Alexander and Jordan (1972) have referred to as the third generation of state school finance litigation. These cases define equal educational opportunity in terms of "an affirmative constitutional duty to compensate for variations in educational needs among children" (p. 472). The fact that they were unsuccessful suggested a change in strategy for school finance litigation in the early 1970s. As Guthrie (1980) states "no longer would liberal-oriented remedies be sought that emphasized school financing in accord with student needs...rather, following McInnis, the remedy subsequently to be sought was to be consistent with the Coons, Clune, and Sugarman principle of fiscal neutrality." (pp. 12-13)

Two years after the McInnis and Burruss cases, legal scholars proposed a new principle of equal educational opportunity expressed in negative terms. Under the Coons, Clune and Sugarman (1970) definition, "the quality of public education may not be a function of wealth other than the wealth of the state as a whole" (p. 2). Also known as the fiscal neutrality standard, this measure of equal opportunity was to become the basis of most school finance litigation in the 1970s.

In the latter part of the 1960s, the efforts of John Serrano, a southern California resident, to obtain equal educational services for his son Anthony came together with the legal theories of Coons, Clune and Sugarman and a law suit was filed against the California school finance system. In Serrano v. Priest the plaintiff alleged that under the California finance scheme, money spent per pupil varied from district to district according to the wealth of the pupil's parents and the district in which the pupil resided, not according to his educational needs. Comparisons were drawn between the Baldwin Park School District, a property-poor Los Angeles suburb, and the property-wealthy and famous Beverly Hills Unified School District. At the time of the trial, Baldwin Park had a property tax base of $16,000 per pupil while Beverly Hills enjoyed a $200,000 per pupil tax base. Beverly Hills spent twice as much per pupil and maintained a tax rate that was less than half that in Baldwin Park.

The suit charged that the obvious disparities in expenditure between school districts in the state, violated the equal protection clauses of the United States and California Constitutions. While the trial court dismissed the case, it was soon appealed to the California Supreme Court. On August 30, 1971 the high court handed down a decision which has become a landmark among school finance cases. It held that the finance system in California:

> ...invidiously discriminates against the poor because it makes the quality of a child's education a function of the wealth of his parents and neighbors. Recognizing as we must that the right to an education in our public schools is a fundamental interest which cannot be

> conditioned on wealth, we can discern no compelling state purpose necessitating the present method of finance. (Serrano v. Priest, 1971, p. 1241)

The court determined that education was a "fundamental interest" and the state finance system "classified" school districts on the basis of wealth. As a consequence of these findings, the court applied the test of strict scrutiny to the funding plan and required the state to demonstrate a "compelling interest" in creating such a system which makes a child's education dependent on the wealth of his local school district. The state responded that a substantial local responsibility for financing education is necessary to strengthen and encourage local responsibility for control of public education. The court rejected this argument, stating in part: "Far from being necessary to promote local fiscal choice, the present financing system actually deprives the less wealthy districts of that option" (Serrano v. Priest, 1971).

In Serrano, the California high court looked past the previous United States Supreme Court rulings in McInnis (1968) and Burruss (1969) and established a new standard. According to Hogan (1985):

> The most significant aspect of the Serrano v. Priest (1971) decision...has been the adoption of the new equal protection standard as a sort of protective canopy thrown over education. School policy and practices, all of which obviously touch upon this fundamental interest, would be subject to active court intervention--strict scrutiny and the compelling purpose doctrine--whenever they are challenged in court (p. 55).

Without the acceptance of education as a "fundamental interest" or wealth as "suspect classification", a court must presume that the state legislation is constitutional and apply the more lenient test which requires the state to simply demonstrate some "rational relationship" between the finance statute and a legitimate state purpose. The success or failure of nearly all subsequent school finance cases has depended on the determination of these factors.

In October 1971, just six weeks after the Serrano decision, a Minnesota federal district court accepted the California arguments with approval, ruling that pupils in publicly financed schools enjoy a right under the equal protection clause of the Fourteenth Amendment. The court concluded "that such a right indeed exists and that the principle announced in Serrano v. Priest is correct" (Van Dusartz v. Hatfield, 1971).

On December 23, 1971, a three judge federal district court declared the Texas school finance plan to be unconstitutional. Rodriguez v. San Antonio Independent School District was originally filed in 1970 by three urban school districts against the Texas Board of Education and the State Commissioner of Education to challenge the state system of allocating funds for education. The case was based on the assertion that underassessment in many rural school districts resulted in the allocation of a disproportionate share of state funds going to these rural districts. Disparities in tax rates and per pupil expenditures were essentially the same as those challenged in Serrano. According to Guthrie (1980), if there were any differences it was that the Texas situation was characterized by even greater inequalities (p. 18). A significant difference, however, was that the Texas plaintiffs grounded

their arguments exclusively in the U.S. Constitution and their case was heard in a federal district court. While the initial decision was favorable, the appeal decision rendered by the U.S. Supreme Court, threatened to halt the entire reform movement which was so encouraged by the Serrano decision.

On March 21, 1973, the U.S. Supreme Court concluded that the Texas school finance scheme, with its wide revenue disparities resulting from primary reliance on property taxes, did not violate the federal equal protection guarantees. Ruling that education is not a fundamental right and that a classification system based on property wealth is not "suspect". The Court required only a "rational basis" for the Texas finance system. It reasoned that the state school support system was rationally related to a legitimate governmental goal which was the preservation of local control. Further, the Court asserted that the plaintiffs were not a suitable class since they were not uniformly poor, nor members of one racial group, nor from a specific geographic area. They, also questioned whether students in low wealth districts were actually being harmed as a consequence of the funding disparities.

In addition to these concerns, the majority felt that the Texas Minimum Foundation School Program provided an acceptable means to achieve the goal of assuring "an adequate minimum educational offering in every school in the state". The Texas school finance system resulted in 50 percent of the cost being paid by the state, the federal government contributed 10 percent and the local districts funded the remaining 40 percent (1973, p. 45).

It is important to note that the Court was narrowly divided in its decision, five to four, and for the first time the question of an

"adequate" educational program was emphasized rather than reliance on a more traditional equity standard. The objective of any state school finance plan, under the majorities view in Rodriguez, would be to provide an "adequate minimum educational offering", thereby "assuring a basic education" for every child in the state (pp. 45-49). The test of this standard would be that each child was afforded "an opportunity to acquire the basic minimal skills" necessary to exercise the basic rights of citizenship. According to Wise, the objective of school finance plans, after Rodriguez, is no longer equal educational opportunity or even equal educational expenditures but rather "the provision of a minimally adequate education as judged by an outcome standard" (1983, p. 301).

This aspect of Rodriguez, coupled with the rejection of federal constitutional protection, dealt a serious setback to school finance reform. While Rodriguez has been characterized as a disaster for the school finance movement (Guthrie, 1980, p. 18), the practical result has merely been to shift the spotlight for subsequent litigation back to the state courts.

On January 19, 1972, the Superior Court of New Jersey in Robinson v. Cahill ruled that education was indeed a "fundamental interest" and the New Jersey system of financing public schools violated the equal protection clause of both the state and federal constitutions (1972, p. 214). On appeal, however, the supreme court of New Jersey, possibly due to Rodriguez, affirmed the lower court ruling but did so only on the basis of the education provision of the state constitution. The court refused to support the equal protection argument saying:

We hesitate to turn this case upon the State equal

> protection clause. The reason is that the equal protection clause may be unmanageable if it is called upon to supply categorical answers in the vast area of human needs, choosing those which must be met and a single basis upon which the state must act (1973, p. 283).

Instead, the court interpreted the state constitutional provision mandating the establishment of a "thorough and efficient system of free public schools" as placing an obligation on the state legislature to provide educational opportunities to equip children for citizenship and employment in contemporary society. Noting that the legislature had never defined the content of the educational program necessary to attain such goals, the court stated that this must be done so that the scope of the obligation would be apparent "in some discernible way" (1973, p. 295).

The court declined to specifically define the educational opportunity required, but suggested that equalization of expenditures among school districts was a prerequisite. It, also, focused on dollar inputs in New Jersey because in its words "...the quality of educational opportunity does depend in substantial measure upon the number of dollars invested" (1973, p. 277). In New Jersey, at the time, the local school districts contributed 67 percent of the total cost of education while the state contributed only 28 percent. The court made it clear, however, that absolute dollar equality was not required by the constitution, and that the state may wish to recognize differences in area costs or in the specific needs of students (1973, pp. 297-298).

In subsequent litigation, the State Supreme Court was called upon to monitor legislative efforts to comply with its 1973 decision. Increasingly, the court began to address the issue of adequacy in educational opportunities rather than equity in resource distribution. In Robinson II (June, 1973) and Robinson III (May, 1975), the Court initially refused to disturb the statute and then, reluctantly, granted a provisional remedy for the 1976-77 school year. In 1976, the Supreme Court in Robinson V, assessed the constitutionality of the Public Education Act of 1975 which the legislature had enacted in response to Robinson I. The Act specified the elements of a "thorough and efficient" system of public education, including provisions for adequate instruction in basic skills and creative arts, support services for special need students, adequate facilities, qualified professional personnel and efficient administrative procedures. The Supreme Court held that the Act was "in all respects constitutional on its face, assuming it is fully funded" (1976, p. 129).

Within a year, however, the court enjoined public officials from expending any funds for the schools as a result of the legislature's failure to provide adequate funds for the 1975 Act (Robinson v. Cahill VI, 1976). After just one week the schools reopened due to the adoption by the legislature of a state income tax to support the Act.

A detailed review of the New Jersey school finance litigation by McCarthy and Deignan concluded that:

> Between 1973 and 1976 the New Jersey Supreme Court appeared to shift its major concern from equity in fiscal resources to adequacy in educational programs measured by student performance in basic skills...

> The New Jersey Supreme Court indicated that as long as the state assures that all districts satisfy the thorough and efficient standard (i.e, student mastery of basic skills necessary for citizenship and employment), provision for some local leeway in funding additional programs is constitutionally permissible. Thus equalization of educational expenditures within the state, although the focus of the original Robinson suit, has not been judicially required. (p. 18, 1982)

Recent School Finance Litigation

The judicial focus on achieving equity in school revenues and expenditures which was secured in Serrano, continues to be a recurring element in recent school finance litigation. The additional interest in educational adequacy as manifested in concern for the sufficiency of funding and program outcomes has evolved as a legitimate judicial approach. Litigation brought since the mid 1970s has generally proceeded along one or both of these patterns. The number of cases has not been reduced as a consequence of Rodriguez. Reviews by the School Finance Project of the Lawyers' Committee for Civil Rights Under the Law indicate that since Rodriguez in 1973, there have been more than 36 cases filed in 33 different states challenging the state finance system. The emphasis continues to be placed on state constitutional grounds pertaining to equal protection, the education provision or both.

In the state of Washington the school finance plan withstood a challenge in 1974 when the state Supreme Court held that the finance system was a "proper" and "pragmatic" method of discharging the state's

duty to educate the children within its borders. They found no evidence of a violation of equal protection guarantees (Northshore v. Kinnear, 1974, p. 178).

Four years later, however, the state's use of property taxes to generate educational revenue was contested and the same high court changed its interpretation of the education provision of the Constitution. The court declared in Seattle School District No. 1 of King County v. State that each student has a constitutional right to "an adequately funded basic educational program" (1978, pp. 92-95). The Court, further selected three available definitions to use in assessing the adequacy of the state school finance plan in the absence of a legislative definition.

> Basic education or basic program of education, as required could be defined as:
>
> 1) one that satisfies state law and regulations pertaining to minimum school inputs; (i.e., staff ratios, salary expenses, teacher qualifications, prescribed courses, etc.)
>
> 2) one which meets the state accreditation standards, and
>
> 3) one which meets a standard of the "collective wisdom" of educators, school boards, and parents throughout the state. (1978, p. 102-103)

In this last instance the Court explained the validity of such a standard by stating:

> In the absence of scientific proof to conclusively demonstrate a relationship between educational "quantitative inputs" and "qualitative outputs", this

> approach seeks to provide standards for needed educational resources by focusing upon the theoretical "normal range ability" student as determined by the collective experience of local educators, school boards, and parents. (1978, p. 103)

The Court held that irrespective of the definition used, the state's provision of funds to Seattle was insufficient. Compliance with the education article of the state constitution could be achieved "only if sufficient funds are derived, through dependable and regular tax sources, to permit school districts to provide "basic education" through a program of education in a "general and uniform system of public schools" (1978, p. 97).

During the latter half of the 1970s, there were a number of state courts which used portions of the Rodriguez decision to uphold the state finance system against claims that it violated state equal protection provisions. In Olsen v. State of Oregon (1976), the high court ruled that education was not a fundamental state right and that the existing public school finance system was related to a legitimate state purpose of furthering local fiscal control. The court stated that "the represent financing system does not totally deprive the children of the poorest district in Oregon (meaning the lowest value of property per pupil) of an education or of the use of some of the tools and programs believed to enhance education" (1976, p. 145). The state constitution is complied with if the state provides for "a minimum of educational opportunities in the districts and permits the "districts to exercise local control over what they desire and can furnish over the minimum" (1976, p. 148).

In Board of Education City of Cincinnati v. Walter (1979), a class action was brought declaring that the Ohio system of public school finance violated the Ohio Constitution. The trial court and the appeals court each held that the statutory plan violated the equal protection clause of the constitution. The State Supreme Court, however, ruled that: (1) the appropriate standard for determining the equal protection claim was the traditional rational basis test; (2) the objective of promoting local fiscal control and decision-making was a rational basis sufficient to withstand the equal protection challenge, and (3) the system for financing public education did not violate the state constitution provision which requires a thorough and efficient system of common schools.

Representing a different view, Justice Locher expressed a vigorous dissenting opinion by stating in part:

> The American Dream is thwarted by the archaic and unconstitutional statutory system of financing elementary and secondary education. Evidence abounds that Ohio's beleagured schools are overwhelmed by problems of such magnitude that the basic needs of pupils go unfulfilled. The majority opinion flies square in the face of reality, not to mention the findings of fact and legal conclusions of the trial court and the Court of Appeals (1979, p. 827).

In Pennsylvania, parents from the Philadelphia school district brought suit against the state officials alleging that the funding system of the state violated the constitution. The trial court

dismissed the case and the state Supreme Court affirmed this decision. Finding no legal harm suffered by the school district or students and questioning the application of the denial of "a normal program of educational services" as charged rather than an "adequate or basic education", the Court ruled the allegation insufficient to state a justiciable cause of action. The Court reasoned that the "thorough and efficient" mandate in the state constitution contains no requirement that educational offerings be uniform. In fact, the framers of the constitution considered and rejected such a possibility. The rational basis of the legislation was once again the "concept of local control to meet diverse local needs" (Danson v. Casey, 1979, p. 367).

The Levittown v. Nyquist case in New York State, according to Odden (1981), serves as an example of the evolution of school finance litigation in the 1980s. Levittown is based on alleged violations of the state equal protection clause and the federal equal protection clause. It is unique, however, from previous cases because it encompasses a comprehensive set of school finance issues never combined before in one case. It includes both the Serrano equal opportunity argument and the following additional issues: (1) special pupil populations and the necessity of the system to be sensitive to pupil needs; (2) cost variations and the rationale for the formula to adjust for the varying purchasing power of the educational dollar across school districts and regions, (3) municipal overburden and the need for finance systems to adjust for the impact on education on unusually high demands for non-educational expenditures, and (4) attendance overburden which recognizes the fact that the use of an attendance based pupil count

disadvantages school districts with low attendance to membership ratios (Odden, 1981, p. 6).

The plaintiffs had based their claim on state and federal equal protection guarantees and the state constitution's education clause. The trial, before the State Court of Appeals, spanned 122 days, produced over 20,000 pages of transcripts, and included testimony from 128 witnesses. The original 27 school districts and students were soon joined by four of New York's largest city school districts as intervenor plaintiffs.

The lower courts held that the New York finance scheme violated the equal protection guarantees and the state constitutional mandate. The courts rejected the state's contention that the preservation of local control justified the finance scheme. The appellate court declared that the freedom of choice in delivering desired educational programs was more illusory than real (1981, p. 859).

In addition to the argument of unequal expenditure levels, the urban plaintiffs successfully claimed that they were dependent upon local governments for educational funds and as such were disadvantaged because they had to compete for fiscal resources from a tax base used to finance a variety of municipal services. They, also, pointed out that the state funding system did not reflect the differences in local revenue raising ability per pupil and the special costs associated with educating large concentrations of special need educationally disadvantaged students in urban areas. The appellate court reviewed data which showed that New York City had 47% of the state's pupils with special educational needs, although it had only 31% of the public school

population and received only 26% of the state's education operating aid. (1981, p. 851)

The New York Court of Appeals (1982) chose not to break new ground in the school finance arena and instead closely followed the reasoning of the U.S. Supreme Court in Rodriguez (1973). Rejecting both the original plaintiff's and intervenor's claims, the Court reasoned that the state was required merely to satisfy the rational basis equal protection test. Under this basis, the Court found that "the preservation and promotion of local control of education...is both a legitimate state interest and one to which the present financing system is reasonably related" (1982, p. 651).

The high court ruled that equal protection guarantees can be satisfied as long as a minimally adequate education is being provided for all children. Specifically it stated:

> Interpreting the term education, as we do, to connote a sound basic education, we have no difficulty in determining that the constitutional requirement is being met in this State, in which it is said without contradiction that the average per pupil expenditure exceeds that in all other States but two. (1982, p. 653)

The Court also rejected the cities contention that competition for tax dollars created an unequalizing force which must be remedied. The Court stated that:

> While unquestionably education forces competition in the contest for municipal dollars from other forms of public services for which nonmunicipal school districts bear no responsibility, municipal dollars flow into the cities

> treasuries from sources other than simply real property taxes--sources similarly not available to nonmunicipal school districts. (1982, p. 649)

The Court, in finding no violation of the state education provision, cited that there is no requirement that education be made available on an "equal or substantially equivalent" basis in every school district (1982, p. 652). Accordingly, the Court deferred to the legislature for the specific decisions on the allocation of dollars in the absence, in its words, "of gross and glaring inadequacy--something not shown to exist in consequence of the present school finance system" (1982, p. 653).

In rapid succession after Levittown, comparable decisions were rendered in Colorado, Lujan v. Colorado State Board of Education (May, 1982), and Maryland, Hornbeck v. Somerset County Board of Education (April, 1983). In both instances, lower courts held the school finance system violated the state constitution with respect to the education provision requiring a thorough and uniform system of public education. The highest court in each state ruled, however, that there were no requirements for absolute equality and as long as there is the provision of an opportunity for each child to obtain a basic education, there is no constitutional violation.

While the cases in Oregon, Ohio, Pennsylvania, and New York, all follow similar lines of reasoning as established in Rodriguez, there were other state courts during this period which upheld the rationale applied in Serrano and Robinson. In Wyoming, West Virginia, Connecticut, and Arkansas successful challenges were made to existing school finance systems which discriminated on the basis of wealth.

In West Virginia, Pauley v. Kelly (1979) was heard by the Supreme Court of Appeals and on February 20, 1979, the court reversed a trial court decision to dismiss and ruled that the state public school finance plan may very well be in violation of the "thorough and efficient" mandate of the state constitution. The court found education to be a fundamental right and ruled that any discriminatory classification caused by the financing plan could not stand unless justified by a compelling state interest. The lower court upon rehearing the case, found the finance system in violation of both the "thorough and efficient" provision and the equal protection provision of the constitution. It eventually ordered the state to prepare a master plan to bring the public schools into conformity with the constitution.

On January 15, 1980, the Wyoming Supreme Court held that its school finance system, based principally upon local property taxes, was unconstitutional in that it failed to afford equal protection guarantees. The court majority declared that "it is nothing more than an illusion to believe that the extensive disparity in financial resources does not relate directly to the quality of education" (Washakie County School District No. 1 v. Herschler, 1980, p. 334).

The court, in finding the existing finance system in violation of the Constitution, was careful not to direct the legislature in specific terms. It invoked the fiscal neutrality standard when it stated:

> We only express the constitutional standard and hold that whatever system is adopted by the legislature, it must not create a level of spending which is a function of wealth other than wealth of the state as a whole. (1980, p. 336)

Additionally, the court made it clear, that while fiscal neutrality must be present, absolute equality is not required. Here, they stated:

> So that there may be no question about this, we wish to make clear that we are not suggesting that each school district receive exactly the same number of dollars per pupil as every other district. A state formula can be devised which will weight the calculation to compensate for special needs--educational cost differentials. There must be allowances for variances in individuals, groups and local conditions. (1980, p. 336)

In 1977, the Connecticut Supreme Court affirmed the decision of a lower court in Horton v. Meskill (1977) and ruled its school finance plan unconstitutional. The funding scheme was dependent on local property taxes and failed to comply with state equal protection guarantees as well as the education provision which required "appropriate" legislation regarding the provision of education. The trail court acknowledged that evidence is inconclusive as to whether increased expenditure per pupil produces better students, but reasoned that the evidence was "highly persuasive". The court concluded that "...disparities in expenditure per pupil tend to result in disparities in educational opportunity" (1974), p. 118). The Supreme Court retained jurisdiction while the General Assembly was afforded an opportunity to take responsive legislative action. In 1979 the Assembly enacted, and in subsequent years amended a plan intended to achieve equity in school finance (1977, p. 355).

In Arkansas, the Supreme Court in May of 1983, took the opposite view in Dupree v. Alma School District No. 30, holding that the state finance system was unconstitutional in that it denied equal protection and suitably efficient and equal educational opportunities to property poor school districts and individual students. Citing Robinson v. Cahill (1973) the Court stated:

> There is no sound basis for holding the equal protection clause inapplicable to the facts in this case. ...we find no legitimate state purpose to support the system. It bears no rational relationship to the educational needs of the individual districts, rather it is determined primarily by the tax base of each district... Such a system only promotes greater opportunities for the advantaged while diminishing the opportunities for the disadvantaged. (1983, p. 93)

In addressing the issue of minimally adequate education the court stated the following:

> ...even where the complaining districts were shown to meet the bare requirements of educational offerings, that is not what the constitution demands. For some districts to supply the barest necessities and others to have programs generously endowed does not meet the requirements of the constitution. Bare and minimal sufficiency does not translate into equal educational opportunity. (1983, p. 93)

School finance reform litigation continues to be waged in New Jersey, where Abbott v. Burke (1984) alleges that the per pupil spending disparities have increased in spite of new education legislation upheld by the Supreme Court in 1976. In New Hampshire, the Supreme Court in Jesseman v. New Hampshire (1984) returned to the superior court a challenge to the state funding system. The court noted the absence of evidence on the cost-quality issue as well as the size and scope of the record warranted returning the case for further lower court consideration.

Texas, in another case of recurring challenges to previously tried school finance systems, has again been sued because of its school finance system. Seven property-poor school districts seek a declaratory judgement that the law is unconstitutional, an injunction against the operation of an illegal finance plan, and attorney's fees and other costs. The case, Edgewood Independent School District v. Bynum (1984) was filed on May 23, 1984. During the summer of 1984, the Texas Legislature met in special session to consider major school reform legislation as proposed by the Governor's Select Committee on Public Education. The case may be continued until the effects of this legislation can be determined.

Summary of Legal Review

In concluding a nearly twenty-year review of school finance litigation, the unmistakable impression is that the conflict between egalitarian and libertarian principles continues. Within the context of this struggle, the courts have played a considerable role. Rist and Anson discuss the shift of policy determination away from the political insti-

tutions and towards the judiciary as a failure of traditional centers of decision-making. This failure, in their words, "is essentially one of not being able to achieve a political or ethical consensus about the most appropriate course to follow...and while the political vacuum remains, decisions must be made. So enter the courts (1977, p. viii).

School finance litigation, initiated in the late 1960s and continuing through the present, has challenged state systems of distributing funds for elementary and secondary education. While not all challenges have been successful in overturning the statutory systems, such litigation and the fear of judicial intervention has often helped to break the political deadlock preserving the status quo and perpetuating traditional methods of school finance (Grubb and Michelson, 1974, p. 161).

Alexander, Connelly and Salmon (1984) conducted a thorough review of school finance litigation during the reform era and concluded the following:

(1) Since 1968, there has been considerable litigation concerning the equity of school finance within the states;

(2) since the Rodriguez decision in Texas, high courts in six states, New Jersey, California, Connecticut, Wyoming, Washington, and Arkansas, have held that their school funding systems are unconstitutional;

(3) since the Rodriguez decision, high courts in six states, Ohio, Pennsylvania, Georgia, Colorado, New York, and Michigan, have upheld the constitutionality of the funding systems;

(4) in most instances, the basis or rationale for these decisions has varied;

(5) and, the trend for the future seems to be to favor a more conservative era where courts will uphold the state financing systems. (1984, pp. 135-149)

T. H. Jones (1985) has recently suggested a similar shift away from judicial activism by state courts, however, he also states that reconciling differing state decisions is not possible. All that can be concluded is that state courts tend to act independently of one another in addressing equalization issues (p. 192).

One might speculate that because of the nature of the strongly held values which constitute this struggle between equity and local autonomy, there is little chance of accurate forecasting. The two guideposts of Serrano and Rodriguez do remain, however, and the standards of state constitutions provide a credible point of reference. The state constitutions and their individual provisions for equal protection and educational rights will become the backdrop for the educational finance laws and resulting patterns of per pupil educational expenditures. Individual state circumstances will predict individual state results.

As this chapter is completed, the school finance landscape is, once again, changing. A state district court judge in Travis County, Texas, has issued a decision which holds that the state is in violation of its own constitution for failing to eliminate widespread financial disparities among its 1,063 school districts. The facts of this case appear to be identical to those of Rodriguez presented almost 15 years ago. Judge Harley Clark, in an opinion issued on April 29, 1987, cited the following conclusions:

> I hold that under our state constitution education is a fundamental right for each of our citizens...
>
> The Court does not detect in the evidence or the law a compelling reason or objective that would justify continuation of this discrimination...
>
> The facts I have recited and found indicated that our financial system, which includes the combination of state and local funds as they currently act in tandem, do not yet meet the requirements of our constitution.
>
> With all due respect to history and to the legislature for its recent generous and thoughtful efforts to rectify this situation, by order of this Court the current system will be set aside. (Edgewood Independent School District, et al. v. Kirby, et al., 1987, pp. 2-5)

A most interesting and poignant prologue to this decision effectively describes the importance of all such judgments:

> They cannot vote yet; they are yet incompletely educated and quite inexperienced. Many are only beginning to learn to read and write. They are still wet and stand upon wobbly legs. They know not the way, so we must lead them. They know not how, so we must show them. (1984, p. 1)

Virginia School Finance Reform

Throughout the nation much of the attention afforded to public school finance has been generated by legal action challenging the constitutionality of state aid distribution systems. Whereas the

proliferation of such litigation has brought mixed results, public school finance reform during the seventies has received an unprecedented level of attention. Odden and Augenblick (1981) suggest that "one of the lasting results of the [reform] actions in the 1970s has been the 'maturing' of public school finance as one of the most visible public policy issues at the state level" (p. 6).

Certainly in Virginia this has been true ever since Burrus v. Wilkerson (1969) challenged the school finance system under the education provision of the Virginia Constitution and the 14th Amendment to the United States Constitution. Burruss was one of the first fiscal equalization cases in the nation and, although it was unsuccessful, it did influence changes in both the Virginia constitution and the distribution formula.

The changes began while Burruss was still at trial. In January of 1968, Governor Mills E. Goodwin addressed the Virginia General Assembly and asked for the authority to appoint a commission to study constitutional revision. The legislature promptly agreed and passed the necessary resolution providing for the appointment of the Commission on Constitutional Revision.

Once appointed, the Commission divided itself into five subcommittees which held hearings throughout the state, reviewed research memoranda and submitted a report to the Governor and the General Assembly in January of 1969. The legislature reviewed and amended the revisions during the course of two legislative sessions in 1969 and in 1970. In November of 1970, the new Constitution was overwhelmingly approved by 72 percent of the voters. The new document became effective on July 1, 1971.

The education provisions in the new constitution were promoted in the public relations campaign prior to the election as one of the primary accomplishments of the revisions (Howard, 1971, p. 885). While there was growing national attention given to the subject, school finance reform could not be considered a pressing concern at the time. Indeed, further consideration of constitutional revision might not have seemed necessary had it not been for the conflict over racial segregation which had raged in Virginia during the preceding years. In 1954, a Prince Edward County, Virginia, desegregation challenge concerning the state constitution was consolidated with three other cases and decided by the U.S. Supreme Court as Brown v. Board of Education (1954). The high court ruled that racial segregation, as required in the Virginia Constitution, was "inherently unequal" and therefore in violation of the Fourteenth Amendment (Brown, 1954, p. 483).

For nearly fifteen years, Virginia through her elected officials tried to thwart the effects of this decision and the results of these efforts were certainly a concern for the Commission. In its final report the Commission referenced this conflict in commitment for education and the importance of constitutional protections for public schools. It also made mention of problems of rising costs in education, the inefficiency of many rural school districts, a growing state responsibility for education, a lack of adequate state assistance in rural areas, and a lack of adequate local support as additional problems facing the public schools (The Report, 1969, pp. 254-255).

1971 Constitutional Revisions

The Commission recommendations, which were approved with minor

changes, provided a far stronger commitment to public education in Virginia. The approved revisions in the Bill of Rights and Sections 1. and 2. of the Education Article are included in Table 2. These changes represent the most significant education revisions because they concern individual rights and the provision of education in the Commonwealth.

Table 2

1971

Constitutional Revisions

Education Provisions

The following sections from the Constitution of Virginia (1971) are the education provisions which establish: its fundamental value; the state's commitment; the Standards of Quality; and the system of financing public education in Virginia.

Article I

Bill of Rights

Section 15. Qualities necessary to preservation of free government.

That free government rests, as does all progress, upon the broadest possible diffusion of knowledge and that the Commonwealth should avail itself of those talents which nature has sown so liberally among its people by assuring the opportunity for their fullest development by an effective system of education throughout the Commonwealth.

Article VIII

Education

Section 1. Public schools of high quality to be maintained.

The General Assembly shall provide for a system of free public elementary and secondary schools for all children of school age throughout the Commonwealth, and shall seek to ensure that an educational program of high quality is established and continually maintained.

Section 2. Standards of quality; State and local support of public schools.

Standards of quality for the several school divisions shall be determined and prescribed from time to time by the Board of Education, subject to revision only by the General Assembly.

The General Assembly shall determine the manner in which funds are to be provided for the cost of maintaining an educational program meeting the prescribed standards of quality, and shall provide for the apportionment of the cost of such program between the Commonwealth and the local units of government comprising such school divisions. Each unit of local government shall provide its portion of such cost by local taxes or from other available funds.

Article I, Section 15. of the Bill of Rights was changed to include Jefferson's famous language which recognizes the importance of assuring to all people the opportunity of an effective education.

Howard, executive director of the Commission and noted constitutional scholar, has written that with this revisions, "Education thus takes its place alongside such fundamentals as free exercise of religion and freedom of expression as one of the values basic to Virginians" (1974, p. 886). In the course of the legislative debates on this section, Senator Bateman further explained the spirit of this addition when he said, "there are certain minimums in this day and time that every child should be able to expect as his right, as we are proposing to say in the new Bill of Rights" (In Howard, 1974, p. 286).

Article VIII Section 1. and 2. carry out the promise of the Bill of Rights and make explicit the commitment of the state. Together, they require the establishment of a statewide system of free public schools, open to all children, and one which has as its goal a program of high quality. The strength of the commitment is emphasized in Section 2. where provision is made for the development of standards of quality and the funding of the resultant program.

Section 2. places a duty on both the localities and the General Assembly. Each locality must raise their assigned share according to their ability and the General Assembly must ensure that the local and state funds combined are sufficient to meet the prescribed Standards of Quality. The sufficiency of the established cost of the Standards and the method of apportionment become key elements in the responsibilities of the General Assembly.

The strengthened commitment to education, embodied in the spirit of the education article, is largely dependent on the actions of the General Assembly to determine appropriate standards and to ensure that

adequate funds are available to accomplish them. According to Howard:

> Indeed, the Constitution focuses particular responsibility on the legislative process by assigning to the General Assembly the twin task of being ultimately responsible for standards of educational quality in Virginia and of deciding what money should be raised, and by whom, to meet those standards. (1974, p. 885)

The approval by the voters in 1971 of these education provisions of the Constitution, created a firm expectation for the establishment and maintenance of quality public education. The attainment of this goal, after fifteen years, remains a matter of perspective.

The Revised Funding Plan

In October of 1972, Governor Linwood Holton established the Task Force on Funding the Standards of Quality. The Task Force was given the job of developing a procedure for estimating the cost of the Standards of Quality for the 1974-74 biennium and a method of distributing the costs among the localities according to their ability to pay. The Task Force submitted an initial report in December of 1972 suggesting short term supplemental funding for the 1973-74 school year and the following structural procedures and guidelines implied by the Constitution:

Procedures

(1) The Board of Education establishes the Standards of Quality.

(2) The General Assembly may revise the Standards established by the Board.

(3) The General Assembly must establish the cost of implementing the Standards of Quality.

(4) The General Assembly must establish the fair share of the cost to be borne by the local school divisions.

(5) The General Assembly must fund the remaining portion of the cost.

Guidelines

(1) The Standards of Quality must be realistic in relation to current educational practice.

(2) The estimate of the cost of the Standards of Quality must be realistic in relation to current costs of education.

(3) The local share of the cost of implementing the Standards of Quality must be based on local ability to pay. (Report of Task Force, 1972, p. 6)

In January 1973, during the regular session of the General Assembly, the Attorney General reinforced the Task Force's findings by issuing an opinion which also interpreted the new provisions of the Constitution. He declared, in part, that the Standards "cannot be prescribed in a vacuum" and the General Assembly "must take into account the actual cost of education rather than developing cost estimates based on arbitrary figures bearing no relationship to the actual expense of education prevailing in the Commonwealth" (Attorney General Opinions, 1973, pp. 351-352).

Up to this point, the General Assembly had used the Basic School Aid Formula for both establishing and apportioning the cost of the educational program. This formula used a minimum teacher salary scale

and a fixed pupil teacher ratio in determining the appropriate amount of state aid to each locality. Because in 1973, every school division in Virginia exceeded the minimum state salary scale and all but one division had a lower pupil-teacher ratio, the Attorney General concluded that the 1973 Basic School Aid Formula did not reflect current educational practice and the General Assembly's use of it as a guide in funding the Standards of Quality did not conform with Section 2. of the new constitution (Attorney General Opinions, 1973, p. 352).

In addition to the problems of accurate cost estimates, the Attorney General noted the lack of the current system either to ensure that each locality had the funds to meet the established cost, or make adjustments for the differences in wealth among school divisions. He specifically noted the existing six to one discrepancy in wealth among Virginia's cities and counties (1973, p. 352).

Standards of Quality

At the request of Governor Holton, The Task Force went back to work, after the conclusion of the 1973 General Assembly, and further refined the concepts in its initial report. In July of 1973, a second report was made to the Governor which recommended general procedures for establishing and revising the Standards of Quality. The second report, also, recommended a method for establishing the cost of these standards and apportioning the cost among the state and individual localities.

Under the proposed formula, the cost of funding the Standards of Quality would be established on the basis of a per pupil expenditure derived from an established personnel standard and a statewide average

salary figure. The local share of this cost depends on a localities "ability to pay" as measured by a sophisticated index of wealth which includes true value of real estate, personal income and sales tax revenue for each locality. This wealth index is called the Local Composite Index (LCI). In the average wealth locality the index of LCI will be .5000 and as a consequence, 50 percent of the established cost of the Standards of Quality would be paid by the locality and 50 percent would be paid by the state. This new approach and the procedures recommended by the Task Force were generally accepted by the General Assembly in 1974 and included in the 1974-76 biennial budget (Second Task Force Report, 1973, pp. 9-14).

There was one key adjustment made by the General Assembly which deviated from the Task Force recommendations. The new formula was partially based on actual average salaries, but it was also dependent on the setting of a personnel standard that was realistic in terms of the requirements of the Standards of Quality. The Task Force recommended a personnel standard of 50 instructional personnel per 1000 students but th legislature reduced this to 48 positions and maintained this standard level for the next eight years despite numerous changes in the Standards of Quality. The new school aid system was implemented in the 1974-75 school year and has remained virtually unchanged through the 1984-84 school year.

CHAPTER III

METHODOLOGY

Conceptual Framework

To establish a conceptual framework for the study, certain parameters were specified. Berne and Stiefel have developed four questions which serve to focus such investigations. They are:

1. Who? What is the makeup of the groups for which school finance systems should be equitable?

2. What? What services, resources, or, more generally, objects should be distributed fairly among members of the groups?

3. How? What principles should be used to determine whether a particular distribution is equitable?

4. How Much? What quantitative measures should be used to assess the degree of equity? (1984, p. 7)

The first question poses a dilemma because all previous studies of school finance in Virginia and all legislative and executive department reports have been prepared with the school division as the unit of analysis. Under this approach, the state's school finance plan is assessed as a distribution of equal school divisions. Despite this precedence, pupils represent a compelling alternative. They are the primary consumer of education and they are the subject of the education

providions of the Virginia Constitution and Bill of Rights. In addition, as Berne and Stiefel have noted, the school division method disregards the relative size of each division and treats each division as if it had the same number of pupils (1984, p. 51).

The pupil unit of analysis differs from the school division method by assuming that the state's school finance system is made up of a distribution of pupils. Although data on variables such as operating expenditures are only available at the school division level, each pupil is assigned the average per-pupil dollar value. Thus, the difference between the units of analysis centers on the way the data are analyzed, not on the availability of data.

The importance of the unit of analysis should not be minimized. The conclusions and the actual values of nearly all equity measures are significantly influenced by this choice. In fact, the only instance when an equity analysis is not affected by the choice of the unit of analysis is when all school divisions have the same number of pupils.

The selection of the unit of analysis represents the first of a number of value judgments which cannot be avoided in any equity study. For example, the pupil unit of analysis focuses on the pupils in the state, and divisions that have greater numbers of pupils have a greater influence on the equity assessment compared to smaller divisions. In this approach each pupil receives equal weight. The school division unit of analysis ignores school division size and assigns an equal weight to each division in the state. This, of course, implies that each pupil in the larger divisions have relatively smaller influence on the equity measurement than each pupil in the smaller school divisions.

In the interest of objectivity and a desire to demonstrate the imperical differences in the selection of a unit of analysis, this study was conducted by using both the school division and the pupil unit of analyses, wherever possible. Results are presented in tables differentiated by unweighted, or school division unit comparisons, and weighted, or pupil unit comparisons. In addition to providing evidence as to the difference in these two methods, the results will provide a historical link with the previous school division studies as well as a new body of data concerning pupil equity in Virginia.

The second decision in limiting the substance of the study is to determine what objects should be distributed equitably? Again Berne and Stiefel (1984) have identified three categories of objects related to students: inputs, outputs, and outcomes. Each of these represent different value judgments and involve unique measurement problems. Inputs are the educational resources which combine to educate children in schools. Typically, in school finance research these inputs are represented in dollar values rather than actual physical resources such as books, equipment or teachers. Any of these, however, could be used as input measures. Output measures, on the otherhand, are the results of education, for example, student achievement scores or behavioral measures. Some would argue that it is these output measures that should be equally distributed among pupils. Finally, there are outcome measures which are much longer term results than the immediate results of schooling. This category includes lifetime outcomes such as income, occupational status, and personal satisfaction. Outcome analysis presents some formidable measurement problems (1984, pp. 8-12).

After considering recent judicial rulings throughout the country, previous Virginia school finance studies and the availability of data, the primary educational resources selected for analysis was operating expenditures per-pupil expressed in dollars. Dollars in per-pupil operating expenditures will be limited to those expenditures for regular day school including school food services, adult education, summer school, and other education programs but excluding capital outlay, debt service and refunds. Operating expenditures per-pupil were analyzed in four separate variables: total operating expenditures (TOE), state and local operating expenditures (SLE), state operating expenditures (SOE), and local operating expenditures (LOE). These separate portions of the analysis of expenditures allow an examination of the effects of the individual components. Also, average teacher salary (ATS) was used as an input dollar index in selected analyses.

In addition to dollars, the allocation of instructional personnel per 1000 students (IPS) was used to analyze inter-division equity. As an output measure, eleventh grade achievement scores on a standardized reading test (RAS) was used in selected measures of equity.

Measures of the percentage of handicapped, vocational, economically disadvantaged pupils, and a composite of all three categories of special need pupils were used in selected measures of vertical equity. And, finally, per-pupil property values of real estate and public service corporations, the Virginia Local Composite Index and true tax rates for each school division were analyzed as measures of school division wealth and effort, respectively.

Principles

The third consideration in studies of educational equity is the decision concerning which principles of equity should be analyzed. Traditionally, the principles chosen have been those concerning horizontal equity and equal opportunity. These analyses were repeated but also extended in the investigation by examining vertical equity and an expanded analysis of equity and adequacy of resources for different types of school divisions in Virginia. An explanation of the three key principles involved in the study follows:

(1) Horizontal Equity (equal treatment of equals) - This principle holds that students who are alike should receive equal shares of the input objects of education. Equity is determined by measuring the dispersion or inequality in the distribution of resources. In Serrano type cases, excessive disparity in educational expenditures is one of the traditional components of a plaintiff charge of inequity. This has also been the basic principle used in previous studies of Virginia's funding system. An implicit goal of school finance reform in Virginia has been to reduce the differences in expenditure per pupil among school divisions within the state.

While there is an impressive body of research which utilizes this principle of equity, it contains several basic weaknesses. Foremost among these is the assumption that students are like and equal in their educational needs. Variations in student characteristics, legitimate differences in costs, differences in population densities are just some of the reasons why horizontal analyses are only a rough gage of educational equity. Berne and Stiefel (1984) suggest that horizontal equity

criterion "rightfully should be applied, only to subgroups, where equality among children can be agreed upon" (p. 13).

(2) Vertical Equity (unequal treatment of unequals) - While horizontal equity is appropriate when children are alike, the principle of vertical equity recognizes that children are different and emphasizes the affirmative requirement that unequals receive appropriate unequal treatment. This criterion, while extremely important, has been often ignored because of the difficulty in measuring it and the determination of the required level of resources to reach appropriate equity. Despite these problems, new measurement techniques are used to estimate the unequal treatment provided for three groups of students in Virginia: the handicapped, the economically disadvantaged and vocational students.

(3) Equal Opportunity (fiscal neutrality) - In addition to acknowledging differences among students that require unequal treatment, this principle acknowledges that for students to have equal chances to acquire the benefits of education there should not be a relationship between the objects or resources of education and the financial capacity of the school divisions or localities. Primarily school reform efforts have sought to eliminate the relationship between educational revenue or expenditures and local school division wealth. In the study, measures of wealth such as the Virginia's Local Composite Index and the true value of real property are correlated to several standard educational resources to test the principle of equal opportunity. The ideal condition of neutrality, the absence of a linear relationship, is the criterion for equity in equal opportunity.

This principle measures the progress of the current funding system toward its expressed goal of "equalization of educational opportunity throughout the Commonwealth" (Task Force Report, 1973 , p. 13).

Research Design and Statistical Procedures

The nature of the present study was one of describing the results of the education funding policies and practices of the Commonwealth of Virginia over a seven year period, 1979 to 1986. To achieve its basic ideals for education, a state must translate its beliefs and principles into economic terms. An analysis of the economic results of Virginia's public policy towards education was conducted using several accepted principles of educational equity and adequacy. The results of these analyses could become the basis for significant modifications in the current system or renewed commitment to the past goals and funding initiatives. The design of the study was formulated for this purpose.

The basis of the analysis was centered on the three principles of equity, previously discussed, and eleven hypotheses which are related to these principles. An important result of the study was a determination of the effect of increased state funding on the level of equity achieved for school divisions and pupils. To accomplish this goal the various analyses were made at five different points within the seven year period. The five years which were designated were selected because each represent the first year of a new two-year, biennial state budget. Therefore, these years reflect the intended efforts of the legislature to carry-out their own educational policies. The resultant analysis suggests the importance of the relationship between state funding and the proclaimed goal of equity.

The five hypotheses which form the basic design of the study are presented in sequence. Each will be described in conjunction with the appropriate principle and research questions.

Horizontal Equity

In studying the Virginia funding system, it is important to know whether the broad goal of equitable treatment of all children has been accomplished during the last seven years. Additionally, it is important to know whether conditions of fiscal equity have improved as state support has increased. Equal treatment of equals is referred to in the literature as horizontal equity. It is primarily concerned with the equal distribution of educational resources or inputs for all children. Horizontal equity is described as measuring the degree of disparity or inequality which exists in a range of educational objects. Equity is determined by the degree of equality which exists among school divisions and pupils. As previously noted, this is one of two traditional measures of equity that have been recognized by various state and federal courts.

To analyze the degree of horizontal equity in Virginia, the following hypotheses were proposed:

1. The Virginia system of public school finance ensures a high degree of equality in educational resources among all pupils and school divisions in the state.

2. The degree of disparity in educational resources has declined among pupils and school divisions in Virginia between 1979 and 1986.

The evaluation of the hypotheses was accomplished by analyzing the distribution of educational objects in dollars and selected physical

resources among school divisions and pupils of the state at five separate points during the seven year period. The dollar objects were selected to be total operating expenditures excluding capital outlay, debt service and refunds (TOE), combined state and local operating expenditures (SLE), state operating expenditures (SOE), and local operating expenditures (LOE). Consistent with the focus of student equity, each of these dollar objects were converted to a per pupil basis. In addition to expenditure objects, the distribution of average teacher salaries (ATS) and the allocation of instructional personnel per 1000 students (IPS) were analyzed.

The statistical techniques used to test the horizontal equity principle were those that capture the spread or dispersion of the objects in a distribution. Perfect equality or horizontal equity would exist when every pupil or every school division has the same level of educational resources. Four statistical techniques were selected to measure this principle: the simple range, the federal range ratio, the coefficient of variation, and the McLoone Index. Each measure contains different value judgments which significantly effect the equity assessment. Berne and Stiefel conducted extensive hypothetical analyses to determine from among a wide range of horizontal equity measures which measures actually are distinctive and assess unique measures in both hypothetical and actual studies in Michigan, the researchers concluded that

> ...in most instances, there are four empirical groups comprised of the following:
>
> 1. range, restricted range and variance;

2. coefficient of variation, Gini coefficient, Theil's measure, standard deviation of logarithms, and relative mean deviations;
3. federal range ratio;
4. McLoone index. (1984, p. 137)

In the present study, one measure from each of these empirical groupings was selected to represent the unique assessment of each group. Each measure will be described in detail and its inherent values discussed. After each explanation, a precise formula will be illustrated where necessary. Each formula will be presented using the pupil unit of analysis. If the number of pupils in each school division, (Pi), is set equal to one, the formula would be converted to a school division unit of analysis.

The first category of measures will be represented by the simple range. The range is the difference between the highest value in a distribution and the lowest value. The higher the range, the greater the disparity. This measure is relatively insensitive to changes within the distribution. It does, however, respond to constant proportional increases in educational objects throughout the distribution. As a result, the inflationary increases throughout the time comparisons of the study will show increasing values for the range and a corresponding decline in equity. This occurs, of course, because the range is based on two points at the extremes of the distribution. In general, the range and even the restricted range, are inappropriate measures of horizontal equity during inflationary circumstances. It is included, despite its limitations, as an example of a category of measures often found in such studies. The range can serve as a point

of comparison to other group measures in the study. The formula for the range is:

Range = highest Xi - lowest Xi, where Xi is the average objects per pupil in school division i.

The second measure of horizontal equity is the federal range ratio. It is the difference in the 95th and the 5th percentiles divided by the value at the 5th percentile. The closer the ratio is to zero, the more even or equitable is the distribution of objects. This measure is used in federal guidelines issued by the U.S. Department of Education. Unlike the range, the federal range ratio does not react to equal proportional increases throughout a distribution. It does, however, change as a constant absolute increase is added to all observations. Thus, it is insensitive to inflation but sensitive to flat grant increases across the distribution. The formula for the federal range ratio is:

$$\text{Federal range ratio} = \frac{\text{Xi at 95th percentile} - \text{Xi at the 5th percentile}}{\text{Xi at the 5th percentile}}$$

The third measure of horizontal equity is the coefficient of variation which is the standard deviation of a distribution divided by its mean and expressed as a percentage. As the coefficient approaches zero, equality or horizontal equity increases. This measure includes all observations in the analysis and it is a more comprehensive measure of the variance which may exist in a distribution. It is insensitive to equal proportional increases such as inflation, but it will react to constant absolute increases in all objects. If shifts in objects or educational resources occur within the distribution, these changes will be reflected by the coefficient of variation. All of the variation

between school divisions and pupils is captured by this measure. The formula is:

$$\text{Coefficient of variation} = \frac{\text{S.D.}}{\overline{Xp}} \times 100, \text{ where } \overline{Xp}$$

represents the mean objects per pupil and S.D. is the standard deviation.

The fourth and final measure of dispersion is the McLoone index. The McLoone focuses only on the lower half of the distribution of objects. The McLoone index is the ratio of the total objects per-pupil below the median to the objects that would be required to raise all observations below the median to the median level. Th value judgment involved in this measure is that the only concern a state should have for horizontal equity, is to bring up low spending school divisions or students. According to this theory, high spending divisions should be allowed to move out in front as far as they may wish to go. The McLoone index, then, is a measure of disparity which is quite unique. It only measures the disparity which exists below the median. The index varies between zero and one and is the only one of the four measures that gets larger as equity increases. The formula is:

$$\text{McLoone index} = \frac{\sum_{i=1}^{j} Pi\ Xi \quad \text{where division 1 through J}}{Mp \sum_{i=1}^{j} Pi \quad \text{are below Mp.}}$$

Note: Symbols used in above formula: Pi = number of pupils in division; Xi = average objects (expenditures) per pupil in district i; Mp = median objects per pupil for all pupils.

Equal Opportunity

The second research question which was relevant to this study is whether equal opportunity has been achieved during the proposed seven

year period, and has the situation improved? Equal opportunity can mean a number of different things but here it refers to the absence of a relationship between educational objects and school division wealth. This traditional equity principle formed the basic criterion for the Serrano Case in California and numerous successful school finance cases which followed. Coons, Clune and Sugarman first articulated the principle as follows: "the quality of public education may not be a function of wealth other than the wealth of the states as a whole" (1970, p. 2).

The popular belief is that most state school finance plans dispense public education largely according to the wealth of school divisions because much of the total funding is dependent on local revenue sources. With the advent of school finance reform, there was considerable emphasis given to equalization formulas which were designed to funnel increases in state aid to poor or low wealth school divisions thus breaking the link between spending per pupil and the wealth of the local communities (Odden, 1980, p. 8). Fiscal neutrality, or the absence of such a relationship, is believed, by most scholars, to be the hallmark of a state funding system which provides true equal opportunity.

To measure the existence of equal opportunity, in Virginia public education, the following hypotheses were constructed:

3. There is no significant relationship between educational resources and local wealth in Virginia when analyzed according to school divisions and pupils.

4. Progress towards the goal of equal opportunity has been enhanced between 1979 and 1986 for both pupils and school divisions.

The evaluation of these hypotheses were conducted by assessing the

relationship that exists between the total operating expenditures per pupil (TOE), state and local expenditures per pupil (SLE) and two measures of local wealth: the Local Composite Index (LCI), the current state approved measure of wealth, and the true value of real property per pupil (TVP).

The equal opportunity principle is essentially a negative principle which states that equal opportunity exists when there is an absence of a relationship between the objects of education and the wealth of the locality. Measures of equal opportunity are relationship measures where the absence of a relationship defines perfect equity. Regression analysis will be used to assess the relationship between per pupil objects (expenditures) as the dependent variable and per-pupil wealth values as the independent variables. From the regression analysis three measures; the correlation coefficient, the coefficient of determination (R Squared), and the coefficient of elasticity, will be derived and analyzed to explain the strength and the magnitude of the relationship.

The correlation coefficient expresses the degree or strength of the linear relationship between two variables and can take any value between -1 and +1. As a measure of equal opportunity, a correlation of zero is indicative of perfect equity, and a value of 1 signifies the most inequitable situation.

Another way of viewing the correlation is to look at the square of the correlation (R Squared). This measure, also known as the coefficient of determination, is the fraction of the variation in the dependent variable that is explained by the regression line. It further defines the strength of the relationship.

The coefficient of elasticity measures the magnitude of the rela-

tionship in terms of percentage changes in the dependent variable associated with a one percent change in the independent variable. A coefficient of elasticity of zero represents perfect equity and inequity increases as the elasticity increases. This measure is computed by multiplying the slope of the regression equation by the ratio of the mean values of the independent $(\tilde{W})$ and dependent $(\tilde{X})$ variables.

$$\text{Coefficient of Elasticity} = \text{Slope} \times \frac{\tilde{W}}{\tilde{X}}$$

It is important to note, that both the slope and elasticity coefficients predict the magnitude of the relationship. The slope, however, is affected by equal proportional changes in the distribution, such as those consistent with inflation. The coefficient of elasticity is not affected by inflation and is consequently included in this analysis.

Vertical Equity and Adequacy

The third research question is related to the principle of vertical equity or the appropriate unequal treatment of unequals. Increasingly, courts have recognized that students and even school districts are different and these differences should receive recognition in school aid programs. Most states have responded by rapidly expanding programs and providing extra funds for services to handicapped students, low income students and vocational students. These efforts represent a higher level of equity, than either equality of resources or fair access to educational programs, as previously discussed. Vertical equity implies a positive duty to address the unique needs of the least advantaged students. It is, indeed, difficult to ignore this objective if a state is sincerely committed to the education of all citizens. It should be noted that this would be the first reported attempt at assessing vertical equity under the current funding formula.

This principle of vertical equity, also, serves as a measure of adequacy since the provision of a basic education, consistent with the Standards of Quality, is the acknowledged right of each child in Virginia. The prescribed Standards address appropriate programs for the handicapped, the remedial or educationally deprived and programs for vocationally inclined students. Recognition of handicapped students and vocational students has long been a part of the funding system in Virginia. The Task Force which recommended the current funding scheme also recommended reading and mathematics skill development programs for low-achieving students but no funds were provided until the 1980-82 biennium (The Task Force Report, 1973, p. 11). The assessment of the equity in the provision of these programs and the adequacy of state support for special need pupils represents an important aspect of this study.

While there is much attention given to vertical equity in the literature, there are limited examples of useful methods to measure this principle. Odden (1980) suggests three alternatives: (1) using weighted students; (2) a separation of all excess costs; or (3) an analysis of expenditures by category of students. He states, however, that current data does not permit such analyses (p. 8). Indeed, data availability is the biggest deterent to comparison studies of this principle.

Berne and Stiefel (1984) suggest that there are three questions that must be addressed if vertical equity is to be assessed:

1. What are the legitimate differences among children that define "unequal" groups of children?

2. Once groups with legitimate differences are defined, how should the educational objects vary over these groups?

3. After the appropriate groups and desired object differences are articulated, how should the equity of the actual situation in comparison with the desired one be measured. (1984, p. 35)

The authors describe two different approaches to vertical equity measurement, each requiring varying degrees of specificity in answering the previous questions.

The first series of measures suggested by Berne and Stiefel (1984), are relationship measures which are dependent only on the identification of the special groups as required in question one and a general answer to question two. Question two is satisfied in this approach by determining simply whether special need pupils require more or less of the educational objects. The study used both regression based relationship measures and a ratio measure to assess whether groups who should receive more objects actually do receive more (1984, p. 35). Both of these measures assess the way expenditures vary with the special groups, but variation unassociated with the special groups is ignored.

The second suggested approach involves the use of "weighted dispersion measures". These require a precise answer to question number two, concerning how the educational objects should vary for special need students. The process of assigning specific student weights for special students, normally, involves a complex analysis of excess costs and would require a separate study for this purpose. Because there is no set answer to question two in Virginia, a survey of weighting schemes in other states was undertaken to formulate appropriate weights for this study.

To measure the degree of vertical equity and adequacy in the Virginia school finance system the following hypotheses were tested:

5. The Virginia public school finance system ensures that special need pupils receive additional educational resources

6. Between 1979 and 1986, the relationship between the percentage of special need pupils and educational resources has increased.

7. Disparity in the per pupil operating expenditures of Virginia's public schools is partially caused by legitimate expenditure differences necessary for special need pupils.

Special need students are defined as those classified by the Department of Education as handicapped, economically disadvantaged or vocational pupils. Since 1975, handicapped, educationally disadvantaged and vocational students have been singled out for special educational services in the Standards of Quality and the Standards of Accrediting Schools in Virginia. Beginning in 1965, the federal government has provided financial assistance to state and local education agencies to serve each of these student groups. Because special services are required by law and regulation in Virginia, it shall be assumed that these students are to receive more educational resources.

Vertical equity and adequacy involves the provision of an appropriate educational program on an equitable basis to all pupils. It will be assumed that all school divisions in the state offer educational programs which adhere to the published Standards of Quality. It is another question, however, as to whether appropriate programs, suitable to the unique needs of all pupils, are being provided on an equitable basis.

These principles were tested statistically by utilizing three conceptually different approaches. The first approach used relationship measures based on a simple regression and similar to those applied in the assessment of equal opportunity. A second assessment of vertical

equity utilized another relationship method based on a ratio approach rather than a regression analysis. And a third approach used a weighted dispersion method which is quite similar to the approach taken in analyzing horizontal equity. In each of these approaches, the difference centered on the ability to answer question number two, concerning how the educational objects should vary between the special group pupils and the non-special group pupils.

In using relationship measures, a precise answer to question two is not required. There must be, however, an agreement that special need pupils should receive more objects or resources than non-special need pupils. With this understanding, the measurement can proceed using two separate forms: one regression based and the other an averaged ratio method.

The regression method is based on per-pupil objects as the dependent variable and the percentage of special need pupils as the independent variable. From this calculation the correlation, the slope, and the coefficient of elasticity can be derived. The percent of special need pupils is used because it is not sensitive to the total number of pupils in the division. The resultant measures can be employed to answer the question: Do special need pupils who should receive more of the educational objects, actually do so? Positive values in each of the statistics mentioned would suggest an affirmative response to the proposed question.

While this provides a general sense of vertical equity, it does not provide a very precise assessment, nor can it serve as a source of comparison. To obtain a more specific index on the degree of the relationship, a new measure called the regression based implicit weight

was devised. The implicit weight is the ratio of the predicted per pupil objects for a district with 100 percent special need pupils divided by the predicted per pupil objects for a district with zero percent special need pupils, where the prediction is based on the simple regression. The following hypothetical example will illustrate the calculation of the implicit weight:

$$\text{Implicit Weight} = \frac{\text{Y Intercept (a)} + (\text{slope} \times 100\% \text{ spec. pupils})}{\text{Y Intercept (a)} + (\text{slope} \times 0\% \text{ spec. pupils})}$$

$$1.9102 = \frac{1696 + (15.44 \times 100)}{1696 + (15.44 \times 0)}$$

In this example, the implicit weight can be interpreted to mean that the simple regression estimates that the per pupil dollar objects of a school division with all special need pupils would be 1.9102 times those of a district with no handicapped pupils.

A second relationship measure, in addition to the regression based approach, is the averaged ratio method that relies on the differences in the average level of per pupil objects across different pupil groups. The ratio of two averages: the average per pupil object for special group pupils and the average per pupil object for non-special group pupils. This third vertical equity measure, the averaged implicit weight, is calculated by dividing the average per pupil object for special group pupils by the average per pupil object for non-special group pupils. Vertical equity requires the averaged implicit weight to be greater than one. The following example will illustrate the procedure:

Non-Special Group Pupils				Special Group Pupils			
Division	Pupils	$Inputs	Total	Division	Pupils	$Inputs	Total
1	95	1,200	114,000	1	5	1,200	6,000
2	92	1,300	119,600	2	8	1,300	10,400
3	90	2,400	220,800	3	8	2,400	19,200
	277	4,900	454,400		21	4,900	35,600

$$\text{Average per pupil \$ input for non-special group pupils} \quad \frac{454,400}{277} = 1640.43$$

$$\text{Average per pupil \$ inputs for special group pupils} \quad \frac{35,600}{21} = 1695.24$$

$$\text{Averaged Implicit Weight} = 1.0334 = \frac{\$1695.24}{\$1640.43}$$

(Berne and Steifel, 1984, p. 93)

The average implicit weight for the example is the ratio of the two averages or 1.0334. Special need pupils, in this example, receive slightly more dollar inputs than do non-special need pupils.

The third general category of measurement for the vertical equity principle is the weighted dispersion method which is similar to the approaches utilized in the horizontal equity analysis. The underlying premise is that some of the disparity evidenced in the horizontal analyses could be associated with legitimate cost differences due to the presence of higher cost pupils. If the numbers of special need pupils are not equally distributed throughout the state, a high percentage of these pupils could indeed account for higher spending practices and greater disparity.

In this method a more precise answer is required to the question of how should the educational objects vary among special need groups. Once this additional cost factor has been established, pupil weights can be

assigned and the horizontal equity analysis can be repeated using new weighted pupil values. Under the weighted dispersion method, the legitimate disparity can be accounted for and the remaining true disparity discovered and analyzed.

For example, a number of states have concluded that special need pupils require additional services and funding. According to McGuire (1982) "at least 15 states have enacted statewide compensatory education programs and 30 states have legislation either permitting or mandating bilingual education programs. All 50 states mandate that handicapped children...receive special education services" (p. 8).

Pupil weighting system, first conceived by Mort in 1930, are based on factors which reflect the differences in the costs of providing these special services to pupils. The National Educational Finance Project (NEFP) conducted extensive studies of the excess cost of educational programs throughout the country and issued a report which contained a prototype state pupil weighting system. This study, based on current practice in 1970 concluded "that vocational education, exceptional education, and compensatory education all cost more per pupil than regular educational programs" (1971, p. 271). Table 3 provides the scales developed for weighting pupils in the prototype state as determined by the National Educational Finance Project. Although conducted in 1970, this study still compares favorably with numerous individual state studies conducted in percent years. Because Virginia does not use a pupil weighting system and specific research has not been undertaken to determine the actual weights, weights were estimated based on other studies and the NEFP study.

Table 3

Scales Used for Weighting Pupils in the Prototype State

National Educational Finance Project

Selected Programs	Prototype State Target Population* (ADM)	Weighting for Cost Differential	Weighted Pupils
Special (Exceptional)			
Mentally Handicapped	16,089	1.90	30,569
Physically Handicapped	2,668	3.25	8,671
Emotionally Handicapped	19,696	2.80	55,149
Special Learning Disorder	5,335	2.40	12,804
Speech Handicapped	31,152	1.20	37,382
Sub Total	74,940		144,575
Compensatory Education			
Basic: Income under $4,000	131,165	2.00	162,330
Vocational--Technical	46,502	1.80	83,704

*Full time equivalent membership

Note: For a summary of the NEFP study see Bernstein, C.D., Hartman, W.T., Kirst, M.W., and Marshall, R.S. Financing Educational Services for the Handicapped: An Analysis of Current Research and Practices (Reston, Va: Council for Exceptional Children, 1976)

In order to simulate the effect special need pupils may have on disparity in Virginia, a pupil weighting system was developed using

reasonable excess cost estimates. Handicapped and disadvantaged pupils were assigned a weight of 2 as compared to a weight of 1 for non-special group pupils. Full time equivalent vocational pupils were weighted at 1.8. The number of special needs pupils in the three categories classified by school division was obtained from records in the Virginia Department of Education.

With the established weights, the total number of weighted pupils in every school division was computed. Then, in each division, the total objects were divided by the number of weighted pupils to obtain the objects (expenditures) per weighted pupils in each division.

Finally, all of the horizontal equity (dispersion) measures were computed again with perweighted pupil objects and weighted pupil replacing per pupil objects and pupils respectively the weighted dispersion measures are interpreted the same as the horizontal dispersion measures, where zero dispersion is vertical equity, and inequity increases as the weighted dispersion increases.

Equal Opportunity by Local Characteristics

To explore the concept of adequacy, a research question of importance concerns whether educational objects are distributed fairly and adequately among different types of school divisions throughout the state. The specific question asked is whether there is a relationship between identified characteristics of localities and certain fundamental objects of education. This inquiry concerns the equal opportunity principle applied to specific areas of the state.

This is a meaningful question because the disparities between suburban, rural, and urban areas of most states contain striking contrasts in educational resources. Most school finance law suits have

been brought by urban or rural school districts who have challenged the unfair treatment resulting from the funding system. Keppel (1966) alluded to this in the following passage:

> ...but inequality based on place is not a matter merely of a syetem that has worked out accidentally to the advantage of the wealthier suburbs and to the detriment of the cities. It seems safe to conclude that if the rural school and the cities' public schools were centers of education for the middle and upper class whites, as the suburbs are, they would be receiving more funds, better equipment, better-paid, better educated, and more experienced teachers (1966, p. 80).

In recognizing differences among children as deserving special consideration several courts also have extended this concept to differences in localities. Differences defined by competition for municipal tax dollars, higher relative cost of living factors and higher costs associated with the sparsity of population have all been cited as legitimate sources of funding differentials in other states. Virginia, to date, has resisted such recognition which might favor different political jurisdictions. This investigation, however, could document whether such differences exist in equal opportunity among areas of the state. Until such correlations are documented and compared, there can be no legitimate basis for differences in funding.

To answer this question, the following hypotheses were tested:

8. There is no significant difference in selected educational resources among rural, urban, and suburban school divisions and pupils in Virginia.

9. Since 1979, equal educational opportunity has improved among urban, suburban, and rural pupils and school divisions.

To conduct an analysis of the pertinent relationships, school divisions in Virginia must be categorized according to their characteristics on some recognized scale or standard of urbanization. In 1984, the Joint Legislative Audit and Review Commission (JLARC) of the Virginia General Assembly developed such a grouping of local governments based on population, population density and size of tax base. JLARC developed 10 cluster groups of localities and analyzed the differential fiscal stress experienced in each cluster (1984, pp. 87-117). In 1986, JLARC published a follow-up to their original study and again used the cluster group approach to categorizing the state localities.

In the 1986 study, JLARC grouped the 10 cluster groups into three broader categories "to facilitate the understanding of the clusters" (p. 28). In both studies, the cluster groups proved to be reasonably homogeneous and effective in distinguishing key characteristics which define the different localities.

The present study utilized the JLARC cluster group system with one modification. The three groups of the 1986 plan were duplicated but a fourth group was also formed. This additional category was added because the JLARC studies noted that many localities were in the process of changing and exhibiting characteristics in conflict with their assigned grouping. These localities, not clearly urban, suburban or rural in nature, were assigned to this fourth category

entitled "transitional". Accordingly, three groups were formed representing urban, suburban, and rural school divisions and a fourth group was formed from the original cluster groups which represented transitional school divisions who were growing or had moderate fiscal capacity. Table 4 presents the evolution of the grouping system used in this study.

Once the groups were formed the equal opportunity principal was analyzed according to several dollar expenditures variables (TOE, SLE, SOE, and LOE), average teacher salaries (ATS), a reading achievement score (RAS), two local wealth variables (TVP, LCI), percent of special need populations (PH, PD, PV), instructional personnel allocations (IPS), and a local effort variable (TTR). This analysis was conducted on both a school division and a pupil basis to demonstrate the patterns of educational resources found in different economic and population zones in the state.

The statistical technique selected for this assessment was discriminant analysis based on four separate groups. School divisions classified as urban, suburban, rural and transitional were analyzed to determine the differences that exist on a range of educational variables previously described. The analysis was repeated for four different school years; 1978-79, 1980-81, 1982-83, and 1984-85. Data from these analyses will be presented describing any significant differences between groups and the key variables in each year of the analysis will be reanalyzed to determine the classification accuracy based on the discriminant function.

The degree of variance between group means was measured by the

Table 4

Comparison of Classification Systems

1984 JLARC Study 10 Clusters	1986 JLARC Revision 3 Groups	1987 Current Study 4 Groups
1. Large cities	1. Cities:	1. Urban Schools:
	(1) lg. cities	(1) lg. cities
	(2) sm. cities metro areas	(2) sm. cities in metro areas
2. Small cities in metro areas		
	(3) sm. cities in rural areas	2. Suburban Schools:
3. Small cities in rural areas		
	2. Mod. To High Capacity Co:	(4) Urbanizing co
4. Urbanizing co	(4) Urbanizing co	(5) Suburbanizing co
	(5) Suburbanizing co	
5. Suburbanizing co	(6) High growth, and capacity rural co	3. Rural Schools:
6. High growth, and capacity rural co	(9) Lo growth, mod capacity rural co	(7) High growth, lo capacity rural co
		(8) Lo growth, lo capacity rural co
7. Hi growth, lo capacity rural co	3. Lo Capacity Co:	
	(7) Hi growth, lo capacity rural counties	
8. Lo growth, lo capacity rural co	(8) Lo growth, lo capacity rural counties	4. Transitional Schools:
		(3) Sm cities in rural
9. Lo growth, moderate		(6) Hi growth, moderate capacity, rural co.
		(9) Lo growth, moderate capacity, rural co.
10. Counties w/major power facilities		(10) Counties w/major power facilities

Wilk's Lambda statistic which is the ratio of the within-groups sum of squares to the total sum of squares. A lambda of 1 occurs when all observed group means are equal. Values closer to 0 occur when within group variability is small and between group variance is large.

The canonical correlation is a measure of the degree of association between the discriminant scores and the groups. This statistic was computed for each discriminant function to demonstrate the amount of variance explained in the groups by the key variables. A final Wilk's lambda, a canonical correlation, and a classification table of results will be presented for each of the analyses conducted in order to demonstrate the strength of the association between groups, the key variables and their ability to predict group membership.

Adequacy of State Funding

The entire study would be incomplete if it did not address the issue of the adequacy of state education funding. Virginia has recognized education as a fundamental value in it's Bill of Rights. It has provided in it's constitution for a methods of identifying and distributing the costs of an education of high quality. Its legislative policies have been directed towards the establishment of a basic educational program for each child through the Standards of Quality. The question remains: Has an adequate educational program been ensured by the General Assembly of Virginia through its public school funding system?

The adequacy principle, for the purposes of this study, embraced the notion of equity. Adequacy is the equitable provision of an

educational program of high quality to all students. The General Assembly of Virginia has been empowered by the state constitution to ensure the equitable provision of such a program by (1) reviewing and approving the components of the required educational program, the Standards of Quality (SOQ), (2) establishing the cost of the SOQ, (3) allocating a fair and equitable share to be paid by each locality, and (4) appropriating from state sources the differences between the cost of the Standards and the local share (Opinions of Attorney General, 1973, p. 351). Because the state, in section 22.1-253.13 of the Code of Virginia, requires localities to provide educational programs consistent with the Standards of Quality; the funding of the costs of the program shall be the measure of adequacy and the resultant allocation of the resources will be the measure of equity.

The prior portions of this study should render a significant amount of data concerning the degree of equity which exists among Virginia's public schools. Whether an adequate educational program is offered to every child requires an investigation of the level of state support and, also, the equity in program outputs. The hypotheses used to answer these questions were as follows:

10. The General Assembly of Virginia has not ensured, through adequate state aid, the equitable provision of an education of high quality for all children.
11. Increased state aid in recent years has resulted in a more equitable distribution of educational resources for all pupils.

In testing these hypothesis, it was important, again, to define the term adequate. In the context of this investigation, an adequate education is an appropriate education consistent with the approved Standards of Quality and offered equitably to all children. The statistical analyses already included as part of the study will provide a way to judge the degree of equal opportunity for all students and the resultant treatment of those with special needs. Additionally, the design of these analyses will provide evidence regarding the progress that has been made towards achieving the goal of a high quality education.

A final analysis was conducted by examining the funding trends over the entire seven year period to determine if state aid has kept pace with the cost of the Standards of Quality and the traditional levels of state support. This step is important because it will demonstrate the performance of the legislature in meeting its duty to provide sufficient funds to maintain schools meeting the Standards of Quality. According to A.E. Dick Howard:

> ...the ultimate duty placed on the General Assembly is the same as had been contemplated by the (Constitutional) Commission: The Assembly must, by whatever means, see that sufficient funds, state and local, are available to maintain a quality program in every school division in the Commonwealth. Thus, even though a locality, however poor, can be called upon to put up its share of school funds, the Assembly must ensure that there are sufficient state funds to make up the difference between the locality's share and the amount needed to meet the Standards of Quality (1973, p. 904).

Comparisons were made between federal, state and local contributions to the costs of education and the changes in the ercentage share over time.

CHAPTER 4

FINDINGS AND RESULTS

The results of the statistical analysis of the financial data on 133 school divisions and approximately one million pupils in Virginia public schools are presented in this chapter. Five different school years were analyzed in the course of the study and 13 different variables of educational inputs, outputs, wealth and effort were gathered and measured. The total public education funding system including federal, state, and local revenue, were carefully analyzed from 1979 through 1986 and the magnitude of the disparity, and equity were identified and compared.

This chapter is organized into five sections, each providing a brief summary of the principle involved, the hypotheses, and a summary of the major finding. Following the findings will be a report of the methods of analysis and an explanation of the appropriate tables and figures. Tables will be used to summarize the data and figures will present graphic displays of the changes in the data over the period of the study.

Horizontal Equity Principle

The principle of horizontal equity is essentially the concept of equal treatment of equals, with emphasis on the notion of equality. The value judgment inherent in a policy of horizontal equity would

define equity in educational opportunity as being equal educational resources for each child, regardless of their status or abilities. The principle has served as the underpinning of nearly every school finance litigation during the last 20 years. It embodies the right of equal protection under the law which is a basic value in American democracy.

Hypotheses

The hypotheses developed to test the presence of horizontal equity in the Virginia school finance system were as follows:

1. The Virginia system of public school finance ensures equality in educational resources among school divisions and pupils in the state.
2. The degree of disparity in educational resources has declined among pupils and school divisions in Virginia between 1979 and 1986.

In hypothesis 1, the public school finance system is assumed to provide horizontal equity or equality in educational resources for all school divisions and pupils of the state. Hypothesis 2, states that the trend between the 1978-79 school year and the 1985-86 school year will show a decline in disparity found in educational resources among school divisions and pupils.

Major Findings for Hypothesis 1

The actual results of the statistical analysis of Virginia public school divisions and pupils on the principle of horizontal equity reveals a number of findings relative to each hypothesis. With respect to the equality of educational resources, the following can be reported:

1a. There is considerable disparity in operating expenditures,

average teacher salaries and instructional personnel allocations among school divisions and pupils in Virginia.

1b. There is greater quality in instructional personnel allocations and average teacher salaries than in school operating expenditures.

1c. Disparity in educational resources is more pronounced when analyzed on a pupil basis rather than on a school division basis.

Report of the Data

The data confirming these findings are displayed in Appendix A. Tables A-1, A-2, A-3, and A-4 present the results of the horizontal equity analysis for total operating expenditures (TOE), state and local operating expenditures (SLE), average teacher salary (ATS), and instructional personnel allocations (IPS), respectively. Each of these tables contains an unweighted school division analysis and a weighted pupil analysis. Measures of central tendency are provided in each table along with the four measures of horizontal equity: the range, the federal range ratio, the coefficient of variation, and the McLoone index. Results are listed for four or five separate years depending on the variable and the availability of the data. At the bottom of each table, a summary of the equity gains or losses is provided for each measure, and each unit of analysis.

Table 5 provides a comparison of the complete results of the equity analysis for all four variables in 1984-85. For each of the measures, except the McLoone index, perfect equity corresponds to zero. For the McLoone index, equity increases as the measure approaches one.

Table 5

Comparison of Horizontal Equity Measures

on Selected Educational Resources

for 1984-85

Resource Variables	Range	Horizontal Equity Measures		
		Fed Range Ratio	Coeff of Variable	McLoone Index
		Unweighted		
Total Operating Exp	3346	.7221	18.9	.9166
State and Local Exp	3245	.8848	23.1	.8870
Average Teacher Sal	17,537	.4225	14.2	.9242
Instr Pers/1000	39.6	.3181	9.6	.9472
		Weighted		
Total Operating Exp	3346	.9035	22.3	.9137
State and Local Exp	3245	.9706	26.8	.8623
Average Teacher Sal	17,537	.6542	16.9	.8855
Instr Per/1000	39.6	.3438	8.2	.9613

* Latest year for which comparable data was available

Table 5 shows that horizontal equity was not achieved in 1984-85 if equity is considered to be absolute equality of resources.

The highest disparity in resources exists among operating expenditures and there is less disparity in instructional personnel allocations and average teacher salaries. For example, in Table 5 state

and local operating expenditures register the highest values for the federal range ratio and the coefficient of variation, and the lowest value for the McLoone index. This indicates high levels of disparity for all three measures. Average teacher salaries and instructional personnel allocation variables show lower values for the federal range ratio and coefficient of variation and higher values on the McLoone index. This indicates lower relative disparity and higher equality.

It can also be seen in Table 5 that disparity or inequality is usually higher when analyzed on a pupil weighted basis rather than on an unweighted school division basis. In both instances, however, considerable disparity exists.

Efforts were made to go beyond a standard of perfect equality and compare Virginia's measures of horizontal equity with other average state measures. Table 6 is a compilation of previous national studies which analyzed this same principal of horizontal equity. It is extremely difficult to find data using similar measures on similar variables and units of analysis. As a result, the coefficient of variation was the only consistent measurement that could be compared. However, Table 6 confirms that Virginia's disparity in operating expenditures remains considerably above the national average of 16.4 in 1977. Unfortunately, comparative data was not available for average teacher salary and instructional personnel allocations.

The data in rows 3 and 5 are from School Finance Reform in the States: 1981 by A. Odden and J. Augenblick, 1981, Education Commission of the States, Denver: Colorado, pp. 10-11.

The data documenting the disparity in educational resources indicates that the Virginia funding system does not ensure horizontal

Table 6

Comparison of Measures of Equity

for Virginia and U.S. Average State

During Selected Years

Years Group	Expenditure Disparity Weighted Coefficient of Variation	Equal Opportunity Weighted Correlation Coefficient	Equal Opportunity Weighted Wealth Elasticity
	Previous National Studies		
1969 U.S. Avg	15.6	-------	-------
1975 U.S. Avg	18.4	-------	-------
1977 U.S. Avg	16.4	.5469	.2266
1975 Virginia	27.0	-------	-------
1977 Virginia	24.3	.7200	.4300
	Current Study Data		
1981 Virginia	28.0	.6554	.3875
1983 Virginia	28.1	.6157	.3249
1986 Virginia	25.2	.6326	.2859

Note: The data from row 1 are from Profiles of the States - 1979 Edition, by E. P. McLoone, M.A. Golladay, and W. Sonnenberg, 1979, U.S. Department of Health, Education and Welfare. Washington, D.C.

The data in row 2 and 4 are from "School Finance Reform in the Seventies: Achievements and Failures": by L. L. Brown, III., A. L. Ginsburg, J. N. Killalea, R. A. Rosthal, and E. D. Tron. 1978, Journal of Educational Finance, 4, pp. 198-200.

equity and that hypothesis 1 should be rejected.

Major Findings for Hypothesis 2

Considering the trends in horizontal equity as provide in hypothesis 2, the data suggests the following findings:

2a. Horizontal equity in the distribution of operating expenditures has improved consistently throughout the period of analysis for both school divisions and pupils.

2b. Average teacher salaries have become less equitably distributed among school divisions in the state. However, when analyzed on a pupil weighted basis, students access to higher paid teachers has become more equitable in recent years.

2c. Instructional personnel allocations have become more equal among school divisions during the period of analysis, but equity has declined among pupils of the state.

2d. The amount of disparity in educational resources for schools divisions in the lower half of the distribution, has remained relatively constant throughout the seven year period of study.

Report of the Data

Appendix A contains tables A-1 through A-4 which offer a complete summary of the horizontal equity analysis throughout the years of the study. Four or five years of resource data were analyzed, depending on the availability of information. Each of these tables have a portion devoted to the gains or losses in equity over the duration of the

analysis. Table A-2 is of particular importance because it concerns equity in state and local operating expenditures. This variable excludes federal funds and addresses the central purpose of the study.

The individual data for the equity measures shows general improvement between 1978-79 and 1985-86, for both school divisions and pupils. Table 7 summarizes the trends in horizontal equity as measured by the coefficient of variation. The coefficient is the most comprehensive of the equity measures because it considers all observations in the distribution of objects.

The data supporting the findings in 2a., 2b., and 2c. can be observed in Table 7. This table indicates that progress was achieved in horizontal equity on all operating expenditure variables but that average teacher salaries among school divisions and instructional personnel allocations among pupils experienced a decline in equity during the period of analysis. Operating expenditure equity rose by 12 percent generally, while declines were noted for teacher salary and instructional personnel allocations on selected analyses.

Finding 2d. refers to the overall trends in the McLoone index during the period of the study. Appendix A contains the detailed analysis which is the basis of this finding. A review of the appendix and each variable analyzed will show differing patterns of change with no consistent direction. It can only be concluded that the changes in these variables over time have no observable trend with respect to the lower half of the distribution of school divisions and pupils.

Each of the tables in Appendix A are accompanied by figures which graphically trace the trends of each variable and measurement. It is

Table 7

Comparison of Gains and Losses in Horizontal Equity

As Measured by the Coefficient of Variation

From 1979 to 1986

Variables	Coefficients of Variation 1979	1983	1986	Percent (+) or (-)
	Unweighted			
Total Operating Exp	21.3	20.4	18.7	+12.4
State and Local Exp	26.0	24.6	22.9	+12.0
Average Teacher Salary	13.6	14.1	14.2	- 4.4
Instructional Pers/1000	10.8	9.8	9.6	+10.9
	Weighted			
Total Operating Exp	23.1	23.5	21.1	+ 8.8
State and Local Exp	28.9	28.1	25.2	+12.9
Average Teacher Salary	18.8	18.4	16.9	+10.4
Instructional Pers/1000	7.8	7.9	8.2	- 5.6

important to remember that each measure provides a unique analysis of the variable and the differing units of analysis involve different perspectives. The range and the federal range ratio are placed side by side, because they both measure the outer portions of the distribution but differ in their response to inflation. The unit of analysis does not effect the range, but it does provide differing results in each of

the other measurements.

The figures in Appendix A, also provide a side by side comparison of the coefficient of variation and the McLoone index. The coefficient of variation takes into account all the observations in a distribution of objects and it is the most comprehensive of any of the other measures. The McLoone index analyzes only the other half of the distribution represented. Care must be exercised in considering the school division and pupil trends on the McLoone index because these are not compatible groups. The pupil analysis represents half of all the pupils in the state, nearly 500,000, while the school division data represent half the school divisions or generally 66 divisions. Frequently, the pupil membership of these 66 dividions will represent much fewer than half the state pupil membership and thus the comparison of this graph can be misleading.

Table A-3 presents the results of the horizontal equity analysis of average teacher salaries for school divisions (unweighted) and pupils (weighted). Teacher salaries have received considerable legislative attention, particularly during the 1982 and 1984 biennial budget years. The average teacher salary is considered an important variable in the provision of quality education in the context of current political thought in Virginia. Table A-3 demonstrates that, on a school division basis, the distribution of average teacher salaries showed a pattern of decline in horizontal equity between 1979 and 1985. All measures showed rather large percentage drops in equality during the period of analysis. This table also shows that on a pupil weighted basis, a different pattern emerged. Horizontal equity for pupils, in

terms of access to higher paid teachers, improved during the same period. There was a consistent pattern, however, of declining equity for pupils and school divisions below the median as measured by the McLoone index.

Table A-4 contains comparative data on the allocation of instructional personnel per 1000 students in average daily membership. This variable has been a part of the state funding formula since 1975, and it is a good indicator of pupil-teacher ratios for all school divisions. The data in this table shows the lowest disparity indicators of any of the previous variables. For the first time, the range declined during the period of analysis. This 18 percent drop can be attributed to the absence of dollars as the unit of measurement and the presence of a teacher ratio unit which is resistant to inflationary increases. Again, the equity gains and losses show a difference in the measures calculated on a school division or pupil basis. Very consistent equity gains were registered for school divisions but losses were shown in the distribution of this variable among pupils in two categories: (a) the federal range ratio, and (b) the coefficient of variation. There was consistent but small gains registered for school divisions and pupils below the median.

The data from these analyses throughout the seven years of the study support the acceptance of hypothesis 2.

Equal Opportunity Principle

The principal of equal opportunity involves the absence of a relationship between various educational resources and the wealth of individual school divisions. Equity, in terms of equal opportunity,

exists when their is no relationship between wealth and resources other than the wealth of the state as a whole. This principle, also known as wealth neutrality, was first articulated by Coons, Clune, and Sugarman in 1970. It formed the basis of the successful Serrano case which challenged the California state school finance system. In striking down the state school aid program, the State Supreme Court made it clear that the system of finance must be fiscally neutral, in that revenues available for education cannot be a function of local property wealth (1971, p. 1241).

Hypotheses

The hypotheses developed to test for the presence of equal opportunity in the Virginia system of school finance were as follows:

3. There is no significant relationship between educational resources and local wealth in Virginia when analyzed according to school divisions and pupils.
4. Progress towards the goal of equal opportunity has been enhanced between 1979 and 1986 for both pupils and school divisions.

Equal opportunity in per pupil dollar operating expenditures was analyzed for two measures of wealth: (a) the true value of real estate property and public service corporations, and (b) the Virginia Local Composite Index. True value of real estate is the traditional measure of wealth used in school finance studies throughout the country. The Local Composite Index is the wealth indicator used by the State of Virginia to determine a locality's ability to pay for education. It is based on three wealth components: local true value of property, local

personal income, and local retail sales each weighted for average daily membership and local population.

Major Findings for Hypothesis 3

Hypothesis 3 assumes that there will be no significant relationship between dollar inputs in the form of operating expenditures per pupil or average teacher salaries, and the local wealth of the school division. Wealth will be represented by both the traditional property value per pupil and the more comprehensive index used by Virginia. The ideal condition is the absence of a relationship or a zero correlation. Hypothesis 4 suggests that recent state efforts have resulted in improved equal opportunity among pupils and school divisions.

The statistical analysis of current equal opportunity indicates the following results:

3a. There is a significant positive linear relationship between educational expenditures and the wealth of individual school divisions. This relationship exists, regardless of the specific form of expenditure or wealth variable.

3b. The Local Composite Index is a stronger indicies of per pupil expenditure and average teacher salary, than is true value of property.

3c. The relationships between wealth and all dependent variables (expenditures and average teacher salary) are stronger when analyzed on a pupil weighted basis rather than on a school division unweighted basis.

3d. There is a significant but relatively weaker relationship between average teacher salary and both measures of wealth.

Report of the Data

Measures of equal opportunity are essentially relationship measures, where perfect equity is defined as the absence of a relationship. The statistical analysis involves the application of regression based relationship measures. The specific measures derived from the regression were (a) the simple correlation coefficient, (b) the coefficient of determination (R squared), and (c) the coefficient of elasticity. Each provides unique information regarding the degree of the relationship that might exist between the dependent and independent variables. As previously described, two forms of per pupil dollar operating expenditures and the average teacher salary serve as the dependent variables, and true value of property and the Local Composite Index are the independent variables. Each analysis was conducted individually with one dependent variable and one independent variable at a time.

The results of the statistical analysis of equal opportunity can be reviewed in Appendix B. Tables B-1, B-2, B-3, B-4, B-5, and B-6 display the equal opportunity tests for the strength and magnitude of the relationship between various expenditure variables and the two specified measures of wealth. Each analysis contains both an unweighted school division comparison and a weighted pupil comparison. The coefficient correlation, the R squared coefficient and the coefficient of elasticity are all provided along with the relevant significance levels. The data is provided on total operating expenditures (TOE), state and local operating expenditures (SLE), and average teacher salary (ATS) for the four years of the study. Data for the 1985-86 school year was included in the analysis for operating expenditures, but comparable data was not

Table 8

Comparison of Equal Opportunity Measures

for Selected Variables During Most Current Years

Regression Variables	Coefficient Correlation	Coefficient Elasticity	Significance Level
	Unweighted (Weighted)		
TOE (1985-86)			
TVP	.5558 (.6066)	.1602 (.2292)	.0000*
LCI	.6800 (.7718)	.3576 (.5085)	.0000*
SLE (1985-86)			
TVP	.5559 (.6326)	.1967 (.2859)	.0000*
LCI	.6970 (.8104)	.4499 (.6376)	.0000*
ATS (1984-85)			
TVP	.2636 (.5221)	.0578 (.1576)	.0000*
LCI	.4347 (.7428)	.1741 (.3902)	.0000*

P <.01

available for teacher salaries.

Table 8 provides a summary of the data which supports the major findings relative to hypothesis 3. The table shows the existence of a positive linear relationship between the tested variables and the appropriate significant levels for both the unweighted and weighted analyses. The relationship, as noted in finding 3a., are strongest in the expenditure variables (TOE) and (SLE). Dependent variable of TOE, SLE, and ATS are displayed with both the true value of real property

(TVP) and the Local Composite Index (LCI) so that differences can be observed. Findings 3b. and 3c. point out that the Local Composite Index provides the stronger relationship to expenditures and salaries in all years and that the pupil weighted analysis yields the stronger values for both wealth variables. All relationships analyzed were significant at the .01 level. Average teacher salary (ATS) has a significant correlation but it is consistently lower in strength than either of the other dependent variables.

On the basis of these findings, hypothesis 3 is rejected.

Major Findings for Hypothesis 4

Between fiscal year 1979 and 1986, the state of Virginia began to provide greater support for public education. This, coupled with a gradual decline in inflation, raised hopes that greater equity might be achieved in the funding of public education. To determine the actual effect of increased funding, an analysis of the trends in equal opportunity was included in the study. Hypothesis 4 suggests that equal opportunity
has been enhanced during the seven year period between 1979 and 1986. The data analysis suggests the following results:

4a. The strength of the relationship between expenditures and wealth grew from 1979 to 1983 and then began to decline in recent years. Sharp declines were observed between 1985 and 1986.

4b. The magnitude of the relationship between wealth and dollar expenditures had been declinging from 1981 through 1986.

4c. Average teacher salaries, between school divisions, have declined in their relationship to local wealth, but increased slightly in relation to wealth when analyzed on an individual pupil basis.

Report of the Data

Figure 1 tracks the trends in the correlation coefficients for state and local operating expenditures (SLE) with the two standard wealth measures: true value of property (TVP), and the Local Composite Index (LCI). The analysis was conducted both on a school division unweighted basis and a pupil weighted basis. According to finding 4a., the trend in each case shows an initial pattern of some growth in the relationship and then a decline in the most recent years of the study.

Figure 2 is a representation of the relationship of the same variables as measured this time by the coefficient of elasticity. The elasticity is a measure of the magnitude of the relationship in that it indicates the amount of change in the dependent variable associated with a one percent change in the independent variable. In this context, an elasticity of zero is equitable, and inequity increases as the elasticity increases. As stated in finding 4b., the trend line shows a consistent decline in the magnitude of the relationship between expenditure and wealth. This is a positive sign which is indicative of improving equal opportunity for pupils and school divisions. Figure 2 shows the greatest progress during the period from 1983 to 1986, the same period of increasing state support for public education.

Figure 3 presents the trend analysis for average teacher salaries and provides the basis for finding 4c. It represents a different pattern than the previous figures in that it differs dramatically

between the school division analysis and the pupil analysis of the same relationship of salaries and wealth. It could be implied that in this instance equal opportunity in terms of access to higher paid teachers is a function of the method of analysis.

Figure 3 further suggests that equal opportunity in access to higher salaries among school divisions has improved during the course of the study but pupil access to higher paid teachers has become more unequal during the same period. This pattern of inequity for pupils is quite pronounced between 1983 and 1986; a period of state encouragement for higher teacher salaries. This variation in an otherwise very consistent trend pattern of improving equal opportunity suggests the effect of a shift in state policy direction. Appendix B contains additional tables and figures which provide consistent data supporting the reported findings.

On the basis of these results, hypothesis 4 suggesting an improving climate of equal opportunity in Virginia, is accepted.

Vertical Equity Principle

Vertical equity involves the belief that fair and impartial treatment requires an affirmative responsibility to provide appropriate unequal treatment for those who are unequal. Unequals, in an educational sense, are those who have special needs beyond the normal range. There are a number of categories of pupils that could qualify for this descriptions of unequal but for the purposes of the study three groups of students have been identified: the handicapped, the economically disadvantaged, and the vocational pupils. The federal

Figure 1

A Comparison of the Relationship Between State and Local Operating Expenditures and Two Wealth Measures: True Value of Real Property (TVP) and the Local Composite Index (LCI)

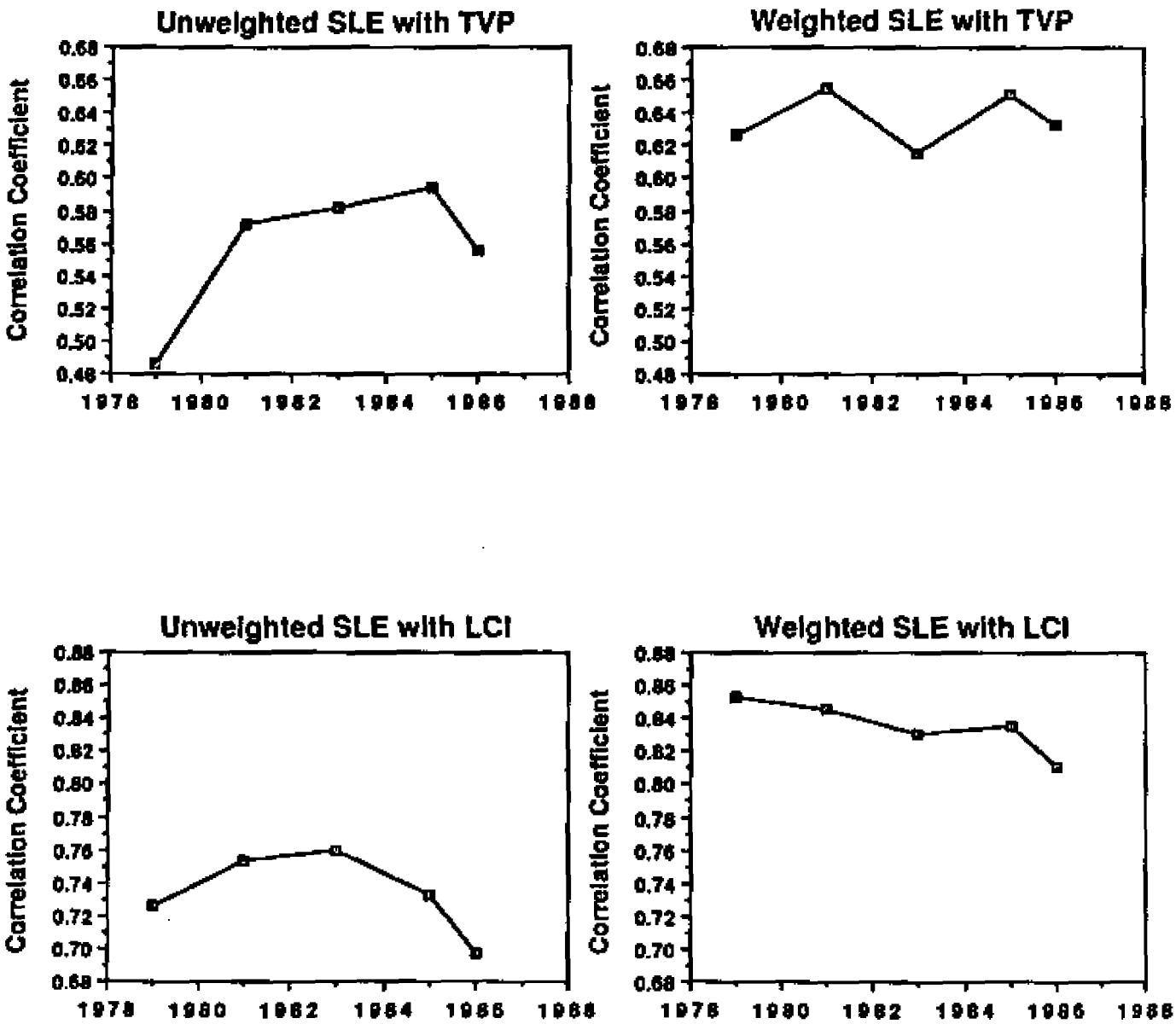


Figure 2

A Comparison of the Magnitude of the Relationship Between State and Local Operating Expenditures Using the Coefficient of Elasticity

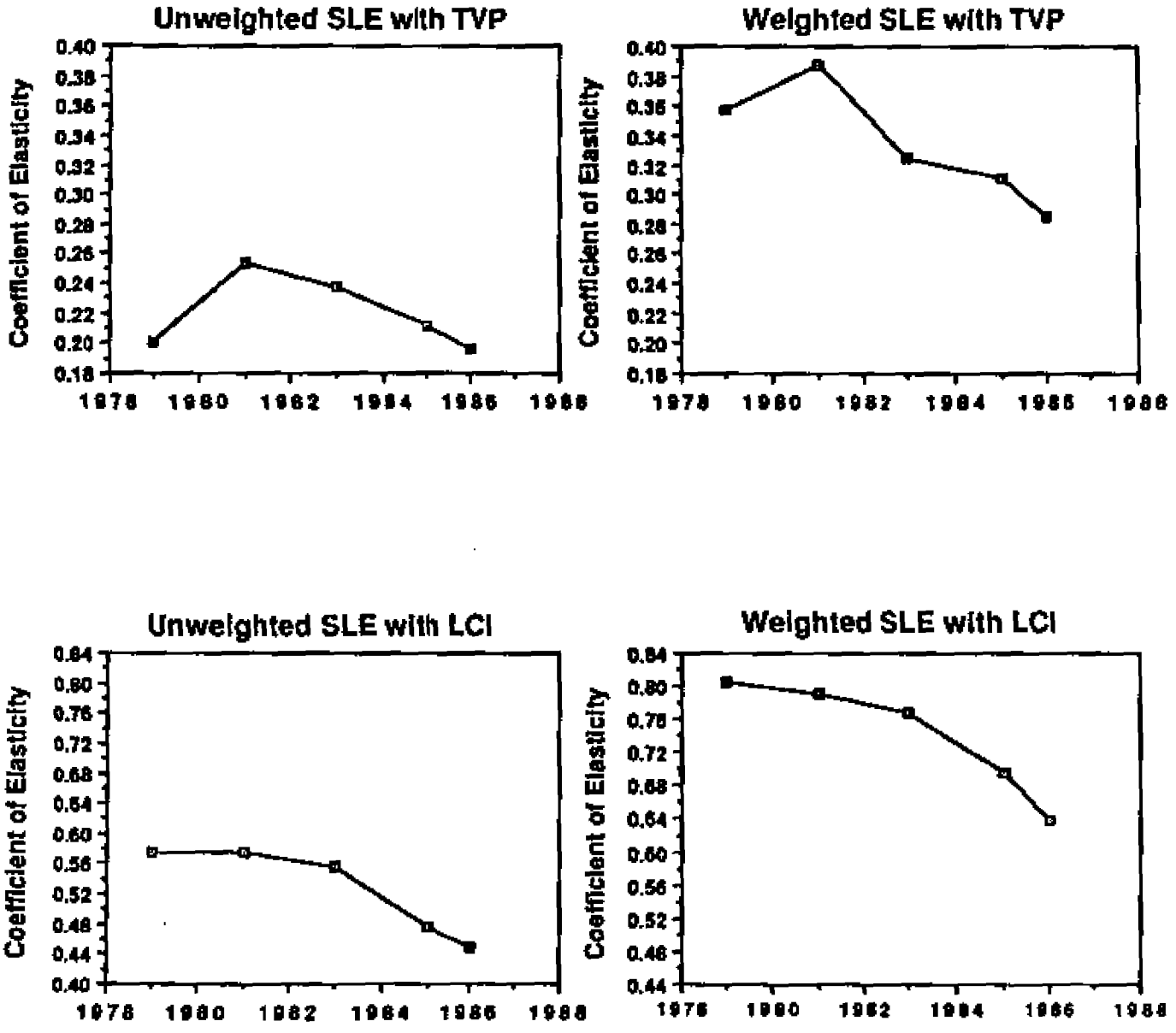
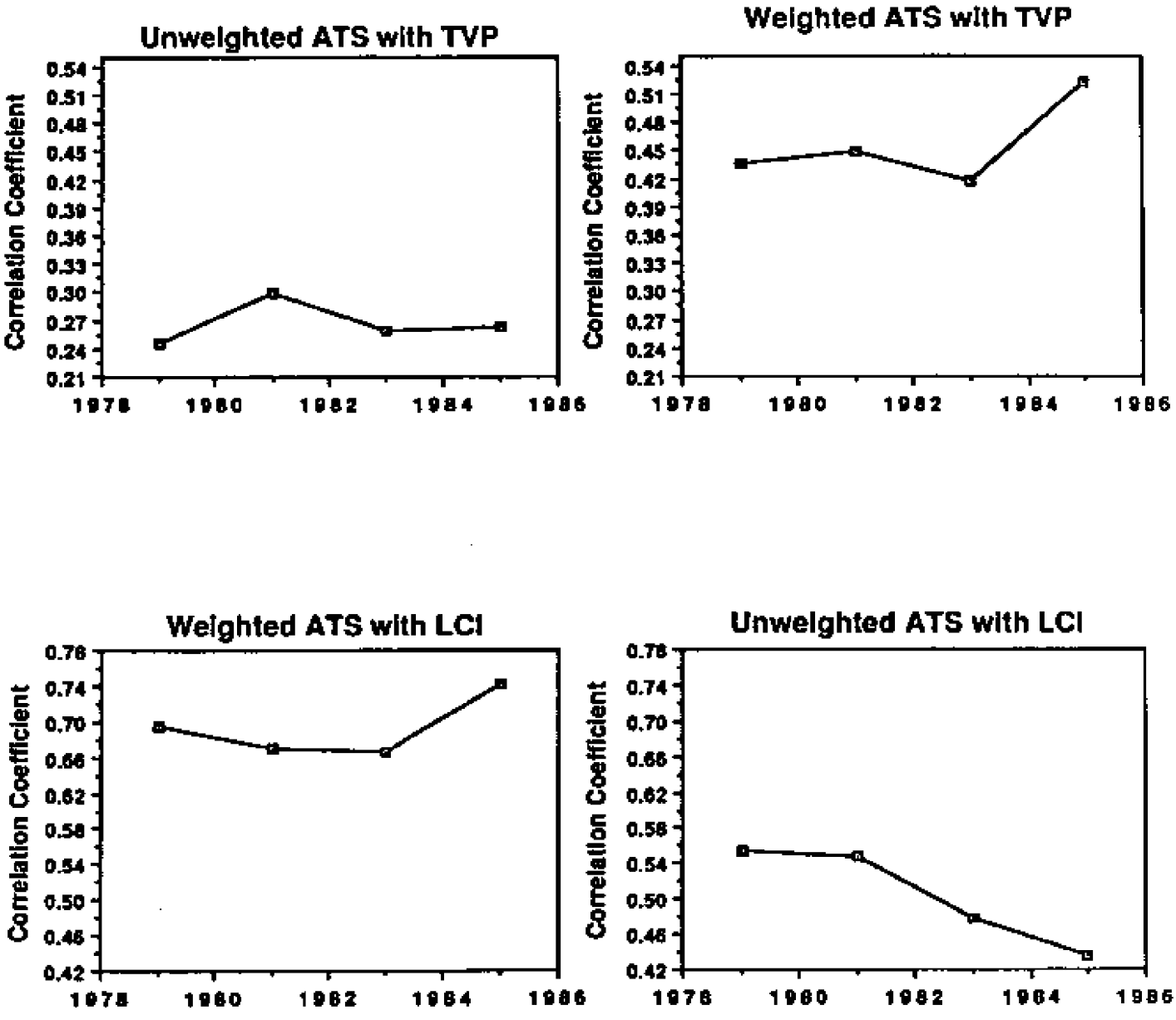


Figure 3

A Comparison of the Strength of the Relationship Between Average Teacher Salaries (ATS) and Two Wealth Variables: True Value of Real Property (TVP) and the Local Composite Index (LCI)



government whose primary concern it is to insure equity, has initiated extensive legislation and aid programs to protect the educational opportunities of these three groups of pupils. Virginia, has directly singled out the handicapped and vocational programs for special consideration in both the standards of quality and the appropriations process.

To a lesser extent, Virginia is addressing its responsibilities to the poorest members of its population. Reference is made to educationally disadvantaged children in both the standards of quality and the categorical funding system. These children are often economically disadvantaged as well. Virginia's latest education commission, The Governor's Commission on Excellence in Education, has recommended a preschool education program for disadvantaged "children at risk" which would begin to "strike at the heart of the problem of the dangerous gap between educational have and have nots in Virginia." (Report of the Governor's Commission, 1986, p. 7)

Hypotheses

The hypotheses established to test vertical equity in Virginia's school finance system are as follows:

5. The Virginia public school finance system ensures that special need pupils receive additional educational resources.
6. Between 1979 and 1986, the relationship between the percentage of special need pupils and educational resources has increased.
7. Disparity in the per pupil operating expenditures of Virginia's public schools is partially caused by legitimate expenditure differences necessary for special need pupils.

Major Findings for Hypothesis 5

Hypothesis 5 assumes that there is a an affirmative responsibility to ensure appropriate unequal and more costly treatment for special need pupils in an equitable system of education. It can be tested by determining if a positive linear relationship exists between the percentage of these pupils in school divisions in Virginia and the expenditure level of these divisions. In addition, it is possible to determine if more dollars are being spent on these pupil groups. Hypothesis 6 focuses on the trends in vertical equity to see if, indeed, progress is occurring during the specified period of analysis.

Three different statistical methods were utilized in this investigation of per pupil operating expenditures and the number and percentage of special need pupils. As a result of the analysis, the following findings can be reported:

5a. The study indicates that school divisions in Virginia with higher percentages of handicapped pupils appear on average to have higher levels of expenditures than school divisions with lower percentages of handicapped pupils. Additionally, handicapped pupils receive more dollar inputs on average than non-handicapped pupils.

5b. In Virginia, school divisions with higher percentages of disadvantaged pupils do not have higher levels of expenditures than divisions with fewer disadvantaged pupils.

5c. School divisions with higher percentages of vocational pupils, similarly, do not have higher levels of dollar expend- itures than divisions with lower percentages of these pupils.

5d. Disadvantaged and vocational pupils also do not receive more

dollars objects on average than do non-special need pupils.

Report of the Data

The vertical equity principle for Virginia public school divisions was analyzed using three conceptually different statistical procedures. The first approach was to study the relationship between special need pupils and operating expenditures using the simple regression analysis. The products of the regression analyses are virtually the same as those provided in the equal opportunity assessment: the correlation coefficient, the slope, and the coefficient of elasticity. The slope is similar to the coefficient of elasticity in that it predicts the magnitude of the relationship between two variables. The slope indicates the size of the change in the dependent variable associated with a one unit change in the independent variable.

In addition to these three measures, a fourth product of the regression, the implicit weight, was used to measure the predicted expenditure level of school divisions with all special need pupils versus one with no special need pupils. Each of these four measures are derived from the simple regression which captures only the variation in the dependent variable (expenditures) associated with the special group. In this case, vertical equity exists when the correlation, the slope, and the elasticity are positive and the implicit weight is greater than 1. This condition can be interpreted as meaning that school divisions with higher percentages of special need pupils have higher per pupil dollar inputs.

A second approach, based on the relationship between expenditures and special need pupils is a ratio measure known as the averaged implicit weight. It is the ratio of the average per pupil objects for

special need pupils and the average per pupil object for non-special need pupils. As with the regression based implicit weight, vertical equity would require that the averaged implicit weight be greater than 1. In these instances, it can be concluded that the special need pupils do, indeed, receive more dollars than the non-special need pupils.

The data confirming the findings on vertical equity are found in Appendix C, Tables C-1 through C-5 contain supporting analyses for vertical equity. Each table provides data for specified analyses and specific years of the study.

Here, Tables 9, 10, and 11 summarize the relationship measures based on the regression and the ratio analyses for handicapped, disadvantaged and vocational pupils in Virginia. These tables are derived from the more complete tables found in the appendix.

Table 9 provides the vertical analysis of the relationship between state and local expenditures and handicapped pupils. The table shows that the results of a regression analysis indicate a positive linear relationship between the percentage of handicapped pupils and per pupil expenditures from state and local sources. The implicit weight, derived from the regression equation, shows that handicapped pupils receive on average more dollars than non-handicapped pupils. For example, using the implicit weight for 1985-86, a school division with 100 percent handicapped pupils would spend 4.5 times more per pupil than a school division with zero handicapped pupils. This analysis is based entirely on the regression equation of state and local expenditures with the percent of handicapped pupils.

The averaged implicit weight is a ratio analysis which is also found in Table 9. It shows that in 1985-86 handicapped pupils received

Table 9

Relationship Measures of Vertical Equity

State and Local Operating Expenditures with Handicapped Pupils

for Selected Years

Relationship Measures	Years 1978-79	1980-81	1982-83	1984-85	1985-86
State and Local Operating Expenditures (SLE with Percent of Handicapped Pupils (PH)					
PH					
mean	8.8	9.8	10.5	10.9	10.7
st. dev.	2.8	2.8	2.6	2.6	2.4
Regression:					
Correlations	.2429	.3241	.2352	.2478	.2750
Simple Slope	26.03	45.37	43.30	52.04	66.62
Elasticity	.2098	.2853	.2340	.2443	.2756
Implicit Weight	4.016	5.155	3.922	3.953	4.565
Ratio:					
Avg. Implicit Wt.	1.024	1.023	1.019	1.020	1.019

on average slightly more dollars per pupil than other non-handicapped pupils. The actual ratio was 1.019 in 1985-86. Table 9 confirms the findings in 5a, because the coefficients are positive, the implicit weight is greater than 1 and the averaged implicit weight is also greater than 1.

Table 10 and Table 11 present similar data for disadvantaged and vocational pupils which confirm findings 5a. and 5b. Here, the coefficients produced by the regression are all negative and both implicit weights indicate values less than 1. Findings 5b., 5c., and 5d. are supported by the data in Tables 10 and 11.

Table 10

Relationship Measures of Vertical Equity

State and Local Operating Expenditures with Disadvantaged Pupils

for Selected Years

Relationship Measures	Years 1978-79	1980-81	1982-83	1984-85	1985-86
State and Local Operating Expenditures (SLE with Percent of Disadvantaged Pupils (PD)					
PH					
mean	27.1	28.5	29.3	19.5	19.8
st. dev.	15.1	16.4	17.4	8.9	9.2
Regression:					
Correlations	-.1942	-.1507	-.1538	-.1232	-.1884
Simple Slope	-3.66	-3.59	-4.21	-7.42	-12.04
Elasticity	-.0910	-.0653	-.0636	-.0624	-.0922
Implicit Weight	.6923	.7844	.7957	.6998	.5735
Ratio:					
Avg. Implicit Wt.	.9282	.9381	.9176	.9512	.9589

Table 11

Relationship Measures of Vertical Equity

State and Local Operating Expenditures with Vocational Pupils

for Selected Years

Relationship Measures	Years 1978-79	1980-81	1982-83	1984-85	1985-86
State and Local Operating Expenditures (SLE with Percent of Disadvantaged Pupils (PD)					
PH					
mean	27.8	30.4	36.0	37.1	38.4
st. dev.	8.5	8.3	8.3	8.1	8.1
Regression:					
Correlations	-.1157	-.0795	-.0837	-.1934	-.2332
Simple Slope	-3.89	-3.74	-4.79	-12.78	-17.05
Elasticity	-.0988	-.0727	-.0412	-.2040	-.4734
Implicit Weight	.6761	.7770	.7729	.5433	.4734
Ratio:					
Avg. Implicit Wt.	.9988	.9971	.9964	.9821	.9834

Considering the data in Tables 9, 10, 11, hypothesis 5 suggesting that the Virginia system of public school finance ensures vertical equity, must be rejected. The analysis indicates a positive relationship between expenditures and percentage of special need pupils in only one of three categories of pupils.

Major Findings for Hypothesis 6

Hypothesis 6 proposes that the relationship between the percentage

of special need pupils and the expenditure per pupil has increased from 1979 to 1986. The actual data, however, indicate the following findings:

6a. There has been very little change in the statistical measures of vertical equity from 1979 through 1986.

Report of the Data

Once again, Tables 9, 10, and 11 provide not only the most recent data, but the results of each year included in the study. A quick inspection will reveal that the sign of the coefficients in the regression analysis have remained the same and the implicit weights have remained relatively constant. Vertical equity appears to exist for handicapped pupils because there is a positive linear relationship between expenditures and the percentage of these pupils and they appear to receive more dollar resources than do other pupils. A negative relationship exists for disadvantaged and vocational pupils and these pupils appear to receive fewer dollar objects than do average pupils. These basic relationships have not changed during the years of this study; therefore, hypothesis 6 is rejected.

Major Findings for Hypothesis 7

Hypothesis 7 is based on the notion that the presence of higher percentages or numbers of special need pupils in certain school divisions could account for legitimate sources of disparity in expenditure which should not be considered as inequitable. Indeed, these differences in funding would be required by the vertical equity principle. To examine this unique question, a special weighted

dispersion procedure was conducted using the three previously identified groups of special students. The results of this analysis suggest the following:

7a. The high degree of disparity in expenditures among school divisions and pupils observed in this and other studies cannot be explained by the increased costs of special needs pupils.

7b. A small amount of disparity in per pupil operating expenditures appears to be associated with higher expenditure levels required for handicapped pupils.

7c. The disparity in per pupil operating expenditures among Virginia's school divisions does not appear to be related at all to higher expenditures required by disadvantaged or vocational pupils.

Report of the Data

A third approach to analyze the existence of vertical equity involves the application of a weighted dispersion measurement. This approach assigns a weight to the special pupils and recalculates the original horizontal equity assessment. The concept suggests that if vertical equity exists than a portion of the disparity in per pupil objects will be due to legitimate expenditures for special need pupils.

Once the special need pupils are weighted and the resultant variance accounted for, the real disparity can then be assessed. If, however, after pupil weighting is applied, the disparity is not reduced, differences in pupils cannot be considered an explanation for the variance in expenditures.

Table 12

A Comparison of Horizontal and Vertically Weighted Dispersion Measures of State and Local Operating Expenditures for 1985-86

Dispersion Measures	Horizontal Equity	Vertically* Weighted	Percent (+) or (-)
Mean ($ per pupil)	2580	1619	+37.2
Median	2426	1528	+37.0
S.D.	591	426	+27.9
Range	3364	2489	+26.0
Federal Range Ratio	.9034	.9460	-4.7
Coefficient of Variation	22.91	26.31	-14.8
McLoone Index	.9091	.8823	-2.9

*Includes additional weights for handicapped pupils (2), for economically disadvantaged (2), and vocational pupils (1.8)

Table 12 compares the results of the horizontal dispersion analysis of state and local operating expenditures with a vertically weighted dispersion analysis. This vertically weighted approach includes additional weights for handicapped, disadvantaged and vocational pupils combined. Thus, all special need pupils, recognized in this study, were considered in this analysis. The resultant disparity was that which exists once the difference in pupil needs has been accounted for.

Table 12 shows equity gains in the central tendency measures and the range, but a consistent pattern of losses for the primary equity

measures. It can be concluded, as noted in finding 7a., that vertically weighting special need pupils higher than average pupils will not alone explain the differences in equity which exists under the current funding system.

Table 13

Comparison of Horizontal and Vertically Weighted Dispersion Measures by Category for State and Local Operating Expenditures for 1985-86

Dispersion Measures	Horizontal Equity Col. 1	Vertically Weighted Categories* Hndpped. Col. 2	Disadv Col. 3	Voctn Col. 4	Total Col. 5
Range	3364	2846	3626	2926	2489
Federal Range Ratio	.9034	.8713	.9861	.9475	.9460
Coefficient of Variation	22.91	22.11	26.11	25.18	26.31
McLoone Index	.9091	.9111	.8927	.8912	.8823

*Includes additional pupil weights for handicapped pupils (2), for economically disadvantaged pupils (2), and vocational pupils (1.8).

Table 13 provides a similar comparison, but in this instance the combined weights are separated by categories of special needs and analyzed independently using the vertically weighted method. The resultant table permits an analysis of the relative influence of each

weighted category. Column 2 represents the values of the equity measures when only handicapped pupils are vertically weighted. Column 3 and 4 provide similar information for disadvantaged and vocational pupils vertically weighted. Column 5 consists of the combined data previously reported in Table 12. Only Column 2, vertically weighted handicapped pupils, shows a reduction in disparity as compared to the horizontal analysis. Thus, finding 7b. indicates that only handicapped weightings have demonstrated improvement in equity and a reduction in disparity attributable to these special need pupils. Vertical weightings of disadvantaged and vocational pupils do not reflect improvement in the equity analyses and, therefore, it is reasonable to conclude that the disparity in operating expenditures cannot be explained by the presence of these special need pupils. Consequently, Hypothesis 7 is rejected.

Equal Opportunity by Local Characteristics

Adequacy in the context of this study is concerned with the provision of appropriate and equitable educational opportunities for all pupils. The word appropriate refers both to the vertical equity principle of a suitable program adjusted to the needs of special pupils and to the equal opportunity principle that the quality of the program should not be dependent upon the wealth of an individual area of the state. The provision of an adequate education, therefore, must meet the vertical equity standard and the equal opportunity standard according to local characteristics.

Despite the fairness of these concepts, a common perception among observers is that there are vast differences between suburban, urban and rural school division in both Virginia and the nation. Fundamentally,

there is no justifiable basis for one area of the state receiving more educational resources than another and absolute equal opportunity would require that there be no differences. To analyze this principle in Virginia, an approach was conceived to discover the key educational resources which differentiate between and, thereby, define separate economic and population areas of the state.

Hypotheses

Adequacy in educational resources among different economic and population areas of Virginia will be analyzed using the following hypotheses:

8. There is no significant difference in selected educational resources among urban, suburban, and rural school divisions and pupils in Virginia.

9. Since 1979, equal opportunity has improved among urban, suburban, and rural pupils and school divisions.

Major Findings for Hypothesis 8

Hypothesis 8 assumes that perfect equal opportunity exists between regions of the state in terms of access to educational resources. Many would suggest that this is not true but few could identify with accuracy the specific sources of these differences. The purpose of this analysis was to isolate through discriminant analysis the key variables which serve to identify and define these unique areas of the state. The data from the analysis suggest these major findings:

8a. There are significant differences in the between group means of educational resources available to four identified classes of school divisions and pupils. In 1984-85, the

significant differences in resources between school divisions were:

1. Average teacher salary;
2. Percent of disadvantaged pupils;
3. State Operating Expenditures, and
4. True tax rates.

In 1984-85, the significant differences in resources between pupil weighted school divisions grouped by local characteristics were:

1. Percent of disadvantaged pupils;
2. Average teacher salary;
3. Local operating expenditure;
4. Percent of vocational pupils;
5. State operating expenditures;
6. True tax rate, and
7. Eleventh grade reading achievement scores.

8b. The unit of analysis has an important impact on the identification if key variables between group members.

8c. The pupil weighted analysis yields descriptive variables which are more accurate in predicting school division classification according to a scale of urbanization.

Report of the Data

The principle of equal opportunity by local characteristics was analyzed by using a statistical technique known as discriminant analysis. A classification system for school divisions based on a scale of urbanization was adapted from a state legislative commission. The actual assignments of school divisions can be found in Appendix D, Table

D-1. A range of educational resource variables were compared against this classification to determine the between group differences. The objective was to determine those variables which defined school division membership in one of the four defined groups: (a) urban, (b) suburban, (c) rural, and (d) transitional school divisions. In a purely equitable system, there would be no significant differences in the between group means for each of the variables. If differences do exist, it is important to identify those variables and test the degree of variance between and within the groups. Also, it is important to know how much of the difference between the groups of school divisions can be explained by the classification system.

The discriminant analysis process provides three statistics and one table which are particularly useful in establishing answers to these questions. First, to determine if significant differences exist, the significance level of each key variable was calculated. The significance is a test for the equality of group means. If the observed significance level is small ($P < .01$), the hypothesis that all group means are the same is rejected.

A second statistic of importance, which is derived from the discriminant analysis, is the Wilk's lambda. When variables are considered individually, Wilk's lambda is the ratio of the within-group sum of squares to the total sum of squares. A lambda of 1 occurs when all observed group means are equal. Values close to zero occur when within groups variability is small compared to the variability between groups. Therefore, large values of lambda indicate that group means do not appear to be different and small values indicate differences.

The third statistic of relevance to this investigation is the canonical correlation. It is a measure of the degree of association between the discriminant scores and the groups. The correlation represents the proportion of total variance attributable to differences among the groups. Higher canonical correlations indicate a stronger relationship between the discriminant function, the variables, and the classification system. Between group variance is greater as the correlation increases. The square of the canonical correlation will yield the percent of variance explained by the key variables in the discriminant analysis.

A final source of data in determining group similarities or differences is the classification results table. For each group, this table shows the percentage of the correctly or incorrectly classified cases. Correctly classified groups appear on the diagonal of the table because here the actual groups match the predicted classification. Higher levels of correctly classified cases demonstrate the ability of the discriminant function to identify groups. As the percentage of correctly classified cases goes up, there is more variance and recognition between groups.

Tables providing this information for each year of the study can be found in Appendix D. Table D-2 through D-7 provide the statistical analysis for each year of the study and the key variables for each analysis.

Table 14 presents the discriminant analysis data for unweighted and pupil weighted school divisions in Virginia for 1984-85. Thirteen variables were processed for each analysis and the key variables displayed are those that proved to have significant differences between

the four group means. The table includes the significant variables used to define the classifications. For each key or significant variable, the table provides a Wilk's lambda statistic and a significance level. Also, a final Wilk's lambda and canonical correlation is provided for the total discriminant function. Additionally, a classification results table is included to indicate individual group predictions and the total percentage of correctly classified cases.

Table 14 indicates the significant variables in both questions, as well as final Wilk's lambdas and canonical correlations. Both classification tables show high degrees of correct classification. The data can be interpreted as showing significant differences between groups of school divisions classified on a scale of urbanization. For example, the four variables identified in the unweighted analysis have a low final Wilks' lambda of .3278, and a canonical correlation indicating that 42 percent of the variance between groups could be explained by group membership. Both classification tables show relatively high levels of correct classifications.

Table 15 lists the key variables from the discriminant equation and displays their group means and standard deviations. Similar comparisons and discriminant analysis data are available in Appendix D for 1978-79, 1980-81, and 1983-83.

The data confirms significant differences between groups of school divisions and pupils classified on a scale of urbanization. Accordingly, hypothesis 8 is rejected.

Major Findings for Hypothesis 9

With respect to the trends from 1979 through 1985 in classifying school divisions according to local characteristics, the discriminant

Table 14

Discriminant Analysis: Significant Variables Predictive of School Division Classification According to Urbanization in 1984-85

Step Entered Equation	Key Variables	Wilks' Lambda	Significance Level
	Unweighted		
1.	Average Teacher Salary	.68509	P .0001
2.	Percent Disadvantaged	.51698	P .0001
3.	State Oper. Expenditures	.39463	P .0001
4.	True Tax Rate	.32785	P .0001
Final Wilks' Lambda .3278		Canonical Correlation .6465	

Classification Results

Actual Groups	N	1	2	3	4
1 Urban	22	59.1%	31.8%	4.5%	4.5%
2 Suburban	28	10.7%	64.3%	14.3%	10.7%
3 Rural	32	0.0%	6.3%	84.4%	9.4%
4 Transitional	50	14.0%	16.0%	8.0%	62.0%
	132 Total	Cases Correctly Classified = 67.42%			

Weighted

1.	Percent Disadvantaged	.46591	P .0001
2.	Average Teacher Salary	.37858	P .0001
3.	Local Operating Expenditures	.30683	P .0001
4.	Percent Vocational	.27897	P .0001
5.	State Operating Expenditures	.25512	P .0001
6.	True Tax Rate	.23114	P .0001
7.	Reading Achievement Score	.22356	P .0001
Final Wilks" Lambda .2236		Cononical Correlation .7717	

Classification Results

Actual Groups	N	1	2	3	4
1. Urban	(22) 293,544	92.6%	7.4%	0.0%	0.0%
2. Suburban	(28) 419,64	0.0%	92.5%	2.9%	4.6%
3. Rural	(32) 124,896	25.3%	8.1%	61.8%	4.7%
4. Transitional	(49) 113,867	21.9%	22.1%	11.6%	44.4%
	(131) 951,949 Total	Correctly Classified = 82.76%			

Table 15

A Comparison of Grouped Mean Scores for Key Variables

Among School Divisions Classified by Urbanization

in 1984-85

Key Variables	1984-85	Means and Standard Deviations 1 Urban	2 Suburban	3 Rural	4 Transition	ST AVG
		UNWEIGHTED				
1. Average Teacher Salary		21,676	19,974	17,362	18,201	18,959
	SD	3,037	3,261	1,105	1,684	2,712
2. Percent Disadv Pupils		20.3	11.1	24.8	26.5	19.5
	SD	9.4	4.1	8.4	7.8	8.9
3. State Oper Expenditures		1,101	1,105	1,261	1,064	1,127
	SD	146	145	73	161	157
4. True Tax Rate		.96	.69	.58	.69	.71
	SD	.23	.22	.14	.28	.26
		Weighted				
1. Percent Disadv Pupils		23.0	8.1	23.8	21.4	16.4
	SD	9.4	4.0	7.2	7.3	10.1
2. Average Teacher Salary		21,812	22,806	17,758	18,591	21,333
	SD	2,060	4,167	1,015	1,536	3,603
3. Local Oper Expenditures		1,470	1,831	694	1,214	1,497
	SD	710	902	178	352	823
4. Percent Vocational Pupils		33.0	34.4	40.4	35.3	34.9
	SD	4.5	5.3	8.2	8.0	6.4
5. State Oper Expenditures		1,111	1,004	1,272	1,087	1,082
	SD	102	174	67	157	166
6. True Tax Rate		.92	.89	.59	.73	.84
	SD	.25	.25	.13	.26	.26
7. Reading Achievement Score		51.6	65.2	44.5	48.3	56.3
	SD	9.6	8.2	6.7	10.0	12.0

analysis yields the following major findings:

9a. Differences in urban, suburban, and rural school divisions are becoming more pronounced when analyzed on a pupil weighted basis.

9b. Differences in urban, suburban, and rural school divisions have remained relatively stable from 1979 to 1985, when compared on a school division basis.

9c. Average teacher salaries and local operating revenue have become more influential since 1983 in defining differences between school divisions and pupils.

Report of the Data

In considering hypothesis 9, the changes in the relationship between school divisions and pupils were analyzed. Table 16 compares the values of the important statistics for each analysis both for school divisions and pupil weighted school divisions. Findings 9a. and 9b. refer to the trends found in this table. It is clear that the pupil weighted data indicates lower Wilk's lambda values, higher canonical correlations and higher percentages of correctly classified cases than does the unweighted analysis. Each of the statistics indicate that pupil weighted school divisions are showing greater variance on the key variables identified and that these specified variables are explaining greater amounts of variance between school divisions. Over the years of the study, these relationships among the pupil weighted data have consistently grown where the unweighted school division comparison shows a more mixed trend.

Figures 4, 5, and 6 present the results of selected analyses using

Table 16

Results of Discriminant Analysis

with Unweighted and Weighted Variables

of School Divisions Classified According to Urbanization

Years	Final Wilks' Lambda	Canonical Correlation	Percent of Cases Correctly Classified
		Unweighted	
1978-79	.3694	.6165	64.66
1980-81	.4519	.5801	60.90
1982-83	.4467	.5913	60.15
1984-85	.3278	.6465	67.42
		Weighted	
1978-79	.2824	.7298	71.84
1980-81	.2898	.7271	73.07
1982-83	.2107	.7575	78.73
1984-85	.2236	.7717	82.76

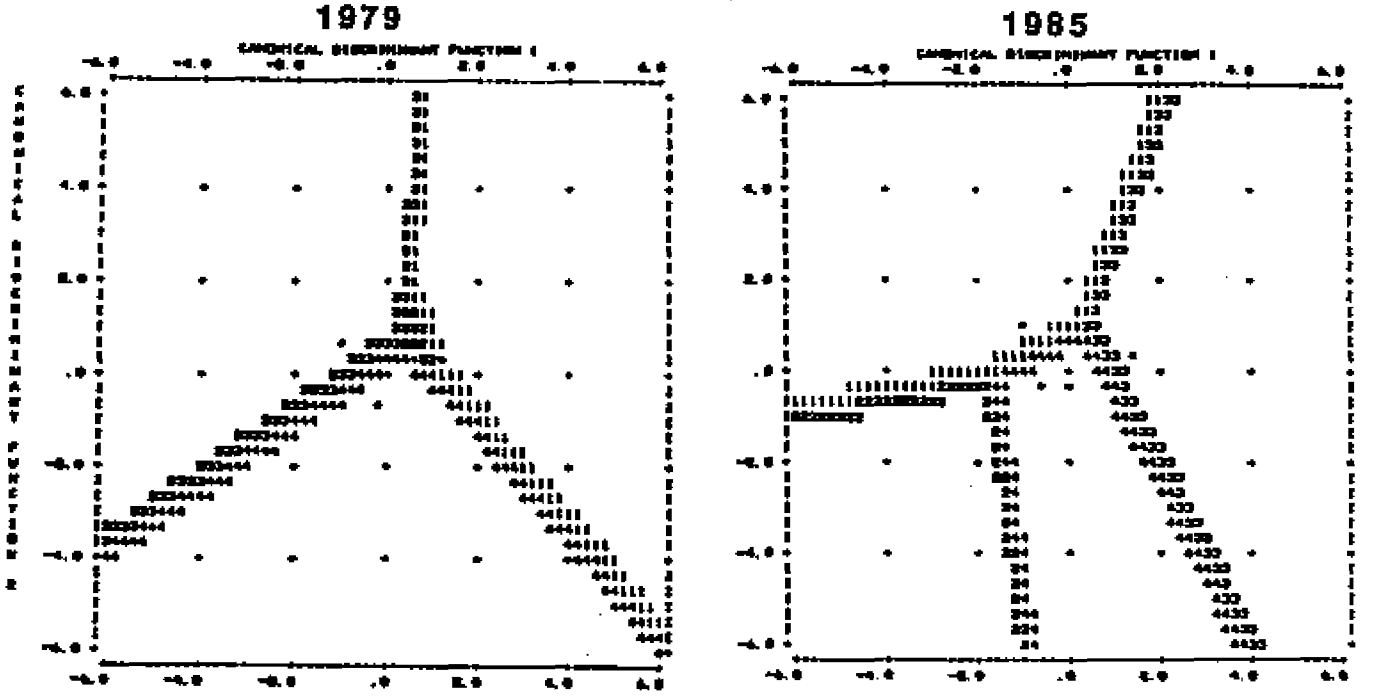
territorial maps and group scatterplots. These figures provide a visual representation of the stated findings. The numerals represent the groups and the group centroid or mean is represented by an asterisk (*). The territorial map provides a picture of the amount of within group variance and between group variance that exists. The numbered boundaries indicate the areas devoted to the majority of the group members. The scatterplots depicts the cluster of group values arrayed

Figure 4

Territorial Maps and Group Scatterplots

1979 and 1985

Unweighted Comparison



Scatterplots

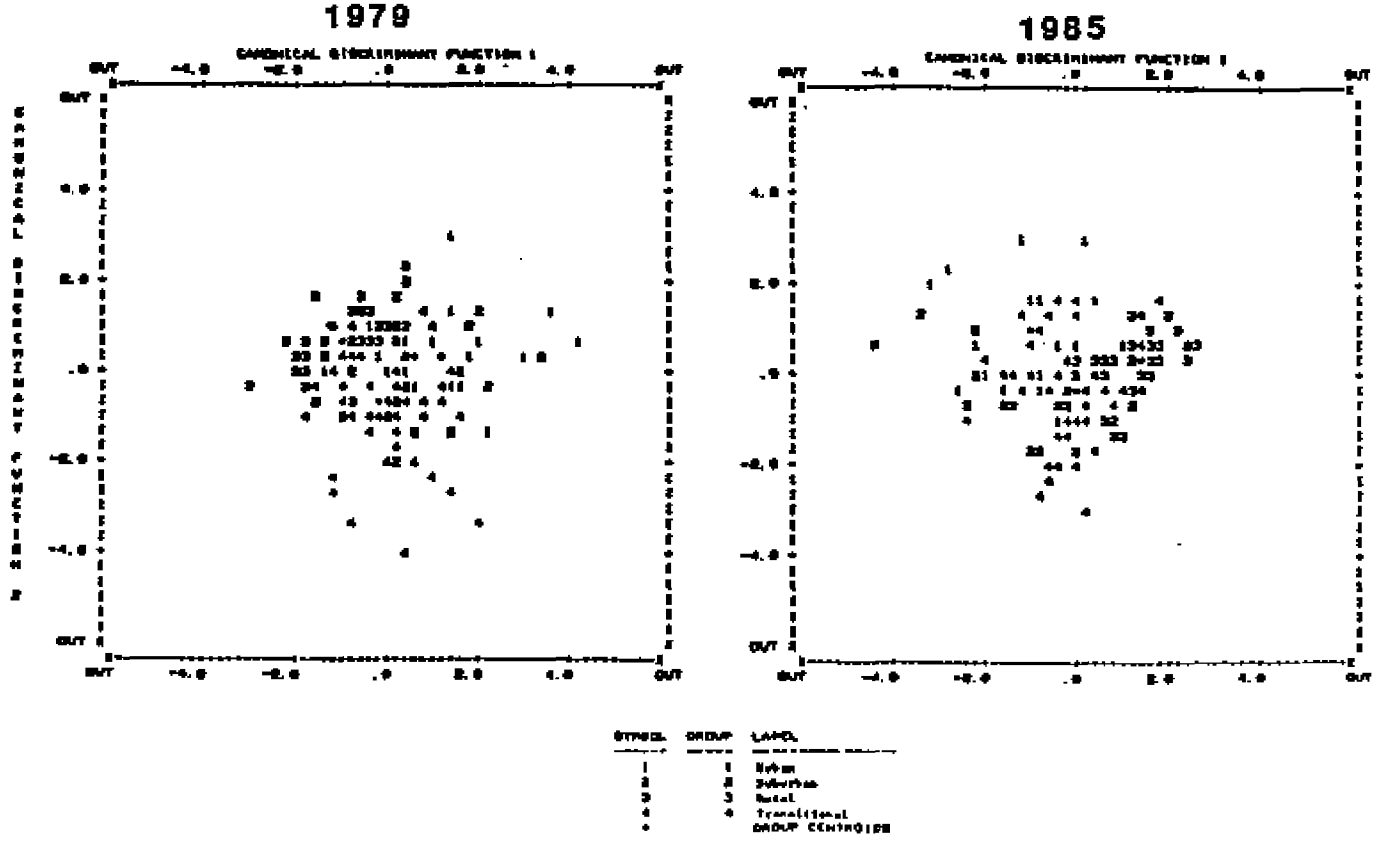


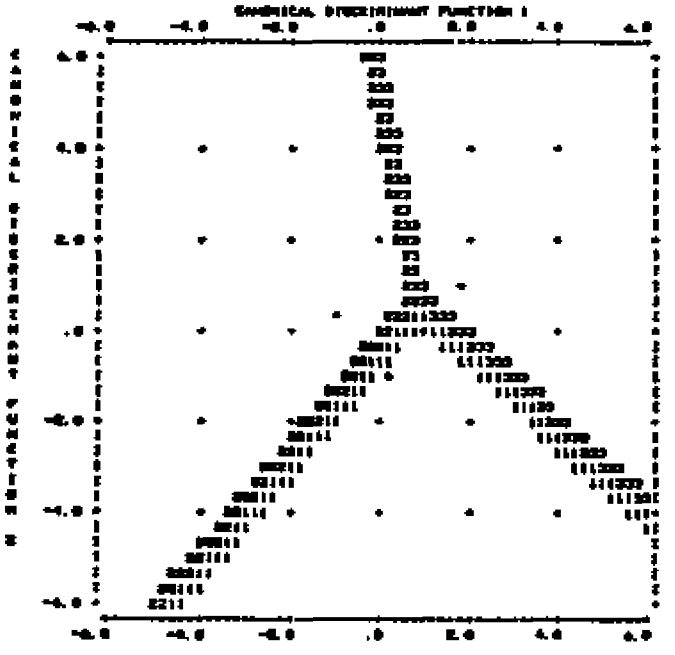
Figure 5

Territorial Maps and Group Scatterplots

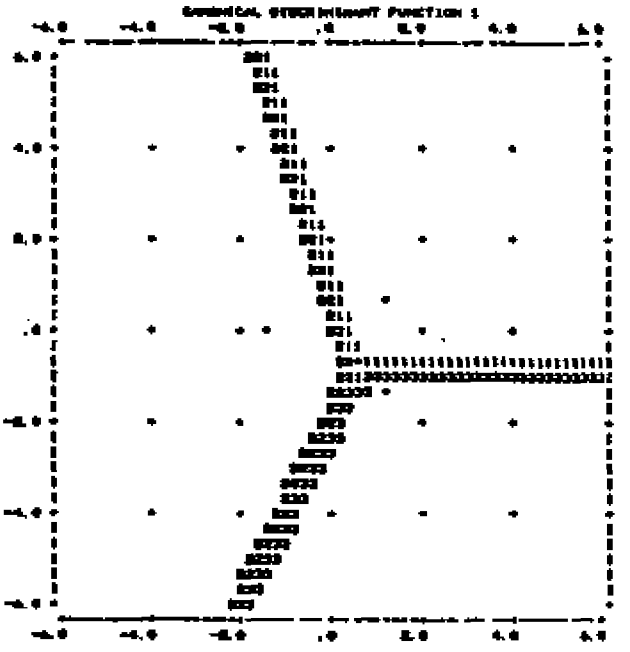
1979 and 1985

Weighted Comparison

1979

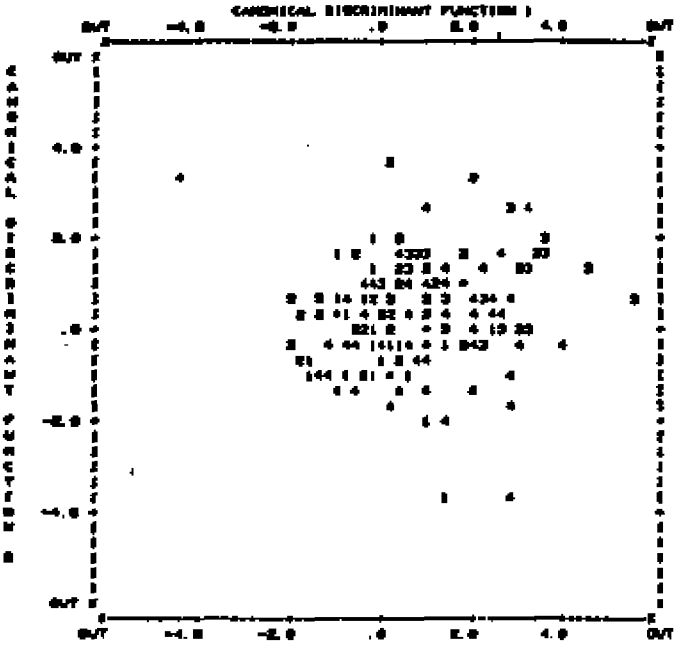


1985

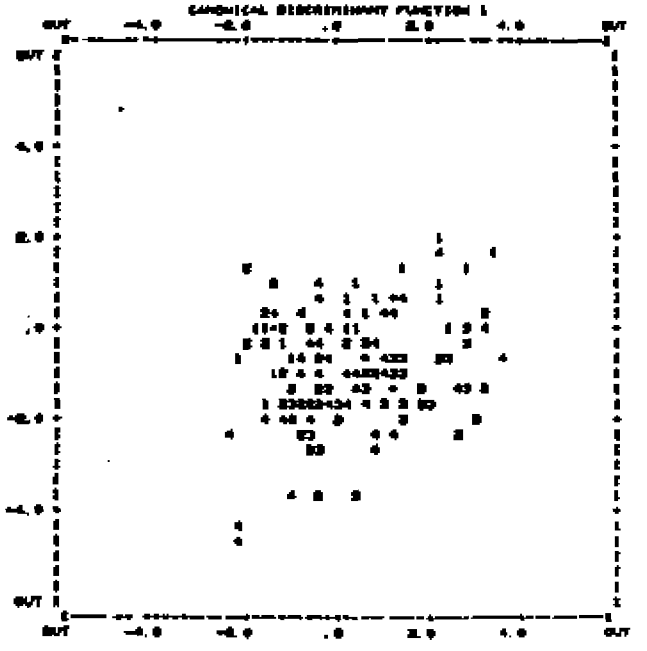


Scatterplots

1979



1985



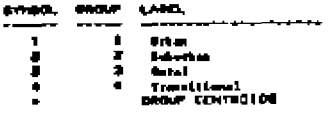
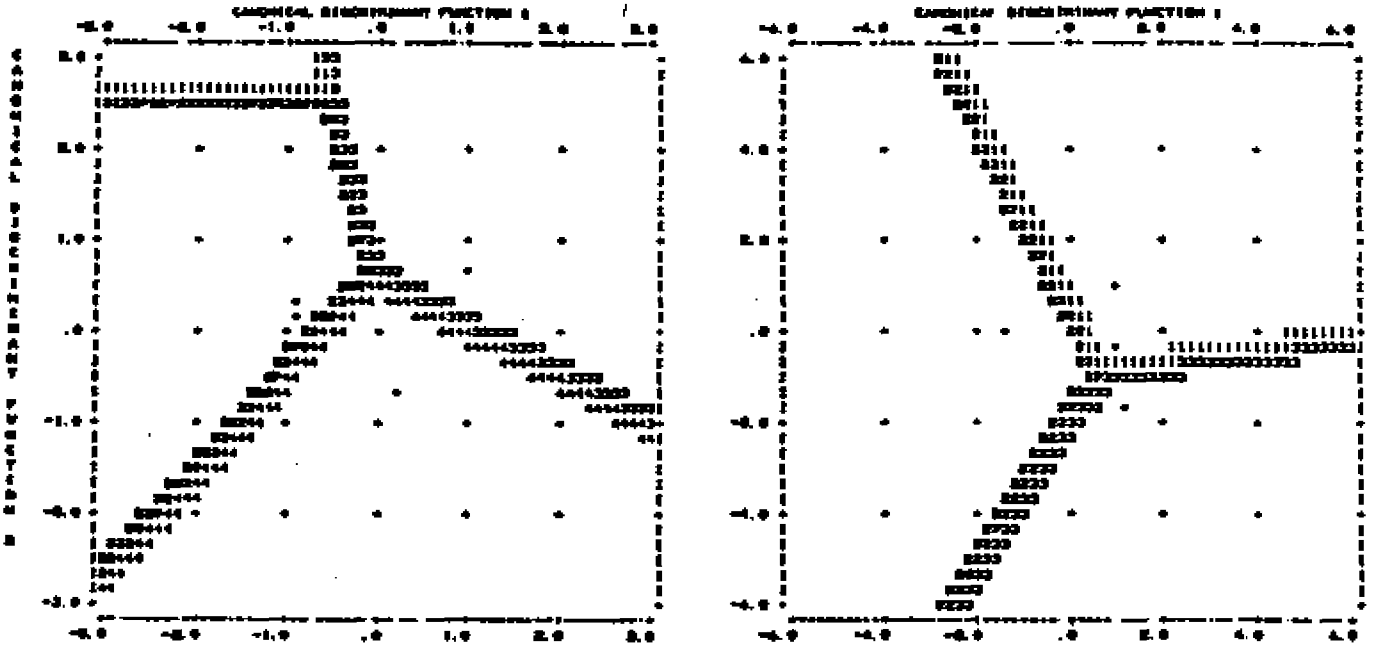


Figure 6

Territorial Maps and Group Scatterplots

1983 Comparison

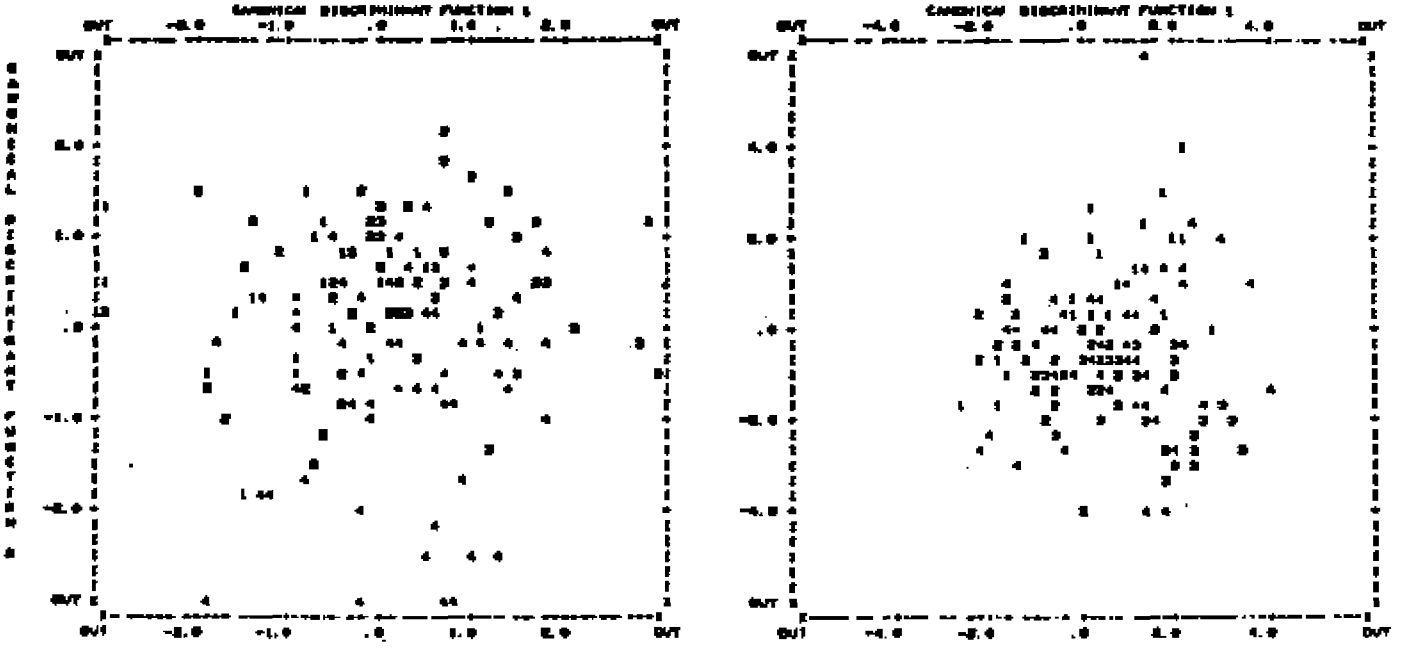
Unweighted versus Weighted



Scatterplots

Unweighted

Weighted



about the group mean or centroid. These charts are generated by the discriminant analysis and visually present the group associations.

Table 17, shows the key variables identified with their relative ranking across the years of the study. The composite ranking indicates the overall influence of the variables throughout the period. As described in finding 9c., the only interesting change in recent years is the emerging influence of average teacher salaries and local operating expenditures particularly in the pupil weighted comparisons. Data for 1985-86 was not available for all variables so this year was omitted from the analysis.

Figure 4 provides a picture of the unweighted comparisons between 1979 and 1985. The prominence of group 4 in both territorial maps indicates the rather loose association in the definitions of the three primary groupings. Group 4 is the transitional group which is generally expected to be difficult to predict. It is made up of school districts that are in transition from one group to another and its members share characteristics common to each of the other groups. It is the least exclusive of the three classifications and should not be a prominent factor in the analysis when there are consistent differences between the three primary groups. This pattern of group 4 influence is evident.

Figure 5 provides a picture comparison of 1979 and 1985 groupings for pupil weighted data. These illustrations show a clear delineation between the three primary groups and group 4. The territorial maps do not show the existence of group 4. The 1985 scatterplot shows a slightly more compact grouping of the individual observations. Both of these occurrences indicate greater between group variance and increased predictability. Figure 5 supports the presence of clear differences, as

Table 17

Composite Ranking of Significant Variables

from 1979, 1981, 1983, and 1985

Significant Variables*	Ranking 1979	1981	1983	1985	Composite Ranking
		Unweighted			
Percent of Disadvantaged	1	1	1	2	1
State Oper Expenditures	2	2	2	3	2
Average Teacher Salaries	---	3	3	1	3
True Tax Rate	4	---	---	4	4
Total Oper Expenditures	5	---	---	---	5
		Weighted			
Percent Disadvantaged	1	1	6	1	1
True Tax Rate	2	3	2	6	2
Reading Achievement Score	6	4	1	7	3
Percent Vocational	3	5	7	4	4
State Oper Expenditures	4	2	8	5	4
Average Teacher Salaries	5	8	---	2	6
Instructional Personnel	8	6	3	---	7
Local Composite Index	---	7	4	---	8
State-Local Expenditures	7	---	5	---	9
Local Oper Expenditures	---	---	---	3	10
Percent Handicapped	9	9	9	---	11

* $P < .01$ throughout the years of the study for the unweighted school division analysis. Figure 4 substantiates finding 9b. which states that

there has been little change in the unweighted analysis from 1979 to 1985.

stated in finding 9a., between school divisions when analyzed on a pupil weighted basis.

Figure 6 compares 1983 unweighted and weighted data. In the territorial maps, it is possible to identify group 4 in the unweighted analysis but not in the pupil weighted approach. The weighted scatterplot is much more closely grouped than the unweighted scatterplot.

These three figures are useful in demonstrating the associations implied in the previous tables. Clearly, distinctions between school divisions classified by categories of urbanization are greater when analyzed on a pupil weighted basis.

According to the statistical analysis of educational resources by school divisions and pupils separated by local characteristic, differences have increased from 1979 to 1985. Consequently, hypothesis 9 must be rejected.

Adequacy of State Funding

Educational adequacy has its origins as a principle of school finance in the San Antonio v. Rodriguez (1973) Case. The decision by the U.S. Supreme Court was partially based on whether Texas provided an adequate education when judged by the future demands of citizenship. The Court suggested that the objectives of state school finance plans should be an "adequate minimum educational offering" (p. 45), thus "assuring a basic education" (p. 49) for each child in the state. Justice Marshall, in a forceful dissent, questioned the Court's "retreat

from [its] historic commitment to equality of educational opportunity" (pp. 70-71). He disagreed with the argument that the state's minimum foundation program of funding to local school divisions automatically guaranteed an adequate education to every child (pp. 86-87).

Since Rodriguez in 1973, this standard of adequacy has become part of the language of school finance and its meaning has been variously explained and assessed. It is clear that adequacy must be viewed in two separate ways: (a) there must be educational adequacy in terms of programs and facilities, and (b) there must be adequate funding to ensure the provision of the program on a fair and equitable basis to all.

The previous portions of this study have documented a total state funding system which continues to permit significant levels of disparity in resources and a consistent relationship between local wealth and educational resources. While horizontal equity and equal opportunity are still important if unobtained objectives in Virginia, progress has taken place in recent years. The importance of state aid and its relationship to various equity measures was the subject of this final phase of the study.

Hypotheses

The specific hypotheses which guided this inquiry are as follows:

10. The General Assembly of Virginia has not ensured, through adequate state aid, the equitable provision of a high quality education for all children.
11. Increased state aid in recent years has resulted in a more equitable distribution of educational resources for all pupils.

Major Findings for Hypothesis 10

The Constitution of Virginia requires the General Assembly "to provide a system of free public schools for all children" and to "seek to ensure that an educational program of high quality is established and continually maintained" (Art. VIII, Sec. 1, Constitution of Virginia, 1971). In addition, the General Assembly is charged with reviewing the Standards of Quality and determining the cost of these standards and the manner in which the funds are to be provided. In the context of this study, the Standards of Quality (SOQ), established in 1974 and reviewed at two year intervals up to the present, has been accepted as the standard of educational adequacy in Virginia. The validity of the SOQ as a standard of minimal requirements has never been seriously questioned. The level of state support of these standards and the method of apportioning their costs has not been equally well received.

The study did not investigate the mechanics of the state system but rather the outcomes and the interactions between state and local aid in relation to the constitutional mandates. Unfortunately, the constitutional language is somewhat ambiguous in that it refers to the provision of a program of "high quality" as well as standards of quality which are to represent minimal requirements. Consequently, it is difficult to provide a definitive answer to the research hypotheses, but merely to suggest an answer indicated by the data analysis. The adequacy of state funds is ultimately a relative question and one which will remain an illusive political question.

However, the data analysis of the interaction of state and local revenue for public education suggests the following:

10a. There is little relationship between state funding and the

percentage of handicapped, disadvantaged, and vocational pupils attending Virginia's public schools.

10b. There is a significant positive relationship between the percentage of handicapped pupils and the amount of local operating expenditures.

10c. The proportion of state funding provided to poor rural school divisions is not great enough to offset the significant advantages in local revenue enjoyed by urban and suburban school divisions.

Report of the Data

As suggested by hypothesis 10, the statistical analysis for the adequacy of state aid was focused on the provision of an appropriate education for all pupils. Vertical equity or the unequal treatment of unequals was the first area to be tested. Analysis of the level of state support for special need pupils was conducted using relationship measures to investigate the link between various sources of operating expenditures and special need pupils. Appendix E contains the analysis tables and figures for the adequacy of state aid. Tables E-1 and E-2 represent the comparison of expenditures to special need pupils.

Table 18 lists correlation coefficients and significance levels for categories of special need pupils and four separate sources of operating expenditures. Note that these sources are the same operating dollar objects used throughout the study: total operating expenditures (TOE), state and local operating expenditures (SLE), local operating expenditures (LOE), and state operating expenditures (SOE). The consistent reference to these dollar objects as expenditures simply identifies these variables as they are found in the published statistical tables of

the state department of education. Operating expenditures by source are synonomous with revenue, but for ease in tracing these sources, the expenditure designation predominates.

According to Table 18, state funding (SOE) shows a slight positive relationship with disadvantaged pupils, but no significant relationship with the other two pupil groups. A surprising negative relationship exists between state aid and handicapped pupils but this is not highly significant. Local expenditures exhibit a significant positive relationship with handicapped pupils and also a significantly negative relationship with disadvantaged and vocational pupils.

The major findings indicate that there is little relationship between state funding (SOE) and the percentage of special need pupils in Virginia's public schools, and that the percent of handicapped pupils does appear to be related to local operating expenditures.

A second analysis of state and local aid sources and their individual influence on equity was addressed using the horizontal equity measure. Table 19D compares local and state operating expenditures separately for the two extreme years of the study: 1979, and 1986. Equity in these funding sources was measured by the coefficient of variation since it is the most comprehensive of the four horizontal measures used in the study. A complete analysis using all four measures is included in Appendix E, Table E-3.

High levels of disparity were recorded in local expenditures, 58.5 and 55.7, and quite low levels of disparity, 13.3 and 15.3, were found in state funding patterns for unweighted school divisions. The concept of equalization is not to fund all school divisions equally, but to

Table 18

Correlation Coefficients for Operating Expenditures by Source with the Percentage of Special Need Pupils in 1985-86

Percent Special Need Pupils	Expenditures by Source TOE	SLE	LOE	SOE
Handicapped	.2876	.2750	.2466	-.0625
	P .000	P .001	P .002	P .238
Disadvantaged	-.0589	-.1884	-.2000	.1612
	P .251	P .015	P -.2000	P .032
Vocational	-.2396	-.2332	-.2202	.0937
	P .003	P .004	P .006	P .143

Table 19

Comparison of the Equity of State Operating Expenditures and Local Operating Expenditures for 1979 to 1986

Equity Measures	LOE 1979	LOE 1986	Equity (+) or (-)	SOE 1979	SOE 1986	Equity (+) or (-)
			Unweighted			
Coefficient of Variation	58.5	55.7	+4.8	13.3	15.3	-15.0
			Weighted			
Coefficient of Variation	58.5	54.9	+6.2	13.2	16.0	-21.3

provide assistance in proportion to a localities needs and ability. For state aid to offset the disparity in expenditures created by local wealth and effort, it must exhibit very similar patterns of disparity or variation in its aid to localities. Finding 10. verifies this observable difference in state and local funding efforts.

Finding 10d. points to the differences that exist in school divisions in unique areas of the state. To investigate the adequacy of state and local funding across different types of school divisions, a multivariate analysis of variance was conducted on school division expenditures classified on a scale of urbanization. The 95% confidence interval was selected because it provides a more representative estimate of the prevailing range of values than does a point comparison of group means. The more complete relationship between groups according to resource variables can thus be displayed. The lack of variance in state funding is evident when compared to local sources of operating expenditures.

Figure 7 is a school division comparison using confidence intervals and Figure 8 is a similar comparison for pupil weighted school divisions. The difference in the range of confidence intervals is due to the difference in sample sizes between the two comparisons. These tables not only show the differences in variance between state and local sources of operating expenditures, but also demonstrate, again, the substantive differences in the unweighted and weighted forms of analysis. On the basis of these findings hypothesis 10 is rejected.

Major Findings for Hypothesis 11

An analysis of state funding trends and appropriate equity measures between 1979 and 1986 suggest the following findings:

11a. State aid is becoming slightly less equitable over time and local revenue for operating expenditures is becoming more equitable.

11b. State aid for the operating expenditures of public education in Virginia has increased by $848 million between 1979 and 1986. Consequently, state revenue has surpassed local revenue as a percentage of total operating costs.

Figure 7

A Comparison of 1985-86 State and Local Operating Expenditures by Sources for 95 Percent Confidence Intervals of Unweighted School Divisions Classified by Urbanization

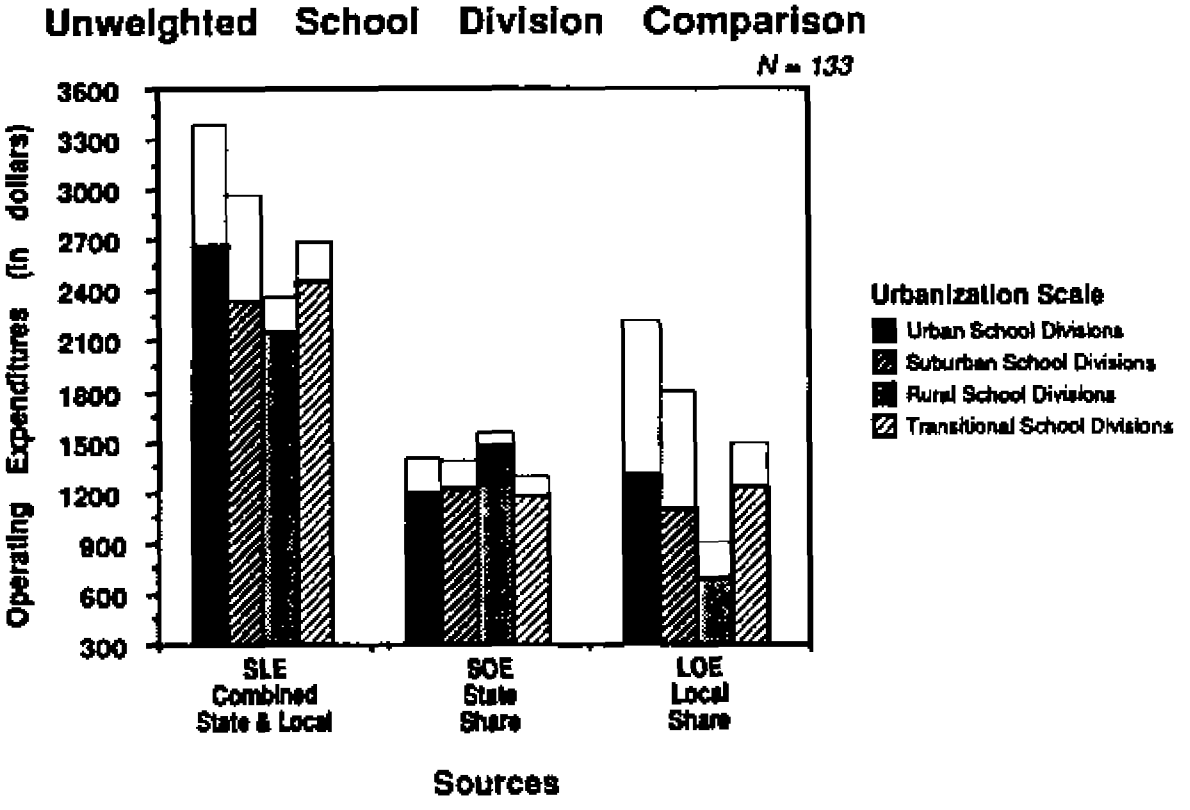
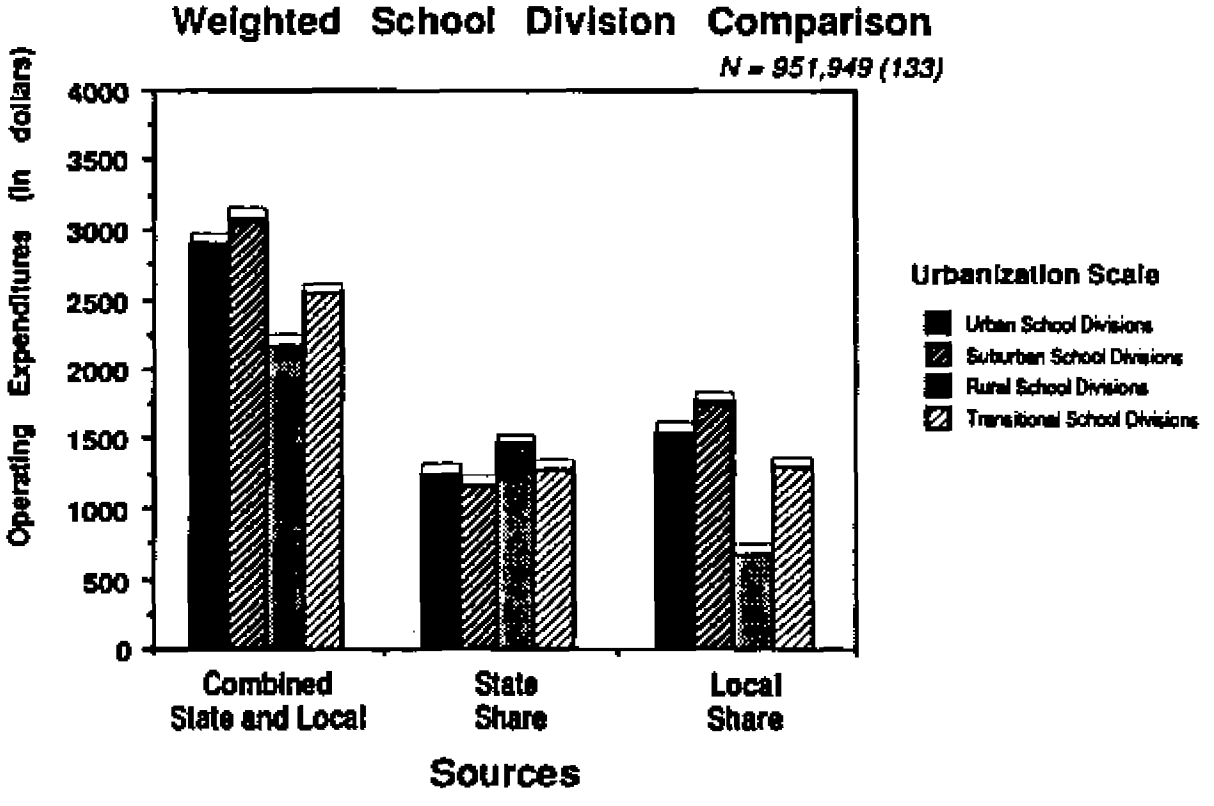


Figure 8

A Comparison of 1985-86 State and Local Operating Expenditures by Sources for 95 Percent Confidence Intervals of Weighted School Divisions Classified by Urbanization



11c. From 1983 to 1986, state aid increased its share of the total operating expenditures for public education by three percent, while local revenue declined by two percent and federal aid declined by one percent.

11d. During the same period, 1983 to 1986, key measures of horizontal equity, equal opportunity and vertical equity showed consistent gains for school divisions and pupils.

Report of the Data

In analyzing the trends in both state funding and equity from 1979 and 1986, several important relationships can be observed. First, finding 11a. suggests that state aid is becoming slightly less equitable while local revenue for schools is becoming more equitable. This can be seen in Table 19 where the coefficient of variation shows equity losses of -15.0 and -21.3 percent for state aid (SOE) and equity gains for local expenditures (LOE) of +4.8 and +6.2 percent. Between 1979 and 1986, state contributions to school operating expenditures were becoming more unequal in distribution and, at the same time, local contributions were becoming more equal throughout the state.

In terms of equity, this is a positive sign because the previous analysis in hypothesis 10 indicated that state aid is generally very equal in its distribution and local support is very unequal. If expenditure equity is to become a reality in Virginia, state aid must become more uneven inorder to offset the great variation in local ability and local effort. Additionally, local expenditures will have to become more similar with less variance between wealthy and poorer areas. The trend cited in this section supports movement in this direction, particularly at the state level.

Using a broader perspective, the aggregate data shows this same progress through the increase in state aid as a percentage of total operating expenditures. Finding 11b. suggests a shift from a reliance on local revenue to support public schools to greater reliance on state operating revenue. Table 20 compares the fluctuations in the total revenue sources for school operating expenditures from 1979 to 1986. These sources are state, local and federal revenue each contributing to

Table 20

Comparison of Dollar Operating Expenditures

by Sources and Percentage of Total Support

for 1979 and 1986

Sources of Total Operating Expenditures (TOE)	Years 1979	1986	Difference $ and Percent
State Revenue*	$707,679,683	$1,555,705,240	+$848,025,557
Percent of TOE	43.4	47.1	+3.7
Local Revenue	$745,594,683	$1,540,805,546	+$795,210,863
Percent of TOE	45.7	46.6	+0.9
Federal Revenue	$177,725,623	$ 209,749,800	+ $32,024,177
Percent of TOE	10.9	6.3	-4.6
Total Operating Expenditures	$1,630,999,989	$3,306,206,586	+$1,675,260,597

* Includes revenue from State Retail Sales and Use Tax.

Note: Data compiled from Statistical Data on Virginia's Public Schools: School Years 1978-79 and 1985-86, Virginia Department of Education, Richmond, 1980 and 1987.

total operating expenditures. The actual allocations from these sources are compared along with the relative percentage that each source represents in total expenditures.

The growth of the state share and the decline in federal aid are important features of this table. This trend towards greater influence of state aid in the total operating expenditures of local schools is particularly important if the data from 1983 to 1986 is analyzed. Table 21 demonstrates that during this most recent period, state aid as a percentage of total school operating expenditures increased by 3 percent while local funds decreased by 2 percent and federal aid declined by 1 percent.

Finding 11d. suggests that from 1983 to 1986 this shift towards greater state funding had a positive effect on most of the equity measures used in this study. The trends in the equity measures are

Table 21

Percentages of Total Operating Expenditures

Compared by Source from 1983 and 1986

Year	Sources			Total
	State	Local	Federal	Expenditures
1982-83	44.1	48.6	7.3	100%
1984-85	45.1	48.2	6.7	100%
1985-86	47.1	46.6	6.3	100%
Total Difference	+3.0	-2.0	-1.0	

Table 22
Percentage Gains (+) and Losses (-)
for Selected Horizontal, Equal Opportunity
and Vertical Equity Measures

Equity Principle Measurement Unit of Analysis	Percentage Gains (+) or Losses (-) for Years 1979	1981	1983	1985	1986	Total
Horizontal Equity						
1. Coefficient of Variation (SLE)						
School Division	---	+4.2	+1.2	+5.8	+0.8	+12.0
Pupil	---	+3.1	-0.4	+4.5	+5.5	+12.8
Equal Opportunity						
1. Correlation (SLE with LCI)						
School Division	---	-3.7	-0.9	+3.9	+4.8	+ 4.0
Pupil	---	+0.9	+1.7	-0.6	+2.9	+ 4.9
2. Elasticity (SLE with LCI)						
School Division	---	-0.1	+3.2	+13.9	+4.6	+21.6
Pupil	---	+1.6	+2.7	+9.1	+7.2	+20.7
Vertical Equity						
1. Correlation (SLE with Percent of Special Need Pupils)						
Handicapped	---	+Yes	-Yes	+Yes	+Yes	+Yes
Disadvantaged	---	-No	+No	-No	+No	-No
Vocational	---	-No	+No	+No	+No	+No

displayed in Table 22. This table compares the percentage gains and losses in equity over the entire period of the analysis. While the movement towards steady progress is quite consistent, it is particularly strong between 1983 and 1986. Positive gains are registered in all but one analysis of horizontal equity and equal opportunity. Vertical equity is more difficult to analyze; but, even here the trend is evident for handicapped and vocational pupils. On the strength of these findings hypothesis 11 is accepted.

These analyses indicate that while there is no evidence of a causal relationship; there is empirical data to suggest that as state aid has

increased, improvement has taken place in nearly every equity measure used in the study. Based on these findings, it is appropriate to accept hypothesis 11.

CHAPTER V

CONCLUSIONS, SUMMARY, AND RECOMMENDATIONS

Concern for school finance has been an active political question since the early 1970s in Virginia. Throughout these years, considerable attention has been devoted by state legislators, courts, and educational leaders to the identification of disparities in expenditures and wealth between the state's public school systems. In 1968, an unsuccessful legal challenge to the Virginia school funding system triggered a national school finance reform movement which ultimately influenced constitutional and school finance policy in the state. In 1975, Virginia implemented a new school aid formula which was designed to insure an equitable system of public education for all children.

Since the enactment of this new funding system, two national and three state studies have been undertaken to measure the equity and fiscal neutrality of the state finance plan. Early in 1978, Brown, Ginsburg, Killalea, Rosthal and Tron concluded a national assessment of the impact of school finance reform. Those researchers found that expenditure disparity across the nation had not decreased from 1970 to 1975 and, if anything, had increased slightly. In Virginia, it was found that greater disparities in resources for public schools existed in 1975-76, than before the implementation of the new funding plan. The researchers attributed much of the differences in total expenditures to

differences in local wealth which varied greatly within the state (1977, p. 211).

In the spring of 1978, Salmon and Shotwell published an article which confirmed the Brown study results for Virginia and suggested that the Virginia basic aid formula "remained an unsophisticated formula which does not take into consideration the variation in educational needs of the student population" (1978, p. 534). In 1981, Odden and Augenblick published a review of school finance reform in the late 1970's . In this study the authors ranked all states on a comparable analysis of expenditure disparity and wealth neutrality. Virginia ranked among the lowest 25 percent of states on both comparisons (1981, pp. 1-25).

Two unpublished doctoral dissertations have been written on the Virginia school finance system. Both studies analyzed the state plan in relation to the pre-1975 system of public school finance in Virginia. Vernall (1982) compared 1970 financial data with similar information in 1980. The author concluded that there had been no improvement in fiscal neutrality (equal opportunity) and that there was a clear relationship between the wealth of the school division and the level of its expenditure (p. 103). Jones (1984) similarly concluded that large revenue disparities existed in Virginia in 1981. In addition, the author reported that a relationship existed between fiscal equity and the amount of state aid allocated to local school districts. According to Jones, reduced state aid led to reduced equity and state aid had not been realistically provided in order to achieve the goal of fiscal equity.

In recognition that the Virginia studies had been conducted during periods of moderate state support for education and high inflation, the present study was begun. Improved measurement techniques, favorable trends in inflation and a rising level of state support for education all contributed to the need for further research. In addition, new political movements both at the state and national level signified a revived interest in public education and created a climate for change.

The present study was undertaken to provide a comprehensive measurement of equity and adequacy in public school funding from 1978-79 through 1985-86. Equity was analyzed in a variety of ways using both school divisions and pupils as the unit of analysis. Horizontal equity, equal opportunity, and vertical equity were the principles used to assess the concept of equity. Adequacy was measured in the provision of educational services to special need pupils, different types of school divisions, and as a function of the actual level of support throughout the period of analysis. The resulting data offers a detailed view of the current status of school finance in Virginia, as well as, a picture of the emerging trends which are a consequence of public policy.

Conclusions

The detailed methodology and findings have been described and presented in previous chapters. In the following section, the conclusions will be presented and discussed in each area of analysis.

Horizontal Equity

Horizontal equity is the principle of equal treatment of equals. In its most basic form, it embodies the concept of equality among school divisions and pupils throughout Virginia. The educational objects or

resources which were analyzed were dollars in operating expenditures and average teacher salaries. The allocation of instructional personnel per 1000 students was used as an additional variable representative of the pupil to teacher ratio. The results were analyzed according to two perspectives: (1) what is the most recent status of horizontal equity, and (2) what are th trends from 1979 to the most recent data year. A review of the findings listed in chapter four leads to the following conclusions concerning horizontal equity in Virginia's public schools:

1. Combined state and local operating expenditures continue to show evidence of high degrees of disparity among school divisions and pupils;
2. Resource variables such as teacher salary and teacher allocations per 1000 students are more equally distributed among school divisions and pupils than are the operating expenditure variables;
3. Recent increases in state contributions to operating expenditures have resulted in consistent but marginal improvement in horizontal equity during the period of the study;
4. There is some evidence that state emphasis on increasing teacher salaries has resulted in a decline in equality among school divisions in Virginia;
5. There is no evidence that any state policy initiatives implemented during the period of this study have had any effect on improving the disparity for the school divisions or pupils in the lower half of their respective groups, and
6. The unit of analysis, in horizontal equity studies has a meaningful influence on the measurement results.

The implications of the study of horizontal equity center around the preferred objectives of the state legislature. In recent years, more dollars have been directed towards the funding of public schools but few changes have occurred in the method of distributing these resources. As a result, horizontal equity remains an elusive and questionable state objective. The study findings suggest that more dollars do make a difference but that significant changes in horizontal equity will require more substantive adjustments in the method of distribution of these resources. More dollars directed towards special need pupils and poorer school districts appears to be the key to improved horizontal equity. The will of the legislature to pursue such an objective remains an unanswered questions.

Also, the study points towards the question of the appropriate unit of analysis for future research. On a national level most studies are reported using the pupil unit as the measure of analysis. In Virginia, however, almost all previous studies have been conducted using the school division as the basis of comparison. This is an important issue because the choice of school divisions or pupils can make a considerable difference in the analysis of equity. The school division unit of analysis treats each school division as if it had the same number of pupils. In this approach the school finance system is assessed as a distribution of school divisions rather than pupils. This method can create the mistaken impression that all systems are alike in size. This, of course, is not accurate, and constitutes a questionable practice. Future studies of the Virginia school finance system should use the pupil unit of analysis because it is more accurate and representative of the true nature of the characteristics and

relationships between divisions. The constitution speaks to the rights of pupils and it should be on this basis that equity is measured.

The present study also signals a danger in the recent state initiative towards increasing teacher salaries. Encouraging or mandating teacher salary increases without adequate support for poorer school divisions appears to have resulted in a loss of equity in teacher salary allocations across the state. Wealthier school divisions can meet the salary increases with smaller tax efforts than rural or urban divisions. This phenomena is not apparent on a pupil analysis, because more pupils reside in wealthier school divisions in the state. If teacher salary increases are vital to the restoration of excellence in public education, then greater equalization of ability to provide resources must become a priority.

Equal Opportunity

The equal opportunity principle in school finance refers to the negative concept that for equity to exist there may not be a relationship between the wealth of a locality and the resources available to the public schools. Often referred to as fiscal neutrality, this principle has been the basis for numerous challenges to state school funding systems throughout the country. The results of the study have produced the following conclusions concerning equal opportunity in Virginia's public schools:

7. Significant positive relationships exist between two measures of wealth and public school operating expenditures in Virginia;

8. The Local Composite Index is a stronger indicator of resource expenditures than the more traditional measure of true value of real property;
9. The pupil analysis yields higher relationship values than does the school division comparison;
10. The strength and magnitude of these relationships have been declining since 1983 in accordance with increases in state funding initiatives, and
11. Despite the progress in reducing the relationship between wealth and spending, equal opportunity in public school funding remains a significant problem of the Virginia school finance system.

The implications of these conclusions are rather self explanatary; operating expenditures in Virginia's public schools remain a function of local wealth rather than the wealth of the state as a whole. Some progress has been achieved and the trends are encouraging, but, the link between spending and wealth will not be erased until state funding becomes more directly associated with the ability of the local school divisions. Prior studies have supported the Local Composite Index (LCI) as an improved measure of local wealth. Currently, however, only half of the state funds are distributed through the equalization formula. To improve the provision of equal opportunity among pupils in Virginia, the state must agree to shift more of its financial resources to the equalized portion of the formula and reduce its use of categorical or non-equalized grants.

Vertical Equity

Vertical equity is the principle that recognizes that students are different and that true equity involves an affirmative requirement that unequal students receive appropriately unequal treatment. States, like Virginia, which accord to all citizens a fundamental interest in education, should recognize a responsibility to provide the additional services required for legitimately unequal pupils. The analysis of vertical equity in this study was based on the designation of three groups of special need pupils: the handicapped, the economically disadvantaged and vocationally inclined pupils. Vertical equity was assumed to be present if the special need pupils received greater percentages of expenditures than did non-special need pupils or if special need pupils received greater actual per pupil dollar expenditures.

The findings in chapter four support the following conclusions regarding vertical equity in Virginia:

12. Under several different analyses, vertical equity appears to exist for only handicapped pupils in Virginia;
13. Disadvantaged and vocational pupils received on average fewer resources than non-disadvantaged and non-vocational pupils. School divisions with higher percentages of special need pupils, on average, have fewer educational resources;
14. Even when federal dollars are included, disadvantaged pupils receive less educational resources than non-disadvantaged pupils in Virginia;
15. Because disadvantaged and vocational pupils are more likely to attend school in poor rural school divisions, additional state

funds are needed to offset the differences in local ability and ensure equitable educational resources;

16. The trend in vertical equity from 1979 to 1986 shows very little change in the distribution of educational resources.

Since 1975, Virginia has recognized the excess costs associated with handicapped and vocational pupils through a variety of categorical aid programs. These efforts were designed to provide funding to schools on a program or pupil allocation basis. There has been no attempt to adjust these state funds to the wealth or ability of the locality. It appears that a consequence of this funding system is the rather low level of support for disadvantaged and vocational pupils. Handicapped pupils do receive more overall funding but this is more a result of local effort and federal statute requirements than the general aid provisions. It would appear that the needs of the vocational students and the poor do not represent a high priority funding objective under the current state school finance scheme.

Equal Opportunity by Local Characteristic

Under equitable circumstances, there should be no significant differences in educational resources between school divisions and pupils grouped by categories of population and economic characteristic. Yet, rural, suburban and urban school divisions are perceived to experience different problems in obtaining educational resources. The study was designed, in part, to analyze these differences across a range of educational resources, to identify the significant variables, and to demonstrate their ability to predict group membership. The results of

several discriminant analysis procedures form the basis of the following conclusions:

17. In Virginia, there are significant differences between school divisions that are classified according to characteristics of urbanization; and, these differences result in inequity of educational opportunity;
18. Some key sources of inequity among school divisions appear to be average teacher salary, the percentage of disadvantaged pupils, the amount of state aid in operating expenditures, and the true tax rate of the locality;
19. The most significant variables can be identified using a pupil weighted unit of analysis, and
20. Contrary to previous trend analysis, the inequity between pupil weighted school divisions classified according to urbanization has been increasing since 1979. Key variables identified by the statistical analysis can be used to correctly classify greater than 80 percent of the pupil weighted school divisions.

These conclusions simply verify the perception that urban, suburban, and rural school divisions do not experience similar educational opportunities and that the state funding system does not adjust sufficiently for the unique needs of these areas. Particular attention should be directed towards the emergence of average teacher salaries as a significant variable which discriminates between these groups. The state has encouraged increasing salaries for instructional personnel but this effort appears to be having a differential and

disequalizing effect on school divisions throughout the Commonwealth. Suburban and urban areas are responding to state encouragement with higher salaries, while poorer localities are unable or unwilling to keep pace.

Another conclusion found in this analysis is that the presence of disadvantaged pupils significantly differentiates between school divisions. The state currently provides very little, if any, recognition of the unique needs of these students; and yet, differential aid directed at this variable would have a significant equalizing effect on total expenditures. Economically disadvantaged pupils tend to be over-represented in rural and urban school divisions. Virginia may no longer be able to shift this responsibility to federal funding sources. The current level of federal support does not appear to be adequate to offset the significant needs of these pupils.

Adequacy of State Aid

The purpose of this analysis was to determine the role that state aid plays in achieving equity in Virginia's public schools. The method used was to analyze the amount and the distribution of state aid under various equity perspectives. The conclusions of this final analysis are as follows:

21. Virginia has not made an effective effort to assist in the education of special need pupils. There is very little statistical evidence to show a relationship between state aid to localities and the percentages of handicapped, disadvantaged, and vocational pupils;

22. Despite increasing state aid, the variance in state support to individual school divisions is not sufficient to offset the large variations in local ability and support for education. Consequently, state aid is not an influencial factor in reducing inequity in educational resources among school divisions in the state, and
23. The level of state aid has been increased from 1979 to 1986, and this has had a positive effect on most of the horizontal and equal opportunity equity measures.

This section of the study has pointed out both a lack of equity in public school finance and a trend towards growing state support for education. Again, however, it is apparent that the emphasis on general fund increases is not sufficient to bring about meaningful changes in equity. The question of the distribution of state dollars must be addressed, at the same time, the total amount of state support is increased.

The results point out a lack of variance in the total state aid system. The allocation of state aid through both equalized and non-equalized accounts is relatively balanced between urban, suburban and rural school divisions. This system of allocation is not sufficient to overcome the advantages of wealthier school divisions. The school divisions with the greatest number of disadvantaged and vocational pupils are among the poorest in the state. The state aid distribution should be changed to direct more funds to special need pupils. This would address the vertical equity differences cited in a previous section of the study and also improve the equal opportunity differences experienced by rural and urban school divisions.

If the state was committed to improving equal opportunity and vertical equity, the amount of state aid allocated to the equalized portion of the funding system could be increased and a pupil weighting system, sensitive to the special needs of handicapped, disadvantaged, and vocational pupils, established. Only in this fashion, can the increases in state support result in true gains in equity and adequacy for local school divisions and pupils.

Summary

In concluding this study, it is important to focus on the several key points that can be drawn from the various analyses. First, horizontal equity in Virginia public school finance remains an unobtained objective. While some progress has been achieved by sincere efforts of the legislative and executive branches of government, much remains to be done to make educational equity a reality in the Commonwealth.

Second, equal opportunity, although improving, remains another objective for future efforts. Local ability continues to be the prime factor in determining the amount of educational resources.

Third, vertical equity is the most glaring failure in the current state school finance system. Handicapped students are the only special need pupils who appear to be receiving adequate amounts of financial support. This, however, appears to be a result of local initiative. State support for special need students is a serious problem which remains to be adequately addressed.

Fourth, greater amounts of state aid will not resolve the equity issue. While there has been important progress in state support of public education during the years of this study, meaningful changes in

equity will require additional effort. New distribution schemes will be needed to direct support to poorer school divisions and those with larger proportions of special need pupils. A pupil weighted basic aid distribution system could address this problem without completely withdrawing state support to wealthier school divisions. A phased-in shift from categorical grants to an equalized pupil weighted system would improve both horizontal and vertical equity and not require spiraling amounts of state revenue.

Fifth, the state initiatives for improving teacher salaries appears to represent a highly significant area of state school finance activity. The method used to stimulate growth in educational salaries will have a significant effect on educational equity. In the early years of this policy, the state merely encouraged school divisions by establishing certain salary increase objectives. In more recent years, the state has required specific percentage increases for each school division. The importance of such activities cannot be underestimated. Salaries represent a significant portion of the total operating expenditures of local schools and this study has demonstrated the emergence of teacher salaries as a key variable in differentiating between various types of state school divisions. Future state activity in this area may well activate a decline in equity unless provisions are made to adequately support and control such spending programs.

The final point which can be gleaned from this inquiry concerns the unit of analysis. Throughout this work the data was reported for both comparisons of school divisions and pupils. As discussed previously in this section, significant differences emerged between these two perspectives. It is the authors conviction that future studies by governmental

agencies or independent researchers should focus upon the pupil as the unit of analysis. There is great diversity within this state in terms of pupil population and other important educational characteristics. The emphasis in research should be on a consistent subject of analysis and the most accurate sources of information. Agreement on the pupil as the unit of analysis will not only bring Virginia into line with most other national state studies, but will allow researchers to become focused on the real recipients of the educational system.

Recommendations for Future Study

In reviewing this study, several areas of additional useful research should be mentioned. An important part of this investigation was the identification of legitimate differences between school divisions which might account for specific differences in operating expenditures. For instance, if vertical equity exists; then it could be argued that part of the disparity in expenditures between school divisions could be attributed to the presence of special need pupils. The current study was unable to substantiate this claim in Virginia; however, investigations of other potential sources of legitimate disparity should be studies. Adjustments in one form of funding may affect other aspects of the total equity equation.

An example of potential legitimate disparity would be a study of the true difference in costs attributed to particular special need pupils. In this study, the author relied on several national studies to approximate the average excess cost of education for handicapped, disadvantaged, and vocational pupils. Recently, several studies have been published which suggest refined measurement techniques to make these analyses within states. A thorough analysis of the number and

average cost of education for a range of special need pupils would be a valuable resource for school finance study in Virginia. A study of this nature could produce a pupil weighting scale which could serve a an important refinement to the current school finance system.

Another source of potential legitimate variance in expenditures between school divisions is the differential costs of education between areas of the state. A cost of education index would be roughly comparable to the cost of living index currently used to measure the differences in living expenses between localities. A cost of education index would identify the differences in costs associated with purchasing education in different areas of the state. There are a number of new techniques being developed for these studies which hold promise for the future of school finance research. At this point, only Florida has implemented a cost of education index as part of their school finance system. A study of this nature would be useful in addressing the concerns that have been raised by northern Virginia communities that experience a 17 percent cost of living rating as compared to the rest of the state. Recognition of the range of educational costs in the state would be another important contribution to the knowledge base for meaningful school finance reform.

Comment

Unfortunately, this study has not resolved the issues of equity and adequacy in public school finance in Virginia. Like most other complex issues involving fundamental cultural values, these problems defy concise and straight forward solutions. This study does suggest that progress has been achieved and signals some possible directions for further advancement. As many have suggested, the school finance issue

is primarily a political question that must be resolved through the interplay of values and forces in a dynamic process. The courts, the legislature, educators and citizens will determine the course of public school finance in Virginia and the nation. The constitution, the courts, and current school law will continue to point the way, but the actual process will be determined within the political arena.

APPENDIX A

Various Analyses of Horizontal Equity 1979 to 1986

Appendix A

List of Tables

List of Figures

Table A-1

Horizontal Equity Measures of Total Operating Expenditures

for Unweighted and Weighted School Divisions

Across Selected Years.

Horizontal Equity Measures	School Years 1978-79	1980-81	1982-83	1984-85	1985-86
Total Operating Expenditures (TOE)					
	Unweighted				
Mean	1448	1981	2384	2862	3167
Median	1376	1896	2285	2752	3055
Standard Deviation	308	412	487	543	591
Range	2039	2583	3083	3346	3616
Federal Range Ratio	.7456	.7365	.7839	.7221	.7099
Coefficient of Var.	21.29	20.79	20.44	18.98	18.66
McLoone Index	.9163	.9146	.9148	.9166	.9154
	Weighted				
Mean	1551	2109	2579	3110	3426
Median	1448	1983	2385	2829	3226
Standard Deviation	359	492	607	694	723
Range	2039	2583	3083	3346	3616
Federal Range Ratio	.8467	.9373	.8647	.9035	.8998
Coefficient of Var.	23.13	23.34	23.54	22.33	21.10
McLoone Index	.8888	.8839	.8985	.9137	.8939

Table A-1.1

Horizontal Equity Gains or Losses

on Selected Measures of Total Operating Expenditures

from 1978-79 to 1985-86 School Years.

Equity Measures	Percentage Gains (+) and Losses (-) Unweighted	Weighted
Range	-77.0	-77.0
Federal Range Ratio	+4.8	-6.3
Coefficient of Variation	+12.4	+8.8
McLoone Index	-0.11	+0.57

Table A-2

Horizontal Equity Measures of State and Local Operating Expenditures

for Unweighted and Weighted School Divisions

Across Selected Years.

Horizontal Equity Measures	School Years 1978-79	1980-81	1982-83	1984-85	1985-86
State and Local Operating Expenditures (SLE)					
Unweighted					
Mean	1092	1562	1936	2322	2580
Median	1018	1476	1830	2233	2426
Standard Deviation	284	390	475	536	591
Range	1848	2534	3003	3245	3364
Federal Range Ratio	.9844	.9003	.9259	.8848	.9034
Coefficient of Var.	26.04	24.97	24.55	23.09	22.91
McLoone Index	.9084	.9051	.9019	.8870	.9091
Weighted					
Mean	1200	1700	2144	2578	2855
Median	1096	1519	1960	2316	2665
Standard Deviation	347	476	602	690	719
Range	1848	2534	3003	3245	3364
Federal Range Ratio	1.0460	1.0970	1.0830	.9706	.9917
Coefficient of Var.	28.92	28.01	28.09	26.77	25.19
McLoone Index	.8632	.8882	.8712	.8830	.8623

Table A-2.1

Horizontal Equity Gains or Losses

on Selected Measures of State and Local Operating Expenditures

from 1978-79 to 1985-86 School Years.

Equity Measures	Percentage Gains (+) and Losses (-) Unweighted	Weighted
Range	-82.0	-82.0
Federal Range Ratio	+8.2	+5.2
Coefficient of Variation	+12.0	+12.9
McLoone Index	+0.08	-0.11

Table A-3

Horizontal Equity Measures of Average Teacher Salary

for Unweighted and Weighted School Divisions Across Selected Years.

Horizontal Equity Measures	School Years 1978-79	1980-81	1982-83	1984-85
Average Teacher Salary (ATS)				
	Unweighted			
Mean	11,934	13,947	16,521	18,947
Median	11,651	13,627	15,950	18,539
Standard Deviation	1,624	1,930	2,323	2,693
Range	10,657	13,179	15,840	17,537
Federal Range Ratio	.3532	.3508	.3867	.4225
Coefficient of Var.	13.61	13.84	14.06	14.22
McLoone Index	.9434	.9390	.9482	.9242
	Weighted			
Mean	13,309	15,582	18,550	21,329
Median	12,670	14,780	17,760	21,010
Standard Deviation	2,508	2,916	3,419	3,603
Range	10,657	13,179	15,840	17,537
Federal Range Ratio	.7079	.7184	.6905	.6542
Coefficient of Var.	18.85	18.71	18.43	16.89
McLoone Index	.9116	.9171	.9027	.8855

Table A-3.1

Horizontal Equity Gains or Losses on Selected Measures

of Average Teacher Salary from 1978-79 to 1984-85 School Years.

Equity Measures	Percentage Gains (+) and Losses (-) Unweighted	Weighted
Range	-65.0	-65.0
Federal Range Ratio	-19.6	+7.6
Coefficient of Variation	-4.4	+10.4
McLoone Index	-2.03	-2.90

Table A-4

Horizontal Equity Measures of Instructional Personnel Allocation

for Unweighted and Weighted School Divisions

Across Selected Years.

Horizontal Equity Measures	School Years 1978-79	1980-81	1982-83	1984-85
Instructional Personnel Per 1000 Students (IPS)				
Unweighted				
Mean	62.0	64.6	65.8	68.1
Median	60.6	63.1	65.3	66.4
Standard Deviation	6.7	6.9	6.4	6.5
Range	48.1	46.1	33.1	39.6
Federal Range Ratio	.3578	.3728	.3664	.3181
Coefficient of Var.	10.80	10.70	9.76	9.61
McLoone Index	.9432	.9436	.9312	.9472
Weighted				
Mean	60.6	63.0	63.9	65.9
Median	59.7	61.6	63.9	64.4
Standard Deviation	4.7	5.1	5.1	5.4
Range	48.1	46.1	33.1	39.6
Federal Range Ratio	.2980	.2966	.3060	.3438
Coefficient of Var.	7.80	8.17	7.92	8.21
McLoone Index	.9548	.9488	.9387	.9613

Table A-4.1

Horizontal Equity Gains or Losses on Selected Measures

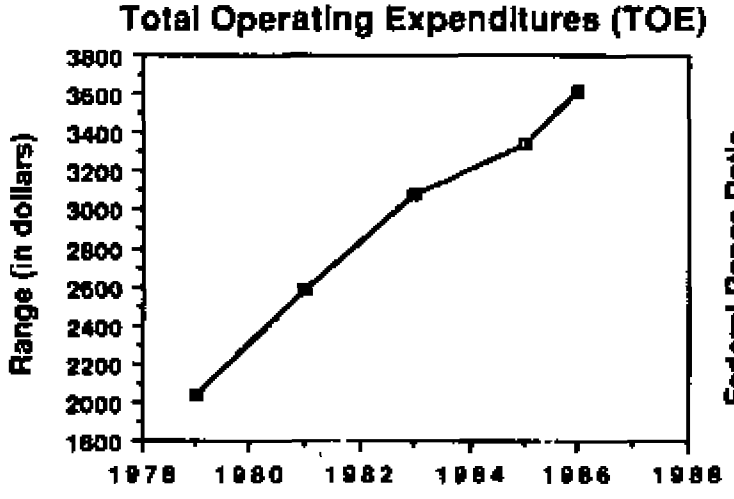
of Instructional Personnel Allocations Per 1000 Students

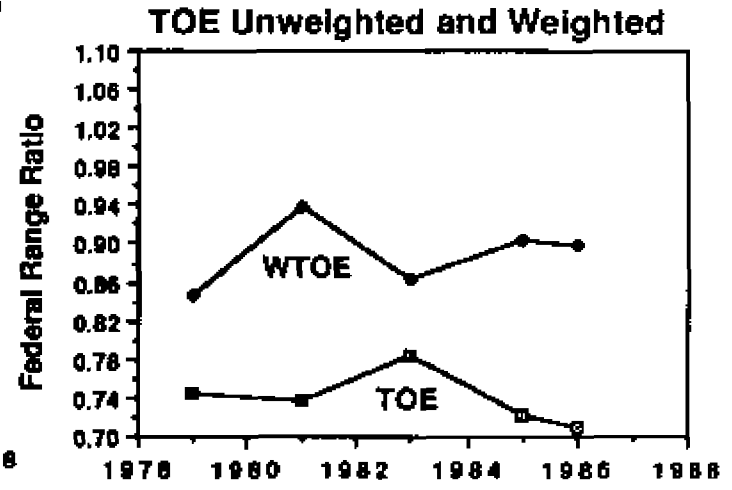
from 1978-79 to 1984-85 School Years.

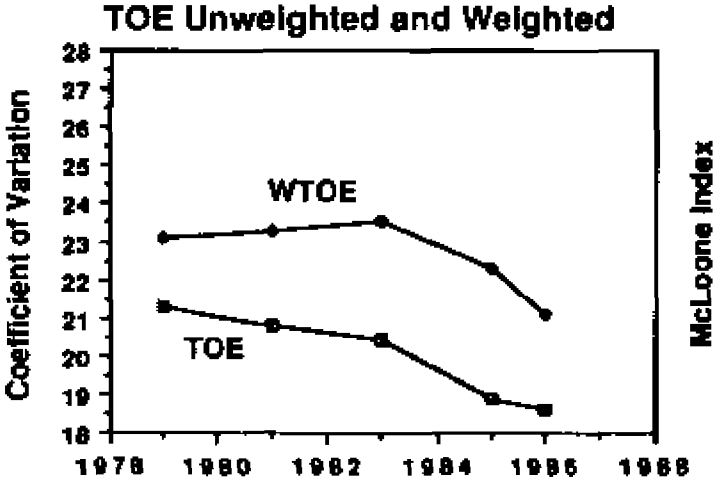
Equity Measures	Percentage Gains (+) and Losses (-) Unweighted	Weighted
Range	+17.7	+17.7
Federal Range Ratio	+11.1	-15.4
Coefficient of Variation	+10.9	-5.6
McLoone Index	+0.42	+0.68

Figure A-1

A Comparison of Horizontal Equity Measures for Total Operating Expenditures (TOE)







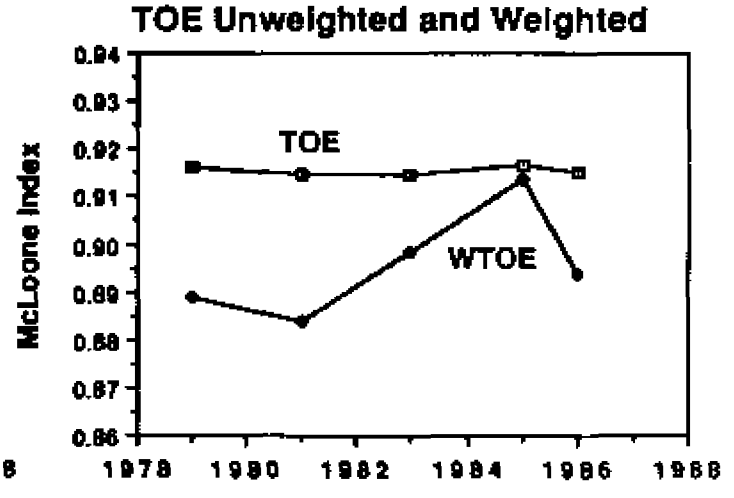
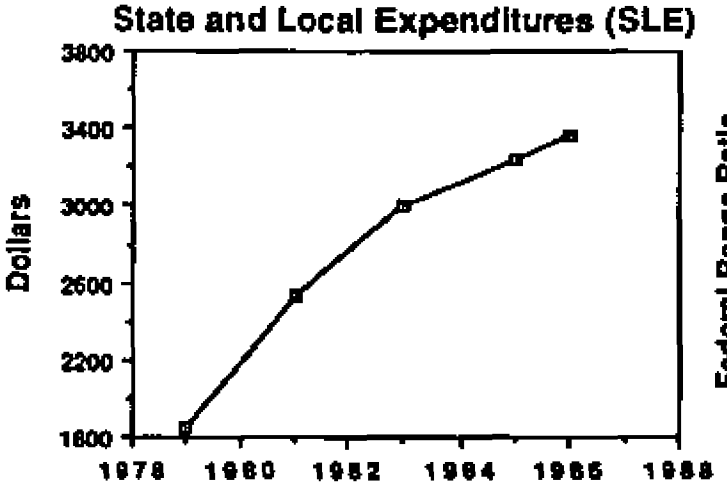
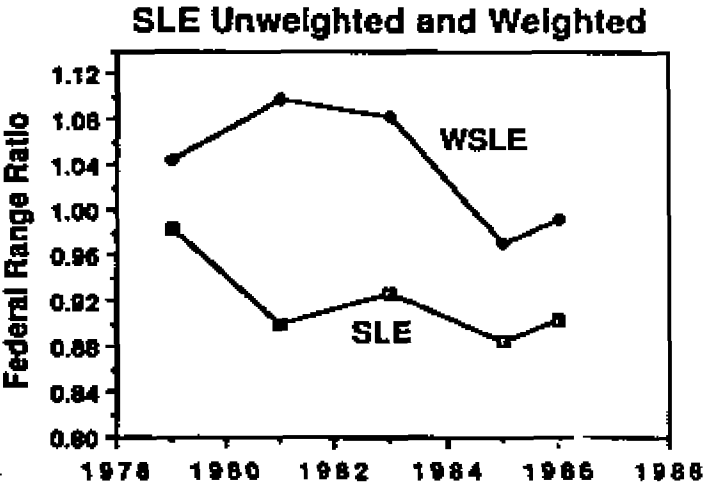
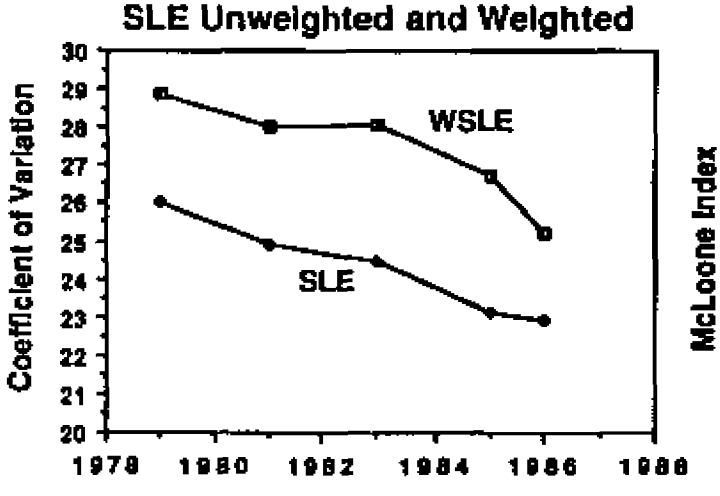


Figure A-2

A Comparison of Horizontal Equity Measures for Unweighted and Weighted State and Local Operating Expenditures (SLE)







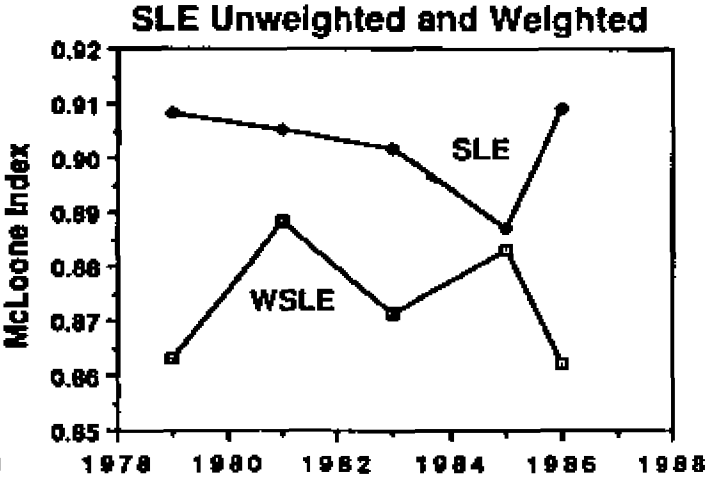


Figure A-3

A Comparison of Horizontal Equity Measures for Weighted and Unweighted Average Teacher Salaries (ATS)

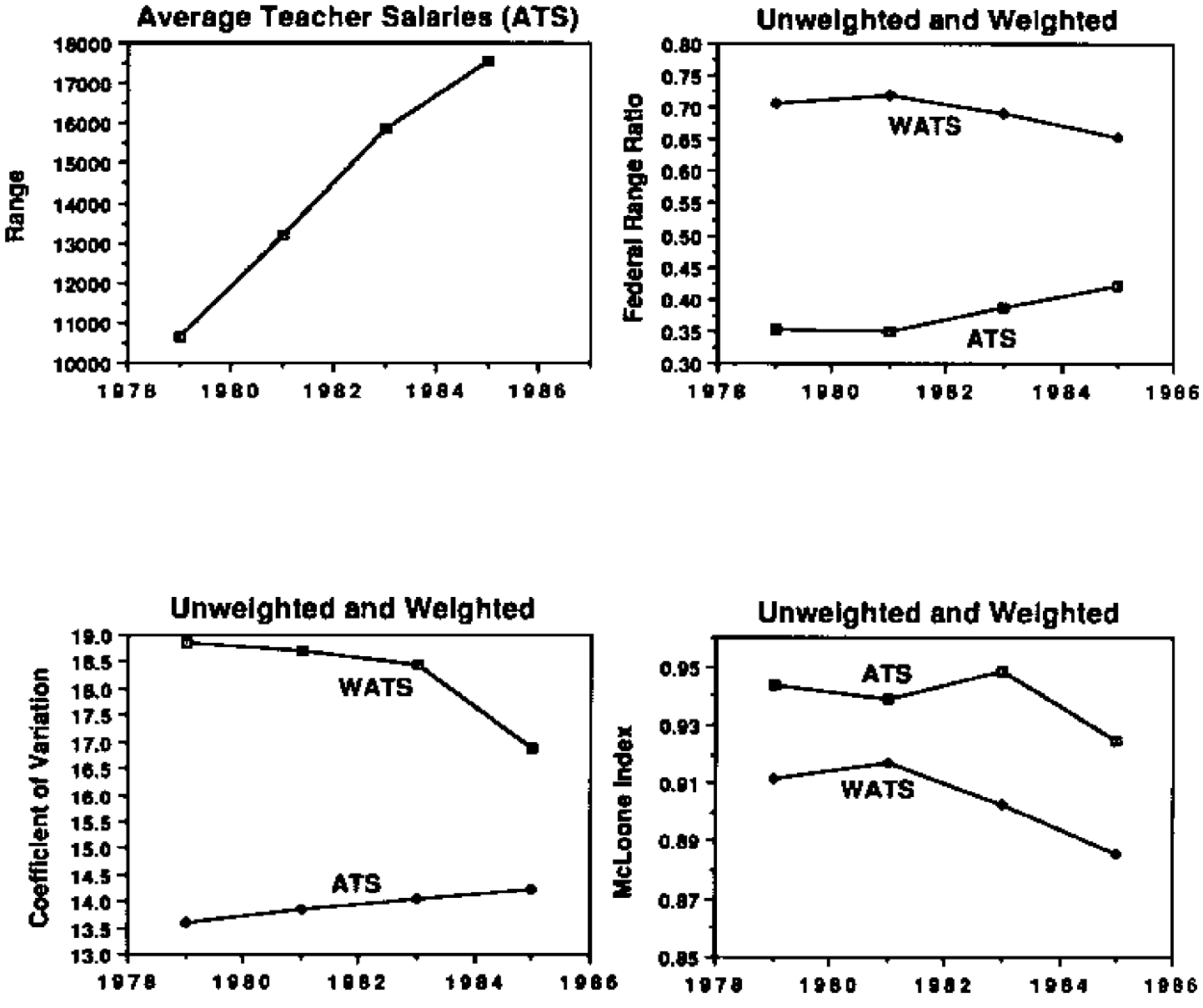
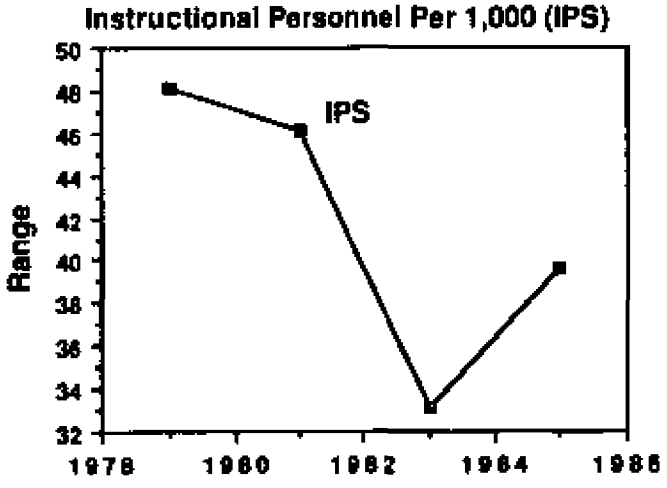
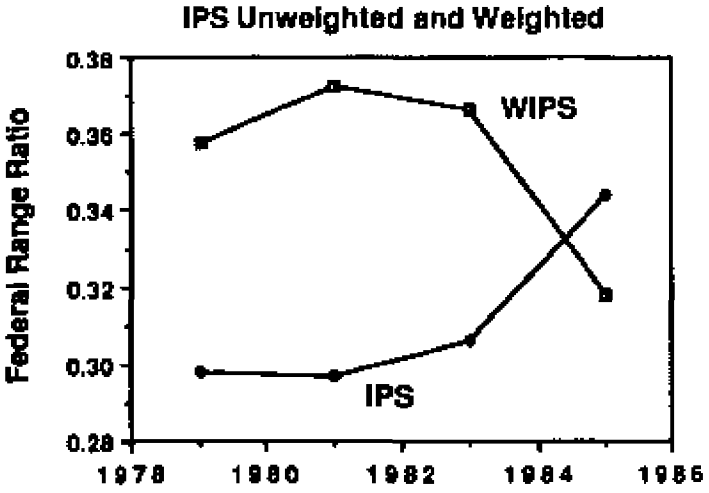
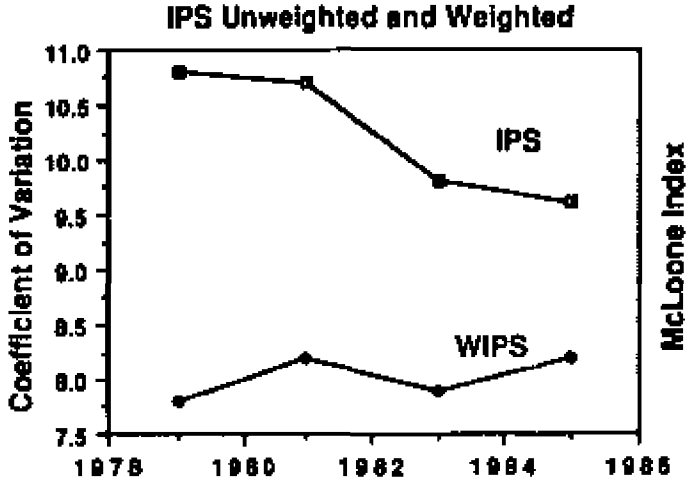


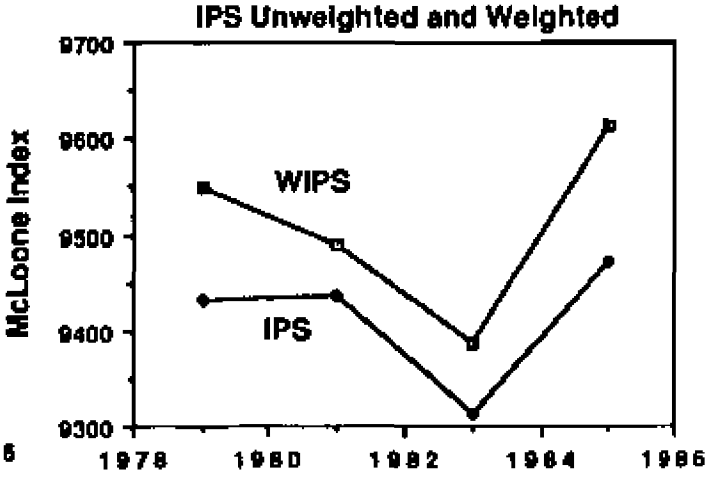
Figure A-4

A Comparison of Horizontal Equity Measures for Unweighted and Weighted Instructional Personnel Per 1,000 Students (IPS)









APPENDIX B

Various Analyses of Equal Opportunity 1979 to 1986

Appendix B

List of Tables

List of Figures

Table B-1

Equal Opportunity Measures of Total Operating Expenditures with True Value of Real Property.

School Years	Correlation Coefficient	R Square	Coefficient of Elasticity	Significance Level
		UNWEIGHTED		
1978-79	.4864	.2366	.1640	.0000*
1980-81	.5756	.3313	.2123	.0000*
1982-83	.5799	.3363	.1968	.0000*
1984-85	.5908	.3491	.1731	.0000*
1985-86	.5558	.3089	.1602	.0000*

School Years	Correlation Coefficient	R Square	Coefficient of Elasticity	Significance Level
		WEIGHTED		
1978-79	.5967	.3561	.2724	.0000*
1980-81	.6346	.4027	.3124	.0000*
1982-83	.6015	.3618	.2662	.0000*
1984-85	.6291	.3957	.2506	.0000*
1985-86	.6066	.3680	.2292	.0000*

* P< .01

Table B-2

Equal Opportunity Measures of Total Operating Expenditures with the Local Composite Index.

School Years	Correlation Coefficient	R Square	Coefficient of Elasticity	Significance Level
		UNWEIGHTED		
1978-79	.7087	.5023	.4582	.0000*
1980-81	.7325	.5366	.4657	.0000*
1982-83	.7437	.5530	.4529	.0000*
1984-85	.7129	.5083	.3814	.0000*
1985-86	.6800	.4624	.3576	.0000*

School Years	Correlation Coefficient	R Square	Coefficient of Elasticity	Significance Level
		WEIGHTED		
1978-79	.8284	.6862	.6249	.0000*
1980-81	.8272	.6842	.6447	.0000*
1982-83	.8190	.6708	.6353	.0000*
1984-85	.8041	.6466	.5583	.0000*
1985-86	.7718	.5957	.5085	.0000*

* P< .01

Table B-3

Equal Opportunity Measures of State and Local Operating Expenditures with the True Value of Real Property.

School Years	Correlation Coefficient	R Square	Coefficient of Elasticity	Significance Level
		UNWEIGHTED		
1978-79	.4867	.2369	.2011	.0000*
1980-81	.5725	.3277	.2536	.0000*
1982-83	.5817	.3384	.2374	.0000*
1984-85	.5941	.3529	.2113	.0000*
1985-86	.5559	.3090	.1967	.0000*

School Years	Correlation Coefficient	R Square	Coefficient of Elasticity	Significance Level
		WEIGHTED		
1978-79	.6268	.3929	.3577	.0000*
1980-81	.6554	.4296	.3875	.0000*
1982-83	.6157	.3791	.3249	.0000*
1984-85	.6515	.4244	.3115	.0000*
1985-86	.6326	.4002	.2859	.0000*

* P< .01

Table B-4

Equal Opportunity Measures of State and Local Operating Expenditures with the Local Composite Index.

School Years	Correlation Coefficient	R Squared	Coefficient of Elasticity	Significance Level
		UNWEIGHTED		
1978-79	.7257	.5267	.5739	.0000*
1980-81	.7527	.5666	.5747	.0000*
1982-83	.7599	.5774	.5561	.0000*
1984-85	.7318	.5356	.4761	.0000*
1985-86	.6970	.4857	.4499	.0000*

School Years	Correlation Coefficient	R Squared	Coefficient of Elasticity	Significance Level
		WEIGHTED		
1978-79	.8528	.7272	.8040	.0000*
1980-81	.8454	.7147	.7909	.0000*
1982-83	.8305	.6898	.7688	.0000*
1984-85	.8355	.6980	.6956	.0000*
1985-86	.8104	.6567	.6376	.0000*

* P< .01

Table B-5

Equal Opportunity Measures of Average Teacher Salaries

with True Value of Real Property.

School Years	Correlation Coefficient	R Square	Coefficient of Elasticity	Significance Level
		UNWEIGHTED		
1978-79	.2452	.0601	.0529	.0022*
1980-81	.2981	.0888	.0732	.0002*
1982-83	.2584	.0668	.0604	.0013*
1984-85	.2636	.0695	.0578	.0011*

School Years	Correlation Coefficient	R Square	Coefficient of Elasticity	Significance Level
		WEIGHTED		
1978-79	.4352	.1894	.1618	.0000*
1980-81	.4490	.2016	.1774	.0000*
1982-83	.4173	.1741	.1445	.0000*
1984-85	.5221	.2726	.1576	.0000*

* P< .01

Table B-6

Equal Opportunity Measures of Average Teacher Salaries with the Local Composite Index.

School Years	Correlation Coefficient	R Square	Coefficient of Elasticity	Significance Level
		UNWEIGHTED		
1978-79	.5534	.3062	.2287	.0000*
1980-81	.5474	.2996	.2316	.0000*
1982-83	.4779	.2284	.2003	.0000*
1984-85	.4347	.1889	.1741	.0000*

School Years	Correlation Coefficient	R Square	Coefficient of Elasticity	Significance Level
		WEIGHTED		
1978-79	.6956	.4838	.4275	.0000*
1980-81	.6715	.4509	.4198	.0000*
1982-83	.6652	.4425	.4040	.0000*
1984-85	.7428	.5518	.3902	.0000*

* P< .01

Figure B-1

A Comparison of the Relationship Between Total Operating Expenditures Per Pupil and Two Wealth Measures: True Value of Property (TVP) and the Local Composite Index (LCI)

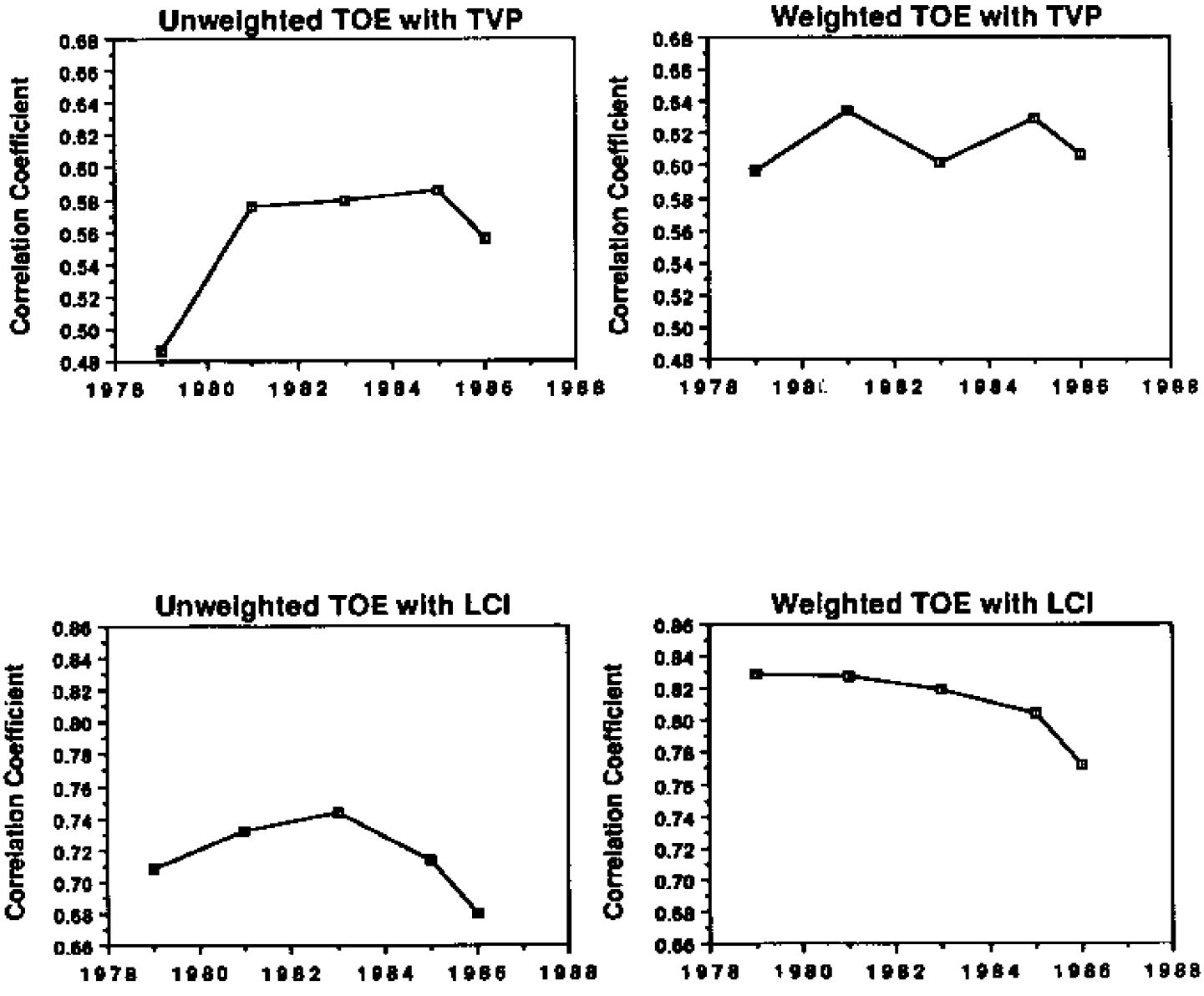


Figure B-2

A Comparison of the Magnitude of the Relationship Between Total Expenditures and Wealth Using the Coefficient of Elasticity

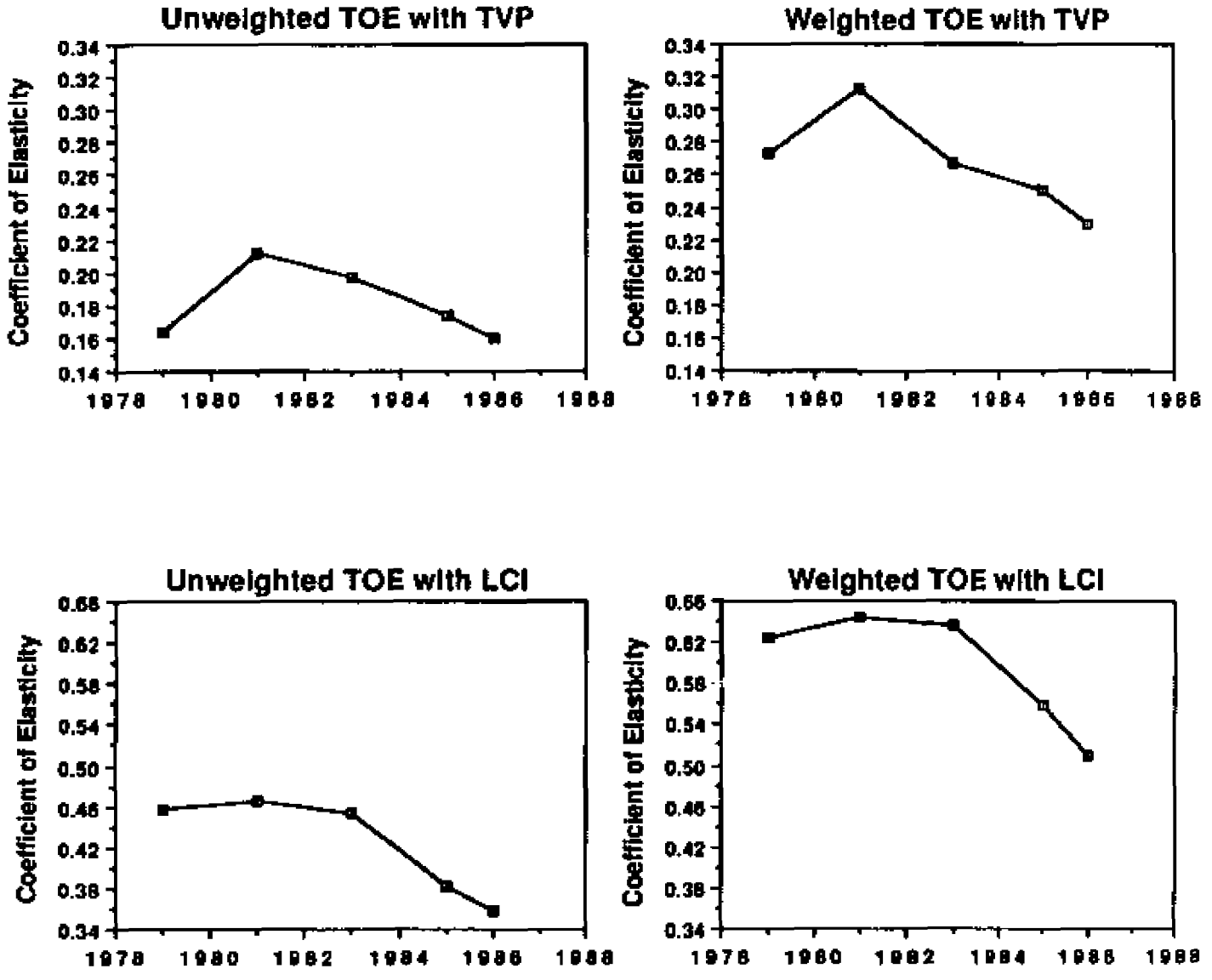
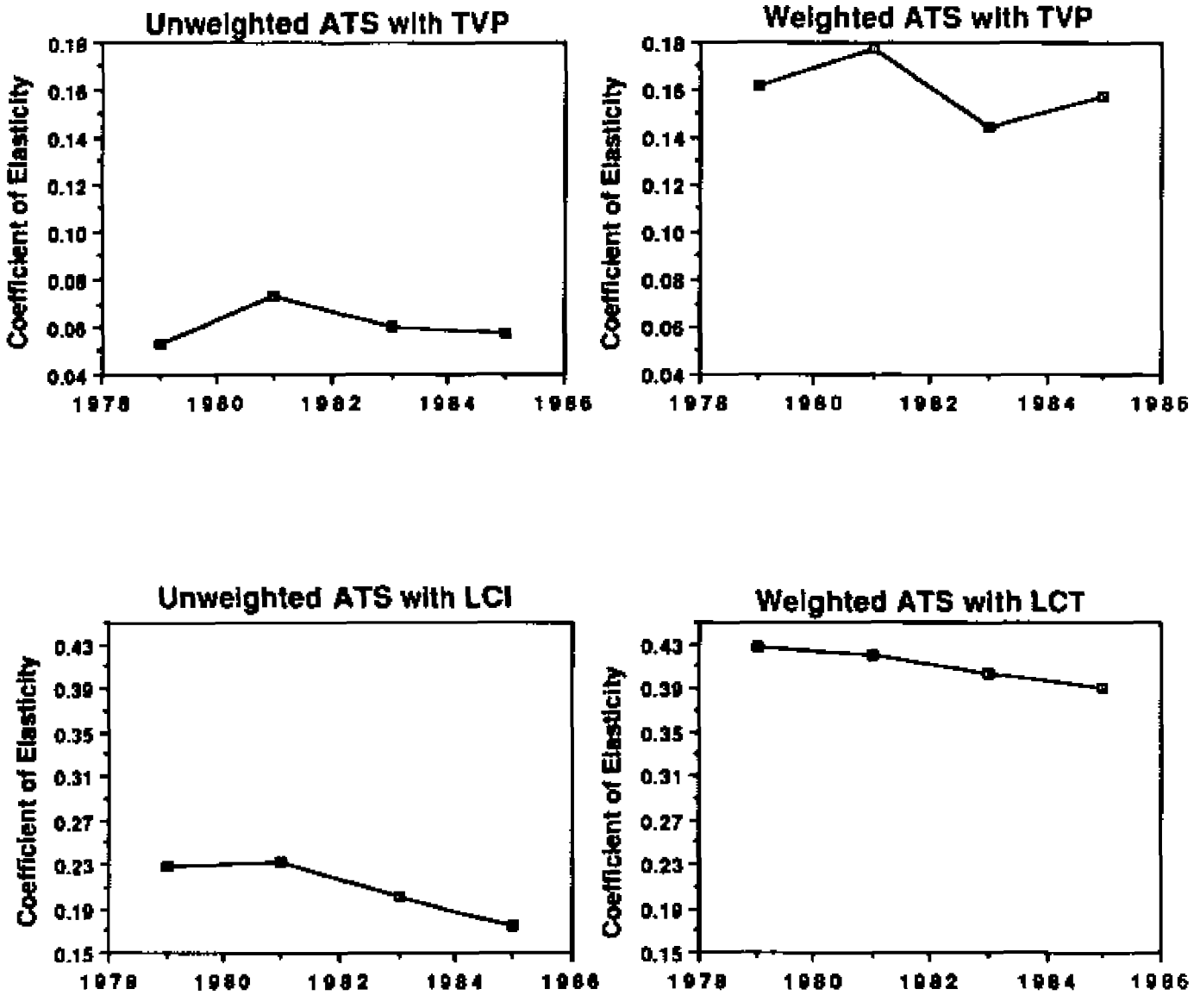


Figure B-3

A Comparison of the Magnitude of the Relationship Between Average Teacher Salaries and Wealth Using the Coefficient of Elasticity



APPENDIX C

Various Analyses of Vertical Equity 1979-1986

Appendix C

List of Tables

Table C-1

Relationship Measures of Vertical Equity:

Total Operating Expenditures with Special Need Pupils

for Selected Years.

Relationship Measures	Years 1978-79	1980-81	1982-83	1984-85	1985-86
Total Operating Expenditures (TOE) with Percent of Handicapped Pupils (PH)					
PH					
mean	8.8	9.8	10.5	10.9	10.7
st.dev.	2.8	2.8	2.6	2.6	2.4
Regression:					
Correlations	.2950	.3401	.2481	.2563	.2876
Simple Slope	32.91	50.27	46.82	54.25	69.69
Elasticity	.2000	.2492	.2054	.2057	.2352
Implicit Weight	3.842	4.381	3.472	3.379	3.875
Ratio:					
Avg. Implicit Wt.	1.018	1.020	1.017	1.017	1.016
Total Operating Expenditures (TOE) with Percent of Disadvantaged Pupils (PD)					
PD					
mean	27.1	28.5	29.3	19.5	19.8
st.dev.	15.1	16.4	17.4	8.9	9.2
Regression:					
Correlations	.0275	.0440	.0037	.0083	-.0589
Simple Slope	0.56	1.10	0.10	0.50	-3.73
Elasticity	.0105	.0159	.0013	.0034	-.0234
Implicit Weight	1.039	1.052	1.004	1.018	.8849
Ratio:					
Avg. Implicit Wt.	.9805	.9870	.9619	.9825	.9886
Total Operating Expenditures (TOE) with Percent of Vocational Pupils (PV)					
PV					
mean	27.8	30.4	36.0	37.1	38.4
st.dev.	8.5	8.3	8.3	8.1	8.1
Regression:					
Correlations	-.1067	-.0506	-.0832	-.2091	-.2396
Simple Slope	-3.88	-2.51	-4.87	-13.98	-17.51
Elasticity	-.0745	-.0385	-.0735	-.1811	-.2128
Implicit Weight	0.7502	0.8779	0.8098	0.5868	0.5445
Ratio:					
Avg. Implicit Wt.	.9944	.9976	.9862	.9852	.9880

Table C-2

Relationship Measures of Vertical Equity:

State and Local Operating Expenditures with Special Need Pupils

for Selected Years.

Relationship Measures	Years 1978-79	1980-81	1982-83	1984-85	1985-86
State and Local Operating Expenditures (SLE) with Percent of Handicapped Pupils (PH)					
PH					
mean	8.8	9.8	10.5	10.9	10.7
st.dev.	2.8	2.8	2.6	2.6	2.4
Regression:					
Correlations	.2529	.3241	.2352	.2478	.2750
Simple Slope	26.03	45.37	43.30	52.04	66.62
Elasticity	.2098	.2853	.2340	.2443	.2756
Implicit Weight	4.016	5.155	3.922	3.953	4.565
Ratio:					
Avg.Implicit Wt.	1.024	1.023	1.019	1.020	1.019
State and Local Operating Expenditures (SLE) with Percent of Disadvantaged Pupils (PD)					
PD					
mean	27.1	28.5	29.3	19.5	19.8
st.dev.	15.1	16.4	17.4	8.9	9.2
Regression:					
Correlations	-.1942	-.1507	-.1538	-.1232	-.1884
Simple Slope	-3.66	-3.59	-4.21	-7.42	-12.04
Elasticity	-.0910	-.0653	-.0636	-.0624	-.0922
Implicit Weight	.6923	.7844	.7957	.6998	.5735
Ratio:					
Avg. Implicit Wt.	.9282	.9381	.9176	.9512	.9589
State and Local Operating Expenditures (SLE) with Percent of Vocational Pupils (PV)					
PV					
mean	27.8	30.4	36.0	37.1	38.4
st.dev.	8.5	8.3	8.3	8.1	8.1
Regression:					
Correlations	-.1157	-.0795	-.0837	-.1934	-.2332
Simple Slope	-3.89	-3.74	-4.79	-12.78	-17.05
Elasticity	-.0988	-.0727	-.0412	-.2040	-.2539
Implicit Weight	.6761	.7770	.7729	.5433	.4734
Ratio:					
Avg. Implicit Wt.	.9988	.9971	.9964	.9821	.9834

Table C-3

A Comparison of Horizontal and Vertically Weighted Dispersion Measures

for Total Operating Expenditures Across Selected Years.

Horizontal Dispersion Measures	Years 1978-79	1980-81	1982-83	1984-85	1985-86
Mean ($ per-pupil)	1448	1981	2384	2862	3167
Median	1376	1896	2285	2752	3055
S.D.	308	412	487	543	591
Range	2039	2583	3083	3346	3616
Fed. Range Ratio	.7456	.7365	.7839	.7221	.7099
Coeff. of Variation	21.29	20.79	20.44	18.98	18.66
McLoone Index	.9163	.9146	.9148	.9166	.9154

N = 133 School Divisions

* Vertically Weighted Dispersion Measures	Years 1978-79	1980-81	1982-83	1984-85	1985-86
Mean ($ per-pupil)	926	1232	1433	1805	1985
Median	873	1174	1354	1733	1885
S.D.	230	292	343	375	424
Range	1445	1916	2139	2317	2551
Fed. Range Ratio	.8218	.7726	.8015	.7877	.7703
Coeff. of Variation	24.84	23.70	23.93	20.77	21.36
McLoone Index	.9030	.9006	.8976	.9026	.9095

N = 133 Vert. Wt. School Divisions

* Includes additional pupil weights for handicapped pupils (♿), for economically disadvantaged pupils (👤), and Vocational pupils (V.8).

Table C-4

A Comparison of Horizontal and Vertically Weighted Dispersion Measures

of State and Local Operating Expenditures for School Divisions

Across Selected Years.

Horizontal Dispersion Measures	Years 1978-79	1980-81	1982-83	1984-85	1985-86
Mean ($ per-pupil)	1092	1562	1936	2322	2580
Median	1018	1476	1830	2233	2426
S.D.	284	390	475	536	591
Range	1848	2534	3003	3245	3364
Fed. Range Ratio	.9844	.9003	.9259	.8848	.9034
Coeff. of Variation	26.04	24.97	24.55	23.09	22.91
McLoone Index	.9084	.9051	.9019	.8870	.9091

N = 133 School Divisions

* Vertically Weighted Dispersion Measures	Years 1978-79	1980-81	1982-83	1984-85	1985-86
Mean ($ per-pupil)	702	976	1168	1466	1619
Median	658	926	1102	1391	1528
S.D.	218	285	340	373	426
Range	1335	1827	2081	2238	2489
Fed. Range Ratio	1.2638	1.1346	1.0723	.9712	.9460
Coeff. of Variation	31.05	29.20	29.11	25.44	26.31
McLoone Index	.8639	.8634	.8628	.8807	.8823

N = 133 Vert. Wt. School Divisions

* Includes additional pupil weights for handicapped pupils (2), for economically disadvantaged pupils (2), and Vocational pupils (1.8).

TABLE C-5

A Comparison of Horizontal and Vertically Weighted Dispersion Measures

by Category for Total, and State and Local Operating Expenditures

during the 1978-79 School Year.

Dispersion Measures	Horizontal Equity	*Vertical Weights for Hdtped	Disadv	Vocatn	Total
	(1)	(2)	(3)	(4)	(5)
Total Operating Expenditures					
Mean ($ per-pupil)	1448	1329	1153	1189	926
Median	1376	1264	1102	1122	873
S.D.	308	271	292	272	230
Range	2039	1711	1963	1628	1445
Fed. Range Ratio	.7456	.7132	.8331	.7863	.8218
Coeff. of Variation	21.29	20.39	25.32	22.88	24.84
McLoone Index	.9163	.9238	.8907	.9115	.9030
			N = 133 School Divisions		
State and Local Operating Expenditures					
Mean ($ per-pupil)	1092	1002	876	897	702
Median	1018	934	813	839	658
S.D.	284	253	279	247	218
Range	1848	1548	1804	1476	1335
Fed. Range Ratio	.9844	.9532	1.245	1.013	1.264
Coeff. of Variation	26.04	25.25	31.86	27.54	31.05
McLoone Index	.9084	.9142	.8670	.8906	.8639
			N = 133 Vert. Wt. School Divisions		

* Includes additional pupil weights for handicapped pupils (2), for economically disadvantaged pupils (2), and Vocational pupils (1.8).

Table C-6

A Comparison of Horizontal and Vertically Weighted Dispersion Measures

by Category of Expenditure during the 1985-86 School Year.

Dispersion Measures	Horizontal Equity Col. 1	*Vertical Weights for Hdcped Col. 2	Disadv Col.3	Vocatn'l Col. 4	Total Col. 5
Total Operating Expenditures					
Mean ($ per-pupil)	3167	2860	2669	2437	1985
Median	3055	2772	2524	2347	1885
S.D.	591	513	561	508	424
Range	3616	3111	3521	3293	2551
Fed. Range Ratio	.7099	.6862	.7527	.7288	.7703
Coeff. of Variation	18.66	17.94	21.02	20.84	21.36
McLoone Index	.9154	.9148	.9179	.8992	.9095
State and Local Operating Expenditures					
Mean ($ per-pupil)	2580	2329	2179	1986	1619
Median	2426	2197	2035	1875	1528
S.D.	591	515	569	500	426
Range	3364	2846	3626	2926	2489
Fed. Range Ratio	.9034	.8713	.9861	.9475	.9460
Coeff. of Variation	22.91	22.11	26.11	25.18	26.31
McLoone Index	.9091	.9111	.8927	.8912	.8823

* Includes additional pupil weights for handicapped pupils (2), for economically disadvantaged pupils (2), and Vocational pupils (1.8).

APPENDIX D

Various Analyses
of
Equal Opportunity by
School Divisions Classified
According to Urbanization
1979 to 1986

Appendix D

List of Tables

Table D-1

Classification of Public School Divisions in Virginia

According to Qualities of Urbanization.

GROUP 1- Urban School Divisions (from Large Cities and Small Cities located in Metropolitan Areas)

22

Alexandria	Norfolk
Charlottesville	Petersburg
Chesapeake	Poquoson
Colonial Heights	Portsmouth
Danville	Richmond
Falls Church	Roanoke
Fredericksburg	Suffolk
Hampton	Virginia Beach
Hopewell	Williamsburg
Lynchburg	
Manassas	
Manassas Park	
Newport News	

GROUP 2- Suburban School Divisions (from Urbanizing and Suburbanizing Counties)

28

Albemarle	Henrico
Amherst	Henry
Arlington	Loudoun
Augusta	Montgomery
Bedford	Powhatan
Botetourt	Prince George
Campbell	Prince William
Chesterfield	Roanoke Co.
Fairfax	Rockingham
Franklin Co.	Spotsylvania
Fauquier	Stafford
Frederick	Warren
Gloucester	Washington
Hanover	York

GROUP 3- Rural School Divisions (Low Capacity Counties)

32

Alleghany	Russell
Bland	Scott
Brunswick	Smyth
Buckingham	Southampton
Carroll	Tazwell
Charles City	Wythe
Charlotte	
Cumberland	
Dinwiddie	
Floyd	
Giles	
Grayson	
Greene	
Greensville	
Halifax	
Lee	
Lunenberg	
Mecklenburg	
Northhampton	
Nottoway	
Page	
Patrick	
Pittsylvania	
Prince Edward	
Pulaski	
Rockbridge	

GROUP 4- Transitional School Divisions (Small Rural Cities, Moderate Capacity Counties, and Rural Counties with Power Plants)

51

Accomack	King William
Amelia	Lancaster
Appomattox	Lexington
Bath	Louisa
Bristol	Madison
Buena Vista	Martinsville
Buchanan	Mathews
Cape Charles	Middlesex
Caroline	Nelson
Clarke	New Kent
Colonial Beach	Norton
Covington	Northumberland
Craig	Orange
Culpeper	Radford
Dickenson	Rappahannock
Essex	Richmond Co.
Fluvanna	Shennandoah
Franklin City	Staunton
Fries	Surry
Galax	Sussex
Goochland	Waynesboro
Harrisonburg	Westmoreland
Highland	West Point
Isle of Wight	Winchester
King George	Wise
King and Queen	

Table D-2

Discriminant Analysis: Significant Variables For School Divisions Classified According to Urbanization in 1978-79.

Unweighted School Division Analysis

Step Entered Equation	Key Variables	Wilks' Lambda	Significance Level
1.	Percent Disadvantaged	.71608	P<.0001
2.	State Oper. Expenditures	.53284	P<.0001
3.	Total Oper. Expenditures	.44260	P<.0001
4.	True Tax Rate	.40556	P<.0001
5.	Local Composite Index	.36936	P<.0001

Final Wilks' Lambda .36936 Canonical Correlation .6165

Classification Results

Actual Groups	N	1	2	3	4
1 Urban	22	63.6%	22.7%	4.5%	9.1%
2 Suburban	28	17.9%	53.6%	10.7%	14.9%
3 Rural	32	3.1%	18.8%	68.8%	9.4%
4 Transitional	51	2.0%	13.7%	15.7%	68.6%
	133 Total	Cases Correctly Classified = 64.66%			

Weighted School Division Analysis

Step Entered Equation	Key Variables	Wilks' Lambda	Significance Level
1.	Percent of Disadvantaged	.52767	P<.0001
2.	True Tax Rate	.44045	P<.0001
3.	Percent Vocational	.37897	P<.0001
4.	State Oper. Expenditures	.33099	P<.0001
5.	Average Teacher Salary	.31015	P<.0001
6.	Reading Achievement Score	.29620	P<.0001
7.	State-Local Oper. Expenditures	.28879	P<.0001
8.	Instructional Personnel/ 1000	.28794	P<.0001
9.	Percent Handicapped	.28237	P<.0001

Final Wilks' Lambda .28237 Canonical Correlation .7298

Classification Results

Actual Groups	N	1	2	3	4
1. Urban	(22) 323,905	64.4%	32.6%	3.0%	0.0%
2. Suburban	(28) 448,092	6.8%	85.4%	4.3%	3.5%
3. Rural	(32) 141,831	9.5%	11.8%	70.3%	8.4%
4. Transitional	(51) 130,030	12.6%	19.2%	22.9%	45.3%
	(133) 1,043,858 Total	Correctly Classified = 71.84%			

Table D-3

Comparison of Grouped Means for Key Variables Which Differentiate Among School Divisions Classified by Urbanization in 1978-79

Key Variables	1978-79	Means and Standard Deviations 1 Urban	2 Suburban	3 Rural	4 Transition	ST AVG
		UNWEIGHTED				
1. Percent Disadv. Pupils		21.7	14.3	36.1	30.9	27.1
	SD	12.1	6.0	15.8	13.9	15.1
2. State Op. Expenditures		680	682	777	653	694
	SD	81	84	44	93	93
3. Total Op. Expenditures		1698	1406	1321	1441	1448
	SD	508	344	135	169	308
4. True Tax Rate		.86	.61	.50	.61	.63
	SD	.25	.23	.15	.31	.27
5. Local Composite Index		.5441	.4721	.3474	.5101	.4686
	SD	.2187	.1468	.0508	.1265	.1545
		WEIGHTED				
1. Percent Disadv. Pupils		26.3	10.1	35.0	31.5	21.2
	SD	12.6	5.8	14.3	12.7	14.6
2. True Tax Rate		.84	.82	.53	.58	.76
	SD	.20	.26	.14	.22	.28
3. Percent Vocational Pupils		22.1	26.4	30.7	26.6	25.7
	SD	5.9	6.1	7.0	8.6	7.1
4. State Op. Expenditures		688	632	781	675	675
	SD	53	92	40	81	89
5. Average Teacher Salary		13,220	14,446	11,363	11,733	13,309
	SD	1,287	3,156	530	803	2,508
6. Reading Achievement Score		38.3	51.8	33.8	35.9	43.2
	SD	10.8	8.1	6.8	12.8	12.2
7. State and Local Expend.		1,190	1331	931	1,048	1,200
	SD	358	369	82	124	317
8. Instructional Pers/1000		61.3	60.5	57.8	62.1	60.6
	SD	5.6	3.4	4.2	5.7	4.7
9. Percent Handicapped Pupils		8.2	8.7	7.5	8.5	8.4
	SD	1.4	1.5	2.2	2.7	1.8

Table D-4

Discriminant Analysis: Significant Variables For School Divisions

Classified According to Urbanization in 1980-81

Unweighted School Division Analysis

Step Entered Equation	Key Variables	Wilks' Lambda	Significance Level
1.	Percent Disadvantaged	.72426	P<.0001
2.	State Oper. Expenditures	.53708	P<.0001
3.	Average Teacher Salary	.45186	P<.0001

Final Wilks' Lambda .4519 Canonical Correlation .5801

Classification Results

Actual Groups	N	1	2	3	4
1 Urban	22	22.7%	40.9%	0.0%	36.4%
2 Suburban	28	10.7%	50.0%	14.3%	25.0%
3 Rural	32	0.0%	15.6%	78.1%	6.3%
4 Transitional	51	0.0%	9.8%	17.6%	72.5%
	133 Total	Cases Correctly Classified = 60.90%			

Weighted School Division Analysis

Step Entered Equation	Key Variables	Wilks' Lambda	Significance Level
1.	Percent of Disadvantaged	.53469	P<.0001
2.	State Operating Expenditures	.45203	P<.0001
3.	True Tax Rate	.40094	P<.0001
4.	Reading Achievement Score	.36306	P<.0001
5.	Percent Vocational	.33296	P<.0001
6.	Instructional Personnel/ 1000	.31881	P<.0001
7.	Local Composite Index	.30245	P<.0001
8.	Average Teacher Salary	.29340	P<.0001
9.	Percent Handicapped Pupils	.28977	P<.0001

Final Wilks' Lambda .2898 Canonical Correlation .7271

Classification Results

Actual Groups	N	1	2	3	4
1. Urban	(22) 304,074	61.6%	35.4%	2.9%	0.0%
2. Suburban	(28) 437,662	1.6%	93.4%	3.3%	1.7%
3. Rural	(32) 135,608	18.9%	10.8%	68.7%	1.6%
4. Transitional	(51) 122,172	25.9%	26.8%	13.7%	33.5%
	(133) 999,516 Total	Correctly Classified = 73.07%			

Table D-5

Comparison of Grouped Mean Scores for Key Variables

Which Differentiate Among School Divisions

Classified by Urbanization in 1980-81

Key Variables	1980-81	Means and Standard Deviations 1 Urban	2 Suburban	3 Rural	4 Transition	ST AVG
		UNWEIGHTED				
1. Percent Disadv Pupils		23.1	14.5	37.7	32.8	28.5
	SD	13.5	6.3	17.3	15.4	16.4
2. State Oper Expenditures		739	758	848	710	758
	SD	95	93	53	104	104
3. Average Teacher Salary		15,604	14,551	12,931	13,537	13,949
	SD	2,534	2,514	937	980	1,937
		WEIGHTED				
1.Percent Disadvantaged Pupils		27.8	10.0	36.3	32.9	21.8
	SD	14.3	6.0	15.3	13.6	15.7
2. State Operating Expenditures		739	703	856	732	738
	SD	63	101	52	103	99
3.True Tax Rate		.84	.80	.54	.61	.75
	SD	.30	.23	.15	.32	.28
4.Reading Achievement Scores		40.2	54.3	34.5	38.2	45.4
	SD	9.1	8.7	7.4	10.9	12.1
5.Percent Vocational		27.3	28.7	33.6	28.3	28.9
	SD	4.2	5.3	7.1	9.0	6.2
6.Instructional Personnel Per 1000 Students		63.1	63.4	60.5	64.3	63.0
	SD	6.1	4.0	4.5	5.9	5.1
7.Local Composite Index		.50	.53	.34	.49	.49
	SD	.15	.14	.05	.13	.15
8.Average Teacher Salary		15,473	16,911	13,209	13,739	15,584
	SD	1,638	3,561	785	904	2,917
9. Percent Handicapped Pupils		9.4	9.7	8.5	9.5	9.4
	SD	1.5	1.3	2.4	2.9	1.8

Table D-6

Discriminant Analysis: Significant Variables

For School Divisions Classified According to Urbanization

in 1982-83.

Unweighted School Division Analysis

Step Entered Equation	Key Variables	Wilks' Lambda	Significance Level
1.	Percent Disadvantaged	.72800	P<.0001
2.	State Oper. Expenditures	.54544	P<.0001
3.	Average Teacher Salary	.44666	P<.0001

Final Wilks' Lambda .4467 Canonical Correlation .5913

Classification Results

Actual Groups	N	1	2	3	4
1 Urban	22	22.7%	40.9%	9.1%	27.3%
2 Suburban	28	10.7%	53.6%	7.1%	28.6%
3 Rural	32	0.0%	9.4%	71.9%	18.8%
4 Transitional	50	3.9%	7.8%	15.7%	72.5%
	132 Total	Cases Correctly Classified = 60.15%			

Weighted School Division Analysis

Step Entered Equation	Key Variables	Wilks' Lambda	Significance Level
1.	Reading Achievement Score	.50545	P<.0001
2.	True Tax Rate	.42131	P<.0001
3.	Instructional Personnel/1000	.36732	P<.0001
4.	Local Composite Index	.32590	P<.0001
5.	State and Local Expenditure	.27335	P<.0001
6.	Percent Disadvantaged	.24707	P<.0001
7.	Percent Vocational	.23054	P<.0001
8.	State Operating Expenditures	.21749	P<.0001
9.	Percent Handicapped	.21072	P<.0001

Final Wilks' Lambda .2107 Canonical Correlation .7575

Classification Results

Actual Groups	N	1	2	3	4
1. Urban	(22) 294,890	76.4%	23.6%	0.0%	0.0%
2. Suburban	(28) 423,540	1.2%	90.8%	4.5%	3.5%
3. Rural	(32) 130,422	9.0%	9.0%	77.6%	4.4%
4. Transitional	(51) 130,030	27.2%	20.0%	10.8%	42.0%
	(133) 965,737 Total				
	Cases Correctly Classified = 78.73%				

Table D-7

Comparison of Grouped Mean Scores for Key Variables

Which Differentiate Among School Divisions

Classified by Urbanization in 1982-83

Key Variables 1982-83	Means and Standard Deviations 1 Urban	2 Suburban	3 Rural	4 Transition	ST AVG
UNWEIGHTED					
1. Percent Disadv Pupils	23.3	14.8	39.2	33.7	29.3
SD	13.8	6.5	19.1	16.0	17.4
2. State Oper Expenditures	892	912	1041	862	921
SD	120	118	72	140	137
3. Average Teacher Salary	18,627	17,270	15,289	15,986	16,530
SD	3,229	2,809	877	1,271	2,330
WEIGHTED					
1.Reading Achievement Score	47.0	62.8	41.4	44.5	52.9
SD	9.6	8.5	6.9	11.6	12.8
2. True Tax Rate	.91	.86	.56	.69	.81
SD	.25	.23	.16	.34	.27
3.Instructional Pers/1000	63.0	64.5	61.9	66.5	64.0
SD	6.1	3.4	5.1	5.7	5.1
4.Local Composite Index	.4980	.5269	.3420	.5041	.4903
SD	.1513	.1428	.0501	.1363	.1487
5.State-Local Expenditures	2,124	2,389	1,618	1,896	2,145
SD	572	642	178	240	602
6.Percent of Disadv Pupils	27.9	10.1	37.4	34.1	22.2
SD	14.5	6.3	16.6	14.4	16.3
7.Percent Vocational Pupils	32.1	34.5	38.6	33.8	34.3
SD	4.3	5.6	7.7	9.0	6.4
8. State operating Expenditures	904	842	1051	885	894
SD	86	132	65	124	130
9. Percent Handicapped Pupils	10.0	10.3	9.2	10.1	10.0
SD	1.7	1.4	2.0	2.7	1.8

Table D-8

Discriminant Analysis: Significant Variables Predictive of School Division Classification According to Urbanization in 1984-85.

Step Entered Equation	Key Variables	Wilks' Lambda	Significance Level
	Unweighted		
1.	Average Teacher Salary	.68509	P<.0001
2.	Percent Disadvantaged	.51698	P<.0001
3.	State Oper. Expenditures	.39463	P<.0001
4.	True Tax Rate	.32785	P<.0001

Final Wilks' Lambda .3278 Canonical Correlation .6465

Classification Results

Actual Groups	N	1	2	3	4
1 Urban	22	59.1%	31.8%	4.5%	4.5%
2 Suburban	28	10.7%	64.3%	14.3%	10.7%
3 Rural	32	0.0%	6.3%	84.4%	9.4%
4 Transitional	50	14.0%	16.0%	8.0%	62.0%
	132 Total	Cases Correctly Classified = 67.42%			

Step Entered Equation	Key Variables	Wilks' Lambda	Significance Level
	Weighted		
1.	Percent Disadvantaged	.46591	P<.0001
2.	Average Teacher Salary	.37858	P<.0001
3.	Local Operating Expenditures	.30683	P<.0001
4.	Percent Vocational	.27897	P<.0001
5.	State Operating Expenditures	.25512	P<.0001
6.	True Tax Rate	.23114	P<.0001
7.	Reading Achievement Score	.22356	P<.0001

Final Wilks' Lambda .2236 Canonical Correlation .7717

Classification Results

Actual Groups	N	1	2	3	4
1. Urban	(22) 293,544	92.6%	7.4%	0.0%	0.0%
2. Suburban	(28) 419,642	0.0%	92.5%	2.9%	4.6%
3. Rural	(32) 124,896	25.3%	8.1%	61.8%	4.7%
4. Transitional	(49) 113,867	21.9%	22.1%	11.6%	44.4%
	(131) 951,949 Total	Correctly Classified = 82.76%			

Table D-9

A Comparison of Grouped Mean Scores for Key Variables

Among School Divisions Classified by Urbanization

in 1984-85.

Key Variables	1984-85	Means and Standard Deviations 1 Urban	2 Suburban	3 Rural	4 Transition	ST AVG
		UNWEIGHTED				
1. Average Teacher Salary		21,676	19,974	17,362	18,201	18,959
	SD	3,037	3,261	1,105	1,684	2,712
2. Percent Disadv Pupils		20.3	11.1	24.8	26.5	19.5
	SD	9.4	4.1	8.4	7.8	8.9
3. State Oper Expenditures		1,101	1,105	1,261	1,064	1,127
	SD	146	145	73	161	157
4. True Tax Rate		.96	.69	.58	.69	.71
	SD	.23	.22	.14	.28	.26
		WEIGHTED				
1. Percent Disadv Pupils		23.0	8.1	23.8	21.4	16.4
	SD	9.4	4.0	7.2	7.3	10.1
2. Average Teacher Salary		21,812	22,806	17,758	18,591	21,333
	SD	2,060	4,167	1,015	1,536	3,603
3. Local Oper Expenditures		1,470	1,831	694	1,214	1,497
	SD	710	902	178	352	823
4. Percent Vocational Pupils		33.0	34.4	40.4	35.3	34.9
	SD	4.5	5.3	8.2	8.0	6.4
5. State Oper Expenditures		1,111	1,004	1,272	1,087	1,082
	SD	102	174	67	157	166
6. True Tax Rate		.92	.89	.59	.73	.84
	SD	.25	.25	.13	.26	.26
7. Reading Achievement Score		51.6	65.2	44.5	48.3	56.3
	SD	9.6	8.2	6.7	10.0	12.0

APPENDIX E

Various Analyses of The Adequacy of State Funding of Public Education 1979 to 1986

Appendix E

List of Tables

List of Figures

Table E-1

Correlation Coefficients for Per Pupil Revenue Sources

with Wealth and Total Expenditure Variables

during Selected Years.

Variables	Per-Pupil Revenue Sources State Operating Exp	 Local Operating Exp
	1978-79	
True Value Property	-.5038 P<.000	.5588 P<.000
Local Composite Index	-.7411 P<.000	.8315 P<.000
State and Local Expenditure	-.4943 P<.000	.9745 P<.000
	1982-83	
True Value Property	-.5954 P<.000	.6420 P<.000
Local Composite Index	-.7906 P<.000	.8418 P<.000
State and Local Expenditures	-.5193 P<.000	.9765 P<.000
	1985-86	
True Value Property	-.7354 P<.000	.6700 P<.000
Local Composite Index	-.8414 P<.000	.8174 P<.000
State and Local Expenditures	-.4844 P<.000	.9692 P<.000

Table E-2

Correlation Coefficients for Per-Pupil Expenditures by Source and Percentage Categories of Special Need Pupils During Selected School Years.

Percent Special Need Pupils	Per-Pupil Expenditure Sources TDE	SLE	LDE	SOE
		1978-79		
Handicapped	.2950 P<.000	.2529 P<.002	.2751 P<.001	-.1367 P<.058
Disadvantaged	.0275 P<.377	-.1942 P<.013	-.1953 P<.012	.2828 P<.000
Vocational	-.1067 P<.111	-.1157 P<.092	-.1516 P<.041	.1078 P<.108
		1982-83		
Handicapped	.2481 P<.002	.2351 P<.003	.2313 P<.004	-.1188 P<.088
Disadvantaged	.0037 P<.483	-.1538 P<.038	-.1735 P<.023	.1645 P<.029
Vocational	-.0832 P<.172	-.0837 P<.170	-.0904 P<.151	.0932 P<.144
		1985-86		
Handicapped	.2876 P<.000	.2750 P<.001	.2466 P<.002	-.0625 P<.238
Disadvantaged	-.0589 P<.251	-.1884 P<.015	-.2000 P<.011	.1612 P<.032
Vocational	-.2396 P<.003	-.2332 P<.004	-.2202 P<.006	.0937 P<.143

Table E-2

Correlation Coefficients for Per-Pupil Expenditures by Source and Percentage Categories of Special Need Pupils During Selected School Years.

Percent Special Need Pupils	Per-Pupil Expenditure Sources TOE	SLE	LOE	SOE
		1978-79		
Handicapped	.2950 P<.000	.2529 P<.002	.2751 P<.001	-.1067 P<.058
Disadvantaged	.0275 P<.377	-.1942 P<.013	-.1953 P<.012	.2828 P<.000
Vocational	-.1067 P<.111	-.1157 P<.092	-.1516 P<.041	.1078 P<.108
		1982-83		
Handicapped	.2481 P<.002	.2351 P<.003	.2313 P<.004	-.1188 P<.088
Disadvantaged	.0037 P<.483	-.1538 P<.038	-.1735 P<.023	.1645 P<.029
Vocational	-.0832 P<.172	-.0837 P<.170	-.0904 P<.151	.0932 P<.144
		1985-86		
Handicapped	.2876 P<.000	.2750 P<.001	.2466 P<.002	-.0625 P<.238
Disadvantaged	-.0589 P<.251	-.1884 P<.015	-.2000 P<.011	.1612 P<.032
Vocational	-.2396 P<.003	-.2332 P<.004	-.2202 P<.006	.0937 P<.143

Table E-3

Comparison of Local and State Operating Expenditures

According to Horizontal Equity Measures During Selected Years.

Horizontal Equity Measures	Local Revenue 1978-79	Local Revenue 1985-86	State Revenue 1978-79	State Revenue 1985-86
	Unweighted			
Mean	575	1275	694	1306
Standard Deviation	337	710	93	200
Range	2092	3966	524	972
Federal Range Ratio	3.983	4.426	0.567	0.660
Coefficient of Variation	58.51	55.71	13.34	15.31
McLoone Index	.7487	.7156	.8736	.8635
	Weighted			
Mean	707	1593	675	1262
Standard Deviation	414	875	89	202
Range	2092	3966	524	972
Federal Range Ratio	3.858	3.922	0.508	0.761
Coefficient of Variation	58.54	54.95	13.18	16.01
McLoone Index	.6852	.6825	.8675	.8335

Horizontal Equity Gains or Losses in Local and State Revenue

for 1978-79 to 1985-86 School Years.

Equity Measures	Local Revenue Unweighted	Local Revenue Weighted	State Revenue Unweighted	State Revenue Weighted
Range	-89.6	-89.6	-85.5	-85.5
Federal Range Ratio	-11.1	-1.6	-16.3	-49.9
Coefficient of Var.	+4.9	+6.1	-14.8	-21.4
McLoone Index	-4.5	-0.39	-1.2	-3.9

Table E-4

Percentage of Total Operating

Expenditures by Source.

Year	State* Share	Local Share	Federal Share	Total
1978-79	43.4	45.7	10.9	100
1980-81	46.0	45.8	9.3	100
1982-83	44.1	48.6	7.3	100
1984-85	45.1	48.2	6.7	100
1985-86	47.1	46.6	6.3	100

* includes state Retail Sales and Use Tax.

Percentage Gains (+) or Losses (-)

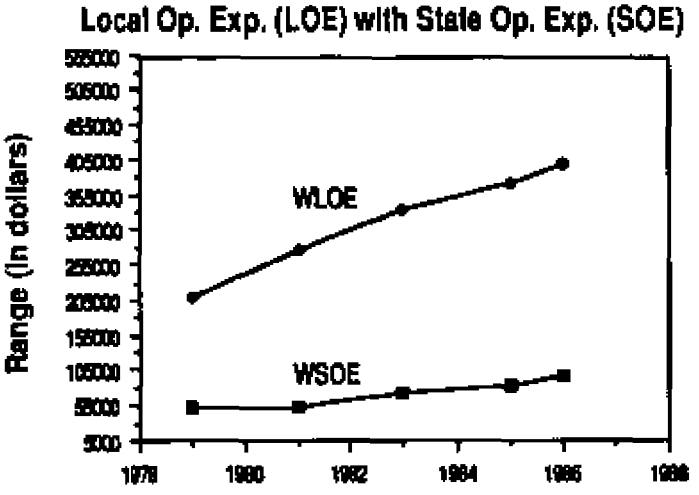
of Total Operating Expenditures by Source.

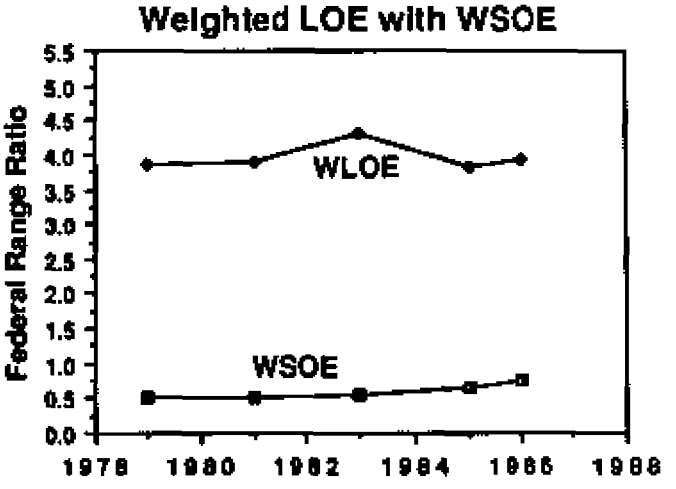
Year	State* Share	Local Share	Federal Share
1978-79	----	----	----
1980-81	+2.6	+0.1	-1.6
1982-83	-1.9	+2.8	-2.0
1984-85	+1.0	-0.4	-0.6
1985-86	+2.0	-1.6	-0.4
Total Difference	+3.7	+0.9	-4.6

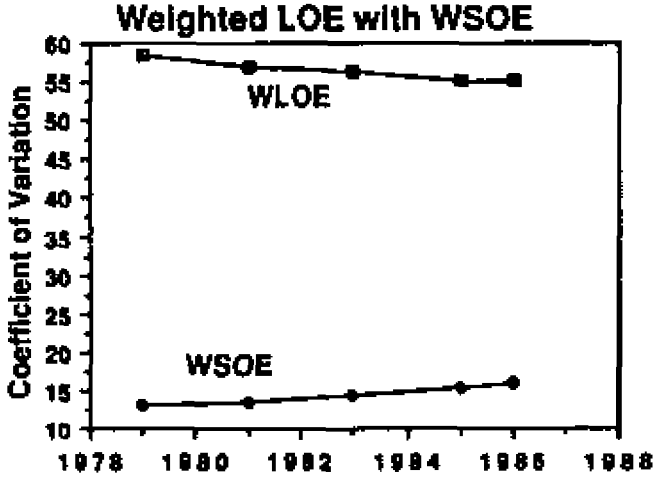
* includes state Retail Sales and Use Tax.

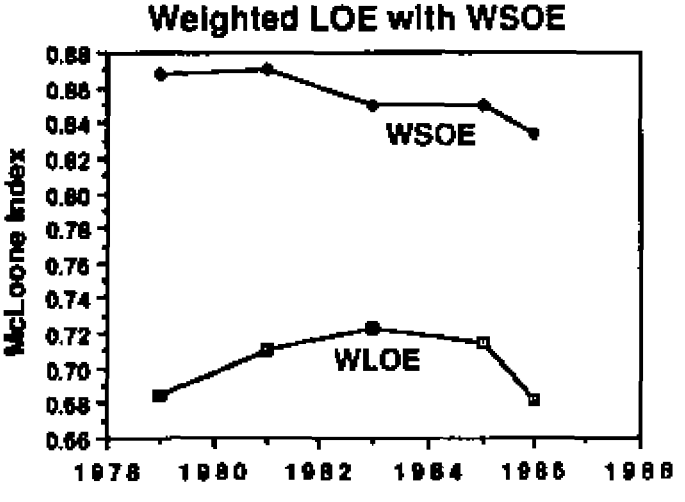
Figure E-1

A Comparison of Horizontal Equity Measures for Pupil Weighted Local Operating Expenditures (LOE) and State Operating Expenditures (SOE) for Selected Years









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ABSTRACT

The purpose of this study was to analyze the Virginia system of school finance from 1979 through 1986 to determine the degree of comprehensive resource equity and funding adequacy for pupils and public school divisions. The study extends prior research by assessing the effectiveness of the current finance system on the basis of three principles of equity and two measures of funding adequacy. Five different years of financial data were analyzed and 13 different variables of educational resource inputs, outputs, wealth, and effort were gathered and measured. The financial data included in this study were drawn from 133 public school divisions and approximately one million pupils in Virginia public schools.

Three principles of equity were examined: horizontal equity, equal opportunity, and vertical equity. Adequacy was measured by examining the equal opportunity principle for school divisions and pupils grouped by local characteristics on a scale of urbanization and by comparing state funding efforts to ensure a sufficient educational program for all pupils. A unique application of discriminant analysis was used to isolate differences among urban, suburban and rural school divisions. The findings of these analyses produced the following conclusions:

- that Virginia has not achieved a reasonable level of horizontal equity. Marginal, but consistent, progress was noted from 1983 to 1986 as state funding increased.

- that Virginia does not provide equal opportunity in its funding efforts. The link between local wealth and educational expenditures, although declining, is still unreasonably high.

- that Virginia has a particularly poor record in providing appropriate support for special need pupils. Vertical equity for disadvantaged and vocational pupils represents a serious deficiency in the state funding scheme.

- that Virginia can only reach the goal of educational equity by adjusting its funding system to increase the level of equalization and recognizing the needs of special pupil populations.

- that the legislative policy of encouraging teacher salary increases has triggered a decline in equity among school divisions.

- that there are significant differences in educational resources between school divisions classified according to characteristics of urbanization.

- that future studies concerning Virginia school finance should utilize the pupil unit of analysis in order to reflect more accurately the impact of financial alternatives.

The results of this research verify progress in educational equity and adequacy in Virginia from 1979 to 1986; however, there remains considerable inequity in educational resources and ineffectiveness in the equalization of state funds.