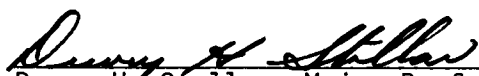
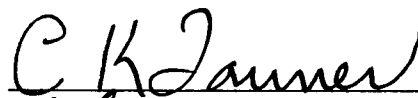


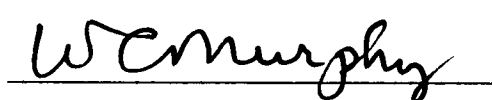
To the Graduate Council:

I am submitting herewith a dissertation written by Gary L. Peevely entitled "Fiscal Equity and Neutrality Among School Districts in the State of Tennessee for the School Years 1976-77 and 1977-78." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Educational Administration and Supervision.

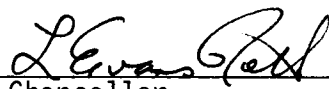

Dewey H. Stollar, Major Professor

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Vice Chancellor
Graduate Studies and Research

FISCAL EQUITY AND NEUTRALITY AMONG SCHOOL DISTRICTS IN THE
STATE OF TENNESSEE FOR THE SCHOOL YEARS
1976-77 AND 1977-78

A Dissertation
Presented for the
Doctor of Education
Degree
The University of Tennessee, Knoxville

Gary L. Peevely

March 1981

3049560

DEDICATION

This dissertation is dedicated to my wife, Karen, who through her sacrifices over the years has shaped many of my dreams into realities.

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The author is grateful for the patience and guidance of his committee members during his studies and the preparation of this document. The author would especially like to express his appreciation to his committee chairman, Dr. Dewey Stollar.

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ABSTRACT

The purpose of this study was to assess the interim effects of the 1977 Tennessee Education Finance Act in terms of both fiscal equity and fiscal neutrality for the first year of the legislation's implementation. The study was accomplished by examining selected public school revenues, expenditures and their sources during the school year prior to the implementation and by comparing the results with those of the first year of the Act's implementation. This required the compilation of similar data for all existing school divisions within the state for two years.

The origins of all data used in the analysis were the Tennessee State Departments of Education or Revenue, the University of Tennessee County Technical Assistance Service and the United States Department of Commerce. The computing facilities at the University of Tennessee, Knoxville, were utilized in performing the various descriptive statistics employed in this study. The variables of interest in this study were: local equalized revenue, local unequalized revenue, State revenue, Federal revenue, total revenues per pupil, instructional expenditures per pupil, adjusted property tax rates, and local school division personal income.

The major finding of the study was that the implementation of the Education Finance Act and the change to the weighted pupil method of funding the schools across the state did foster greater fiscal equity and neutrality. However, in fiscal equity, there was exhibited no change toward more equitable adjusted property tax rates.

The three types of fiscal neutrality investigated in this study were ex ante, ex post and income. The area of unequalized local revenue made the greatest advance toward fiscal neutrality in all three types. The revenues derived from state sources remained directly related to the income level of the school districts.

Federal revenues, while not directly addressed in the Education Finance Act, remained related to both the level of income and property wealth. Total revenues received by the school districts were neutral in all areas except income. There was a continuation of the relationship between instructional expenditures and local school division property wealth. In addition, the relationship between the amount of property wealth and the adjusted tax rate of districts went unchanged. Overall, there seemed to be greater strides made in the removal of relationships between the sales and property tax rates and the variables of interest. The relationship of income and the variables of interest either remained the same or exhibited change toward less neutrality.

Educational policy makers at both the state and local levels need information, which is derived from broad based economic data, to make valid decisions concerning the fiscal well-being of all local school divisions. This information should be of such quality that the administrators of both the State Department of Education and local school divisions will be able to perform long-range resource planning.

In a rapidly changing economy there is need for constant yearly assessment of the status of the statewide school finance situation. This action needs to be reinforced by the provision of quality technical assistance to local school divisions by an established partnership of the State Department of Education and institutions of higher education within the state.

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CHAPTER I

INTRODUCTION

Providing for the education of its citizens has long been established as a responsibility of individual states. This premise has been evidenced by the public education process having been included in and provided for by most state constitutions. Although historically supported by local funds, state and federal aid have been increasingly important components of education finance (Odden, 1976, p. 3).

The National Education Association (1978) in an annual report for school year 1978-79 reported that overall states' contributions to education finance was 47.4 percent of total funds, while local and federal contributions were 43.8 and 8.8 percent respectively. For school year 1980-81, NEA has projected these figures to be 53.7 percent state, 37 percent local, and 9.3 percent federal contributions.

Musgrove and Musgrove (1973) have suggested that the most appropriate level of government to finance education were the state and federal governments. Historically however, the education finance structure has been a mix of heavy reliance upon local property taxes with a smaller state support role.

The citizens of many states had assumed that public schools should be supported mainly by local funds which, for the majority, meant a reliance upon local property tax revenues (Odden, 1976, p. 3). However, as populations tended to cluster in areas of varying property and income wealth, correspondingly the difference in the amount and ability to pay such taxes polarized (Alexander, 1975). As states

became aware of such differentiations, they sought various means to equalize educational funding of the districts within their respective boundaries. This dictated providing revenues from state funds that are usually derived from sources other than property taxation (Burrup, 1977). States began to implement their financial responsibility for providing equal educational opportunity by modifying or reforming their plans for providing financial support to local districts.

While many of these finance reform programs have had good intent, they have not been panaceas. Various equalization aid programs have been developed in order to put the wealth of the state, rather than the varying wealth of the individual school district, behind the financing of public education. Theoretically, many equalization programs have attempted to allocate state revenue in an inverse proportion to a local wealth measure. The choice of that wealth measure has been, for the most part, a determining factor in the amount of aid that has been received by individual districts (Odden, 1976, p. 4).

In many districts, both rural and urban, some people have insisted that they were entitled to state funds for schools because they have paid state taxes. As a result, wealthy districts have often received proportionately as much revenue from the state as the less wealthy (Johns, 1975). In cases such as these, existing discrepancies have been perpetuated or increased and their link to local wealth has continued (Killalea, 1976, p. 3). Reform in many states has done little to equalize the distribution of per-pupil instructional expenditures (Carroll, 1979, p. 173).

The school finance reform movement originally grew out of a concern for the distribution of revenues among many districts serving students from various income levels. The association between districts' revenues per pupil and the average income of a population they serve has approximated a concept of fiscal neutrality (Killalea, 1976). The most widely accepted version of the fiscal neutrality concepts has referred to the relationship between districts' revenues (or expenditures) and their property tax bases. Fiscal neutrality, according to this view, has required that expenditures per pupil be non-correlative of property tax bases (Carroll, 1979, p. 163).

In addition to property wealth neutrality, another neutrality concept has been expanded to include income. Income neutrality has referred to the relationship of an income measure (i.e. per capita, household) to a district's revenues or expenditures (Carroll, 1979, p. 24). Even when property tax has been the only local tax, income still may have been a more comprehensive and sensitive measure of local district fiscal capacity. According to Sharkansky and Hofferbert (1969), income has been the best single explanatory variable for government expenditures. The federal government, moreover, has used a per capita income measure of wealth for each state in nearly all its equalization aid programs for education, regardless of an individual state's mix to tax types (Odden, 1976, p. 161).

In a report prepared for the National Institute of Education by Stephen Carroll of the Rand Corporation, the author identified three concepts of fiscal neutrality. Two of these concepts reflected the relationship between revenues (or expenditures) and fiscal effort as measured by the property tax rate. This concept has come to be

known as ex ante fiscal neutrality and exists where a given level of fiscal effort guarantees the same per pupil revenue to each district regardless of local wealth. The work of Martin Feldstein (1975) with neutrality of school finance in the State of Massachusetts has shown that an ex ante fiscally neutral system may not, in general, yield ex post fiscal neutrality.

The concept of fiscal equity, however, has primarily focused on the levels of district expenditures or revenues and required that expenditures or revenues per pupil, after adjustments for different program costs and pupil need, be equal across all school districts in a state. The fiscal equity standard has been concerned with the expenditure (revenue) per-pupil gaps between high and low spending (revenue) school districts and required the reduction, if not elimination, of those differences (Carroll, 1979, p. 160).

American school finance, in both the areas of revenue availability and expenditures, has been riddled with inequity. When the data on the distribution of revenues for expenditure purposes were examined, a strong correlation was found in many states between the property wealth and/or income of a district on one hand and its level of educational expenditures on the other (Carroll, 1979, p. 161).

The decade of the 70's marked a time in which increased attention was directed to the disparities in resources among school districts of various states. During the first half of that decade, 22 states reformed their school finance programs (Odden, 1978, p. vii). Many times this was as a direct result of court decisions concerning inequity of educational opportunity (*Serrano v. Priest*, 1971).

Unfortunately, several recent studies have indicated that inequities still exist even in some reform states.

Killalea Associates, Inc., (1976) in their research School Finance Reform in the Seventies: Achievements and Failures, found that in 1975 high spending districts in 40 states spent at least 50 percent more than low spending districts. In four of those states, the discrepancy was twice the amount from high to low expenditures, and moreover there was at least a 20 percent variation in per pupil expenditure in 18 states.

In addition to expenditure disparities as a determinant of equity, Hickrod and Hubbard (1976) also considered the variable of local wealth. They indicated in their study of the 1973 education finance reform in Illinois that expenditure disparity was but one criterion available to gauge the equity of school finance programs. The Hickrod and Hubbard study was also concerned with the extent to which the pupil expenditures depended on local wealth. The Killalea report, in utilizing concepts similar to those of Hickrod and Hubbard, indicated that although state revenue allocations to low wealth districts increased in 23 states between 1970 and 1975; in almost all the states, the low wealth districts remained at a distinct disadvantage relative to districts of higher wealth. The report concluded that there had been no progress in the nation as a whole in closing the disparity gaps in this sector of education finance (Killalea, 1976, p. 19).

For measuring within state expenditure disparities in 1975 and disparity changes of 1970 to 1975, Killalea used the ratio of

expenditures at the 95th percentile of students (districts) to expenditures at the 5th percentile. In Tennessee during 1975 these students (districts) at the 95th percentile received 1.9 times as much for expenditure purposes as those pupils at the 5th percentile. The expenditure disparity that existed in 1975 was 99 percent of the 1970 disparity. Killalea used the 95 to 5 percentile methodology because it was a measure of extreme expenditure disparities and was incorporated as an allocation measure in federal regulations (Killalea, 1976, p. 27).

In reporting the relationship between local expenditures and property valuation per pupil, the Killalea study divided Tennessee's student population (districts) into three groups: (1) the lowest 25 percent of the state's districts (property valuation per pupil), (2) the middle 50 percent, and (3) the highest 25 percent. The results were that the 25 percent of districts having the lowest property valuation per pupil received 85 percent of the state's average expenditure per district in 1975. This represented 102 percent of the level of resources received by the same quartile in 1970, reflecting an increase of only 2 percent. The mid-range received 97 percent of the state's average expenditure in 1975 or 88 percent of the 1970 receipts. The highest quartile, however, received 120 percent of the state's average expenditure or 124 percent of 1970's receipts (Killalea, 1976, p. 29). These data indicated an increase in resources for expenditures in both the high and low quartiles and a marked decrease in the percentage of the middle quartile over a 5 year period.

Tennessee has made an attempt to reform its school finance situation. In September of 1973, the Tax Modernization and Reform Commission of the State of Tennessee reported that the question of how schools were to be financed was one of the foremost issues faced by the legislature in seeking to achieve either a more equitable tax structure or a school program designed to provide equal educational opportunities. According to the Commission, the problem had been complicated by: (1) increased cost due to inflation and fluctuating enrollments, (2) disparities in local wealth, and (3) heavy reliance on local property tax. This Commission recommended that school finance in Tennessee be reformed by adopting as a goal that 80 percent of the foundation program be supported by the state and 20 percent supported locally. The recommendation was also made to adopt a program of financing equalized local leeway up to a limit above the foundation level. In addition, the recommendation was made to adopt a pupil cost unit approach for the allocation of state funds to local districts (Tax Modernization and Reform Commission, 1973).

In 1977, Tennessee legislators enacted funding legislation (Senate Bill No. 400) that replaced Tennessee's teacher unit formula with a pupil weighted average daily attendance (WFTEADA) foundation formula. The foundation program funds are now allocated to local districts on the basis of the total number of weighted students according to their educational needs and the district teacher experience and education factor, and statewide are funded 90 percent by state and 10 percent by local school districts (Odden, 1977).

After the passage of the Tennessee Education Finance Act in 1977, the Joint Legislative Committee on Elementary/Secondary School Finance voted to cooperate with the State Commissioner of Education in making a detailed study of the equity of the State's public school finance program. The body that was formed to implement this was the Tennessee School Finance Equity Study. In 1978-79 this body conducted (or sponsored) a number of studies in reviewing the equity and adequacy of Tennessee's Public School Finance Program.

In November, 1979, a summary report of the Tennessee School Finance Study for 1978-79 was published. The report concluded with the following recommendations relative to future equalization of education finance in Tennessee. These were: (1) increase the base cost allotment per pupil in the Tennessee Foundation Program, (2) the cost differentials should more adequately reflect program needs and costs, (3) adopt a more accurate measure of county-relative taxpaying ability, and (4) the adoption of a broad based individual income tax as well as considering changes in the present consumer and property based tax systems (Gibbs, 1979).

I. STATEMENT OF THE PROBLEM

The financing of public school operations in many states of the union has been inequitable in the areas of both revenue expenditures and revenue source neutrality. School finance reform legislation has been enacted by numerous states to ameliorate such existing discrepancies; however, the task then remained to ascertain whether the reform had the effect of its intent. Such has been the instance with the State of Tennessee where legislation was enacted in 1977 to

provide a more equitable distribution of funding for all public school districts. The effects of this legislation in terms of fiscal equity and neutrality have not been fully determined.

II. PURPOSE

The objective of this study was to assess the interim effects of the 1977 Tennessee Education Finance Act, in terms of fiscal equity and fiscal neutrality, for the first year of implementation. This was accomplished by examining selected public school revenues, expenditures and their sources during school year 1976-77, prior to implementation of the Tennessee Education Finance Act, and comparing the results with those of the subsequent 1977-78 school year.

III. PROCEDURES

The origins of all data used in the analyses were: (1) the Tennessee State Department of Education Annual Statistical Reports (1977, 1978), (2) Tennessee State Department of Education Annual Public School Financial Reports (1977, 78), (3) Tennessee Education Association Research Reports (1978-R7 and 1979-R6), (4) data from the Tennessee State Department of Revenue (1977, 1978, 1979), (5) Tennessee County Tax Statistics, County Technical Assistance Service, The University of Tennessee, and (6) income data from the Regional Economics Information System, Bureau of Economic Analysis, Department of Commerce.

Variables of Interest

Seven variables of interest were used to examine the effects of the Tennessee Education Finance Act of 1977 on distributional

equality (fiscal equity) and fiscal neutrality. Five of these concerned current revenues per pupil, while the remaining two concerned instructional expenditures per pupil and local property taxes levied for education. The seven variables of interest were as follows:

1. Local (equalized) Revenue -- The sum of local revenue in each district that was equalized according to the State Minimum Foundation Program (1976-77 data) and the Tennessee Education Finance Act of 1977 (1977-78 data).
2. Local (unequalized) Revenue -- The sum of local revenues available in each district other than local (equalized) revenue.
3. State Revenue -- The sum of revenue other than that for capital outlay, available to each district from state sources.
4. Federal Revenue -- The sum of revenue available to each district from the Federal Impact Aid Program (PL 874) and Elementary Secondary Education Act, Title I.
5. Total Revenues per Pupil -- The total revenue per pupil from all sources (local equalized to local unequalized + state + federal).
6. Instructional Expenditures per Pupil -- The sum of direct expenditures for instruction -- the sum of direct expenditures for instruction, and expenditures for instructional support services, including pupil personnel, instructional media, instructional and curriculum development, and instructional staff development and training.
7. Adjusted Property Tax Rates -- The sum of all local

property tax rates whose levies support the operations in each district's schools. It includes the general (or operational) fund tax rate and any special fund account tax rates. It excludes capital outlay and debt service tax rates.

Measures of Distributional Equality (Fiscal Equity)

Eleven measures that summarize the distributional effects of the Tennessee Education Finance Act of 1977 and the Minimum Foundation Program of 1976 were used. They were as follows:

1. Percentiles
2. Range
3. Restricted Range
4. Restricted Range Ratio
5. Mean Deviation from the Median
6. Relative Mean Deviation from the Median
7. Mean
8. Standard Deviation
9. Coefficient of Variation
10. Mean Deviation from Mean
11. Relative Mean Deviation from Mean

The eleven measures were computed for each of the seven variables of interest using data from school year 1976-77 (before legislation) and school year 1977-78 (after legislation). The computer facilities at The University of Tennessee, Knoxville, were used to run the computations. Procedures used to compute each of the eleven measures using data from school years 1976-77 and 1977-78 were as follows:

1. Percentiles -- Each district in the state was ranked according to the seven variables of interest. Next, a listing of the values of each of the seven variables was made for the 100th (highest), 95th, 75th, 50th (median), 25th, 5th, and 1st (lowest) percentile district.
2. Range -- The differences between the values of each of the seven variables of interest in the highest and lowest districts were computed.
3. Restricted Range -- The differences between the values of each of the seven variables at the 95th and 5th percentiles were computed.
4. Restricted Range Ratio (also known as the Federal Range Ratio) -- The restricted ranges of each of the seven variables of interest were divided by the values of each variable at the 5th percentile to compute the restricted range ratios. This measure is the number of times that the variable at the 95th percentile is larger than at the 5th percentile.
5. Mean Deviation from the Median -- The average (mean) absolute deviation from the median was computed for each of the seven variables of interest.
6. Relative Mean Deviation from the Median -- The mean absolute deviation from the median divided by the median was computed for each of the seven variables of interest.
7. Mean -- The sum of the values of each variable of interest over the districts divided by the number of districts was computed.

8. Standard Deviation -- The square root of the sum of the squared differences between the value of each of the variables in each district and the mean, divided by the number of districts minus one, was computed.
9. Coefficient of Variation -- The standard deviation of each of the seven variables of interest was divided by its respective mean to derive the coefficient of variation.
10. Mean Deviation from Mean -- The average (mean) absolute deviation between the value of the variable in each district and the mean (for all seven variables of interest) was computed.
11. Relative Mean Deviation from Mean -- The mean absolute deviation from the mean divided by the mean was computed for each of the seven variables of interest.

The results of these computations provided the bases for a comparison of the distributional equality that was precipitated by the reform legislation.

Measures of Fiscal Neutrality

Seven measures of fiscal neutrality were used to examine the effects of the reform legislation. They were as follows:

1. Regression on property wealth.
2. Regression on income.
3. Regression on local option sales tax.
4. Regression on adjusted property tax rate.
5. Mean for property wealth decile.
6. Mean for income decile.
7. Correlation between each of the seven variables of interest

and adjusted per-pupil wealth, income per pupil, and the adjusted tax rate.

As was the case with the computations for fiscal equity, the computer facilities at The University of Tennessee, Knoxville, were used to run the computations. The procedures used to compute each of the seven measures from data concerning school year 1976-77 (before legislation) and school year 1977-78 (after legislation) were as follows:

1. Regression on property wealth-- Each of the seven variables of interest was regressed on assessed value per pupil (in thousands). Then, a second regression for each of the seven variables was computed on adjusted wealth per pupil squared. Two measures of fiscal neutrality resulted from each regression, viz., an F-statistic, which served as an indicator of "goodness-of-fit," or the degree to which each variable is related to assessed value; and an elasticity coefficient, which indicated the nature of the estimated relationship between each variable and property wealth per pupil. The elasticity coefficient is the estimated percentage change in the variable that, at the mean, is associated with a one-percent change in property wealth per pupil.
2. Regression on income -- Each of the seven variables of interest was regressed on income per pupil and on income per pupil squared. Two measures of fiscal neutrality resulted, viz., an F-statistic and elasticity at the mean.

3. Regression on local option sales tax revenue -- Each of the seven variables of interest was regressed on sales tax revenue and on sales tax revenue squared. Two measures of fiscal neutrality resulted, an F-statistic and elasticity at the mean.
4. Regression on adjusted tax rate -- Each of the seven variables of interest (except adjusted tax rates) was regressed on the adjusted tax rate and adjusted tax rate squared. Two measures of fiscal neutrality resulted from each regression, viz., the F-statistic and elasticity at the mean.
5. Mean for property wealth decile -- The districts were ranked by property wealth per pupil and divided into deciles. Then, the mean of each of the seven variables of interest was computed for the districts in each decile.
6. Mean for income decile -- The districts were ranked by per-pupil income and then divided into deciles. Next, means for the seven variables of interest for the districts in each decile were computed.
7. Correlations -- Pearson Product moment correlation coefficients were then computed for each of the seven variables of interest and property wealth per pupil, local sales tax revenue, income per pupil, and adjusted tax rate.

The results of these computations on data from school year

1976-77 (before legislation) and 1977-78 (after legislation) provided the basis for a comparison of the fiscal neutrality that exist after the reform legislation.

IV. LIMITATIONS AND DELIMITATIONS

The researched population was limited to the 147 public school districts in school year 1976-77 and the 148 districts for school year 1977-78, within the State of Tennessee.

Unpublished data from the Regional Economics Information System, Bureau of Economic Analysis, Department of Commerce, July, 1978, provided the most current income data for Tennessee counties, standard metropolitan statistical areas, and other cities or towns.

The most current data for wealth indices, local school district financial and pupil population summaries, were obtained from the Annual Statistical Reports of the Department of Education, State of Tennessee for the scholastic year ending June 30, 1977 and June 30, 1978. County data prorated or reported as percentages were the best estimators of contiguous data for city and independent districts within a specific county. Pupil data were reported as per average daily attendance.

The State of Tennessee has modified the foundation level for support annually. Similarly, many local district tax rates have been modified annually. What changes would have been made if these systems had not been restructured and how those changes would have affected the distributions and the relationships of interest here are questions beyond the scope of this study.

V. DEFINITIONS

Adjusted County Property Value

The sum of the total assessed valuation of the county and the county property equivalent of Tennessee Valley Authority payments in lieu of taxes.

Average Daily Attendance or ADA

The aggregate days attendance of a given district during a reporting period divided by the number of days school is in session during the period.

Base Cost

The amount of the annual appropriation for the Tennessee Foundation Program divided by the product of the state training and experience factor and the sum of the total WFTEADA and the total state weighted identified and served handicapped.

Current Expenditure

This includes all items for which school funds are expended except capital outlay and debt service.

Federal Contribution

The amount of revenue contributed by the federal government for support of the educational effort at the local district level. These revenues may be channeled through the state education agency or allotted directly to the local school district.

Fiscal Equity

A standard requiring, that after adjustment for education cost and pupil need, expenditures or revenues per pupil be equal across all school districts in a state.

Fiscal Neutrality -- ex ante

A standard whereby a given level of fiscal effort (tax rate) provides the same per pupil revenue to each district regardless of local wealth levels.

Fiscal Neutrality -- ex post

A standard whereby actual per pupil spending and wealth are uncorrelated.

Income Neutrality

The relationship between revenue sources in a school district and its personal income per pupil base.

Revenues

Those moneys obtained by taxation within local districts and other contributions at the state and federal level for the support of education at the local district level.

School Finance Reform

The enacting of legislation that alters or revises the distribution of revenues among local school districts.

State Contribution

Those revenues for current expenditure, contributed by the state via the Tennessee Foundation Program.

Weighted Full Time Equivalent Average Daily Attendance or WFTEADA

One full-time equivalent average daily attendance is multiplied by the cost differential for a program as provided in section 5 (b), (1), (2), and (3) of the Tennessee Education Finance Act of 1977.

Wealth

The measure of potential to secure revenues from local sources for support of the educational effort at the local district level. The indices of local district wealth considered in this study were:

(1) real property assessments, (2) per pupil income, and (3) local option sales tax revenue.

VI. ORGANIZATION OF THE STUDY

Chapter I presents the problem and purposes, profiles procedures, presents limitations and delimitations, and defines the terms which are used.

Chapter II presents a review of the related literature.

Chapter III describes the statistical methods used in analyzing the data.

Chapter IV presents the results of the study.

Chapter V contains a general summary and the conclusions drawn from the study.

CHAPTER II

REVIEW OF LITERATURE

School Finance -- Beginnings

The history of school finance is a relatively young field of study when compared with social sciences. In fact, it has only been within this century that scholars have begun to evaluate and research the methods whereby we finance the formal educational processes of children.

Within this country, the first mandated school finance activity took place with the Massachusetts Law of 1647 which required appointment of teachers and schoolmasters. The passage of this act established the "New England Pattern" (Garms, Guthrie, and Pierce, 1978).

The "New England Pattern" consisted of four principles: The State could require children to be educated; the State could require towns to establish schools; the civil government could supervise and control schools by direct management in the hands of public officials; and public funds could be used in the support of public schools (Butts and Cremin, 1953, p. 103).

Since many of these schools had been established on a local basis, the problem remained for such schools to be financed at the local level. Many original colonies used rate bills or tuition charges, a practice held over from European homelands. While many of the early New England colonies used property tax as a method of financing education, tax support was used only to a limited extent in the original southern states, and, in some middle Atlantic States, was used for the support of pauper schools (Burrup, 1977, p. 123).

According to Cubberley, the Massachusetts Laws of 1642 and 1647, providing for the equalized and compulsory taxation of all for all town

charges, represented the very foundation stones upon which our American public school systems were founded (Cubberley, 1919). Furthermore, Knight stated that early colonial schools were little more than a reflection of the convictions, prejudices, hopes and fears which the early settlers brought with them from Europe (Knight, 1951, p. 7).

Burrupe indicated that the permissive property tax laws which existed when the colonies became states gradually became mandatory in the latter part of the eighteenth century and the early part of the nineteenth. As the westward movement of settlers accelerated and the number of local school districts began to multiply, the "popularity" and acceptability of the local property tax as the mainstay of the school financing program increased. By the turn of that century, all of the states were using property taxes supplemented by revenue from the land grants and other sources (Burrupe, 1977, p. 124).

The advisory commission on intergovernmental relations felt that the question of educational inequality sprang up at this time.

About the turn of the century, public schools in most population centers acquired their present structure - 12 grades and a 9 month school term - and this came to represent a greater cost to local taxpayers. As states legislated programs of this scope, the issue of inequality in local wealth surfaced. Rural communities in particular found it increasingly difficult to impose tax rates stiff enough to meet the state mandated programs. Cities with their concentration of valuable properties could and did provide high level educational programs with moderate tax effort. (Advisory Commission on Intergovernmental Relations, 1969).

School Finance -- Theorist

The turn of this century also saw the theorists coming to the forefront of school finance. The development of state school finance support is said to have begun with Cubberley at this time (Ellis, 1974).

Some of the principal tenets of Cubberley's philosophy of school finance are expressed in his following writing:

Theoretically all the 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 (Cubberley, 1905, p. 17).

This simple but far-reaching conceptualization of what he believed to be the state's responsibility in apportioning state school funds was derived from Cubberley's concern that considerable disparities existed in fiscal capacity and tax effort among local school districts within the same state. Cubberley saw that expenditures per pupil in neighboring school districts often were very disparate.

Cubberley's research enabled him to become aware of the inequities existing in the quality of education among school districts with individual states. The obvious reason for this differential was the fact that local financial capability to support schools varied greatly from one district to another. Therefore, educational expenditures and financial capability to support education were positively correlated, and Cubberley noted that the method of distributing state funds, at that time, merely aggravated this situation (Cohn, 1974).

The findings of Cubberley have provided other finance researchers and disseminators with their empirical base. The conclusions of his research are still applicable in many states today. Some of Cubberley's conclusions were as follows:

1. Due to unequal distribution of wealth, the demands set by the states for maintaining minimum standards cause very unequal burdens among local districts.
2. The excessive burden of communities should be equalized by the state.
3. A state tax best equalizes the burdens.
4. Any form of state taxation for schools fails to accomplish the ends for which it was created unless a wise system of distribution is provided.
5. Few states had as yet evolved a just and equitable plan for distributing the funds they had at hand.
6. "Taxes where paid," property valuation, total population, and school census were all undersirable methods of apportionment.
7. Total enrollment, enrollment for a definite period, average daily membership, average daily attendance, and aggregate days attendance are each successive improvements over the census basis of apportionment.
8. Any single measure for distributing state funds is defective but if one is used, the best single measure is the number of teachers employed.
9. The best basis for distributing state funds is the combination of the teachers actually employed and aggregate days attendance.
10. Special incentive funds shall be provided to encourage communities to provide secondary education, kindergartens, and manual training.
11. A reserve fund should be established for the relief of those communities which have made the maximum effort allowed by law and yet are unable to meet the minimum demands made by the state (Cubberley, 1905, p. 250-253).

These concepts of school finance set forth by Cubberley had great influence on educational leaders during the first quarter of the twentieth century (Johns, 1969, p. 22).

In 1918 Butterworth published his study of funds available, methods and purposes of their apportionment, and results obtained

through the states' programs of financing secondary education. Butterworth used two criteria for evaluation: (1) the degree to which funds available equalized burdens and opportunities for education among the communities of a state and (2) the degree to which funds available stimulated communities to improve their own facilities.

Butterworth reached the following conclusions:

1. Permission to use general funds for high school purposes does little to equalize burdens for secondary education.
2. Special state aid has been one factor in stimulating both the state and local community to greater effort for secondary education.
3. Special state aid has met actual educational needs of communities in a very crude way. To remedy this condition, cost of maintaining minimum standards and wealth of the community concerned should serve as constant standards for apportionment.
4. Special state aid is but a step in the process.
5. The desirable goal is that system of state aid wherein elementary and secondary education are both considered essential and the state equalizes the burden and the opportunities of education up to specified minimum standards (Butterworth, 1918).

Butterworth's study, like many others of his era, had relative significance to the universal problem of school finance. Many studies, while confined to one state, had findings that were applicable in other situations. Such was the 1911 research of Swift in Massachusetts, which recommended that the states assume a far larger burden of school costs and distribute all state aid in such a manner as to make state reimbursements directly proportionate to needs and efforts of the cities and towns receiving them (Swift, 1911).

The next major contribution to the theory of school finance was proposed by Harlan Updegraff of the University of Pennsylvania in

his survey of the rural schools of New York in 1921. Updegraff maintained that, while a portion of support for local schools should come from the state, local support is fundamental; that the administration of state aid should be such as to increase the efficient participation of citizens in a democratic form of government; and that state aid should guarantee to every child, irrespective of residence, equal opportunity to that of any other child for the education which will benefit him for life (Updegraff, 1922).

The concept of the foundation program was introduced and interpreted initially in the Strayer-Haig Educational Finance Inquiry in New York in 1923. George Strayer first advanced his theories of school finance in this report. Strayer and Haig gave detailed descriptions of their theoretical conceptualization of the equalization of educational opportunity. Strayer and Haig pointed out that:

. . .to carry into effect the principle of equalization of educational opportunity and equalization of school support as commonly understood, it would be necessary (1) to establish schools or make other arrangements sufficient to furnish the children in every locality within the state with equal educational opportunities up to some prescribed minimum; (2) to raise the funds necessary for this purpose by local or state taxation adjusted in such manner as to bear upon the people in all localities at the same rate in relation to their taxpaying ability; and (3) to provide adequately either for the supervision and control of all the schools, or for their direct administration, by a state department of education (Strayer and Haig 1923, p. 173).

A conceptual framework for formulating a financial plan of state support was introduced by Strayer and Haig in that same publication. The paradigm is 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, p. 175).

Strayer and Haig emphasized the equalization of the tax burden to support schools as well as the equalization of educational opportunity. They did not, however, incorporate a reward for effort or incentive concept in their state support model. Strayer and Haig attacked these concepts, which had been advanced by Cubberley and Updegraff, in the following manner (Johns, 1972):

Any formula which attempts to accomplish the double purpose of equalizing resources and rewarding effort must contain elements which are mutually inconsistent. It would appear to be more rational to seek to achieve local adherence to proper educational standards by methods which do not tend to destroy the very uniformity of effort called for by the doctrine of equality of educational opportunity.

Paul Mort was not only a theorist, but also a disseminator of education finance research. According to Bailey (1962), it would be fair to say that, without denigrating in any way the contribution of other powerful academics, no single person in the twentieth century had a more profound effect upon state educational finance than Paul R. Mort. Mort developed the technology for implementing many of the theories proposed by Strayer and Haig. For a state's guaranteed minimum program, Paul Mort proposed the following elements:

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, p. 6).

Mort defined a satisfactory equalization program as follows:

A satisfactory equalization program that would demand each community have as many elementary and high school classroom or teacher units, or their equivalent, as is typical for communities having the same number of children to educate. It would demand that each of these classrooms meet certain requirements as to structure and physical environment. It would demand that each of these classrooms be provided with a teacher, course of study, equipment, supervision, and auxiliary activities meeting certain minimum requirements. It would demand that some communities furnish special facilities, such as transportation (Mort, 1924, p. 8).

Mort sought objective, equitable measure of educational need that could be used by a state legislature in determining the amount of the state appropriation for equalization. He also wished his measure to be used by officials in the state department of education for apportioning state school funds with a minimum of state control.

Mort was instrumental in popularizing the weighted pupil method of funding schools. Although Mort's research focused on elementary and secondary schools, his weighted pupil concept was extended to vocational, exceptional, and compensatory educational programs. Most foundation

programs today use some form of the weighted teacher or weighted pupil measure (Johns, Alexander and Stollar, 1971, p. 11).

In 1931, Mort directed a national study of state support for education. The following is a synopsis of his survey State Support for Public Education:

1. In all but a few states, the actual minimum status of education was determined by the economic ability of local districts to support schools rather than the social needs for education.
2. The minimum program actually guaranteed was in nearly every state far below the program provided in communities of average wealth.
3. An analysis of the methods used by the different states to measure educational need revealed that no state was using as refined measures as were available. Measures in use were inequitable in one or more of the following respects: treatment for variation of size of school, treatment of districts of the same size, caring for the higher costs of high schools, caring for non-residence, consideration of costs of living, consideration of transportation, and consideration of capital outlays (Mort, 1933).

In 1930, a time when great emphasis was being placed on local initiative and home rule in the educational enterprise, Henry C. Morrison, a professor at the University of Chicago, advocated a unified state-wide system of education and full state funding of education. Morrison believed that the purpose of publicly supported education was not to pursue local interests but to train the young people of the state to be good citizens. Benson sums up Morrison's views on the purpose of public education as follows:

It is thus necessary to place limits on the expenditures of rich districts in order that public funds shall not be diverted into "private schools," as distinct from citizenship education. Taxes for schools are to be collected where taxable income can be found in the state, and school resources

are to be distributed in accordance with local requirements to provide a uniform standard of citizenship training (Benson, 1968, p. 165).

Morrison's primary objective was the equalization of educational opportunity. He saw that great inequities in wealth had caused great inequities in the quality of education and that previous attempts to achieve equality in this area through equalization funds and other means had failed. Morrison had this to say about these past plans:

We have a childish faith in "plans." When the inevitable disillusionment comes, we conclude that the plan "did not work," and look for another. In the case of equalization schemes, the disillusionment is prone to come at a time when the original plan has been forgotten and inequality is discovered all over again (Morrison, 1930).

There has always been a level of dissatisfaction with the local property taxes as a means of funding education on the local level. Morrison was aware of this disenchantment when he was doing his research; therefore, along with his proposal of full state funding, he advocated the use of a state income tax for the purpose of state school support. Today, Hawaii is the only state which has established a complete state-wide system of education with no local school districts.

World War I had the effect of accelerating the rate of change of the United States from an agrarian to an industrial society. The war started the breaking up of the parochialism and the isolation of rural America. This led to an industrialized mobile population which needed much more formal education than an isolated rural population. The subsequent transformation of society was paralleled by the growth of state aid for public schools which more than doubled between 1920 and 1930 (Johns, Alexander, Stollar, 1971, p. 25).

The era of the Great Depression had far-reaching effects on school finance. The fact that about 82 percent of school revenue in 1930 came from local sources demonstrates that nearly all school revenue was derived from local property taxes (Johns, Alexander, Stollar, 1971). The depression, however, was a time when many people were losing their homes, property, and business for tax default. The resulting opposition to property taxes during this time provided an opportunity for the advocates of state aid to advance their programs.

Much of the work in school finance over the next two decades was in refinement and modification of Mort's design. The developers and disseminators of state support policies were numerous, to say the least. Most of the early theorists were university professors whose students ultimately became university professors who, in turn, had students who became university professors, all teaching the basic concepts of the early theorists (Johns, 1960, p. 193).

Roe L. Johns and Edgar L. Morphet usually have worked as a team in developing state school support legislation. Both were students of Strayer and Mort, and both accepted the basic theories of state support advanced by Strayer, Haig, and Mort. Each of these men made some significant modifications in Mort's technology of calculating educational need and local taxpaying ability. Johns and Morphet differed in belief with Mort in regard to the issue of state control (Johns, 1960, p. 194).

Mort's technology for calculating educational need was designed to minimize state control and to maximize local control over educational decision making. He sought to avoid as much state control as possible

and also to eliminate entirely any reward for effort on the part of the local district (Johns, 1960, p. 212).

Morphet and Johns saw no reason why the state should not use its power and strategic position to prevent undesirable local educational policies, as well as to introduce desirable new policies and programs by means of incentive elements incorporated in the foundation program plan for state support. Mort prized local initiative very highly, and he interpreted any type of state "programming" or "earmarking" for educational services within the foundation program as undesirable state control, for it would interfere with local initiative (Johns, 1960, p. 207).

Morphet and Johns did not believe that state legislatures would give large increases in state funds to local schools unless they received some assurance concerning the improvement or extension of the educational services provided (Johns, 1960, p. 201).

In 1947, Morphet and Johns drafted a foundation program for the State of Florida. The total design of the technology developed by Morphet and Johns for determining the cost of the minimum foundation involved the following:

1. Calculating the cost of instruction by multiplying the number of allotted instruction units by the appropriate amounts provided in a salary allotment scale.
2. Calculating the amounts allotted for transportation by a method developed by Johns in his doctoral study.
3. Calculating the amount allotted for other current expenses by multiplying the instruction units by a flat amount per unit determined by the average costs.
4. Calculating the amount allotted for capital outlay and debt service by multiplying the instruction units by a flat amount determined by the average depreciation costs of the school plant (Johns, 1960, p. 196).

Erick Lindman was considered both a developer and disseminator of state support plans. In 1945, he developed an equalized variable matching formula by which percentage reimbursements of program costs varied from district to district, based upon local taxable resources per unit of load. The formula included a constant which could be changed to effect varying degrees of "equalization" (Johns, 1960, p. 197).

William P. McLure, like Lindman, has been both a disseminator and developer of state support programs. He has participated in and also has directed a number of state studies. McLure has largely utilized Mort's conceptual model for state support, but he further developed that model by analyzing the relationship of sparsity to school cost. McLure developed a sparsity correction in order to adjust measures of educational need for the extra costs of transportation and lower than normal pupil-staff ratios. McLure, like Cubberley and Morrison, studied the harmful effects of inefficient local school district organization on the equalization of educational opportunity and the difficulty of developing a sound state support program in a state with small, inefficient school districts (McLure, 1947, p. 97).

The effects of World War II on school finance were twofold. First, it accelerated the development of technology nationally and it made apparent the fact that education was a necessity, not only for individuals, but also for the welfare of society. After World War II, the chief task of the American educational system seemed to be that of providing facilities for the millions of new students who appeared as a result of the ensuing baby boom. This phenomena began in 1946 and continued through the 1950's. This state of affairs created a demand to find sources of revenue for public schools that would correspond more closely with

rapid price changes and school enrollment than property taxes. Johns emphasized that property was becoming less related to income sources and cited that 58 percent of the national income was derived from compensation of employers in 1929 as opposed to 72 percent in 1969 (Alexander, et al. 1971).

Selected School Finance Court Cases

In 1954, the United States Supreme Court for the first time considered the rights of the individual as guaranteed in the United States Constitution as having precedence over the authority of the individual states to conduct education without question. In Brown v. Board of Education the United States Supreme Court reasserted that education was a state function and that the federal government could not interfere with state management of education except in cases of practice contrary to federal law. The court ruled that the doctrine of separate but equal facilities was in essence unequal, and therefore, Negro children were deprived of equal protection of the law as guaranteed by the Fourteenth Amendment (Harris, 1960, p. 1,300).

A unanimous Court recognized that "education is perhaps the most important function of state and local governments. . . .Such an opportunity, where the state has undertaken to provide it, is a right which must be made available to all on equal terms" (Brown v. Board of Education).

Brown v. Board of Education set the stage for a new era of thinking as to the availability of certain fundamental rights to all citizens on equal terms. The case was based on two important assumptions:

1. Education is perhaps the most important function of state and local government;
2. It is doubtful that any child may succeed in life if he is denied the opportunity of an education.

The decision made it plain that there is no compelling state interest which will justify any racially discriminatory policy in public education.

Almost twenty years after the Brown ruling, the courts were again being asked to consider the proposition that education was a fundamental personal right, protected by the state, and were also asked to rule the system of educational finance, which was thought to be conditioned on the wealth of a child's parents and neighbors, as unlawful.

Two major forces brought this issue to the nation's attention through the courts:

1. The rising cost of public education, coupled with a growing resistance to further property tax increases, and
2. The rising demand for equality in the distribution of public services.

In practically every state in the nation, wide variations existed in the amount of taxable wealth available to local school districts. Because their taxing efforts had been limited to the availability of local revenues, the public school systems had been unable to provide equal educational opportunities to their children.

From the few brief references in Brown to various social science studies, school finance came to the point where huge research projects on the effectiveness of schooling, such as the Coleman Report, were brought into litigation.

In response to the Supreme Court ruling in Brown v. Board of Education, the federal government passed the Civil Rights Act of 1964.

Education, the federal government passed the Civil Rights Act of 1964. The many complex issues raised by Brown caused the Equality of Educational Opportunity Survey of 1966 (known as the Coleman Report) to be initiated.

The first important court case to explore the realm of equal educational opportunity via finance was McInnis v. Shapiro in 1969 in Cook County, Illinois. The suit was filed by a number of elementary and high school students on behalf of themselves and others challenging the constitutionality of various state statutes pertaining to the Illinois system of financing their public schools. They sought permanent injunction prohibiting the distribution of tax funds under the laws. The students felt their rights under the Fourteenth Amendment were being violated because state funds were being distributed only on the basis of local assessed valuations and tax rates.

A three-man court ruled that the Illinois program of financing public education reflected rational policy consistent with the mandate of the Illinois Constitution and that there were no constitutional requirements that expenditure be made on the basis of students' educational need. The court further stated that if changes were needed, the change should be pursued through legislation, not through the courts. The case was dismissed and judgement was later affirmed upon appeal in the case McInnis v. Ogilvie. This decision and the decision by a three-judge federal court in the Virginia case of Burruss v. Wilkerson were to serve as references for similar cases until the case Serrano v. Priest.

On August 30, 1971, a landmark opinion on school finance was handed down by the California Supreme Court in the case of Serrano v. Priest. This case had been dismissed twice by lower courts before being accepted for review by the California Supreme Court. The court accepted

the "fiscal neutrality" approach which argued that the courts should reject existing state financing schemes as arbitrary and unfair. The court's opinion left little doubt as to its ultimate views on the dispute:

The California public school financing system. . . . conditions the full entitlement to (education) on wealth, classified its recipients on the basis of their collective affluence and makes the quality of a child's education depend upon the resources of his school district and ultimately upon the pocketbook of his parents. We find that such financing system as presently constituted is not necessary to the attainment of any compelling state interest. Since it does not withstand the requisite "strict scrutiny," it denies to the plaintiffs and others similarly situated the equal protection of the laws (Serrano v. Priest, 1971).

The principal features of the court's decision were these:

1. The quality of a child's education cannot be the function of the wealth of the child's parents and neighbors, or school district.
2. Education in our public schools is a "fundamental interest" of the states which cannot be conditioned on wealth.
3. To allot more educational dollars to the children of one district than to those of another merely because of the fortuitous presence of commercial and industrial property which augments a district's tax base is to make the quality of the child's education dependent upon the location of private commercial and industrial establishments.
4. A funding system which is heavily dependent upon the local property tax and hence the differences of local wealth 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. Such discrimination is a violation of the equal protection clause of the Fourteenth Amendment of the United States Constitution.
5. Inequalities are created when people who were relatively less affluent were required to pay

higher taxes than the more affluent people in order to generate the financial resources needed for an equal or even lesser quality public education (Education Commission of the States, 1972).

It is important to note that there were several positions which the Serrano decision did not take. The courts did not say or suggest:

1. That the property tax, per se, is unconstitutional or an improper tax source.
2. That the same amount of money should be spent on each child for education.
3. That the legislature must adopt any specific method or plan for school financing to remove the constitutional inequities, but would permit the legislatures to devise appropriate new systems which are not in violation of the equal protection of the law (Education Commission of the States, 1972).

On April 10, 1974, the Superior Court of the State of California for the county of Los Angeles in the case of Serrano v. Priest stated that it was not the function of the court to make a determination of a particular plan for financing public education. The court simply pointed out the objectionable features of the California financing system from an equal-protection-of-the-laws standpoint as follows:

1. The basic aid payments of \$125 per pupil to the high-wealth school district,
2. The right of voters of each school district to vote tax overrides and raise unlimited revenues at their discretion;
3. Disparities between school districts in per-pupil expenditures, apart from the categorical aids special needs program, that do not reduce to insignificant differences, which mean amounts considerably less than \$100 per pupil, within a maximum period of six years; and

4. Variations in tax rates between school districts that are not reduced to nonsubstantial variations within the same maximum period set forth in sub-paragraph (3) for the equalization of per-pupil expenditure levels (Serrano v. Priest, 1974).

On January 19, 1972, the New Jersey Superior Court of Hudson County ruled on Robinson v. Cahill (1972), ordering a revision in the tax structure to remove inequities of the various school districts of New Jersey. On April 3, 1973, the Supreme Court of New Jersey affirmed the judgement of the Superior Court that the current system of school finance in New Jersey was unconstitutional. In doing so, the Supreme Court of New Jersey accepted the lower court's proposition of the relationship between dollars spent and the quality of educational opportunity.

There was testimony with respect to the correlation between dollar input per pupil and the end product of the educational process. Obviously equality of dollar input will not assure equality in educational results. There are individual and group disadvantages which play a part. Local conditions, too, are telling, for example, insofar as they attract or repel teachers who are free to choose one community rather than another. But it is nonetheless clear that there is a significant connection between the sums expended and the quality of the educational opportunity. And of course the legislature has acted upon that premise in providing state aid on formulas designed to ameliorate in part the dollar disparities generated by a system of local taxation. Hence we accept the proposition that the quality of educational opportunity does depend in substantial measure upon the number of dollars invested, notwithstanding that the impact upon students may be unequal because of other factors, natural or environmental (Robinson v. Cahill, 1972).

On March 21, 1973, the United States Supreme Court reversed the decision of the federal district court which had found the Texas system of school finance unconstitutional. The Supreme Court's reversal in

San Antonio v. Rodriguez (1973) brought to an end the federal court involvement in school finance reform at that time, ending one chapter of an era which began theoretically in 1965 and practically in 1968 (Wise, 1965). Wise, in his book Rich Schools, Poor Schools (1968), had accurately predicted the legal challenges of school finance, the court involvement, and the inevitable outcome and impact on state programs of financing public education.

Serrano v. Priest in California received the recognition as the case that set off the revolution in school finance. The text that provided much of the legal basis for Serrano v. Priest in California was Private Wealth and Public Education (1970). The authors, Professors John Coons, William Clune, and Stephen Sugarman, did the research and manuscript while Coons was at Northwestern Law School in Chicago. "District power equalization" (DPE) and an alternative "Fiscal neutrality" standard were first introduced in this book. Private Wealth and Public Education and Rich Schools, Poor Schools provided a great amount of resource material for many of the "Serrano-type" cases.

The appeal of the Rodriguez case filed in federal court was the first "Serrano-type" case considered by the United States Supreme Court, making the decision in San Antonio v. Rodriguez the "law of the land." The action by the plaintiffs claimed that the system of school finance in Texas discriminated against students living in poor school districts. The Supreme Court decision was 5 to 4. The majority opinion stated:

We hardly need add that this Court's action today

is not to be viewed as placing its judicial imprimatur on the status quo. The need is apparent for reform in tax systems which may well have relied too long and too heavily on the local property tax. And certainly innovative new thinking as to public education, its methods and its funding is necessary to assure both a higher level of quality and greater uniformity of opportunity. These matters merit the continued attention of the scholars who already have contributed much of their challenges. But the ultimate solutions must come from lawmakers and from the democratic pressures of those who elect them (Wise, 1973).

The Western United States District Court of Texas on December 23, 1971, declared that the minimum foundation program for financing public education in the State of Texas was in violation of both the United States and Texas Constitutions.

The court ruled that the Texas System discriminated on the basis of "wealth" and that "wealth" is a "suspect" classification and that education is a "fundamental" interest protected by the United States Constitution.

The United States Supreme Court said that the district court did not deal with certain "threshold considerations" which had to be dealt with before the question on classification and fundamentality was to be handled. These "threshold considerations" are: (1) whether or not, in dealing with a fundamental right relative rather than absolute deprivation, a novel concept, is "of significant consequence," and (2) whether or not it matters that the disadvantaged poor cannot be identified clearly as a class (Education Commission of the States, 1973).

The court said that the Texas system seeks to safeguard two values: a minimum state educational program and local participation in decisions on the schools. The inequalities in the system come, as in other state systems, from the element of local participation. Rodriguez, according to the Supreme Court decision, was a direct attack on the Texas decision to delegate to its political subdivisions the power to tax local property to pay for matters of local interest. The Court noted that its

tradition has been to recognize that state legislatures have broad leeway in drawing up classifications for tax programs. Leaving more questions unanswered and problems unsolved, the United States Supreme Court reversed the decision of the federal district court and found the Texas school finance system constitutional.

By February 1974, two years after the Rodriguez decision, 59 cases had been filed on both state and federal grounds. At that time, 7 federal and 15 states suits were pending involving the school finance systems of 18 states. Most of the state suits were based on an "establishment of education" clause in state constitutions. These suits and others which focused attention on the problems of education finance were instrumental in 22 states reforming their finance programs during the 1970s.

The Economists

During the 1960s many economists became interested in school finance as part of research in the larger context of the public economy. Charles Benson (1961, 1963) and Jesse Burkhead (1964) were among the more noted researchers to specialize in this area. These researchers focused less on a specific aid mechanism and more on theoretical and empirical inquiry into systems of taxation and intergovernmental aid.

Richard Netzer's Economics of the Property Tax (1966) contributed insights into the ability of certain classes of property owners to shift the burden of taxation to others. Despite alternative theories on this question, Netzer's discussion of the regressivity of property tax has become a staple of school finance reform. During this period several economists also investigated the effects of different

proportions of types of property (residential, commercial, etc.) on the fiscal behavior of local jurisdictions (Ladd, 1975).

Another group of economic studies has documented economic and demographic shifts since World War II (U. S. Advisory Commission on Intergovernmental Relations, 1967). Studies by Brazer, Campbell and Sacks (Campbell and Sacks, 1967), and others described shifts in economic activities and population patterns that left the nation's largest cities with stagnant tax bases and costly social needs, while suburban areas were drawing new businesses and higher income populations with relatively little need for public health, welfare, law enforcement, and other public services. The impact of these various phenomena on the fiscal capacity of different types of jurisdictions has led to the inclusion of urban factors and income measures as adjustments to the property value standard in school finance formulas (Bressler and Berke, 1978).

In addition to taxation and fiscal capacity, another set of issues, those of distribution and neutrality, has attracted the concern of economists. Werner Hirsch (1970) posed the following ideas which pertained to the future of school finance: aid increasing expenditures from sources available to the recipient government; aid distorting the allocation of resources between the recipient government and the private sector; and aid distorting the allocation of resources among services offered by recipient governments. Pursued by Hirsch and others, this line of inquiry led to an examination of the components of state aid to local districts. David Stern (1972) used a prototype econometric model of current expenditure by local school systems to simulate alternative formulas for distributing general purpose state aid. This model

predicted how the amount of expenditure by local school districts would respond to different forms of state aid. Martin Feldstein's work using wealth elasticity to measure the degree of wealth neutrality or non-neutrality, added to the former works and provided education finance researchers with a much needed empiricism for future research.

The elasticity of tax revenues refers to the responsiveness of the revenues from a tax to changes in various economic factors in a state. In particular, policy makers may want to know whether tax revenue will increase at the same pace as changes in personal income. The revenues from an elastic tax will increase by more than one percent for each one percent rise in personal income. While income taxes are usually elastic tax sources and have progressive patterns of incidence, property taxes can be inelastic and have regressive patterns of incidence. Expenditure elasticities can be defined in a similar manner (Odden, 1978, p. 57).

As studies have been undertaken to examine local district's response to changes in the school finance laws, the economic principles of income and substitution effects have emerged as important guides for research. Economists have also undertaken to describe the determinants of public expenditure behavior (Bahl, 1968; Burkhead and Miner, 1971). In most cases the major components of public expenditure models have been cross-sectional data, expenditure levels as the dependent variable, and multivariate statistical techniques as the methodological tool (Bressler and Berke, 1978). The findings can be said to establish the relationship between property valuation and socioeconomic characteristics on a district's expenditure level. In the terms used in these studies, a

significant amount of the variation in local district expenditure patterns was explained by these major independent variables (James, Kelly, and Garms, 1966).

Selected School Finance Reform and Reformers 1968-79

A resurgent wave of school finance activity was spawned by the work of Arthur Wise in Rich Schools, Poor Schools (1968). In his preface, Wise wrote that the objective of his work was:

. . . To determine whether the absence of equal educational opportunity within a state, as evidenced by unequal per-pupil expenditures, may constitute a denial by the state of the equal protection of its laws. I was impelled in this endeavor by the belief that there is no justification constitutional or otherwise for permitting the circumstances of parental and geographical wealth to determine the quality of a child's education in the public schools.

The effect of Rich Schools, Poor Schools was to predict future court litigation such as Serrano and Rodriguez.

The first comprehensive national study of school finance since 1933 was the National Educational Finance Project, initiated by the United States Office of Education in June, 1968. This project was administered through the Florida State Department of Education and the University of Florida at Gainesville; Roe L. Johns served as project director. The purposes of the National Educational Finance Project were to:

1. Identify the dimensions of educational need in the nation.
2. Identify target populations with special educational needs.
3. Measure cost differentials among different educational programs.

4. Relate the variations in educational needs and costs to the ability of school districts, states, and the federal government to support education.
5. Analyze economic factors affecting the financing of education.
6. Evaluate present state and federal programs for the financing of education.
7. Construct alternative school finance models, both state and federal, and analyze the consequences of each (Johns, 1971, p. 7).

In this study, The National Education Finance Project focused its attention primarily on an evaluation of the extent to which various plans of state and local financing employed by the 50 states utilize the financial resources available to equalize educational opportunities (Johns, 1971, p. 234).

The basic assumption of the National Educational Finance Project Typology was: Financial equalization is most nearly accomplished when the following two factors are met: (1) the varying educational needs of the student population are taken into consideration in the method of allocation of funds to the expending units, and (2) the variation of the ability among the local school districts to support education is reduced or eliminated through the utilization of state resources (Johns, 1971, p. 238).

Considering alternatives to the fiscal capacity of school districts to finance adequate programs, Johns Found:

Income per school age child does more accurately reflect the educational "load" of the area in question. It also adjusts for differences in the age distribution of the population of a state. States with a large proportion of persons in the upper age brackets may rank considerably higher when their fiscal capacity is measured on the basis of personal income per school age child (Johns, 1971, p. 67).

Another proposal introduced in this study discussed income per child, as Johns stated:

Income per child in average daily attendance had also been proposed as an alternative measure of fiscal capacity. It is claimed that this measure reflects the actual educational "load" since it is based on the children actually in school. This measure, of course, markedly affects the apparent fiscal capacity of states or school districts in which a high percentage of the children attend non-public schools or in which have been a substantial number of children who are not in school (Johns, 1971, p. 69).

On March 3, 1970, Executive Order 11513 established the President's Commission on School Finance. On March 3, 1972, two years later, the final report Schools, People, and Money was completed.

In the summary of "Findings and Recommendations," the final report pointed out the need for change in school finance.

As we seek to strengthen schools for the new tasks laid upon them in recent decades, we must alter many parts of our American educational structure but as we rebuild, we shall do well to protect its foundations, for they are solid.

This country has reached unparalleled heights in its economic and social development--due, in good part, to our educational system. Our public and non-public schools have served the majority of Americans well and are continuing to do so. The fact that many, too many, have not enjoyed the benefits to which they are entitled, should not be generalized into an indictment of the total system. It is a well recognized flaw that must be corrected by constructive and deliberative measures, not by divisive mandates (Commission Report, 1972).

This summary was but a harbinger of future United States Supreme Court action in the Rodriguez case.

As the popularity of school finance grew with jurists, educators, economists, and the general public, so did the volume of material being

published on the subject. In Answers to Inequity (1974), Joel Berke found a strong relationship nationwide between property wealth, income, and spending levels on education.

If one believes that greater resources should be spent on the education of children who are demonstrably the least likely to succeed--the physically or mentally handicapped, the poor, the members of racial minorities--the present pattern of resource allocation is simply wrong. It is the communities that are the richest, the whitest, and the most socially advantaged that usually lead their areas in the quality and quantity of school services. Large cities and heavily urbanized areas seldom receive school revenues that reflect the more difficult educational tasks they must perform, the higher urban cost levels that prevail, or the heavier demands that are placed upon their tax bases for a wide and costly variety of municipal services. Poor rural areas, too, almost invariably lag far behind the rest of the state in the quality of schooling they provide. In short, the current distribution of educational resources does not correspond to the distribution of the nation's most urgent educational needs (Berke, 1974, p. 161).

Elchanan Cohn (1974) pointed out in his book Economics of State Aid to Education that support of education was controlled by the state and that equity of funding related to a call for social equality.

Equality in education, although conceptually related to the general call for social equality in other sectors of society, has a special significance and urgency of its own. There are two reasons for the distinction: (1) equality of education can serve as a base upon which equality on other areas can be accomplished more easily, and (2) the financial support for education is under the control of the state and not a de facto condition occurring in its own right (Cohn, 1974, p. 25).

Cohn described the achievement of students and the capacity of a school district to provide services as two major concerns in equalizing educational finance.

An equalizing approach to educational finance, thus, must be concerned with two conditions: the educational

achievement (or deficiency) of the students and the financial capacity of the school district to provide necessary services. Most states have programs of financial assistance to school districts which are labeled "equalizing" but the extent of which these programs are actually equalizing varies greatly depending, in part, on the following factors: (1) consideration of educational needs; (2) absolute number of dollars devoted to equalization; (3) the existence of flat grants, general grants, and categorical grants; (4) encumbering ceiling, minimum, and save-harmless provisions (Cohn, 1974, p. 26).

Benson, in Planning for Educational Reform, described the ideal objectives and framework through which school finance reform must be evaluated as various solutions to these issues are raised.

Throughout our analysis of school finance, we have maintained that policy reform must be evaluated within a framework of three broad objectives: (1) reduction of fiscal inequity that presently produces allocative patterns closely related to district wealth and family income; (2) amelioration of the racial and social class segregation encouraged by the existing finance system; and (3) expansion of the educational alternatives available to individual households dissatisfied with the uniformity of the public school systems. In some detail we have examined three general proposals now being widely considered as potential solutions to the issues raised by the courts and educational reformers (Benson, 1974, p. 119).

In order to meet the demand for various school finance reforms which coincided with the growth of literature, individual states passed various legislations which revised the structure whereby local schools are supported. This action precipitated equalization formulas that have been classified into three categories (Odden, 1978).

The first of these equalization formula categories was a high-level foundation program such as that enacted in Tennessee. This state equalization aid program has typically guaranteed a certain foundation level of expenditure for each student. As in many other

states, the Tennessee foundation program has a higher level of state revenue for support than local revenue.

The second equalization formula category is that of a foundation program augmented by a guaranteed tax base or guaranteed yield program for districts choosing to spend above the foundation level. California, Montana, and Texas utilize this type of equalization formula.

The third type of category is that of district power equalization, guaranteed tax base, guaranteed yield, or percentage equalization programs that provide equal revenues from state and local sources for equal tax rates. District power equalization (DPE) is a state equalization aid program that equalizes the ability of each school district to raise revenue for education. In a pure DPE program, the state guarantees to both property poor and property rich school divisions the same dollar yield for the same property tax rate. The idea is that equal tax rates should produce equal per pupil expenditures. In the property poor school divisions, the state makes up the difference between what is raised locally and what the state guarantees. In property rich school divisions, excess funds may or may not be recaptured and distributed to poor districts. Montana, Utah, and Wisconsin have such recapture mechanisms. Guaranteed tax base programs, guaranteed yield programs, and percentage equalizing programs approximate the DPE program.

Most reform proposals have embraced one of two basic themes which are contingent upon equalization formula (Carroll, 1979, p. 4). The first theme is equalization of fiscal outcomes among the school districts within a state. This theme emerges from an egalitarian principle that all students and all taxpayers should be treated alike. According to this

theme, the state's school finance system should not allow any student (or taxpayer) to obtain a more expensive education (or lower tax burden) than that afforded others in the state. The finance plan associated with this theme of equalizing fiscal outcomes is full state assumption. In its school finance reform in 1974, New Mexico assumed full responsibility for school finance by allowing no local discretion in district's revenues or tax rates. The schools are financed out of state funds plus a state-mandated local levy.

The second reform theme is equalization of fiscal opportunities among the states' school districts. This theme reflects the problem that much disparity has not been in school spending, but that the low-wealth districts have not had the same ability to raise school revenue as did high-wealth districts. This problem brings to bear the concept of fiscal neutrality, whereby a state's school finance system should be fiscally neutral in the sense that any district can obtain the same level of funding as any other district provided only that it put forth the same tax effort, vis-a-vis a district power equalizing formula.

Neutrality does not require equality in funding per pupil; rather, it requires that any district be able to obtain the same (adjusted) funding per pupil as any other district provided only that it put forth the same effort (Carroll, 1979, p. 23). It has been generally agreed that equity requires fiscal neutrality; and, for many, fiscal neutrality has been sufficient for equity. Equity in this case has been satisfied if all districts have an equal opportunity to obtain funds regardless of the extent to which they take advantage of their opportunities.

Carroll (1979) made an important distinction between three main concepts of fiscal neutrality. According to Carroll, ex ante neutrality exists where a given level of fiscal effort provides the same per pupil revenue to each district regardless of local wealth, as under a pure district power-equalizing formula. Ex post neutrality exists where actual per-pupil spending and wealth are uncorrelated. Income neutrality likewise exists when the average income of the districts population, based on a per pupil computation, is not correlated with district revenues or expenditures.

These concepts of fiscal neutrality are not equivalent, and formulas or plans which meet one concept may fail to meet the other. One example would be in a foundation system which set the foundation level below a theoretically agreed support level. Seemingly, high-wealth districts would levy low tax rates, while lower-wealth communities would levy higher tax rates. All districts would end up with about the same level of per pupil funding, and the correlation between funding and wealth might be negligible, but tax rates and wealth would be highly correlated (Carroll, 1979, p. 25). In this case, ex post neutrality might be satisfied, but ex ante neutrality would be violated.

School Finance Reform Research Projects -- 1970s

In the Elementary Secondary Education Act (ESEA), the United States Congress delineated the federal role in school finance reform. It authorized study of the issue and assistance to states trying to equalize their funding procedures. Title V-B (Sec. 521 (1)) permitted state expenditures of funds for the development of more equitable means of financing education; Section 1203 (e) (3,4) mandated special studies of impacts of school finance patterns on large urban areas,

minority students, and weighting of classes of pupils; the National Institute of Education (NIE) is also required to study the finance issue (Sec. 304 [a]) (Burns, 1979, p. 114).

In research sponsored jointly by the Carnegie and Rand Corporations, Stephen Barro (1971) found the California school finance situation to be inequitable. Principal findings concerning the distribution of resources among districts were summarized as follows: (1) there was substantial inequality in spending among districts; (2) whatever relationship existed between resources and educational need was in the wrong direction; there were fewer resources where the need was greatest, more resources where the need was least; and (3) in addition to inequality in spending, there were large disparities in the tax rates districts must levy to support any given level of per pupil outlay.

Barro's research was one of the first of many such projects in school finance to be funded by public and private organizations during that decade. Some of the future front runners of school finance research support and dissemination were to be the Ford Foundation, the Rand Corporation, and the Education Commission of the States.

In November of 1976, the Center for the Study of Educational Finance at Illinois State University published The 1973 Reform of the Illinois General Purpose Grant-in-Aid: An Evaluation After Three Years. Among the findings of this research led by Alan Hickrod and Ben Hubbard was the identification of ten items of research and development needs in Illinois school finance. These ranged from cost of living adjustments to an investigation of the method by which a specification of poverty is

entered into the Illinois formula. This research served to further identify research problems associated with school finance in Illinois. At present, the Illinois funding process is required by legislation to undergo a comprehensive annual evaluation.

In 1977, a joint project by the office of the Assistant Secretary for Planning and Evaluation, U.S. Department of Health, Education, and Welfare and Killalea Associates, Incorporated, produced the document School Finance Reform in the Seventies: Achievements and Failures. This research was an effort to measure the equity increases in state school finance programs resulting from school finance reform activities in the 1970s. The primary tool used in measuring the equity changes in state school finance programs was expenditure disparity data. Two measures of district to district disparity were calculated: a federal range ratio and the coefficient of variation. These measures were used primarily to examine the equity changes that took place within states over time. In addition, the data were also used to make interstate comparisons and to present analyses of expenditure disparities in terms of wealth differentials and urban type.

Compared to earlier efforts to judge the equity of state school finance programs, this effort was notable in two respects: (1) in addition to the range measure of disparity, the coefficient of variation was calculated, which provided a measure of the entire area of disparity, and (2) these disparity measures were calculated for two points in time so that a longitudinal comparison of progress could be made (Johns and Magers, 1978, p. 377).

Two studies stand out in their attempt to determine explicitly the impact of wealth variables over time in response of school districts

to finance reforms. The first of these was the research of Vincent and Adams (1978) who investigated 1971-72 and 1975-76 data from Minnesota, which enacted a foundation type of school finance reform in 1971; and 1972-73 and 1975-76 data from Colorado, which enacted a guaranteed tax base type of school finance reform in 1973. For both states, Vincent and Adams found, in general, that higher expenditures per pupil were associated with higher household income and districts with greater proportions of commercial, industrial, and agricultural property in the tax base.

The second was Carroll's research (1979) which analyzed the reforms enacted between 1972 and 1974 in California, Florida, Kansas, Michigan, and New Mexico. One of the study's principal findings was that reform brought growth in district revenues in all five states and declines in local property tax rates for education in all but Michigan. Also, while the five states had made some progress toward a more equal distribution of revenues per pupil, these increments were small, and for many districts, there was no improvement. Reform had done little in any of the states to equalize the distribution of per-pupil instructional expenditures. While reform had loosened the tie of school revenue to local property tax bases, the districts serving large numbers of poor children have not fared as well as wealthy districts, in distributional equality. In addition, the Michigan data showed that state matching grants have no effect on school district spending, and state block grants have very little effect. Spending increased by an average of 6 cents for every dollar of state unrestricted grants; however, a dollar of federal or state categorical aid increased district spending by 32 to 38 cents.

According to Carroll (1979, p. vii), two factors explain why reform accomplished relatively little in these states. First, reform tried to pursue objectives that were diverse and conflicting, such as equalizing revenues, preserving local control over spending, avoiding cutting back on high spending districts, providing tax relief, and avoiding excessive growth in state spending for schools. Because all these goals could not be achieved together, it was difficult to make progress on any single one. Second, each of the five states tended to make add-ons and adjustments to its basic school finance plan, usually with disequalizing effects.

When the decision has been made to reform a system's financial structure and the companion decision to evaluate that reform is made, the key question becomes: which statistical tests must be computed that will adequately quantify the degree of equity and neutrality that is precipitated. The attention that school finance analysts gave to the statistical tests used to measure the degree to which a system meets either fiscal equity or fiscal neutrality was another important contribution during the 1970s. Berne (1978) presented a comprehensive analysis of the various tests of equality and neutrality. According to Berne's analysis, there is a great number of conceptual issues related to the use of various statistical tests, and a system can score high on one measure while scoring low on another measure.

The absence of clear statements of school finance equity standards and concomitant measures thereof was keenly felt during the September 1977 hearings on H.B. 131, a bill introduced by the Honorable Carl Perkins to provide for a federal role in school finance

equalization. During those hearings it was clear that many who testified used similar terms to describe very different policy goals and that no one could point to research that showed the status of equity in school finance under any definition of equity among all the 50 states (Odden, Berne, and Stiefel, 1979, p. 2).

One response to this lack of information was an informal gathering of several school finance scholars and policy makers in October of 1977. A product of this meeting, the School Finance Cooperative, first met as a body in November 1977, to discuss what could be done about defining and measuring equity among the states. Its long term goal was to narrow the differences between and among the academic and policy communities. In addition, the cooperative decided that as a first step it should attempt to develop a comprehensive framework of equity in school finance and to pool the data available among its members, both to conduct research on methodological issues related to measuring equity and to assess the degree of equity and change in equity over time in the states for which data were available.

The research of Odden, Berne, and Stiefel (1979) was a manifestation of the cooperative's objective. This study provided useful definitions and measurement procedures, especially in the area of equity.

Other researchers have contributed in the areas of both equity and neutrality. Especially noteworthy is the work of Carroll (1979), which has been cited earlier. The definitions and measurement procedures that he used in analyzing the reforms enacted in California, Florida, Kansas, Michigan, and New Mexico show promise, not only for applying to multiple states, but also to single states.

Therefore, the conclusion from the review of the literature was that much activity has been focused in recent years on clarifying school finance reform terminology and measurement procedures. Further, the area is a dynamic one and still evolving in its methodology.

After a careful review of the measurement rationales available in the literature, those used by Carroll (1979) were selected for use in this dissertation. This measurement rationale contains procedures for both equity and neutrality. Moreover, it is compatible with the assessment of a single state's reforms in school finance. The subsequent chapter describes this rationale and the procedures used in determining the interim effects of the 1977 Tennessee Education Finance Act on fiscal equity and neutrality.

CHAPTER III

METHOD

The method used to determine the interim effects of the 1977 Tennessee Education Finance Act on fiscal equity and fiscal neutrality was the comparative analysis method. More specifically, selected public school revenues, expenditures, and their sources were examined for school years 1976-77 and 1977-78. The former was the school year prior to implementation of the Tennessee Education Finance Act, while the latter was the school year in which the Tennessee Education Finance Act was first implemented. The measurement rationale and procedures used were adopted from the research of Carroll (1979, pp. 14-35).

Seven variables of interest were employed in the examination. Seventeen measures of fiscal equity were computed for each of the two school years. Seven sets of measures of fiscal neutrality were computed for these data bases. Data sources for all computations were official publications of federal agencies, the State of Tennessee and those counties therein.

Those variables used to examine both fiscal equity and fiscal neutrality will be described first, along with the data sources and the procedures used to extract or derive the variables from the data sources. This will be followed by a listing of the measures used in the examination of fiscal equity for the two school years and the procedures used in their computations. Next, a listing of the measures used in the examination of fiscal neutrality for the two school years will be made. Finally, the procedures used in their computations will be described.

I. VARIABLES

Local (Equalized) Revenue

Local (equalized) revenue was the sum of local revenue in each district that was equalized according to the State Minimum Foundation Program (1976-77 data) and the Tennessee Education Finance Act of 1977 (1977-78 data).

The sources of data for this variable (1976-77) were the 1976-77 Composites Report from the Department of Education, Area of State Disbursements and the Annual Statistical Report of the Department of Education for the school year ending June 30, 1977. The total amount required by each of the individual districts was derived from the Statistical Report. The number of students enrolled in each of the districts was derived from the 1976-77 Annual Statistical Report. The system amounts were divided by the numbers of students to derive the local equalized revenue for each district.

Data for this variable (1977-78) were extracted directly from the State Equalization Plan for Financing the Public Schools in Tennessee, dated August, 1978 (pp. 47-54).

Local (Unequalized) Revenue

Local (unequalized) revenue was the sum of local revenues available in each district other than local (equalized) revenue.

Data for this variable (1976-77) were obtained from the Annual Statistical Report of the Tennessee Department of Education for the school year ending June 30, 1977. County and other revenue for each school district found in Tables 24, 25, and 26 (pp. 152-163) were summed. Industrial payments for food for each school district (found

in Table 26 (pp. 160-163) were subtracted from this sum before it was divided by the number of pupils in average daily attendance.

Source data for this variable (1977-78) were extracted directly from the State Equalization Plan for Financing the Public Schools in Tennessee, August 1978 (pp. 47-54).

State Revenue

State revenue was the sum of all revenue available to each district from state sources.

The source of data for this variable (1976-77) was the Annual Statistical Report of the Tennessee Department of Education for the school year ending June 30, 1977. Utilized was Table 21 (pp. 140-143). State funds for capital outlay were subtracted from total state funds and this sum was divided by the average daily attendance of each individual school district.

The data source for the (1977-78) variable was the Annual Statistical Report of the Tennessee Department of Education for the year ending June 30, 1978. School food service, transportation and capital outlay funds of Table 21 (pp. 146-149) were subtracted from total state funds. This amount was then divided by the respective average daily attendance for each school division.

Federal Revenue

Federal revenue was the sum of the revenue available to each district from the Federal Impact Aid Program (PL 874) and the Elementary and Secondary Education Act (ESEA) Title I.

The data for this variable (1976-77) were derived from the Annual Statistical Report of the Tennessee Department of Education for the school

year ending June 30, 1977. The ESEA Title I revenue of Table 22 (pp. 144-147) was added to the PL 874 funds of Table 23 (pp. 148-151). This sum was divided by the average daily attendance of each respective school district.

The source of the data for the (1977-78) variable was the Annual Statistical Report of the Tennessee Department of Education for the school year ending June 30, 1978. The ESEA Title I revenue of Table 22 (pp. 144-147) was added to the PL 874 funds of Table 23 (p. 144). This sum was divided by the average daily attendance of each respective school district.

Total Revenues Per Pupil

Total revenues per pupil was the total revenue per pupil in average daily attendance from all sources (local equalized + local unequalized + state + federal).

The data sources for this variable were as outlined in the above sections (1-4). After the data in each category (local equalized, local unequalized, state and federal) were derived for each district; these categories were summed to obtain the total revenues per pupil in average daily attendance. This method was repeated to obtain the data base of this variable for both years of interest.

Instructional Expenditures Per Pupil

Instructional expenditures per pupil was the sum of direct expenditures for instruction and expenditures for instructional support services, including personnel, instructional media, instructional and curriculum development and training.

The data source for this variable (1976-77) was the Annual Statistical Report of the Tennessee Department of Education for the year ending June 30, 1977. The data were extracted from Table 29 (totals), page 178. This method was repeated for 1977-78 data.

Adjusted Property Tax Rates

Adjusted property tax rates was the sum of all local property tax rates whose levies support the operations in each district's schools, including the general (or operational) fund tax rate and any special fund account tax rates, excluding capital outlay and debt service tax rates.

The data source for this variable (1976-77) was the document Tennessee County Tax Statistics: Property Tax, County-wide Motor Vehicle Tax and Local Option Sales Tax, Technical Report No. 16 (pp. 3-9) published by the County Technical Assistance Service, The University of Tennessee. The general purpose school fund, other school fund and special school district tax rate were summed or extracted according to their respective school districts.

The (1977-78) data source was the document Tennessee County Tax Statistics: Property Tax, County-wide Motor Vehicle Tax, and Local Option Sales Tax, Technical Report No. 17, November 1978, as published by the County Technical Assistance Service of the University of Tennessee. The general purpose school fund, other school fund, and special school district tax rate were summed or extracted according to their respective school districts.

II. MEASURES (FISCAL EQUITY)

A total of eleven descriptive statistics was computed for each of the seven variables on the data from each of the two school years. These were standard descriptive statistics that typically are applied to quantitative data for analysis purposes. These eleven measures are those that are included in current research pertaining to fiscal equity.

They were as follows:

1. Percentiles
2. Range
3. Restricted Range
4. Restricted Range Ratio
5. Mean Deviation from the median
6. Relative mean deviation from the median
7. Mean
8. Standard Deviation
9. Coefficient of variation
10. Mean Deviation from mean
11. Relative mean deviation from mean

Data derived from the sources cited earlier were key punched, verified, and run at the Computing Center, The University of Tennessee, Knoxville, Tennessee. The Statistical Analysis System (SAS-79) Procedure was used to compute the seventeen descriptive statistics for each of the seven variables for each of the two school years (11 x 7 x 2). The specifics concerning each of the descriptive statistics were as follows:

1. Percentiles -- Seven rankings of the school districts for each school year were obtained; one for each of the seven

variables. Those values (districts) that occurred at the 100th (highest), 95th, 75th, 50th, 25th, 5th, and 1st (lowest) percentiles in each ranking were recorded.

2. Range -- Utilizing the seven rankings of the school districts for each school year, the range or difference from the highest to lowest value of each of the seven variables was computed and recorded.
3. Restricted Range -- Again utilizing the seven rankings of the 147/148 districts for each school year, the restricted range or difference from the 95th to the 5th percentile of value of each of the seven variables was computed and recorded.
4. Restricted Range Ratio -- Utilizing the previously obtained restricted range via the method in number 3 above, the restricted range of each variable was divided by the value at the 5th percentile of each respective variable.
5. Mean Deviation From the Median -- The average (mean) absolute deviation from the median was computed for each of the seven variables of interest for each of the two school years.
6. Relative Mean Deviation From the Median -- The mean absolute deviation from the median of each variable, divided by the median was computed for each of the two school years of interest.
7. Mean -- The sum of the values of each of the 7 variables of interest was divided by the number of districts for each of the two school years of interest.

8. Standard Deviation -- The square root of the sum of the squared differences between the value of each of the 7 variables in each school district and the mean, divided by the number of districts minus one was computed for each of the two school years.
9. Coefficient of Variation -- The standard deviation, as obtained in number 8 above, of each of the seven variables was divided by its respective mean to derive the coefficient of variation for each of the two school years.
10. Mean Deviation From Mean -- The average (mean) absolute deviation between the value of the variable in each district and the mean in all seven variables was computed for each of the two school years.
11. Relative Mean Deviation From Mean -- The absolute mean deviation from the mean, as found in number 10 above was divided by the mean of each of the seven variables for the two school years.

III. MEASURES (FISCAL NEUTRALITY)

Seven types or categories of measurements concerning fiscal neutrality were computed for each of the two school years. The following is a listing of the types of category of measurement accomplished on each variable, the data sources involved, and the procedures used to derive the data:

1. Regression of the Seven Variables on Property Wealth -- The sources of property wealth for each of the individual

school districts for the two school years were the 1977 and 1978 tax aggregate reports of Tennessee pursuant to TCA 4-307. The total local assessments for each county were divided by their respective average daily attendance to obtain the assessed value per pupil.

2. Regression of the Seven Variables on Income Per Pupil -- Income documents from the Bureau of Economic Analysis Regional Economics Information System provided the personal income by major sources for each district for both school years. These data were divided by their average daily attendance to derive the income per pupil for each district.
3. Regression of the Seven Variables on Local Option Sales Tax Revenue -- Total local option sales tax revenues for each county, for both school years were obtained from the Tennessee Department of Revenues. The revenue for each county was divided by the percentage of average daily attendance of each school district within each county to obtain their mandated percentages.
4. Regression of the Seven Variables on Adjusted Property Tax Rate -- The data sources and procedures for deriving adjusted property tax rates for each school district has been listed earlier.
5. Mean for Property Wealth Decile -- The data sources and procedures for deriving property wealth for each district have been listed earlier.
6. Mean for Per Pupil Income Decile -- The data sources and

procedures for deriving per pupil income for each district have been listed earlier.

7. Pearson Product Moment Correlations -- Between each of the seven variables and property wealth per pupil, income per pupil, local sales tax revenue, and adjusted property tax rate -- the data sources and procedures for deriving these data for each district have been listed earlier.

Derived data for the seven types or categories of measurements were key punched, verified, and run at the Computing Center, The University of Tennessee, Knoxville. The Statistical Analysis System (SAS 79) Procedure was used to compute each of the above seven categories. The specifics concerning each of the seven types or categories of measurements pertaining to fiscal neutrality were as follows:

1. Regression of the Seven Variables on Property Wealth -- Each of the seven variables of interest was regressed on assessed value per pupil. A second regression for each of the seven variables was then computed on adjusted wealth squared. Two measures of fiscal neutrality for each school year resulted from each regression, an F-statistic which served as an indicator of "goodness-of-fit" or the degree to which each variable is related to assessed value; and an elasticity coefficient, which indicated the nature of the estimated relationship between each variable and property wealth per pupil. The elasticity coefficient is the estimated percentage change in the variable that, at the mean, is associated with a 1 percent change in property wealth per pupil.

2. Regression of the Seven Variables on Income Per Pupil -- Each of the seven variables was regressed on income per pupil and on income per pupil squared. Two measures of fiscal neutrality resulted for each school year; an F-statistic and elasticity at the mean.
3. Regression of the Seven Variables on Local Sales Tax Revenue -- Each of the seven variables was regressed on sales tax revenue and on sales tax revenue squared. Two measures of fiscal neutrality resulted for each school year; an F-statistic and elasticity at the mean.
4. Regression of the Seven Variables on Adjusted Property Tax Rate -- Each of the seven variables of interest (except adjusted tax rates since it was one of the seven variables) was regressed on the adjusted tax rate and adjusted tax rate squared. Two measures of fiscal neutrality for each school year resulted from each regression; an F-statistic and elasticity at the mean.
5. Mean for Property Wealth Decile -- The individual districts were ranked by property wealth per pupil and then divided into deciles by school year. Next, the mean of each of the seven variables of interest was computed for the districts in each school year.
6. Mean for Per Pupil Income Decile -- The individual school districts were first ranked by per pupil income and then divided into deciles by school year. Next, means for the seven variables for the districts in each decile were computed for each school year.

7. Pearson Product Moment Correlations -- Between each of the seven variables and property wealth per pupil, income per pupil, local sales tax revenue and adjusted property tax rate for each of the two school years.

The eleven measurements pertaining to fiscal equity and the seven types or categories of measurements pertaining to fiscal neutrality for the pre Tennessee Education Finance Act (school year 1976-77) were then compared with those for the post Tennessee Education Finance Act (school year 1977-78) to determine the interim effects of the legislation. Results of the analyses are contained in Chapter IV.

CHAPTER IV

RESULTS AND DISCUSSION

The statistical analyses of the data served to confirm or reject the proposition that the 1977 Tennessee Education Finance Act precipitated a school finance system that possessed fiscal equity and ex post, income, and ex ante fiscal neutrality in its first year of implementation. The results of these analyses, which are contained in this chapter, are presented in two sections. The first pertains to fiscal equity, while the second pertains to fiscal neutrality. In each of the two sections, the statistical results are presented first, followed by a discussion of the results.

I. FISCAL EQUITY

Results

Tables 1 through 7 contain the resultant computations for the pre and post reform years, the differences between them (in terms of the unit value), the direction (increase or decrease) of the differences, and the percentage of each increase or decrease. More specifically, Table 1 pertains to the first variable of interest, viz., local (equalized) revenue. Table 2 pertains to local (unequalized) revenue, which is the second variable of interest. Table 3 pertains to the third variable of interest, viz., state revenues. Table 4 pertains to federal revenues, which is the fourth variable of interest. Table 5 concerns the fifth variable of interest, viz., total revenues per pupil. Table 6 concerns the instructional expenditures per pupil, which is the sixth variable of interest. Lastly, Table 7

TABLE 1

Results of Computations and Comparisons for Local (Equalized)
Revenue (First Variable of Interest)
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Percentiles*				
100th	36.000	61.000	25.000	69
95th	25.600	41.550	15.950	62
75th	19.000	31.000	12.000	63
50th	17.000	25.000	8.000	47
25th	15.000	19.000	4.000	27
5th	12.000	15.000	3.000	25
1st	11.000	10.490	-0.510	5
Range*	25.000	50.510	25.510	102
Restricted Range*	13.600	26.550	12.950	95
Restricted Range Ratio	1.133	1.770	0.640	56
Mean Deviation from Median*	2.775	6.682	3.910	141
Relative Deviation from Median	0.163	0.267	0.110	64
Mean*	17.517	25.587	8.070	46
Standard Deviation*	3.978	8.487	4.510	113
Coefficient of Variation	0.227	0.331	0.100	46
Mean Deviation from Mean*	2.384	6.706	3.820	133
Relative Deviation from Mean	0.164	0.262	0.100	60

* Expressed in dollars per pupil.

TABLE 2

Results of Computations and Comparisons for Local (Unequalized)
Revenue (Second Variable of Interest)
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Percentiles*				
100th	1109.000	1069.000	-40.000	4
95th	739.000	760.399	20.600	3
75th	414.000	447.250	33.250	8
50th	302.000	329.500	27.500	9
25th	244.000	255.750	11.750	5
5th	182.000	200.450	18.450	10
1st	146.960	153.450	6.490	4
Range*	962.040	915.555	-46.490	5
Restricted Range*	557.800	559.949	2.150	0
Restricted Range Ratio	3.064	2.793	-0.270	10
Mean Deviation from Median*	115.625	122.601	6.980	6
Relative Deviation from Median	0.382	0.372	-0.010	3
Mean*	324.224	380.480	26.260	7
Standard Deviation*	172.188	174.320	2.130	1
Coefficient of Variation	0.486	0.458	0.280	6
Mean Deviation from Mean*	124.551	130.305	5.750	5
Relative Deviation from Mean	0.351	0.342	-0.010	3

* Expressed in dollars per pupil.

TABLE 3

Results of Computations and Comparisons for State Revenue
 (Third Variable of Interest)
 Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Percentiles*				
100th	1237.000	991.000	-246.000	25
95th	528.000	582.100	54.100	10
75th	489.000	527.000	38.000	8
50th	466.000	504.000	38.000	9
25th	441.000	480.000	39.000	9
5th	407.800	450.450	42.650	10
1st	379.200	359.620	- 19.580	5
Range*	857.800	631.380	-226.420	36
Restricted Range*	120.200	131.650	11.450	10
Restricted Range Ratio	0.294	0.292	0.003	0
Mean Deviation from Median*	33.918	35.182	1.260	4
Relative Deviation from Median	0.072	0.069	0.003	0
Mean*	472.884	510.831	37.950	8
Standard Deviation*	76.674	68.271	- 8.400	12
Coefficient of Variation	0.162	0.133	- 0.003	21
Mean Deviation from Mean*	34.516	36.296	1.780	5
Relative Deviation from Mean	0.072	0.071	0.001	0

*Expressed in dollars per pupil.

TABLE 4

Results of Computations and Comparisons for Federal Revenues
 (Fourth Variable of Interest)
 Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Percentiles*				
100th	999.000	250.000	-749.000	300
95th	115.600	136.550	20.950	18
75th	81.250	87.750	6.500	8
50th	59.500	65.000	5.500	9
25th	47.750	50.250	2.500	5
5th	30.350	34.000	3.650	12
1st	21.760	24.960	3.200	15
Range*	977.240	225.040	-752.200	334
Restricted Range*	85.250	102.550	17.300	20
Restricted Range Ratio	2.808	3.016	0.210	7
Mean Deviation from Median*	30.191	23.027	- 7.160	31
Relative Deviation from Median	0.507	0.354	- 0.150	43
Mean*	74.123	72.567	- 1.560	2
Standard Deviation*	91.034	32.688	- 58.350	178
Coefficient of Variation	1.228	.450	0.078	173
Mean Deviation from Mean*	32.643	24.203	- 8.440	35
Relative Deviation from Mean	0.440	0.333	- 0.110	32

* Expressed in dollars per pupil.

TABLE 5

Results of Computations and Comparisons for Total
Revenues Per Pupil (Fifth Variable of Interest)
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Percentiles*				
100th	2457.000	1814.000	-643.000	35
95th	1337.200	1437.650	100.450	8
75th	968.000	1075.000	107.000	11
50th	858.000	925.000	67.000	8
25th	792.000	863.000	71.000	9
5th	720.000	798.700	78.700	11
1st	659.080	574.060	- 85.020	15
Range*	1797.920	1239.940	-557.980	45
Restricted Range*	617.200	638.950	21.750	4
Restricted Range Ratio	0.855	0.799	- 0.060	7
Mean Deviation from Median*	132.734	136.290	3.560	3
Relative Deviation from Median	0.154	0.147	- 0.010	5
Mean*	918.408	987.884	69.480	8
Standard Deviation*	224.499	198.960	- 25.540	13
Coefficient of Variation	0.244	0.201	0.004	21
Mean Deviation from Mean*	145.197	145.097	0.100	0
Relative Deviation from Mean	0.158	0.146	0.010	8

* Expressed in dollars per pupil.

TABLE 6

Results of Computations and Comparisons for Instructional
Expenditures Per Pupil (Sixth Variable of Interest)
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-78	1977-78	DIFFERENCE	%
Percentiles*				
100th	998.000	1055.000	57.000	6
95th	814.000	834.650	20.650	3
75th	594.000	634.500	40.500	7
50th	526.000	568.000	42.000	8
25th	481.000	518.500	37.500	8
5th	442.600	471.800	29.200	7
1st	400.400	442.680	42.280	11
Range*	597.600	612.320	14.720	2
Restricted Range*	371.400	362.850	- 8.550	2
Restricted Range Ratio	1.254	0.769	- 0.490	63
Mean Deviation from Median*	78.408	85.168	6.760	9
Relative Deviation from Median	0.149	0.149	0	0
Mean*	559.320	601.304	41.980	8
Standard Deviation*	112.830	125.237	123.410	11
Coefficient of Variation	0.271	0.282	0.010	3
Mean Deviation from Mean*	83.900	92.946	9.050	11
Relative Deviation from Mean	0.150	0.154	0.004	0

* Expressed in dollars per pupil.

TABLE 7

Results of Computations and Comparisons for Adjusted Property
Tax Rate (Seventh Variable of Interest)
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Percentiles*				
100th	4.130	4.950	0.820	20
95th	3.800	3.836	0.040	1
75th	2.470	2.640	0.170	7
50th	1.940	2.020	0.080	4
25th	1.600	1.595	0.010	0
5th	1.070	0.991	-0.080	8
1st	0.634	0.738	0.100	17
Range*	3.500	4.210	0.710	20
Restricted Range*	2.730	2.850	0.120	4
Restricted Range Ratio	2.551	2.870	0.320	13
Mean Deviation from Median*	0.564	0.674	0.110	20
Relative Deviation from Median	0.291	0.334	0.040	15
Mean*	2.104	2.202	0.100	5
Standard Deviation*	0.767	0.892	0.130	16
Coefficient of Variation	0.364	0.405	0.040	11
Mean Deviation from Mean*	0.589	0.693	0.100	18
Relative Deviation from Mean	0.279	0.314	0.040	13

* Expressed in dollars per pupil.

concerns the seventh variable of interest, viz., adjusted property, tax rate.

(1) Local Equalized Revenue. Reference to Table 1 will show increases in 16 of the 17 measures used over the two years. The metric for local (equalized) revenue was dollars per pupil. Only one measure showed a decrease, viz., the 1st percentile. The differences of those percentile rankings that increased (100th, 95th, 75th, 50th, 25th, and 5th) ranged from 25 to 69 percent. The first percentile difference decreased by 5 percent. Based on these changes, it can be seen that the range, which is the difference between the 100th percentile and the 1st percentile, would show an increase over the two years.

The difference in the restricted range between the two years, which was the difference between the values (dollars per pupil) of local (equalized) revenue at the 95th and the 5th percentiles, increased by 95 percent of the second year. The difference in the restricted range ratio (sometimes called the Federal Range Ratio), which was the number of times the variable (in this case, local equalized revenue) at the 95th percentile was larger than at the 5th percentile, increased by 56 percent during the reform year.

In regard to the relative deviation from the median (50th percentile), which was the mean absolute deviation from the median divided by the median, an increase of 64 percent during the second year was found. For the means of the two years, the difference increased by 46 percent. The difference between the standard deviations of the two mean values of local (equalized) revenues showed an increase

of 113 percent. The difference in the coefficients of variation (difference between the two means divided by their standard deviations) was found to be an increase of 46 percent. The difference in the mean deviations from the means for the two years increased by 133 percent. Lastly, the difference between the relative deviations from the means for the two years, in terms of local (equalized) revenue, showed an increase of 60 percent.

(2) Local (Unequalized) Revenue. Results of the computations concerning the second variable of interest (local (unequalized) revenue) are contained in Table 2. Reference to this table will show that increases of 11 of 17 measures were found over the two years. Five of the 17 measures showed decreases in the second year, while one measure showed no change.

The amount (in dollars per pupil) of local (unequalized) revenue at the 100th percentile decreased by 4 percent in the second, or reform, year. The amounts at the 95th, 75th, 50th, 25th, 5th, and 1st percentiles showed increased ranging from 3 percent (95th) to 10 percent (5th). The difference in the ranges of the two years decreased by 5 percent, but the difference in the restricted ranges remained unchanged. The difference in the restricted range ratio decreased by 10 percent.

In regards to the differences in the mean and the relative deviations from the medians of the two years, both measures showed increases. The increase in the difference in the mean deviations from the medians showed an increase of 6 percent, while the difference in the relative deviations from the medians showed an increase of 3 percent.

Differences in the means, standard deviations, and coefficients of variation (means divided by standard deviations) for the two years were as follows. The mean local (unequalized) revenues for the two years showed a 7 percent increase during the second year. Similarly, a slight increase (1 percent) was found in the difference of the standard deviations. The difference in the coefficients of variation for the two years decreased by 6 percent.

For the mean and relative deviations from the means of the two years, one showed an increase, but the other showed a decrease. The difference in the mean deviations from the means of the two years increased by 5 percent, while the difference in the relative deviations from the means showed a decrease of 3 percent.

(3) State Revenues. Table 3 contains the results for state revenues (the third variable of interest). The metric used for each of the 17 computational sets was dollars per pupil. Nine of the 17 measures showed increases, 5 showed decreases, while 3 showed no changes over the two years. As for the percentiles, the difference in state revenues for the two years at the 100th percentile decreased by 25 percent. The difference in the 1st percentile showed a 5 percent decrease.

In regard to the range, restricted range, and restricted range ratio, high variation existed. The difference in the ranges of the two years showed a decrease of 36 percent. The difference in the restricted ranges showed a 10 percent increase, while the restricted range ratios for the two years were approximately equal.

For the mean and relative deviations from the medians, the difference of the former increased by 4 percent in the second, or reform, year. The relative deviations from the medians for the two years were approximately equal and denoted no change.

As to the means, standard deviations, and coefficients of variation of the two years for state revenues, the difference in the means increased by 8 percent. However, the difference in the standard deviations decreased by 12 percent. As could be expected, the coefficients of variation, which are computed by dividing the means by their standard deviations, showed a decrease (12 percent) over the two years.

Lastly, the difference in the mean deviations from the means of state revenues for the two years showed an increase of 5 percent. No difference, however, was found between the relative deviations from the means for the two years.

(4) Federal Revenues. The results for the fourth variable of interest are contained in Table 4. The metric used in each of the 17 computational sets was dollars of federal revenues per pupil. Eight of the 17 measures showed increases in the reform or second year, while nine showed decreases.

In the percentiles, only the 100th showed a decrease in the second year. The decrease found was 300 percent. The differences in the 95th, 75th, 50th, 25th, 5th, 1st percentiles showed increases ranging from 5 to 18 percent.

For the ranges, restricted ranges, and restricted range ratios, the first (ranges) measure in this group showed a 334 percent

decrease in the second year. Conversely, the restricted range difference was a 20 percent increase. The difference in the restricted range ratios for the two years also showed an increase (7 percent).

As to the mean and relative deviations from the medians, both measures showed a decrease in the second or reform year. The difference of the two mean deviations from the medians was a decrease of 31 percent. That of the relative deviations from the medians was a decrease of 43 percent.

In the means, standard deviations, and coefficients of variation group of measures, decreases in the reform year were recorded. The difference in the two means decreased slightly, viz., 2 percent, but the decrease in the two standard deviations was substantial, viz., 178 percent. Since both the mean and standard deviation differences showed decreases, it could be predicted that the difference in the two coefficients of variation would also decrease. It did and by a substantial amount, viz., 173 percent.

The last group of measures, viz., the mean and relative deviations from the mean, also showed decreases over the two years. The difference in the mean deviations from the means was found to be a decrease of 35 percent. The decrease found in the relative deviations from the means was 32 percent.

(5) Total Revenues Per Pupil. As stated in the previous chapter, this fifth variable of interest was a compound variable in that it was the summation of local (equalized) revenues, local (unequalized) revenues, state revenues, and federal revenues. Table 5 contains the results of the computations and comparisons of the 17 measures employed in total revenues per pupil. As was the case in

the previous variables of interest, the metric employed was dollars per pupil. Thus, the results in Table 5 are the total revenues per pupil in dollars. Eight of the 17 measures showed increases in the reforms or second year. Eight measures also showed decreases in the second year. Only one measure showed no change across the two years.

In the percentiles, only the 100th and 1st showed decreases. The 100th percentile difference was 35 percent. The decrease in the 1st percentile was 15 percent. The 95th, 75th, 50th, 25th, and 5th percentiles showed increases ranging from 8 to 11 percent.

As to the ranges, restricted ranges, and restricted range ratios, the differences in the ranges showed a 45 percent decrease, whereas, the difference in the restricted ranges showed a 4 percent increase. The restricted range ratios difference decreased by 7 percent.

For the mean and relative deviations from the medians for the two years, one increased and the other decreased. The mean deviation from the median difference increased by 3 percent. The relative deviation from the median difference decreased by 5 percent.

In the next group of measures, viz., means, standard deviations, and coefficients of variation, high variations were found. The difference between the means, in terms of total revenues per pupil, for the two years increased by 8 percent in the second year over the value recorded for the first year. However, the difference in the standard deviation decreased by 13 percent. As could be expected, the coefficients of variation for the two years differed by 21 percent (decreased).

Lastly, the mean deviations from the means of the pre and post reform years showed no change. An 8 percent increase in the value of the relative deviation from the mean of the second year over the first year was found.

(6) Instructional Expenditures Per Pupil. The results for the sixth variable of interest, using the metric of dollars of instructional expenditures per pupil, for the 17 measures and comparisons are contained in Table 6. Reference to this table will show that 13 of the 17 measurements showed increases over the two years. Only two showed decreases, while two showed no changes. All of the seven percentile measurements showed increases. These increases ranged from 3 to 11 percent. Also, a slight increase (2 percent) was found in the range differences. Conversely, a 2 percent decrease was found between the two restricted ranges. The difference in the two restricted range ratios increased by 63 percent.

As to the mean and relative deviations from the medians for the two years, the difference in the mean deviations from the medians showed an increase of 9 percent. No change was found between the relative deviations from the medians of the two years.

For the means, standard deviations, and coefficients of variation of the two years, all showed increases in the second year. The difference in the means was an increase of 8 percent. The increase in the standard deviations over the two years was 11 percent. Overall, these increases produced a slight increase (3 percent) in the coefficient of variation for the second year.

Lastly, the difference in the mean deviations from the

means of the two years showed an 11 percent increase. No appreciable change was found in the relative deviations from the means.

(7) Adjusted Property Tax Rate. Reference to Table 7 will show the results of the 17 computational measures and comparisons for the seventh variable of interest, viz., adjusted property tax rate. The metric used was adjusted property tax rate in terms of dollars per pupil. Fifteen of the 17 measures showed increases over the two years. Of the two measures remaining, one showed a decrease, while the other showed no appreciable change.

Increases were found in the 100th, 95th, 75th, 50th, and 1st percentiles. These increases ranged from 1 to 20 percent. No appreciable change was found in the 25th percentile measurements for the two years. The 5th percentile difference showed a decrease of 8 percent.

For the range, restricted range, and restricted range ratio group of measurements, all showed increases over the two years. The range increased by 20 percent, the restricted range increased by 4 percent, and the restricted range ratio increased by 13 percent.

Similarly, both the deviations (mean and relative) from the means showed increases (20 percent to 15 percent, respectively), as did the means, standard deviations, and coefficients of variation (5, 16, and 11 percent, respectively). Lastly, both the differences between the deviations (means and relative) from the means also showed increases (18 and 13 percent, respectively).

Discussion

The discussion of the results, which have been presented in the prior subsection, will be limited to the methodology of

Carroll (et al., 1979). These researchers in school finance reform suggest that of the 17 different kinds of measurement, which typically are utilized in research on fiscal equity (and which are presented in this dissertation), only two should be used to determine whether or not a reform program has been successful in fiscal equity. These measures are (1) the relative deviation from the median, and (2) the coefficient of variation. Carroll believes that the remaining measures are redundant and do not require extensive discussion. He advises other researchers to compute all 17 measurements and to display the results, but to focus upon the relative deviation from the median and the coefficient of variation differences to determine reform program success. This methodology will be followed in the discussion of each of the seven variables of interest which follows. An operational definition of each of the two measures will be presented first and then followed by a discussion of the two measures for each of the seven variables of interest obtained from data in the pre and post reform years.

Relative Deviation from the Median

This measure equals half the difference between the average values of the variable of interest for pupils from the median and the average values of the variable of interest for below median pupils, expressed as a percent of the median. For example, in the case of this study's fourth variable of interest, federal revenue, it is the percent by which the statewide per pupil federal revenue would have to be increased to raise all below median pupils' federal

revenue to the average achieved by pupils above the median. A relative deviation from the median of 0.20 means that above median pupils average 40 percent greater federal revenues than below median pupils. Another way of stating this is that the cost of raising all below median pupils to the average revenue of above median pupils would be 20 percent of statewide average per pupil federal revenues. The smaller that the relative deviation is from the median, the greater is the fiscal equity of the reform program.

The Coefficient of Variation

Using the same particulars as described above, a coefficient of variation of 0.20 for federal revenues, which is computed by dividing the standard deviation by the mean, means that one-sixth of the pupils attend districts in which federal revenues are 20 percent or more above the mean and about one-sixth attend districts in which federal revenues are at least 20 percent below the mean. Approximately two-thirds of the pupils attend districts in which federal revenues are within 20 percent of the mean. The smaller the coefficient of variation, the greater the fiscal equity of the reform program.

The following discussions will examine each of the seven variables of interest in terms of the differences obtained between the pre reform year (1976-77) and the post reform year (1977-78) in the relative deviation from the median and the coefficient of variation.

(1) Local (Equalized) Revenue/Relative Deviation from the Median. This measure was 0.16 for the pre reform year (1976-77). In that year, above median pupils averaged 32 percent greater local

(equalized) revenues per pupil than did below median pupils. The statewide, local (equalized) revenues per pupil would have had to been increased by 16 percent to raise all below median pupils' local (equalized) revenues per pupil to the average achieved by pupils above the median.

For the post reform year (1977-78), the relative deviation from the median was computed to be 0.27. In that year, above median pupils averaged 54 percent greater local (equalized) revenues per pupil than did below median pupils. The statewide per pupil local (equalized) revenues would have had to been increased by 27 percent to raise all below median pupils' local (equalized) revenues to the average achieved by pupils above the median.

It can be seen that the difference in the relative deviation from the median for the two years increased by 0.11 ($0.27 - 0.16$), or 64 percent. This can be interpreted that the interim effects of the reform were in the opposite direction from the optimum in terms of local (equalized) revenues. Fiscal equity, in terms of this variable of interest, as measured by this measurement, was not achieved by the reform program.

(2) Local (Equalized) Revenue/Coefficient of Variation.

In the pre-reform year, this measure was 0.22, which means that one-sixth of the pupils attended districts in which local (equalized) revenues were 22 percent or more above the mean and about one-sixth attended districts in which local (equalized) revenues were at least 20 percent below the mean. Approximately two-thirds of the pupils attended districts in which local (equalized) revenues were within 20 percent of the mean.

On the other hand, the post reform year, the coefficient of variation was 0.33, which means that one-sixth of the pupils attended districts in which local (equalized) revenues were 33 percent or more above the mean and about one-sixth attended districts in which local (equalized) revenues were at least 33 percent below the mean. Approximately two-thirds of the pupils attended districts in which the local (equalized) revenues were within 33 percent of the mean.

The difference between the coefficients of variation for the two years increased by 0.10 (0.33-0.23), or 46 percent. As was the case with the relative deviation from the median, it can be concluded that the interim effects of the reform were in the opposite direction from the optimum in terms of local (equalized) revenue. Fiscal equity, in terms of this variable of interest, as measured by this measurement, was not achieved by the reform program.

(3) Local (Unequalized) Revenue/Relative Deviation from the Median. This measure was found to be 0.38 for the pre reform year. In that year, above median pupils averaged 76 percent greater local (unequalized) revenues per pupil than did below median pupils. The statewide, local (unequalized) revenues per pupil would have had to been increased by 38 percent to raise all below median pupils' local (unequalized) revenues per pupil to the average achieved by pupils above the median.

In 1977-78, the post reform year, the relative deviation from the median was computed to be 0.37. In that year, above median

pupils averaged 74 percent greater local (unequalized) revenues per pupil than did below median pupils. The statewide per pupil local (unequalized) revenues would have had to been increased by 37 percent to raise all below median pupils' local (unequalized) revenues to the average achieved by pupils above the median.

The difference in the relative deviations from the median for the pre and post reform years decreased by 0.01 (0.38-0.37), or 1 percent. This can be interpreted that the interim effects of the reform were in the correct direction to display fiscal equity. However, the reduction was only slight. Fiscal equity, in terms of this variable of interest, as measured by this measurement, was approached by a small degree.

(4) Local (Unequalized) Revenue/Coefficient of Variation.

This measure was 0.49 in the pre reform year. This can be interpreted that one-sixth of the pupils attended districts in which local (unequalized) revenues were 49 percent or more above the mean and about one-sixth attended districts in which local (unequalized) revenues were at least 49 percent below the mean. Approximately two-thirds of the pupils attended districts in which local (unequalized) revenues were within 49 percent of the mean.

In the second year or reform year, the coefficient of variation was 0.46, which means that one-sixth of the pupils attended districts in which local (unequalized) revenues were 46 percent or more above the mean and about one-sixth attended districts in which local (unequalized) revenues were at least 46 percent below the mean. Approximately two-thirds of the pupils attended districts in which the local (unequalized) revenues were within 46 percent of the mean.

The difference between the coefficients of variation for the pre and post reform years decreased by 0.03 (0.49-0.46), or 6 percent. The directional shift towards fiscal equity and the small degree of change shown by this measures is approximately that shown by the relative deviation from the median. Fiscal equity, in terms of this variable of interest, as measured by the coefficient of variation, was approached by a small degree.

(5) State Revenue/Relative Deviation from the Median.

In both years, the relative deviation from the median was found to be 0.07. This means that above median pupils averaged 14 percent greater state revenues per pupil than did below median pupils during both years. The statewide state revenues per pupil would have had to been increased by 7 percent to raise all below median pupils' state revenues per pupil to the average achieved by pupils above the median. No difference in the relative deviations from the medians for the two years was experienced. Thus, it can be concluded that fiscal equity was not addressed in terms of this variable of interest and as measured by the difference in the relative deviations from the medians.

(6) State Revenue/Coefficient of Variation. In the pre reform year, this measure was 0.16, which means that one-sixth of the pupils attended districts in which state revenues were 16 percent or more above the mean and about one-sixth attended districts in which state revenues were at least 16 percent below the mean. Approximately two-thirds of the pupils attended districts in which state revenues per pupil were within 16 percent of the mean.

During the second or post reform year, the coefficient of variation was 0.13. This means that in the second year one-sixth

of the pupils attended districts in which state revenues were 13 percent or more above the mean and about one-sixth attended districts in which state revenues were at least 13 percent below the mean.

The difference between the two coefficients of variation for the two years decreased by 0.03 (0.16-0.13), or 21 percent. The direction of the difference was correct, even though the degree of change was relatively small. Fiscal equity, in terms of federal revenue per pupil, and as measured by the coefficient of variation, was approached by a small degree.

(7) Federal Revenue/Relative Deviation from the Median.

For the pre reform year, this measure was computed to be 0.51. This means that in that year above median pupils averaged 102 percent greater federal revenue per pupil than did below median pupils. The statewide, federal revenues per pupil would have had to be increased by 51 percent to raise all below median pupils' federal revenues per pupil to the average achieved by pupils above the median.

For the post reform year (1977-78), the relative deviation from the median was found to be 0.35, which means that in that year above median pupils averaged 70 percent greater federal revenue per pupil than did below median pupils. The statewide, federal revenues per pupil would have had to be increased by 35 percent to raise all below median pupils' federal revenues per pupil to the average achieved by pupils above the median.

The difference between the relative deviations from the means for the two years decreased by 0.16 (0.51-0.35), or 43 percent.

This can be interpreted that the change in this variable was in the correct direction and of sufficient magnitude to display some semblance of fiscal equity. Fiscal equity, in terms of this variable, and as measured by the relative deviation from the median, was approached to a substantial degree.

(8) Federal Revenue/Coefficient of Variation. The coefficient of variation in the first year was 1.23, which meant that one-sixth of the pupils attended districts in which federal revenues were 123 percent or more above the mean and about one-sixth attended districts in which federal revenues were at least 123 percent below the mean. Approximately, two-thirds of the pupils attended districts in which federal revenues were within 123 percent of the mean.

In the second or reform year, the coefficient of variation decreased greatly to a value of 0.45. This meant that in the reform year, one-sixth of the pupils attended districts in which federal revenues were only 45 percent or more above the mean and about one-sixth attended districts in which the federal revenues were at least 45 percent below the mean. Approximately two-thirds of the pupils attended districts in which federal revenues were within 45 percent of the mean.

The difference between the coefficients of variation for the two years was 0.78 ($1.23 - 0.45$), or 173 percent. This shows that the change in this variable was in the correct direction and of sufficient magnitude to gain a substantial degree of fiscal equity. Thus, both measures (the relative deviation from the median and the

coefficient of variation) for this variable of interest indicated that fiscal equity was being approached by a substantial degree.

(9) Total Revenues Per Pupil/Relative Deviation from the Median. The relative deviation from the median in the first year was found to be 0.15. This meant that above-median pupils averaged 30 percent greater total revenues per pupil than did below median pupils during the first year. The statewide, total revenues per pupil would have had to been increased by 15 percent to raise all below median pupils' total revenues per pupil to the average achieved by pupil above the median.

For the reform year (1977-78), the relative deviation from the median decreased slightly to 0.14, which meant that above median pupils averaged 28 percent greater total revenues per pupil than did below median pupils during the second year. The statewide, total revenues per pupil would have had to been increased by 14 percent to raise all below median pupils' total revenues per pupil to the average achieved by pupils above the median.

As can be seen, there was a slight reduction in the two relative deviations from the medians for the two years. The difference was 0.01 (0.15-0.14), or 5 percent. This can be interpreted that the interim effects of the reform were in the correct direction, but of only a small degree of magnitude. Fiscal equity, in terms of this variable of interest, and measured by the relative deviation from the median, was approached to a small degree.

(10) Total Revenues Per Pupil/Coefficient of Variation.

The coefficient of variation for the first year was 0.24. This meant

that one-sixth of the pupils attended districts in the first year in which total revenues per pupil were 24 percent or more above the mean and about one-sixth attended districts in which the total revenues per pupil were at least 24 percent below the mean. Approximately, two-thirds of the pupils attended districts in which the total revenues per pupil were within 24 percent of the mean.

For the second year, the coefficient of variation was 0.20. This meant that, for the second year, one-sixth of the pupils attended districts in which the total revenues per pupil were 20 percent or more above the mean and about one-sixth attended districts in which the total revenues per pupil were at least 20 percent below the mean. Approximately two-thirds of the pupils attended districts in which the total revenues per pupil were within 20 percent of the mean.

The difference between the two coefficients of variation was a reduction of 0.04 ($0.24 - 0.20$), or 21 percent. As was the case with the first measure, this difference can be interpreted that the interim effects of the reform were in the correct direction, albeit small in magnitude. Fiscal equity, in terms of total revenues per pupil, and as measured by both measures (relative deviation from the median and coefficient of variation) was approached to a small degree.

(11) Instructional Expenditures Per Pupil/Relative Deviation from the Median. In both the pre reform and post reform years, the relative deviations from the medians were found to be

the same, i.e., 0.15. This meant that, for both years, above median pupils averaged 30 percent greater instructional expenditures per pupil than did below median pupils. The statewide, instructional expenditures per pupil would have had to been increased by 15 percent to raise the below median pupils' instructional expenditures per pupil to the average achieved by pupils above the median. Since no difference was found between the two measures, it can be concluded that fiscal equity was not addressed in terms of this variable of interest, and as measured by the difference in the relative deviations from the medians.

(12) Instructional Expenditures Per Pupil/Coefficient of Variation. In the first year, the coefficient of variation was 0.20. This meant that one-sixth of the pupils attended districts in which the instructional expenditures per pupil were 20 percent or more above the mean and about one-sixth attended districts in which instructional expenditures per pupil were at least 20 percent below the mean. Approximately two-thirds of the pupils attended districts in which instructional expenditures per pupil were within 20 percent of the mean.

For the second or reform year, the coefficient of variation increased to 0.21. For this year, this meant that one-sixth of the pupils attended districts in which instructional expenditures per pupil were 21 percent or more above the mean and about one-sixth attended districts in which instructional expenditures were at least 21 percent below the mean. Approximately two-thirds of the pupils attended districts in which instructional expenditures per pupil

attended districts in which instructional expenditures per pupil were within 21 percent of the mean.

The difference between the two coefficient of variation was an increase of 0.01 (0.21-0.20), or 3 percent. As can be seen, the direction of the change was incorrect for fiscal equity to have been approached. However, the magnitude of the change was extremely small (3 percent). It can be concluded that fiscal equity was either not addressed or only slightly affected adversely by the reform in terms of this variable of interest, and as measured by the coefficient of variation.

(13) Adjusted Property Tax Rate/Relative Deviation from the Median. In the first year (1976-77), the relative deviation from the median was found to be 0.29. This meant that above median pupils averaged 58 percent greater adjusted property tax rates (per pupil) than did below median pupils. The statewide, adjusted property tax rate (per pupil) would have had to been increased by 29 percent to raise all below median pupils' adjusted property tax rate (per pupil) to the average achieved by pupils above the median.

The relative deviation from the median for the second year (1977-78) increased to 0.33. This meant that for this year, the above median pupils averaged 66 percent greater adjusted property tax rates (per pupil) than did below median pupils. The statewide, adjusted property tax rate (per pupil) would have had to been increased by 33 percent to raise all below median pupils' adjusted property tax rate (per pupil) to the average achieved by pupils above the median.

As can be seen, the second year's increase in the relative deviation from the median was 0.04 (0.33-0.29), or 15 percent. First, the direction of the change was incorrect to approach fiscal equity. Second, the magnitude of the change, although not large, was great enough to indicate that the reform's interim effects were substantial enough to be adverse to fiscal equity for this variable of interest, and as measured by the relative deviation from the median.

(14) Adjusted Property Tax Rate/Coefficient of Variation.

The coefficient of variation for the first year (1976-77) was found to be 0.36. This meant that one-sixth of the pupils during the first year attended districts in which the adjusted property tax rate (per pupil) was 36 percent or more above the mean and about one-sixth attended districts in which the adjusted property tax rate (per pupil) was at least 36 percent below the mean. Approximately two-thirds of the pupils attended districts in which the adjusted property tax rate (per pupil) was within 36 percent of the mean.

The coefficient of variation for the second year (1977-78) increased to 0.41, which meant that for this year one-sixth of the pupils attended districts in which the adjusted property tax rate (per pupil) was 41 percent or more above the mean and about one-sixth attended districts in which the adjusted property tax rate (per pupil) was at least 41 percent below the mean. Approximately two-thirds of the pupils attended districts in which the adjusted property tax rate (per pupil) was within 41 percent of the mean.

The difference between the two coefficients of variation was an increase of 0.05 (0.41-0.36), or 11 percent. As was the case

with the first measure (relative deviation from the median) the direction of the difference was the opposite for fiscal equity to have been displayed. The magnitude of the difference was substantial enough to indicate that adverse effects had been precipitated by the reform, in terms of this variable, and as measured by the coefficient of variation.

II. FISCAL NEUTRALITY

Results (Regression)

Tables 8 through 14 contain the results of the regression computations pertaining to fiscal neutrality for the pre reform year of 1976-77 and the post reform year of 1977-78. More specifically, Table 8 contains the results of regressing the first variable of interest, which was local (equalized) revenue, on the four regression variables of (1) property wealth, (2) income per pupil, (3) local option sales tax revenue, and (4) adjusted property tax rate. Table 9 contains the results of regressing local (unequalized) revenue, which was the second variable of interest, on the same four regression variables listed above. Similarly, Tables 10, 11, 12, 13, and 14 contain the results of regressing state revenue (the third variable of interest), federal revenue (the fourth variable of interest), total revenues per pupil (the fifth variable of interest), instructional expenditures per pupil (the sixth variable of interest), and adjusted property tax rate (the seventh variable of interest), respectively, on the four regression variables.

TABLE 8

Regression Results for Local (Equalized) Revenue
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth:				
Linear F Ratio	15.470	4.840	-10.63	69
Linear Elasticity	1.414	7.966	6.55	463
Quadratic F Ratio	4.760	0.070	- 4.69	99
Quadratic Elasticity	2.632	0.211	- 2.42	92
Income Per Pupil:				
Linear F Ratio	1.130	0.510	- 0.62	55
Linear Elasticity	0.546	3.553	3.01	551
Quadratic F Ratio	0.000	0.220	0.22	100
Quadratic Elasticity	0.094	0.334	0.24	256
Local Option Sales Tax:				
Linear F Ratio	145.310	47.570	-97.74	67
Linear Elasticity	1.226	9.089	7.86	641
Quadratic F Ratio	142.210	54.250	-87.96	62
Quadratic Elasticity	2.627	1.387	- 1.24	47
Adjusted Property Tax:				
Linear F Ratio	5.530	16.330	10.85	196
Linear Elasticity	-0.321	- 6.203	- 5.88	1839
Quadratic F. Ratio	4.960	15.870	10.91	220
Quadratic Elasticity	0.636	- 0.864	- 1.50	236

TABLE 9

Regression Results for Local (Unequalized) Revenue
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth:				
Linear F Ratio	49.200	26.930	-22.27	45
Linear Elasticity	1.068	0.853	- 0.23	21
Quadratic F Ratio	25.900	11.540	-14.36	55
Quadratic Elasticity	26.621	1.878	-24.74	93
Income Per Pupil:				
Linear F Ratio	6.900	17.200	10.30	149
Linear Elasticity	0.618	0.948	0.33	53
Quadratic F Ratio	0.680	8.130	7.45	1096
Quadratic Elasticity	98.296	1.444	-96.86	99
Local Option Sales Tax:				
Linear F Ratio	69.240	59.670	- 9.57	14
Linear Elasticity	0.460	0.480	0.02	4
Quadratic F Ratio	66.530	59.990	- 6.54	10
Quadratic Elasticity	0.978	1.041	0.06	6
Adjusted Property Tax:				
Linear F Ratio	0.900	2.720	1.82	202
Linear Elasticity	0.065	134.378	134.31	203
Quadratic F Ratio	0.620	2.170	1.55	250
Quadratic Elasticity	0.114	0.252	0.13	108

TABLE 10
Regression Results for State Revenue
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth:				
Linear F Ratio	41.150	13.960	-27.19	66
Linear Elasticity	3.031	352.781	349.75	11543
Quadratic F Ratio	62.480	22.460	-40.02	64
Quadratic Elasticity	11.441	9.042	- 2.40	21
Income Per Pupil:				
Linear F Ratio	7.350	0.600	- 6.75	92
Linear Elasticity	1.911	-0.640	1.27	67
Quadratic F Ratio	5.320	0.970	- 4.35	82
Quadratic Elasticity	-4.257	-1.751	2.51	59
Local Option Sales Tax:				
Linear F Ratio	1.400	0.010	- 1.39	99
Linear Elasticity	-0.237	0.025	0.27	113
Quadratic F Ratio	0.870	0.000	- 0.87	100
Quadratic Elasticity	-0.402	-0.012	- 0.39	98
Adjusted Property Tax:				
Linear F Ratio	0.810	0.020	- 0.79	98
Linear Elasticity	-0.177	0.040	0.22	122
Quadratic F Ratio	1.030	0.060	- 0.97	94
Quadratic Elasticity	-0.414	0.036	0.46	110

TABLE 11

Regression Results for Federal Revenues
Tennessee School Districts 1976-77 and 1977-78

MEASURES	1976-77	1977-78	DIFFERENCE	%
Property Wealth:				
Linear F Ratio	0.090	0.450	0.36	400
Linear Elasticity	-0.021	-0.123	0.10	500
Quadratic F Ratio	0.010	0.220	0.21	2100
Quadratic Elasticity	0.027	0.275	0.25	833
Income Per Pupil:				
Linear F Ratio	0.180	0.140	-0.04	22
Linear Elasticity	-0.035	-0.104	0.06	150
Quadratic F Ratio	0.000	0.000	0.00	0
Quadratic Elasticity	-0.010	0.002	0.01	130
Local Option Sales Tax:				
Linear F Ratio	0.410	2.750	2.34	571
Linear Elasticity	-0.017	0.123	0.10	500
Quadratic F Ratio	0.310	1.410	1.10	355
Quadratic Elasticity	-0.031	-0.191	0.16	533
Adjusted Property Tax:				
Linear F Ratio	0.440	1.460	1.02	232
Linear Elasticity	-0.016	0.094	0.12	600
Quadratic F Ratio	0.190	2.650	2.46	1295
Quadratic Elasticity	-0.022	0.266	2.29	1450

TABLE 12

Regression Results for Total Revenues Per Pupil
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth:				
Linear F Ratio	60.520	34.900	-25.62	42
Linear Elasticity	2.302	2.193	- 0.11	5
Quadratic F Ratio	46.740	22.570	-24.17	52
Quadratic Elasticity	6.789	5.857	- 0.93	14
Income Per Pupil:				
Linear F Ratio	0.610	16.910	10.30	1689
Linear Elasticity	0.372	1.752	1.38	373
Quadratic F Ratio	0.130	4.770	4.64	3569
Quadratic Elasticity	-0.454	2.544	2.99	664
Local Option Sales Tax:				
Linear F Ratio	26.540	42.380	15.84	60
Linear Elasticity	0.633	0.963	0.33	52
Quadratic F Ratio	27.270	43.690	16.42	60
Quadratic Elasticity	1.380	2.107	0.73	53
Adjusted Property Tax:				
Linear F Ratio	0.000	2.700	2.70	100
Linear Elasticity	0.006	0.298	0.29	100
Quadratic F Ratio	0.000	2.230	2.23	100
Quadratic Elasticity	-0.002	0.571	0.57	100

TABLE 13

Regression Results for Instructional Expenditures Per Pupil
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth:				
Linear F Ratio	24.200	14.710	-9.49	39
Linear Elasticity	1.969	1.469	-0.50	25
Quadratic F Ratio	9.460	4.690	-4.77	50
Quadratic Elasticity	4.179	4.622	0.44	11
Income Per Pupil:				
Linear F Ratio	8.480	18.200	9.72	115
Linear Elasticity	1.644	2.139	0.50	30
Quadratic F Ratio	0.280	6.660	6.38	2279
Quadratic Elasticity	0.792	0.000	-0.79	100
Local Option Sales Tax:				
Linear F Ratio	54.140	46.600	-7.54	14
Linear Elasticity	1.017	0.965	-0.05	5
Quadratic F Ratio	51.420	45.470	-5.95	12
Quadratic Elasticity	2.150	0.007	-2.15	100
Adjusted Property Tax:				
Linear F Ratio	1.130	1.140	0.01	88
Linear Elasticity	0.001	0.201	0.20	100
Quadratic F Ratio	1.240	1.240	0.00	0
Quadratic Elasticity	0.408	0.440	0.04	10

TABLE 14

Regression Results for Adjusted Property Tax
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth:				
Linear F Ratio	7.270	5.870	-1.40	19
Linear Elasticity	-0.699	0.520	1.22	174
Quadratic F Ratio	2.870	1.390	-1.48	52
Quadratic Elasticity	-1.524	-0.862	0.66	43
Income Per Pupil:				
Linear F Ratio	4.580	5.940	1.36	30
Linear Elasticity	0.603	0.730	0.13	22
Quadratic F Ratio	8.530	4.990	-3.54	42
Quadratic Elasticity	2.040	1.496	-0.54	27
Local Option Sales Tax:				
Linear F Ratio	1.940	0.020	-1.92	99
Linear Elasticity	-0.140	0.013	0.15	107
Quadratic F Ratio	2.110	0.000	-2.11	100
Quadratic Elasticity	-0.319	-0.012	-0.31	100

The regression results in each table consist of four measures. Two of these are F ratios. One is a linear F ratio, while the other is a quadratic F ratio. The two F ratios pertain to the degree to which the variable of interest is related to the regression variable that is being used. These F ratios are sometimes called measures of "goodness-of-fit." The higher the F ratio, the higher is the probability that the observed relationship between the variable of interest and the regression variable is nonrandom.

The other two measures of the four contained in each table are (1) a linear elasticity measure, which is companion with the linear F ratio, and (2) a quadratic elasticity measure, which is companion with the quadratic F ratio. The two elasticity measures pertain to the estimated change in the variable of interest that, at the mean, is associated with a one percent change in the regression variable of concern. All four measures were derived by regressing the variable of interest, whose metric was dollars per pupil, with each of the four regression variables. The metric employed in each of the four regression variables, with the exception of property wealth, was also dollars per pupil. In the property wealth regression variable, the metric employed was thousands of dollars per pupil.

Before reviewing the results of the regression computations, two notes of import should be made. The first of these pertains to the direction and strength of the regression for each type of fiscal neutrality sought. For example, regressing each of the seven variables of interest on property wealth (the first of the four regression variables) provides information on whether or not the reform program possesses ex post neutrality. For this type of neutrality to be

present, a small F ratio and a small elasticity are found in the differences between these measures for the pre reform year and those of the post reform year. In other words, a reform program that possesses ex post neutrality is one in which there is little or no relationship between the revenues and the property wealth of districts. The small F ratio indicates a low probability that the observed relationship between the variable of interest and the regression variable (property wealth) is nonrandom. The small elasticity indicates that a small change in the variable of interest, with respect to property wealth, is the percentage increase in the first variable that is, on the average, associated with a 1 percent increase in property wealth. For example, an elasticity of revenues with respect to wealth of 0.18 means that the average district's revenues increase by 0.18 percent with each 1 percent increase in its wealth. Conversely, an elasticity of revenues with respect to wealth of 0.78 means that the average district's revenues increase by 0.78 percent with each 1 percent increase in its wealth.

Regressing each variable of interest on income per pupil (the second regression variable) for each of the two years provides information on whether or not the reform program possesses income neutrality. The same relationship, in terms of a small F ratio and a small elasticity, that exists for ex post neutrality, also exists for income neutrality. For income neutrality to be present, there should be little or no relationship between the variables of interest and income per pupil.

Regressing each variable of interest on local option sales tax revenue and adjusted property tax rates for each of the two years

provides information on whether or not the reform program possesses ex ante neutrality. For this type of neutrality to be present, a large F ratio and a large elasticity should be found in the differences between these measures for the pre reform year and the post reform year.

The second note of import is that the quadratic forms of the F ratio and the elasticity are typically used to determine whether or not a reform program has achieved (or approached) neutrality. The linear forms of these two measures do not appear to be as useful as the quadratic forms.

The results of regressing each variable of interest on the four regression variables are presented next. These will be followed by a presentation of the decile means and Pearson product moment correlation.

(1) Local (Equalized) Revenue/Ex Post Neutrality. Reference to Table 8 will show that the linear and quadratic F ratios decreased in the reform year (1977-78) by 69 and 99 percent, respectively. The linear elasticity value increased by 463 percent, but the quadratic elasticity decreased by 92 percent during the second year.

(2) Local (Equalized) Revenue/Income Neutrality. Reference to Table 8 will show that for the second year the linear F ratio decreased by 55 percent from what it was during the first year. The quadratic F ratio, however, increased by 100 percent. The linear elasticity showed a 551 percent increase. The quadratic elasticity increased by 256 percent.

(3) Local (Equalized) Revenue/Ex Ante Neutrality. Reference to Table 8 will show that for the regression variable of local option sales tax, the linear F ratio decreased in the second or reform year by 67 percent. The quadratic F ratio also decreased by 62 percent. As for the elasticity, the linear elasticity increased by 641 percent, but the quadratic elasticity decreased by 47 percent during the second year.

For the regression variable of adjusted property tax rate, both of the F ratios (linear and quadratic) increased during the second year (196 and 220 percent, respectively). Both the linear and quadratic elasticities decreased during the second year. The linear elasticity decreased substantially (1,839 percent) during the second year. The quadratic elasticity decreased in the second year by 236 percent.

(4) Local (Unequalized) Revenue/Ex Post Neutrality. Reference to Table 9 will show that all four measures decreased during the second year. The linear F ratio decreased by 45 percent. The quadratic F ratio decreased by 55 percent. For the elasticities, the linear elasticity decreased by 21 percent, while the quadratic elasticity decreased by 93 percent.

(5) Local (Unequalized) Revenue/Income Neutrality. Reference to Table 9 will disclose that all measures, except the quadratic elasticity, increased during the second year. The linear F ratio increased by 149 percent, while the quadratic F ratio increased by 1.096 percent. The linear elasticity increased by 33 percent. The quadratic elasticity decreased by 99 percent.

(6) Local (Unequalized) Revenue/Ex Ante Neutrality. Reference to Table 9 will disclose that for the third regression variable, viz., local option sales tax, the linear F ratio decreased by 14 percent. The quadratic F ratio also decreased (10 percent). The linear elasticity increased slightly by 4 percent. The quadratic elasticity also increased slightly by 6 percent.

For the fourth regression variable (adjusted property tax rate), increases in the second year were found for all four measures. The linear F ratio and the quadratic F ratio increased by 202 and 250 percent, respectively. The linear elasticity increased substantially by 203,506 percent. The quadratic elasticity increased by 108 percent.

(7) State Revenue/Ex Post Neutrality. Table 10 contains the regression results for state revenues. Reference to this table will show that all measures, except the linear elasticity, showed decreases in the second year. The linear F ratio decreased by 66 percent. The quadratic F ratio decreased by 64 percent. The quadratic elasticity decreased by 21 percent. The quadratic elasticity increased substantially (11,543 percent).

(8) State Revenue/Income Neutrality. Reference to Table 10 will show that the linear F ratio decreased by 92 percent during the second year. The decrease in the quadratic F ratio for this period was 82 percent. Both elasticities showed increases during the second year. The linear elasticity increased by 67 percent, while the quadratic elasticity increased by 59 percent.

(9) State Revenue/Ex Ante Neutrality. Reference to Table 10 will show that for the regression variable of local option sales tax all measures, except the linear elasticity, showed decreases in the second year. The linear F ratio decreased by 99 percent, while the quadratic F ratio decreased by 100 percent. The linear elasticity increased by 113 percent, but the quadratic elasticity decreased by 98 percent.

For the fourth regression variable (adjusted property tax), the two F ratios decreased and the two elasticities increased in the second year. The linear F ratio decreased by 98 percent and the quadratic F ratio decreased by 94 percent. The linear elasticity increased by 122 percent, while the quadratic elasticity increased by 110 percent.

(10) Federal Revenue/Ex Post Neutrality. Table 11 contains the regression results for federal revenues (the fourth variable of interest). Reference to this table will show that all four measures increased in the second year by large percentages. The linear F ratio increased by 400 percent. The quadratic F ratio increased by 2,100 percent. The linear elasticity increased by 500 percent. Lastly, the quadratic elasticity increased by 833 percent.

(11) Federal Revenue/Income Neutrality. Reference to Table 11 will show that for the second year the linear F ratio decreased by 22 percent. No change was recorded for the quadratic F ratio. Both of the elasticity measures showed increases. The linear elasticity increased by 150 percent and the quadratic elasticity increased by 130 percent.

(12) Federal Revenue/Ex Ante Neutrality. For the third regression variable (local option sales tax), reference to Table 11 will show that all four measures increased substantially in the second year. The linear F ratio increased by 130 percent and the quadratic F ratio increased by 355 percent. The linear elasticity increased by 500 percent and the quadratic elasticity increased by 533 percent.

For the fourth regression variable (adjusted property tax), all four measures were also found to have increased substantially during the second year. The linear and quadratic F ratios increased by 232 and 1,295 percent, respectively. The linear and quadratic elasticities increased by 600 and 1,450 percent, respectively.

(13) Total Revenues Per Pupil/Ex Post Neutrality. The results for this variable of interest are contained in Table 12. Reference to this table will show that all measures decreased in the second year. The two F ratios (linear and quadratic) decreased by 42 and 52 percent, respectively. The two elasticities (linear and quadratic) decreased by and 14 percent, respectively.

(14) Total Revenues Per Pupil/Income Neutrality. Reference to Table 12 will show that all measures for the regression of total revenues per pupil on income per pupil increased substantially in the second year. The largest increases were recorded for the F ratios. The linear and quadratic F ratios increased 1.689 and 3,569 percent, respectively. The linear and quadratic elasticities increased 373 and 664 percent, respectively.

(15) Total Revenues Per Pupil/Ex Ante Neutrality. Reference to Table 12 will show that all measures for both regression variables,

viz., local option sales tax and adjusted property tax, increased in the second year. For the local option sales tax, the linear and quadratic F ratios increased by the same percentage (60 percent). The linear and quadratic elasticities increased by 52 and 53 percent, respectively. For adjusted property tax, all four measures increased by the same percentage in the second year, viz., 100 percent.

(16) Instructional Expenditures Per Pupil/Ex Post Neutrality.

The regression results for this variable of interest are contained in Table 13. Reference to this table will show that both of the F ratios decreased in the second year. The linear F ratio decreased by 39 percent and the quadratic F ratio decreased by 50 percent. Of the two elasticities, one decreased while the other increased. The linear elasticity decreased by 25 percent, but the quadratic elasticity increased by 11 percent.

(17) Instructional Expenditures Per Pupil/Income Neutrality.

Reference to Table 13 will show that all measures, except the quadratic elasticity, showed increases in the second year. The two F ratios (linear and quadratic) increased by 115 and 2,279 percent, respectively. The linear elasticity increased by 30 percent, but the quadratic elasticity decreased by 100 percent.

(18) Instructional Expenditures Per Pupil/Ex Ante Neutrality.

Reference to Table 13 will show that for the local option sales tax regression variable, all four measures decreased in the second year. The linear and quadratic F ratios decreased by 14 and 12 percent,

respectively. The linear and quadratic elasticities decreased by 5 and 100 percent, respectively.

For the adjusted property tax regression variable, the linear F ratio showed an increase of 88 percent, but no change (0 percent) was found for the quadratic F ratio. The linear and quadratic elasticities increased by 100 and 10 percent, respectively.

(19) Adjusted Property Tax Rate/Ex Post Neutrality.

Table 14 contains the regression results for this variable of interest. It should be noted that only three regressions were made for this variable, because the fourth regression variable was the same variable as the seventh variable of interest, viz., adjusted property tax rate.

Reference to Table 14 will disclose that while the two F ratios showed decreases in the second year, the two elasticities showed increases. Specifically, the linear and quadratic F ratios showed decreases of 19 and 52 percent, respectively. On the other hand, the linear and quadratic elasticities showed increases of 174 and 43 percent, respectively.

(20) Adjusted Property Tax Rate/Income Neutrality. Reference to Table 14 will disclose that for the second year, the linear F ratio increased by 30 percent, while the quadratic F ratio decreased by 42 percent. The linear elasticity increased by 22 percent, but the quadratic elasticity decreased by 27 percent.

(21) Adjusted Property Tax Rate/Ex Ante Neutrality. Reference to Table 14 will disclose that for the second year, the two F ratios

(linear and quadratic) showed decreases of 99 and 100 percent, respectively. The linear elasticity showed an increase of 107 percent, but the quadratic elasticity showed a decrease of 100 percent.

Results (Mean Deciles)

Tables 15-21 contain the results of the mean decile computations pertaining to fiscal neutrality for the pre reform year of 1976-77 and the post reform year of 1977-78. More specifically, Table 15 contains the results of having rank ordered the property wealth and income per pupil and dividing these into deciles according to their local (equalized) revenue. A mean was then computed for each of the deciles. Table 16 contains the results of the computations for both property wealth deciles and income per pupil deciles as they pertained to local unequalized revenue. Similarly, Tables 17, 18, 19, 20 and 21 contain the results of computing the means of the property wealth and income per pupil deciles according to state revenue (the third variable of interest), federal revenue (the fourth variable of interest), total revenue per pupil (the fifth variable of interest), and adjusted property tax rate (the seventh variable of interest).

The results of computing the property wealth and income decile means of each variable of interest are presented next. This will be followed by a discussion of the decile means results.

(1) Local (Equalized) Revenue/Property Wealth Decile.

Reference to Table 15 will show that the means for each decile of

TABLE 15

Decile Means for Local Equalized Revenue
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Mean for Property Wealth Decile				
1st	15.714	22.928	7.21	46
2nd	14.500	19.857	5.36	37
3rd	15.857	19.071	3.21	20
4th	15.866	22.600	6.73	42
5th	15.928	24.071	8.14	51
6th	18.357	28.785	10.43	57
7th	18.933	26.933	8.00	70
8th	19.357	31.285	11.93	62
9th	20.000	30.428	10.43	52
10th	20.500	29.642	9.14	45
Mean for Income Per Pupil Decile				
1st	13.687	20.733	7.05	51
2nd	14.714	24.500	9.79	67
3rd	16.500	24.800	8.30	50
4th	16.166	23.842	7.68	47
5th	18.764	26.571	7.81	42
6th	19.307	29.866	10.56	55
7th	20.066	24.800	4.73	24
8th	19.533	29.866	10.33	53
9th	19.000	26.733	7.73	41
10th	17.357	24.428	7.07	41

TABLE 16

Decile Means for Local Unequalized Revenue
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Mean for Property Wealth Decile				
1st	301.714	328.928	27.21	9
2nd	240.357	330.500	90.21	38
3rd	284.000	277.428	- 6.57	2
4th	266.533	281.533	15.00	6
5th	275.857	314.000	38.14	14
6th	358.357	359.785	1.43	0
7th	391.666	428.666	37.00	9
8th	393.142	432.357	39.22	10
9th	480.714	520.857	40.14	8
10th	564.571	558.857	- 5.71	1
Mean for Per Pupil Income Decile				
1st	241.625	253.333	11.71	5
2nd	229.000	293.812	64.81	28
3rd	341.625	316.500	-25.13	8
4th	275.000	309.684	34.68	13
5th	317.294	349.571	29.28	9
6th	332.153	460.333	128.18	39
7th	459.133	452.800	- 6.33	1
8th	465.933	450.600	-15.33	3
9th	435.533	414.800	-20.73	5
10th	436.571	516.500	79.93	18

TABLE 17

Decile Means for State Revenue
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Mean for Property Wealth Decile				
1st	460.142	497.642	37.50	8
2nd	471.142	518.714	47.57	10
3rd	485.714	517.357	31.64	7
4th	465.200	508.266	43.07	9
5th	481.142	509.214	28.07	6
6th	469.285	500.785	31.50	7
7th	458.266	521.200	62.93	14
8th	473.214	504.214	31.00	7
9th	460.857	501.714	40.86	9
10th	529.928	558.785	28.86	5
Mean for Income Per Pupil Decile				
1st	487.625	522.533	34.91	7
2nd	490.642	512.125	21.48	4
3rd	517.687	509.400	-8.29	2
4th	474.416	513.684	39.27	8
5th	468.882	508.000	39.12	8
6th	469.538	502.666	33.13	7
7th	463.533	528.733	65.20	14
8th	461.200	502.733	41.53	9
9th	442.933	487.133	44.20	10
10th	448.357	520.428	72.07	16

TABLE 18

Decile Means for Federal Revenue
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Mean for Property Wealth Decile				
1st	87.500	96.142	8.64	10
2nd	55.500	63.857	8.36	15
3rd	60.785	66.000	5.22	9
4th	71.000	83.533	12.53	18
5th	168.500	87.571	-80.93	92
6th	60.928	75.357	14.43	24
7th	65.933	72.933	7.00	11
8th	54.928	57.142	2.21	4
9th	60.071	64.357	4.29	7
10th	65.857	67.357	2.00	3
Mean for Income Per Pupil Decile				
1st	143.937	96.466	-47.47	49
2nd	103.500	76.750	-26.75	35
3rd	60.312	83.700	23.39	39
4th	53.250	59.684	6.43	12
5th	51.000	68.428	17.43	34
6th	58.307	61.000	2.69	5
7th	65.333	74.333	9.00	14
8th	65.666	75.000	9.33	14
9th	60.600	68.866	8.27	14
10th	74.384	67.714	- 6.67	10

TABLE 19

Decile Means for Total Revenues Per Pupil
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Mean for Property Wealth Decile				
1st	866.785	945.642	78.86	9
2nd	781.500	932.928	151.43	19
3rd	846.357	879.142	32.79	4
4th	818.600	895.933	77.33	9
5th	941.428	940.142	-1.29	0
6th	906.928	964.714	57.78	6
7th	934.800	1049.733	114.93	12
8th	940.642	1025.000	84.36	9
9th	1021.642	1099.571	77.93	8
10th	1180.857	1211.642	30.78	3
Mean for Income Per Pupil Decile				
1st	886.875	893.066	6.19	1
2nd	837.857	907.187	69.33	8
3rd	936.125	934.400	-1.73	0
4th	818.833	906.894	88.07	11
5th	855.941	949.571	93.63	11
6th	879.307	1051.266	171.96	20
7th	1008.066	1064.066	56.00	6
8th	1012.333	1058.200	45.87	5
9th	959.666	1002.466	42.80	4
10th	971.357	1127.642	156.28	16

TABLE 20

Decile Means for Instructional Expenditures Per Pupil
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Mean for Property Wealth Decile				
1st	553.785	588.000	34.21	6
2nd	466.285	544.285	78.01	17
3rd	503.571	532.142	28.57	6
4th	503.533	536.000	32.47	6
5th	499.357	543.357	44.00	9
6th	562.714	582.428	19.71	4
7th	605.400	661.666	56.27	9
8th	590.428	631.000	40.57	7
9th	639.714	672.571	32.86	5
10th	664.142	714.357	50.22	8
Mean for Per Pupil Income Decile				
1st	484.250	523.200	38.95	8
2nd	494.642	533.312	38.67	8
3rd	524.250	541.400	17.15	3
4th	500.916	540.473	39.55	8
5th	508.882	556.852	47.98	9
6th	533.769	623.400	89.63	17
7th	629.800	719.733	89.93	14
8th	658.133	646.666	-11.47	2
9th	637.000	626.666	-10.33	2
10th	620.285	706.142	85.86	14

TABLE 21

Decile Means for Adjusted Property Tax Rate
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Mean for Property Wealth Decile				
1st	2.940	3.261	0.32	11
2nd	2.353	2.920	0.57	24
3rd	2.263	2.090	-0.17	8
4th	1.989	2.180	0.19	10
5th	2.063	2.020	-0.04	2
6th	2.309	2.126	0.18	8
7th	1.940	2.085	0.15	7
8th	1.753	1.884	0.13	7
9th	1.760	1.909	0.15	9
10th	1.715	1.826	0.11	6
Mean for Per Pupil Income Decile				
1st	2.211	2.378	0.17	8
2nd	1.882	1.839	-0.04	2
3rd	2.218	2.088	-0.13	6
4th	2.355	2.217	-0.14	6
5th	2.066	1.825	-0.24	12
6th	1.846	2.177	0.33	18
7th	1.934	2.471	0.54	28
8th	2.267	2.111	-0.16	7
9th	2.095	2.367	0.27	13
10th	2.298	2.661	0.36	16

property wealth increased in the reform year (1977-78). The range of this increase was from a low of 3.210 or 20 percent in the 3rd decile to a high of 11.93 or 62 percent in the 8th decile.

(2) Local Equalized Revenue/Income Per Pupil Decile.

Reference to Table 15 will show that the means for each decile of property wealth increased in the reform year (1977-78). The range of this increase was from a low of 4.73 or 24 percent in the 7th decile for a high of 10.56 or 55 percent in the 6th decile.

(3) Local Unequalized Revenue/Property Wealth Decile.

Reference to Table 16 will show that the means of the local unequalized revenue in the property wealth deciles for the reform year (1977-78), as compared to the pre reform year (1976-77), ranged from a low of -6.57 which was a 2 percent decrease in decile 3, to a high of 90.14 which was a 38 percent increase in decile 2. Two deciles means, viz., the third and the tenth, showed decreases in the reform year. All other decile means showed increases over the two years.

(4) Local Unequalized Revenue/Per Pupil Income. Reference to Table 16 will show that the means of the local unequalized revenue in the per pupil income deciles of the reform year (1977-78), as compared to the pre reform year (1976-77), ranged from a low of -25.13 for an 8 percent decrease in decile 3 to a high of 128.18 which was a 39 percent increase in the 6th decile. The third, seventh, eighth, and ninth decile means showed decreases in the reform year. All other decile means showed increases over the two years.

(5) State Revenue/Property Wealth Deciles. Reference to Table 17 will show that the means of the state revenue in the property wealth deciles in each case increased during the reform year (1977-78). This increase ranged from a low of 28.07 or 6 percent in the 5th decile, to a high of 62.93 or 14 percent in the 7th decile.

(6) State Revenue/Per Pupil Income Deciles. Reference to Table 17 will show that the means of the state revenues in the per pupil income deciles for the reform year (1977-78), as compared to the pre reform year (1976-77), ranged from a low of -8.29 for a 2 percent decrease in the 3rd decile, to a high of 65.20 for a 14 percent increase in the 7th decile. The third decile means was the one to show a decrease over the two years.

(7) Federal Revenue/Property Wealth Deciles. Reference to Table 18 will show that the means of the federal revenue in the property wealth deciles for the reform year (1977-78), as compared to the pre reform year (1976-77), ranged from a low of -80.93 for a 92 percent decrease in the 5th decile, to a high of 14.43 for a 24 percent increase in the 6th decile. The fifth decile means was the only one to show a decrease over the two years.

(8) Federal Revenue/Per Pupil Income Deciles. Reference to Table 18 will show that the difference in the means of the federal revenue in the per pupil income deciles for the reform year (1977-78), as compared to the pre reform year (1976-77), ranged from a low of -47.47 for a 49 percent decrease in the 1st decile to a high of 23.30 for a 39 percent increase in the 3rd decile. The first, second, and

tenth decile means showed decreases over the two years. All others showed increases.

(9) Total Revenue Per Pupil/Property Wealth Deciles.

Reference to Table 19 will show that the differences in the means of the total revenue per pupil in the property wealth deciles for the reform year (1977-78), as compared to the pre reform year (1976-77), ranged from a low of -1.29 which approximated a minim (less than 1 percent) reduction in this variable for the 5th decile. The highest change for this variable was 151.43 or a 19 percent increase in the 2nd decile. Only the fifth decile mean showed a decrease over the two years.

(10) Total Revenue Per Pupil/Per Pupil Income Deciles.

Reference to Table 19 will show that the differences in the means of the total revenue per pupil in the per pupil income deciles for the reform year (1977-78), as compared to the pre reform year (1976-77), ranged from a low of -1.73 which was a minim reduction (less than 1 percent) in this variable for the 3rd decile. The greatest change for this variable was 171.96 or a 20 percent increase in the 6th decile. The third decile mean was the only one that showed a decrease over the two years.

(11) Instructional Expenditures Per Pupil/Property Wealth Deciles. Reference to Table 20 will show that the means of instructional expenditures for each decile of property wealth increased in the reform year (1977-78). The range of this increase was from a low of 19.71 or 4 percent in the 6th decile, to a high of 78.01 or 17 percent in the 2nd property wealth decile.

(12) Instructional Expenditures Per Pupil/Per Pupil Income Deciles. Reference to Table 20 will show that the differences in the means of the instructional expenditures per pupil in the per pupil income deciles for the reform year (1977-78), as compared to the pre reform year (1976-77), ranged from a low of -11.47 or a 2 percent reduction in the 8th decile to a high of 89.93 or a 14 percent increase in the 7th decile. Only the eighth and ninth decile means showed decreases over the two years.

(13) Property Tax Rate/Property Wealth Deciles. Reference to Table 21 will show that the differences in the means of the property tax rates in the property wealth deciles for the reform year (1977-78), as compared to the pre reform year (1976-77), ranged from a low of -0.04 or a 2 percent reduction in the 5th decile to a high of 0.57, a 24 percent increase in the 2nd decile. The third, fifth, and sixth decile means showed decreases across the two years. All others showed increases.

(14) Property Tax Rate/Per Pupil Income Decile. Reference to Table 21 will show that the differences in the means of the property tax rates in the per pupil income deciles for the reform year (1977-78), as compared to the pre reform year (1976-77), ranged from a low of -0.04 for a 2 percent decrease in the 2nd decile to a high of 0.54 for a 28 percent increase in the 7th decile. The second, third, fourth, fifth, and eighth decile means showed decreases over the two years. The remaining decile means showed increases.

Results (Pearson Product Moment Correlation Coefficient)

Tables 22 through 28 contain the resultant computations for the pre and post reform years, the differences between them, and the direction (increase or decrease) of the differences. Table 22 pertains to the first variable of interest, local equalized revenue. Table 23 pertains to the second variable or local unequalized revenue. Table 24 pertains to the third variable which is state revenue. Table 25 pertains to the fourth variable of interest or federal revenue. Table 26 pertains to total revenue per pupil which is the fifth variable of interest. Table 27 concerns the instructional expenditures per pupil or the sixth variable, and Table 28 refers to the variable adjusted property tax rate.

(1) Local Equalized Revenue. Reference to Table 22 will show a decrease in the difference of the Pearson coefficient in property wealth, income per pupil, and local sales tax revenue. However, the adjusted property tax rate coefficients show an increase in negative coefficients. This would in actuality be a decrease of approximately 67 percent.

(2) Local Unequalized Revenue. Table 23 shows that the coefficients from the pre reform year to the post reform year showed decreases in both property wealth and local sales tax revenue. The other variables, income per pupil and adjusted property tax rates, showed marked increases of 57 percent and 67 percent respectively.

(3) State Revenue. Reference to Table 24 shows decreases in the coefficients for property wealth by 38 percent, and local option sales tax rates by 108 percent. The variables of income

TABLE 22

Pearson Product Moment Correlation
Local Equalized Revenue
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth	0.315	0.182	-0.14	44
Income	0.087	0.059	-0.03	33
Local Sales Tax Revenue	0.707	0.495	-0.21	30
Adjusted Property Tax Rate	-0.212	-0.347	-0.14	67

TABLE 23

Pearson Product Moment Correlation
Local Unequalized Revenue
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth	0.509	0.401	-0.11	22
Income	0.213	0.324	0.12	57
Local Sales Tax Revenue	0.568	0.538	-0.03	5
Adjusted Property Tax Rate	0.087	0.149	0.06	67

Table 24

Pearson Product Moment Correlation State Revenue
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth	0.476	0.30112	-0.18	38
Income Per Pupil	-0.219	-0.06932	0.16	73
Local Sales Tax Revenues	-0.097	-0.00824	-0.11	108
Adjusted Property Tax Rate	-0.083	-0.08312	0.09	113

Table 25

Pearson Product Moment Correlation Federal Revenue
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth	-0.025	-0.056	-0.09	300
Income Per Pupil	-0.035	-0.030	0.00	0
Local Sales Tax Revenue	-0.053	-0.135	-0.09	180
Adjusted Property Tax Rate	-0.061	0.109	0.17	283

Table 26

Pearson Product Moment Correlation Total Revenue Per Pupil
Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth	0.549	0.446	-0.10	18
Income Per Pupil	0.064	0.263	0.20	286
Local Sales Tax Revenue	0.363	0.474	0.08	21
Adjusted Property Tax Rate	0.004	0.149	0.14	3,500

TABLE 27

Pearson Product Moment Correlation
 Instructional Expenditures Per Pupil
 Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth	0.383	0.308	-0.08	20
Income Per Pupil	0.235	0.332	0.10	42
Local Sales Tax Revenue	0.521	0.491	-0.03	6
Adjusted Property Tax Rate	0.097	0.097	0.00	0

TABLE 28

Pearson Product Moment Correlation
 Adjusted Property Tax Rate
 Tennessee School Districts 1976-77 and 1977-78

MEASURE	1976-77	1977-78	DIFFERENCE	%
Property Wealth	-0.241	-0.219	0.02	9
Income Per Pupil	0.194	0.218	0.02	12
Local Sales Tax Revenue	-0.127	0.013	0.14	111

per pupil and adjusted property tax rate increased by 73 percent and 113 percent respectively.

(4) Federal Revenue. Table 25 contains the results of the correlation coefficients computations for the four variables of interest and federal revenue. Property wealth showed a difference of .09 for a 300 percent increase. Income per pupil was relatively unchanged, while local sales tax revenues showed -0.09 difference for a 180 percent decrease. Adjusted property tax rate showed a difference of .17 for a 283 percent increase in the correlation coefficients across the two years.

(5) Total Revenue Per Pupil. Reference to Table 26 will show that the correlation coefficients for the total revenue per pupil decreased by 18 percent for property wealth. However, the difference in the coefficients for income per pupil was 0.20 for an increase of 286 percent. Similarly, local option sales tax revenue increased by 21 percent. The greatest increase was found in the adjusted property tax rate correlation coefficient, which rose 3,500 percent from pre to post reform year.

(6) Instructional Expenditures Per Pupil. Table 27 contains the results of the correlation coefficients for the four variables of interest and instructional expenditures per pupil. The coefficient for property wealth decreased -0.08 (or 20 percent) from the pre reform to the post reform year. Similarly, local sales tax revenue coefficient showed a decrease of 6 percent. However, the difference in pre and post reform coefficients for income per pupil was .10 for a 42 percent increase. Adjusted property tax rate showed no change in the correlation coefficient.

(7) Adjusted Property Tax Rate. Table 28 contains the results of the correlation coefficients for the three variables property wealth, income per pupil, and local sales tax revenue. The variables of income per pupil and local sales tax revenue showed percentage increases of 12 and 111 respectively, while the property wealth variable showed an increase of 9 percent.

Discussion (Regression)

The discussion of the results concerning fiscal neutrality will be limited to the methodology of Carroll (1979). As was the case with fiscal equity, this researcher suggests that only part of the measures typically used by school finance researchers in the analysis of fiscal neutrality should be emphasized, viz., regression measures. He advises other researchers to compute all three types or categories of fiscal neutrality measures, viz., regression, decile means, and Pearson Product Moment Correlation Coefficients, and to display the results, but to focus on the regression results in the determination of whether or not a school finance reform program has achieved or approached fiscal neutrality. This methodology will be followed in the subsequent discussion subsection.

As was noted earlier, the quadratic forms of the F ratio and the elasticity are used for the determination of whether or not the three types of neutrality have been achieved by a reform program (Carroll, 1979). The discussion of the regression results

follows this methodology. Also, the quadratic elasticity will be discussed first, followed by a discussion of the quadratic F ratio for each regression result. This is the order of the importance of the two measures.

(1) Local (Equalized) Revenue/Ex Post Neutrality -- (Table 8, p. 100) In the pre reform year (1976-77), the quadratic elasticity was 2.63. This meant that the average district's local (equalized) revenues increased by 2.63 percent with each 1 percent increase in property wealth. In the post reform year (1977-78), the quadratic elasticity decreased to 0.21, which meant that in the second year, the average district's local (equalized) revenues increased by only 0.21 percent with each 1 percent increase in property wealth. Thus, it can be concluded that ex post neutrality was effected to a substantial degree by the reform program, as measured by the quadratic elasticity measure.

The quadratic F ratio for the first year was 4.76, while it was 0.07 in the second year. This is a 99 percent decrease in the size of the F ratio ($4.76 - 0.07 = 4.69$). Thus, the probability that the relationship between local (equalized) revenue and property wealth was nonrandom was reduced substantially. This fact substantiates the finding of the quadratic elasticity. Ex post neutrality was exhibited by the reform program for local (equalized) revenue, as confirmed by both measures.

(2) Local (Equalized) Revenue/Income Neutrality -- (Table 8, p. 100) The quadratic elasticity was 0.09 for the first or pre reform year. This meant that for the first year, the average district's

local (equalized) revenue increased by 0.09 percent with each 1 percent increase in its income. For the second year, the quadratic elasticity increased to 0.35, which was a 256 percent increase over the first year. This meant that the average district's local (equalized) revenue increased by 0.35 percent with each one percent increase in its income per pupil. Thus, it can be concluded that income neutrality was not achieved by the reform program, as measured by the quadratic elasticity.

For the first year, the quadratic F ratio was 0.00. For the second year, the quadratic F ratio increased to 0.22. This means that the degree of relationship between local (equalized) revenue and income per pupil increased. This was opposite to the requirements for income neutrality. Thus, it can be concluded that income neutrality was not achieved by the reform program, as confirmed by both measures.

(3) Local (Equalized) Revenue/Ex Ante Neutrality -- (Table 8, p. 100) The results concerning local option sales tax will be presented first, followed by those for adjusted property tax. The quadratic elasticity for the first year was 2.63, which meant that the average district's local (equalized) revenue increased by 2.63 percent for each 1 percent increase in its local option sales tax revenue. For the second year, the quadratic elasticity decreased to 1.39, which was a 47 percent decrease ($2.63 - 1.39 = 1.24$). This meant that the average district's local (equalized) revenue increased by 1.39 percent for each 1 percent increase in its local option sales tax revenue. As

can be seen, this change was in the incorrect direction for ex ante neutrality to be exhibited. Thus, it can be concluded that ex ante neutrality was not achieved by the reform program, as measured by the quadratic elasticity.

The quadratic F ratio for the first year was 142.21. In the second year the quadratic F ratio was 54.25. The difference between the two F ratios was a 62 percent decrease ($142.21 - 54.25 = 87.96$). As was the case with the quadratic elasticity, the direction of the difference was incorrect for ex ante neutrality to be exhibited. Thus, it can be concluded that income neutrality, in terms of local (equalized) revenues regressed on local option sales tax, was not achieved by the reform program, as exhibited by both measures.

The quadratic elasticity for the first year for local (equalized) revenue regressed on adjusted property tax was 0.64, which meant that the average district's local (equalized) revenue increased by 0.64 percent for each 1 percent increase in its adjusted property tax revenue. The quadratic elasticity for the second year was -0.87, which was a decrease of 236 percent ($0.64(-) - 0.87 = 1.50$). This meant that the average district's local (equalized) revenue increased by -0.87 for each 1 percent increase in its adjusted property tax revenue. Thus, it would have taken a 2 percent increase in the adjusted property tax rate before any local (equalized) revenue would have been experienced. As can be seen, there is an inverse relationship between local (equalized) revenue and adjusted property tax in the second or reform year. The requirements for ex ante neutrality are such that a direct relationship must exist. Thus, it can be

concluded that ex ante neutrality was not achieved by the reform program, as measured by the quadratic elasticity.

The quadratic F ratio for the first year was 4.96, whereas, for the second year it was 15.87. This shift in direction is the correct one for confirming that the relationship between local (equalized) revenue and adjusted property tax revenue had a high probability of being nonrandom. Nevertheless, the quadratic elasticity indicated that the first requirement for possessing ex ante neutrality was not present. Consequently, it can be concluded that ex ante neutrality was not achieved by the reform program.

(4) Local (Unequalized) Revenue/Ex Post Neutrality -- (Table 9, p. 101) In the first year, the quadratic elasticity was 26.62, which meant that the average district's local (unequalized) revenue increased by 26.62 percent with each 1 percent increase in property wealth. In the second year, the quadratic elasticity decreased to 1.88. This meant that, for the second year, the average district's local (unequalized) revenue increased by 1.88 percent with each 1 percent increase in property wealth. The difference between the quadratic F ratios for the two years was 24.74, or 93 percent. Thus, it can be concluded that ex post neutrality was achieved by the reform program, as measured by the quadratic elasticity.

For the first year, the quadratic F ratio was 25.90. In the second year, this ratio decreased to 11.54, which was a 55 percent reduction ($25.90 - 11.54 = 14.36$). The probability that the relationship between local (unequalized) revenue and property wealth was nonrandom

was decreased. Thus, it can be concluded that ex post neutrality was achieved by the reform program, as confirmed by both measures.

(5) Local (Unequalized) Revenue/Income Neutrality -- (Table 9, p. 101) The quadratic elasticity for the first year was 98.30, which meant that the average district's local (unequalized) revenue increased by 98.30 percent with each 1 percent increase in income per pupil. In the second year, the quadratic elasticity decreased to 1.44, which was a 99 percent reduction. This meant that in the second or reform year, the average district's local (unequalized) revenue increased by 1.44 percent with each 1 percent increase in income per pupil. As can be seen, the direction and magnitude of the change were correct for those required after a program to possess income neutrality. Thus, it can be concluded that income neutrality was achieved by the reform program, as measured by the quadratic elasticity.

The change in the quadratic F ratios across the two years was in the incorrect direction (0.68 for the first year, increasing to 8.13 in the second year). In effect, the probability that the relationship between local (unequalized) revenue and income per pupil was nonrandom was increased. Nevertheless, it can be concluded that income neutrality was achieved on the strength of the quadratic elasticity, which is the primary measure of the two.

(6) Local (Unequalized) Revenue/Ex Ante Neutrality -- (Table 9, p. 101) The results concerning the regression variable of local option sales tax will be discussed first. Next, the results concerning the regression variable of adjusted property tax will be discussed.

The quadratic elasticity for the first year was 0.98. This meant that in that year, the average district's local (unequalized) revenue increased by 0.98 percent for each 1 percent increase in local option sales tax revenue. In the second year, the quadratic elasticity increased to 1.04, which was a 6 percent increase. This meant that in the second year, the average district's local (unequalized) revenue increased 1.04 percent for each 1 percent increase in local option sales tax revenue. The direction of the change was in agreement to exhibit ex ante neutrality, even though the magnitude was relatively small. Thus, it can be concluded that ex ante neutrality was approached for local (unequalized) revenue, when regressed on local option sales tax, as measured by the quadratic elasticity.

The pre reform year's quadratic F ratio was 66.53, whereas, the post reform year's quadratic F ratio was 59.99. The difference was a decrease of 10 percent ($66.53 - 59.99 = 6.54$). The direction of the change was not indicative of ex ante neutrality, but this measure was opted by that of the quadratic elasticity. Thus, ex ante neutrality was approached.

The quadratic elasticity for the first year, when local (unequalized) revenue was regressed on adjusted property tax was 0.12. Thus, in the first year, the average district's local (unequalized) revenue increased by 0.12 percent for each 1 percent increase in adjusted property tax revenue. For the second year, the quadratic elasticity increased to 0.25, which was a 108 percent increase. This meant that in the second year, the average district's local (unequalized) revenue increased 0.25 percent for each 1 percent increase in adjusted property tax revenue. The direction and magnitude of the change

indicated that ex ante neutrality was achieved by the reform program, as measured by the quadratic elasticity.

The quadratic F ratios increased 250 percent between the two years. In the first year, the quadratic F ratio was 0.62, whereas, in the second year, the quadratic F ratio was 2.17. The direction and magnitude of the change indicated that ex ante neutrality was achieved by the reform program, as measured by the quadratic F ratios.

(7) State Revenue/Ex Post Neutrality -- (Table 10, p. 102)
the first year, the quadratic elasticity was 11.44. This meant that the average district's state revenue increased by 11.44 percent for each 1 percent increase in its property wealth. For the second year, the quadratic elasticity decreased to 9.04, which was a 21 percent reduction. This meant that in the second year, the average district's state revenue increased by 9.04 percent for each 1 percent increase in property wealth. The direction and magnitude of the change indicated that the reform program had produced ex post neutrality, as measured by the quadratic elasticity.

The "goodness-of-fit" between the relationship of the state revenue and property wealth confirmed that ex post neutrality had been achieved. The quadratic F ratio for the first year was 62.48, whereas, the quadratic F ratio for the second year was 22.46. This was a decrease of 64 percent ($62.48 - 22.46 = 40.02$). Thus, the direction and magnitude of the change confirmed the findings of the quadratic elasticities.

(8) State Revenue/Income Neutrality -- (Table 10, p. 102)
The quadratic elasticity for the first year was -4.26. This meant that

the average district's state revenue increased by -4.26 percent for each 1 percent increase in its income per pupil. In the second year, the quadratic elasticity increased to -1.75. This meant that the average district's state revenue increased by -1.57 percent for each 1 percent increase in its income per pupil. The change was of the correct magnitude (59 percent) to exhibit income neutrality, but the direction of the change was incorrect. Thus, it can be concluded that the reform program did not achieve income neutrality, as measured by the quadratic elasticity.

As to the quadratic F ratios, the direction of the change and its magnitude over the two years were indicative of income neutrality. The quadratic F ratios for the two years were 5.32 and 0.97, respectively. This was an 82 percent decrease ($5.32 - 0.97 = 4.35$). However, these effects were overshadowed by the results of the primary measure, viz., the quadratic elasticity. Consequently, it is concluded that the reform program did not achieve income neutrality.

(9) State Revenue/Ex Ante Neutrality -- (Table 10, p. 102)

The results of regressing state revenue on local option sales tax will be discussed first. The discussion of the results from regressing state revenue on adjusted property tax is presented last.

In the first year, the quadratic elasticity was -0.40, which meant that the average district's state revenue increased by -0.40 percent for each 1 percent increase in its local option sales tax revenue. In the second year, the quadratic elasticity reduced to -0.01. This was a 98 percent reduction. This meant that the average district's state revenue increased by -0.01 percent for each

1 percent increase in its local option sales tax revenue. The direction of the change was not indicative of ex ante neutrality, even though its magnitude was. Thus, it can be concluded that the reform program did not achieve ex ante neutrality, as measured by the quadratic elasticity.

As to the F ratios, the direction of the change or difference of the quadratic F ratios for the two years was not indicative of ex ante neutrality. The quadratic F ratio for the first year was 0.87, whereas, that of the second year decreased to 0.00.

For state revenue regressed on adjusted property tax, the opposite was true, in terms of the quadratic elasticities. In the first year, the quadratic elasticity was -0.42, which meant that the average district's state revenue increased by -0.42 percent for each 1 percent increase in its adjusted property tax revenue. In the second year, the quadratic elasticity increased to 0.04. This meant that the average district's state revenue increased by 0.04 percent for each increase of 1 percent in its adjusted property tax revenue. The difference between the two measures was an increase of 110 percent. The direction and magnitude of the change indicated that ex ante neutrality was achieved by the reform program, as measured by the quadratic elasticity.

The direction of the change or difference in the two quadratic F ratios for the two years was not indicative of ex ante neutrality, even though the quadratic elasticity difference was. In the first year, the quadratic F ratio was 1.03. However, it decreased in the

second year to 0.06 (a 94 percent reduction). Even so, since the quadratic F ratio is the secondary measure, it can be concluded that the reform program achieved ex ante neutrality.

(10) Federal Revenue/Ex Post Neutrality -- (Table 11, p. 103)

For the first year, the quadratic elasticity was 0.03, which meant that the average district's federal revenue increased by 0.03 percent for each 1 percent increase in property wealth. For the second year, the quadratic elasticity increased substantially to 0.26. This meant that the average district's federal revenue increased by 0.26 percent for each 1 percent increase in property wealth. Although the magnitude was sufficiently high, the direction of the change was opposite. Thus, it can be concluded that ex post neutrality was not achieved.

(11) Federal Revenue/Income Neutrality -- (Table 11, p. 103)

The quadratic elasticity was -0.01 for the first year. This meant that the average district's federal revenue increased by -0.01 percent for each increase of 1 percent in income per pupil. For the second year, the quadratic elasticity increased to 0.003. This meant that the average district's federal revenue increased by 0.003 percent with each increase of 1 percent in income per pupil. The direction of the change was the opposite to that required for income neutrality. Thus, it can be concluded that income neutrality was not achieved.

There was no change in the quadratic F ratio between the two years. Thus, the degree that federal revenue and income per pupil were related remained the same for each year.

(12) Federal Revenue/Ex Ante Neutrality -- (Table 11, p. 103)

The results of regressing federal revenue on local option sales tax will be discussed first. This will be followed by the discussion of regressing federal revenue on adjusted property tax.

For the first regression set, the quadratic elasticity was -0.03 in the first year. This meant that the average district's federal revenue increased by -0.03 percent for each 1 percent increase in local option sales tax revenue. In the second year, the quadratic elasticity increased to -0.19, which meant that the average district's federal revenue increased by -0.19 percent for each 1 percent increase in local option sales tax revenue. The direction and magnitude of the change satisfied the requirements for ex ante neutrality. Thus, it can be concluded that ex ante neutrality was achieved as measured by the quadratic elasticity.

The quadratic F ratio change between the two years also confirmed that ex ante neutrality was achieved. The quadratic F ratio for the first year was 0.31. For the second year, the quadratic F ratio increased to 1.41. This was an increase of 355 percent.

For the second regression set, the quadratic elasticity was -0.02. This meant that the average district's federal revenue increased by -0.02 percent for each 1 percent increase in federal revenues during the first year. The quadratic elasticity for the second year was 0.27, which was a substantial increase. This meant that, for the second year, the average district's federal revenue increased by 0.27 percent for each 1 percent increase in adjusted property tax revenue. The direction and magnitude of the change

satisfied the requirements for ex ante neutrality. Thus, it can be concluded that ex ante neutrality was achieved as measured by the quadratic elasticity.

As was the case with the F ratios of the first regression set, the quadratic F ratio change between the two years for the second regression set also confirmed that ex ante neutrality was achieved. For example, the quadratic F ratio for the first year was 0.19. In the second year, the ratio increased to 2.65, which was a substantial increase. The direction and magnitude of the change satisfied the requirements for ex ante neutrality.

(13) Total Revenues Per Pupil/Ex Post Neutrality -- (Table 12, p. 104) The quadratic elasticity for the first year was 6.79. This meant that the average district's total revenues per pupil increased by 6.79 percent for each 1 percent increase in property wealth for the first year. For the second year, the quadratic elasticity decreased to 5.86. This meant that, in that year, the average district's total revenues per pupil increased by 5.86 percent for each 1 percent increase in property wealth. The decrease was a 14 percent reduction. The direction and magnitude of the change satisfied the requirements of ex post neutrality. Thus, it can be concluded that the reform program achieved ex post neutrality, as measured by the quadratic elasticity.

The direction and magnitude of the difference in the quadratic F ratios over the two years also confirmed the fact that ex post neutrality was achieved. For the first year, the quadratic F ratio was 46.74. This measure decreased by 58 percent for the second year

(5.86). Thus, both measures confirmed that the reform program achieved ex post neutrality.

(14) Total Revenues Per Pupil/Income Neutrality -- (Table 12, p. 104) The first year, the quadratic elasticity was -0.45. This meant that the average district's total revenues per pupil increased by -0.45 for each 1 percent increase in income per pupil. In the second year, the quadratic elasticity increased to 2.54, which was a 664 percent increase. The direction of the increase precluded the achieving of income neutrality, as measured by the quadratic elasticity.

This was confirmed also by the direction of the difference in the quadratic F ratios for the two years. In the first year, the quadratic F ratio was 0.13. This measure increased substantially in the second year to 4.77. Thus, it can be concluded that the reform program did not achieve income neutrality, as confirmed by both measures.

(15) Total Revenues Per Pupil/Ex Ante Neutrality -- (Table 12, p. 104) The results of the first regression set will be discussed first, followed by a discussion of the second regression set. In the first set, total revenues per pupil were regressed on local option sales tax. In the second set, total revenues per pupil were regressed on adjusted property tax.

The quadratic elasticity for the first year was 1.38, which meant that the average district's total revenues per pupil increased 1.38 percent for each 1 percent increase in local option sales tax revenue. In the second year, the quadratic elasticity increased by 53 percent to 2.11. For the second year, the average district's total

revenues per pupil increased by 2.11 percent for each 1 percent increase in local option sales tax revenue. The direction and magnitude of the change satisfied the requirements for ex ante neutrality, as measured by the quadratic elasticity.

Similar findings existed with the direction and magnitude of the change in the quadratic F ratios. In the first year, the quadratic F ratio was 27.27. This measure increased by 60 percent (to 43.69) in the second year. Thus, it can be concluded that both measures confirmed that the reform program achieved ex ante neutrality.

For the second regression set, the quadratic elasticity in the first year was -0.003. This meant that the average district's total revenues per pupil increased by -0.003 percent for each 1 percent increase in adjusted property tax revenue. In the second year, this measure increased 100 percent to the value of 0.57. This meant that in the second year, the average district's total revenues per pupil increased by 0.57 percent for each 1 percent increase in adjusted property tax revenue. The direction and magnitude of the change satisfied the requirements for ex ante neutrality, as measured by the quadratic elasticity.

The direction and magnitude of the change in the quadratic F ratios for the two years were similar to those of the elasticities. In the first year the quadratic F ratio was 0.00, but it increased to 2.23 (100 percent increase) in the second year. Thus, it can be concluded that the reform program achieved ex ante neutrality, as confirmed by both measures.

(16) Instructional Expenditures Per Pupil/Ex Post Neutrality -- (Table 13, p. 105) In the first year, the quadratic elasticity was 4.18. This meant that the average district's instructional expenditures per pupil increased by 4.18 percent for each 1 percent increase in property wealth. In the second year, this measure increased to 4.62 (an 11 percent increase). The direction of the change precluded ex post neutrality from being achieved.

On the other hand, the direction and magnitude of the change in the quadratic F ratios were satisfactory to achieve ex post neutrality. Nevertheless, the primacy of the quadratic elasticity overshadowed this fact. Thus, it can be concluded that the reform program did not achieve ex post neutrality.

(17) Instructional Expenditures Per Pupil/Income Neutrality -- Table 13, p. 105) The quadratic elasticity for the first year was 0.79, which meant that the average district's instructional expenditures per pupil increased by 0.79 percent for each 1 percent increase in the income per pupil. This measure decreased to 0.0003 for the second year. This meant that the average district's instructional expenditures per pupil increased by only 0.0003 percent for each 1 percent increase in income per pupil for the second year. The direction of the change and its magnitude satisfied the requirements for income neutrality.

The results of the F ratios, however, were not in harmony with those of the elasticities. For example, in the first year, the quadratic F ratio was 0.28. This measure increased in the second year to 6.66. Thus, the direction was incorrect to confirm the conclusions reached from the elasticities. Nevertheless, the

elasticity measure is primary. Thus, it can be concluded that the reform program did achieve income neutrality.

(18) Instructional Expenditures Per Pupil/Ex Ante Neutrality -- (Table 13, p. 105) The discussions that follow will dwell first on the regression set of instructional expenditures per pupil regressed on local option sales tax, and second, on the regression set of instructional expenditures per pupil regressed on adjusted property tax.

In the first year, the quadratic elasticity was 2.15, which meant that the average district's instructional expenditures per pupil increased 2.15 percent for each 1 percent increase in local option sales tax revenue. However, in the second year, this measure decreased to 0.008. This meant that in the second or reform year, the average district's instructional expenditures per pupil increased by only 0.008 percent for each 1 percent increase in local option sales tax revenue. For ex ante neutrality to be achieved, this measure should have increased in the reform year. Thus, as measured by the quadratic elasticity, the reform program did not achieve ex ante neutrality.

This was confirmed by the difference in the quadratic F ratios for the two years. In the first year, the quadratic F ratio was 51.42. This measure decreased to 45.47 in the second year. Thus, both measures confirmed that ex ante neutrality was not achieved, as determined by regressing instructional expenditures per pupil on local option sales tax revenue.

However, for the second regression set, ex ante neutrality was confirmed. The quadratic elasticity for the first year was 0.41, which meant that the average district's instructional expenditures

per pupil increased by 0.41 percent for each increase of 1 percent in adjusted property tax revenue. In the second year, the quadratic elasticity increased to 0.44. This was 10 percent increase in the difference between the two measures. It also meant that in the reform year, the average district's instructional revenues per pupil increased by 0.44 percent for each 1 percent increase in adjusted property rate revenue. Although the magnitude of the change was not large, the shift was in the correct direction. Thus, it is concluded that the reform program achieved or approached ex ante neutrality, as measured by the quadratic elasticity.

There was no change in the quadratic F ratios for the two years. The values were 1.24 for both years. Even so, ex ante neutrality was achieved to a small degree in the reform year.

(19) Adjusted Property Tax/Ex Post Neutrality -- (Table 14, p. 106) Ex post neutrality was not achieved for this variable of interest. In the first year, the quadratic elasticity was -1.53, which indicated that the average district's adjusted property tax revenue increased -1.53 percent with each 1 percent increase in its property wealth. This measure increased by 43 percent during the second year to -0.86. This meant that the average district's adjusted property tax revenue increased by -0.86 percent for each 1 percent increase in property wealth. The direction of the difference between the two years was incorrect for achieving ex post neutrality.

On the other hand, the difference between the quadratic F ratios for the two years was in the correct direction. The quadratic F ratio was 2.87 in the first year and 1.39 in the second year. This

was a 52 percent decrease. Nevertheless, the quadratic F ratio is secondary to the quadratic elasticity. Thus, it can be concluded that the reform program did not achieve ex post neutrality.

(20) Adjusted Property Tax/Income Neutrality -- (Table 14, p. 106) For the first year, the quadratic elasticity was 2.04. This indicated that the average district's adjusted property tax revenue increased by 2.04 percent for each 1 percent change in income per pupil. This measure decreased to 1.50 in the second year. This meant that the average district's adjusted property tax revenue increased by only 1.50 percent for each 1 percent increase in income per pupil in the reform year. The direction (negative) and the magnitude (27 percent) of the change confirmed that income neutrality was achieved by the reform program.

The direction and magnitude of the change in the quadratic F ratios over the two years also confirmed that income neutrality was achieved. The decrease in this measure over the two years was by 40 percent. In the first year, it was 8.53, while in the second year, it was 4.99. Thus, both measures confirmed that income neutrality was achieved.

(21) Adjusted Property Tax/Ex Ante Neutrality -- (Table 14, p. 106) Neither of the two measures of quadratic elasticity and F ratio confirmed that ex ante neutrality was achieved. In the first year, the quadratic elasticity was -0.32. This meant that in the first year, the average district's adjusted property tax revenue increased by -0.32 percent for each 1 percent increase in local option sales tax revenue. In the second year, the quadratic elasticity

decreased to -0.01 , which meant that the average district's adjusted property tax revenue increased by only -0.01 percent for each 1 percent increase in local option sales tax revenue. Thus, it can be seen that the direction of the change was not confirmatory for ex ante neutrality.

The direction of the change in the quadratic F ratios across the two years was also in the incorrect direction for ex ante neutrality. For example, the quadratic F ratio for the first year was 2.11, but it reduced to 0.00 in the second year. Thus, it can be concluded that ex ante neutrality was achieved by the reform program as confirmed by both measures.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS FOR FURTHER STUDY

This chapter presents the summary, conclusions, and recommendations for further study, deducted from the analysis of the data used in this study. Also included are the purpose of the study, methodology, and results which were found.

I. SUMMARY

The purpose of this study was to assess the interim effects of the 1977 Tennessee Education Finance Act, in terms of fiscal equity and fiscal neutrality, for the first year of implementation. This was accomplished by examining selected public school revenues, expenditures, and their sources during school year 1976-77, prior to implementation of the Tennessee Education Finance Act, and comparing the results with those of the post reform, 1977-78 school year.

Methodology

Selected data for this study were obtained from the following: the Tennessee State Department of Education, Tennessee Education Association, Tennessee State Department of Revenue, the county Technical Assistance Service of the University of Tennessee (Nashville) and the Regional Economics Information System, Bureau of Economic Analysis, United States Department of Commerce.

Those variables utilized to examine the effects of the

reform legislation on fiscal equity concerned both current revenues and their sources, along with instructional expenditures. The revenue variables were local equalized and unequalized, State, Federal, and the total of the above sources. In addition to instructional expenditures, the equity of adjusted property tax rates was studied. While the study utilized an array of computational measures in the determination of fiscal equity, only those measures chosen as prime indicators in current literature were discussed at length.

For the investigation of fiscal neutrality, the seven variables heretofore mentioned were regressed on the districts' property wealth, income, local option sales tax, and adjusted property tax rate. Another investigation was made of districts' characteristics of property and income wealth. The final examination of fiscal neutrality for the comparison at the pre and post legislation years was accomplished by computing Pearson Product Moment Correlation Coefficients for each of the seven aforementioned variables with property wealth per pupil, local sales tax revenue, income per pupil, and the adjusted tax rate.

II. RESULTS

Fiscal Equity

The effects of the 1977 Education Finance Act on statewide fiscal equity as measured by the relative deviation from the median and the coefficient of variation were mixed according to the different variables of interest. The effects on local equalized revenue was

not toward fiscal equity; however, local unequalized revenue moved toward greater fiscal equity. This would indicate a movement toward greater local revenue equity inasmuch as there was a degree of state control over local equalized revenue which was absent from local unequalized revenue.

The effects of the reform legislation on total state revenues received by local districts was negligible; yet movement was shown toward more equity across the state. While Federal Revenues were not directly addressed by the reform legislation, in order to maintain the fidelity of the study, this variable was investigated. Federal Revenue did, however, show a great deal of movement toward greater fiscal equity among the districts from the pre to the post reform year.

The study next addressed the equity of the total revenue picture among the districts for the two years. It was found that there was a small but positive movement toward greater fiscal equity of total revenues.

The next equity variable addressed was what effect the reform legislation had on instructional expenditures. It was found that there was really no change in this variable from pre to post legislative years.

The study then considered the variable of adjusted property tax rates. In terms of both types of measurement, it was shown that there was an adverse effect upon tax rates across the state. This would indicate that the reform legislation had a tendency to precipitate less equitable property tax rates during the first year of implementation.

Fiscal Neutrality

In keeping with current school finance thrust, three types of fiscal neutrality were investigated in this study. Each of the seven variables of interest was measured with two statistical instruments, elasticity and the F test or ratio, to determine the effects of the 1977 reform legislation.

Local equalized revenue was shown to move toward fiscal neutrality only in the ex post or property wealth category. There was no positive movement in either income, neutrality or sales and property tax which, for the purpose of this study, were delineated as ex ante neutrality. This would indicate that although the reform legislation fostered a greater degree of neutrality toward property wealth and the revenues the local districts received from the foundation program, this effect was not shown in either those districts' income or sales and property tax structure.

Perhaps of more importance was the effect of the reform legislation on the neutrality of local unequalized revenue of districts across the state. This revenue is that which is appropriated and expended according to local means and volition. In each case, ex post, income, and ex ante neutrality, there was a strong move toward greater fiscal neutrality.

The State Revenue situation finds a move toward greater neutrality in ex post and ex ante; however, there was no such change in income neutrality. This would indicate that those revenues available from state sources are related to the income of an individual school district.

Once again, while Federal Revenues were not directly addressed by the reform legislation, the assessment of their neutrality remained inherent to this study. It was found that there was movement toward greater ex ante neutrality; however, both ex post and income neutrality were not achieved during the implementation year.

Both ex post and ex ante neutrality were achieved in the area of total revenues; however, income neutrality was not achieved. This would indicate that a relationship did exist between the amount of total revenues and income in districts across the state.

Instructional expenditures saw neutrality achieved in the income and ex ante areas. However, a relationship was found to exist in the post reform year between property wealth and instructional expenditures.

While there was an achievement of both income and ex ante fiscal neutrality, there was found to be a relationship between the property tax rates among the school districts and their property wealth. Therefore, there was no achievement of ex post fiscal neutrality for the post reform year in this category.

Overall, there seemed to be greater strides made in the area of ex ante fiscal neutrality or the removal of relationships between sales and property tax rates and the variables of interest. In addition, in the critical areas of state and local revenues, there was also attained a very positive measure of ex post neutrality. It was evident, however, that there did exist a relationship between the amount of state, local equalized revenues, total revenues, and the income of school districts.

In the area of income neutrality, a greater degree of neutrality was achieved in the variables of local equalized revenue and instructional expenditures. There did remain a relationship between income and the variables of local unequalized revenue, state revenue, federal revenue, total revenue, and the adjusted tax rate. This relationship violated the tenets of income neutrality as measured by this method, inasmuch as there was a relationship between school district income and the amount of revenue that district raised on its local initiative. Also of importance to note is that a relationship did exist between a district's adjusted property tax rate and both its property wealth and income status.

In the area of local equalized revenue, there was a desired change in the correlations with property wealth, income, and sales tax revenue. However, there was an inverse relationship shown in adjusted property tax rates. On the other hand, for local unequalized revenue there was a positive direction exhibited in property wealth and sales tax revenue. Income and adjusted tax rates did not exhibit directions toward greater neutrality.

The investigation of State Revenue found positive directions in property wealth, income, and local sales tax revenue; however, the adjusted tax rate did not exhibit increased neutrality.

The correlations of property wealth, income, sales tax revenue, and adjusted tax rate with Federal Revenues were not congruent with greater fiscal neutrality.

In the area of total revenue, the only variable that exhibited positive direction toward greater fiscal neutrality was

in the correlation of property wealth. Income, local sales tax, and tax rate all showed directions away from greater neutrality.

In the area of Instructional expenditures, there were changes toward greater neutrality in the coefficients of both property wealth and local sales tax revenue. There was no change in the tax rate situation; however, income exhibited a movement away from greater neutrality.

For the category of adjusted property tax rates, both property wealth and local sales tax revenue showed movement toward greater neutrality. Income once again showed movement toward less fiscal neutrality.

III. CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, it was concluded that the 1977 Education Finance Act did have positive effects upon the equity of revenue availability and neutrality during the first year of the legislation's implementation. The strengths in the equity of the Tennessee Foundation Program were paralleled by the program's neutrality.

The change in the amount of revenue received across all districts from the Foundation Program was toward less equity, however the change in the amount of revenue utilized by local districts, other than foundation revenue, showed an increase in equity. This increase in the equity of local unequalized revenue was at the expense of the local district property tax rates. In order to secure revenues for the local district's contribution

to the Foundation Program and to meet increasing demands upon their system, many school districts found it necessary to seek an increased property tax rate for education purposes. The increased tax rate and greater revenue availability at the local district level did not have the effect of equalizing instructional expenditures. Since there was negligible change in the equity of instructional expenditures, it was concluded that the increased revenues were utilized in meeting the increasing cost of other facets of the districts educational processes.

Although Federal Revenue was not addressed in the legislation, there was a large increase in its equity. The fact that Federal Revenue was not addressed and the size of its change rendered the equity of total district revenue meaningless for the purpose of this study.

As in equity, local unequalized revenue showed positive change toward greater neutrality, however, this source of revenue was not neutral in the area of property tax rates and property wealth. Local Equalized Revenue, on the other hand, showed an increase in the neutrality of property wealth. The conclusion was that while the Foundation Program did achieve greater equity in the amount of funds local districts obtained from this source, the residence of students was still a determining factor in the amount of local unequalized revenue they were to enjoy. This tenet was supported by the fact that Instructional expenditures exhibited a decrease in neutrality for the area of property wealth.

The relationship between the level of income of those

persons within districts and the revenue sources, other than local unequalized revenue, showed dramatic increases. It was, therefore, concluded that external revenue sources were not income neutral. It was furthermore concluded that this lack of neutrality was a potential attribute when categorical funds were targeted to those districts with a lower income population.

Based on the findings and conclusions of this study, the following recommendations are suggested:

(1) This study concerned itself with the first year of the implementation of the 1977 Education Finance Act. However, as the data of the 1980 Census as conducted by the United States Department of Commerce and data of the Tennessee Department of Education have become available, further research is recommended to ascertain whether the results of this study have sustained a trend toward greater fiscal equity and neutrality.

(2) The Tennessee State Department of Education should adopt the research methodology herein, along with other techniques utilized by the School Finance Cooperative, for the assessment of fiscal equity and neutrality.

(3) There should be a comprehensive yearly assessment of the fiscal equity and neutrality condition of school districts in the State of Tennessee, by the State Department of Education. Information from this yearly assessment should be expeditiously supplied to all local school districts.

(4) There should be an adequate technical assistance program to aid local school divisions with long range fiscal planning. This program should have as its nucleus a consortium whose members

would be representatives from the State Department of Education, Institutes of Higher Education, Tennessee Education Association, superintendents and principals associations as well as members of the Tennessee legislature and private industry. The Technical Assistance Program should be adequately staffed, equipped and funded by state, local and foundation sources.

(5) The following research is recommended:

- (a) the use of district personal income levels and sales tax revenue as a factor in the determination of both local fiscal needs and efforts.
- (b) much of the revenue generated by individual school districts finds its way back into the local economy in the form of purchased goods and services. This economic multiplier effect and the degree of its impact should be studied.
- (c) the effects of the 1977 Education Finance Act on real estate value capitalization; or what effect either change in tax rates or government expenditures had on the market value of real property in the local school districts.

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