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To the Graduate Council:

I am submitting herewith a dissertation written by Gerald V. Eagan, Jr., entitled "An Analysis of 1976 Property Tax Potential for Counties in Tennessee." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Agricultural Economics.

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AN ANALYSIS OF 1976 PROPERTY TAX POTENTIAL FOR COUNTIES IN TENNESSEE

A Dissertation

Presented to

the Graduate Council of

The University of Tennessee

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

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by

Gerald V. Eagan

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ABSTRACT

The objective of the study was to evaluate the potential of general property taxes in financing county governments in Tennessee. Specific objectives were to (1) analyze differential rates of change in property tax bases and revenues among the counties and (2) determine the implications for county fiscal structures and taxpayer burdens inherent in property tax base, property tax revenue, and income trends.

The first phase of the analysis involved (1) objective classification of county groups with similar socioeconomic change patterns, (2) statistical evaluation of the groupings, and (3) regression analyses of change relationships among the counties, county groups, and for the state. Variables used in the analysis were expressed as changes to secure insight of the dynamic characteristics and relationships.

Four groups of counties were identified using principal components analysis. The groups were labeled (1) rapid-balanced-change, (2) moderate-balanced-change, (3) low-change, and (4) unbalanced-change counties. A multiple-discriminant analysis indicated significant differences between all groups except 2 and 3 at the 5 percent level. Group 1 and 2 counties included both urban and near-urban counties as well as some well-developed rural counties. Counties included in Group 3 and 4 tended to be more rural and less developed. Only six of the 32 counties in Group 4 had increases in total population from 1960 to 1970.

Income elasticities of two property tax components, tax base and tax revenue, were estimated for individual counties, all counties, and

county groups. Individual county elasticities were highly variable ranging from almost zero to 2.4 for both tax components. The tax base elasticity for all counties was 1.1 while the revenue elasticity was 1.0. Thus property tax base response to income increases was slightly elastic for the state but the revenue response was proportional to income change.

The response for both components tended to be inelastic for Group 2 counties with coefficients of .95 and .87 for the tax base and revenue components, respectively. Revenue elasticities were less elastic than tax base elasticities for all groups except Group 4 counties for which both coefficients rounded to 1.1. The revenue elasticity for County Group 1 was also 1.1. Thus, the most urban and the most rural of Tennessee counties had slightly elastic property tax responses to increases in total personal income.

Multivariate regression models which included wealth, population, and land use change variables as well as income change were examined for Tennessee and the four county groups. Income and population change variables were statistically significant for both the tax base and revenue regression models; however, the remaining variables were not statistically significant and/or improperly signed. The multiple regression models were not significantly better in explaining either tax base or revenue change variations than the elasticity models. Income alone explained about 83 percent of the change in tax base and about 76 percent of the change in property tax revenue. The multiple regression models increased explanatory powers by only 2 and 3 percent for the tax base and revenue models.

Comparisons of performance and potentials for 1967 were developed to provide a frame of reference in the second phase of the study. The comparisons indicated that about an 8 percent increase in property tax levies could have been realized if the average effort for the state of Tennessee in 1967 had been the minimum effort for all counties. Approximately 65 percent of these additional levies were accounted for by counties of Group 2 and 20 percent by counties of Group 1. There were four of the 15 counties in Group 1 and 10 of the 28 counties in Group 2 which accounted for most of the underutilization of property taxes. These counties accounted for 73 percent or $10.3 million of the potential additional levies in 1967. Counties in Groups 3 and 4 had relatively small potentials for added levies in terms of the group and state totals. However, several counties in these groups would have been able to significantly increase local revenues with the added potentials available under the assumed conditions.

Analyses of 1976 potentials were conducted using two assumptions regarding the levels of property tax collection effort in conjunction with trend line projections of county population and total personal income growth. The greatest changes in per capita and total levies were found to occur among the counties of Group 2. Low level effort projections indicated that levies among most counties would approximately double from 1967 to 1976. Many of the counties in Group 2 would about triple levies to exert the same effort by 1976. At the high level of tax effort the levies for most counties would quadruple but the levies for many of the counties in Group 2 would increase five- and six-fold from 1967 to 1976. Total property tax levies for all counties at the

high level of effort would increase from $165 million in 1967 to $455 million in 1976 under the assumed conditions.

The magnitude of these absolute estimates of property tax increases were especially high for Group 2 counties. In relative terms, however, the burdens projected for Group 2 counties were tempered by the projected increases in total and per capita income levels. The relative index values for County Groups 1 and 4 in 1967 were higher than those of Groups 2 and 3 indicating superior tax effort. Projections for 1976 under the assumed conditions resulted in projected relative burdens for Groups 3 and 4 which were higher than those for Groups 1 and 2.

The analyses implied that relative property tax burdens were more onerous for County Groups 1 and 4 in 1967 despite the fact that per capita property tax levies in many Group 4 counties were less than half the levies imposed in the Group 1 counties. The projections for 1976 indicated that the relative burdens for counties of Groups 3 and 4 would be higher than those of County Groups 1 and 2 because of the lower per capita income available for tax payment.

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CHAPTER I

INTRODUCTION

I. INTRODUCTION

All levels of government in the United States have been confronted by rapidly increasing costs in recent years. These increases result from the simultaneous pressures of inflation and ever-increasing demands of citizens for new and/or improved facilities and services. Local governments in Tennessee, as elsewhere, must secure increased revenues needed to finance new facilities and new or upgraded public services. One important source of these revenues essential to the production of public goods is the general property tax. This tax, severely criticized throughout its long history, remains essentially unchanged today for its revenue productivity has seldom faltered and alternative local revenue sources are often limited by statute.

Taylor (62, p. 313) anticipated only a gradual decline in the relative importance of property tax revenues through the 1950's despite his contention that "Its sole virtue lies in its age." Nationally, property tax revenues did decline from 51 percent of total local revenues in 1948 to 47 percent by 1963. However, local property tax revenues actually increased from 10 percent to 13 percent of total federal, state, and local revenues during the same period (10, p. 27). As the 1960's progressed, there has been increasing taxpayer resistance at the local level. Bond issues for education and other needs have been refused at

the polls with increasing frequency. Thus, as the decade progressed there appeared to be a broad tendency for a quickened decline in the importance of property tax revenues to local governments (31, 41, 50).

II. THE PROBLEM

The extent of shifts in relative importance among Tennessee county government revenue sources is apparent in Table I-1. Property tax revenues and state aid to the counties which provided more than 95 percent of total revenues in fiscal 1960 declined to less than 70 percent of all county revenues by 1970. During the decade, federal aid, local sales taxes, and other sources* have risen rapidly. Federal aid funds, mostly for education, and other sources amounted to only 2.5 and 2.1 percent of total county revenues in 1960. The local option sales tax was not enacted by the legislature until 1963 so that its growth in importance has been the most rapid.

The increased revenues of county governments provided by these alternative sources have eased the pressures for increasing property taxes and/or for additional state aid appropriations to the counties. However, the potential for continued increases in revenues from these alternative sources during the 1970's seems limited. Federal aid funds have in fact exhibited a slight relative decline during the four most recent years. The local option sales tax has potential for increase only

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*Other revenues of county governments include privilege taxes, auto inspection fees, user charges, and other county enacted fees or taxes. Personal conversation with Mr. Donald Jackson, Executive Secretary, Tennessee Taxpayers Association, December 14, 1971.

TABLE I-1

ANALYSIS OF COUNTY GOVERNMENT REVENUES IN TENNESSEE FOR SPECIFIED YEARS

Fiscal Year Ending	Total Revenue All Sources	Property Tax Revenues	% of Total	Local Sales Taxes	% of Total	Federal Aid	% of Total	State Aid	% of Total	Other Sources	% of Total
	(Millions)	(Millions)		(Millions)		(Millions)		(Millions)			
1960	206.3	87.8	42.6	--	--	5.2	2.5	108.9	52.8	4.5	2.1
1967	437.3	153.0	35.0	27.0	6.2	39.0	8.9	161.2	36.9	57.0	13.0
1968	476.9	166.6	34.9	35.0	7.3	41.2	8.6	171.3	35.9	62.8	13.2
1969	518.1	178.9	34.5	46.7	9.0	41.2	8.0	180.7	34.9	70.5	13.6
1970	585.1	207.3	35.4	65.6	11.2	45.2	7.7	199.3	34.1	67.7	11.6
Percentage Change 1960-70	183.6	136.0		143.0*		774.2		83.0		1417.8	

*1967-70.

Sources: Tennessee Taxpayers Association. The 1960 or Twenty-Fifth Annual Survey of County City and Town Government in Tennessee. Research Report Number 143, May 1961; Tennessee Taxpayers Association. The 1967 or Thirty-Second Annual Survey of County City and Town Government in Tennessee. Research Report Number 174, September 1968; Tennessee Taxpayers Association. The 1968 or Thirty-Third Annual Survey of County City and Town Government in Tennessee. Research Report Number 177, September 1969; Tennessee Taxpayers Association. The 1969 or Thirty-Fourth Annual Survey of County City and Town Government in Tennessee. Research Report Number 180, September 1970; Tennessee Taxpayers Association. The 1970 or Thirty-Fifth Annual Survey of County City and Town Government in Tennessee. Research Report Number 182, September 1971.

as economic conditions improve and/or as more counties move to adopt the maximum allowable rate which will be increased to seven-twelfths of the state rate after June 30, 1972. Those counties which have not yet adopted local sales tax are predominantly rural with relatively low potential for sales tax revenues. Therefore, it would seem that local sales taxes must exhibit a slower rate of increase in the coming decade (76, pp. 32, 33, 41).

Other county revenues, a conglomerate mix of use charges, privilege taxes, and miscellaneous levies have increased quite rapidly. The apparent decrease of importance of these revenues in fiscal 1970 may result from incomplete reporting rather than the start of a downward trend. Even so, the availability of new local revenues from such sources would seem to be limited by overall economic improvement. Accordingly, a smaller rate of growth in these revenues seems likely for the near future.

If these tendencies as outlined continue, increased attention will be paid to property tax revenues during the 1970's. The potential for increasing local government revenues appears quite high under the assumptions used by Quindry for two studies sponsored by the Southern Regional Education Board (SREB) of 1967 and 1969 tax potentials (47, 48). These studies indicated that $142 million and $189 million additional property tax revenues could have been secured by all Tennessee local governments in those two years. To do so would require the adoption of a minimum tax collection effort equal to the average effort exerted by the 50 states. Both studies yield ample evidence that Tennessee and most other SREB member states were below other regions of the United States as regards the use of property taxes. The Advisory Commission on

Intergovernmental Relations (ACIR) report of 1971 provides additional evidence of this situation in comparisons of the states and selected counties (2, pp. 10, 11, 128, 152). Property tax collections by city and county governments per $1,000 of personal income in 1969 were $41.25, $28.00, and $24.35 for the United States, SREB states, and Tennessee, respectively (48, p. 24). These rates represented slight declines from the property tax collection effort exerted by these groups and Tennessee in 1967.

These data on national, regional, or even state situations tend to obscure the nature and extent of the problem confronting individual county governments. There are extreme variations among the counties in Tennessee which strongly affect property tax potentials. For example, assessed value of taxable property per capita ranged from $502 to $2,717 (76, pp. 50, 51). Per capita personal incomes of Tennessee counties varied from $1,064 to $3,811 according to 1969 estimates. Though most counties in Tennessee enjoyed relatively rapid increases in per capita income during the 1960's, only three counties and the four SMSA's attained per capita income levels of $3,000 or more. Only one county and none of the SMSA's exceeded the national per capita personal income level of $3,705 in 1969 (37, p. 6). Equally as variable among the counties of the state were the populations which ranged from 3,565 in Moore County to 722,014 for Shelby County (97, 99). In fiscal year 1970 per capita property tax revenues ranged from $14 to $88 among the counties. State aid per capita to the counties varied from $15.03 to $154.06 in 1970 (76, pp. 58-9).

Property taxes levied by county governments in Tennessee comprised 31.7 percent of total revenues in 1950, 42.1 percent in 1960, and appeared in 1961 to be trending toward 50 percent of total county revenues by 1970 (66, p. 10). However, as shown in Table I-1, page 3, relative importance of property tax revenues to Tennessee counties declined rather sharply from about 42 percent of fiscal 1960 revenues to 35.4 percent of all county revenues in 1970. In contrast, property tax revenues comprised 44.5, 44.6, and 41.1 percent of total county revenues across the United States in the years 1957, 1962, and 1967 (88, p. 9). While economists and tax experts alike concede that property ownership is increasingly less correlated with income and the ability to pay taxes, it seems somewhat contradictory that counties in Tennessee should begin a rapid decline in property tax utilization during a period in which most counties have experienced per capita income gains greater than the average for the United States (37, p. 4). There is little indication that county revenue needs will rise at lessened rates early in the 1970's. Declining educational finance needs will not have a substantial effect in reducing local fiscal needs until the latter part of the decade according to federal projections (59).

Tennessee county governments obtained a declining share of total revenues from property taxes and state aid funds during the 1960's. The rapid increase of revenues from alternate sources including federal aid and the local option sales tax relieved to a great extent the pressures for increasing state aid funds and local property taxes during the decade. However, there are indications that the rates of increase among these revenue sources may slow considerably in the near future. There is also

ample evidence that counties in Tennessee have varied greatly in usage of property taxes for local revenue needs.

It seems that rising citizen demands for improved and/or new public services can be expected through the coming decade. To meet these demands will require increased revenues and each source will come under increased scrutiny as demands and the resultant burdens increase. Property taxes in Tennessee are insured an important role as local revenue sources for the near future because constitutional and political factors jointly bar quick adoption of income taxes at either the state or local levels.

Against this background there is a need to evaluate the potential role which property taxes might assume in financing local governments. The direction and magnitude of expected changes in county property tax bases and resulting revenues in relation to income and other socioeconomic variables should be analyzed. Such analysis should provide a base for projection of future change. These projections and the insights offered by them should be of interest and use to citizens, planners, and administrators in preparing to meet the needs of the 1970's.

The study assumed that all additional revenues which could be secured via property taxes would be needed in the near future. The purpose of this study was to evaluate the potentials of individual counties and SMSA's to secure property tax revenues in 1976 based upon the available data and utilizing applicable techniques. The scope of the study was limited to the property tax potentials of Tennessee counties and the county governments of the four SMSA's which include one county each in the states of Georgia and Arkansas.

III. OBJECTIVE

The objective of the study was to evaluate the potential of the general property tax in financing local public facilities and services among the counties of Tennessee. Specific objectives included the

1. Analysis of differential rates of change in property tax bases and property tax revenues occurring between counties.
2. Determination of the implications for county fiscal structures and taxpayer burdens inherent in income, tax base, and revenue trends.

IV. PROPERTY TAXES IN THEORY AND PRACTICE

The central problem of economics is resource scarcity. Want satisfying goods are constrained in quantity and quality of resource limitations. All modern economies have private and government sectors. These sectors compete for scarce resources and impose a need for decisions as to (1) what goods are produced, (2) which sector allocates the resources, and (3) which sector produces the goods. The resource allocation method of the public sector has not been economically specified but formulated by society at the polls through elected and/or appointed officials serving in that broad area concerned with public finance (32, p. 4).

If public goods are produced and allocated, there must be finances for the public sector. At the local level of government in this country the main source of revenue has been the property tax. Whether imposed strictly for revenue purposes or for other purposes property taxes tend

to influence the economic decisions and functions of public and private sectors of the economy. Tax theorists have long treasured the concept of "economic equity" or "justice" (32, pp. 80-81; 62, p. 244; 45, pp. 66-74). "Equity" and "justice" are value judgments imposed by society. Economics can only attempt to delineate the means of reaching the goal(s) of that collective value judgment.

In the strict absolute sense equity would require absolutely equal taxes per tax unit. For example, a poll tax might be imposed to provide all revenues to a given jurisdiction. The economic impossibility and social unacceptability of such absolutism has led to the general adoption of two basic guidelines in the theory of tax equity. These concepts are (1) horizontal equity and (2) vertical equity which specify the desirability of equal treatment for equals and unequal treatment of those not equal (32, p. 82). These guides are dependent upon a definition of taxpaying ability so that equals may be distinguished and in turn be distinguished from those of unequal ability.

As in the case of equity, "taxpaying ability" has roots in the value judgments of society rather than economics. Income differences and ownership of property have been the historically used measures of ability to pay. The correlation of income with property ownership was stronger in earlier society and imposition of property taxes on specific classes of wealth in colonial days may well have been a reasonably devised system (11, p. 20; 32, pp. 82-83). A gradual evolution from a classified property tax to a general property tax occurred by the mid-nineteenth century which greatly changed the nature of this tax (32, p. 280; 6, p. 535). The use of general property taxation as a state and local

revenue source continued until about the turn of the twentieth century. From then to the present the trend has been to reduce the broad spectrum of property subject to taxation and to limit coverage to real property and tangible personal property. State governments retreated rapidly from dependence upon property taxation leaving the source to local units of government. Increasing numbers of states classified properties and specified reduced limits of liability for personal property. These actions reduced the tax base of local government units and generally increased dependence of these units upon this single revenue source until recent years. Since the 1950's pressures upon local governments have been eased in some states by opening access of these units to local sales taxes and/or local income taxes. These actions have, however, been rather limited.

The decreasing correlation of income with ownership of property and increasing awareness that taxes must ultimately be paid from income have brought almost total agreement that property taxation is the most anachronistic of taxes (62, p. 243; 32, p. 83). However, the success of this tax in securing vitally needed local revenues in all but the depths of the depression seems to insure its survival for some time to come.

The alternative justification of property taxation has been from the "benefit" viewpoint. The provision of police and other public services can be said to benefit the property owner by increasing the worth of his property. Therefore, a tax should be levied against the value of property (32, p. 85; 62, pp. 304-309; 5, p. 559). While the argument may appear attractive in concept, no reasonable equation between the cost and benefit of such public services in relation to property values can be

derived. The exception to this may be in the case of special assessments for specific public projects. However, direct special assessments are but a small part of local property taxes in any local government fiscal structure (62, p. 305).

V. REVIEW OF LITERATURE

Studies of the causes of change in property tax bases and associated revenues have shown widely varied results. Salient features of pertinent studies are reviewed in this section.

Income Elasticity and Property Taxes

Admittedly there are more factors other than income which affect the property tax bases and revenues of local governments. Nonetheless, the simplistic elasticity approach has been rather successful in measuring past change and yielding insight of future changes. The elasticity of the property tax base is the quotient of the percentage change in market value of taxable property and the percentage change in personal income for a specified period. The concept of property tax revenue elasticity is closely related and both concepts have been used in a number of aggregate national and state studies (9, 10, 11, 12, 33, 39, 45, 53).

The elasticity approach is essentially a simple regression technique and frequently used in tax analyses. Bridges (10, p. 25) settled upon this technique as the practical means of measuring past relations and projecting future movements. Netzer (45, p. 186) considers income elasticity of the underlying economic property tax base as the relevant measure for "isolating the influence of economic forces on

property tax revenues and for comparing future yields of this and other taxes." On the other hand, short-run projections, indications of revenues for the near future, and taxpayer willingness to put increases in income into taxes are best secured from the income elasticity of the property tax revenue (45, p. 186; 12, pp. 186-188; 53, pp. 8-10).

Burkhead (11, 12) has relied upon revenue elasticity analyses in school finance studies. Kimzey (36, pp. 62-67) used time series, multiple regression and elasticity techniques in a study of King County and Seattle. Kimzey found rather widely varied estimates using the different techniques. The multiple regression analyses used by Kimzey resulted in a mixture of indications as did Burkhead's analysis (12).

Elasticity of property tax base has most frequently been used in aggregate studies based on time series data. The tax base has usually been the Goldsmith wealth series or an adaptation while Gross National Product is used for the income series (10, pp. 21-23). These studies have not obtained uniform estimates of income elasticities but a majority fall within the range of .8 to 1.2. Later studies utilizing Census of Governments property values seem to have resulted in more elastic coefficients and a wider range of values for different classifications of property (19, p. 23; 53, pp. 9-10).

Complex Relations

Three of the more successful multivariate analyses of property tax components were undertaken by Burkhead (11, 12), Wessel (104), and Kimzey (36). Burkhead's and Kimzey's studies were mostly directed at relations underlying property tax revenue responses. Wessel evaluated

the response of property tax rate, legal base, and revenues. Burkhead and Wessel were able to derive the more complex multivariate regression equations with several statistically and economically significant relations. Kimzey related revenue to population and income change.

The distinctive feature of the analyses by Burkhead (12, p. 188) and Wessel (104) was the use of the income elasticity as the dependent variable in the regression. This formulation is an indirect approach using income elasticities of the property tax components regressed upon independent variables representing population characteristics, income characteristics, tax rate, and wealth. Burkhead in particular used as independent economic variables (1) average per capita income and (2) change in proportion of households with incomes greater than $7,000. This model explicitly introduces income change to both sides of the equation and certainly would seem to improve the statistical performance. It does not, however, get at the underlying variables directly causing or associated with change in the property tax base or revenue itself.

Statistically significant relationships in this indirect approach were: (1) percentage change in population, 1950-1960, (2) percentage change in ratio of population over 65 to total population, (3) percentage change in ratio of public school average daily attendance to total population, 1950-1960, (4) average per capita income, 1949-1959, (5) per capita nonproperty taxes, 1959, and (6) percent increase in full value tax rate, 1955-1959 (12, p. 189).

A complex of socioeconomic variables influence changes in property tax bases and revenues. Economic and statistical significance of relations would be improved if changes in tax bases or revenues could be directly

linked to changes in the independent variables over time. The absence of examples from the literature indicates either a lack of attempts or more likely a lack of success. However, Burkhead (11, p. 70) cautioned that "property tax elasticity would appear to respond to a different pattern of influences within each state." The nature of these relations has apparently never been investigated for Tennessee in a direct approach. The relative lack of overlapping levels of local governments in Tennessee would also appear to be advantageous in attempting a direct approach to analysis (2, p. 82).

Grouping Observations

The studies cited above were varied in scope. Most were aggregate studies of the United States. Burkhead (11, 12) studied property tax revenue responses within the states of New York and New Jersey. Kimzey (36) confined his researches to the Seattle SMSA. Neither study was concerned with the task of sorting or grouping the units under study into similar classifications.

Chappell (14, pp. 65-66) used "measure variables" in a principal components analysis to group counties according to economic growth. Hartshorn and Stephenson (30, p. 32) found the principal components analysis useful in developing a profile of socioeconomic development for counties in Georgia. The index derived with this tool can be used to provide a basis for sorting observed units into classes but does not provide a means for evaluating statistical differences between the groups. For this task multiple discriminant analysis provides an evaluation of the differences between the group means and a classification matrix which

indicates the distribution. Chappell (14, pp. 79-88) used this technique to distinguish between county growth groups. Currin (17, p. 12) pointed out that discriminant analysis requires the a priori classification of observed units on the basis of one or more factors.

Evaluating Potentials

The Advisory Commission on Intergovernmental Relations (ACIR) has published three studies concerned with the task of evaluating state and local government finances (1, 2, 3). Measures of tax capacity and tax effort for interstate comparisons were reasonably well standardized in these studies which linked tax capacity to income availability. Tax effort of governments was evaluated and compared in terms of tax payment per $1,000 of personal income while tax burden was usually expressed in per capita terms. These studies did not make use of an alternate means of evaluating tax burdens offered by Frank (26) in a 1959 article. He proposed using the percentage of personal income paid in taxes divided by per capita income be used as a relative measure of burden. This technique relates tax payment to personal income availability to establish a more meaningful indicator of tax burden.

Quindry (47, 48) compared state-local government aggregate fiscal performance in two studies using various tax payments per capita and in relation to personal income as gauges of burden and effort. He also estimated potential revenues from each of several state and local tax sources on the assumption that states could and would adopt as a minimum rate the average tax effort per $1,000 of personal income exerted in the United States. From this framework he obtained rather striking estimates

of unused potential revenues for the 15 Southern Regional Education Board states as he assumed that revenues from other sources used at higher than average levels would not be diminished. In the second of these studies Quindry (48) utilized the income relative measure of tax burden proposed by Frank (26) to evaluate total tax burdens of state and local governments combined. This measure indicated that other SREB states and Tennessee generally exerted considerably higher levels of tax effort than was shown by the rankings on either payments per capita or payments as a percentage of personal income.

VI. TERMINOLOGY AND DEFINITIONS

As is true of all fields, students and administrators of property taxation have developed a specialized terminology. This section will discuss the general framework of property taxation and define the terminology to be used throughout the study.

The Property Tax

The property tax is a levy against ownership. Conceptually simple, there are four steps to property taxation: assessment of value, equalization of assessments, apportionment, and collection.

Assessment. Assessment of property requires two steps. First, the property must be listed on the tax roll. Secondly, the assessed valuation must be determined. The difficulties of carrying out this function in regard to real property are such that many counties in Tennessee have had inadequate levels of performance (57, 66). Reform legislation enacted in 1967 has directed that each county in Tennessee

undergo an "approved" reappraisal and equalization study after 1965. The process, nearing completion, has been applied only to real property. Personal property of individuals has in effect been untaxed in Tennessee for many years. Personal properties of businesses have been assessed at relatively low levels in most counties and seldom has the "personality" portion of county tax base reached more than 10 percent. Thus the economic tax base for most jurisdictions in Tennessee is in effect the estimated market value of taxable real estate.

The value of property set for tax purposes comprises the assessed value and forms the conventional or legal tax base. Standard practice calls for property to be appraised at full value and a specified proportion be designated as the assessed value for tax purposes. The ratio of assessed value to full value determines the assessment ratio. Typically the median assessment ratio is some fraction of full value. Few jurisdictions in the United States use full value assessments and currently none in Tennessee attempt to do so. Local governments in Tennessee are currently in the process of raising assessment ratios toward a minimum level of 50 percent. This is to be accomplished by 1973 under legislative acts passed in 1967 (56, p. 6).

Property tax levies are determined by the application of the stated or nominal tax rate to the assessed value of properties. The nominal tax rate, determined by local government, may vary widely. The rate in Tennessee is customarily expressed in terms of dollars per $100 of assessed valuation rather than as percentage or millage rates. The lack of uniformity in nominal tax rates and wide variation in median assessment ratios among jurisdictions leads to difficulties in making

comparisons of tax levies between counties. Such comparisons are usually made in terms of effective rate on full or market value of the taxable property in a jurisdiction. The effective rate is that rate which would bring in the same tax levy if property were assessed for tax purposes at 100 percent of full or market value. Unless otherwise specified, all rates and tax bases referred to throughout the study will be effective tax rates and estimated full or market value of taxable property.

Equalization. The process of equalization involves seeing that properties of the same value receive like assessments. The process of equalization would be eased if competent appraisers could appraise each property each year. Unfortunately, agreement of appraisers leaves much to be desired and the demands upon property assessors dictate that on site evaluations of properties will be infrequent and uncertain occurrences. Thus, equalization usually is carried out by equalization boards upon the initiation of taxpayer complaint. Functionally, the county equalization boards in many counties have had little to do because the general level of assessment has been relatively low.

Apportionment. Apportionment is the process of determining the rates of property taxation imposed by various levels of local government upon a given piece of property. In Tennessee this will usually involve the independent actions of county and city or town governments. The state of Tennessee discontinued the property tax in 1949. The number of special tax districts though increasing does not yet constitute a major factor in the apportionment of local tax levies in Tennessee (55, p. 10). Establishment of the county tax rate is a function of the Quarterly County

Court while city tax rates are usually set by the City Council or equivalent body. Nominal rates have been converted to effective rates throughout the study unless otherwise stated.

Collection. The final phase is the collection of property taxes levied. The quality of property tax administration in terms of collection effort is vitally important. Delinquency in collections may occur if tax burdens are excessive in relation to the level of income available for payment of the tax. Burden is a function of income, assessment, rate, and the adequacy of equalization. Thus, burden may increase drastically as economic conditions affect the income from property in an adverse fashion. Either laxity of tax collection effort or depressions may cause rising rates of delinquency. Business declines confront local governments with a need to reduce assessed valuations without reducing tax rates, i.e., maintain the effective rate. In such circumstances deb limits, if enforced, will require (1) reduction of public services or (2) access to new sources of revenues such as state or federal funds.

Collection effort of property taxes by local government is increasingly measured in terms of the income available for payment. While payments of property taxes may be expressed as percentages the more usual expression is in dollars per $1,000 of personal income. Thus, a property tax collection effort of $30 per $1,000 of personal income is simply an alternative means of expressing collections amounting to 3 percent of personal income. Collection effort will usually be expressed in terms of dollars per thousand of personal income throughout the study and unless otherwise stated will refer only to property taxes. Property

tax effort in past years will refer to revenues collected. However, in the evaluation of potentials the term will refer to property tax levies ignoring losses due to late and/or nonpayment.

Other Terms

Several definitions and concepts related to fiscal capacity for and the performance of taxation apply to property taxation as a part of the total fiscal system. These concepts and definitions are discussed in this section and delineated for the balance of the study.

Property tax elasticity. The elasticity coefficient of a property tax component specifies the relative change that will occur in that component given a 1 percent increase in income for a specified period of time. The property tax base elasticity defined earlier was but one component for which such coefficients may be determined. Elasticities of property tax revenues and of the tax rate may also be derived. The concern of this study will be with the elasticities of the property tax bases and of the property tax revenues unless otherwise noted.

Property tax base. There are really two property tax bases, the legal and the economic property tax base. The legal or nominal property tax base is the assessed value of property for tax purposes as listed on the tax rolls. The economic property tax base and the one which will be used in the analyses is the estimated full or market value of taxable property within a given jurisdiction. In the following discussions the terms tax base and tax revenues will refer to the economic property tax

base and the revenues derived from that base. Reference to any other tax base or revenues will be specified as such.

Fiscal capacity. This is a quantitative measure reflecting the total resources available to a government for taxation. Absolute measurement of tax capacity would be possible only under a multitude of assumptions which would effectively render the attempt meaningless. In use the measures tend to be relative and tied to a composite of sources such as wealth, income, and business activity. The study will be concerned with property tax capacity as a part of the total using a designated proportion of personal income available as the capacity measure.

CHAPTER II

DATA BASE AND PROCEDURE

I. DATA BASE

Data for the study were gathered from available secondary sources. All data were secured in a form or changed to a form which indicated changes occurring during the decade of the 1960's within the counties studied. Most of the data were specifically for the periods 1959 to 1969 or 1960 to 1970. Certain data were not available for these exact periods. In these instances data for the most recent ten-year period available were used to establish the change rates.

Income data were not available on a county basis for those counties within SMSA's. Therefore, other individual county data within the four SMSA's were combined to form four multicounty units which will be referred to as SMSA's throughout the study. These units do not include the city tax base and revenue components. Because the Chattanooga and Memphis SMSA's cross state lines, the data included the 95 counties of Tennessee plus one county each from the states of Georgia and Arkansas. The consolidation of counties within the four SMSA's reduced the number of government units observed to 91.

Sources of data included various Bureau of Census publications, Office of Business Economics income estimates, Tennessee Taxpayer Association reports, and tax aggregate reports of the Tennessee Board of Equalization (34, 37, 51, 52, 58, 64-102). Certain of these reports were

adapted directly by the author while other data were assembled, prepared, and/or modified by intermediate agencies such as the Center for Business and Economic Research of The University of Tennessee.

Property tax base values for the counties were determined from both the annual reports of the Tennessee Taxpayers Association and the tax aggregate reports for the counties of Tennessee. These values include not only the estimated value of all locally assessed property but the value of utility and other properties which are assessed by the Tennessee Public Service Commission. Estimated values of the property tax bases of the two counties lying outside Tennessee were determined from estimates based upon Census of Government data for the years 1957, 1962, and 1967.

II. PROCEDURE

The data were subjected to a variety of statistical analyses. These included correlation and regression, principal components, and multiple discriminant analyses to suggest and test hypotheses regarding income elasticities of property tax components of the counties in Tennessee from 1960 to 1970.

Objective I

The extreme variations in the socioeconomic characteristics of the counties have been discussed previously. To facilitate analysis it was necessary to classify the 91 counties and SMSA's into groups with similar rates of socioeconomic change during the last decade. Observation revealed that no single variable seemed to yield a consistent ranking or index of change. The use of simple proxy variables such as population

change, change in total or per capita personal income were therefore not acceptable. The greatest relative change in per capita incomes during the 1960 to 1970 period occurred in many smaller rural counties of Tennessee. Despite rapid increases these counties remained well down the ranks with respect to absolute per capita income levels. Furthermore, many of the more rural counties had negative net migration rates for the 1960 to 1970 decade (23, 37). Counties which would rank at the top of an index of change would be expected to have positive changes in all or nearly all indicators of social and economic well-being.

Principal components analysis was selected as the tool with which to derive an index of socioeconomic change among the counties from 1960 to 1970. This tool was used to capture the rates of change among the data set in the research of Chappell (14). The broader concept of socio-economic change sought by Hartshorn and Stephenson (30) in their construction of a socioeconomic profile was maintained in this study.

The chief advantage of principal components analysis is in data reduction for determination of successive planes of a data system along which variances of the observed values are maximized. These component planes are the "characteristic vectors" of the covariance matrix. Each succeeding component accounts for a lesser portion of the total variance in the system. Thus, the minimum number of underlying dimensions or factors which will describe or represent a system can be determined (5, p. 272; 16, p. 151).

Transforming the original variable vectors into characteristic vectors define the planes along which intercorrelations of the original variables are strongest (16, p. 152). Coefficients for each linear

combination are obtained to express the relation in a functional form. Secondly, each observation may be assigned a relative value with respect to each linear component. These ordered relative values form an index of the observations along each component. When the "first" principal component accounts for a large proportion of the total variance of the data system, it is assumed that it provides an effective index. An attempt was made in this study to express changes across a broad spectrum of socioeconomic variables over time. This was to allow for the variation of social, political, and institutional factors in sorting the counties into similar groups. This should allow more meaningful analyses of the underlying causes of change in the property tax bases and revenues.

Coefficients for the first principal component of each county were used to form the index in this study as in the studies cited above. This is the ultimate reduction of the multivariable system which was selected for analysis. Breaks in the distribution of counties along the index offered several choices for a priori groupings. Groups were selected in this study to secure the largest possible groups while retaining relatively uniform breaks in the index values between the groups of counties. The principal components analysis offers no means of evaluating the statistical differences between the groups selected so that a second multivariate statistical technique was applied.

Multiple discriminant analysis was used to evaluate the statistical differences between the groups established with the aid of the components analysis. A stepwise discriminant program, BMD07M (21, pp. 587-605), was selected. The program chosen allowed the inclusion of all 39 measure variables selected from the available data. The stepwise procedure also

allowed insight into the variations in discriminating ability of the function as each variable was added to the function.

Output of the discriminant analysis computer program included a matrix of F values, a classification matrix, and a probability table. The F matrix provided values specifically for testing the null hypothesis that no difference existed between the means of the groups. The classification matrix showed the frequency distribution of the observed counties between the groups. Perfect classification by the a priori procedure would result in the specified group numbers falling only along the diagonal of the classification matrix. Finally, the probability table indicated the likelihood of each observed unit belonging to each of the four groups on the basis of the measure variables considered.

After classification of the counties was completed, the income elasticity of the property tax base and revenue for each group was estimated. Individual county elasticities and the statewide elasticity were also computed for purposes of comparison. The group and statewide elasticities were computed using regression techniques with income as the sole independent variable. The group elasticities were secured using dummy variable regressions. Complex relations were explored by adding variables representing change in population, wealth, and institutional changes to the regression models.

Objective II

In the second phase of analysis projections of income and population changes for the 1970's were needed. Preliminary estimates of county populations for Tennessee in 1980 were available from work of the

Tennessee Social Science Advisory Committee (64). These projections were used to secure straight line estimates of changes in county population to 1976.

There were no corresponding projections of nominal personal income by counties for 1975 or 1980. Projections were therefore derived from time series techniques and based upon the OBE personal income series (37). These projections for 1975 county personal incomes were constrained to meet the bounds of independently determined estimates of total personal income for Tennessee. The county projections were essential to the derivation of projected changes in the property tax base using the elasticity method.

Evaluation of property tax potentials by county were carried out for the years 1967 and 1976. The evaluation of 1967 potential was conducted by comparing actual property tax levies to those which would have occurred if the weighted average of property tax levies for the state of Tennessee had been imposed by all counties imposing a lower level of effort. The 1976 potential was derived at two levels of tax collection effort. The lower level of effort was the average rate for Tennessee in 1967 as used above. The higher rate of tax collection effort considered was the average rate exerted by counties and school districts in the United States in 1967. These levels of effort were applied to county income projections to obtain revenue potentials. The implications of these levels of property tax burdens were evaluated in terms of per capita burden, relative burden, and effective tax rate which would be required to raise the potential revenues.

CHAPTER III

ANALYSIS FOR OBJECTIVE I

I. INTRODUCTION

The first objective was to analyze the differential rates of change in the property tax base and the property tax revenue components of county governments in Tennessee. To analyze the changes that had occurred during the decade 1960 to 1970 counties were grouped using principal components analysis which ranked the counties along an index of socioeconomic change. The statistical significance of the groupings was tested. The relationships of the property tax components to income, population, and wealth change variables were examined using simple and multivariate regression techniques.

Application of Components Analysis

Data were included on 39 change variables for the counties and SMSA's of Tennessee during the past decade. The 39 variables are listed in Appendix Table A-1. These data were subjected to a preliminary correlation analysis (21, pp. 49-54). Thirteen variables were selected which appeared to yield a cross-sectional view of social and economic changes in the counties. Changes in income, wealth, and population characteristics were reflected in the variables selected for analysis. The variables chosen were (1) percentage change in total personal income, (2) percentage change in total property tax revenue, (3) percentage change

in total property tax base, (4) change in percentage of homes valued at less than $10,000, (5) change in the percentage of homes valued at more than $20,000, (6) percentage change in the population density per square mile, (7) change in percentage of population age 16 and older, (8) change in percentage of population aged 19 and older, (9) change in percentage of population aged 65 and older, (10) change in the value of median residential rental unit, (11) change in total population, (12) change in "effective income," and (13) change in percentage of households with more than $10,000 of cash income.

The principal components analysis was obtained using the BMD01M program available through the U. T. Computer Center facilities (21, pp. 150-154). Computational procedure was as follows.

Where the X_{ij} are the values of the jth variable and the ith case with i = 1, 2 . . . n, and j = 1, 2 . . . , p + q the data are centered and normed

$$W = (w_{ij}) = (X_{ij} - \bar{X}_{\cdot j}) \div \sum_{i=1}^{n} [(X_{ij} - \bar{X}_{\cdot j})^2]^{1/2} \qquad (1)$$

where

$$\bar{X}_{\cdot j} = \frac{1}{n} \sum_{i=1}^{n} X_{ij} \qquad (2)$$

is the mean value of jth variable of the ith county. The correlation matrix C of the standardized values w_{ij} was obtained

$$C = (c_{jk}) = \sum_{i=1}^{n} (w_{ij})' (w_{ik}), \ (k = 1, 2 \ldots m). \qquad (3)$$

Eigenvalues and eigenvectors of C were found by solution of

$$(c - \lambda I)\, b = 0 \qquad (4)$$

where λ_j was the jth eigenvalue and

$B = (b_{kj})$ the matrix whose columns are the appropriate eigenvectors.

Transformation of the W's to their orthogonal components is achieved by matrix multiplication

$$Z = (Z_{ij}) = [\sqrt{n-1}\ WB] = \sqrt{n-1} \sum_{k=1}^{m} (w_{ik})(b_{kj}). \qquad (5)$$

The rank order of each standardized case was obtained from Equation (5) for each principal component.

Results of Components Analysis

The analysis resulted in the identification of a general first component which accounted for more than 48 percent of the total variance in the 13 variable system. The suitability of the first component for use as a generalized index is also indicated by the rapid drop-off in importance of the second and third components which accounted for about 15 and 8 percent of the total variance, respectively. The coefficients of the first component for the selected change variables are given in Table III-1.

The analysis indicated that the largest single portion of the variation in the change variables could be expressed in the linear relation.

$$C_1 = -.1763X_1 - .0742X_2 - .1225X_3 + .3032X_4 - .2597X_5 - .3580X_6$$
$$+.314X_7 + .328X_8 + .304X_9 - .3118X_{10} - .3579X_{11} - .2810X_{12}$$
$$-.2408X_{13}$$

TABLE III-1

FIRST PRINCIPAL COMPONENT COEFFICIENTS FOR CHANGE VARIABLES IN TENNESSEE

Variable Number	Description	Component Coefficient
1	Percentage change in total personal income	-.1763
2	Percentage change in total property tax revenue	-.0742
3	Percentage change in total property tax base	-.1225
4	Change in percentage of homes valued less than $10,000	.3032
5	Change in percentage of homes valued greater than $20,000	-.2597
6	Percentage change in population density	-.3580
7	Change in percentage of population age 16 and over	.3140
8	Change in percentage of population age 19 and over	.3280
9	Change in percentage of population age 65 and over	.3040
10	Change in median rental	-.3118
11	Percentage change in population	-.3579
12	Percentage change in effective income	-.2810
13	Change in percentage of households with more than $10,000 cash income	-.2408
	Total variance of system	13.00
	Variance accounted for by first component	6.3043
	Percent of total variance accounted for	48.4

where C_1 is the first principal component of the change variables and X_1 through X_{13} are the change variables. The relative importance of the variables is indicated by the absolute value of the coefficient. Thus, percentage change in the population density and change in the population are almost equally important. Changes in median value of residential rental units, age distribution of the population, and change in the percentage of homes valued at less than $10,000 were next in importance.

The first principal component was taken as an index of socioeconomic change. Ranking of each observed county along the first component is presented in Table III-2. The index is a factor or construct strongly identified with changes in income, wealth and population. The ranking distributed the counties with generally larger decreases in population, sizable relative increases in per capita income, and moderate increases in total personal income at the positive end of the scale. Urban and rapidly urbanizing counties with generally positive and more moderate changes in all indicators were ranked at the negative end of the scale. Thus, the counties and SMSA's were distributed along a relative scale from those more prosperous counties exhibiting a broadly based positive improvement in all selected indicators of socioeconomic change in descending order to those rural counties exhibiting varied directions and rates of change. The most common feature of counties at the lower end of the scale was the general absolute loss of population.

The ranking of the counties did not result in a clear-cut identification of four equally sized groups separated by equal sized gaps in the index values. Examination of the distribution revealed that breaks after the fifteenth, forty-third, and fifty-ninth counties gave perhaps

TABLE III-2

SOCIOECONOMIC STATUS INDEX OF CHANGE FOR COUNTIES AND SMSA'S OF TENNESSEE WITH GROUP CLASSIFICATIONS

County or SMSA	Index Value	County or SMSA	Index Value	County or SMSA	Index Value
		Group 1			
Cheatham	-7.513765	Hamblen	-3.219696	Memphis	-3.015039
Williamson	-6.602494	Houston	-3.146778	Obion	-2.548250
Bradley	-4.623515	Putnam	-3.130397	Jefferson	-2.507348
Nashville	-4.020391	Weakley	-3.100143	Warren	-2.467507
Dickson	-4.017716	Humphreys	-3.087414	Coffee	-2.447454
		Group 2			
Bedford	-2.291776	Sevier	-1.363275	Carroll	-0.922492
Madison	-2.285407	Hawkins	-1.282664	Moore	-0.914086
Rutherford	-2.227604	Greene	-1.263684	Robertson	-0.686731
Washington	-2.189232	Maury	-1.168691	Lewis	-0.583906
Gibson	-2.116857	Chattanooga	-1.159709	Grainger	-0.583576
Decatur	-1.979837	Henry	-1.104593	Franklin	-0.468622
Sullivan	-1.733530	Montgomery	-1.031938	Knoxville	-0.395376
Dyer	-1.709795	Trousdale	-1.022839	Lawrence	-0.393113
Benton	-1.566254	Smith	-0.957941	McMinn	-0.388763
Hardeman	-1.391949				

TABLE III-2 (continued)

County or SMSA	Index Value	County or SMSA	Index Value	County or SMSA	Index Value
		Group 3			
DeKalb	-0.217039	Marshall	0.295949	Rhea	0.628562
White	-0.120132	Giles	0.296437	Wayne	0.651302
Hickman	-0.054424	Cumberland	0.527764	Chester	0.707738
Union	0.132121	Henderson	0.536224	Fayette	0.814223
Cocke	0.134743	Hardin	0.593136	Lincoln	0.853201
Tipton	0.173524				
		Group 4			
Unicoi	1.167819	Marion	1.781669	Lake	3.348947
Roane	1.272045	Overton	1.842456	Clay	3.443695
Loudon	1.283017	Polk	1.895492	Haywood	3.528232
Crockett	1.337729	Morgan	2.341377	Jackson	3.538665
Stewart	1.368849	Lauderdale	2.408512	Campbell	3.782763
Cannon	1.430927	Macon	2.419326	Grundy	3.818713
Johnson	1.528339	Claiborne	2.529488	Scott	4.188795
Carter	1.573213	Perry	2.830355	Fentress	4.467570
Sequatchie	1.598908	Van Buren	3.078697	Hancock	5.463390
Monroe	1.615035	Bledsoe	3.116229	Pickett	5.758627
McNairy	1.664618	Meigs	3.252334		

the best combination of breaks in the distribution and largest number of counties in the groups. The divisions were arbitrarily made at these points to yield county groups of 15, 28, 16, and 32 observations as indicated in Table III-2.

Significance of County Groups

The statistical significance of the county groupings determined with the aid of the principal components analysis above was tested during a stepwise multiple discriminant analysis (21, pp. 587-605). Preliminary examination of the data, means, covariance, and correlation matrices revealed no readily apparent features which would provide a basis for selecting variables to be used in the analysis. Therefore, all 39 variables shown in Appendix A-1 were allowed to enter, and use of the stepwise procedure provided an opportunity to obtain summary information at specified steps prior to the end of the procedure.

The analysis used all 39 variables in the final classification function. The overall F ratio was significant at the 1 percent level. The F and classification matrices are given in Tables III-3 and III-4. The F matrix provides a basis for testing the significance of differences between group means. The values shown in Table III-3 are all significant at the 5 percent level except the difference between Group 2 and Group 3. The critical value $F(39, 49; \alpha = .05)$ is 1.6. Some difficulty in distinguishing between the middle groups is common. It should be noted that at step number 30, the classification function provided a significant difference between means of Groups 2 and 3.

The classification matrix presented in Table III-4 indicates the relative correctness of the a priori classification based upon the index.

TABLE III-3

MULTIPLE DISCRIMINANT ANALYSIS F MATRIX FOR 39 SOCIOECONOMIC CHANGE VARIABLES

	Group		
Group	1	2	3
2	2.2423*	0.0	0.0
3	3.9751*	1.2898	0.0
4	10.9855*	6.8791*	2.9715*
Degrees of freedom	39/49		
$F_{(\alpha = .05)}$:	1.63		

TABLE III-4

MULTIPLE DISCRIMINANT ANALYSIS CLASSIFICATION MATRIX OF 91 COUNTIES BASED UPON 39 VARIABLE SYSTEM

A priori	Group			
Grouping	1	2	3	4
1	14	1	0	0
2	1	25	2	0
3	0	1	15	0
4	0	0	0	32

Had the *a priori* classification been entirely correct, the numbers 15, 28, 16, and 32 would have appeared along the diagonal of the table. The matrix shows, however, that only Group 4 was correctly delineated. Group 1, shown along row 1, had 14 counties correctly placed and one county which should have been in Group 2. Group 2 as it was established from the index apparently had one county which was nearer the Group 1 mean and two counties which were nearer the Group 3 mean. There were 25 of the 28 counties from Group 2 which were correctly classified. Group 3 comprised of but 16 counties had 15 placed correctly and one county which was nearer the mean of Group 2. These misclassifications were undoubtedly influenced to some degree by the larger number of variables considered in the discriminant analysis. However, the use of only 13 variables for the principal components analysis and the *a priori* division of counties resulted in the misplacement of only five counties from the total of 91.

II. PROPERTY TAX COMPONENT ELASTICITIES

The income elasticities of the economic property tax base and the property tax revenue components are examined in this section of the analysis. The elasticity approach to analysis and projection of property (or other) tax components is a simple technique. However, despite the lack of sophistication this approach appears to work better than any other method employed.

Concept

The concept of income elasticity is a familiar one. By definition the income elasticity of a tax component is the quotient of percentage

change in the tax component and the percentage change in income for a particular period of time. Various measures of income and tax base have been used in previous studies. Confinement of this study to a single state reduced the data needs and restricted the kinds of data which could be used. County unit tax base and revenue data were used while personal income series by county and SMSA were the only income measures readily available for use.

The determination of income elasticities of either property tax component may be secured from

$$E = \frac{\log C_i - \log C_o}{\log Y_i - \log Y_o}$$

where E is the coefficient of income elasticity. C_i and C_o are the component values for year o and i. Y_i and Y_o are the income values for year o and i (98, p. 254).

This procedure effectively determines the elasticity as the quotient of the average rates of change for the period concerned. In effect, it yields a cross-sectional measure of the elasticities (12, p. 188).

County Elasticities

Preliminary examination of changes in the economic property tax bases and revenues of counties in Tennessee revealed a good deal of variation during the 1960 to 1970 period. Therefore, it was anticipated that income elasticities of both tax components would also vary widely for the period. Part of the variability was expected to come as a result of institutional change. In 1967 the state legislature enacted property

tax reform programs which resulted in the reappraisal and equalization of 41 counties in Tennessee by June 30, 1970 (74, pp. 2, 3). Undoubtedly, these changes have resulted in increases of the economic tax base for most or all of these counties. However, examination of the changes in estimated economic tax bases of counties earlier in the same decade revealed about 30 different counties had undergone drastic (20 percent or more) increases of the tax base during one or more years prior to 1967. Thus, nearly as many counties in the state had already made substantial upward revisions in economic tax base prior to 1967 as were involved after 1967. In addition, the eight counties in Tennessee included in the four SMSA's appeared to maintain relatively uniform and large annual increases in economic property tax bases throughout the decade. Therefore, about 70 of the counties have undergone reappraisal or other processes which boosted tax bases during the decade, and it was assumed that no separate or special effect could be ascribed to the 1967 legislation. In general, the counties which showed relatively lower tax base change rates and have not undergone recent approved reappraisals tend to be smaller, more rural counties which tend to have small effect upon the aggregate measures for the state or county groups.

The individual county income elasticities were obtained using the formula presented above. The income elasticity coefficient is the ratio of the percentage change in the property tax base (or revenue) to the percentage change in personal income. Thus a property tax base income elasticity of 1.5 indicates that a 1 percent increase in personal income would be accompanied by a 1.5 percent increase in the property tax base. An elasticity coefficient of less than one indicates that either the tax

base or revenue lags behind an increase in personal income. The individual county elasticities obtained follow in Table III-5. As expected, there was wide variation in the tax base and revenue elasticities among the counties. Property tax base elasticities ranged from .09 for Stewart County to 2.30 for Sequatchie County. The extreme elasticities were rare with four counties, Cannon, Grainger, Polk, and Sequatchie, exhibiting tax base elasticities greater than 2.0. Of these counties only Cannon County maintained a comparatively high revenue elasticity.

Distributions of the property tax base and revenue elasticities for the counties are shown in Table III-6. These distributions show the tendency of the property tax base to be more responsive to changes in personal income than the property tax revenue. Income elasticity of the tax base was 1.0 or more for 55 counties over the 1960 to 1970 period. Only 42 counties had revenue elasticities of 1.0 or more for the same period of time. Some counties had therefore reduced the potential property tax impact of rising bases by reducing the effective tax rates. The mean tax base elasticity was 1.10 and the median was 1.09. The mean revenue elasticity was 1.01 and the median was .97. Variability of both distributions was rather large. The standard deviation for both tax base and revenue elasticities was .43.

Special circumstances appear to account for most of these extreme coefficients. Cannon County showed remarkably high increases in both tax base and revenues against moderate increases in personal income. This effort was apparently begun in the early 1960's to retire large bonded debts incurred during the 1950's while providing a high rate of repayment on school bonds issued during the 1960's. This county regularly and

TABLE III-5

INCOME ELASTICITY OF PROPERTY TAX BASE AND PROPERTY TAX REVENUES BY COUNTY OR SMSA FOR THE PERIOD 1960-1970

	Property Tax Base Elasticity	Property Tax Revenue Elasticity
SMSA		
Chattanooga	.82	1.06
Knoxville	.84	1.08
Memphis	.90	1.79
Nashville	.99	1.35
Counties		
Bedford	.57	.87
Benton	1.33	1.37
Bledsoe	.46	.88
Bradley	1.30	.88
Campbell	.85	.88
Cannon	2.28	2.44
Carroll	.44	1.40
Carter	1.02	1.36
Cheatham	1.08	.61
Chester	.58	.68
Claiborne	1.02	1.82
Clay	1.08	1.52
Cocke	1.33	1.10
Coffee	1.22	.78
Crockett	1.52	.29
Cumberland	.92	.74
Decatur	1.06	1.08
DeKalb	1.85	1.66
Dickson	.93	.97
Dyer	.94	.63
Fayette	.93	.42
Fentress	.26	.68
Franklin	.69	.82
Gibson	.57	.37
Giles	.94	.48
Grainger	2.15	1.71
Greene	.99	.54
Grundy	1.90	1.71
Hamblen	1.33	1.17
Hancock	.31	.25
Hardeman	.96	.23
Hardin	1.30	.62
Hawkins	.63	.87
Haywood	1.78	1.19
Henderson	1.03	.61

TABLE III-5 (continued)

	Property Tax Base Elasticity	Property Tax Revenue Elasticity
Henry	1.02	1.23
Hickman	1.68	1.67
Houston	1.76	1.00
Humphreys	1.26	1.53
Jackson	.58	1.26
Jefferson	1.33	1.15
Johnson	1.06	1.28
Lake	1.29	1.27
Lauderdale	1.30	.01
Lawrence	.92	.76
Lewis	.80	.73
Lincoln	1.17	1.02
Loudon	1.48	1.08
McMinn	.68	1.41
McNairy	1.33	.56
Macon	1.06	.90
Madison	1.00	.81
Marion	1.20	.90
Marshall	1.21	.77
Maury	.73	.87
Meigs	1.11	.96
Monroe	.75	.83
Montgomery	.80	1.76
Moore	1.49	.41
Morgan	1.59	.91
Obion	1.46	1.04
Overton	.36	.56
Perry	1.16	.58
Pickett	1.23	.64
Polk	2.08	1.66
Putnam	1.14	1.32
Rhea	.85	.70
Roane	.54	.73
Robertson	1.21	.86
Rutherford	.64	.98
Scott	.90	1.11
Sequatchie	2.30	1.28
Sevier	1.24	1.21
Smith	1.24	.46
Stewart	.09	.87
Sullivan	1.38	.92
Tipton	1.41	1.31
Trousdale	.73	.32
Unicoi	.67	.96
Union	1.20	1.98

TABLE III-5 (continued)

	Property Tax Base Elasticity	Property Tax Revenue Elasticity
Van Buren	1.27	1.46
Warren	1.33	1.36
Washington	1.06	1.04
Wayne	1.56	1.05
Weakley	1.09	.66
White	1.42	.99
Williamson	1.38	1.21

TABLE III-6

FREQUENCY DISTRIBUTIONS OF COUNTY PROPERTY TAX BASE AND REVENUE ELASTICITIES, 1960-1970

	Number of Counties	
Income Elasticity	Property Tax Base	Property Tax Revenue
Less than .4	4	6
.40 through .59	7	8
.50 through .79	8	15
.80 through .99	17	20
1.00 through 1.19	16	14
1.20 through 1.39	22	13
1.40 through 1.59	8	5
1.60 or more	9	10

rapidly revised property values throughout the 1960 to 1970 period. As a result, Cannon County maintained rather favored status as a "blue ribbon county" (66, pp. 47, 51; 69, p. 46; 76, pp. 30, 66).* Polk County has like Cannon County apparently rapidly moved property values upward to meet past debts and to finance current services. The county had not undergone reappraisal at the time of this study. The revenue elasticity for the county was 1.66 indicating a rather strong willingness to put additional income into public finances. Sequatchie and Grainger Counties were reappraised and equalized just at the end of the 1960's. The increases in property tax bases of these counties were substantial and the effect upon the elasticity would tend to be somewhat exaggerated by the simple formula used. Grainger County showed a greater willingness to put added income into the public sector with a revenue elasticity of 1.71 as compared to a 1.28 revenue elasticity for Sequatchie County. The very low tax base elasticity for Stewart County resulted from a major portion of the county being taken into the "Land Between the Lakes Park" being developed by the Tennessee Valley Authority. The next lowest tax base elasticity was .36 for Overton County. This rural county did not undergo reappraisal until 1971.

Generally speaking, one might expect the counties with high tax base elasticities to be progressive, imposing levies which would result in rather high revenue elasticities as a goodly portion of additional personal income was put into property taxes. However, this was not the

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*A blue ribbon county is one of less than 50,000 population with no outstanding refunding bonds, a net per capita debt of less than $100, and a net debt ratio of less than 12 percent.

case for Tennessee counties. A Spearman rank correlation analysis of the association between high tax base and high revenue elasticities was performed. The correlation coefficient was .28 which indicated that high revenue elasticities were only moderately and positively associated with high property tax base elasticities.

The lowest of revenue elasticities was exhibited by Lauderdale County and apparently resulted from success in obtaining substantial increases in revenues from other sources. The county was able to make relatively large increases in operating expenditures throughout the 1960's while maintaining approximately the same net debt ratio for the past 20 years. Property tax revenues rose slightly for the early 1960's and then declined absolutely by 1970 which resulted in the very low elasticity reported in Table III-5, page 41 (66, pp. 47, 51; 76, p. 66).

Aggregate Elasticities

The county elasticities presented in the preceding section were obtained by individual calculations. The task of obtaining elasticities for the four county groups and for Tennessee was accomplished using regression analysis.

Conceptual and statistical considerations. The dependent variables, change in the property tax base and change in property tax revenue, were regressed upon the independent variable, change in total personal income. The change rates were used as inputs to the BMD02R regression program (21, pp. 1-15). Normal output of this program yields a regression equation in the form $Y = a + bX$. To secure a b coefficient directly readable as an elasticity the program was constrained to yield a zero

intercept regression of the form $Y = bX$. Given that the input values Y_i and X_i were in percentage terms the resulting b coefficient is also an elasticity coefficient. The computational procedure used under the zero intercept constraint differs slightly from the normal (21, p. 7). The normal computation of the matrix $\overline{A}$ is

$$A_{ij} = \sum_{k=1}^{n} (X_{ki} - X_i)(X_{kj} - X_j) \quad i, j = 1 \ldots p \tag{1}$$

whereas specification of the zero intercept requires the computation of $\overline{A}$ as

$$A_{ij} = \sum_{k=1}^{n} X_{ki} X_{kj} \quad i, j = 1 \ldots p \tag{2}$$

Therefore, the normal computation is from deviations of observed values from the mean while forcing a zero intercept uses the X values as observed. The procedure constrains

$$b_o = \overline{Y} \tag{3}$$

so that the model becomes

$$Y - \overline{Y} - B_1 (Z - \overline{Z}_1) + \ldots + \tag{4}$$

rather than the conventional

$$Y = B_o + B_1 Z_1 + \ldots + . \tag{5}$$

The procedure reduces parameter estimate requirements by one (22, pp. 145-146). The degrees of freedom are also reduced by one because the

dependent variable observations $(Y_1 - \bar{Y})$, $(Y_2 - \bar{Y})$ ... $(Y_n - \bar{Y})$ are related by the constraint that

$$\sum_{i=1}^{n} (Y_i - \bar{Y}) = 0. \qquad (6)$$

Results for statewide elasticity models. The regressions of changes in the property tax components upon change in total personal income in Tennessee are summarized in Table III-7. Equations I and II are simple regressions yielding income elasticities of the property tax base and revenue, respectively. The tax base elasticity obtained by the regression was about 1.15 and the revenue elasticity was 1.01. These coefficients are almost identical with the arithmetic means of the county elasticity coefficients obtained earlier. These coefficients were 1.1 and 1.0 for the tax base and revenue elasticities, respectively. Both sets of statewide elasticities show that elasticity of the tax base has been slightly higher than the revenue elasticity. Indications are that while tax base response has been slightly greater than proportionate to income increases, the response of property tax revenues has been almost exactly proportional which tends to support the finding by Quindry and Eagan (50, pp. 4-5) that effective property tax burden for 211 local governments in Tennessee apparently declined slightly during the 1960's.

The coefficients were both highly significant and the R^2 values of .82 and .75 indicated that a relatively high percentage of the total variation in property tax components for Tennessee was explained solely by variation in the rate of change in total personal income. These aggregate elasticities are parsimonious and condense data to a minimum for the state. However, insight as to the variations among county groups

TABLE III-7

REGRESSION EQUATIONS OBTAINED FROM ANALYSIS OF RESPONSE OF PROPERTY TAX BASE AND REVENUES TO CHANGE IN TOTAL PERSONAL INCOME FOR TENNESSEE

Equation Number	Dependent Variable	Continuous Variable X_3
I	X_1	1.1462* (.0573)
	$R^2 = .82$	$S_e = 63.6$
II	X_2	1.0123* (.06196)
	$R^2 = .75$	$S_e = 68.8$

*Significant at the 1 percent level.

X_1 = Percentage change in property tax base.

X_2 = Percentage change in property tax revenue.

X_3 = Percentage change in total personal income.

was the major reason for using regression analyses presented in the following section.

Results for group models. The county group elasticity coefficients were obtained using multiple regression anaysis with (0, 1) dummy variables to allow determination of variable relationships for each of four groups of counties. Using interaction variables and constraining the regressions to zero intercepts provided a basis for estimating county group property tax base and revenue elasticities directly as income changed. The results are presented in Table III-8 with equations I and II as the tax base and tax revenue models.

In discussing the results it must be kept in mind that singularity prevention in the computational matrix requires that a (0, 1) vector for one of the set of dummy variables be omitted (22, pp. 134-136; 35, p. 222). The vector for Group 2 was omitted. For this reason in equation I the coefficient of X_5 is given as zero and the coefficient of X_3 actually represents the income elasticity of response for County Group 2. The remaining coefficients, b_4, b_6, and b_7, represent difference in response to change in total personal income for County Groups 1, 3, and 4 as compared to Group 2 (29, p. 10). The tax base regression equation for Group 1 is therefore $X_1 = .95185X_3 + .38678X_4$ which reduces to $X_1 = 1.3386X_3$. The remaining tax base elasticity coefficients were determined from $b_3 + b_6$ and $b_3 + b_7$. The property tax base and revenue elasticities are all presented in Table III-9.

Because of the unique relationship between dummy variables (X_4 through X_7) and the continuous variable (X_3) the interpretation of

TABLE III-8

REGRESSION EQUATIONS OBTAINED FROM ANALYSIS OF PROPERTY TAX BASE AND REVENUE RESPONSE TO CHANGE IN TOTAL PERSONAL INCOME FOR COUNTY GROUPS

Equation Number	Dependent Variable	Continuous Variable X_3	Slope Change Interaction Variables for County Groups X_4 (1)	X_5 (2)	X_6 (3)	X_7 (4)
I	X_1	0.95185*	0.38678**	0.0	0.40273**	0.1514
		(.09493)	(.15084)		(.1654)	(.1427)
	R^2 = .83		S_e = 61.476			
II	X_2	0.86626*	0.25272	0.0	0.14955	0.23974
		(.10615)	(.16866)		(.18498)	(.15958)
	R^2 = .76		S_e = 68.74			

*Significant at the 1 percent level.

**Significant at the 5 percent level.

X_1 = Percentage change in property tax base.

X_2 = Percentage change in property tax revenue.

X_3 = Percentage change in total personal income.

X_4 - X_7 = Dummy variables for County Groups 1 to 4, respectively.

TABLE III-9

INCOME ELASTICITIES OF PROPERTY TAX BASES AND PROPERTY TAX REVENUES FOR TENNESSEE AND COUNTY GROUPS

		Income Elasticity of	
		Tax Base	Tax Revenue
County Group 1	$(b_3 + b_4)$	1.3386	1.119
2	(b_3)	0.9519	0.8663
3	$(b_3 + b_6)$	1.3546	1.0158
4	$(b_3 + b_7)$	1.1032	1.106
Tennessee		1.1462	1.0123

statistical tests also differs for the results shown in Table III-8. The t test applied to b_3 is interpreted in conventional terms since X_3 is the continuous variable as well as the reference for Group 2 counties. Thus, b_3 is significantly different from zero at the 1 percent level. However, b_4 and b_6 can only be said to differ from b_3 at the 5 percent level (29, p. 15). Since both b_4 and b_6 added to b_3 yield tax base elasticities greater than b_3, it can be assumed that the coefficients for Groups 1 and 3 are also different from zero. The elasticity for Group 4, $b_3 + b_7$, can be assumed to differ from zero since it is slightly larger than .95, but it is not statistically different from .95. Green and Gustafsson (29) do report a hand method for testing the differences between regression coefficients obtained using dummy variable analysis. However, the necessary inverse matrix coefficients are not included in the BMD02R output, so these tests were not used in this study. Statistical inferences must therefore be somewhat tentative.

Regression equation II shows that property tax revenue response to change in personal income (b_3) was significantly different from zero. However, none of the county group coefficients were statistically different from that of Group 2 counties at the 10 percent level. The revenue elasticity coefficients for county groups were obtained by summing $b_3 + b_4$, $b_3 + b_6$, and $b_3 + b_7$ and are shown in Table III-9 with the tax base elasticities.

Elasticities. The individual county elasticity analyses and the county group regression analyses both revealed the tendency of property tax revenues to be less responsive to income change than the property tax

base. The group analyses revealed, however, that the counties in Group 4 differed from the general tendency for the state as may be seen from the elasticities summarized in Table III-9. Response of Group 4 counties to changes in income resulted in almost identical changes in the property tax base and revenues for the two elasticities rounded to 1.1. In other words, a 1 percent change in total personal income would result in a 1.1 percent change in both the property tax base and revenue for this group of 32 counties over the 1960 to 1970 period.

Property tax bases of county Groups 1 and 3 were very responsive to income changes with elasticities of 1.34 and 1.35, respectively. The revenue response to income change was moderately elastic for Group 1 counties with a coefficient of 1.12. Group 3 counties exhibited only a proportional response with a revenue elasticity of 1.02.

Both tax base and revenue elasticities of counties in Group 2 lagged behind income change with elasticities of .95 and .87, respectively. The marked tendency toward inelastic responses and the weighting effect of the 28 counties included in this group was sufficient to hold the statewide response very close to unity.

In summary the elasticity coefficients presented in Table III-9 indicate that for Group 2 counties tax base growth lagged behind a 1 percent income change by .05 percent while property tax revenues lagged by about .13 percent. In all other county groups tax base and revenue change equaled or exceeded income growth for the 1960 to 1970 period. However, only the more urbanized and the more rural of Tennessee counties exhibited elastic responses of property tax revenues to income growth

during the decade with a 1 percent increase in personal income yielding a 1.1 percent increase in revenues.

III. PROPERTY TAX COMPONENTS IN COMPLEX MODELS

A complex of variables including income, population, land use, and/or institutional change must influence both the direction and magnitude of changes in any of the property tax components. The income elasticities as derived in the preceding section are parsimonious of data. However, the elasticity approach has numerous shortcomings as discussed by Bridges (10, p. 25). One of the more obvious is that institutional and/or political change may be measured rather than the strict influence of economic change as remarked by Davis and Miller (19).

Results of Statewide Models

The regression equations obtained in analysis of property tax component responses for Tennessee are shown in Table III-10. Equation I shows the response of the property tax base in Tennessee counties to (X_3) change in personal income, (X_4) decline in homes lacking plumbing facilities, (X_5) change in homes valued at more than $20,000, ($X_6$) change in population density, (X_7) change in population in urban places, and (X_8) decline in percentage of land in farms.

Rate of change in the property tax base was significantly affected during the 1960 to 1970 period by (X_3) change in income, (X_4) decrease in homes lacking plumbing facilities, (X_6) change in population density, and (X_7) change in population of urban places. Variables X_3, X_4, and X_6 were statistically significant at the 1 percent level and X_7 was significant at the 5 percent level. Variables X_5 and X_8 were not statistically significant.

TABLE III-10

MULTIPLE REGRESSION EQUATIONS OBTAINED FROM ANALYSIS OF PROPERTY TAX BASE AND REVENUE RESPONSE AMONG TENNESSEE COUNTIES TO CHANGES IN SIX SOCIOECONOMIC VARIABLES

Equation Number	Dependent Variables	Independent Variables					
		X_3	X_4	X_5	X_6	X_7	X_8
I	X_1	0.54049***	-3.2855***	-1.2336	2.5396***	-0.4215**	1.1985
		(.1995)	(.8432)	(1.283)	(.7584)	(.1866)	(1.1405)
		R^2 = .8587		S_e = 57.4		F ratio = 86.08	
II	X_2	0.66749***	-1.7531*	0.97407	1.2478	-0.03408	2.5626*
		(.23654)	(.9995)	(1.5214)	(.899)	(.2212)	(1.3521)
		R^2 = .767		S_e = 68.1		F ratio = 46.6	

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

X_1 = Percent change in total property tax base; X_2 = Percent change in total property tax revenue; X_3 = Percent change in total personal income; X_4 = Decline in homes lacking plumbing facilities; X_5 = Change in homes valued greated than $20,000; X_6 = Change in population density; X_7 = Percent change in population in places 2,500 and above; X_8 = Decrease in percentage of land in farms.

Change in personal income (X_3) and change in population density (X_6) were directly associated with change in the dependent variable, percentage change in the property tax base. Thus, a 1 percent change in personal income would result in a .54 percent change in the rate of tax base change holding all other variables constant. The effect of a 1 percent change in population density would be a 2.54 percent change in the rate of change in tax base. The decline in homes lacking in plumbing facilities was directly related to change in the property tax base as evidenced by the negative sign of X_4. The remaining significant variable (X_7) indicated an inverse relationship between increasing population of towns greater than 2,500 persons and change in the property tax base. This indication was contrary to the expected positive relationship between increasing urban population and rising property tax base.

Two variables, change in homes valued at more than $20,000 ($X_5$) and change in percent of land in farms (X_8), were not statistically significant. Contrary to expectations the coefficient b_5 was negative indicating that an increase in the percentage of homes valued at more than $20,000 would have an inverse effect upon the rate of change in the tax base. A similar effect was indicated for X_8 where a decline in the percentage of land in farms would produce a negative effect upon the dependent variable since b_5 was positive. Neither variable was significant but possible explanations for these unexpected indications may stem from (1) the inherent undervaluation of higher valued properties, (2) the lag in reappraisal and assessment as urbanization occurs and farmland passes into higher valued uses, or (3) a combination of both effects.

The multivariate model indicated a direct and significant effect upon rate of change in the tax base from change in income (X_3) and change in population density (X_6). The housing quality variables X_4 and X_5 offered conflicting indications; however, only decline in homes lacking plumbing facilities (X_4) was statistically significant. The population change in urban places ($_7$) was inversely related to tax base change which was an unexpected relationship.

The multivariate revenue relationship is summarized in equation II of Table III-10. The dependent variable, change in total property tax revenue (X_2), was specified as a function of the independent variables used in equation I. Of these variables only three--percent change in total personal income (X_3), change in homes lacking plumbing facilities (X_4), and change in percent of land in farms (X_8)--could be considered statistically significant. Change in income (X_3) was significant at the 1 percent level and the remaining two variables were significant at the 10 percent level. The change in homes lacking plumbing facilities (X_4) was directly related to revenue changes. However, the decline in percentage of land in farms (X_8) had a positive coefficient indicating an inverse relationship contrary to expectations.

Variables X_5, X_6, and X_7 were not statistically significant in this regression. Variable X_7, change in population in urban places, was signed irrationally indicating an inverse relationship. Examination of the stepwise regression output indicated that change in population density (X_6) entered the regression at a significant level but declined as variables X_5 and X_7 entered the regression. A statistically superior

model could have been obtained by elimination of X_5 and X_7 from the model.

The coefficients of determination for equations I and II were .86 and .77 indicating variation in the independent variables accounted for 86 and 77 percent of the variation in property tax base and revenue changes. These coefficients were but slightly better than the coefficients of .82 and .75 obtained in the income elasticity models reported in Table III-7, page 49.

County Group Models

Two regression models were specified to analyze the response of property tax components to differing rates of income change between county groupings as well as several continuous socioeconomic variables. The statewide models presented above were modified by inclusion of dummy variables representing different rates of income change in the same fashion as used in the income elasticity models. The continuous variables used included wealth, population, and land use change variables as in the statewide models.

Conceptual relations. The statewide models examined above indicated that population change in urban places had little explanatory power and might be contributory to the introduction of multicollinearity. This variable was therefore dropped from consideration in the county group models. The results also indicated that change in the percentage of homes lacking plumbing facilities (X_4) was more closely associated with change in the tax base (X_1) while revenue change rate (X_2) tended to be more closely associated with change in homes valued at $20,000 or

more (X_5). Therefore, X_4 was included in the tax base model and excluded from the tax revenue model. The variable X_5 was used only in the revenue model. These changes left the basic structural specification unchanged with rates of change in the two tax components assumed to be functions of (1) change in personal income, (2) change in wealth, (3) change in population, (4) change in land use, and (5) membership in a particular group of counties previously determined.

Results. Two multiple regression equations were determined in the analysis of complex relationships for county groups. These are presented in Table III-11. Equation I shows the relation of changes in the property tax base to selected independent variables. Equation II shows the relationships for change in property tax revenues.

Equation I indicates that change in the property tax base was significantly and directly affected by change in total personal income (X_3), decline in the percentage of homes lacking plumbing facilities (X_4), and percentage change in population density per square mile (X_6). The income (X_3) and population change (X_6) variables were significant at the 10 percent level while the wealth variable was significant at the 1 percent level. The remaining continuous variable, decline in percentage of land in farms (X_7), was not statistically significant and an inverse relationship with X_1 was indicated by the positive sign of b_7.

The dummy variables X_8, X_9, X_{10}, and X_{11} allowed for differentiation in effect of income change between the County Groups 1, 2, 3, and 4, respectively. Because County Group 2 was used as the reference group, the coefficient b_9 is zero and b_3 is the coefficient of the continuous

TABLE III-11

MULTIPLE REGRESSION EQUATIONS OBTAINED FROM ANALYSIS OF PROPERTY TAX BASE AND REVENUE RESPONSE AMONG COUNTY GROUPS IN TENNESSEE TO CHANGES IN FOUR SOCIOECONOMIC VARIABLES

Equation I:

$$X_1 = \underset{(.204)}{0.3604X_3}^{*} - \underset{(.878)}{2.9577X_4}^{***} + \underset{(1.15)}{2.2685X_6}^{*} + \underset{(1.185)}{1.9338X_7} + \underset{(0.179)}{0.1519X_8} + 0.0X_9 + \underset{(0.166)}{0.3902X_{10}}^{**} + \underset{(0.174)}{0.1724X_{11}}$$

$R^2 = .86$ $S_e = 58.2$ F ratio = 71.8

Equation II:

$$X_2 = \underset{(0.096)}{0.6646X_3}^{***} + \underset{(2.201)}{1.9295X_5} + \underset{(1.217)}{2.6765X_6}^{**} + \underset{(2.46)}{2.0707X_7} - \underset{(0.168)}{0.0396X_8} + 0.0X_9 + \underset{(0.182)}{0.3454X_{10}}^{*} + \underset{(0.134)}{0.5284X_{11}}^{***}$$

$R^2 = .78$ $S_e = 66.8$ F ratio = 42.0

***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively.

X_1 = Percentage change in county property tax base; X_2 = Percentage change in county property tax revenue; X_3 = Percentage change in total personal income; X_4 = Decrease in percentage of homes lacking plumbing facilities; X_5 = Increase in percentage of homes valued at $20,000 or more; X_6 = Percentage change in population density; X_7 = Decrease in percentage of land in farms; X_8, X_9, X_{10}, X_{11} = Dummy variables for change in personal income in County Groups 1, 2, 3, and 4, respectively.

income variable and and County Group 2 as well. The coefficient b_3 (.36) was significantly different from zero at the 10 percent level. The remaining group coefficients were evaluated in the same fashion as in the elasticity models of Section III above. Thus b_{10}, the only statistically significant dummy variable, differs from b_3 at the 5 percent level, and the County Group 3 coefficient for income ($b_3 + b_{10}$) is statistically different from b_3 and from zero. The remaining group coefficients, b_7 and b_{11}, for County Groups 1 and 2 were not statistically different from b_3. However, the income coefficients for these groups ($b_3 + b_7$) and ($b_3 + b_{11}$) were both larger than b_3 alone. Therefore, it can be reasoned that the income coefficients for Group 1 and Group 4 counties are statistically different from zero though not different from each other or from Group 2.

The income coefficients were obtained by summing b_3 with the dummy variable coefficients to yield group coefficients and the procedure results in the four group equations summarized in Table III-12. As dummy variables were used only for income change, the coefficients of variables X_4, X_6, X_7, and X_8 are the same for all groups. The income and other coefficients obtained in this analysis are not elasticities and should therefore be interpreted in the conventional manner. Thus b_3 of the equation for Group 1 indicates that by holding the other variables constant, a 1 percent change in personal income would result in a .51 percent increase in the rate of change in the property tax base. A 1 percent decrease in the homes lacking plumbing facilities (X_4) would result in a 2.96 percent increase in the tax base change rate if other variables were held constant.

The coefficient of multiple determination (R^2) for equation I was .86, and the standard error of estimate (S_e) was 58.2. The overall F

TABLE III-12

COUNTY GROUP EQUATIONS OBTAINED BY REGRESSION ANALYSIS OF PROPERTY TAX BASE RESPONSE TO CHANGE IN PERSONAL INCOME, WEALTH, POPULATION, AND LAND USE

County Group	Dependent Variable	Independent Variables				
		X_3	X_4	X_6	X_7	X_8
1	X_1	.51223	-2.9577**	2.2685*	1.9338	0.1519
2	X_1	.36034*	-2.9577**	2.2685*	1.9338	0.1519
3	X_1	.75052	-2.9577**	2.2685*	1.9338	0.1519
4	X_1	.53278	-2.9577**	2.2685*	1.9338	0.1519

** and * indicate statistical significance at the 1 and 10 percent levels.

ratio for the equation was significant at the 1 percent level. However, the additional explanatory powers of these equations would appear to offer no real advantage over the county group tax base elasticity model discussed in Section III above. The R^2 of the elasticity model for county groups was .83 as compared to .86 obtained by the inclusion of four variables in addition to income change in the model above.

Equation II in Table III-11, page 61, shows that change in property tax revenue (X_2) was significantly and directly affected by percentage change in total personal income (X_3) and percentage change in population density (X_6). These coefficients were statistically significant at the 1 and 5 percent levels. The remaining continuous variables, change in percentage of homes valued at $20,000 or more ($X_5$) and decline in percentage of land in farms (X_7), were not statistically significant. Both b_5 and b_7 were properly signed in this model so as to indicate a direct relationship with the dependent variable. The summing of b_3 with the dummy income coefficients resulted in the county group equations summarized in Table III-13 with differing values of b_3 for each group but identical coefficients for the other independent variables. The dummy variables X_{10} and X_{11} were significantly different from X_3 at the 10 and 1 percent levels, respectively. Thus the income change coefficients were significantly different from zero. County Group 2 ($b_3 + b_9$), 3 ($b_3 + b_{10}$), and 4 ($b_3 + b_{11}$) coefficients were all equal or greater than b_3 which was the reference coefficient significant at the 1 percent level. The income change coefficient b_8 was negative making the coefficient for County Group 1 ($b_3 - b_8$) somewhat smaller than b_3. However, the value of b_8 (-.0396) was so small that in all likelihood the Group 1 coefficient was

TABLE III-13

COUNTY GROUP EQUATIONS OBTAINED BY REGRESSION ANALYSIS OF PROPERTY TAX REVENUE RESPONSE TO CHANGE IN PERSONAL INCOME, WEALTH, POPULATION, AND LAND USE

County Group	Dependent Variable	Independent Variables				
		X_3	X_5	X_6	X_7	X_8
1	X_2	.625	1.9295	2.6765*	2.0707	-0.03962
2	X_2	.6646**	1.9295	2.6765*	2.0707	-0.03962
3	X_2	1.0100	1.9295	2.6765*	2.0707	-0.03962
4	X_2	1.1931	1.9295	2.6765*	2.0707	-0.03962

** and * indicate statistical significance at the 1 and 5 percent levels.

also different from zero. The coefficient for income change of County Groups 3 and 4 were nonzero and different from that of Group 2. Group 1 and 2 income coefficients were not significantly different.

Interpretation of the coefficients is the same as in the tax base model discussed above. The coefficients indicate the percentage change in dependent variable which would result from a 1 percent change in the independent variable being considered if all other independent variables were held constant.

The coefficient of multiple determination (R^2) for equation II was .78, and the standard error of estimate was 66.8. These values were little superior to the R^2 of .76 and S_e of 68.7 recorded for the elasticity model discussed in Section III above. Therefore, the use of linear multiple regressions in analysis of the tax base and tax revenue relationships failed to provide more usable predictive models than the elasticity models of Section III presented earlier.

CHAPTER IV

ANALYSIS FOR OBJECTIVE II

I. INTRODUCTION

The second objective, evaluation of the potential for property tax revenues in financing county government operations, required the establishment of frames of reference and assumptions regarding rates of change into the future. The second section presents the projections of income and tax base which were derived. Finally, evaluations by counties and county groups are presented. These evaluations were derived under two levels of tax collection effort assumed for purposes of illustration to be reasonable and attainable by all counties in the state. The implications for changes in property tax revenue availability and in terms of property tax burdens are presented under each condition.

II. PROPERTY TAX BASE PROJECTIONS

The income-elasticity approach to deriving projections of change in county property tax bases was applied in this section. The derivation of income projections upon which tax base changes were dependent is discussed at some length. The tax base projections were made upon the assumption that county group elasticities were representative of all counties in the group and would be maintained during the first half of the 1970's.

Income Projections

Lack of usable county personal income projections for 1975 or 1980 necessitated the derivation of such a series for this study. The methodology was limited to time series techniques. Preliminary examination of the state and county personal income data series resulted in linear trend lines when plotted on semi-logarithmic paper. The pattern was consistent for counties with both rapid and slow rates of income change during the decade.

The first stage in deriving the projections of personal income involved fitting transformed data in a linear regression:

$$Y = a + bt$$

where:

Y = the logarithm of county personal income

a = the regression intercept, a constant

b = the log of the regression line slope also a constant

t = time, one year.

These regressions were derived for individual county and Tennessee personal incomes using annual observations. The b value obtained from the regression provides the annual rate of change in income associated with the passage of time. From this value the extent of change in personal income for each county and the state was calculated using the formula:

$$P_i = P_o(1 + r)^n$$

where:

P_o, P_i = beginning and projected year personal incomes

r = the annual rate of change

n = the number of years.

The regression was used to secure estimates of total personal income in Tennessee for 1975 as well as the counties. Three state projections were obtained using 7, 12, and 14 observations, respectively. The lower and more conservative estimate resulted using a regression of the most recent seven data points. The highest annual rate of change was secured by supplementing the 12 most recent observations of state income with estimates of 1971 and 1972 total personal income supplied by analysts at the CBER (49, p. 24). The mean of the three estimates, $18,164 million, was arbitrarily selected as the value to be used as a boundary estimate to which the sum of the county estimates should correspond.

Change rates for individual counties were obtained using the simple regression based upon the most recent seven observations available. These rates resulted in a set of estimates which summed to $18,203 million and exceeded the boundary estimate by $39 million, an error of about .2 percent. The individual county estimates were divided by estimated 1975 populations to obtain estimates of per capita income. Population estimates were derived from the Tennessee Social Science Advisory Committee projections of county populations to 1980 (64). Examination of these preliminary estimates of per capita personal income obtained by combining these data indicated large increases in per capita income for Decatur, Gibson, Hardeman, Tipton, Trousdale, and Van Buren counties. The income change rates for these counties obtained by the simple regressions were all quite large and perhaps unlikely to hold through the 1970's. Simple, logical, and objective techniques for modifying these estimates without

introducing other variations were unavailable. The income projections and resulting property tax bases obtained from the elasticity technique will, therefore, be subject to limitations but have been objectively obtained. The income projections obtained are presented in Appendix Table A-2 along with the county income estimates from 1959 through 1969.

Tax Base Projections

The tax base projections for 1976 were based upon the county group income elasticities rather than the individual elasticities obtained in Chapter III. The projections were, therefore, based upon four income elasticities rather than the 91 individual coefficients which varied quite widely. The tax base projections were computed from the formula:

$$B_i = B_o(1 + r\varepsilon)^n$$

where:

B_o, B_i = the tax base for the first and projected years

r = the rate of change in personal income

ε = income elasticity of the tax base

n = number of years projected.

The property tax bases for 1967 and projected values obtained for 1976 are shown in Appendix Table A-3.

III. EVALUATION OF PROPERTY TAX POTENTIAL

In the past evaluation of tax potential was sometimes done by estimating the tax base and under appropriate assumptions applying one or more tax rates to secure estimates of potential revenues. The property tax base was then regarded as the resource from which potential revenue

yields were measured. More recently economists and tax authorities alike have placed more emphasis upon income availability in evaluating tax revenue potential; for unless capital is being depleted, all tax payments ultimately come from income.

The realization that income availability has an important bearing upon property tax capacity has become more general in recent years as increasing numbers of persons on fixed incomes felt the pressures of rising rates. An added difficulty in evaluating property tax potential stems from the question of what rate should be applied to the tax base. In many if not most cases the property tax rate is set at a rate which will just provide revenues sufficient to meet budget needs after revenues from all other sources have been considered. As a result, the local tax rate has been subject to a considerable degree of variation. Therefore, in this study potential will be evaluated in terms of property tax effort. Tax effort is usually evaluated in terms of revenues collected per $1,000 of personal income. To abstract from unknown losses in revenues due to late payment or nonpayment the evaluation of effort was measured in terms of levies per $1,000 of personal income. Implications of the potential levies in terms of tax burden were then presented.

The counties of Tennessee levied property taxes totaling $165.3 million in 1967. These levies were 1.78 percent of personal income for that year. A simple approach to evaluation of revenue potentials is to assume that average tax effort is reasonable and that all units of government under study could achieve the average level of property tax effort. Counties already at above average levels of tax effort are assumed to maintain that higher rate. The difference between actual and the assumed

conditions represents additional revenue potential. By varying the assumed levels of tax effort comparisons at several levels of potential revenues can be developed to evaluate revenue availability. The burdens which actual and assumed levels of tax utilization would impose upon residents can then be gauged in terms of per capita and relative burden. The relative tax burden used in the study was proposed by Frank (26). This measure relates the average level of income available for tax payment to the level of tax effort. The index values were derived from the formula:

$$I = \left(\frac{(T/Y_t)\ 100}{Y_{pc}} \right) 10{,}000$$

where:

I = the index value

T = the tax levy in millions of dollars

Y_t = the total personal income in millions of dollars

Y_{pc} = the per capita personal income level.

The relative index number is the property tax levy as a percentage of total personal income divided by the per capita personal income level. Therefore, a county which levies property taxes in the amount of 2 percent of personal income and has a per capita income of $1,500 will be imposing a heavier burden than a county with the same levy but a per capita income level of $3,000. The index numbers were not centered about 100 in the study so that relative burdens at different levels of effort could be compared for 1967 and 1976.

Performance and Potential--1967

Property tax levies for the counties of Tennessee in 1967 amounted to 1.78 percent of personal income or $17.80 per $1,000 of personal income. It was assumed that counties levying property taxes at less than this level of property tax effort could raise levies to that average level while counties making above average use of property taxes would continue to do so.

The actual 1967 levies for all counties are shown in Table IV-1 along with the potential levies for counties which levied taxes at less than the average rate. These data indicated that slightly more than $14 million in additional property taxes would have been levied in 1967 if the average collection effort had been the minimum effort. Blanks in the 1967 potential columns of Table IV-1 indicate actual county performance exceeded the weighted average level of effort for the state.

Examination of the distribution of the potentials for added property tax revenues in 1967 revealed that the largest revenue gaps were among the counties of Groups 1 and 2. The gap between actual and potential levies for each underutilizing county was determined and summarized in Table IV-2. Group 1 counties accounted for 20.4 percent or about $2.9 million of the $14 million in potential additional levies for the state. Eleven of the 15 counties in the group underused the property tax. However, four counties in Group 1, Bradley, Hamblen, Warren, and Coffee, accounted for $2.1 million or 74.2 percent of the gap between actual and potential levies for the group. Group 2 counties were the larger source of potential added levies. There were 21 underutilizing counties in this group of 28 counties and the revenue gap was $9.1 million or 64.6 percent

TABLE IV-1

ACTUAL 1967 PROPERTY TAX LEVIES AND POTENTIAL 1967 LEVIES BY COUNTIES OF TENNESSEE AT AVERAGE 1967 PROPERTY TAX EFFORT

County and Group	1967 Performance			1967 Potential		
	Tax Levy ($1,000)	Per Capita Burden	Relative Burden	Tax Levy ($1,000)	Per Capita Burden	Relative Burden
			Group 1			
Memphis	39,797	53.85	70.5	--	--	--
Nashville	34,210	65.10	72.0	--	--	--
Bradley	1,370	28.84	69.0	1,728	36.39	87.0
Cheatham	337	26.62	105.0	352	28.89	109.7
Coffee	767	24.20	28.8	1,634	51.55	61.4
Dickson	709	33.29	89.6	733	34.43	92.1
Hamblen	1,047	27.92	49.4	1,586	42.29	74.8
Houston	140	25.00	96.1	160	28.61	109.9
Humphreys	662	50.92	100.7	--	--	--
Jefferson	655	26.95	76.9	810	33.33	95.0
Obion	1,056	35.92	68.4	1,200	40.81	77.7
Putnam	943	27.65	84.5	1,098	32.21	98.5
Warren	631	24.18	52.8	995	38.12	83.2
Weakley	708	25.47	71.5	935	33.62	94.4
Williamson	1,608	50.25	154.7	--	--	--
			Group 2			
Chattanooga	16,294	53.85	64.3	--	--	--
Knoxville	16,506	41.95	59.2	18,642	47.37	66.9
Bedford	708	28.66	49.1	1,063	43.04	73.7
Benton	193	16.22	61.9	342	28.74	109.7
Carroll	435	17.13	57.6	780	30.70	103.4
Decatur	288	31.30	71.4	344	37.34	85.1
Dyer	981	32.06	59.0	1,269	41.48	76.4
Franklin	741	27.44	89.1	844	31.25	101.5
Gibson	1,144	24.08	30.0	2,396	50.98	62.8
Grainger	292	21.31	259.5	--	--	--
Greene	884	18.97	49.3	1,627	34.91	90.7
Hardeman	582	25.98	81.1	714	31.87	99.5
Hawkins	1,193	36.15	157.5	--	--	--
Henry	781	33.23	71.2	904	38.48	82.3
Lawrence	863	29.76	85.8	961	33.14	95.6
Lewis	225	33.58	87.3	233	34.80	90.6
McMinn	1,719	48.84	85.0	--	--	--
Madison	2,117	32.67	69.7	2,497	38.54	82.3
Maury	2,150	49.20	92.8	--	--	--
Montgomery	1,625	26.64	46.0	2,613	42.84	74.0

TABLE IV-1 (continued)

County and Group	1967 Performance Tax Levy ($1,000)	1967 Performance Per Capita Burden	1967 Performance Relative Burden	1967 Potential Tax Levy ($1,000)	1967 Potential Per Capita Burden	1967 Potential Relative Burden
Moore	91	26.00	80.4	112	32.04	99.4
Robertson	1,079	37.34	136.6	--	--	--
Rutherford	1,631	28.12	64.6	2,154	37.13	85.4
Sevier	658	20.25	98.8	828	25.47	124.1
Smith	342	27.14	121.7	--	--	--
Sullivan	6,315	50.45	52.7	6,892	55.09	57.5
Trousdale	184	36.08	74.7	199	39.09	81.1
Washington	2,012	27.79	66.2	2,640	36.46	86.9
			Group 3			
Chester	207	20.91	101.6	253	25.53	124.1
Cocke	758	30.32	127.5	--	--	--
Cumberland	476	23.22	97.8	562	27.44	115.7
DeKalb	218	19.64	75.6	319	28.70	110.6
Fayette	396	17.22	91.5	564	24.22	130.5
Giles	784	35.16	99.2	--	--	--
Hardin	623	34.23	122.7	--	--	--
Henderson	380	22.22	68.3	550	32.16	98.8
Hickman	575	47.52	218.9	--	--	--
Lincoln	719	29.47	84.2	813	33.34	95.3
Marshall	521	29.94	59.8	692	39.77	79.5
Rhea	602	35.41	94.4	--	--	--
Tipton	711	24.95	100.3	799	28.04	112.7
Union	115	12.78	184.4	134	14.83	215.0
Wayne	382	31.06	126.9	--	--	--
White	370	22.70	64.0	546	33.50	94.4
			Group 4			
Bledsoe	182	23.33	178.7	--	--	--
Campbell	1,243	46.55	231.8	--	--	--
Cannon	215	25.29	141.6	--	--	--
Carter	1,075	24.94	84.6	1,317	30.56	103.7
Claiborne	601	30.98	202.1	--	--	--
Clay	130	18.84	134.3	146	21.15	151.0
Crockett	421	28.84	82.6	486	33.28	95.3
Fentress	291	22.56	200.5	--	--	--
Grundy	210	19.27	112.1	255	23.35	136.1
Hancock	88	12.39	95.6	144	20.31	156.1
Haywood	630	30.43	113.9	--	--	--
Jackson	226	26.90	117.6	--	--	--
Johnson	257	22.54	171.5	--	--	--

TABLE IV-1 (continued)

County and Group	1967 Performance Tax Levy ($1,000)	1967 Performance Per Capita Burden	1967 Performance Relative Burden	1967 Potential Tax Levy ($1,000)	1967 Potential Per Capita Burden	1967 Potential Relative Burden
Lake	363	43.21	143.5	--	--	--
Lauderdale	659	31.68	111.6	--	--	--
Loudon	739	30.41	89.9	796	32.74	96.8
McNairy	535	28.92	129.8	--	--	--
Macon	413	33.31	148.5	--	--	--
Marion	557	26.65	77.3	691	33.04	95.8
Meigs	139	26.73	176.1	--	--	--
Monroe	641	27.16	116.5	--	--	--
Morgan	451	32.45	268.0	--	--	--
Overton	238	15.87	95.0	345	23.02	137.8
Perry	261	50.19	177.0	--	--	--
Pickett	61	15.25	93.7	91	22.70	139.9
Polk	698	58.17	72.0	--	--	--
Roane	1,472	37.55	128.1	--	--	--
Scott	850	55.92	372.0	--	--	--
Sequatchie	143	22.70	136.0	144	22.89	137.5
Stewart	141	18.80	75.8	210	28.01	112.9
Unicoi	440	28.76	69.8	554	36.18	87.8
Van Buren	62	16.76	62.0	109	29.35	108.4
Tennessee	165,306	42.84	--	179,366	46.49	74.0

TABLE IV-2

ADDITIONAL PROPERTY TAX POTENTIAL IN 1967 BY COUNTY GROUPS

Group and County	Additional Potential (Dollars)	Additional Per Capita Potential (Dollars)
	Group 1	
Memphis	--	--
Nashville	--	--
Bradley	358,355	7.55
Cheatham	15,177	1.22
Coffee	866,978	27.35
Dickson	24,394	1.14
Hamblen	539,114	14.38
Houston	20,145	3.60
Humphreys	--	--
Jefferson	154,584	6.36
Obion	143,195	4.87
Putnam	155,482	4.56
Warren	363,706	13.94
Weakley	226,533	8.15
Williamson	--	--
Total	2,867,663	9.64
	Group 2	
Chattanooga	--	--
Knoxville	2,136,373	5.43
Bedford	354,380	14.34
Benton	148,910	12.51
Carroll	345,091	13.59
Decatur	55,456	6.03
Dyer	287,853	9.41
Franklin	102,608	3.80
Gibson	1,251,921	26.64
Grainger	--	--
Greene	743,028	15.95
Hardeman	131,784	5.88
Hawkins	--	--
Henry	122,757	5.22
Lawrence	98,576	3.40
Lewis	8,241	1.23
McMinn	--	--
Madison	379,932	5.86

TABLE IV-2 (continued)

Group and County	Additional Potential (Dollars)	Additional Per Capita Potential (Dollars)
Maury	--	--
Montgomery	987,790	16.19
Moore	21,501	6.14
Robertson	--	--
Rutherford	523,278	9.02
Sevier	169,240	5.21
Smith	--	--
Sullivan	577,228	4.61
Trousdale	15,778	3.09
Washington	627,288	8.66
Total	9,089,013	8.12
	Group 3	
Chester	45,896	4.64
Cocke	--	--
Cumberland	86,677	4.23
DeKalb	100,809	9.08
Fayette	168,498	7.23
Giles	--	--
Hardin	--	--
Henderson	170,163	9.95
Hickman	--	--
Lincoln	94,329	3.87
Marshall	171,814	9.87
Rhea	--	--
Tipton	88,434	3.10
Union	18,971	2.11
Wayne	--	--
White	176,201	10.81
Total	1,121,792	6.31
	Group 4	
Bledsoe	--	--
Campbell	--	--
Cannon	--	--
Carter	242,479	5.63
Claiborne	--	--
Clay	16,099	2.33
Crockett	64,563	4.42

TABLE IV-2 (continued)

Group and County	Additional Potential (Dollars)	Additional Per Capita Potential (Dollars)
Fentress	--	--
Grundy	44,848	4.11
Hancock	55,898	7.89
Haywood	--	--
Jackson	125	.02
Johnson	--	--
Lake	--	--
Lauderdale	--	--
Loudon	56,383	2.32
McNairy	--	--
Macon	--	--
Marion	133,203	6.37
Meigs	--	--
Monroe	279	.01
Morgan	--	--
Overton	107,278	7.15
Perry	--	--
Pickett	29,989	7.50
Polk	--	--
Roane	--	--
Scott	--	--
Sequatchie	1,433	.23
Stewart	69,057	9.21
Unicoi	113,672	7.43
Van Buren	46,506	--
Total	981,812	4.72

of the $14 million gap for the state. This finding is in agreement with the relatively lower tax base and revenue elasticities prevalent among Group 2 counties found in the elasticity analyses of Chapter III.

In most instances, per capita property tax burden imposed by levying taxes at the state average level of effort would have been increased less than $10. The majority of increases and the larger part of resulting revenues would, of course,come from counties in Groups 1 and 2.

The effect of raising tax effort to the average level of $17.80 per $1,000 would have been minimal upon Group 1 counties. Only three of the Group 1 counties tax efforts rated an index value of more than 100 in 1967. These were Cheatham, Humphreys, and Williamson counties. Imposing the minimum effort would have added Houston County to the list and raised the Cheatham County index from 105 to 110. The tax effort of Williamson County in this group was the highest at 154.7 with a property tax effort of 2.78 percent of personal income against a per capita income level of $1,801.

The 1967 tax levies of only four counties in Group 2 were high enough to reach an index of more than 100. These were Grainger, Hawkins, Robertson, and Smith counties. Imposing the minimum level of tax effort would have brought four more counties, Benton, Carroll, Franklin, and Sevier, to indexes greater than 100.

The actual property tax levies for seven of the 16 counties in Group 3 and 22 of the 32 counties in Group 4 indexed at values greater than 100 in 1967. The imposition of the minimum effort level would have raised the burden of thee more counties in Group 3 above 100. These were Cumberland, DeKalb, and Fayette counties. Of all the Group 4 counties

only Crockett, Loudon, Marion, Polk, and Unicoi would have retained burden index values less than 100 if the average tax effort had been imposed in 1967. There would seem to be ample indication that burden indexes in the range of 80 to 110 indicate fair to good utilization of available tax capacity. Index values of 200 and more as shown by seven counties in 1967, all in Group 4, would seem to indicate excessive reliance upon property taxes in relation to average income available for payment.

Potentials and Burdens--1976

The analysis of potential for increasing property tax yields in 1976 has constructive use as a benchmark for gaining insight to future property tax yields and the burdens implicit in those yields. Potential yields for 1976 were derived at two levels of tax effort. The lower level which was $17.80 per $1,000 of personal income was the average rate imposed by the counties of Tennessee in 1967. This rate implied an anticipation of a property tax revenue elasticity of unity from 1967 to 1976. The higher level of tax effort considered was $25 per $1,000 of personal income. This rate was approximately the average property tax effort of county and school districts in the United States in 1967.

Potentials for 1976

The two levels of effort were applied to the 1976 county income projections in Appendix A-2. The resulting potential property tax levies are presented in Table IV-3. Per capita tax levies were increased rather sharply at both levels of effort. The lowest per capita levy for 1967 was $12.78 by Union County while the largest levy was $65.10 by Nashville.

TABLE IV-3

ESTIMATED 1976 PROPERTY TAX LEVIES FOR TENNESSEE COUNTIES ASSUMING 1967 TENNESSEE AND UNITED STATES AVERAGE LEVELS OF TAX EFFORT

County and Group	1976 Potential Assuming 1967 Tennessee Average Property Tax Effort			1976 Potential Assuming 1967 United States Average Property Tax Effort		
	Tax Levy ($1,000)	Per Capita Burden	Relative Burden	Tax Levy ($1,000)	Per Capita Burden	Relative Burden
			Group 1			
Memphis	71,704	87.61	35.3	100,708	123.05	50.8
Nashville	54,819	93.95	33.7	76,993	131.95	47.4
Bradley	3,766	66.19	47.8	5,290	92.97	67.2
Cheatham	970	65.10	48.3	1,363	91.44	67.9
Coffee	3,053	85.76	36.8	4,288	120.44	51.7
Dickson	1,614	68.68	45.9	2,268	16.49	64.5
Hamblen	3,450	77.53	40.8	4,833	108.60	57.4
Houston	292	47.87	66.5	410	67.21	93.4
Humphreys	1,198	82.05	38.0	1,683	115.24	53.4
Jefferson	1,812	62.27	49.8	2,545	87.46	69.9
Obion	2,264	71.19	44.0	3,180	100.00	61.9
Putnam	2,245	58.01	53.8	3,153	81.46	75.6
Warren	2,234	75.22	41.5	3,138	105.64	58.2
Weakley	1,887	63.54	49.8	2,650	89.23	70.0
Williamson	2,211	55.00	56.1	3,105	77.24	78.8
			Group 2			
Chattanooga	28,847	89.67	35.3	40,515	125.94	49.6
Knoxville	32,556	77.39	40.9	45,725	108.69	57.5
Bedford	2,140	79.85	39.6	3,005	112.13	55.7
Benton	619	47.98	65.8	870	67.44	92.4
Carroll	1,431	53.60	59.0	2,010	75.28	82.9
Decatur	894	101.44	34.5	1,255	129.38	48.4
Dyer	2,572	81.91	88.7	3,613	115.05	54.3
Franklin	1,497	51.98	60.8	2,103	73.00	85.4
Gibson	5,849	116.98	27.1	8,215	164.30	38.0
Grainger	415	27.85	112.9	583	39.09	158.5
Greene	3,273	64.81	48.8	4,598	91.04	68.5
Hardeman	1,663	71.37	44.3	2,335	100.21	62.1
Hawkins	1,965	54.58	57.8	2,760	76.67	81.2
Henry	1,750	71.14	44.3	2,458	99.90	62.3
Lawrence	1,944	63.74	49.4	2,730	89.51	69.4
Lewis	465	64.58	48.6	653	90.63	68.3
McMinn	2,837	74.66	42.0	3,985	104.87	58.9
Madison	4,810	69.41	45.4	6,755	97.47	63.8
Maury	3,313	69.89	44.8	4,653	98.15	62.9

TABLE IV-3 (continued)

County and Group	1976 Potential Assuming 1967 Tennessee Average Property Tax Effort: Tax Levy ($1,000)	Per Capita Burden	Relative Burden	1976 Potential Assuming 1967 United States Average Property Tax Effort: Tax Levy ($1,000)	Per Capita Burden	Relative Burden
Montgomery	4,566	65.23	47.8	6,413	91.61	67.1
Moore	212	57.30	55.1	298	80.41	77.4
Robertson	1,404	42.94	72.3	1,973	60.32	101.5
Rutherford	4,117	62.10	50.2	5,783	87.22	70.5
Sevier	1,718	56.33	55.6	2,413	79.10	78.0
Smith	591	46.17	68.4	830	64.84	96.0
Sullivan	13,612	98.00	32.0	18,118	137.60	45.0
Trousdale	500	90.91	34.3	703	127.73	48.3
Washington	4,799	60.21	52.0	6,740	84.57	73.0
			Group 3			
Chester	481	46.70	67.7	675	65.53	94.9
Cocke	1,404	53.18	59.5	1,973	74.72	83.6
Cumberland	1,198	55.21	57.3	1,683	77.53	80.5
DeKalb	573	50.71	62.6	805	71.24	87.9
Fayette	1,162	52.11	60.9	1,633	73.21	85.6
Giles	1,396	59.66	52.8	1,960	83.76	74.2
Hardin	1,134	60.64	52.0	1,593	85.16	73.0
Henderson	1,084	60.90	52.0	1,523	85.53	73.1
Hickman	543	42.09	74.4	763	59.11	104.5
Lincoln	1,399	56.64	55.9	1,965	79.55	78.4
Marshall	1,258	69.89	45.1	1,768	98.19	63.3
Rhea	1,136	63.11	49.8	1,595	88.61	69.9
Tipton	2,118	71.80	43.8	2,975	100.85	61.5
Union	240	25.00	125.7	338	35.16	176.6
Wayne	701	57.46	55.0	985	80.74	77.3
White	1,161	67.11	47.2	1,630	94.22	66.3
			Group 4			
Bledsoe	258	34.40	93.0	363	48.33	130.5
Campbell	1,166	43.51	72.9	1,638	61.10	102.4
Cannon	263	30.23	105.0	370	42.53	147.5
Carter	2,106	48.08	65.9	2,958	67.52	92.5
Claiborne	837	42.27	74.3	1,180	59.60	104.4
Clay	240	35.82	88.5	338	50.37	124.3
Crockett	844	56.64	55.8	1,185	79.53	78.3
Fentress	438	35.90	89.0	615	50.41	125.0
Grundy	367	35.63	89.1	515	50.00	125.2
Hancock	258	39.09	81.1	363	54.92	113.9

TABLE IV-3 (continued)

County and Group	1976 Potential Assuming 1967 Tennessee Average Property Tax Effort: Tax Levy ($1,000)	Per Capita Burden	Relative Burden	1976 Potential Assuming 1967 United States Average Property Tax Effort: Tax Levy ($1,000)	Per Capita Burden	Relative Burden
Haywood	1,073	54.19	58.4	1,508	76.14	82.1
Jackson	388	47.90	65.9	545	67.28	92.6
Johnson	530	43.44	72.2	745	61.07	101.4
Lake	381	47.63	66.5	535	66.88	93.4
Lauderdale	1,203	58.12	54.3	1,690	81.64	76.3
Loudon	1,330	51.95	60.4	1,868	72.95	84.8
McNairy	938	50.16	63.1	1,318	70.45	88.6
Macon	525	42.34	74.9	738	59.48	105.2
Marion	1,180	53.39	58.6	1,658	75.00	82.3
Meigs	219	41.32	76.1	308	58.02	106.9
Monroe	1,132	46.39	67.8	1,590	65.16	95.3
Morgan	482	34.68	90.7	678	48.74	127.4
Overton	684	44.42	70.8	960	62.34	99.5
Perry	320	60.38	52.1	450	84.91	73.2
Pickett	146	38.42	82.2	205	53.95	115.5
Polk	947	79.58	39.6	1,330	111.76	55.6
Roane	2,106	50.99	61.5	2,958	71.61	86.4
Scott	653	42.68	73.9	918	59.97	103.7
Sequatchie	256	38.21	82.4	360	53.73	115.7
Stewart	466	62.97	50.3	655	88.51	70.7
Unicoi	1,091	70.39	44.9	1,533	98.87	63.1
Van Buren	327	83.85	37.5	460	117.95	52.7
Tennessee	324,013	75.76		455,075	106.41	

The effect of maintaining the 1967 average level of tax effort combined with the projected gains in total personal income was to double the per capita and total levies in many instances. The per capita effort for Union County projected to 1976 was $25 while the projection for Gibson County was $117 per capita.

The projected rates of income growth for several Group 2 counties were quite high. These high rates of growth and the rather low levels of property tax utilization by these counties in 1967 combined to indicate dramatic increases in potential revenues for 1976. This abrupt rise was exemplified by Bedford and Gibson counties for which the changes in levies from 1967 to 1976 potentials were 202 percent and 411 percent, respectively. Chattanooga and Knoxville, also Group 2 members, indicated more modest increases in levies of 77 and 97 percent, respectively. County variation in the percentage change from actual 1967 levies to 1976 potentials at the high and low rates were large due to variations in property tax use for 1967 and variations in rates of income change.

For the state, change from actual property tax levies in 1967 to the low potential for 1976 was 96 percent, or $165.3 million to $324.0 million. The change when using the higher level of effort for 1976 potential was from $165.3 million to $455.1 million, a projected change of 175 percent.

Burdens in 1976

Per capita property tax burdens increased sharply for most counties of Groups 1 and 2 when the higher level of tax effort was assumed. Gibson County was projected to increase per capita levies from $117 to more than

$164 if effort were shifted from the lower to the higher level. The same increase in effort would produce only $10 per capita in added levies for Union County. The effect in terms of relative burden would, however, be much more severe for Union County. Increasing the tax levy $10 per capita for Union County would raise the relative effort index from 126 to about 177. A $47 increase in per capita levies for Gibson County would only raise the relative index from 27.1 to 38 under the assumed effort and income projections. These differences in per capita and relative effort changes underscore the basic differences in county resources available for financing governmental functions.

Inspection of the relative burden index values at two levels of effort for 1976 projections of personal income reveals the general effect upon the counties. Table IV-4 summarizes the relative property tax burdens under the actual 1967 and assumed conditions. The means of the index values by county groups indicate that relative burden in 1967 was clearly heavier among Group 3 and Group 4 counties. The assumption of property tax effort at the state average rate in 1967 brought the 1976 mean index value up by 2.5 points, 15.2 points, 15.6 points, and 9.6 points for Groups 1, 2, 3, and 4, respectively. These shifts point out again that potential revenues could have been secured with more ease from County Groups 1 and 2 as the effort index is tied closely to average income level. The increase in mean index value for Group 3 was equal that of Group 2 but would have brought in only 8 percent of the potential increase in tax levies while Group 2 counties could have brought 64 percent of the potential revenue increase in property tax levies by counties in Tennessee for 1967.

TABLE IV-4

RELATIVE COUNTY AND COUNTY GROUP PROPERTY TAX INDICES OF BURDEN UNDER ACTUAL AND POTENTIAL CONDITIONS FOR 1967 AND 1976

County	1967		1976	
	Actual Levy	1.78 Percent Average Levy	1.78 Percent of Personal Income	2.5 Percent of Personal Income
		Group 1		
Memphis	70.5	--	36.2	50.8
Nashville	72.0	--	33.7	47.4
Bradley	69.0	87.0	47.8	67.2
Cheatham	105.0	109.7	48.3	67.9
Coffee	28.8	61.4	36.8	51.7
Dickson	89.6	92.1	45.9	64.5
Hamblen	49.4	74.8	40.8	57.4
Houston	96.1	109.9	66.5	93.4
Humphreys	100.7	--	38.0	53.4
Jefferson	76.9	95.0	49.8	69.9
Obion	68.4	77.7	44.0	61.9
Putnam	84.5	98.5	53.8	75.6
Warren	52.8	83.2	41.5	58.2
Weakley	71.5	94.4	49.8	70.0
Williamson	154.7	--	56.1	78.8
Means	79.3	81.8	45.9	64.5
		Group 2		
Chattanooga	64.3	--	35.3	49.6
Knoxville	59.2	66.9	40.9	57.5
Bedford	49.1	73.7	39.6	55.7
Benton	61.9	109.7	65.8	92.4
Carroll	57.6	103.4	59.0	82.9
Decatur	71.4	85.1	34.5	48.4
Dyer	59.0	76.4	88.7	54.3
Franklin	89.1	101.5	60.8	85.4
Gibson	30.0	62.8	27.1	38.0
Grainger	259.5	--	112.9	158.5
Greene	49.3	90.7	48.8	68.5
Hardeman	81.1	99.5	44.3	62.1
Hawkins	157.5	--	57.8	81.2
Henry	71.2	82.3	44.3	62.3
Lawrence	85.8	95.6	49.4	69.4
Lewis	87.3	90.6	48.6	68.3
McMinn	85.0	--	42.0	58.9
Madison	69.7	82.3	45.4	63.8

TABLE IV-4 (continued)

County	1967 Actual Levy	1967 1.78 Percent Average Levy	1976 1.78 Percent of Personal Income	1976 2.5 Percent of Personal Income
Maury	92.8	--	44.8	62.9
Montgomery	46.0	74.0	47.8	67.1
Moore	80.4	99.4	55.1	77.4
Robertson	136.6	--	72.3	101.5
Rutherford	64.6	85.5	50.2	70.5
Sevier	98.8	124.1	55.6	78.0
Smith	121.7	--	68.4	96.0
Sullivan	52.7	57.5	32.0	45.0
Trousdale	74.7	81.1	34.3	48.3
Washington	66.2	86.9	52.0	73.0
Means	82.9	98.1	52.1	70.6
		Group 3		
Chester	101.6	124.1	67.7	94.9
Cocke	127.5	--	59.5	83.6
Cumberland	97.8	115.7	57.3	80.5
DeKalb	75.6	110.6	62.6	87.9
Fayette	91.5	130.5	60.9	85.6
Giles	99.2	--	52.8	74.2
Hardin	122.7	--	52.0	73.0
Henderson	68.3	98.8	52.0	73.1
Hickman	218.9	--	74.4	104.5
Lincoln	84.2	95.3	55.9	78.4
Marshall	59.8	79.5	45.1	63.3
Rhea	94.4	--	49.8	69.9
Tipton	100.3	112.7	43.8	61.5
Union	184.4	215.0	125.7	176.6
Wayne	126.9	--	55.0	77.3
White	64.0	94.4	47.2	66.3
Means	107.3	122.9	60.0	84.4
		Group 4		
Bledsoe	178.7	--	93.0	130.5
Campbell	231.8	--	72.9	102.4
Cannon	141.6	--	105.0	147.5
Carter	84.6	103.7	65.9	92.5
Claiborne	202.1	--	74.3	104.4
Clay	134.3	151.0	88.5	124.3
Crockett	82.6	95.3	55.8	78.3
Fentress	200.5	--	89.0	125.0

TABLE IV-4 (continued)

County	1967		1976	
	Actual Levy	1.78 Percent Average Levy	1.78 Percent of Personal Income	2.5 Percent of Personal Income
Grundy	112.1	136.1	89.1	125.2
Hancock	95.6	156.1	81.1	113.9
Haywood	113.9	--	58.4	82.1
Jackson	117.6	--	65.9	92.6
Johnson	171.5	--	72.2	101.4
Lake	143.5	--	66.5	93.4
Lauderdale	111.6	--	54.3	76.3
Loudon	89.9	96.8	60.4	84.8
McNairy	129.8	--	63.1	88.6
Macon	148.5	--	74.9	105.2
Marion	77.3	95.8	58.6	82.3
Meigs	176.1	--	76.1	106.9
Monroe	116.5	--	67.8	95.3
Morgan	268.0	--	90.7	127.4
Overton	95.0	--	70.8	99.5
Perry	177.0	--	52.1	73.2
Pickett	93.7	139.9	82.2	115.5
Polk	72.0	--	39.6	55.6
Roane	128.1	--	61.5	86.4
Scott	372.0	--	73.9	103.7
Sequatchie	136.0	--	82.4	115.7
Stewart	75.8	112.9	50.3	70.7
Unicoi	69.8	87.8	44.9	63.1
Van Buren	62.0	108.4	37.5	52.7
Means	137.8	147.4	69.3	97.4

Potential 1976 property tax levies projected at both levels of effort indicated an overall reduction of relative burden for all county groups. Only the counties of Group 4 retained effort indexes in the vicinity of 100 at the higher level of effort. This general reduction occurred for two reasons. First, a general increase in per capita income levels was projected for 1976. Secondly, counties which had tax efforts in excess of $25 per $1,000 of personal income in 1967 were projected at the $25 per $1,000 level in 1976.

The assumption that above average rates would be maintained was dropped since relatively few counties exceeded the national property tax effort in 1967. The 22 counties with tax effort levels exceeding $20 per $1,000 of income in 1967 are shown in Table IV-5. Twelve of the 22 counties were in Group 4. The number of counties equaling or exceeding the national average rate of $25 per $1,000 was considerably smaller and included only seven counties. Of these high users of the property tax, Williamson was from Group 1 and Hickman belonged to Group 3. The remaining five counties, Campbell, Claiborne, Morgan, Perry, and Scott, were from Group 4. No counties from Group 2 exceeded the $25 per $1,000 level of effort. The retention of the higher levels of effort while adding substantial revenues for the counties would have relatively small effect upon totals for the groups and for the state. The revenues might, however, be especially vital to particular counties unless alternative sources were found.

An indication of the impact upon effective property tax rates which may occur because of differing property tax base elasticities may be seen from Table IV-6. This table shows the effective property tax rates levied

TABLE IV-5

COUNTIES OF TENNESSEE THAT LEVIED PROPERTY TAXES EXCEEDING 2 PERCENT OF PERSONAL INCOME IN 1967

County	Group	Level of Effort
Nashville	1	2.17
Bledsoe	4	2.04
Campbell	4	3.29
Claiborne	4	2.50
Fentress	4	2.13
Grainger	2	2.35
Hardin	3	2.50
Hawkins	2	2.39
Hickman	3	3.23
Humphreys	1	2.27
Lake	4	2.48
McMinn	2	2.04
Macon	4	2.22
Maury	2	2.14
Meigs	4	2.17
Morgan	4	2.95
Perry	4	2.97
Polk	4	2.05
Roane	4	2.19
Robertson	2	2.26
Scott	4	4.57
Williamson	1	2.79

TABLE IV-6

EFFECTIVE PROPERTY TAX RATES NECESSARY TO ATTAIN 1967 ACTUAL AND POTENTIAL LEVIES AND TWO LEVELS OF POTENTIAL LEVIES FOR 1976

County	Effective Rate*			
	1967 Actual	1967 Potential	1976 Low Potential	1976 High Potential
		Group 1		
Memphis	1.02	--	.69	.97
Nashville	1.24	--	.75	1.05
Bradley	.62	.78	.58	.82
Cheatham	.81	.84	.49	.69
Coffee	.65	1.39	.98	1.38
Dickson	.89	.92	.64	.89
Hamblen	.63	.96	.71	1.00
Houston	.95	1.08	.80	1.12
Humphreys	.61	--	.33	.47
Jefferson	.76	.94	.72	1.01
Obion	.73	.82	.62	.87
Putnam	.75	.88	.63	.88
Warren	.73	1.15	.77	1.08
Weakley	.62	.82	.58	.81
Williamson	.95	--	.41	.57
		Group 2		
Chattanooga	1.08	--	.99	1.39
Knoxville	.95	1.05	1.04	1.47
Bedford	.52	.77	.75	1.05
Benton	.51	.90	.84	1.18
Carroll	.76	1.39	1.33	1.87
Decatur	.90	1.08	1.01	1.41
Dyer	.65	.84	.81	1.13
Franklin	.80	.91	.86	1.21
Gibson	.58	1.22	1.14	1.60
Grainger	.97	--	.73	1.02
Greene	.45	.82	.78	1.09
Hardeman	.92	1.13	1.00	1.41
Hawkins	.91	--	.60	.85
Henry	.81	.94	.89	1.25
Lawrence	.91	1.01	.99	1.39
Lewis	.93	.96	.89	1.26
McMinn	1.06	--	.87	1.22
Madison	.73	.86	.85	1.19

TABLE IV-6 (continued)

County	Effective Rate* 1967 Actual	1967 Potential	1976 Low Potential	1976 High Potential
Maury	.92	--	.76	1.07
Montgomery	.80	1.29	1.24	1.74
Moore	.66	.81	.82	1.15
Robertson	1.07	--	.84	1.18
Rutherford	.74	.98	.93	1.31
Sevier	.50	.63	.58	.82
Smith	.66	--	.68	.95
Sullivan	.65	.71	.70	.99
Trousdale	.68	.74	.71	.99
Washington	.54	.71	.69	.97
		Group 3		
Chester	.60	.74	.56	.81
Cocke	.84	--	.55	.78
Cumberland	.68	.80	.55	.77
DeKalb	.73	1.06	.83	1.17
Fayette	.52	.75	.51	.72
Giles	.81	--	.56	.79
Hardin	.81	--	.49	.69
Henderson	.75	1.09	.77	1.08
Hickman	.90	--	.42	.59
Lincoln	.64	.73	.56	.79
Marshall	.60	.80	.61	.85
Rhea	1.09	--	.69	.97
Tipton	.76	.85	1.00	1.40
Union	.66	.77	.59	.83
Wayne	.63	--	.42	.59
White	1.05	1.54	1.07	1.50
		Group 4		
Bledsoe	1.25	--	.91	1.28
Campbell	1.45	--	.69	.97
Cannon	.72	--	.69	.97
Carter	.63	.77	.73	1.02
Claiborne	1.17	--	.74	1.05
Clay	.90	1.01	.90	1.27
Crockett	.82	.94	.83	1.16
Fentress	1.36	--	1.00	1.40
Grundy	.84	1.02	.90	1.26
Hancock	.45	.73	.57	.81
Haywood	.59	--	.52	.72
Jackson	1.22	--	1.02	1.43

TABLE IV-6 (continued)

County	Effective Rate*			
	1967 Actual	1967 Potential	1976 Low Potential	1976 High Potential
Johnson	.59	--	.52	.73
Lake	.69	--	.46	.64
Lauderdale	1.06	--	.87	1.22
Loudon	.92	.99	.88	1.23
McNairy	.95	--	.76	1.07
Macon	.72	--	.53	.75
Marion	.88	1.09	.90	1.27
Meigs	.67	--	.51	.72
Monroe	1.08	--	.93	1.31
Morgan	1.26	--	.67	.95
Overton	.88	1.28	1.11	1.56
Perry	.83	--	.42	.59
Pickett	.55	.82	.76	1.07
Polk	1.24	--	.97	1.36
Roane	1.22	--	.84	1.18
Scott	2.10	--	.74	1.04
Sequatchie	1.15	1.16	1.06	1.49
Stewart	.85	1.27	1.18	1.67
Unicoi	1.15	1.45	1.24	1.74
Van Buren	.87	1.51	1.31	1.85
Tennessee	.96	--	.77	1.08

*Rates expressed as dollars per $100 of full or estimated market value.

by the counties in 1967 and the effective rates which would be required in 1967 and in 1976 to secure the estimated potential levies for those years. The effective rate assumes that property values are assessed at full or market value.

The estimates in Table IV-6 indicate that counties in Group 1 could generally raise the potential revenues at effective rates little higher than $1.00 per $100 of value or 1 percent of market value. This would require that the assumed rates of income change and the tax base elasticity hold from the 1960's to the 1970's. The only county of this group which would have to raise effective tax rate drastically above the 1967 rate would be Coffee County moving from an effective rate of $.65 in 1967 to $1.38 per hundred in 1976.

Group 2 counties would on the other hand be confronted with tax bases which generally were not rising as rapidly as personal income levels. Only Hawkins, Sevier, Smith, Sullivan, Trousdale, and Washington counties in this group would be able to raise the potential levies without exceeding the $1.00 per $100 rate. The remaining 24 counties would have to apply rates as high as $1.87 to obtain levies which would meet the potential estimated at the high level of effort.

Group 3 counties were like Group 1 counties generally projected to meet the high potential levies without going above the $1.00 per $100 rate. DeKalb, Henderson, Tipton, and White counties of this 16 county group were the exceptions with projected rates of $1.17, $1.08, $1.40, and $1.50 required to meet the high level of potential levies under the assumed conditions.

The 32 counties of Group 4 were projected as experiencing moderate increases in personal incomes for the early 1970's. The property tax base elasticity was only 1.1 so that changes in property values would be but slightly greater than income changes and the effective rates necessary to meet potential levies would tend to be somewhat higher than Groups 1 and 3. There were, in fact, 10 of the 32 counties in this group which were expected to retain effective rates less than $1.00 under the assumed conditions.

CHAPTER V

SUMMARY AND IMPLICATIONS

I. SUMMARY

The objective of the study was to evaluate the potential of general property taxes for financing county governments in Tennessee. Specific objectives were to (1) analyze differential rates of change in property tax bases and revenues among the counties and (2) determine the implications for county fiscal structures and taxpayer burdens inherent in tax base, income, and revenue trends.

The first phase of the study involved (1) objective classification of the counties into groups with similar patterns of socioeconomic change, (2) statistical evaluation of the groupings, and (3) regression analyses of change relationships among the groups and for the state. Variables used in the classification and the regression analyses were expressed as rates of change to gain insight of dynamic characteristics and relationships.

Four groups of counties were identified using principal components analysis. The groups were labeled (1) rapid-balanced change, (2) moderate-balanced change, (3) low-change, and (4) unbalanced-change counties. The statistical difference between county groups was confirmed by application of multiple discriminant analysis.

Group 1 counties included combined county units for each of the Nashville and Memphis SMSA's plus 13 individual county units which tended

to have similar rates of socioeconomic change. Other than the two SMSA's in the group only Bradley County had a population exceeding 50,000 persons in 1970. Hamblen County was projected to reach a population of 50,000 by 1980. Only three Group 1 counties were located in East Tennessee. These counties were Bradley, Jefferson, and Hamblen. The Memphis SMSA, Obion, and Weakley counties in West Tennessee were included in this group. The remaining nine counties, Cheatham, Coffee, Dickson, Houston, Humphreys, Putnam, Warren, and Williamson along with the Nashville SMSA were in Middle Tennessee.

Group 2, moderate-balanced change counties, was more evenly distributed with eight, eleven, and nine counties located in West, Middle, and East Tennessee, respectively. The Chattanooga and Knoxville SMSA's were included in this group. Gibson, Greene, Madison, Maury, Montgomery, Rutherford, Sullivan, and Washington counties were included in Group 2. These individual counties either had populations in excess of 50,000 in 1970 or were projected to reach that level of population by 1980. Many of the counties had relatively high rates of change for some socio-economic variables but moderate or low rates for others. The Chattanooga and Knoxville SMSA's, for example, had slower rates of total and per capita personal income change than several of the counties in the group which adjoined them. All directions of change for these counties were positive with respect to socioeconomic development.

Counties in Group 3 tended to be more rural and exhibited lower rates of change in all or nearly all variables. No urban counties were included in this group. None of the counties exceeded 50,000 population in 1970 and none were projected to reach that level by 1980. Most of the

16 counties in this group held steady or gained in population during the period 1960 to 1970. However, Fayette, Giles, and Tipton counties lost population during the past decade. Counties of Group 3 were distributed with five, seven, and four located in West, Middle, and East Tennessee, respectively.

Group 4 included the most rural and underdeveloped of the counties in Tennessee. Carter and Roane counties were the most populous of the group with 1970 populations of about 43,000 and 48,000 persons, respectively. Twenty-six of the 32 counties in Group 4 lost population during the 1960 to 1970 decade and had relatively low to moderate gains in personal income. Van Buren County was a notable exception to this tendency with a stable population and large income gains. Other counties in the group enjoyed sizable gains in per capita income due to (1) a combination of population decline in conjunction with moderate gains in total personal income, or (2) location adjoining more developed counties offering improved employment opportunities during the decade. Most counties of Group 4 remained among the lowest with respect to per capita personal income at the close of the 1970's despite sizable gains because most of these counties had very low per capita income levels at the beginning of the decade. Should the income trends of the 1960's continue in this decade, a number of Group 4 counties might attain a higher level of economic well-being.

Following classification of counties into groups the responses of property tax base and revenues to changes in personal income were analyzed. The income elasticities for both property tax components were obtained for individual counties and for the groups of counties. Individual county

elasticities were extremely variable ranging from almost zero to about 2.4 for both the tax base and revenue. Coefficients of these values spanned extreme ranges from almost no change to a 2.4 percent change in tax base or revenue resulting from a 1 percent change in personal income. The tax base income elasticity for Tennessee tended to be more elastic (1.1) than the revenue elasticity (1.0) for the 1960 to 1970 period.

Analyses of the county group elasticities indicated that Group 2 counties (moderate-balanced growth) were more likely to have low tax base and revenue elasticity coefficients (.95 and .87) than the remaining three groups. Dummy variable (0, 1) regression analyses were used in estimating county group elasticities. The coefficients of the determination (R^2) for these regressions were .83 and .76 for the tax base and revenue equations, respectively. These values indicated that 83 percent of the variation in property tax base change was explained by the variation in rate of personal income change, and 76 percent of the variation in revenue change was explained by variation in rate of income change.

Income elasticities of the property tax base obtained in this analysis ranged from .95 for Group 2 upward to 1.10 for Group 4 to approximately 1.35 for Groups 1 and 3. Revenue elasticities ranged from .87 for Group 2 to 1.0 for Group 3 to 1.10 for Groups 1 and 4. Thus responsiveness of the tax base to income change tended to be considerably less elastic among Group 2 counties than for counties of Group 1 and 3. Property tax revenue response of Group 2 counties also was less responsive, especially in relation to Groups 1 and 4.

The income elasticity coefficients for all groups in both the tax base and revenue equations were statistically different from zero. However, not all group elasticities were significantly different from each other. None of the county group revenue elasticity coefficients were statistically different. The tax base elasticities for County Groups 1 and 3 each differed from that of County Group 2 but not from one another. The tax base elasticity for Group 4 was not significantly different from Group 2.

Complex multivariate relationships were studied following the elasticity analyses. Regression models including wealth, population, and land use change variables in addition to income change as independent variables were examined for all counties in Tennessee. The R^2 of the statewide tax base and revenue models were approximately the same as for the elasticity relations. Contradictory signs were obtained for certain of the variables included. The models were then respecified to remove specific variables which appeared redundant, and dummy (0, 1) variables were included to represent changes in personal income among the county groups. Regressions were obtained for both the property tax base and revenue responses among the county groups.

The regressions obtained in the complex relations analysis were statistically significant from the standpoint of R^2 and F ratios. However, several of the coefficients were not statistically significant or properly signed. Furthermore, the R^2 values for the complex models were but little larger than the elasticity models. Thus the explanatory powers of the complex models were not superior to the income elasticity relationships for county groups and for Tennessee.

The first phase of the analysis established that differing rates of change among a complex of socioeconomic variables could be used to distinguish between groups of counties in Tennessee. Furthermore, a tendency for county groups with differing socioeconomic change characteristics to have different property tax base responses to personal income change was revealed.

The second phase of analysis was directed toward evaluation of property tax potentials of the counties. A comparison of performance and potentials for the year 1967 was developed. This indicated that Group 1 and Group 2 counties accounted for about 85 percent of the unrealized potential for the state of Tennessee. The evaluation assumed that the average 1967 property tax effort exerted by all counties in Tennessee (1.78 percent of personal income) was feasible. The total potential for added levies was about $14 million or about 8 percent of all county property tax levies for 1967.

The marked tendency toward less than proportional response to income change for both tax base and revenue components among Group 2 counties resulted in the largest gap between actual and potential levies for the four groups of counties. Only six of the 28 counties in Group 2 had both tax base and revenue elasticity coefficients greater than unity. The gap amounted to 64.6 percent or $9.1 million of the $14.1 million additional levies which would have accrued to all counties in Tennessee under the assumed minimum effort conditions for the analysis of 1967 potential.

The mean tax base and revenue elasticities obtained from the individual county elasticities for Group 2 (.96 and .92, respectively)

were slightly more elastic than the coefficients obtained by regression. The variability of the individual county elasticities was rather large for the standard deviations of the tax base and revenue elasticities were .35 and .39, respectively. The tax base coefficients ranged from a low of .44 to a high of 2.15. The revenue elasticity coefficients ranged from .23 to 1.76. However, only in 13 cases did the potential for added levies amount to more than 25 percent of the 1967 actual levy on an individual county. The Chattanooga SMSA, Grainger, Hawkins, McMinn, Maury, Robertson, and Smith counties imposed average or greater tax levies in 1967. Of the counties named all but Knoxville levied taxes exceeding 2 percent of personal income in 1967. Benton, Carroll, Franklin, and Sevier were the only counties which would have been forced to a relative tax burden index greater than 100 at the 1967 average level of tax effort.

The major portion of potential additional property tax levies were accounted for by Knoxville, Bedford, Carroll, Dyer, Gibson, Greene, Madison, Montgomery, Rutherford, Sullivan and Washington counties. These 10 counties of the 28 counties in Group 2 accounted for $8.2 million or 90 percent of the $9.1 million gap between actual and potential levies in 1967. Therefore, the remaining 10 counties which did not impose property tax levies at the 1967 average level of effort for Tennessee had relatively small gaps between actual and potential levies.

Continuation of these trends for Group 2 counties through the 1970's would most likely result in rapidly increasing difficulties for officials of some county governments in meeting revenue needs. The evaluation of Group 2 counties indicated greater absolute and relative

potential for additional property tax levies in 1967 than for any other group of counties.

The counties of Group 1 showed property tax base and revenue elasticities of 1.3 and 1.1, respectively, for the 1960 to 1970 period. Eight of the 15 counties in Group 1 had both base and revenue elasticity coefficients greater than unity for the period. The standard deviations of the individual county elasticity coefficients for Group 1 counties were .22 and .32 for the tax base and revenue, respectively. These deviations were the smallest for all four groups of counties.

There were, in fact, 11 of the 15 counties in Group 1 which underutilized the property tax base by imposing actual levies of less than 1.78 percent of personal income in 1967. However, only Coffee, Hamblen, Putnam, Warren, and Weakley counties could have realized more than 25 percent increases in property tax levies by imposing the state average levy. The additional levies available to Bradley, Coffee, Hamblen, and Warren counties would have amounted to about $2.1 million of the $2.9 million property tax gap for counties of Group 1. Thus the remainder of Group 1 counties tended to be levying property taxes at close to the average effort level for the state of Tennessee in 1967. There were three counties, Nashville, Humphreys, and Williamson, which levied property taxes at rates exceeding 2 percent of personal income in 1967. Nashville and Humphreys levied taxes at the rates of 2.17 and 2.27 percent while Williamson levied at the rate of 2.79 percent of personal income in 1967.

There were 16 counties in Group 3. Of the 16 there were 10 which did not levy property taxes at the average level of effort for Tennessee

in 1967. However, only six of the counties would have increased local levies by 25 percent or more at the average level of effort. The gap between actual and potential levies for Group 3 was about $1.1 million in 1967. DeKalb, White, Marshall, Henderson, and Fayette counties accounted for $.8 million of the total gap for the group of counties. Variability of the individual county tax base and revenue elastidities was more severe for Group 3 than for Groups 1 and 2. The means of individual elasticities were approximately 1.2 and 1.0 for the tax base and the tax revenue, respectively. Standard deviations for the two elasticities were .33 and .46. The tax base elasticity ranged from .58 to 1.85 and revenue coefficients ranged from .42 to 1.98 for the 16 observations. The tendency for counties of Group 3 to respond readily to changes in income with greater than proportional increases of the tax revenues was slight with only seven of the 16 counties indicating revenue coefficients of income elasticity greater than 1.0 during the decade of 1960 to 1970. There were but two counties, Hardin and Hickman, in this group which levied property taxes in excess of 2 percent of personal income in 1967. Hardin County levied taxes at 2.05 percent of personal income while Hickman County imposed levies which amounted to 3.23 percent of personal income for the year 1967.

There were 32 counties in Group 4, and 11 of these levied property taxes at less than the average rate for Tennessee in 1967. The variability of elasticity coefficients was greatest for this group of counties. The mean tax base and revenue elasticities were 1.1 and 1.0, respectively. The standard deviations were .57 and .50, respectively. The tax base elasticities ranged from .09 to 2.30. The revenue elasticities ranged

from .01 to 2.44. The counties of this group which would have increased levies in excess of 25 percent at the average level of effort in 1967 were Grundy, Hancock, Overton, Perry, Stewart, Unicoi, and Van Buren. Of these counties only Unicoi and Carter counties had property tax levies reaching $500,000 at the 1967 potential. The balance of counties which levied at less than the average effort included some which had larger absolute potential additions to property levies than the counties just cited. Carter County and Marion County had potential additions to levies amounting to $240,000 and $130,000. These two counties plus the counties of Unicoi and Overton at $110,000 each accounted for $600,000 of the $980,000 of levy potential for this entire group of 32 counties. The relative smallness of these additional levies for counties in this group does not diminish the importance of these revenues to the counties. There were 12 of these counties which levied property taxes at the rate of 2 or more percent of personal income in 1967. Five of the counties exceeded the United States average of 2.5 percent. Scott County levied taxes amounting to 4.57 percent of personal income in 1967, and Campbell County levied taxes at the rate of 3.29 percent of personal income for the same year.

Evaluations of potential property tax levies for 1976 were obtained at two assumed levels of tax collection effort. The low level of effort assumed for 1976 was 1.78 percent of personal income, the same level as used in the evaluation of 1967 potentials. Based upon the projections of individual county personal income changes derived for this study this level of tax collection effort would produce levies approximately twice as large as those of 1967. The increases in per capita

levies would more than double for many of the counties in Group 2. Per capita levies for the remaining county groups would approach doubling during the period.

The higher level of tax collection effort (2.5 percent) would have a considerably more drastic effect upon total and per capita tax levies. Certain of the Group 2 counties would have per capita levies increased by four to five times from 1967 levies. The result for the state would be to increase property tax collections from $165 million to an estimated $455 million by 1976. This would mean an increase of more than 175 percent in property tax levies in Tennessee. However, the relative burden in many counties should be no greater than counties encountered in 1967 due to the projected increases in personal incomes per capita. Relative burdens would again tend to be considerably lower among counties of Groups 1 and 2 since fewer of the counties in Groups 3 and 4 were projected to achieve drastic increases in per capita income levels in the period.

II. IMPLICATIONS

The revenue elasticity coefficient of .86 for Group 2 counties during the 1960's indicated an unwillingness to put income increases into property tax payments. The property tax base elasticity for this group of counties was .95 or slightly inelastic and considerably less elastic than the coefficients of 1.3 obtained for counties of Groups 1 and 3. The tendency for lower response among these counties to changes in income for both the tax base and revenues apparently had resulted in a "revenue gap." Continuation of these trends into the 1970's would result in

increasing difficulties for county officials seeking to secure necessary revenues. The evaluation of revenue potentials for 1967 and 1976 indicated these counties had the greatest potential for adding to property tax levies. While realization of potentials would bring about drastic increases for these counties in per capita tax levies the relative effort index values for most counties would not be inordinately high because sizable per capita income increases were projected.

The next largest potential for increasing property tax revenues lay with counties of Group 1. Because most of these counties tended to have more elastic tax base and revenue responses during the 1960's, the projected increases in per capita levies and in relative burdens were smaller than for Group 2 counties. Projected relative burdens for most of these counties at the high level potential were for the most part less than the relative burdens which were incurred by these counties in 1967.

Changes for a few individual counties in Groups 3 and 4 were projected to result in substantial increases in per capita and relative tax burden. However, the general level of tax effort for these counties during the 1960's tended to be rather high and the low level of tax effort used for the 1976 potential represented a decrease in effort for several counties of these two groups. Nevertheless, the relative effort exerted by counties of Group 4 would remain highest for the state at the low level of effort and were the high tax effort assumed the mean relative effort would be 1.5 times that of the Group 1 counties.

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APPENDIX

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TABLE A-1

LIST OF VARIABLES CONSIDERED FOR THE STUDY AND SUBJECTED TO MULTIVARIATE ANALYSIS

Item	Description
1	Percentage change in total personal income from 1959 through 1969.
2	Percentage change in per capita personal income from 1959 through 1969.
3	Percentage change in total property tax revenues from 1960 through 1970.
4	Percentage change in per capita property tax revenues from 1960 through 1970.
5	Percentage change in total property tax base from 1960 through 1970.
6	Percentage change in per capita property tax base from 1960 through 1970.
7	Change in the percentage of homes lacking plumbing facilities from 1960 through 1970.
8	Change in the percentage of homes valued at less than $10,000 from 1960 through 1970.
9	Change in the percentage of homes valued at more than $20,000 from 1960 through 1970.
10	Change in the percentage of population that is rural from 1960 through 1970.
11	Percentage change in population density per square mile from 1960 through 1970.
12	Change in the dependency ratio from 1960 through 1970.
13	Percentage change of population in places 2,500 and above.
14	Percentage change of population in places of 10,000 persons and above.
15	Change in the percentage of population in group quarters.
16	Change in the rate of population doubling from 1960 through 1970.

TABLE A-1 (continued)

Item	Description
17	Compound annual rate of population growth.
18	Change in the median age of the population.
19	Change in percentage of the population aged 16 and above.
20	Change in percentage of the population aged 18 to 24 years.
21	Change in percentage of the population aged 19 and above.
22	Change in percentage of the population aged 21 and above.
23	Change in percentage of the population aged 65 and above.
24	Change in the percentage of homes occupied from 1960 through 1970.
25	Change in the percentage of homes renter occupied from 1960 through 1970.
26	Percentage change in mobile home numbers.
27	Change in the median contract rent from 1960 through 1970.
28	Percentage change in average value of farms including land and buildings from 1954 through 1964.
29	Change in the percentage of land in farms from 1954 through 1964.
30	Percentage change in total retail sales from 1958 through 1968.
31	Percentage change in total retail establishment payrolls from 1958 through 1968.
32	Percentage change in employees engaged in manufacturing from 1958 through 1968.
33	Percentage change in manufacturing payroll from 1958 through 1968.
34	Percentage change in value added by manufacturing from 1958 through 1968.
35	Percentage change in new capital expenditures in manufacturing sector from 1958 through 1968.
36	Percentage change in population from 1960 through 1970.
37	Change in the fertility ratio.

TABLE A-1 (continued)

Item	Description
38	Percentage change in effective buying power from 1959 through 1969.
39	Change in the percentage of households with greater than $10,000 income.

TABLE A-2

ESTIMATED PERSONAL INCOME IN SELECTED YEARS 1959-1969 AND PROJECTED INCOME 1975

SMSA or County	Millions of Dollars							
	1959	1962	1965	1966	1967	1968	1969	1975
Chattanooga	517.2	570.1	724.1	809.4	875.7	943.2	1,031.4	1,621.6
Knoxville	664.3	741.0	897.5	974.6	1,047.3	1,140.4	1,240.1	1,800.6
Memphis	1,176.3	1,379.3	1,735.8	1,905.8	2,062.6	2,290.9	2,499.1	3,975.7
Nashville	903.8	1,037.7	1,319.5	1,459.4	1,580.3	1,746.0	1,910.4	3,050.8
Bedford	33.4	39.1	49.3	57.0	59.7	66.0	73.2	122.6
Benton	10.8	12.3	16.1	17.5	19.2	19.8	21.5	35.1
Bledsoe	5.1	6.1	7.2	7.6	8.9	8.7	9.6	14.1
Bradley	53.4	65.5	87.0	92.5	97.1	112.5	126.7	208.3
Campbell	23.4	26.6	31.6	32.8	37.8	42.0	43.7	61.2
Cannon	9.9	11.4	11.5	11.4	11.4	12.3	13.2	14.2
Carroll	25.3	30.4	36.6	39.3	43.8	47.7	51.2	77.9
Carter	53.8	56.2	71.1	75.4	74.0	80.2	86.7	121.9
Cheatham	8.7	11.1	16.7	18.5	19.8	23.1	27.5	54.5
Chester	8.7	10.4	12.7	13.5	14.2	16.2	17.7	26.4
Claiborne	14.3	16.8	20.0	22.6	29.0	28.0	30.0	46.4
Clay	5.3	6.0	6.9	7.4	8.2	8.8	9.4	13.0
Cocke	20.8	26.2	33.3	35.3	38.6	42.9	47.5	76.9
Coffee	46.4	60.0	80.1	87.7	91.8	91.8	96.9	183.1
Crockett	16.5	18.5	25.2	25.9	27.3	27.6	31.1	48.3
Cumberland	15.7	19.9	26.4	27.6	31.6	35.5	37.4	64.6
Decatur	8.3	9.8	15.3	17.5	19.3	22.3	23.8	51.2
DeKalb	10.8	13.9	16.3	17.0	17.9	19.9	21.1	31.7
Dickson	20.9	24.4	35.1	36.6	41.2	46.2	50.6	87.9
Dyer	38.4	45.2	60.7	60.6	71.3	79.8	86.2	133.8
Fayette	15.8	19.0	28.0	28.8	31.7	33.5	35.9	65.9
Fentress	8.1	10.2	12.1	10.3	13.7	15.3	17.0	19.9
Franklin	27.2	33.9	40.4	43.3	47.3	50.0	53.8	83.2

TABLE A-2 (continued)

SMSA or County	Millions of Dollars							
	1959	1962	1965	1966	1967	1968	1969	1975
Gibson	60.5	75.5	102.8	110.2	134.6	158.8	169.1	302.3
Giles	24.8	28.4	32.1	35.1	42.0	47.0	52.1	71.3
Grainger	7.7	9.0	10.7	11.4	12.4	14.0	15.8	22.2
Greene	46.5	59.0	77.4	83.6	91.4	96.9	105.5	185.1
Grundy	9.6	11.0	11.9	13.5	14.3	14.1	15.1	21.1
Hamblen	49.2	58.0	80.2	84.9	89.1	105.4	112.2	191.4
Hancock	4.5	4.9	4.8	5.7	8.1	8.7	9.8	12.2
Hardeman	16.2	20.8	32.4	34.7	40.1	40.9	44.2	95.4
Hardin	14.7	20.7	25.9	28.3	30.4	33.3	35.0	64.6
Hawkins	23.2	27.2	31.2	43.5	50.0	55.3	58.7	112.8
Haywood	19.9	26.6	31.1	33.6	33.8	36.2	39.0	62.3
Henderson	15.7	21.5	25.1	26.9	30.9	33.7	35.8	58.3
Henry	28.1	31.8	43.1	45.9	50.8	55.1	58.7	97.2
Hickman	13.5	13.1	16.7	18.6	17.8	18.9	24.1	31.5
Houston	5.2	5.8	8.0	8.5	9.0	9.3	10.2	16.8
Humphreys	16.3	16.5	22.9	25.2	29.2	34.8	40.7	62.1
Jackson	7.5	8.6	9.4	10.6	12.7	13.3	14.8	20.4
Jefferson	25.0	32.1	44.7	46.9	45.5	55.1	57.9	105.0
Johnson	8.2	9.8	12.1	12.5	13.1	17.3	19.5	27.3
Lake	10.2	11.7	14.5	13.6	14.6	14.7	16.1	20.8
Lauderdale	19.7	22.4	32.5	33.3	35.0	37.8	40.1	68.9
Lawrence	29.2	37.6	46.2	52.7	54.0	61.1	63.8	112.7
Lewis	6.8	7.9	10.4	12.1	13.1	13.9	14.9	27.0
Lincoln	29.5	33.0	39.7	44.7	45.7	49.5	53.4	80.6
Loudon	28.9	31.9	38.7	41.0	44.7	47.8	51.7	72.9
McMinn	44.7	58.7	66.8	71.0	84.4	91.3	98.1	148.6
McNairy	15.1	19.4	24.6	25.9	27.6	29.8	31.8	53.0
Macon	13.2	14.5	16.6	17.6	18.6	20.1	22.2	28.7
Madison	83.1	96.0	124.3	132.1	140.3	154.2	173.3	267.1

TABLE A-2 (continued)

SMSA or County	Millions of Dollars							
	1959	1962	1965	1966	1967	1968	1969	1975
Marion	21.3	25.7	30.8	35.3	38.8	38.6	40.9	68.4
Marshall	24.5	26.8	32.8	35.2	38.9	42.7	48.3	67.6
Maury	59.1	75.2	89.6	98.3	100.7	109.5	119.5	189.7
Meigs	4.3	4.5	5.8	6.4	6.4	7.5	8.4	12.3
Monroe	21.8	24.2	30.0	31.3	36.0	39.1	41.8	60.1
Montgomery	90.6	104.3	119.2	127.6	146.8	162.7	173.2	240.0
Moore	3.9	4.7	5.4	5.9	6.3	7.3	7.9	11.4
Morgan	10.0	10.5	12.2	12.9	15.3	17.3	19.2	24.3
Obion	42.3	42.2	59.2	61.4	67.4	76.3	81.8	122.8
Overton	10.5	13.7	17.0	17.2	19.4	21.6	23.4	36.3
Perry	4.6	5.4	7.4	7.9	8.8	9.6	10.3	17.7
Pickett	3.5	3.9	5.1	5.2	5.1	5.5	5.7	8.6
Polk	24.1	24.1	28.9	32.1	34.1	37.0	38.2	53.1
Putnam	32.4	40.9	52.4	54.9	61.7	68.7	74.0	121.4
Rhea	16.3	19.0	24.9	25.1	32.9	34.3	37.0	57.1
Roane	39.3	45.0	54.5	57.1	67.1	72.4	76.3	111.0
Robertson	32.6	36.3	44.5	48.7	47.8	50.1	56.7	82.3
Rutherford	66.8	81.2	98.1	110.7	121.0	129.0	142.7	230.5
Scott	11.2	13.2	15.5	17.9	18.6	22.1	23.2	36.5
Sequatchie	4.8	5.8	8.7	8.8	8.1	8.5	8.6	16.2
Sevier	23.7	28.5	36.7	37.7	46.5	51.0	57.0	87.6
Smith	13.1	15.2	18.0	19.7	18.8	21.8	23.5	34.1
Stewart	7.1	8.3	10.4	11.0	11.8	15.2	16.4	24.3
Sullivan	225.6	271.5	312.5	384.8	387.2	435.9	482.3	796.1
Tipton	28.1	31.5	39.7	40.6	44.9	48.1	52.3	74.7
Trousdale	4.7	6.7	9.2	10.8	11.2	12.8	13.3	29.8
Unicoi	17.5	20.4	24.0	26.7	31.1	34.7	38.9	57.3
Union	4.8	5.6	6.5	6.8	7.5	8.3	9.6	12.7
Van Buren	2.2	3.7	6.8	6.8	6.1	7.2	7.2	21.2

TABLE A-2 (continued)

SMSA or County	Millions of Dollars							
	1959	1962	1965	1966	1967	1968	1969	1975
Warren	26.8	32.5	46.1	48.4	55.9	61.1	68.7	120.9
Washington	93.9	98.9	126.2	136.0	148.3	164.0	180.4	262.0
Wayne	10.7	13.0	17.0	19.3	19.2	21.4	23.5	41.4
Weakley	27.1	33.6	44.5	48.5	52.5	55.9	61.6	107.3
White	15.7	18.3	26.5	27.7	30.7	34.2	36.0	64.5
Williamson	27.4	34.6	47.6	50.5	57.7	61.6	67.7	121.9
Tennessee	5,394	6,258	7,859	8,669	9,287	10,223	11,233	17,953

VITA

Gerald V. Eagan was born at Drayton, North Dakota, October 5, 1931. Reared in Minnesota, he graduated from Argyle High School in 1948. He graduated from the University of Minnesota in 1952 and taught Vocational Agriculture at Lanesboro, Minnesota for one year. Upon completing two years army service he was employed as Assistant County Extension Agent at Pikeville, Tennessee. In 1964 he entered Graduate School at The University of Tennessee receiving a Master of Science degree in 1966. Upon completing the requirements for a Doctor of Philosophy degree he accepted a position as Agricultural Economics Specialist in the Extension Service of West Virginia University at Morgantown.

The author married the former Peggy A. Lawson of Cleveland, Tennessee. They have one daughter, Jere Michelle.