Order Number 8900097

Modeling municipal expenditures in Michigan

Selim, Jahangir, Ph.D.

Michigan State University, 1988

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

PLEASE NOTE:

In all cases this material has been filmed in the best possible way from the available copy. Problems encountered with this document have been identified here with a check mark __✓__.

1. Glossy photographs or pages _____
2. Colored illustrations, paper or print _____
3. Photographs with dark background _____
4. Illustrations are poor copy _____
5. Pages with black marks, not original copy _____
6. Print shows through as there is text on both sides of page _____
7. Indistinct, broken or small print on several pages ✓
8. Print exceeds margin requirements _____
9. Tightly bound copy with print lost in spine _____
10. Computer printout pages with indistinct print _____
11. Page(s) _____ lacking when material received, and not available from school or author.
12. Page(s) _____ seem to be missing in numbering only as text follows.
13. Two pages numbered _____. Text follows.
14. Curling and wrinkled pages _____
15. Dissertation contains pages with print at a slant, filmed as received _____
16. Other _____

_____

_____

MODELING MUNICIPAL EXPENDITURES IN MICHIGAN

By

Jahangir Selim

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Urban and Regional Planning Program
College of Social Science

1988

ABSTRACT

MODELING MUNICIPAL EXPENDITURES IN MICHIGAN

By

Jahangir Selim

Municipal expenditure levels vary from community to community according to the unique combination of their social, economic, and physical characteristics. Type of community, nature of government, location, fiscal capacity, and other variables affect municipal expenditures. Although research on municipal expenditures is extensive in the literature, city officials and planners still have little guidance in estimating changes of expenditures properly to reflect changes in community characteristics. The results of most studies have limited application for the estimation of community expenditures because they are primarily based on aggregate national data. This dissertation provided results more useful to individual cities in Michigan by working with variables that can better distinguish their characteristics.

This study analyzed the 1980 expenditures of 293 Michigan municipalities, and developed multiple regression equations to estimate expenditures as a function of a

selected number of community characteristics. From a large data set developed from community fiscal reports, categories of expenditures were selected according to their budgetary importance, and expenditure determinants were derived from a combination of correlation analysis, factor analysis, and the theoretical notions developed in the literature. Seven dependent and ten independent variables were included in the final regression analysis.

The results of the study showed that the following variables describing fiscal capacity and population account for most of the variations detected: population density, population size, percent of new housing, percent of business value, household median income, total tax per capita, intergovernmental transfer, and community structure.

The regression equations were used to estimate expected changes in expenditures due to changes in community characteristics. The extent of expenditure variations were discussed by calculating coefficients measuring per capita expenditure changes due to fixed changes on the independent variables. Conclusions were drawn from the regression models and their applicability and limitations were also discussed.

ACKNOWLEDGMENTS

My special appreciation and thanks goes to Dr. Rene Hinojosa, Chairman of my Guidance Committee, for his advice and encouragement throughout development and completion of this study. I am also thankful to Dr. Roger Hamlin, Dr. Bruce Pigozzi, Dr. Paul Strassmann, and Dr. Milton Steinmueller, for their willingness to serve on my Guidance Committee and for their valuable advice.

A grant from the Center for Redevelopment of Industrialized States (CRIS), an organ of the Social Science Research Bureau at Michigan State University, was very helpful in the completion of this research. Special thanks goes to CRIS and persons associated with CRIS, who were helpful throughout the research.

Finally, I wish to thank all individuals who have offered help in many ways in the completion of this research.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER 1

INTRODUCTION

Overview of the Study

Municipal authorities make many of the important financial decisions which affect residents who live within the municipal boundary. Proper fiscal allocations in support of municipal services are essential to generate and provide efficient services to the community. The rising cost of services, the limits of tax base and revenues, and the changes on community characteristics make the study of municipal finance a complex subject (Morss, 1966; Bradford, et al., 1974). Citizens of a community increasingly demand better services for less or no tax increases. Recent cuts of federal funding for local governments and reduced state transfers have placed additional strains on municipal officials and planners in their attempts to provide better services.

There are different components of municipal finance, such as expenditure levels, tax base, inter-governmental fund transfers, and others. The expenditure side is the most important and complex facet of municipal finance. One aspect of municipal fiscal planning is to allocate future expenditures to different expenditure

categories (Sharkansky, 1967). In the allocation process, the knowledge of which community attributes are associated with what type of expenditure category is very helpful (Weicher, 1970). In most cases, however, planners and public officials often use combination of approaches, such as analysis of past trends, earlier year's budgetary commitments, limitation of taxing base, and others.

In Michigan, the levels of local government expenditures have not been studied well enough to provide guidance to planners and decision makers in local communities. What is needed is knowledge of expenditure levels as a function of community attributes or characteristics. In other words, what is the distribution of municipal service expenditures that corresponds to particular features of a community? How is the knowledge of community attributes helpful in allocating future expenditures? Do community characteristics affect federal and state funding? Do different types of communities have different expenditure behaviors? Does type or nature of a government affect its expenditure levels? Does the location of a community affect its expenditure levels? Are there regional variations in expenditure levels? These are unanswered questions that need to be studied in Michigan.

The present research investigated the effect of community characteristics on municipal expenditures, the

variation of expenditures according to community categories, the variation of expenditures according to government type or nature, and regional variations of municipal expenditures.

This research studied 293 different communities in Michigan. Correlation and factor analysis were performed to identify and test the correspondence between levels of expenditure and community attributes. Also, linear regression equations were developed to explain the variation of expenditures according to community attributes, community category, government type, and regional location.

The results from this study may be helpful to more than 1700 local communities in Michigan. Most of these local communities cannot initiate or support studies of this kind because of lack of funds or research personnel. Similarly, at the state level, it is not known that such a study has been conducted.

Problem Statement

The expenditure level of any municipal community depends on its unique physical and socio-economic characteristics. Each community determines its expenditures through an independent decision-making process. Community characteristics influence decisions on expenditure allocation. Planners or public officials

react to the interaction of socio-economic and physical forces within a community during the decision-making process. In other words, the allocation of funds to different municipal services reflects (or is strongly associated with) the community's characteristics. Fabricant (1952) first raised the question of possible relationships among expenditures and community characteristics.

If all the communities expenditures behave in the way as described above, then it is possible to find some of the determinants or community characteristics which directly relate to the process of expenditure allocation. Each of the expenditure categories are usually correlated with at least one or more community characteristic. Knowledge of correlation or relationships between expenditure levels and community characteristics is important to understand the expenditure level of a community or municipality. These relationships can help to explain how the expenditure levels would change if the community characteristics change. Fisher (1964), Bahl (1965), and Kee (1965) have used correlation technique to explain the relationships among expenditures and community characteristics.

The changing community characteristics, the revenue restrictions (limited sources), and diversity of expenditure levels complicate the understanding of the

expenditure variations. Knowledge of correlation between expenditures and community characteristics is a good way to begin explaining the allocation of expenditure; at least it can give a good idea of the direction of change in expenditures (increase or decrease according to the change of community attributes). For example, Gabler (1971), has shown that increases in population density usually increases police expenditures in Ohio and Michigan.

Another question is the variation of municipal expenditure according to type of community (such as city or township). How expenditures vary according to type of community has not been studied well enough to give a better understanding to municipal officials.

Another factor that needed attention was the administrative structure of the community as this determines the way fund are allocated. In Michigan, the decision- making process varies from community to community, depending on the type or nature of its government. In some municipalities, decision making is strongly influenced by the mayor, in others by the city manager, and in some communities by a legislative body or some combination of the above. How the nature of decision-making processes influence the expenditure level has not been studied in Michigan to explain the variation of expenditures.

The role of spatial location of a community is also a factor whose importance is unknown in Michigan. Gabler (1971), Kasadra (1968), and others have studied regional variations of municipal expenditure in the U.S., but regional variations within a state are important for municipalities, as each state has its own uniform laws and regulations to control local governments. How the variations of characteristics from region to region in Michigan affects municipal expenditures can also be an important help in explaining the municipal expenditure levels.

Local Government in Michigan

The different forms of local governments in Michigan are broadly classified as: counties, cities, townships and villages. The term municipal government usually refers to all of the above local governments, which is how it are used in this research.

Cities, townships, and villages are entitled to perform different activities according to charters, general laws, or statute authorized by the state. A local unit of government may be incorporated or unincorporated. To be incorporated by law means that the unit of government is entitled to perform certain basic duties and provide services to the community in addition to powers to regulate, tax, and spend.

Townships are the oldest form of local governments in addition to counties. Townships were introduced in Michigan in 1787, as a unit of land survey measuring six square miles. In 1827, townships became a form of local government. Townships provide several local services with limited revenue collecting powers (Taylor and Bourdon, 1969, pp. 2-3). There were about 1,200 townships in Michigan in 1980.

A city is the most urbanized form of local government having special powers and responsibilities. A city is a separate unit of local government, having specific duties specified by the state and its own responsibilities to provide services to the community. Usually a city has greater independence to maintain local regulations and functions in respect to providing services, assessing properties, and having taxing power. These additional power in cities might have effect on their expenditure levels.

In 1981, there were 266 cities in Michigan which had "home rule" charters adopted by local referendum (Michigan Municipal League, 1981, p. 2). All of the 266 cities were incorporated.

The basic difference between a village and a city is that if an area is incorporated as a village, it may still remain part of the township. Villages have limited powers to provide police and fire protection, to do public

works, and provide utilities. But assessing property value, collecting taxes for school districts, administrating county, state and local election are performed by townships (Michigan Municipal League, 1981, p. 2). Villages are either governed by general laws or by special charters. In Michigan there were 266 incorporated villages in 1981, out of which 219 were governed by general laws, and the rest by special charter.

Purpose and Objectives of the Study

The purpose of this study was to determine how municipalities behave in allocating expenditures to different services they provide. Michigan, as a state, has its own identity in a unique social, economic, and political structure which is significantly different from other states. Within the state system, the municipalities are subject to some common features (such as, state regulations, tax system, audit system, state's property valuation, etc.) which influence the municipalities in allocation processes. Hence, the main purpose of this study was to see how these features combined with community characteristics determine the expenditure levels in municipal governments.

This study focused on determining the relationships between expenditures and community characteristics, including revenues, to see how the

changes of community variables affects the expenditures. The main outcome of the research was, therefore, to explain and establish the nature of those relationships. The results can be helpful for local officials and planners to analyze their future budgets, expenditure patterns or levels, and to estimate expenditure shifts for changing community characteristics and revenue base.

The relevancy of this study can be justified on the following grounds:

1. Most of the previous studies were conducted based on interstate or nationwide samples. Hence, implications of these results for a particular state are questionable, and require verification using a statewide sample because regulations and community attributes vary from state to state.

2. In most of the previous studies, the only variables included were those readily available from census documents. Hence, some of the important categories (e.g. expenditures for legislative, judicial, general government, protective services, planning activities, selected funds, capital outlays, and others) were not analyzed. Revenue sources, such as tax rates, transfers from the state, transfers from the federal government, and other selected funds were, in most cases, ignored. What their effect is on the explanation of expenditure variation is unknown.

3. The expenditure variation by type of community should be analyzed with a unified model, so that comparisons can be made. This research develops unified model that makes it easier to interpret the expenditure variations among the different types of communities.

4. The type of governments also influences expenditure levels, but this was not addressed by previous research. An analysis of how government types influence expenditure levels should provide for better understanding of the municipal fiscal process in Michigan.

5. The regional variation of municipal expenditures should be analyzed to provide some explanation of how municipal service costs vary according to the location of a community.

In summary, the dissertation attempted to achieve the following objectives:

1. to identify community characteristics or attributes which correlate to municipal expenditures

2. to determine the variations of expenditures by type or category of community

3. to determine the variations of expenditure according to the type or nature of municipal governments,

4. to determine the regional variations of municipal expenditures.

Research Assumptions

To accomplish the above objectives there were a number of research assumptions that were made. These are stated below in the form of the following hypotheses:

1. Each category of expenditure has a relationship with certain types of community characteristics. This relationship may be different for each expenditure category.

It is assumed that there may be a strong bondage between community characteristics and level of expenditures, but each expenditure category has different relationships with community characteristics.

2. There is every possibility that each type of community has a different expenditure structure.

In this view, expenditures also become a function of the nature or type of community, such as cities or townships. This assumption looks at how levels of expenditure differ from one type of community to another.

3. There is every possibility that type of municipal government has an influence on expenditures.

4. Municipal expenditures vary according to the regional location of a community.

These assumptions are discussed in Chapter 2 using the knowledge from the literature review.

Study Methodology

This study was based on a cross-sectional analysis of 293 communities in Michigan. Three analytical methods were used: (1) Pearson correlation analysis, (2) factor analysis, and (3) linear regression analysis. Initially, twenty-one expenditure variables were included, along with forty-three independent variables. After preliminary analysis, a limited number of important dependent, and independent variables were chosen. Regression equations were then derived taking each of the selected expenditure variables as dependent variables, along with selected independent variables. Dummy variables were used where appropriate.

The data used for the study were collected from the documents of the U.S. Census Bureau and from other federal and state agencies. A substantial portion of the data was extracted from unpublished records of the Bureau of Local Government Services, Michigan Department of Treasury.

The sample of 293 communities included all cities and townships having a population of 5,000 or more, as defined by the 1980 Census of Population.

The study started with the identification of the important dependent and independent variables. The aim of this stage was to eliminate redundant variables before the application of multiple regression equations. Three types

of screening approaches were used: (1) judgmental and reasoning, (2) Pearson correlation analysis, and (3) factor analysis. The use of these approaches can be justified by the following points:

1. Knowledge from previous studies of municipal expenditures provided a starting point for selecting variables that may be important in the regression equations. The problem of using this information was that as fiscal processes differ from state to state, variables found relevant in other states might not be relevant in Michigan. The advantages of this method were that there might be some variables which have similar effects across different states.

2. Pearson correlation analysis can be applied to both dependent and independent variables to identify community characteristics that are strongly related to expenditures. Correlation coefficients can be used to select the most representative variables within categories of variables for both dependent and independent variables.

3. Factor analysis is another way to screen redundant variables, particularly in multivariate analysis. This analysis was performed for identifying important dependent and independent variables for inclusion in the regression. The use of this technique, discussed in detail later, reduces the multicollinearity problem.

The next step in the analysis was to determine the relationships between expenditures and community characteristics variables. This was done by deriving linear regression equations taking expenditure variables as dependent variables and community characteristics as independent variables. Seven regression equations were derived to reflect the most important expenditures. Selected independent variables were initially entered in the regressions, but were further reduced by the step-wise regression method. Dummy variables were developed for the nominal variables.

Organization of the Dissertation

The dissertation was organized into six chapters. Chapter one presents an introduction and preliminary overview of the research which includes the statement of the problem, the purpose, justification and a brief outline of the hypotheses.

Chapter two reviews previous studies and research done in the subject area. The literature review and theoretical background are also discussed. Then in relation to theoretical perspectives, the research questions are analyzed, and assumptions of the study are made.

The methodology of the study is discussed in Chapter three. It includes the variables used in the

study, their definitions, application of study techniques and how the analysis is made.

In Chapter four, results of the preliminary analysis of the variables are presented, particularly the selection of dependent and independent variables for the regression. Statistical analysis of variables and relevant results are shown.

The regressions building process and regression results are presented in Chapter five. The implications of results are also discussed.

Chapter six is a summary of the study, along with an outline of limitations as encountered, and suggestions for further research.

CHAPTER 2

LITERATURE REVIEW

Overview

This chapter reviews previous research and studies related to municipal expenditures. During the literature review, similarities and contradictions of the various research results are pointed out. The chapter ends with a discussion of the contribution of the literature to the research assumptions posed earlier.

Literature Review

The expenditure levels of local governments drew the attention of a few researchers in the early 1950s. With very few exceptions, every study focused on per capita expenditures. In this review, "expenditure" is referred to per capita expenditures, unless otherwise stated. A leading study by Fabricant (1952) is pioneer in this regard. In that study, an analysis was made of state and local government expenditures using the 1942 U.S. census data for the 48 states. He included 12 expenditures (dependent) variables and 3 independent variables. The expenditure variables were: (1) state higher education, (2) local schools, (3) highways, (4) public welfare, (5) health and

hospital, (6) police, (7) fire, (8) natural resources, (9) sewer and sewer disposal, (10) other sanitation, (11) general control, and (12) all other expenditures. He included only three independent variables for explaining the expenditures: population density, degree of urbanization, and personal income. In Fabricant's research, all of the variables were found to be important in predicting or explaining the expenditure level.

In the late 1950s, Brazer (1959) studied expenditure levels with a nationwide sample of 462 cities (population of 25,000 or more). Linear regression techniques were used to conclude that municipal size, growth rate, and degree of urbanization strongly correlate with local service costs. After Brazer's study others followed.

Fisher (1961) used the same dependent and independent variables of Fabricant (1952) using 1957 data for 48 states to build regression equations for expenditure variables. It was concluded that,

> Variations in population density, degree of urbanization and per capita income explain a considerable amount of variation in per capita state and local government expenditure among the state. The degree to which these variables explain difference in expenditure for particular functions varies considerably. They explain a high proportion of the variations in expenditure for police and fire protection but a very low proportion of the variations in expenditure for public welfare (p. 355).

Kurnow (1963) criticized Fisher's model, and tried to developed a nonlinear regression model with the same

variables Fisher used, but including an additional variable of federal aid. It was argued that since 1942, federal aid to local governments had influenced the nature of expenditures (per capita), so he included the federal aid variable. He also compared the two models of Fabricant and Fisher.

He concluded that population density and the degree of urbanization are strongly correlated. He dropped population density from his model. He showed that his model explain 78% variation (R-square), while Fisher's model gives only 53% explanation of variability. He emphasized that one model estimated for one period might not be valid after several years because the system of expenditures and community attributes are changing.

Spangler (1963) used regression analysis to study the effect of population change on state and local government expenditures. Nine expenditure categories were considered as dependent variables: (1) education, (2) highways, (3) public welfare, (4) health and hospital, (5) police, (6) fire, (7) interest, (8) general control, and (9) capital outlay. Two sets of regression equations were determined for 1957 and 1960. The only independent variable was the rate of population change (for 1950-57 and 1950-60).

The study results revealed that except highway and public welfare expenditures, all other six categories (1,

4, 5, 6, 7, 8) have positive relationships between rate of population growth and per capita expenditures.

Loewenstein (1963) studied three suburban Philadelphia townships to investigate the effect of location of a new industry or departure of an existing industry on the fiscal revenues and expenditures. In one community, departure of an existing industry showed little effect on the township's income, and consequently, on municipal finance. In the other two communities, location of new industries showed net gain to the financial resources of townships' income. But the situation was a function of the type of industry, location of employees' residents, revenue structure of the community, and other variables. Attracting new industries was considered to be the most important factor in building community's financial resources.

Sacks and Harris (1964) conducted a study taking the same independent variables as used by Fabricant and Fisher, but added three other intergovernmental aid variables. The independent variables were: (1) population density, (2) percent of urbanization, (3) per capita income, (4) state aid per capita, (5) federal aid per capita, and (6) federal and state aid per capita. The dependent expenditure variables were: (1) all general expenditures, (2) higher education, (3) local schools, (4) highways, (5) public welfare, (6) health and

hospitals, (7) police, (8) fire protection, and (9) general control. They found that independent variables 1, 2, 3, and 4 gave the maximum goodness-of-fit (R-squares). They also found that population density is relatively the most important variable in the regression equations. Among the aid variables, federal aid was more important than state aid variables.

A later study by Fisher (1964) was performed using 10 expenditure variables and a multistate state and local expenditure sample. The dependent expenditure variables were: (1) local schools, (2) higher education, (3) highways, (4) public welfare, (5) health and hospital, (6) police, (7) fire, (8) sewerage and sanitation (9) general control, and (10) interest and debt. Although a total of 13 independent variables were included in the analysis, after preliminary analysis only 7 variables were included in the final regression. These were:

Economic variables:

(1) percent of families with less than $2,000 income, 1959,

(2) yield of representative tax system, 1960, as percent of the U.S. average.

Demographic variables:

(3) population per square mile

(4) percent of population in urban places

(5) percent increase in population

Socio-political variables:

(6) Index of two party competition

(7) percent of population over 25 with less than 5 years schooling, 1960.

In his regression analysis, he found that the variable "percent families with less than $2,000 income" explained most of the variation in the equations.

Kee (1965) performed a regression analysis using 1957 interstate data for 36 selected SMSAs. He computed regression equations for both central cities and suburban cities. He found that the complexity of organizational, administrative, and functional mechanism differ in both central cities and suburban cities. In general, he found that total general expenditures are mostly explained by: state aid; the ratio of central city's population to its SMSA population; per capita income; and, to a somewhat lesser extent, the local proportion of state and local government responsibility and ratio of owner occupied housing units. Highway expenditures were also explained by state aid, the employment ratio in manufacturing industries to total employment and the expenditure allocation variables for highways. Health and hospital expenditures were explained by two factors: population density and the allocation variables. He also concluded that some states delegate more power to local governments for expenditures, which has effect on expenditure levels.

Bahl and Saunders (1965) applied regression techniques on a 48 state sample of local government expenditures (1957 and 1960) to see how changes of some community characteristics influence expenditures. The independent variables were: (1) changes in per capita personal income, (2) changes in population density, (3) changes in urban population, (4) changes in per capita federal grants to states, and (5) changes in school enrollment. The dependent variables (per capita expenditures) were: (1) total general expenditures, (2) general control, (3) sewerage, (4) fire, (5) police, (6) health and hospitals, (7) welfare, (8) highways, (9) local public schools, and (10) institutions of higher learning. He estimated the equations for 48 states. He compared his study with that of Sacks and Harris who found that 3 basic independent variables (1, 2, 3) explained 52% of variation in 1957 and 1960. But Bahl and Saunders study found that these 3 variables explain only 18% of the variation. It was concluded that their new approach of considering changing effects of the independent variables, the basic three predictive variables of Fabricant showed diminishing explanatory power.

Morss (1966) raised the question of the validity of earlier cross-sectional studies, and argued that the objectives of studies of this kind were for (1) understanding, (2) prediction, and (3) developing guidelines

for normative decision in the field of municipal expenditures. He did his research with 1960 interstate data and emphasized the tax variables were the most important in explaining the expenditure variations. His only dependent expenditure variable was total per capita general state and local government expenditures. His independent variables were: (1) total per capita general state and local governments' taxes collected, (2) federal aid to state and local governments, and (3) all other revenues. He concluded that:

> In short, it appears that the federal aid variable is significant in explaining variations in state and local expenditures because [these] lower governments are required to spend all of federal aid they receive (p. 98).

He questioned the need for cross-sectional study and placed an emphasis on time-series study. But he did not suggest any particular approach.

Davis and Haines, Jr. (1966) studied a sample of data from the Pittsburgh Metropolitan Region applying the linear regression model. The dependent expenditures variables were: (1) general government, (2) public safety, (3) health and sanitation, (4) streets and highways, (5) interests, (6) total operation and maintenance, and (7) total capital outlays. The results of the study showed that population density, market value of industrial property, and median family income explained the greatest amount of variability in the equations.

Sharkansky (1967) studied the state and local government expenditures with a sample of 48 states using 1963 data. The expenditure variables were: (1) expenditures in total, (2) education, (3) highways, and (4) public welfare. The independent variables were: (1) per capita income, (2) federal aid as a percent of state government revenue, (3) tax effort (state and local government taxes as a percent of personal income), (4) state role (the percentage of state and local expenditures spent by state agencies), and (5) previous expenditures (i.e., expenditures per capita in 1961).

In the above study, an effort was made to include the previous year's expenditures as independent variables to estimate next year's expenditures. It was argued that

> The spending of past years helps to commit a state to certain levels of taxes and Federal aid, and serve to define the portion of state and local spending performed by State agencies. Thus, previous expenditures may be at the base of whatever simple relationship exist between current spending and other independent variables (Sharkansky, pp. 171-172).

To justify the above assumption, regression equations were estimated for 1963 expenditures taking 1961 expenditures as independent variables. Then the actual expenditures in 1963 were compared to estimated expenditures in 1963. The results showed that there were remarkable changes between estimated and actual expenditures in 1963. These results weakened the assumption that previous expenditure pattern have strong

influence on the current (or next year's) expenditure. By separating state and local governments expenditures, it was found that "state spending is not as dependent as local government spending on the level of economic activity" (p. 179). In other words, his finding established the relationship of economic activity and local government expenditure.

Gabler (1969) performed a study to see the effects of population size on city expenditures. Regression analysis was performed, taking data from three states -- Ohio, Texas, and New Jersey. His sample included all cities with a population of 25,000 or more. The dependent (per capita expenditures) variables were: (1) total current expenditures, (2) highways (3) police, (4) fire, (5) sanitation and sewerage, (6) parks and recreation, and (7) general control. The independent variables were (1) population size, (2) density or population per square mile, (3) rate of change of population size, (4) percent of population 65 years or over, (5) median number of school years completed by those 25 years or older, and (6) median family income. The data were divided into twc categories to see the effect of population size on expenditure data: (1) population size effect: cities 25,000 to 250,000 population, and (2) population size effect: cities with a population over 250,000. The results showed that city size has a direct

effect on the expenditure structure. City size is usually measured in terms of total population in a city.

Masten, Jr. and Quindry (1970) studied 567 cities and villages in Wisconsin using 1966 data to see the effects of population size on expenditures. The population subgroups of the data were designated as:

1. 477 cities and villages with a population less than 5,000
2. 62 cities and villages with a population between 5,000 and 20,000
3. 25 cities and villages with a population between 20,000 and 100,000
4. 567 cities and villages of all sizes (including 3 cities over 100,000 population)

The dependent variables were 1966 per capita expenditures. The independent variables were: (1) total population, (2) population density, (3) per capita adjusted gross income, (4) per capita full value of assessed property, and (5) land area.

The results of the study revealed some interesting relationships. It has been found that the explanatory power of independent variables varies according to the urbanization process or size of cities. Masten and Quindry's results support those of Gabler in that the relationship of population size and expenditure in local communities is significant.

Neenan (1970) analyzed whether suburban areas subsidize or are being subsidized for public services by central cities. The analysis was done to identify public sector benefits flows between Detroit and six suburban municipalities and revenues flows between Detroit and these municipalities. The conclusion was that the suburbs were exploiting Detroit's services.

Neenan's study is different from all other municipal studies described above. While others tried to investigate the variation of expenditures across communities, Neenan raised the question that municipal services produced in one community can be exploited by other communities. Furthermore, it shows that in the production and consumption of community services, locational or regional interdependence is a factor. Also, organizational structure of cities is important to explain municipal service expenditures.

Weicher (1970), in a study of central city expenditures, argued that previous researchers mostly relied on the following factors to explain municipal expenditures: (1) the possible existence of economies of scale (size of city), (2) the fiscal effect of political fragmentation (numbers of governments in SMSA), (3) the relationships between local expenditures and aid received from higher level of government, and (4) the response of expenditures to changes in fiscal capacity. In his study the above

factors were included, in addition to two new variables categories: (5) taste and (6) service conditions. The study analyzed the 1960 per capita expenditures of 206 central cities of SMSAs in each of the following service categories: (1) police protection, (2) fire protection, (3) sewer and sanitation, and (4) highways. The six independent variable categories and their respective variables were as follows:

(1) Measures of size:

(a) population size.

(2) Intergovernmental revenue:

(a) intergovernmental aid per capita

(3) Metropolitan fragmentation:

(a) the ratio of central city to urbanized area population (including the central city), and (b) the ratio of city manufacturing employment to SMSA manufacturing employment (again including the central city).

(4) Fiscal capacity (business activities were used to measure the fiscal activities):

(a) retail sales per capita, and (b) the number of manufacturing establishments per capita.

(5) Taste variables:

(a) racial: the proportion of nonwhite people, (b) ethnic: the proportion of people of foreign stock, (c) the proportion of population having less than 5

years of schooling over 25 years of age, (d) the proportion of persons 25 years or older who have completed four years of college, and (e) age: proportion of population less than 21 years.

(6) Service conditions:

(a) mean January temperature, (b) crowdiness: percent of housing units having more than one per room in 1960, (c) population density: population per square mile in 1960, (d) old housing: percent of housing built before 1930 (as of 1960). (e) number of employee per manufacturing establishment in 1958 (because larger industries provide their own services such as night watchers, sanitation, etc.).

Using linear regression analysis, Weicher found that in explaining police expenditures, twelve variables were important. The variables were: four taste variables (the proportion of foreign stock, nonwhite, young person, and college graduate), two service condition variables (population density and average size of manufacturing), intergovernmental revenue variable, three fiscal capacity variables (income, unemployment, and retail sale), SMSA population growth, and one measure of political fragmentation (central city's share of SMSA manufacturing). The research also showed that increases in population density have a tendency to increase expenditures. In the case of fire expenditures, results were similar to those of police

expenditures. In the case of highway expenditures, one taste variable (the proportion of foreign stock people), two service conditions variables (population density and mean January temperature), two measures of fiscal capacity (retail sales and intergovernmental revenue), crowding and city population were significant variables. The variables found significant in the case of sanitation expenditures were: taste (the proportion of nonwhite), service conditions (population density and age of housing), intergovernmental revenue, retail sales and the central city's share of urbanized area population.

Gabler (1971) made a new study taking 1962 data of eight states (including the 3 states of his 1969 study) to see whether city size produces a variation in expenditure or if there are economies or diseconomies of scale. Michigan was included in the study. His results support the earlier conclusion that "... for certain expenditures and/or employment classifications in certain states, large cities do experience diseconomies of scale" (p. 138). For example, the regional variation of the states expenditures were analyzed. It was found that an independent variable (population density) affecting expenditure positively in one state, have negative effect on expenditure in other states. In the case of police expenditure, increase of population density increases police expenditure in Michigan and Ohio. However, in California and New Jersey,

increase of population density has decreasing effect on police expenditures. Also it was found that population density has no effect on police expenditures in Texas, Massachusetts, or Illinois. This result suggests that the community characteristics variable found important in one region may not be important in an other state or region.

Kasadra (1974) used data for 168 SMSAs to study the relationship between suburban population growth and service performed in central cities (p. 135). He studied four major central cities' service functions: (a) retail trade, (b) wholesale trade, (c) business and repair, and (d) public services. He then divided public services into 6 per capita expenditures categories: (1) police, (2) fire, (3) highway, (4) sanitation, (5) recreation, and (9) general control. He then applied a multivariate path model by which he estimated the path coefficients between per capita expenditures for common central city service functions and population size of central cities and suburbs for the years 1960 and 1970. He concluded that in most cases, cities or townships are interdependent in providing services, and that basically suburban communities are more dependent on central city's services. These results and others (Neenan, 1970) point out the need to study the regional setting of communities.

Peterson (1976) made a comparative study of spending increases of 28 big cities from 1962 to 1972.

His main aim was to see the difference of spending in declining and growing big cities. In an estimate of 1972 expenditures, he found that in the case of per capita expenditures for police, housing, and fire, declining cities spent much more than growing cities. Growing cities, on the other hand, spent a little more in cases of per capita sewer and park and recreation than declining cities (p. 49). In regard to the property taxes, he argued that:

> ... the property tax has proved a fecund source of revenue for cities with expanding economic and population bases, but in the declining central cities it has lagged far behind spending totals (pp. 52-53).

Peterson emphasized local fiscal capacity. He identified the property tax base of a community as the most important factor in municipal finance, particularly for growing cities.

Bradford et. al., (1974) studied the inherent causes and trends of municipal service costs throughout the United States. He took two points in time in the 1950s and 1960s, and investigated the rising per capita costs in the categories of (1) education, (2) health and hospitals, (3) police and fire protection, and (4) public welfare. He argued that rising costs of municipal services were a function of the production inputs, technological development, and quality of municipal services. So, in comparing municipal expenditures across communities, it is important to notice the different

technological infrastructure systems (supply system, sewer plants, etc.) used by different communities.

In a study by Stuhmer and Hamlin (1977), several expenditures categories were analyzed taking 1972 Michigan expenditure data of municipalities. The expenditures variables (total expenditures in each category) were: (1) total expenditures, (2) general administration, (3) government, (4) buildings, (5) police, (6) fire, (7) sewer, and (8) roads. Regression analysis was performed with the following community variables as independent variables: (1) density of business value, (2) old housing, (3) low income, (4) professional employment, and (5) crowdiness. Two independent variables, such as, business value and percent of old housing were found important in all of the regression equations (significant level .05 or more). But R-squares for the equations were poor in most cases. In this study, expenditure variables were used as the "total expenditures" in each category. This is the only study where "total expenditure" were analyzed in comparison to all studies discussed so far, where per capita expenditures were used.

In a study in Wyoming, Minge (1977) found that,

> The legal system appears to affect allocation of public resources by local units of government. Some laws require expenditure for particular activities; other laws prohibit certain expenditures. Still other laws such as those limiting revenue, requiring certain

> procedures, and establish government structure may indirectly affect allocation (p. 399).

A later study by Bahl et. al., (1978), provided an alternative positive theory of police expenditures. Specifically, it meant to show within the context of a traditional consumer maximization model, how the socio-economic characteristics and fiscal capacities of a community determine the level of police expenditures, the level of police wages, and employment. A nonlinear model was tested using fiscal data for the year 1972 for a cross-section of 79 metropolitan governments with a population of 100,000 or more. Three dependent variables were tested as follows: (1) wages and compensation, (2) employment, and (3) crime. The independent variables for wage and compensation were: (1) opportunity wages, (2) median education of the city population over 25 years of age, (3) percent of police employees affiliated with a union, and (4) total police employment per thousand of population. It was found that:

> The average level of police wages is positively and significantly related to the level of manufacturing wages with an elasticity of about 0.8. The education variable has a positive effect on the police compensation rate and unionization is found to positively influence the level of police wages (p. 71).

Booth (1978) found ".... that a shift in municipalities employment base away from manufacturing, towards mercantile employment results in higher taxes and lower municipal service levels for local residents" (p. 33). He

developed three regression equations for three expenditure variables (1) per capita police expenditure (2) per capita fire expenditures, and (3) per student school expenditures. His independent variables were (1) mean family income, (2) percent of manufacturing employment to total population, (3) percent of mercantile employment to total population, (4) percent of residential assessed value to total assessed values, (5) population, (6) population density, (7) total students, and (8) percent of students to total population. He used data for 47 Wisconsin municipalities, each having a population of 10,000 or more in 1970. He found that mercantile employment is more significant than manufacturing employment in explaining expenditures.

Ladd (1978) developed a model to compare municipal expenditures of states which exercise limitations on local taxing power and states which do not. It was found that property taxes and intergovernmental aids have substantial influence on the local government spending.

Bennet (1980) analyzed the distribution of public goods in different industrialized countries including the United States. His analysis focused on supply and demand, government structures, locational aspects, and national and local framework. In the United States he found that the spatial variation of economic activities have impact

on revenue and expenditures structures of local governments (p. 68-9).

Ladd (1981) made a study to see the effect of population change on the total expenditures of municipalities. She used the 1975-1976 municipal expenditures data for Massachusetts cities and townships. The dependent variable was per capita total expenditures. The independent variables included were: (1) property tax per capita, (2) median income of families and individuals, (3) residential fraction of the assessed value of property subject to local property taxation, (4) metropolitan area population as proxy for the price of public services across metropolitan areas, (5) commercial worker per capita, (6) fraction of population living in households with income below the poverty level (1970), (7) fraction of housing units occupied by renters (1970), (8) manufacturing workers residing in the community divided by the population of the community (1970), (9) total 1975 population, (10) state categorical aid to local governments per capita, (11) federal revenue sharing grants per capita, (12) state lump aid to local governments per capita and (13) 1975 population divided by 1970 population. Using a nonlinear model she concluded that population of about 110,000 is an optimum size of a city, and the cities below or above that population size usually show increases in total expenditures.

Martin (1982) tried to address the questions of cities' budgets deficit/surplus and the nature of fiscal strain on big cities. With data for Detroit and Boston, Martin concluded that Boston suffered from a tax deficit and Detroit experienced the intergovernmental aids deficit. It is interesting to observe that different cities have different fiscal system with respect to revenue collection, as analyzed by Martin (1982) for Detroit and Boston. In the case of Boston, the city did not charge appropriate property tax, which put strain on the city's fiscal system. Hence the level of taxation is important to balance the level of expenditures. But in Detroit, the intergovernmental aid is a problem, as it was lagging in comparison to other big cities. Comparing this results with the study of Ladd (1978), it can be concluded that property tax and intergovernmental aids are important factors in analyzing the municipal expenditures.

Sjoquist (1982) studied 48 SMSAs in the south to see the effects of local governments on central city expenditures. His dependent variable is government (general) expenditure per capita in 1972. The independent variables are: (1) the number of jurisdictions within the SMSA in 1972, (2) the estimated tax share, and (3) median family income in 1970. The above three variables were found important to explain the expenditures.

Palumbo (1983) reestimated Sjoquist model using regional dummy variables to examine regional expenditure variation. The regional variation of expenditure have been found, which showed that Northeast region in the U.S. has higher per capita local expenditure. Hence, region play a vital role in the local government expenditure analysis.

Contribution of the Literature to the Research Assumptions

Investigation of earlier studies have provided some insight into the hypotheses posed in Chapter 1. In this section the validity of these hypotheses are discussed in light of literature review.

The first hypothesis describes that municipal expenditures have relationships with community attributes, and for each category of expenditure, the relationships are different. It has been found from earlier research that some community characteristics usually correlate with expenditure categories, but the degree of correlation varies from region to region and from state to state.

The literature review revealed that from 1950s researchers tried to investigate the possible relationships of the community characteristics with expenditure levels. Fabricant, in the early 1950s, first used the idea of possible relationships between expenditures and community characteristics. Since then

several other authors have investigated the possible relationships of community characteristics and municipal expenditures. The community characteristics identified varied from study area to study area and from one period to another period of time. Due to complexity of expenditure's relationships with community attributes, variables important in one study area, were found less important in other area. Also in some cases, several studies recognized identical variables, such as population size, population density, and property values. One of the major observations is that in all studies, variables found important are a combination of variables of earlier studies, and new variables representing unique characteristics of the study area. This observation leads to the assumption that in Michigan, it is possible to establish a relationships between community characteristics and expenditures. It is possible that some community characteristics identified by earlier researchers could be important in Michigan due to some similarities in community structure. Also some new community characteristics may be found important due to some unique characteristics of Michigan communities.

The issue of the costs of the services produced and related demands for services is important in comparing the municipal expenditures across communities. The costs of services varies from community to community, but costs

may be responsive to the demand and quality of services. In economic analysis, cost is usually determined when marginal cost equals marginal demand. Apparently, high demands generate high costs. In municipal services uniformity of costs are rare. Each community's service generating system is different and associated with local factors. One community can produce one service with better quality than another community with same costs. In most of the earlier research, this issue was overlooked.

Another observation is that each category of expenditure has different relationships with community characteristics. For example, police expenditures and roads expenditures do not have the same degree of relationships with community characteristics. Fisher (1964) in a nationwide study showed that police expenditures were mostly explained by income, population in urban place, population growth rate, and education levels of citizens. But roads expenditures were mostly explained by income, taxes, population in urban place, population growth, and political awareness. Similarly, separate relationships were found for each of the other categories. In this study, it is assumed that separate relationships need to be established for each expenditure category.

To derive relationships between expenditures and community characteristics, some variables found important

in earlier studies (listed in next chapter) are included in this study. Also some new variables representing Michigan's unique characteristic are included.

The second hypothesis describes the role of organizational structure of communities in explaining expenditures. As each community's characteristics differ from others, it is important to see whether there is a broad difference in categorical definition of communities. In Michigan, the municipal communities are broadly classified into two categories: (a) cities and (b) townships. Whether there are any significant differences or effects of these community categories on expenditure levels is also important to know. As the classification of city or township have some underlying criteria related to taxing power, issuance of bonds, organizational structures, there is the possibility that each category of community exhibits a different cost structure for the different services they provide.

A few researchers have discussed possible relationships of community structure with expenditures. Neenan discussed that for some services suburban communities exploit public services from central cities, but he did not distinguish different cost structures between these two types of communities. In a later study Kasadra explored the dependency of suburban communities on central cities for public services. Masten, Jr. and Quindry

studied cities and villages in Wisconsin together. He did not investigate separate expenditure behavior of cities and villages.

One of the observations found in the literature is the possible existence of different expenditure levels in different types of communities. This observation leads to the proposition that each type of community should exhibit different expenditure levels. This is particularly true in Michigan where municipal communities are mostly comprised of cities and townships. Hence, investigation of the effect of community type on municipal expenditures is relevant on the basis of theoretical and practical perspectives.

The third hypothesis deals with the possible relationships of government structure with expenditures. This leads to the assumption that the governmental process and administrative capacity influences expenditures. Usually the highest body or person plays a vital role in expenditure (budgetary decisions) decision, but administration systems vary across communities. The executive and legislative body generally perform expenditure decisions. In Michigan, some communities are run by a city manager, some by a strong mayor system, and some by a strong city council system. These different governments usually differ in expenditure patterns as

well. It can be argued that other things being constant, the nature of government influences expenditures.

In the literature, some evidence is found regarding the possible relationships between government types and expenditures. Sjoquist included the number of jurisdictions (governments) within the SMSA as a variable to explain the expenditure phenomenon. But the separate effect of government type in expenditures were not analyzed. Neenan (1970) discussed the organizational structure of a central city and suburban communities to explain the expenditures in SMSA regions. This organizational structure leads to different administrative systems, which may affect expenditures. But community structure is represented by community type while administrative structures is represented by government type. Hence it is possible that there might be some relationships between community type and government type. The existence of relationship was not resolved in the earlier research. In this research, analysis of expenditure levels according to government type and its comparison with expenditure levels of community type could establish some relationships.

The fourth hypothesis deals with the difference of expenditure levels according to location of communities. It can be studied at the level of individual community based on the individual characteristics of each. But is

there any possibility that a group of communities located in a specific region differ in expenditure behavior from another group of communities located in another region? This question has been raised by several studies, particularly when they were analyzing the expenditure levels throughout the nation. Some of the notable researches in this regard are: Neenan about Detroit SMSA regional expenditures; Gabler (1970) about expenditures in the U.S. regions (states); Kasadra and Palumbo about the regional expenditure variation in different SMSAs in the United States. These studies analyzed the difference in expenditures among regions. The difference of urbanized vs. rural regions, more densely populated vs. less populated area, and industrial region vs. agricultural regions have different community characteristics. If a community were located in a specific region, then it could have a different expenditure level than a similar community in another region. Climate varies from region to region, and many municipal service are also responsive to the weather conditions. Also, city size is found larger in metropolitan region, hence there might be some relationships between city size and location of a community. If this is true, then city size might represent some aspect of regional variation in expenditures.

In Michigan, for planning and economic development purposes, the state considers 14 regions (Appendix 12(B)). State development policy usually aims at developing or assisting economically depressed regions. Economic aid, state transfer, and economic development policy are also adopted based on this regionalization. The policy-makers are usually interested in knowing about the regional variation of expenditures.

This study tried to explain municipal expenditure variations dividing Michigan into four regions. As the main aim of this study is to explain the expenditure level or behavior (not regionalization), then Michigan is divided into some established regions for this study. The regions are as follows:

1. Detroit Region: includes Monroe, St. Clair, Livingston, Oakland, Macomb, Washtenaw and Wayne Counties
2. Lower part of lower peninsula (except Monroe, St. Clair, Livingston, Oakland, Macomb, Washtenaw and Wayne Counties, which is considered as a separate region)
3. Upper part of Lower peninsula
4. Upper peninsula

These regions were tentatively chosen by comparing the State Planning and Development map and the SMSA (regional) map of the U.S. Census Bureau. (Detailed explanations of regions are given in Chapter 4 in reference to maps and statistics).

The regional variation of municipal expenditures in Michigan can explain a new dimension of expenditure phenomenon. The explanation of regional expenditure pattern is helpful for the state's regional policies and also for regional communities in understanding expenditure allocations.

CHAPTER 3

METHODOLOGY

Overview

This study was based on a cross-sectional analysis of data for 293 communities. Three analytical methods were used: (1) Pearson correlation analysis, (2) factor analysis, and (3) linear regression analysis. The analysis began with 21 expenditure variables which were treated as dependent variables. Out of these 21 variables, seven important variables were selected for regression analysis. There were initially 43 independent variables which were grouped into 11 categories according to similar characteristics. From there, nine important independent (quantitative) variables were chosen. Regression equations were then derived for the most important categories of expenditures. Qualitative variables were treated as dummy variables. From the results of the regression analysis, an illustrative study of relative effects was performed to evaluate the changes in expenditures due to given changes in community characteristics.

The Variables

Data were obtained for a total 21 dependent variables for the year 1980, of which 20 were operating expenditures and one was the total capital outlays. These 21 variables were collected by comparing expenditure categories reported in earlier research and categories reported by Michigan communities in prescribed forms. Each of the expenditure variable was standarized into per capita expenditure and percent of expenditure. The variables available for the study are as follows (short names are shown in capital letters for both per capita and percent of expenditures):

1. Legislative expenditures (operating expenditures from General Fund) of 1980

   Per capita ---------- PCLEGX

   Percent of expenditures -------- PPLEGX

2. Per capita judicial expenditures (operating expenditures from General Fund) of 1980

   Per capita ---------- PCJUDX

   Percent of expenditures -------- PPJUDX

3. Per capita general government expenditures (operating expenditures from General Fund) of 1980

   Per capita ---------- PCGGOVX

   Percent of expenditures -------- PPGGOVX

4. Per capita protective service expenditures (operating expenditures from General Fund) of 1980

Per capita ---------- PCPROTX

Percent of expenditures -------- PPPROTX

5. Per capita expenditures in health, culture and recreation (operating expenditures from General Fund) of 1980

Per capita ---------- PCHCRX

Percent of expenditures -------- PPHCRX

6. Per capita other general fund expenditures (operating expenditures from General Fund) of 1980

Per capita ---------- PCOTHX

Percent of expenditures -------- PPOTHX

7. Per capita expenditures of total general fund (operating expenditures from General Fund) of 1980

Per capita ---------- PCGFTOTX

Percent of expenditures -------- PPGFTOTX

8. Per capita expenditures in selected fund (total operating expenditures) of 1980

Per capita ---------- PCSFX

Percent of expenditures -------- PPSFX

9. Per capita total expenditures (Total operating expenditures from General Fund and Selected Fund) of 1980

Per capita ---------- PCTOTX

Percent of expenditures -------- PPTOTX

10. Per capita police expenditures(operating expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCPOLICX

Percent of expenditures -------- PPPOLICX

11. Per capita fire expenditures(operating expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCFIREX

Percent of expenditures -------- PPFIREX

12. Per capita expenditure for health and social services (operating expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCHEALTX

Percent of expenditures -------- PPHEALTX

13. Per capita expenditure for park and recreation (operating expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCRECX

Percent of expenditures -------- PPRECX

14. Per capita expenditure for library and culture (operating expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCLIBX

Percent of expenditures -------- PPLIBX

15. Per capita expenditure for planning activities (operating expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCPLANX

Percent of expenditures -------- PPPLANX

16. Per capita expenditure for housing (operating expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCHOUSX

Percent of expenditures -------- PPHOUSX

17. Per capita expenditure for economic development (operating expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCECOX

Percent of expenditures -------- PPECOX

18. Per capita expenditure for roads (operating expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCROADX

Percent of expenditures -------- PPROADX

19. Per capita expenditure for sewer, water and sanitation (operating expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCSEWERX

Percent of expenditures -------- PPSEWERX

20. Per capita expenditures for municipal employee salaries (operating expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCSALATX

Percent of expenditures -------- PPSALATX

21. Per capita expenditures for total capital outlays (Capital expenditures of General fund and Selected Fund) of 1980

Per capita ---------- PCCAPITX

Percent of expenditures -------- PPCAPITX

By comparing the independent variables used in the earlier studies with community characteristics of Michigan data were collected for 43 independent variables. These variables were organized into 11 types of community characteristics (short name of variables are in parentheses):

(a) Population variables

1. 1980 population of each community --- (POP80)
2. Area of each community in 1980 --- (AREA)
3. Density of population per square mile in 1980 --- (PDEN)

(b) Education Variables

4. Percent of high school graduates in persons 25 years old or over in 1980 --- (GHS)

5. Percent of persons 25 years old and over who have completed 4 or more years of college in 1980 --- (GCOL)

(c) Employment variables

6. Civilian labor force --- percent unemployed in 1980 --- (UNEM)

7. Employed persons 16 years and over --- percent in manufacturing industry in 1980 --- (EMMAN)

8. Families --- percent with no work in 1980 --- (UNFAM)

(d) Income variables

9. Median income in 1979 (dollars) ---- for household --- (INHH)

10. Median income in 1979 (Dollars) ---- for families -- (INFAM)

11. Per capita income in 1979 (dollars) --- (INCAP)

12. Income in 1979 below poverty level: percent of persons for whom poverty level is determined --- (PPER)

13. Income in 1979 below poverty level: percent of families - (PFAM)

(e) Housing variables

14. Persons per (year round) housing unit in 1980 --- (HOUSECA)

15. New housing units--Year round housing units: percent with structures built 1970 to March 1980 --- (HOUSEN)

16. Old Housing units: percent with structures built before 1939 --- (HOUSO)

17. Medium aged housing units: percent with structures built between 1940 and 1969 --- (HOUSEM)

18. Occupied housing units --- Percent of occupied housing units to total in 1980 --- (HOUSOCP)

19. Vacant housing units-- percent of vacant housing to total in 1980 --- (HOUSVACP)

20. Median gross rent (dollars) specified renter occupied: Occupied Housing unit in 1980 --- (RENT)

(f) Property value variables:

21. Percent of State Equalized Value (SEV) of agricultural real properties to total real SEV in 1981 --- (SEVAGP)

22. Percent of State Equalized Value (SEV) of commercial real properties to total real SEV in 1981 --- (SEVCOMP)

23. Percent of State Equalized Value (SEV) of industrial real properties to total real SEV in 1981 --- (SEVINDP)

24. Percent of State Equalized Value (SEV) of residential real properties to total real SEV in 1981 --- (SEVRESP)

25. Percent of State Equalized Value (SEV) of timber cut-over properties to total real SEV in 1981 --- (SEVTIP)

26. Percent of State Equalized Value (SEV) of development properties to total real SEV in 1981 --- (SEVDEVP)

27. Percent of State equalized Value (SEV) of Business properties (sum of SEVCOMP and SEVINDP) to total real SEV in 1981 --- (SEVBUSP)

(g) Community Assets Variables

28. Per capita General assets owned by community in 1980-81 - (ASSETCA)

(h) Tax Rate Variables

29. Mills the community levies for general operating purposes in 1980 --- (MIGOP)

30. Maximum number of mills allowed by law or charter in 1980 --- (MIMAX)

31. Mills levied to fund bonded indebtness in 1980 --- (MIBON)

32. Extra millage for other purposes in 1980 --- (MIEXT)

33. Total mills the community levied in 1980 --- (MITOT)

(i) Tax Variables:

34. Per capita total property tax in 1980 --- (TAXPROCA)

35. Per capita other taxes in 1980 --- (TAXOTHCA)

36. Per capita total taxes in 1980 --- (TAXTOTCA)

(j) Aid Variables

37. Per capita total federal transfers or assistance in 1980 --- (TRAFEDCA)

38. Per capita total state transfers in 1980 --- (TRASTACA)

39. Per capita all other transfers or assistance in 1980 --- (TRAOTHCA)

40. Per capita total transfers in 1980 --- (TRATOTCA)

(k) Collected Revenue Variables

41. Per capita general fund revenue in 1980 --- (REVGFCA)

42. Per capita selected funds revenue in 1980 --- (REVSFCA)

43. Per capita total revenues in 1980 --- (REVTOTCA)

Standardization of Dependent Variables

The expenditure variables can be expressed in the following forms: (1) total expenditure in each category, (2) per capita expenditures in each category, and (3) percent of expenditures in each category. The total expenditures present the lump sum amount of money spent in any category. It is an absolute form of description of expenditure. But in practice, measurement of relative expenditures are important when comparisons among commu-

nities are made. Per capita and percent of expenditures are forms of relative measurement of expenditures, by which expenditure behavior among communities can be compared.

Per capita expenditures can be termed as the level of expenditures and percent of expenditures can be termed as pattern of expenditures. As stated in the literature review, most of the studies used per capita expenditures. In this research, the per capita form of expenditures are used. The reasons for that are: (1) to compare the results of this study with earlier studies, and (2) in practice, per capita expenditures are mostly used to estimate and analyze of municipal expenditures.

Data Sources

A portion of the data needed for the study was collected from the published documents of the U.S. Census Bureau and from other federal and state agencies. However, each community in Michigan is required to submit annual expenditure and revenue statistics on a prescribed form to the Bureau of Local Government Services, Department of Treasury, State of Michigan. A substantial portion of data needed for this research were collected from these unpublished prescribed forms.

The data set was for the fiscal year of 1980-81. In some cases, where data for that period were not

available, values of the preceding or subsequent year were used. In some cases, when data were not available at all, they were treated as missing values.

Sample of Michigan Communities

The sample included all cities and townships having a population of 5,000 or more. According to the 1980 census there were 293 communities (cities, townships and villages) in Michigan which had a population of 5,000 or more in 1980-81. The list of communities studied appears in Appendix 1. The advantage of using these cases was that local government fiscal reports were uniform for this population size.

Preliminary Analysis of Variables

A preliminary analysis was done to identify "important" dependent and independent variables. The aim of this stage of the analysis was to eliminate redundant variables before the application of multiple regression equations. Three types of screening techniques were used: (1) judgmental and reasoning, (2) Pearson correlation analysis, and (3) Factor analysis.

Screening of Dependent Variables

The objective of this part of the analysis was to identify important dependent variables to perform

regression analysis. Initially 21 dependent variables were introduced to show the different aspects and diversity of municipal expenditures. But due to the limited scope of this research, a reduced number of categories were needed. This was done by using a combination of judgment, correlation analysis, and factor analysis. The criteria used for selecting reduced number of expenditures variables are: (1) expenditure categories mostly related to urban and regional planning function, and (2) expenditure categories analyzed in earlier studies, so comparison of the results of this study with earlier studies can be made.

Screening of Independent Variables

Out of 43 independent quantitative variables collected, not all them are important for regression analysis. The following techniques were used to screen the independent variables:

(1) Judgment and reasoning were used based on previous studies of municipal expenditures. Variables used by others were examined, but the problem is that because fiscal processes differ from state to state, some variables found relevant in some states might not be relevant in Michigan. Therefore, the choice of variables used by others needs to be further examined in view of available data.

(2) Pearson correlation technique was applied to investigate the correlation patterns. Two types of correlation matrices were developed: (1) correlation among independent variables of each type or group, and (2) correlation between selected dependent variables and independent variables. The first matrix was used to see which variables were highly correlated within that type. The second matrix gave the information about the independent variables that are capable of predicting expenditures the best. Pearson correlation analysis was applied to all 11 categories of independent variables.

(3) Factor analysis is a another way of screening redundant variables. Factor analysis was performed to identify important independent variables to include in the regression equations. The advantage of this analysis is that it can be selected important variables from each factor reducing the multicollinearity problem. Using this technique, forty three independent variables were grouped into few factors. From each factor, important variable was chosen based on theoretical background.

Screening of Qualitative Variables

Three type of qualitative variables were used to account some important characteristics of communities for which quantitative data were not available. These variables are: (1) type of community, (2) type of

governments, and (3) regional location. The classification of these variables are described below:

(1) Type of community: Two types of communities are considered: (a) cities and (b) townships.

(2) Type of Governments: Municipal governments have been classified into three basic types: (a) mayor-council, (b) manager-council, and (c) other (township board or council).

(3) Type of Regional Location: As stated earlier, Michigan has been divided into four regions. Detail description of regions are given in the following chapter.

A t-test was performed to determine significance of difference of expenditures between cities and townships. Also, crosstabulation between expenditures and qualitative variables were performed. If the result was significant, then one dummy variable was included in the regressions for either cities or townships. Similar analysis was performed for type of governments and type of location to examine the possible inclusion of dummy variables.

Regression Analysis

Linear regression equations were derived to established relationships between expenditures and community characteristics variables. Expenditure variables were treated as dependent variables and

community characteristics as independent variables. All regression equations were based only on the selected variables from screening process. Dummy variables were used to explain the variation according to category of communities, types of governments, and variations according to the location or region.

Step-wise method was used to choose independent variables to enter into the regression equations. As discussed before, each category of expenditure has a separate relationship with community characteristics. Hence, each expenditure variable has different relationship with the independent variables selected from screening process. To estimate this separate relationships in each regression equation between each expenditure category and community characteristics, stepwise is the most appropriate.

Relative Effects on Expenditures

To illustrate the relative effect on expenditures from changes by independent variables, calculation were performed using regression equations.

CHAPTER 4

ANALYSIS OF VARIABLES

Overview

The study used regression techniques to determine the nature of the relationships among expenditure variables and independent variables. Prior to the application of regression, variables were screened for redundancy. Two types of screening techniques were used: correlation analysis and factor analysis. These techniques were incorporated with judgment and reasoning based on earlier studies to select variables.

Correlation analysis and factor analysis were first performed for dependent variables. Combining the results of the analysis with the knowledge derived from earlier research, a set of dependent variables (per capita expenditures) were chosen for final regression analysis.

Correlation and factor analysis were also performed for independent variables. Correlation coefficients were computed to established relationships between variables within each type or category of independent variables and between selected dependent variables with variables in each type (or category). Factor analysis was then performed for all 43 independent

variables. From the results of correlation analysis, factor analysis, and previous studies and theoretical background, a set independent variables were chosen for the final regression analysis.

Before selecting variables for final regression analysis, in case of categorized data, crosstabulations were performed to established the relationships of expenditures and community characteristics.

A Note on Percent of Expenditures

As discussed in Chapter 3, percent of expenditures are one way of expressing expenditures. But all the major studies of municipal expenditures so far performed and as stated in the literature review, did not include percent of expenditures. Most of the researchers were interested in per capita expenditures and in only one research (Stuhmer and Hamlin, 1977), total expenditure in each category was used.

In this section, an brief analysis has been made to show what were the percentage (of expenditures) the municipalities spend in different expenditures categories and what were their relationships with per capita expenditures. Appendix 2(B) shows the means, standard deviations, minimum and maximum values of percent of expenditures for 21 expenditure variables. For comparison, similar values for the per capita expenditures

for the same 21 expenditure variables are presented in Appendix 2(A). From the both appendices, it seems that an expenditure category which has low per capita, also has low percent in that expenditure category. Similarly, an expenditure category having high per capita expenditure seems to has high percentage of expenditures. To verify these relationships more accurately, correlation coefficients between per capita and percent of expenditure of each category were derived and shown in Appendix 3(B). If the correlation coefficient is high in each category, it indicates that in each category the per capita and percent of expenditures has consistent trend, such as when per capita expenditure decreases, then percent of expenditure decreases, or when per capita expenditure increases, then percent of expenditure increases. But from Appendix 3(B), it is found that in a few expenditure categories, per capita and percent of expenditures are highly correlated. For example, per capita and percent of expenditures for judicial, legislative, economic development, and housing expenditures are highly correlated (above 0.85), but these expenditure categories are not significant in the overall municipal finance because these categories have very low per capita and percent of expenditure values (Appendix 2). Some of the expenditures variables (which have high per capita and percent of expenditures (Appendix 2) have very low

correlation, such as, PPGGOVX with PCGGOVX (0.01), PPGFTOTX with PCGFTOTX (0.06) (Appendix 3(B)). The rest of the variables are moderately correlated. These results shows that the relationships between per capita and percent of expenditures are not consistent across Michigan communities.

Most of the researchers, as indicated in the literature review, analyzed only per capita expenditures, probably for the reason that per capita expenditure is a simple form of expressing expenditures when comparison among communities are made. Moreover, per capita expenditures are usually used by the practicing planners. In this research, further study is performed only for per capita expenditures.

Selection of Expenditure Variables

Data for 21 per capita expenditure variables were initially collected as explained in Chapter 3. Expenditure studies presented in the literature review, do not explain in detail about the choice of expenditure variables. In most cases, a few preselected expenditure variables were taken and then regression analysis was made. In this study, because of availability of data for wide range of expenditure categories, instead of preselecting variables, correlation and factor analysis were applied to these 21 expenditure variables. Then

comparing correlation and factor analysis results with the expenditure variables used in earlier researches, a few expenditure variables were chosen. Though it is easier to select expenditure variables randomly, as did earlier researchers, but correlation and factor analysis of expenditure variables were helpful to understand the relationship among expenditure variables.

In selecting expenditure variables for final analysis the following consideration were made. First, the importance of expenditure categories related to municipal planning function, such as, the most common expenditure categories across communities and the categories where larger amount of money are allocated in the budget. Second, the expenditure categories which were used in the most of earlier research. But in Michigan, some expenditure categories are different from other states, and these expenditures were not studied before. For example, expenditure in General Fund is a major expenditure category as identified in Michigan by the State. The General Fund category include the total expenditure from the community's own fund.

To start the selection of expenditure categories, a correlation matrix was obtained for 21 expenditure variables as shown in Appendix 3(A). To compare the strength of relationships, correlation coefficients are defined into three levels: low correlation (coefficients

less than 0.20), moderate correlation (coefficients between 0.20 and 0.50.) and high correlation (coefficient value 0.50 or above). The correlation coefficients having values greater than 0.20 are shown in Appendix 3(A). From the correlation matrix, it can be seen that except for three expenditure variables (PCLEGX, PCPLANX and PCHOUSX), all variables are moderately to highly correlated to each other. In almost every case, the variables PCLEGX, PCPLANX and PCHOUSX have low correlation with others. With a few exception, each of the variables PCJUDX, PCOTHX, PCHEALTX, PCCAPITX, PCSFX, PCLIBX and PCECOX are moderately correlated with other variables (except PCLEGX, PCPLANX and PCHOUSX). The variables which have high correlation (with a few exception) with themselves are: PCPOLICX, PCGFTOTX, PCFIREX, PCRECX, PCTOTX and PCSALATX. The correlation pattern shows that a group of variables are associated with another group of variables, from which it is apparent that all the expenditure variables can be grouped into fewer categories. Factor analysis is the method by which these groups of variables can be separated.

The next step was to perform factor analysis. The results are shown in Appendix 4(A). The factor coefficients having values greater than 0.40 were included. Three expenditure categories (PCTOTX, PCGFTOTX and PCSFX) were excluded from factor analysis, because

their expenditure values are too high to compare with other component of expenditures and they show highest factor loading, which is obvious. The remaining 18 expenditure variables were included in the factor analysis. The rotated factor matrix was derived. In 10 iterations, 4 factors were extracted with eigenvalues greater than 1. The eigenvalues, percent of variance and cumulative percent of variance of each of the factors are shown in Appendix 4(B).

As expected by examining the correlation pattern, the factor analysis has grouped 18 variables into 4 factors or groups. The first factor included 12 variables. The eigenvalue was equal to 6.07 and percent of variance explained was 33.7. It is interesting to note that most of the important variables, such as, police, fire, salary, recreation, sewer, judicial, library, health and others were included in Factor 1, and eigenvalues and percent of variance explained is much higher than rest of the three factors. The variables in factor 1 show that major expenditure categories of municipal expenditures are interrelated.

Factor 2 has a eigenvalue of 1.91 and percent of variance explained is 10.6; which included 5 variables. The higher factor loading in factor 2 corresponds to legislative (PCLEGX), general government (PCGGOVX) and road (PCROADX) expenditures. In factor 3, two variables

were included, planning expenditures (PCPLANX) and capital expenditures (PCAPITX). This factor has an eigenvalue of 1.37 and percent of variance of 7.6. This factor indicates that the planning activities and capital outlays expenditures of municipalities are interrelated. In factor 4, two variables were grouped, housing (PCHOUSX) and economic development (PCECOX) expenditures. This factor has a eigenvalues of 1.24 and percent of variance explained by it is 6.9.

From the above correlation and factor analysis, some idea about the nature and interrelation of per capita expenditure variables was obtained. As it was described earlier, only a few 'important' expenditure variables were to be studied.

From the results of factor analysis, it can be seen that most of the important expenditure variables, such as police (PCPOLICX), salary (PCSALATX), park and recreation (PCRECX), fire (PCFIREX), and sewer (PCSEWERX) were included in factor 1. Most of these variables were also included in earlier expenditure research. For example, Fabricant (1952) studied 12 expenditure categories which included police, fire, sewer expenditures; Spangler (1963) studied 9 expenditure variables including health, police, fire, sewer expenditures; Bahl and Saunders (1965) studied 10 expenditure variables including sewerage, fire and police expenditures; Gabler (1969)

studied 7 expenditure variables including police, fire, sanitation, park and recreation expenditures; Weicher (1970) studied 4 expenditures variables which were police, fire and sewer; Stuhmer and Hamlin (1977) studied 8 expenditure categories including police, fire and sewer and roads. Comparing the variables in factor 1 with variables included by these authors, three expenditure variables were to be selected for further study: police expenditures (PCPOLICX), fire expenditure (PCFIREX) and park and recreation expenditures (PCRECX).

Factor 2 revealed two variables, legislative (PCLEGX) and government (PCGGOVX) expenditures which were not considered by others. These variables are part of the political rather than municipal planning function of a community and could be judged to be important. But road expenditures (PCROADX) are a more common category which already has been documented by others [Fabricant (1952), Spangler (1963), Bahl and Saunders (1965), Gabler (1969) Weicher (1970) and Stuhmer and Hamlin (1977)]. The variable PCROADX was selected for further study.

Two variables in factor 3, planning and capital outlays expenditures are major municipal planning activities. Capital outlays expenditures have been studied Spangler (1963) and Davis and Haines, Jr (1966). Because most cities and townships in Michigan spend a substantial amount of money for capital outlays (average

$21.50 per capita, Appendix 2(A)), this category was selected for further study.

In factor 4, housing and economic development expenditures are planning related municipal activities, but the average amount of money spent in these categories is very low in Michigan ($0.41 per capita in housing and $0.48 per capita in economic development, Appendix 2(A)). Consequently, no variable was selected from factor 4.

As was the case in various studies, Kee (1965), Bahl (1965), Morss (1966), Sharkansky (1967), Gabler (1969), Masten, Jr and Quindry (1970), Stuhmer and Hamlin (1977) and Ladd (1981), additional variables were selected from aggregate expenditure categories. Total expenditures are useful for cross-community comparison. Planners, public officials and citizens are interested in knowing how a community fares compared to others. In Michigan, two types of aggregate expenditures are considered important: total general fund expenditure (PCGFTOTX) and total expenditures (PCTOTX). These aggregate categories were selected for further study.

The seven variables selected for further study (definition in Appendix 5) are the following:

1. PCPOLICX --- Per capita police expenditures
2. PCFIREX --- Per capita fire expenditures
3. PCRECX --- Per capita park and recreation expenditures

4. PCROADX --- Per capita operating and maintenance expenditures for roads

5. PCCAPITX --- Per capita expenditures for capital outlays

6. PCGFTOTX --- Per capita total operating expenditure of General Fund (total expenditures from own sources)

7. PCTOTX --- Per capita total expenditures

Selection of Independent Variables

Data for forty three independent variable (quantitative) were collected as discussed in Chapter 3. The mean values of these variables are presented in Appendix 6. But all these variables are not equally significant in explaining the variations in expenditures. From the knowledge gained in previous research and using correlation and factor analysis, the number of variables were reduced to ten.

Correlation Analysis

In the screening process, correlation analysis was used in two ways: (1) to determine the correlation between variables within each group of independent variables, and (2) to determine correlation between final dependent variables and each group of independent variables. The results of correlation analysis are described below.

The three population variables show that they are moderately correlated to each other (Appendix 7(A)). Population density is negatively correlated with area which shows that the municipalities which have larger area have a lower density. Townships have usually a larger area on average. From the correlation between dependent variables and three population variables (Appendix 8) density is correlated with most of the expenditure variables. Also population size shows moderate relationships with expenditure variables. These correlation pattern suggest that population density and population size might be candidate to explain expenditures.

The two education variables are strongly correlated (Appendix 7(B)) but they have very little influence on expenditure level (Appendix 8). These two variables were included to show whether educational status leads to better taste and demand for more community services. But in this regard, the percent of educated people in the population has little direct effect on the expenditure behavior. So, variables from this group might not be appropriate to explain expenditure variation.

In the employment variables group, unemployment rate is reasonably correlated with manufacturing employment (Appendix 7(C)), which shows that the manufacturing community usually experiences more unemployment. On the other hand, unemployment rate is highly correlated with

number of unemployed families. From correlation pattern between expenditure variables and employment variables (Appendix 8), only the unemployment rate of families is moderately correlated with expenditures, which shows that the rate of families unemployed has a positive or increasing effect on expenditures. This variables could be able to explain expenditure variation moderately.

Out of five income variables, three income measuring variables (INHH, INFAM and INCAP) are strongly correlated to each other and two poverty measuring variables (PPER and PFAM) are also correlated to each other strongly (Appendix 7(D)). However, the income measuring variables are negatively correlated with poverty variables, which suggest that any one of the five variables can be selected to represent income status. Analyzing the correlation pattern between expenditures and income variables (Appendix 8), it was found that household income is moderately correlated (negatively) with expenditures, which shows that high income communities usually spend less. On the other hand, communities where poverty levels are high usually spend more, as both poverty variables are positively correlated with expenditures. This shows that the poverty level of the population puts a strain on municipal expenditures. These results suggest that any variable from income group could be considered to explain expenditure variations.

Among the seven housing variables, most of them are moderately correlated with each other (Appendix 7(E)). Considering the correlation with expenditure (Appendix 8), three variables, such as, people per housing unit (HOUSECA), percent of old housing (HOUSO) and percent of new housing (HOUSEN)] are moderately correlated with all expenditure variables. This shows that if the population density in the housing units increases, then the expenditures decreases. Also, in communities where there are more new houses the expenditures decrease. But communities having more old houses spend more, as is shown by the positive correlation. These results suggest that either new housing or old housing are important to explain expenditures and can be selected for regression.

Seven property variables show that business value is correlated positively with commercial SEV and industrial SEV; and negatively correlated with agricultural SEV and residential SEV (Appendix 7(F)). Also residential SEV is negatively correlated with commercial SEV and industrial SEV. From correlation pattern among expenditures and SEV variables (Appendix 8), the percent of agricultural SEV is negatively correlated with all expenditures variables. This indicates that townships usually have a low level of expenditure because on the average, townships have a substantial amount of agricultural land. Also, residential SEV is negatively

correlated (low to moderate) with most of the expenditures variables. But three important variables-- percent of commercial SEV, percent of industrial SEV, and percent of business SEV have moderately positive effect on expenditures. Among all of the SEV variables, the percent of business SEV shows the highest correlation with almost all of the expenditures variables. Hence, from property value variables, business value seems to be most important to explain expenditures and could be selected for regression analysis.

The asset value has a low positive correlation with four of the expenditure variables (Appendix 8). It shows that the community which has more community assets per capita usually has higher police, fire, and road expenditures. But in overall consideration, this variable is not important to explain expenditures.

From tax rate variables group, millage rate for general operating purposes (MIGOP) is strongly correlated with maximum millage rate a community is allowed to levy (MIMAX) and with total millage levied (MITOT) (Appendix 7(G)). Also MIGOP has a low correlation with millage for bonded indebtness (MIBON). The correlation patterns between expenditures and tax rate variables indicates that three variables MIGOP, MIMAX, MITOT are strongly correlated with all of the expenditure variables and the relationships are positive which shows that an increase in

the tax rate usually increases expenditures (Appendix 8). The expenditures variables general fund, police, fire, and total expenditures have low correlation with millage for bonds. The correlation patterns indicate that tax rate variables can be included in regression to explain expenditures.

From correlation of tax variables (Appendix 7(H)), total tax (TAXTOTCA) is highly correlated (.97) with property tax (TAXPROCA) which shows that most of the local government taxes are comprised of property tax. Other types of taxes (TAXOTHCA) have a correlation (.30) with total tax which shows that other taxes usually contribute the local government revenue. From correlation pattern among expenditures and tax variables (Appendix 8), property tax and total tax variables are highly correlated with expenditure variables. Hence, either of them can be selected to explain expenditure variations.

Of the four aid variables (Appendix 7(I)), total transfer (TRATOTCA) is highly correlated with federal transfer (TRAFEDCA) and state transfer (TRASTACA) variables. The variable other transfer (TRAOTHCA), which is mostly county transfers to municipalities, has low correlation with total and federal transfers. From the correlation patterns among expenditures and aid variables (Appendix 8), the total, federal and state transfers are highly correlated with the expenditure variables. Among

aid variables, total transfer, state transfer, and federal transfer are strongly correlated with expenditures; any one of them could be selected to explain expenditures.

The total collected revenue variables (REVTOTCA) are strongly correlated with general fund revenue (REVGFCA) and selected fund revenue (REVGFCA) (Appendix 7(J)). Looking at the correlation patterns among expenditures and revenue variables (Appendix 8), all revenue variables are strongly correlated with expenditures, which is generally expected. The results shows that revenue variables could be selected for regression analysis to explain expenditures variations.

From the above correlation analysis, some conclusion can be drawn for different categories of variables. First, it is apparent that nine categories of independent variables were important to explain expenditures, which are: population, employment, income, housing, property value, tax rate, taxes, intergovernmental aids, and collected revenues. Two variables groups found less important: education and asset.

Second, the above correlation pattern showed that a significant number of community characteristics variables have high to moderate correlation with expenditure variables. It was apparent also that many community characteristics were highly correlated with themselves. Hence what was needed was to group community

characteristic variables into a limited number of categories without losing the information from the whole data set. This was done with factor analysis.

Factor Analysis of Independent Variables

A factor analysis was performed on all 43 independent variables. Initially, the extraction was limited to 50 iterations, but the computer package used, SPSS-X, extracted 11 factors after 34 iterations. The eigenvalues of all these extracted factors are greater than 1. The results of the factor analysis are shown in Appendix 9(A). The coefficients shown are those having values greater than 0.30. The eigenvalues, percent of variance and cumulative percent of variance are shown in Appendix 9(B).

In the first factor, most of the variables are related to the revenue base or fiscal capacity of a community. It shows that the revenue structure of a community is interrelated to tax rate, property tax, total revenue, and total tax. Clustering of revenue variables in one factor establishes the fact that the revenue structure of a community is an independent dimension. In previous research, it has been found that from above variables total tax (TAXTOTCA) or property tax (TAXPROCA) variables are the most important. Peterson (1976), Ladd (1978), Ladd (1981) used either total tax or property tax

variables to explain expenditures. The property tax rates across community is not uniform, such as the cities which levies income tax usually have less property tax. But total taxes includes all kind of taxes and are almost uniformly comparable. In this study, from factor 1, only the total tax variable (TAXTOTCA) was used as independent variables for regression analysis. Total tax variable was also the variable that had a high correlation with expenditures. It should be noted that factor 1 had an eigenvalue of 8.26, which was higher than for all of the other factors. The percent of variance explained by factor 1 was 19.2.

Variables in factor 2 consists mostly of those related to the economic status of a community, such as income, poverty rate, and unemployment rate. This is the second most important factor having an eigenvalue of 6.79 and percent of explained variance of 15.8. This factor shows that income variables (INFAM, INHH, INCAP) are negatively associated with poverty rate (PPER and PFAM) and unemployment rate (UNFAM and UNEM). Earlier research included in the regressions either per capita income (INCAP), family income (INFAM), or household income (INHH), as in the case of Fabricant (1952), Fisher (1961), Sack and Harris (1964), Kee (1965), Bahl (1965), Davis and Haines (1966), Sharkansky (1967), Gabler (1969), Masten, Jr and Quindry (1970), Booth (1978), and Ladd (1981).

This study selected household income (INHH) which is moderately correlated with expenditures as the independent variable to represent factor 2.

Factor 3 consists of property value variables, such as residential, commercial, industrial, and business (industrial and commercial combined) SEV. The clustering of property values in one factor indicates that property values make one independent dimension among community characteristics. Property values have been included by Masten, Jr and Quindry (1970), Peterson (1976), Stuhmer and Hamlin (1977), Booth (1978), and Ladd (1981). Among the different types of property values, Stuhmer and Hamlin (1977) identified business value as the most important variable in explaining expenditures variation. Communities which have more business property, usually generate more revenue. But costs associated with these business property was also large. Proper security through police and fire department in the business district are additional services provided by these communities. Hence from factor 3, variable SEVBUSP was selected as independent variable for regression. This factor has an eigenvalue of 2.88 and the percent of variance explained of 6.7.

Factor 4 consists of housing vacancy and occupancy rate; unemployment rate and percent of medium-aged housing. This factor has a eigenvalue of 2.49 and the

percent of variation explained is 5.8. Housing vacancy rates describe the extent the housing stock meets the demand. Usually, old cities or economically distressed cities have high housing vacancy rates. If in a city more infrastructure (such as, housing or utilities) is available than is demanded, it might indicate a decreased level of taxes. This study selected housing vacancy rate (HOUSVACP) to represent the variables in Factor 4.

Factor 5 with eigenvalue of is 2.41 and percent of explained variance of 5.6, is made up by intergovernmental transfers and aids variables. These variables are federal transfer, other transfer, and total transfer. Intergovernmental transfers have a separate dimension as these variables are clustered in a single factor. Several authors stressed the importance of federal aid, state aid, or total aid by including these variables in the explanation of expenditures, such as Sack and Harris (1964), Sharkansky (1967), Weicher (1970), and Ladd (1981). From factor 5, the total aid variable (TRATOTCA) was selected for further analysis.

Factor 6 has an eigenvalue of 2.28 and percent of explained variation of 5.3. This factor represent labor and education conditions of inhabitants, including the variables those related to education status, manufacturing employment, unemployment rate, and commercial SEV. Gabler (1969), Weicher (1970), and Bahl (1978) used education

variables (percent of college educated or high school educated persons) to see whether communities having higher incidence of educated persons spent more. One of the assumptions here is that people with higher education are usually in higher income groups, and demand better municipal services which increases expenditures. Stuhmer and Hamlin (1977) argued that education status has less influence on expenditures than professional status (occupation) of the majority of inhabitants in a community. In this study, the education variables showed low correlation with expenditures. Kee (1965), Weicher (1970), Booth (1978), and Ladd (1981) have included manufacturing employments as determinants of expenditures. In factor 6, manufacturing employment is a measure of occupation status of a community and moderately correlated with expenditures. Hence from factor 6, manufacturing employment (EMMAN) is selected as independent variables for regression analysis.

The most important variable in factor 7 is population variable. This factor has an eigenvalue of 2.24 and percent explained variation of 5.2. The number of people in a community measures its relative size. It has been argued by Brazer (1959) and Gabler (1969) that size of a community is a major factor in providing services. In most cases, the economy (or diseconomy) of municipal services depends on the size of population.

Some types of services may not be available for certain size. But size is also related to type of organization and governmental arrangement. Cities are usually larger than townships. Spatially, the more urbanized regions are generally clustered around few centers (SMSAs). As in the work by other authors: Weicher (1970), Kasadra (1974), and Ladd (1981); population size (POP80) is selected from factor 6 for regression analysis.

From four variables in factor 8, two are related to agricultural and commercial property value. But factor 3 was also composed of property value variables. Business property value variables was also considered important in factor 4. Since the effects of factor 8 are already accounted in the other factors (SEVAG factor 1 and factor 10; SEVCOMP in factor 3, factor 5 and factor 10; HOUSECA factor 1 and factor 10), no variable was selected from this factor.

Factor 9 has an eigen value of 1.76 and percent of explained variance of 4.1. In this factor, among others, two housing variables were included, old housing (HOUSO) and new housing (HOUSEN). But also three revenue variables entered in this dimension. These revenue variables were already included in factor 1, factor 5 and factor 7. Another variable in this cluster was community asset variables, but it was poorly correlated with expenditures. The two housing variables measured the age

of community by the percent of old housing and the percent of new housing. Kee (1965), Stuhmer and Hamlin (1977), and Ladd (1981) used housing variables and found these to be significant. Stuhmer and Hamlin (1970) found that old houses concentrated mostly in big cities were associated with increasing costs on fire and police expenditures. Factor 9 can equally be captured by new housing as it is the inverse of old housing. New housing (HOUSEN) was selected from this dimension. New housing has the advantage of showing growth and new development in a community.

Factor 10, with an eigenvalue of 1.72 and percent of explained variance of 4.0, has seven variables representing a range of community attributes: population density (PDEN), four economic status (PPER, PFAM, UNFAM and UNEM), and two housing variables (HOUSEM and HOUSEN). Economic status variables were already included in factor 2 and housing variables in factor 9. The one variable that earlier studies showed as very important is population density. Fabricant (1952), Fisher (1961), Sack and Harris (1964), Fisher (1961), Kee (1965), Davis and Haines (1966), Gabler (1969), Masten and Quindry, Jr. (1970), and Booth (1978) found strong relationships between population density and local government expenditures. Gabler (1971) found that population density may affect expenditures either positively or negatively.

Population density captures the agglomeration effect of population which may affect the intensity of the use of services. Population density (PDEN) variable is selected from here.

Factor 11 is made up by two property value variables [development property value (SEVDEVP) and timber cut-over property value (SEVTIP)]. These two variables represent a very small portion of property values in a community. The larger property categories (business, commercial, industrial, and residential) were already represented in factor 3. So, no variable is selected from this factor. Moreover, the variable SEVTIP has also included in factor 4 capturing partial effect of factor 11.

In summary, factor analysis helped to identify 9 independent (quantitative) variables for inclusion in regression analysis. What is left is to see whether or not additional qualitative (dummy) variables are needed to represents some important aspects of municipalities.

Selection of Qualitative Variables

Three types of qualitative variables were considered in this research in an attempt to account for the different nature of communities in Michigan. These qualitative variables could not be included in factor

analysis and were analyzed separately. If found important they were included as dummy variables in regression.

The variation of per capita municipal expenditures for all cases are provided in Table 1 to compare expenditures according to different qualitative categories of communities.

Table 1

Variation of Per Capita Municipal Expenditures

Expenditures Category	Mean	Median	Low	High	Standard Deviation	Coefficient of Variation
PCPOLICX	40.5	35.1	0.0	220.8	36.5	90.1
PCFIREX	21.9	15.2	0.0	98.0	20.0	91.4
PCRECX	9.6	4.7	0.0	70.5	12.3	127.7
PCROADX	21.7	14.4	0.0	125.2	23.0	106.0
PCAPITX	21.5	10.1	0.0	307.2	34.1	158.4
PCGFTOTX	143.2	96.3	8.4	730.4	116.4	81.3
PCTOTX	275.0	208.6	26.1	1973.1	255.5	92.9

To select dummy variables, two types of analysis were performed. First, the difference of expenditures within each category of qualitative variables were compared and T-tests were performed to measure the significance of differences in expenditures. In this research the entire universe of communities with a population of 5,000 or above in 1980 were considered, so dividing all cases according to qualitative categories and performing T-test could be questionable because the groups

were not really samples as such. However, if community expenditures in a given year are considered as only one observation from a series of possible outcomes through time, the T-test could be applicable to assess of differences in expenditures simply occur at this particular point in time.

Second, crosstabulation were performed between expenditure levels of different communities and qualitative variables to inspect the variation of expenditures according to qualitative community characteristics. The communities were divided into three categories according to their level of expenditure. Low spending communities were defined as the communities which were in the lower 25 percentile. High spending communities are in the highest 25 percentile in terms of spending. The rest of the communities are in between low and high spending level. The distribution of communities according to their levels of expenditure is shown in Table 2.

Table 2

Range of Expenditures

Expenditure	Low Range of Expenditures for lowest 25% communities	Medium Range of Expenditures for 25% to 75% communities	High Range of Expenditures for highest 25% communities
PCPOLICX	$0- 8.00	$8.00- 64.00	$64.00- 220.00
PCFIREX	$0- 6.40	$6.40- 35.50	$34.50- 97.00
PCRECX	$0- 0.60	$0.60- 14.50	$14.50- 71.00
PCROADX	$0- 1.70	$1.70- 35.00	$35.00- 125.00
PCAPITX	$0- 3.10	$3.10- 24.80	$24.80- 308.00
PCGFTOTX	$9.00-47.80	$47.80-229.00	$229.00- 729.00
PCTOTX	$25.00-87.50	$87.50-390.00	$390.00-1975.00

By applying T-test and crosstabulation, the selection of dummy variables are made in the following:

Type of community. The communities are divided into two types: cities and townships. From 293 communities studied here, 141 were cities and 152 were townships. Table 3 shows the variation of expenditures according to cities and townships. As we hypothesized that the nature of community affects expenditures, a simple test can support the hypothesis. T-Tests for mean values of expenditures for city and townships showed significant difference. For example, the T-Statistics for mean values of total expenditures for cities and townships is 14.54, at significant level 0.00.

Table 3

Comparison of Per Capita Expenditures for Cities and Townships

	Mean Values of Expenditures		
Expenditures	All cases	Cities	Townships
PCPOLICX	40.49	69.20	13.92
PCFIREX	21.90	33.71	10.98
PCRECX	9.60	17.67	2.14
PCROADX	21.71	40.26	4.53
PCCAPITX	21.50	34.90	9.14
PCGFTOTX	143.21	240.71	53.57
PCTOTX	275.03	450.16	110.69

Variation of expenditure levels were examined from crosstabulation between expenditure ranges (Table 2) and qualitative variables city and township. The results of crosstabulation are presented in Appendix 10. The results shows that for all expenditure categories, cities are in high and medium spending levels; on the other hand, townships are in low and medium spending levels.

Both the results of T-test and crosstabulation showed that there are significant differences in the spending levels between cities and townships. It is apparent that cities spend much more money than townships in all categories. In the case of total expenditures, cities spend almost four times more than townships. In all other cases, cities spend several times more than townships. The reasons for this wide difference are: (1) cities have many more functions than townships;

(2) cities are more urbanized and densely populated, which increases their expenditures; and (3) the average population in cities is much higher than that of cities.

Because of these substantial differences, it is apparent that a dummy for community type should be in regression analysis. The dummy variable CITY is selected for this representation (CITY = 1 for cities, otherwise 0).

Type of government. There are two types of governments in Michigan cities: (1) Mayor-Council form and (2) Manager-Council form. In the case of townships, the governmental arrangement are either: (1) Manager (Superintendent)-Council form, or (2) Township Board (Council) form.

For this study, all government forms are grouped into three types:

1. Mayor: all government of mayor-council forms
2. Manager: all government of manager-council form and all government of manager (superintendent)-council forms.
3. Others: all governments of townships board form

Out of 293 communities studies here, 39 were mayor type, 112 were manager type and 142 were other type of governments (Appendix 11). The differences in expenditures among these types of governments are shown in Table 4.

Table 4

Comparison of Per Capita Expenditures for Types of Government

	Mean of Expenditures			
Expenditures	All Cases	Mayor	Manager	Other
PCPOLICX	40.49	74.36	63.03	13.45
PCFIREX	21.90	34.03	31.64	10.90
PCRECX	9.60	14.85	17.35	2.03
PCROADX	21.71	38.87	37.31	4.68
PCCAPITX	21.50	25.65	35.82	8.82
PCGFTOTX	143.21	257.63	220.91	51.28
PCTOTX	275.03	451.15	422.13	108.15

Table 4 shows mayor and manager governments have almost similar expenditure levels because both categories are mostly comprised of cities. In the case of other or township board governments have least expenditures. T-test for mean values of expenditure categories were performed, which showed significant results. For example, T-statistics for mean values of total expenditures for mayor and other form of governments is 7.67, at two tails significant of 0.00. On the other hand, T-test for manager and mayor form of governments showed less significant.

The variation of expenditures, according to government types, were investigated by crosstabulation and are shown in Appendix 10. The results indicated that all expenditure categories are influenced by government types, particularly, two different patterns are distinguishable.

First, mayor and manager types have similar expenditure ranges and most of the communities of these type of governments are in high and medium spending levels. Mayor and manger type of governments exist in cities and have complex organizational structure. It is conclusive that organizational complexity in governments increase spending levels. Second, communities with other type of governments are in the low and medium spending groups. These communities are mostly consisted of townships, which are less urbanized and have simple organizational structure in government in compare to cities.

There are significant difference in expenditures between the mayor or manager and other form of governments, but this difference was also apparent when communities are distinguished by cities and townships in the previous section. This is due to the fact that mayor and manager forms of governments occur mostly in cities, while other forms of government are in townships. Therefore, community type (city or township) could represent difference in government type (mayor, manager or other) in the regression analysis. As dummy variable CITY was selected in the earlier section to represent community type, which also could represent difference in government type. Hence, no separate dummy was selected for government type. To ascertained about the role of this dummy, separate regression equations were derived

including government type dummy as independent variables, but it was not significant to include in the regressions.

Regional location. Michigan was divided into four regions to study the regional effects of municipal expenditures. The following criteria were used in dividing the study regions:

1. 14 State Planning and Development regions, as defined by Department of Treasury, State of Michigan, were considered. In each of the four study regions, one or more state planning regions were included.

2. Population distribution of census map and SMSA map were considered and they were super imposed on the state planning map to include SMSA regions in the four study regions.

3. In grouping the study regions, urban and rural areas were considered to examine difference in expenditures.

The number of municipalities in each of the study regions and the respective state regions and SMSAs are shown in Table 5. Detailed descriptions and illustrations of regional locations are presented in Appendix 12.

Table 5

Number of Communities in Each of the Study Regions

Study Regions	State Regions	SMSA included	Number of municipalities
Region 1	1	Ann Arbor, Detroit	128
Region 2	2, 3, 4, 5, 6, 7, 8, 14	Bay city Battle Creek Flint Grand Rapids Jackson Kalamazoo Lansing Muskegon Saginaw	145
Region 3	9, 10		6
Region 4	11, 12, 13		14

The mean per capita expenditures according to these four regions are shown in Table 6 below.

Table 6

Comparison of Per Capita Expenditures of Four Regions

	Mean of Expenditures				
Expenditure	All	REG1	REG2	REG3	REG4
PCPOLICX	40.49	50.49	32.06	38.52	34.04
PCFIREX	21.90	24.87	19.34	26.62	18.01
PCRECX	9.60	11.47	7.27	19.08	12.24
PCROADX	21.71	22.24	19.49	41.80	31.97
PCCAPITX	21.50	18.88	23.03	35.67	25.62
PCGFTOTX	143.21	173.44	113.15	173.11	166.69
PCTOTX	275.03	312.19	238.42	319.67	286.62

From above, it can be seen that some regional variation of expenditures in Michigan exists, but it is not extreme as in the case of community type. The Detroit region (region 4) shows highest per capita expenditures in most of the categories. But the Northern Michigan (region 3 and region 4) also shows a similar per capita expenditures that of Detroit region. The Central Michigan region (which comprises mostly the urbanized lower peninsula, region 2) shows a slightly lower level of per capita expenditures for most categories.

One of the problems in comparing regions as above is that the number of communities is not the same in all regions which may reduce the significance of results. Region 3 and region 4 consist of low number of communities in comparison to region 1 and region 2. The T-test for mean values of expenditures for fours region were performed, which shows low results representing that regional variation in expenditures is not significant. Also, T-test for two regions (region 1 and region 2) were performed. For example, T-statistics for the mean value of total expenditures for region 1 and region 2 is 2.33, at two tails significant level 0.021. For other expenditure variables, the t-statistics are lesser. This results show that to a lesser extent, the regional variation of expenditures in Michigan municipalities

exist. Comparing the expenditure variation with community type (cities and townships), the regional variation is much less.

To examine regional variation in more detail, crosstabulations were performed between expenditure ranges (Table 2) and regions. The results (Appendix 10) show that in each of the regions, communities with all ranges of expenditures (low, medium, and high) are found. This indicate that regional variation of expenditures is not extreme.

Considering the above results, it can be concluded that dummy variables are not needed from regional variables. Another aspect of regional variation is that more urbanized region (such as, Detroit and Southern Michigan) have larger community size, but the rural region (northern Michigan) has small community size. But population size was selected (in the earlier section) as independent variable for regression analysis. Hence community size, to some extent, represent regional variation. Also, to ascertain the role of regional dummy, separate regression equations were derived including regional dummy as independent variables, but it was not included in the equations.

Final Independent Variables for Regression

The final list of independent variables for regression included 10 variables, 9 of them are quantitative and 1 is dummy variables, as follows:

Population and Urbanization:

1. PDEN: Population density (persons per square mile)
2. POP80: 1980 population in thousands
3. HOUSEN: Percent of new housing (built between 1970-1980)
4. HOUSVACP Percent of vacant housing units

Industrial and Commercial Composition:

5. SEVBUSP Percent of commercial and Industrial SEV
6. EMMAN Percent of Employment in manufacturing

Fiscal Capacity:

7. INHH Household median income in thousands of dollars
8. TAXTOTCA Total Tax per capita

Intergovernmental Transfer:

9. TRATOTCA Per capita total intergovernmental transfer

Community Structure:

10. CITY: Type of community as city or township (CITY = 1 for cities; 0 for townships).

CHAPTER 5

REGRESSION OF EXPENDITURES ON COMMUNITY CHARACTERISTICS

Overview

Multiple regression analysis is the technique which was finally applied in order to express statistically municipal expenditures as a function of community characteristics. Regression equations were derived for the seven expenditure variables chosen in the previous chapter. Ten community characteristics, also chosen in the previous chapter, were used as independent variables, and one of those was formulated as a dummy variables.

The stepwise method of variable selection process was used to derive regression equations. The results of the regression equations are presented in the Appendices in detail, and a summary table was included in the discussion. A brief analysis of assumptions for regressions and possible violations of assumptions was also discussed.

Using the regression equations obtained, a table of expected changes of expenditures was prepared to

illustrate the magnitude of the effects due to corresponding changes in community characteristics.

Variables Selections Methods

There are different methods of selecting variables to enter into the regression equations. The three most commonly used variable selection methods are: (1) forward selection, (2) backward selection, and (3) stepwise selection (SPSSX: Advanced Statistics Guide, 1985, p. 45).

In forward selection, variables are entered into the regression equation one-by-one according to some established criteria. The first variable entered into the equation is with the largest positive or negative correlation with the dependent variable. Then the F test is performed for the null hypothesis of the coefficient of the entered variable and compared with certain established criterion. In statistical package used in this research, SPSSX, has two criteria; either of them can be used in the selection of variables. One criterion specifies a minimum value of the F-statistic to be attained (default 3.84) by a variable in order to enter into the equation. Another criterion is to specify a certain probability level of the F statistic (default 0.05), where all variables with a probability level equal to or less than the specified level are entered into the regression equation (SPSSX: Advanced Statistics Guide, 1985, pp. 45-46).

Backward selection begins by building the regression equation with all variables, and then variables are eliminated by testing if certain conditions are met. Two types of criteria can be specified in the SPSSX package, and either one can be used. One criterion is to specify a minimum F value (default 2.71) a variable must attain to be in the equation. Another criterion is the maximum probability of F (default value 0.10) a variable can have, and if probability value is greater than the specified level, the variable is removed from the equation (SPSSX: Advanced Statistics Guide, 1985, p. 47-48).

The stepwise selection is a combination of both the forward and backward selection methods. The first highest correlated variable is entered into the equation according to the forward selection method. Then the second variable is also entered based on highest partial correlation and forward selection criterion. At this step the regression equation is checked by the backward process to determine whether any variable entered is ready to drop out according to backward or removal criteria. This process is repeated for successive variables (SPSSX: Advanced Statistics Guide, 1985, p. 48).

In this study, the stepwise method was used to derive the regression equations. The advantage of stepwise regression is that it has checks and balances criteria for entering and removing variables. This helps

to ensure a good regression equation. Also, the ten independent variables chosen for regression might not be equally important in the regression of different expenditure variables. Each independent variable has different relationship with each of the expenditure variables, and stepwise method is convenient to select important variables for separate regression equation.

Assumptions of the Regressions

For the reliability of the estimated regression results, each of the regression equations should meet certain standards or assumptions. The following are some basic assumptions that need to be satisfied for each of the regression equations:

1. The absence of errors in sample and variables were collected without any measurement errors

2. The relationship between dependent and independent variables are linear

3. The independent variables are independent of each other linearly, that is, there is no multicollinearity

4. The error terms must satisfy that:

(a) the conditional distribution of the error term is normal, that is, the error term is normally distributed

(b) the conditional distribution of each error term has a mean of zero

(c) The error terms have homoscedasticity, that is, the variance of the conditional distribution of error term is constant for all such distributions. If this assumption is violated, then heteroscedasticity is found in the data.

The above assumptions were verified for all of the estimated equations and results are discussed in later sections.

Estimation and Interpretation of Regressions

Seven regression equations were estimated for seven expenditures variables selected in Chapter 4. The regression equations were derived taking 10 community characteristics as independent variables, which were also selected in Chapter 4. The regression equations are shown in detail in Appendix 13 and summary of regression coefficients are presented in Table 7.

Out of the 10 independent variables used to derived the regression equations, only 8 of them entered in the regression equations, but not all of them appeared in each regression. Table 7 shows the regression coefficients corresponding to each expenditure variable. The eight variables entered in the equations were: population density, population, new housing, business values, household income, total tax, total transfer, and city. The two variables, housing vacancy rate and

manufacturing employment did not enter in any of the equations, though they were selected from two separate factors. This might be for the reason that their influences have been accounted by other variables in the equations. The regression results for each of expenditure category is discussed below:

Police Expenditures

The regression for police expenditures included seven independent variables, which were population density, population, total tax, business value, new housing, and city. Each variables had a different contribution in explaining police expenditures. As each of the variables in the equations were measured in different units, the relative importance of variables cannot be compared from regression coefficients. "One way to make regression coefficients somewhat more comparable is to calculate beta weights, which are the coefficients of the independent variables when all variables are expressed in standardized (Z-score) form" (SPSSX: Advanced Statistics Guide, 1985, p. 39).

The beta coefficients were calculated for each variable and are shown in Appendix 13 with regression results. Total tax variable has the highest beta coefficient (0.311) and CITY has the second highest beta coefficient (0.238). It shows that for police

Table 7

Summary of Regression Coefficients

Dependent Variables	Cons-tant	PDEN	POP80	TAXTOTCA	SEVBUSP	HOUSEN	TRATOTCA	INHH	CITY
PCPOLICX	7.473	0.002	9.13E-5	0.135	0.328	-0.214	0.049		17.241
PCFIREX	14.688	0.002	4.08E-5	0.070	0.247	-0.314			
PCRECX	5.775			0.048		-0.132			7.993
PCROADX	25.958	-0.003		0.039		-0.246		-5.1E-4	34.010
PCAPITX	4.219	-0.004					0.180		23.421
PCGFTOTX	61.084		1.98E-4	0.611	0.814	-1.323	0.182		62.532
PCTOTX	107.163		3.58E-4	0.595	1.803	-2.145	0.646		149.494

Note: (1) All the coefficients are significant at 0.05 or better except constant terms.
(2) For more details about variables and statistics see Apeendix 13.

expenditures, taxing capacity or fiscal capacity is important. Communities with strong fiscal systems usually spend more for safety and law enforcement in the community. Variable CITY indicates that a city spends almost $17.24 per capita more than a townships. These results are supportive of the results of cross-tabulation in Chapter 4, where it was found that for police expenditures, cities were higher spenders than townships. The inclusion of two population related variables, population and population density indicate that population size and the concentration of population positively increase the police expenditures. This result is similar to the results of Brazer (1959) and Gabler (1969), who established that population size is important in explaining police expenditures. In the case of population density, Gabler found that increases in population density has increasing effect on police expenditures. The regression results of Stuhmer and Hamlin (1977) showed that old housing is associated with increase in police expenditures in Michigan. Similarly here, new housing shows a decreasing effect on police expenditures. New housing is a indicator of community growth, development and qualitative living conditions, and subsequently, have an opposite effect of old housing which is related to community poverty, poor living conditions, and crimes.

The appearance of business value in the equation confirms the results of Stuhmer and Hamlin (1977) that communities which have more business value require more police protection and increases police expenditures. It appears that intergovernmental aid variable has little effect on police expenditures, which indicates that the contribution of federal and state aids for police expenditure is low. The R-square of police expenditure equation, which measures the proportion of the variation in police expenditures explained by the equation, is 0.757. This value is high comparing with others, such as for the Brazar (1959) study was 0.260; Bahl (1969) study was 0.643; Weicher (1959) study was 0.727 (Weicher, 1970, p. 392); and Stuhmer and Hamlin (1977) was 0.628. The F-statistics of regression equation, which indicate reliability of regression, has a high value of 124. Also, the standard error of regression equation indicates what might be the error level in using the regression equation. The standard error of police equation is a low number of 17.81, and indicate that the equation is satisfactory.

Fire Expenditures

The regression for fire expenditure included five independent variables: population density, population, total tax, business values, and new housing. The variable total tax has the highest beta coefficient (0.291), which

shows that fire expenditures are mostly explained by the fiscal capacity of communities. Though fire protection is an essential municipal service, it can be seen from the equation results that rich communities are associated with higher levels of fire protection.

According to Stuhmer and Hamlin (1977), conditions of housing are highly correlated to the requirements for fire services and communities which have older housing require more fire service expenditures. Conversely, new housing reduces the consumption of fire services and reduces the costs for this services. In the present equation, it is shown by the negative sign of the variable new housing. Also in the equation, population size, population density, and business value appears with positive regression coefficients, which indicate a positive relationship with fire expenditures. This confirms the results of Fabricant (1952), Bahl (1965), Gabler (1969), and Stuhmer and Hamlin (1977). One important aspect of the regression for fire is that the variable CITY was not included, which indicate that the difference in fire expenditures between cities and townships are negligible. This may be for the reason that fire protection is one of the important municipal function needed to maintain safe community, and hence, all types of communities provide uniform (to certain extent) fire protection. The R-square of the equation is 0.521. The

R-squares for fire expenditures for other similar studies, such as Brazar (1959) was 0.269, Bahl (1969) was 0.508 and Weicher (1970) was 0.638 (Weicher, 1970, p. 392), and Stuhmer and Hamlin (1977) was 0.560. Comparing R-squares of this study with above mentioned studies, R-square of this study is reasonable. The standard error is 13.92, and F-statistics is 61 for the equation, which is acceptable.

Park and Recreation Expenditures

Three variables were included in this regression: total tax, new housing, and city. Of these three variables, tax total is the important one in determining the expenditure levels. Variable total tax has the highest beta value (0.323), which indicates that communities with better fiscal and economic conditions provide better recreational services to their communities. New housing has a negative coefficient, which shows that communities with newer houses spend less on park and recreation activities. This may be for the reason that communities with new housing may provide lots with more open spaces, which reduces the need for public open spaces. The CITY variable shows that there is a $7.50 per capita difference in park and recreation expenditures between cities and townships. This indicate that park and recreation expenditure varies according to community type.

Contrary to Gabler's (1969) study, which found that population size is one of the factors which affects park and recreation expenditures, this study shows that population size may not be important. The R-square of the park and recreation equation is 0.482. Most of the earlier studies did not include park and recreation expenditures. Gabler (1969) made a simple analysis, but did not estimate any regression equation for park and recreation expenditure. The standard error is 8.85 and the F-statistics is 88 for park and recreation equation, which is satisfactory.

Road Expenditures

The regression equation for road expenditures included five variables, such as population density, new housing, total tax, household income, and city. The variable CITY (with highest beta coefficient of 0.733) shows that cities have more road expenditure responsibilities than townships. Also, circulation and accessibility is a main characteristics of a city where more concentration of residential, commercial, and industrial activities are found. Population density has a negative effect on roads expenditures, which shows that an increase in population density, to certain extent, increases the frequency of road use, and ultimately reduces the per capita maintenance expenditures of roads.

This result is comparable with Weicher (1970) who showed that population density was negatively related to road expenditures (p. 385).

Another two variables in the equation, new housing and income of households, show a decreasing effect on road expenditures. This may be because higher income households and new housing communities are associated with relatively new road infrastructure, which reduces maintenance costs. Total taxing capacity has a relatively small increasing effect on this kind of expenditures. The R-square for roads expenditures equation is 0.666. The R-square for the road expenditure equations was not high is other studies, such as Brazar (1959) study was 0.162, Bahl (1969) study was 0.266, Weicher (1970) was 0.344 (Weicher 1970, p. 392), and Stuhmer and Hamlin (1977) was 0.170. Comparing these results, the R-square for this study is relatively high. The standard error of the equation is 13.38, and F-statistics is 111, which show that the equation is significant.

Capital Expenditures

In the regression equation for capital expenditures only 3 independent variables were entered: total transfer, city, and population density. The variable CITY (with highest beta coefficient of 0.339) indicates that cities perform more capital projects than

townships. Also, variable total transfer represent that capital projects mostly relied on intergovernmental transfers from the state and federal governments. The population density variable indicates that if population is more concentrated, then capital facilities are supported by more people, thus reducing the per capita capital outlay expenditures. One particular aspect of capital expenditures is that it is an irregular spending category from community to community, and usually, capital outlay projects are implemented when opportunities arise. In a year, one community may perform more capital projects than other community. As being irregular spending category, capital expenditures might not be subject to statistical prediction. Spangler (1963, p. 194) computed correlation coefficient (r) of 0.46 between capital expenditures and population growth for 1960 data. Davis and Haines, Jr. (1966, p. 274) included capital expenditures in their study, but their estimated equation was so poor that it was not even reported. In this study, capital outlay expenditures equation had a R-square of 0.237. Though this value is not high, at least the regression equation indicates what community factors affects capital outlays expenditures. The standard error for the equation is 30.09 and F-statistics is 28.

General Fund Expenditures

The regression equation for general fund expenditures included 6 independent variables: population, total tax, business values, new housing, total transfer, and city. Among these variables, total taxing capacity is relatively more significant (with a highest beta value of 0.433). As general fund expenditures comprised expenditures cnly from community's own source (general fund), it shows this expenditure category is mostly explained by the community's own taxing efforts, which is expected. The CITY variable indicates that cities spend per capita $62.53 more than the townships. The variables intergovernmental transfer (TRATOTCA), population (POP80), and business value (SEVBUSP) have an increasing effect on the general fund expenditures. As explained in the case of police and fire expenditure, the general fund expenditures appears to decrease with increases of new housing. This result of regression equation cannot be compared with other studies because it was not studied earlier. The R-square of the equation is very high (0.837). The standard error is 47.71 and F-statistics is 234. These results are satisfactory.

Total Expenditures

The regression equation for total expenditures included six variables: population, total tax, business value, new housing, total transfer and city. The variable CITY (having highest beta value of 0.290) is the relatively most important variable in explaining total expenditures. The coefficient of CITY shows that the cities usually spend $149.49 higher than the townships. The variables total tax, business values, and population have increasing effect on this expenditures. New housing, as explained in police and fire expenditures, is negatively associated with total expenditures. Intergovernmental transfer also have increasing effects on this expenditure category, which is supported by the results of Kee (1965), Bahl (1965), Sharkansky (1967), and Ladd (1981). The R-square of the total expenditure equation is 0.540. This value for similar studies of Bahl (1965, p. 53) was 0.310, and Stuhmer and Hamlin (1977) was 0.628. Comparing with other results, the R-square for this study is reasonable. But the standard error of the equation is 174.9, which reduces the significant of equation to some extent. In this regard, one factor should be considered, that is the total expenditures contain a large amount of intergovernmental transfer, which creates accounting problems, such as money received in one fiscal year usually is spent beyond that fiscal

year, money for one project goes to other projects, and others. Comparing total expenditure equation with the general fund expenditures equation, it has been found that general fund equation is more valid and statistically significant. This is for the reason that the general fund is composed of a community's own funds and has fewer accounting problems. The F-statistics for total expenditures equation is 54, which is satisfactory.

Review of Possible Violation of Regression Assumptions

For a confirmation of the regression results, the estimated results were reviewed for compliance with the statistical requirements. It was concluded that all requirements were met satisfactorily:

1. Measurement errors of dependent and independent variables were minimized because data were gathered in a uniform and consistent manner.

2. The linear specifications of the regression functions appeared to be reasonable. The multiple correlation coefficients for all equations were high, ranging from 0.490 to 0.915, which is a indicator of linear relationships.

3. Multicollinearity did not seemed to be a problem. The tolerance level of each of the independent variables in the equations are between 0.313 and 0.895 In SPSS-X package, a tolerance value of 0.01 was indicated

minimum (SPSSX: Advanced Statistical Guide, 1985, p. 55). The tolerance values of variables in equations are far above this minimum value.

4. In error terms were reviewed by examining the distribution of residuals:

(a) The histogram of residuals for each of the equations showed normal distribution. Cumulative plots or normal probability plots were also obtained for all equations. According to these plots, the residuals are almost uniformly distributed above and below the diagonal line. Hence it shows that the error terms are normally distributed.

(b) The conditional distribution of error terms should have a zero mean if the model is appropriate for data (SPSSX: Advanced Statistics Guide, 1985, p. 24). In the estimation process by SPSSX, the standardized residual for any case is the residual for that case divided by the sample standard deviation. Standardized residuals have a mean of 0 and a standard deviation of 1.

(c) The assumption that error terms have a constant variance was tested by drawing plots of studentized residuals against predicted values for dependent variables. When the spread of residuals increases with the magnitude of predicted values, then the equality of the variance assumption is said to be violated. In all cases, the plots were not widely spread.

From the above points, it can be concluded that the regression equations obtained were quite acceptable, considering that in reality, there are rare cases where assumptions are not violated.

Expenditures Effects from Changes in Community Characteristics

From the regression equations, it is possible to estimate the expected increases or decreases in expenditures due to changes of the independent variables. The calculation of expenditures effects can be accomplished as follows:

First, suppose that for an initial point of time A, the regression equation for a given expenditure category is

$$Y_A = b_0 + b_1 X_{1A} + b_2 X_{2A} + \ldots\ldots b_n X_{nA} + \ldots\ldots$$

where, Y_A = expenditure level

X_{nA} = independent variable n at time A

b_0 = constant term

b_n = coefficients for independent variable n

n = designates the independent variable in the equation

Second, suppose that for a later point of time B there has been a change in one of the community characteristics, X_n, by a given amount expressed as percent p from the original level. Then other things

remaining equal, the expected expenditure value for time B would be

$$Y_B = b_0 + b_1 X_{1A} + b_2 X_{2A} +...+ b_n(X_{nA} + pX_{nA}) +...$$

By subtracting the value of the first equation from the second, the change of expenditure, as percent, would be

$$Y_B - Y_A = b_n (X_{nA} + pX_{nA} - X_{nA})$$

$$Y_B - Y_A = b_n \, p \, X_{nA}$$

$$\text{or,} \quad \frac{Y_B - Y_A}{Y_A} = \frac{b_n \, p \, X_{nA}}{Y_A}$$

The effects on expenditures from percent changes in the independent variables can then be generalized as,

$$\% \text{ changes of Y (expenditure)} = b_n \, p \, \frac{X_{nA}}{Y_A}$$

This formula was used to illustrate the magnitude of changes in expenditures expected from a 10 percent increases in community attributes of a hypothetical city with average characteristics. For a 10 percent increase from the mean value of independent variables (population density, population size, total tax, business value, new housing, total transfer, and household income), expected changes in expenditures were estimated and results are shown in Table 8

Table 8

Percent Change in Expenditures Due to 10 Percent Increase in Independent Variables

Expenditures	% Change in Expenditures due to 10% Increase* in each Independent variables						
	PDEN	POP80	TAXTOTCA	SEVBUSP	HOUSEN	TRATOTCA	INHH
PCPOLICX	0.94	0.46	2.16	1.77	-1.19	0.81	--
PCFIREX	1.30	0.45	2.49	2.96	-3.90	--	--
PCRECX	--	--	2.69	--	-2.59	--	--
PCROADX	-1.44	--	0.77	--	-1.69	--	-2.72
PCAPITX	-2.34	--	--	--	--	4.26	--
PCGFTOTX	--	0.27	2.71	1.22	-2.05	0.84	--
PCTOTX	--	0.25	1.32	1.35	-1.66	1.48	--

* Increase from the mean value of each independent variables except city.

These results offer some practical applications for planners and local officials to estimate changes in expenditures when community characteristics are changed. For example, when population density increases, planners can see that police and fire service expenditures increase, while road and capital expenditures decrease. This might indicate physical infrastructure are underutilized and increase of population density only ensures decreasing per capita costs.

Increasing in population size has increasing effects on police, fire, general fund, and total expenditures. This indicates that additional services are required in these categories if population is increased. For parks and recreation, road and capital expenditures, population size does not show any immediate affect. This might be for the reason that these physical facilities can be used by increasing number of people to certain limit without increasing costs.

The taxing capacity shows positive relationships with all expenditure categories except capital expenditures. Tax base of communities is an important factor in deciding expenditure levels. Communities which have strong taxing or fiscal capacity spend more. Capital expenditures is less influenced by local taxes, because most of local taxing are collected for providing operating services. In reality, capital projects are performed by

external funds, such as governmental transfers, different type of bonds, or special funds.

Communities which have more business properties spend high for police, fire, general fund, and total expenditures. To ensure proper business atmosphere, proper security and safety are needed through police and fire services. So, when new commercial and industrial properties are increased in a community, it should be taken into consideration that expenditures would increase in the above mentioned categories.

Housing conditions seem to have an association with expenditures. Communities with a larger percent of new housing usually spent less. The coefficient in Table 10 show the negative relationship with expenditures. This might be for several reason. For example, in the case of fire expenditures, a 10 percent increase in new housing, reduces the fire expenditures by 3.90 percent. As it was discussed before, new houses are better in structural quality and hence, there is less possibility of fire hazards. So, increase of new housing reduces the fire expenditures. A community with new housing has new roads and other infrastructure, which reduce expenditures for maintenance.

Increase in intergovernmental aids increase expenditures in police, capital, general fund, and total expenditures. A 10 percent increase in aids results in a

4.26 percent increase in capital expenditures. This shows capital projects are mainly supported by intergovernmental aids.

Only road expenditure has shown negative association with household income. It is found that a 10 percent increases in income will cause a 2.72 percent decreases in expenditures. Hirsch (1960, p. 39) estimated income elasticity coefficients for education, police, and fire expenditures, where it was found that income increases these expenditures. Contrary to Hirsch, income is associated only with road expenditures in this study.

The above analysis gives an idea to planners or public officials, if a community characteristics (which are included in regression) changes, what are the consequences on the expenditures, or at least in what direction an expenditures category may change. The coefficients in Table 8 can be calculated for any city or township.

Conclusion

As so many interacting forces together determine the expenditures in a community, it is not possible to estimate regression equations with very high R-squares. The residuals do not show extreme cases. In this study, all the variations of the expenditures are not fully explained by the equations. One reason is that there are

also some additional factors (e.g. political process, quality of municipal services, effect of climate on municipal services, time consideration, past budget commitments, and others) have been overlooked which might have an effect on expenditures.

CHAPTER 6

CONCLUSION

Overview

This concluding chapter discusses the overall results of the study and its limitations, and then makes recommendations for further study.

Summary of the findings

This study analyzed a selected number of expenditure categories. The research started with twenty-one initial expenditure categories, but final analysis was only performed for seven important categories. The results presented in the preceding chapters reveal some important aspects of municipal finance. Earlier it was assumed that municipal expenditure levels were strongly associated with a limited number of community characteristics. The analysis performed in Chapter 4 and Chapter 5 supports this hypothesis.

Using a combination of correlation analysis, factor analysis and the theoretical notions developed in the literature, ten independent community characteristics variables were identified as independent variables: population density, population size, percent of new

housing, percent of vacant housing units, percent of business value, percent of employment in manufacturing, household median income, total tax per capita, intergovernmental total transfer, and a dummy variable representing municipal organization. From these ten variables, two variables (housing vacancy and manufacturing employment) were found to be insignificant for inclusion in the regression equations. The eight variables used for explaining expenditure variations in Michigan municipalities are compatible with those used by other authors. From Fabricant (1952) to Palumbo (1983), the dominant community characteristics that seem to control expenditures are generally those related to population and fiscal capacity. Comparing the results of this study with those of others, two new community characteristics, "new housing" and "city type", added significantly to the explanatory power of the regression equations.

In Michigan, the effect of revenues on expenditures had not been extensively analyzed in earlier attempts. In this study, from the eight variables which were found important, two of them are revenue variables: total tax and intergovernmental transfers. Taxing capacity appears to be the most important revenue variables; communities with higher tax base spend more. Transfer of funds from higher level of governments to local

governments is positively related with some expenditure categories, particularly with capital expenditures.

A more limited analysis was performed to investigate the relationship between per capita expenditures and percent expenditures for a given municipal function. It was found that higher per capita expenditures in a category do not always yield higher percent expenditures in that category. This shows that the distribution of the level of expenditures is not uniform across communities.

The assumption that community structure has influence on expenditure levels was supported by the data. In particular, cities in Michigan were found to have higher spending levels than townships. For some categories, city expenditures were several times more than township expenditures. Degree of urbanization and fiscal capacity, by affecting demand and supply, may explain differences.

Another assumption posed by this study was that expenditures vary according to government type. This was also supported by the study results. It was found that communities with mayor and manager government type distinctly spend more than "other" types of governments (townships board or council). The difference between manager and mayor type of governments was not found to be significant. It was also found that when mayor or manager types occur, the cases are usually cities. "Other"

governments types are mostly in townships. Therefore, the dummy variable describing community structure already defines information about government type and separate dummy for government type is not needed for the accounting of variations, at least not in Michigan.

The assumption about the regional variation of expenditures was found to be less significant. In most categories, region 1, which is basically comprised of the greater Detroit region, has slightly higher expenditures levels, but is not statistically significant from other regions. The northern Michigan region, which comprises the upper peninsula (region 4) and the upper part of lower peninsula (region 3), has the second highest expenditures level. Region 2, which comprises the central and lower part of Michigan, showed the lowest level of expenditures in most cases. But this regional variation of expenditures in Michigan is not extreme.

For the study of expected effects on expenditures due to changes in community characteristics, the regression equations were applied on a hypothetical city with average characteristics. More specifically, expected expenditures were calculated for a 10 percent change in values of the independent variables. Coefficients showing these effects should be helpful for planners and public officials in predicting expected expenditure consequences due to some of their decisions or plans to modify existing

conditions in the community. For example, when any subdivision development proposal is evaluated by planners, the effects on expenditures resulting from changes in population density can be estimated to find out how the development will effect community service costs. Also, for new commercial and industrial projects, it will be possible to estimate how the increase of property values would affect per capita municipal service costs. In turn, these costs can be compared with estimated revenues generated by the projects. This approach should help planners in making more informed recommendations.

The results presented in previous chapters show that the four objectives of the dissertation have been fulfilled. The important community characteristics for explaining expenditure variation in Michigan were identified, expenditure variations were found to vary according to community structure, type of government and organizational structure influences expenditures, and regional differences of expenditures are not pronounced. Initially, it was expected that regional variations may exist, but the data do not support this contention.

Limitations of the Study and Recommendations

Although 21 expenditure variables were first collected, the final analysis was made using only seven expenditure categories. Consequently, this study is a

partial analysis of expenditures in Michigan. Other expenditure categories, such as sewer, water supply, salary, general governments, and others, might be important for certain communities. In future research, these expenditure categories could be explored for analysis.

The study was based on cross-sectional data for 1980. This kind of study from a single point of time has limitations for prediction purposes. Although time-series study could have provided increased accuracy of prediction, it would not have been possible to generate the coefficients to link categories of expenditures with specific community characteristics. In other words, while the predictive accuracy of this study is not high, the gain in the ability to relate changes to levels of expenditures is adequate compensation for loss of prediction power. But implications and results of cross-sectional study may only be valid for a short period of time. As levels of municipal expenditures are determined by community characteristics and these change through time, future studies could be performed with cross-sectional data to compare the changes in community factors. For example, every 5 years a new study can be performed and regression coefficients can be compared to find the relative importance of community characteristics.

Some community factors, such as political processes and decision making, efficiency of management in spending and administrating municipal services, budgetary commitments, climatic factors related to municipal services, and the evaluation of delivery and quality of services from community to community might also have influence upon municipal expenditures. But due to limited time and resources, and non-availability of information, these variables were not included in the study. In future study, addition of these factors could increase the explanatory power of regression equations.

In comparing expenditures across communities, demand and cost are important. The demand for services may vary from community to community according to quality of services and costs. Also, with the same costs, different communities can produce same service, but with different quality. Residents of rich communities might be willing to pay high taxes for high quality services; on the other hand, poor communities may be satisfied with low quality services. To analyze costs and quality of services, each community should be treated as a case study before it can be compared with other communities. In this research, distinctions of demand and quality of services was ignored. This issue could be addressed in further research.

In the regressions, each equation has some unexplained variation. This might be due to some community factors that were not taken into consideration. Further ideas about the expenditure differentiation across communities can be derived by looking at these residuals or outliers. Most of the outlier communities were cities and located in southern urbanized regions. Some of these outliers were Pontiac, Jackson, Gross Point, Saginaw, Plymouth, Dearborn, Woodheaven, Holland, Detroit, Petosky, Clawson, and others. Most of these cities are old, densely populated, and have a more complicated organizational structure. In the future research, these individual communities could be analyzed individually or as a group to understand better their expenditures.

Expenditures were studied in per capita terms. Percent is an other way to express distribution of expenditures. Further study using percent of expenditure could provide additional information.

There are more than 1,700 cities, townships, and villages in Michigan. In this study only 293 cities and townships which have a population of 5,000 or more were included, so a large number of small communities were left out of the study. The results of this study might not be applicable to these small communities. A separate study could be performed for small communities.

LIST OF APPENDICES

APPENDIX 1

Appendix 1: List of Communities

COUNTY	COMMUNITY*	COUNTY	COMMUNITY*	COUNTY	COMMUNITY*
Allegan	DorrT	Emmet	Petoskey		LeoniT
Alpena	AlpenaT	Genessee	ClaytonT		NapoleonT
	Alpena		DavisonT		SpringArborT
Barry	Hastings		FentonT		SummitT
Bay	BangorT		FlintT		Jackson
	HamptonT		FlushingT	Kalamazoo	ComstockT
	KawkawlinT		GainesT		CooperT
	MonitorT		GeneseeT		KalamazooT
	BayCity		GrandBlancT		OshtemoT
Berrien	BentonT		MontroseT		SchoolcraftT
	ColomaT		MountMorrisT		TexasT
	LincolnT		MundyT		Kalamazoo
	NilesT		RichfieldT		Portage
	OronokoT		ThetfordT	Kent	AdaT
	StJosephT		ViennaT		AlpineT
	Benton Har.		Burton		ByronT
	Buchanan		Davison		CascadeT
	Niles		Fenton		GainesT
	StJoseph		Flint		GrandRapidsT
Branch	Coldwater		Flushing		PlainfieldT
Calhoun	BattleCreekT		GrandBlanc		SpartaT
	BedfordT		SwartzCreek		EastGrRa
	EmmetT	Gogebic	Ironwood		GrandRapids
	Pennfield	G.Traverse	EastBayT		Grandville
	Albion		GarfieldT		Kentwood
	BattleCreek		TraverseCity		Walker
	Marshall	Gratiot	Alma		Wyoming
	Springfield	Hillsdale	Hillsdale	Lapeer	MayfieldT
Cass	HowardT	Houghton	CalumetT		OregonT
	OntwaT		Hancock		Lapeer
	Dowagiac		Houghton	Lenawee	MadisonT
Cheboygan	Cheboygan	Ingham	DelhiT		RaisinT
Chippewa	SaultSteM		LansingT		Adrian
Clinton	BathT		MeridianT		Tecumesh
	DeWittT		EastLansing	Livinston	BrightonT
	StJohns		Lansing		GenoaT
Delta	WellsT		Mason		GreenOakT
	Escabana	Ionia	Belding		HamburgT
Dickinson	IronMountain		Ionia		HartlandT
	Kingsford	Iosco	OscodaT		PutnamT
Eaton	DeltaT	Isabella	UnionT		TyroneT
	WindsorT		MountPleasant		Howell
	Charlotte	Jackson	BlackmanT	Macomb	BruceT
	GrandLedge		Columbia		ChesterfieldT

*COMMUNITY = Name of the community, (if name ends with T, it is township, otherwise, city)

Appendix 1 (Cont'd.).

COUNTY	COMMUNITY*	COUNTY	COMMUNITY*	COUNTY	COMMUNITY*
	ClintonT		BrandonT	Shiawassee	VernonT
	HarrisonT		CommereT		Owosso
	MacombT		HighlandT	Tusla	Indianfields
	ShelbyT		IndependenceT	Van Buren	AntwerpT
	WashingtonT		LyonT		PawPawT
	CenterLine		MilfordT		SouthHaven
	EastDetroit		OaklandT	Washtenaw	PittsfieldT
	Fraser		OrionT		ScioT
	MountClemens		OxfordT		SuperiorT
	NewBaltimore		PontiacT		SylvanT
	Roseville		Rochester		YorkT
	StClairShores		RoyalOak		YpsilantiT
	Sterling Ht		Southfield		AnnArbor
	Utica		SouthLyon		Saline
	Warren		Troy		Ypsilanti
Manistee	Manistee		Wixom	Wayne	BrownstownT
Marquette	ChocolayT		BeverlyHill		CantonT
	ForsythT		HollyTV		GrossIleT
	Ishpeming		MilfordV		HuronT
	Marquette	Ottawa	AallendaleT		NorthvilleT
	Negaunee		GeorgetownT		PlymouthT
Mason	Ludington		GrandHavenT		RedfordT
Mecosta	BigRapids		HollandT		SumpterT
Menominee	Menominee		ParkTOtt		VanBurenT
Midland	Midland		SpringLakeT		AllenPark
Monroe	AshT		TallmadgeT		Dearborn
	BedfordT		GrandHaven		DearbornH
	BerlinT		Holland		Detroit
	DundeeT	Saginaw	BirchRunT		Ecorse
	FrenchtownT		BridgeportT		FlatRock
	LaSalleT		BuenaVistaT		GardenCity
	MonroeT		CarrolltonT		GrossPointe
	Monroe		ChesaningT		GrossPteF
Montcalm	Greenville		SaginawT		GrossPteP
Muskegon	DaltonT		ThomasT		GrossPteW
	EgelstonT		Saginaw		Hamtramack
	FruitportT	St. Clair	ClayT		HarperWoods
	LaketonT		FortGratiotT		HighlandPark
	MuskegonT		KimballT		Inkster
	Muskegon		PortHuronT		LincolnP
	MuskegonHt		Marysville		Livonia
	NortonShore		PortHuron		Melvindale
Oakland	AvonT	St. Joseph	Sturgis		Northville
	BllomfieldT		ThreeRivers		Plymouth

*COMMUNITY = Name of the community, (if name ends with T, it is township, otherwise, city)

Appendix 1 (Cont'd.).

COUNTY	COMMUNITY*
	RiverRouge
	Riverview
	Romulus
	Southgate
	Taylor
	Trenton
	Wayne
	Westland
	Woodhaven
	Wyandotte
	Cadillac
	HighlandPark
	Inkster
	LincolnP
	Livonia
	Melvindale
	Northville
	Plymouth
	RiverRouge
	Riverview
	Romulus
	Southgate
	Taylor
	Trenton
	Wayne
	Westland
	Woodhaven
	Wyandotte
Wexford	Cadillac

*Community = Name of the community (if name ends with T, it is township, otherwise, city)

APPENDIX 2

Appendix 2(A): Per Capita Expenditures for All Communities

	MEAN	STD DEV	MINIMUM	MAXIMUM
PCLEGX	1.88	2.95	0.00	24.76
PCJUDX	1.79	3.83	0.00	24.61
PCGGOVX	28.74	23.24	2.54	248.83
PCPROTX	70.65	63.74	0.00	345.32
PCHCRX	18.54	24.29	0.00	184.70
PCOTHX	23.65	30.88	0.00	270.52
PCGFTOTX	143.21	116.42	8.38	730.41
PCPOLICX	40.49	36.47	0.00	220.83
PCFIREX	21.90	20.01	0.00	97.95
PCHEALTX	2.03	6.84	0.00	77.93
PCRECX	9.60	12.26	0.00	70.50
PCPLIBX	4.35	6.40	0.00	37.52
PCLANX	1.39	1.88	0.00	17.18
PHOUSX	0.41	1.73	0.00	14.49
PCECOX	0.48	1.97	0.00	18.92
PCROADX	21.71	23.00	0.00	125.16
PCSEWERX	52.90	44.38	0.00	231.66
PCSALATX	102.62	101.18	4.65	694.29
PCCAPITX	21.50	34.07	0.00	307.25
PCSFX	130.69	186.73	0.00	1837.25
PCTOTX	275.03	255.48	26.10	1973.07

Appendix 2(B): Percent of Expenditures for All Communities

	MEAN	STD DEV	MINIMUM	MAXIMUM
PPLEGX	1.18	4.24	0.00	44.58
PPJUDX	0.49	1.02	0.00	4.89
PPGGOVX	14.89	9.03	0.92	46.30
PPPROTX	26.71	13.75	0.00	78.35
PPHCRX	6.57	7.25	0.00	74.30
PPOTHX	9.22	8.07	0.00	50.21
PPGFTOTX	58.57	19.72	6.88	100.00
PPPOLICX	14.44	10.74	0.00	78.75
PPFIREX	9.57	7.19	0.00	54.34
PPHEALTX	0.72	2.71	0.00	39.49
PPRECX	3.05	3.09	0.00	22.09
PPLIBX	1.56	2.17	0.00	19.58
PPPLANX	0.89	1.36	0.00	9.29
PPHOUSX	0.16	0.75	0.00	7.37
PPECOX	0.12	0.50	0.00	4.49
PPROADX	8.25	7.87	0.00	43.42
PPSEWERX	20.24	16.99	0.00	78.81
PPSALATX	35.74	13.00	4.21	86.79
PPCAPITX	9.34	13.60	0.00	85.67
PPSFX	41.43	19.72	0.00	93.12
PPTOTX	100.00	0.00	100.00	100.00

APPENDIX 3

Appendix 3(A): Correlation Coefficients Among Per Capita Expenditure

	PCLEGX	PCJUDX	PCGGOVX	PCPROTX	PCHCRX	PCOTHX	PCGFTOTX	PCPOLICX	PCFIREX	PCHEALX
PCLEGX	1.00									
PCJUDX		1.00								
PCGGOVX		0.25	1.00							
PCPROTX		0.49	0.53	1.00						
PCHCRX		0.40	0.32	0.66	1.00					
PCOTHX		0.30	0.31	0.54	0.45	1.00				
PCGFTOTX		0.51	0.60	0.93	0.74	0.72	1.00			
PCPOLICX		0.51	0.53	0.88	0.56	0.47	0.84	1.00		
PCFIREX		0.39	0.43	0.75	0.53	0.43	0.72	0.64	1.00	
PCHEALTX		0.30		0.42	0.34	0.27	0.42	0.41	0.32	1.00
PCRECX		0.37	0.35	0.67	0.75	0.46	0.71	0.61	0.55	0.29
PCLIBX			0.36	0.48	0.61	0.28	0.53	0.48	0.36	
PCLANX						0.21		0.20	0.20	
PCHOUSX		0.21								
PCECOX				0.24			0.25	0.28	0.25	
PCROADX		0.22	0.46	0.68	0.50	0.48	0.70	0.63	0.51	0.31
PCSEWERX		0.27	0.52	0.57	0.40	0.30	0.57	0.57	0.45	0.21
PCSALATX		0.45	0.56	0.80	0.60	0.47	0.81	0.78	0.71	0.43
PCAPITX				0.32			0.31	0.27	0.27	0.22
PCSFX			0.35	0.36	0.23		0.38	0.41	0.34	0.22
PCTOTX		0.32	0.53	0.69	0.51	0.47	0.73	0.69	0.57	0.36

	PCRECX	PCLIBX	PCLANX	PCHOUSX	PCECOX	PCROADX	PCSEWERX	PCSALATX	PCAPITX	PCSFX	PCTOTX
PCRECX	1.00										
PCLIBX	0.51	1.00									
PCLANX			1.00								
PCHOUSX				1.00							
PCECOX	0.20	0.23			1.00						
PCROADX	0.58	0.52				1.00					
PCSEWERX	0.44	0.38				0.52	1.00				
PCSALATX	0.62	0.52			0.26	0.71	0.55	1.00			
PCAPITX	0.27	0.26				0.34	0.24	0.42	1.00		
PCSFX	0.29	0.26				0.47	0.45	0.64	0.30	1.00	
PCTOTX	0.53	0.43			0.23	0.67	0.59	0.85	0.37	0.90	1.00

Appendix 3(B): Correlation Coefficients between Per Capita and Percent of Expenditures

	PPLEGX	PPJUDX	PPGGOVX	PPPROTX	PPHCRX	PPOTHX	PPGFTOTX	PPPOLICX	PPFIREX	PPHEALTX
PCLEGX	0.85									
PCJUDX		0.87								
PCGGOVX			0.01							
PCPROTX				0.43						
PCHCRX					0.62					
PCOTHX						0.56				
PCGFTOTX							0.06			
PCPOLICX								0.47		
PCFIREX									0.29	
PCHEALTX										0.46

	PPRECX	PPLIBX	PPPLANX	PPHOUSX	PPECOX	PPROADX	PPSEWERX	PPSALATX	PPCAPITX	PPSSFX	PPTOTX
PCRECX	0.72										
PCLIBX		0.62									
PCLANX			0.54								
PCHOUSX				0.88							
PCECOX					0.91						
PCROADX						0.43					
PCSEWERX							0.54				
PCSALATX								0.47			
PCAPITX									0.53		
PCSFX										0.49	
PCTOTX											

APPENDIX 4

Appendix 4(A): Factor Analysis (Rotated) for Dependennt Variables (Per Capita Expenditures)

4 Factors Extracted (10 Iterations)

	F1	F2	F3	F4
PCPROTX	0.866			
PCPOLICX	0.817			
PCSALATX	0.806			
PCHCRX	0.734			
PCRECX	0.719			
PCFIREX	0.718			
PCJUDX	0.678			
PCHEALTX	0.647			
PCROADX	0.638	0.438		
PCOTHX	0.605			
PCSEWERX	0.493	0.482		
PCLIBX	0.440	0.437		
PCLEGX		-0.594		
PCGGOVX	0.464	0.523		
PCPLANX			0.778	
PCAPITX			0.490	
PCHOUSX				0.739
PCECOX				0.522

Note: Coefficients equal or less than 0.40 are not shown. All factors have eigenvalues greater than one.

Appendix 4(B): Eigenvalues, Percentage of Variance and Cumulative Precent of Variance of Each Factor of Dependent Variables

Factors	Eigen-values	Percent of Variance	Cumulative Percent
Factor 1	6.07	33.7	33.7
Factor 2	1.91	10.6	44.3
Factor 3	1.37	7.6	51.9
Factor 4	1.24	6.9	58.8

APPENDIX 5

Appendix 5: Categorization of Expenditures

---

1. Police Expenditures:

This category consists of all expenditures incurred by law enforcement activities as found in the police fund of local units. It includes expenditures such as police activities, police administration, crime control and administration, traffic and safety, training, and other related activities.

2. Fire Expenditures:

This category consists of all expenditures incurred by fire department activities, as found in the fire fund of local units. It includes expenditures such as fire department administration, fire fighting, fire prevention, fire fighting supplies and equipments, automotive maintenance and supply, communications, and other related activities.

3. Parks and Recreation Expenditures:

This category consists of all expenditures incurred by parks and recreation activities, as found in parks and recreation fund of local units. It includes all expenditures for recreation programs including administration, park facilities, supervision, policing, lighting facilities, maintenance of facilities, and any other parks or recreation activities.

4. Roads Expenditures:

This category consists of all expenditures incurred by highways, streets and bridges, as found in the highway, streets and bridges fund. It includes maintenance and operation of highways, streets or bridges including lighting.

5. Capital Outlays Expenditures:

This category consists of all capital outlay expenditures for all types of activities in local government units. It includes long term capital improvements, building and construction, purchase of equipment and others.

Appendix 5 (Cont.).

---

6. General Fund Expenditures:

This category consists of all municipal functions as defined by the general fund of local governments. It includes expenditures related to legislative and judicial functions, general governments, public works, health and welfare, recreation and cultures, and others.

7. Total Expenditures:

This category consists of all expenditures for all activities in local units. It includes all expenditures from local sources and intergovernmental transfers.

APPENDIX 6

Appendix 6: Mean Value of Independent Variables

	MEAN	STD DEV	MINIMUM	MAXIMUM
(A) POPULATION				
POP80	24402.33	73491.37	5003.00	1202493.00
AREA	21.83	19.12	1.00	170.00
PDEN	1911.51	2099.47	57.00	10650.00
(B) EDUCATION				
GHS	71.80	9.88	40.00	96.00
GCOL	16.13	10.60	3.00	65.00
(C) EMPLOYMENT				
UMEM	9.55	3.96	3.00	32.00
EMMAN	30.46	9.17	2.00	50.00
UNMAN	11.01	4.81	3.00	34.00
(D) INCOME				
INHH	21229.06	5791.49	8836.00	47138.00
INFAM	23902.46	5598.15	10240.00	50696.00
INCAP	8125.75	2234.80	3766.00	21685.00
PPER	7.89	5.55	2.00	39.00
PFAM	6.10	4.28	1.00	36.00
(E) HOUSING				
HOUSECA	2.94	0.33	2.09	4.69
HOUSEN	27.26	16.46	1.00	80.00
HOUSO	24.15	18.33	1.00	88.00
HOUSEM	48.57	16.36	7.90	94.30
HOUSOCP	95.25	2.59	72.92	99.27
HOUSVACP	4.74	2.59	0.73	27.08
RENT	265.39	55.34	158.00	515.00
(F) PROPERTY VALUE				
SEVAGP	4.30	7.28	0.00	32.86
SEVCOMP	16.35	9.54	0.23	67.72
SEVINDP	10.21	12.12	0.00	74.87
SEVRESP	68.91	14.11	13.74	97.51
SEVTIP	0.05	0.31	0.00	3.25
SEVDEVP	0.35	1.09	0.00	11.55
SEVBUSP	26.37	15.71	0.26	82.28
(G) ASSET				
ASSETCA	1096.29	1636.87	8.43	19174.89

Appendix 6 (Cont'd.).

(H)	TAX RATE				
		MIGOP	6.87	6.30	0.00	22.00
		MIMAX	8.99	7.50	0.00	25.00
		MIBON	1.27	1.83	0.00	9.00
		MIEXT	1.48	2.02	0.00	13.00
		MITOT	9.74	7.30	0.00	34.00
(I)	TAX					
		TAXTOTCA	78.10	82.67	1.16	639.88
		TAXPROCA	69.15	78.87	0.00	637.31
		TAXOTHCA	8.68	19.02	0.00	117.78
(J)	AID					
		TRATOTCA	80.99	68.64	4.03	597.44
		TRAFEDCA	26.51	47.35	0.00	535.48
		TRASTACA	52.55	32.34	0.00	204.46
		TRAOTHCA	1.92	6.16	0.00	51.58
(K)	REVENUE					
		REVTOTCA	307.79	257.19	29.87	1977.26
		REVGFCA	154.26	116.84	25.15	695.63
		REVSFCA	153.59	177.56	0.00	1758.34

APPENDIX 7

Appendix 7(A): Correlation Coefficienat Among Population Variables

	POP80	AREA	PDEN
POP80	1.00		
AREA	0.36	1.00	
PDEN	0.31	-0.43	1.00

Appendix 7(B):Correlation Coefficienat Among Education Variables

	GHS	GCOL
GHS	1.00	
GCOL	0.81	1.00

Appendix (C): Correlation Corefficients Among Employment Variables

	UNEM	EMMAN	UNMAN
UNEM	1.00		
EMMAN	0.25	1.00	
UNMAN	0.55		1.00

Appendix 7(D): Correlation Coefficients Among Income Variables

	INHH	INFAM	INCAP	PPER	PFAM
INHH	1.00				
INFAM	0.97	1.00			
INCAP	0.85	0.91	1.00		
PPER	-0.72	-0.68	-0.58	1.00	
PFAM	-0.69	-0.69	-0.58	0.90	1.00

Appendix 7(E): Correlation Coefficients Among Housing Variables

	HOUSECA	HOUSEN	HOUSO	HOUSEM	HOUSOCP	HOUSVACP	RENT
HOUSECA	1.00						
HOUSEN	0.31	1.00					
HOUSO	-0.26	-0.56	1.00				
HOUSEM		-0.37	-0.55	1.00			
HOUSOCP			-0.31	0.42	1.00		
HOUSVACP			0.31	-0.42	-1.00	1.00	
RENT		0.26	-0.56	0.36	0.25	-0.25	1.00

Appendix 7(F): Correlation Coefficients Among Property Value Variables

	SEVAGP	SEVCOMP	SEVINDP	SEVRESP	SEVTIP	SEVDEVP	SEVBUSP
SEVAGP	1.00						
SEVCOMP	-0.41	1.00					
SEVINDP	-0.22		1.00				
SEVRESP		-0.48	-0.75	1.00			
SEVTIP					1.00		
SEVDEVP						1.00	
SEVBUSP	-0.43	0.63	0.79	-0.88			1.00

Appendix 7(G): Correlation Coefficients Among Tax Rate Variables

	MIGOP	MIMAX	MIBON	MIEXT	MITOT
MIGOP	1.00				
MIMAX	0.91	1.00			
MIBON	0.21		1.00		
MIEXT				1.00	
MITOT	0.92	0.82	0.45	0.28	1.00

Appendix 7(H): Correlation Coefficients Among Tax Variables

	TAXTOTCA	TAXPROCA	TAXOTHCA
TAXTOTCA	1.00		
TAXPROCA	0.97	1.00	
TAXOTHCA	0.30		1.00

Appendix 7(I): Correlation Coefficients Among Aid Variables

	TRATOTCA	TRAFEDCA	TRASTACA	TRAOTHCA
TRATOTCA	1.00			
TRAFEDCA	0.89	1.00		
TRASTACA	0.74	0.37	1.00	
TRASTACA	0.36	0.29		1.00

Appendix 7(J): Correlation Coefficients Among Collected Revenue Variables

	REVTOTCA	REVGFCA	REVSFCA
REVTOTCA	1.00		
REVGFCA	0.80	1.00	
REVSFCA	0.91	0.50	1.00

APPENDIX 8

Appendix 8(A): Correlation Between Independnet Variables and Per Capita Expenditures

Variable	POP80	AREA	PDEN	GHS	GCOL	UNEM	EMMAN
PCPOLICX	0.38	-0.37	0.67				
PCFIREX	0.31	-0.27	0.58				
PCRECX	0.21	-0.30	0.50				-0.20
PCROADX		-0.44	0.40				
PCAPITX							
PCGFTOTX	0.33	-0.40	0.68				
PCTOTX	0.28	-0.34	0.49				

Variable	UNFAM	INHH	INFAM	INCAP	PPER	PFAM	HOUSECA
PCPOLICX	0.42				0.27	0.31	-0.41
PCFIREX	0.41	-0.21			0.36	0.34	-0.33
PCRECX	0.27						-0.31
PCROADX	0.40	-0.34	-0.26		0.27	0.26	-0.36
PCAPITX							
PCGFTOTX	0.45	-0.22			0.27	0.30	-0.43
PCTOTX	0.40	-0.24			0.24	0.26	-0.38

Variable	HOUSEN	HOUSO	HOUSEM	HOUSOCP	HOUSVACP	RENT	SEVAGP
PCPOLICX	-0.50	0.30					-0.49
PCFIREX	-0.50	0.38					-0.39
PCRECX	-0.45	0.31					-0.39
PCROADX	-0.47	0.54				-0.27	-0.39
PCAPITX		0.22					-0.23
PCGFTOTX	-0.55	0.42					-0.50
PCTOTX	-0.45	0.41					-0.44

Variable	SEVCOMP	SEVINDP	SEVRESP	SEVTIP	SEVDEVP	SEVBUSP	ASSETCA
PCPOLICX	0.37	0.36	-0.28		-0.20	0.50	0.22
PCFIREX	0.25	0.34	-0.25			0.42	0.25
PCRECX	0.30	0.22				0.35	
PCROADX	0.31	0.28	-0.23			0.41	0.21
PCAPITX	0.23					0.28	
PCGFTOTX	0.29	0.43	-0.29		-0.23	0.50	
PCTOTX	0.28	0.34	-0.24			0.43	0.24

Appendix 8(A) (Cont'd.).

Variable	MIGOP	MIMAX	MIBON	MIEXT	MITOT	TAXTOTCA	TAXPROCA
PCPOLICX	0.74	0.69	0.30		0.78	0.73	0.65
PCFIREX	0.58	0.52	0.20	0.21	0.62	0.58	0.50
PCRECX	0.62	0.57			0.58	0.61	0.56
PCROADX	0.74	0.67			0.68	0.57	0.54
PCAPITX	0.27	0.29			0.24	0.26	0.20
PCGFTOTX	0.82	0.76	0.26		0.80	0.81	0.74
PCTOTX	0.65	0.59	0.23		0.64	0.59	0.51

Variable	TAXOTHCA	TRATOTCA	TRAFEDCA	TRASTACA	TRAOTHCA	REVTOTCA	REVGFCA
PCPOLICX	0.46	0.62	0.33	0.80		0.74	0.83
PCFIREX	0.45	0.50	0.26	0.64		0.64	0.70
PCRECX	0.33	0.46	0.23	0.61		0.58	0.71
PCROADX	0.26	0.53	0.21	0.77	0.21	0.70	0.72
PCAPITX	0.31	0.42	0.30	0.44		0.48	0.34
PCGFTOTX	0.43	0.64	0.33	0.84	0.20	0.78	0.97
PCTOTX	0.47	0.58	0.30	0.74		0.88	0.72

Variables	REVSFCA
PCPOLICX	0.52
PCFIREX	0.46
PCRECX	0.38
PCROADX	0.54
PCAPITX	0.48
PCGFTOTX	0.49
PCTOTX	0.80

Appendix 8(B): Summary of Correlation Between Independnet Variables and Per Capita Expenditures

---

The following is the summary of correlation between seven expenditure variables and community characteristics. In description, the following division of correlation coefficients were used:

Strong Correlation: coefficient greater than 0.50

Moderate Correlation: coefficient between 0.50 and 0.20

Low Correlation: Coefficients less than 0.20

1. Police Expenditures: From correlation analysis we find that fire expenditure is correlated with community characteristics as follows:

1a. Highly correlated:

Positively - PDEN (.67) SEVBUSP (.50)

Negatively - HOUSEN (-.50)

1b. Moderately Correlated

Positively: UNFAM (0.42), POP80 (0.38), SEVCOMP (0.37), SEVINDP (0.36), PFAM (0.31), HOUSO (0.30), PPER (0.27), ASSETCA (0.22)

Negatively: SEVAGP (-.49), HOUSECA (-0.41), AREA (-0.37), SEVRESP (-0.28), SEVDEVP (-0.20)

Appendix 8(B) (Cont'd.).

---

2. Fire Expenditures: From correlation analysis we find that fire expenditure is correlated with community characteristics as follows:

2a. Highly correlated

Positively: PDEN (0.58)

Negatively: HOUSEN (-0.50)

2b. Moderately Correlated:

Positively: SEVBUSP (0.42), UNFAM (0.41), HOUSO (0.38), PPER (0.36), PFAM (0.34), SEVINDP (0.34), POP80 (0.31), SEVCOMP (0.25), ASSETCA (0.21)

Negatively: SEVAGP (-0.39), SEVINDP (-0.34), HOUSECA (-0.33), AREA (-0.27), SEVRESP (-0.25)

3. Recreation Expenditures: Parks and recreation expenditure is correlated with community characteristics as follows:

3a. Highly correlated:

Positively: PDEN (0.50)

3b. Moderately correlated:

Positively: SEVBUSP (0.35), HOUSO (0.31), SEVCOMP (0.30), UNFAM (0.27), SEVINDP (0.22), POP80 (0.21)

Negatively: HOUSEN (-0.45), SEVAGP (-0.39), HOUSECA (-0.31), AREA (-.30), EMMAN (-0.20)

Appendix 8(B) (Cont'd.).

---

4. Road Expenditures: The correlation pattern of road expenditures and community characteristics are as follows:

4a. Highly correlated:

Positively: HOUSO (0.54)

4B. Moderately Correlated:

Positively: SEVBUSP (0.41), PDEN (0.40), UNFAM (0.40), SEVCOMP (0.31), SEVINDP (0.28), PPER (0.27), PFAM (0.26), ASSETCA (0.21)

Negatively: HOUSEN (-0.47), AREA (-0.44), SEVAGP (-0.39), HOUSECA (-.36), INHH (-0.34), RENT (-0.27), INFAM (-0.26), SEVRESP (-0.23)

5. Capital Expenditures: The correlation pattern of capital expenditures and community characteristics are as follows:

5a. Highly correlated: None

5b. Moderately Correlated:

Positively: SEVBUSP (0.28), SEVCOMP (0.23), HOUSO (0.22)

Negatively: SEVAGP (-0.23)

Appendix 8(B) (Cont'd.).

---

6. Total General Fund Expenditure: The correlation pattern of this expenditure and community characteristics are as follows:

6a. Highly correlated:

Positively: PDEN (0.68), SEVBUSP (0.50)

Negatively: HOUSEN (-0.55), SEVAGP (-0.50)

6b. Moderately correlated:

Positively: UNFAM (0.45), SEVINDP (0.43), HOUSO (0.42), POP80 (0.33), PFAM (0.30), SEVCOMP (0.29), PPER (0.27)

Negatively: HOUSECA (-0.43), AREA (-0.33), SEVRESP (-0.29), INHH (-0.22), SEVDEVP (-0.23)

7. Total Expenditures: The following is the correlation pattern of the total expenditures with the community characteristics variables:

7a. Highly correlated: None

7b. Moderately correlated:

Positively: PDEN (0.49), SEVBUSP (0.43), HOUSO (0.41), UNFAM (0.40), SEVINDP (0.34), SEVCOMP (0.28), POP80 (0.28), PFAM (0.26), PPER (0.24), ASSETCA (0.24)

Negatively: HOUSEN (-0.45), SEVAGP (-0.44), HOUSECA (-0.38), AREA (-0.34) INHH (-0.24), SEVRESP (-0.24).

APPENDIX 9

Appendix 9(A): Factor Analysis (Rotated) for Independent Variables

11 Factor Extracted (34 ITERATIONS)

Variables	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
MIGOP	0.901										
REVGFCA	0.894										
TAXTOTCA	0.886										
TAXPROCA	0.885										
MITOT	0.853										
MIMAX	0.832										
TRASTACA	0.791										
REVTOTCA	0.675				0.435				0.323		
PDEN	0.660									0.485	
SEVAGP	0.478							-0.458			
INFAM		0.922									
INHH		0.908									
INCAP		0.878									
RENT		0.789									
PPER		-0.745								0.361	
PFAM		-0.720								0.394	
UNFAM	0.323	-0.644								0.356	
GHS		0.617				0.592					
HOUSO	0.390	-0.579							0.533		
UNEM		-0.515		0.377		-0.443				0.319	
SEVRESP			-0.898								
SEVBUSP	0.332		0.849								
SEVINDP			0.824								
HOUSVACP				0.905							
HOUSOP				-0.905							
TRAFEDCA					0.741		0.351				
TRAOTHCA					0.719						
TRATOTCA	0.492				0.670		0.323				
REVSFCA	0.390				0.523				0.392		
EMMAN						-0.824					
GCOL		0.508				0.720					
POP80							0.854				
AREA	-0.518						0.530				
TAXOTHCA							0.500		0.345		
MIBON							0.435				
SEVCOMP			0.350			0.336		0.657			
HOUSECA	-0.374							-0.608			
MIEXT								0.529			
ASSETCA									0.713		
HOUSEM		0.382		-0.396						0.592	
HOUSEN	-0.464								-0.402	-0.545	
SEVDEVP											0.623
SEVTIP				0.315							-0.606

Note: Coefficients equal or less than 0.30 are not shown. All factors have eigenvalues greater than one.

Appendix 9(B): Eigenvalues, Percentage of Variance and Cumulattive Percentage of Variance of Each Factor for Independent Variables

Factors	Eigen-values	Percent of Variance	Cumulative Percent
Factor 1	8.26	19.2	19.2
Factor 2	6.79	15.8	35.0
Factor 3	2.88	6.7	41.7
Factor 4	2.49	5.8	47.5
Factor 5	2.41	5.6	53.1
Factor 6	2.28	5.3	58.4
Factor 7	2.24	5.2	63.6
Factor 8	1.85	4.3	67.9
Factor 9	1.76	4.1	72.0
Factor 10	1.72	4.0	76.0
Factor 11	1.20	2.8	78.8

APPENDIX 10

Appendix 10(A): Crosstabulation of Per Capita Police Expenditures by Community Types

PCPOLICX	Community Types: Township	City	Row Total
Low	72		72
Medium	73	67	140
High	3	70	73
Column Total	148	137	285

Total Cases = 293 Missing Cases = 8

Appendix 10(B): Crosstabulation of Per Capita Police Expenditures by Government Types

PCPOLICX	Government Types: Mayor	Manager	Other	Row Total
Low		2	70	72
Medium	17	58	65	140
High	20	50	3	73
Column Total	37	110	138	285

Total Cases = 293 Missing Cases = 8

Appendix 10(C): Crosstabulation of Per Capita Police Expenditures by Regions

PCPOLICX	Regions: Reg 1	Reg 2	Reg 3	Reg 4	Row Total
Low	27	41	2	2	72
Medium	52	75	4	9	140
High	48	24		1	73
Column Total	127	140	6	12	285

Total Cases = 293 Missing Cases = 8

Appendix 10(D): Crosstabulation of Per Capita Fire Expenditures by Community Types

	Community Types		
PCFIREX	Township	City	Row Total
Low	64	9	73
Medium	76	64	140
High	8	64	72
Column Total	148	137	285

Total Cases = 293 Missing Cases = 8

Appendix 10(E):Crosstabulation of Per Capita Fire Expenditures by Government Types

	Government Types			
PCFIREX	Mayor	Manager	Other	Row Total
Low	2	11	60	73
Medium	19	51	70	140
High	16	48	8	72
Column Total	37	110	138	285

Total Cases = 293 Missing Cases = 8

Appendix 10(F): Crosstabulation of Per Capita Fire Expenditures by Regions

	Regions				
PCFIREX	Reg 1	Reg 2	Reg 3	Reg 4	Row Total
Low	27	41	1	4	73
Medium	62	69	2	7	140
High	38	30	3	1	72
Column Total	127	140	6	12	285

Total Cases = 293 Missing Cases = 8

Appendix 10(G): Crosstabulation of Per Capita Park and Recreation Expenditures by Community Types

	Community Types		
PCRECX	Township	City	Row Total
Low	66	7	73
Medium	80	59	139
High	2	71	73
Column Total	148	137	285

Total Cases = 293 Missing Cases = 8

Appendix 10(H): Crosstabulation of Per Capita Park and Recreation Expenditures by Government Type

	Government Types			
PCRECX	Mayor	Manager	Other	Row Total
Low	4	6	63	73
Medium	16	49	74	139
High	17	55	1	73
Column Total	37	110	138	285

Total Cases = 293 Missing Cases = 8

Appendix 10(I): Crosstabulation of Per Capita Park and Recreation Expenditures by Regions

	Regions				
PCRECX	Reg 1	Reg 2	Reg 3	Reg 4	Row Total
Low	27	43	2	1	73
Medium	61	71		7	139
High	39	26	4	4	73
Column Total	127	140	6	12	285

Total Cases = 293 Missing Cases = 8

Appendix 10(J): Crosstabulation of Per Capita Roads Expenditures by Community Types

PCROADX	Community Types: Township	City	Row Total
Low	72		72
Medium	76	64	140
High		73	73
Column Total	148	137	285

Total Cases = 293 Missing Cases = 8

Appendix 10(K): Crosstabulation of Per Capita Roads Expenditures by Government Types

PCROADX	Government Types: Mayor	Manager	Other	Row Total
Low		6	66	72
Medium	21	47	72	140
High	16	57		73
Column Total	37	110	138	285

Total Cases = 293 Missing Cases = 8

Appendix 10(L): Crosstabulation of Per Capita Roads Expenditures by Regions

PCROADX	Regions: Reg 1	Reg 2	Reg 3	Reg 4	Row Total
Low	30	40	1	1	72
Medium	65	71	1	3	140
High	32	29	4	8	73
Column Total	127	140	6	12	285

Total Cases = 293 Missing Cases = 8

Appendix 10(M): Crosstabulation of Per Capita Capital Expenditures by Community Types

	Community Types		
PCAPITX	Township	City	Row Total
Low	57	12	69
Medium	73	65	138
High	13	55	68
Column Total	143	132	275

Total Cases = 293 Missing Cases = 18

Appendix 10(N): Crosstabulation of Per Capita Capital Expenditures by Government Types

	Government Types			
PCAPITX	Mayor	Manager	Other	Row Total
Low	3	11	55	69
Medium	18	54	66	138
High	13	43	12	68
Column Total	34	108	133	275

Total Cases = 293 Missing Cases = 18

Appendix 10(O): Crosstabulation of Per Capita Capital Expenditures by Regions

	Regions				
PCAPITX	Reg 1	Reg 2	Reg 3	Reg 4	Row Total
Low	31	35	1	2	69
Medium	67	62	3	6	138
High	29	33	2	4	68
Column Total	127	130	6	12	275

Total Cases = 293 Missing Cases = 18

Appendix 10(P): Crosstabulation of Per Capita General Fund Expenditures by Community Types

PCGFTOTX	Community Types: Township	Community Types: City	Row Total
Low	72	1	73
Medium	77	64	141
High		72	72
Column Total	149	137	286

Total Cases = 293 Missing Cases = 7

Appendix 10(Q): Crosstabulation of Per Capita General Fund Expenditures by Government Types

PCGFTOTX	Government Types: Mayor	Manager	Other	Row Total
Low		2	71	73
Medium	20	53	68	141
High	17	55		72
Column Total	37	110	139	286

Total Cases = 293 Missing Cases = 7

Appendix 10 (R): Crosstabulation of Per Capita General Fund Expenditures by Regions

PCGFTOTX	Regions: Reg 1	Reg 2	Reg 3	Reg 4	Row Total
Low	30	39	2	2	73
Medium	54	80	2	5	141
High	42	23	2	5	72
Column Total	126	142	6	12	286

Total Cases = 293 Missing Cases = 7

Appendix 10(S): Crosstabulation of Per Capita Total Expenditures by Community Types

PCTOTX	Community Types: Township	City	Row Total
Low	71		71
Medium	73	68	141
High	2	69	71
Column Total	146	137	283

Total Cases = 293 Missing Cases = 10

Appendix 10 (T): Crosstabulation of Per Capita Total Expenditures by Government Types

PCTOTX	Government Types: Mayor	Manager	Other	Row Total
Low		1	70	71
Medium	21	56	64	141
High	16	53	2	71
Column Total	37	110	136	283

Total Cases = 293 Missing Cases = 10

Appendix 10 (U): Crosstabulation of Per Capita Total Expenditures by Regions

PCTOTX	Regions: Reg 1	Reg 2	Reg 3	Reg 4	Row Total
Low	20	47	2	2	71
Medium	69	65	1	6	141
High	37	27	3	4	71
Column Total	126	139	6	12	283

Total Cases = 293 Missing Cases = 10

APPENDIX 11

Appendix 11: Number of Communities in Different Type of Governments

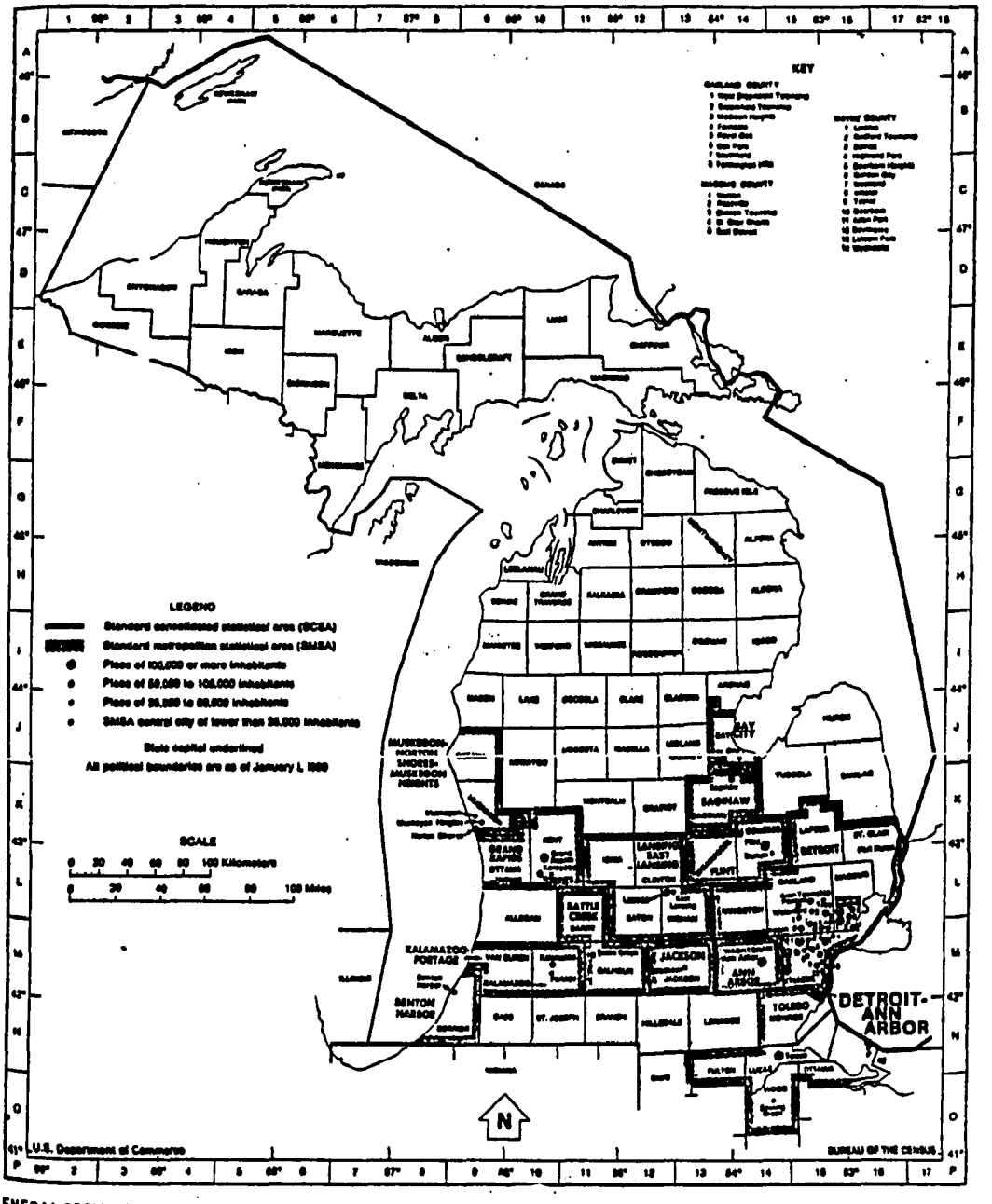
Classification of government for study	Actual Government Type in Practice	Numbers		
		City	Township	Total
1. Mayor	(a) Cities with mayor-council form	39		39
2. Mayor	(a) Cities with manager-council form	102		
	(b) Townships with manager (superiden- tant)-council form		10	112
3. Other	(a) Townships with Township board form		142	142
	Total	141	152	293

APPENDIX 12

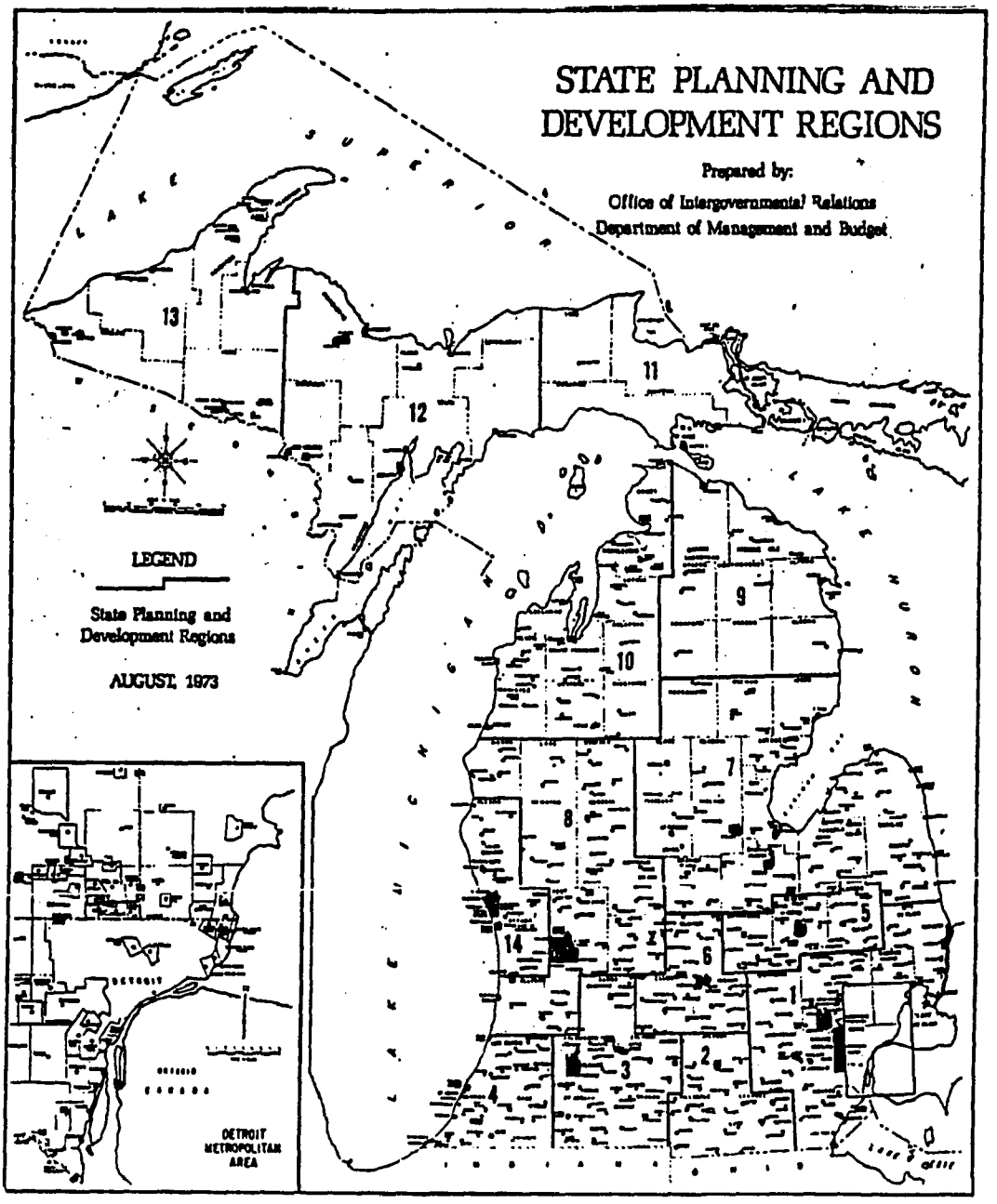
Appendix 12(A): Map of SMSAs Regions in Michigan by the U.S. Census Bureau

---

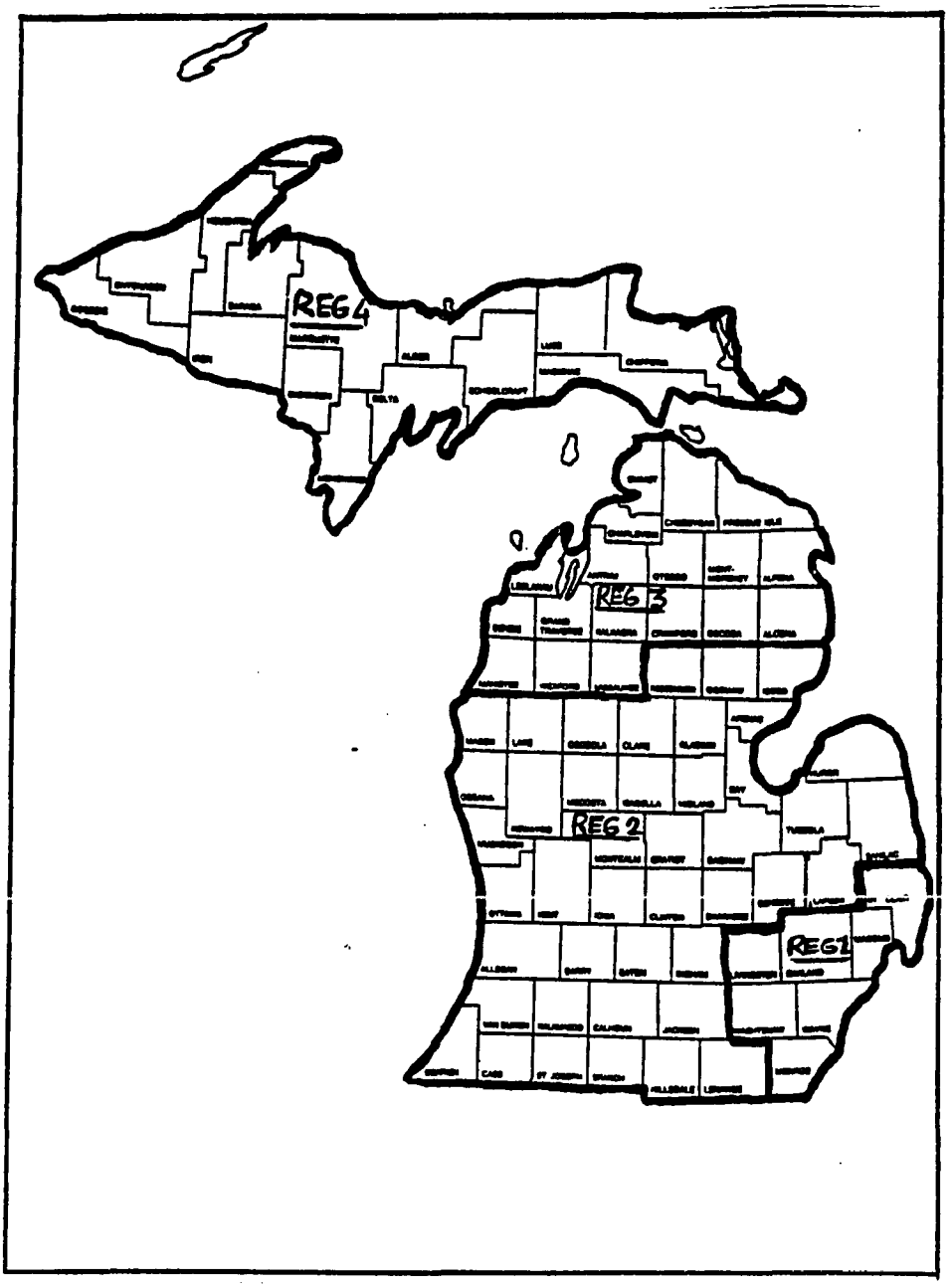
Standard Consolidated Statistical Area, Standard Metropolitan Statistical Areas, Counties, and Selected Places



Appendix 12(B): Map of State's Planning and Development Regions in Michigan



Appendix 12(C): Map of Study Regions



APPENDIX 13

Appendix 13(A): Regression for Police Expenditures

VARIABLES STATISTICS							EQUATION STATISTICS					
Variables in the equations	B	SE B	BETA	Tolerance	T	SIG T	Multiple R	R Square	Adjust. R Square	Standard Error	F	Sig F
CITY	17.241	3.821	0.238	0.313	4.512	0.000						
TAXTOTCA	0.135	0.019	0.311	0.457	7.128	0.000						
POP80	9.13E-5	1.62E-5	0.190	0.762	5.613	0.000						
PDEN	0.002	7.66E-4	0.143	0.431	3.182	0.001						
SEVBUSP	0.328	0.081	0.141	0.716	4.049	0.000						
HOUSEN	-0.214	0.083	-0.097	0.601	-2.559	0.011						
TRATOTCA	0.049	0.021	0.095	0.512	2.311	0.021						
CONSTANT	7.473	3.806			1.964	0.056						
							0.874	0.764	0.757	17.816	124	0.00

Appendix 13(B): Regression for Fire Expenditures

VARIABLES STATISTICS							EQUATION STATISTICS					
Variables in the equations	B	SE B	BETA	Tolerance	T	SIG T	Multiple R	R Square	Adjust. R Square	Standard Error	F	Sig F
TAXTOTCA	0.070	0.013	0.291	0.594	5.408	0.000						
HOUSEN	-0.314	0.062	-0.257	0.652	-5.002	0.000						
POP80	4.08-E5	1.17E-5	0.152	0.895	3.478	0.000						
SEVBUSP	0.247	0.059	0.192	0.803	4.139	0.000						
PDEN	0.002	5.709	0.165	0.474	2.740	0.006						
CONST.	14.688	2.851			5.151	0.000						
							0.727	0.529	0.521	13.927	61	0.00

Appendix 13(C): Regression for Park and Recreation Expenditures

VARIABLES STATISTICS							EQUATION STATISTICS					
Variables in the equations	B	SE B	BETA	Tole-rance	T	SIG T	Multiple R	R Square	Adjust. R Square	Standard Error	F	Sig F
CITY	7.993	1.655	0.323	0.412	4.829	0.000						
TAXTOTCA	0.048	0.009	0.326	0.495	5.338	0.000						
HOUSEN	-0.132	0.037	-0.176	0.713	-3.514	0.000						
CONSTANT	5.775	1.540			3.749	0.000						
							0.701	0.492	0.486	8.853	88	0.00

Appendix 13(D): Regression for Road Expenditures

VARIABLES STATISTICS							EQUATION STATISTICS					
Variables in the equations	B	SE B	BETA	Tole-rance	T	SIG T	Multiple R	R Square	Adjust. R Square	Standard Error	F	Sig F
CITY	34.010	2.726	0.733	0.347	12.474	0.000						
PDEN	-0.003	5.58E-4	-0.279	0.458	-5.443	0.000						
HOUSEN	-0.246	0.063	-0.175	0.589	-3.874	0.000						
INHH	-5.1E-4	1.54E-4	-0.126	0.836	-3.334	0.001						
TAXTOTCA	0.039	0.014	0.140	0.459	2.746	0.006						
CONSTANT	25.958	3.939			6.589	0.000						
							0.820	0.672	0.666	13.388	111	0.00

Appendix 13(E): Regression for Capital Expenditures

VARIABLES STATISTICS							EQUATION STATISTICS					
Variables in the equations	B	SE B	BETA	Tole-rance	T	SIG T	Multiple R	R Square	Adjust. R Square	Standard Error	F	Sig F
TRATOTCA	0.180	0.035	0.354	0.604	5.144	0.000						
CITY	23.421	5.422	0.339	0.462	4.320	0.000						
PDEN	-0.004	0.001	-0.263	0.553	-3.662	0.000						
CONSTANT	4.219	2.948			1.431	0.153						
							0.496	0.246	0.237	30.099	28	0.00

Appendix 13(F): Regression for General Fund Expenditures

VARIABLES STATISTICS							EQUATION STATISTICS					
Variables in the equations	B	SE B	BETA	Tolerance	T	SIG T	Multiple R	R Square	Adjust. R Square	Standard Error	F	Sig F
TAXTOTCA	0.611	0.049	0.433	0.476	12.259	0.000						
CITY	62.532	9.806	0.266	0.340	6.376	0.000						
TRATOTCA	0.182	0.057	0.107	0.512	3.163	0.001						
HOUSEN	-1.323	0.207	-0.185	0.704	-6.391	0.000						
POP80	1.98E-4	4.22E-5	0.127	0.809	4.700	0.000						
SEVBUSP	0.814	0.216	0.108	0.716	3.762	0.000						
CONSTANT	61.080	9.300			6.567	0.000						
							0.915	0.837	0.834	47.718	234	0.00

Appendix 13(G): Regression for Total Expenditures

VARIABLES STATISTICS							EQUATION STATISTICS					
Variables in the equations	B	SE B	BETA	Tolerance	T	SIG T	Multiple R	R Square	Adjust. R Square	Standard Error	F	Sig F
CITY	149.494	35.982	0.290	0.343	4.155	0.000						
TRATOTCA	0.646	0.211	0.173	0.515	3.049	0.002						
TAXTOTCA	0.595	0.182	0.192	0.480	3.258	0.001						
HOUSEN	-2.145	0.760	-0.137	0.703	-2.822	0.005						
POP80	3.58E-4	1.55E-4	0.105	0.809	2.314	0.021						
SEVBUSP	1.803	0.794	0.109	0.718	2.270	0.024						
CONSTANT	107.163	34.331			3.121	0.002						
							0.741	0.550	0.540	174.9	54	0.00

BIBLIOGRAPHY

BIBLIOGRAPHY

Adams, Robert F. 1967. "On the Observations in the Consumption of the Public Services", in Harvey Brazer (ed.) Essays in State and Local Finance. Ann Arbor: University of Michigan

Adrian, Charles, and Charles Press. 1972. Governing Urban America. New York: McGraw Hill Book Company.

Akin, John S., and Gerald E. Autin. 1976. "City Schools and Suburban Schools: A Fiscal Comparison", Land Economics, November issue, pp. 452-466.

Bahl, Roy W., and Robert J. Saunders. 1965. "Determinants of Changes in State and Local Governments Expenditures", National Tax Journal, Vol. 18, pp. 50-57.

Bahl, Roy W. 1968. "The Determinants of State and Local Government Expenditures", in S. Muskin and J. Cotton (eds.) Functional Federalism: Grants-in-aid and PPB System. Washington,D.C: Goerge Washington University.

Bahl, Roy W. 1969. Metropolitan City Expenditures: A Comparative Analysis. Lexington: University of Kentucky Press.

Bahl, Roy W. 1968. "Public Policy and Urban Fiscal Problem: Piecemeal vs. Aggregate Solutions", Land Economics, February issue, pp. 41-50.

Bahl, Roy W. 1975. The Impact of Economic Base Erosion, Inflation, and Employee Compensation Costs on Local Governments. New York: Maxwell School of Citizenship and Public Affairs, Syracuse University.

Bahl, Roy W. and et al. 1978. "The Determinants of Local Government Police Expenditures: A Public Employment Approach", National Tax Journal, Vol. 31, March issue.

Barr, James L., and Otto A. Davis. 1966. "An Elementary Political and Economic Theory of the Expenditure of Local Government", Southern Economic Journal, Vol. 33, pp. 149-165.

Baumol, William J. 1963. "Urban Services: Interactions of Public and Private Decision", in Howard Scaller (ed.) Public Expenditure Decisions in the Urban Community. Washington, D.C: Resource for the Future.

Beaton, W. Patrick. 1974. "Environmental Structure and Municipal Costs", in W. Patrick Beaton (ed.) Municipal Needs, Services and Financing. New Brunswick: Center for Policy Research, Rutgers University.

Beaton, Patrick. 1974. Municipal Needs, Services and Financing: Reading on Municipal Expenditures. New Brunswick: Center for Urban Policy Research, Rutgers University.

Beaton, Patrick. 1975. "The Determinants of Police Protection Expenditure", National Tax Journal, Vol 29, pp. 328-335.

Bennett, R.J. 1983. The Geography of Public Finance. London: Methuen.

Bergstrom, T.C., and R.P. Goodman. 1973. "Private Demands for Public Goods", American Economic Review, Vol. 63, No. 3, pp. 280-297.

Bhattacharyya, Gouri K., and Richard A. Johnson. 1977. Statistical Concepts and Methods. New York: John Wiley & Sons.

Bradford, D.F., et al. 1974. "The Rising Cost of Local Public Services: Some Evidence and Reflection" in W. Patrick Beaton (ed.) Municipal Needs, Services and Financing. New Brunswick: Center for Policy Research, Rutgers University.

Brazar, Harvey. 1959. City Expenditure in the United States. Occasional Paper no. 66. New York: National Bureau of Economic Research.

Bromage, Arthur W. 1957. Introduction to Municipal Government and Administration. New York: Appleton-Century-Croft, Inc.

Burchell, Robert W. et al. 1984. The New Reality of Municipal Finance. New Brunswick: Center for Urban Policy Research, Rutgers, The State University of New Jersey.

Burchell, Robert. et al. 1978. The Fiscal Impact Handbook. New Brunswick: Center for Urban Policy Research, Rutgers University.

Burchell, Robert & David Listokin. 1981. (eds.). Cities Under Stress: The Fiscal Crisis of Urban America. New Brunswick: The Center for Urban Policy Research, Rutgers University.

Booth, Douglas E. 1978. "The Differential Impact of Manufacturing and Mercantile Activity on Local Government Expenditures and Revenues", National Tax Journal, March issue.

Caezza, John F. 1978. "Budget Caps -- A Short History and a Long Future", New Jersey Municipalities, Vol. 55, No. 7, October issue, pp. 15-16.

Clark, John J., et al. 1979. Capital Budgeting: Planning and Control of Capital Expenditures. Englewood Cliffs, NJ: Prentice Hall.

Davis, Otto A. and George H. Haines, Jr. 1966. "A Political Approach to a Theory of Public Expenditure: The Case of Municipalities", National Tax Journal, September issue, pp. 259-275.

Dougharty, Larry. 1975. Municipal Service Pricing: Impact on Urban Development and Finance Summary and Overview. Santa Monica, CA: Rand Corporation.

Deacon, Robert T. 1977. "Private Choice and Collective Outcomes: Evidence From Public Sector Demand Analysis, National Tax Journal, December issue, pp. 371-386.

Dusansky, Richard and Lawrence P. Nordell. 1975. "City and Suburb: The Anatomy of Fiscal Dilemmas", National Tax Journal, May issue, pp. 133-138.

Dworak, Robert J. 1980. Taxpayers, Taxes, and Government Spending: Perspective of the Taxpayers Revolt. New York: Praeger Publisher.

Ehrenber, R.G. 1973. "The Demand for State and Local Government Employees", American Economic Review, Vol. 63, No. 3, June issue. pp. 366-379.

Fabricant, Solomon. 1952. Trend of Government Activity in the United States Since 1900. New York: National Bureau of Economic Research, Inc, pp. 122-131.

Fisher, Glenn. 1961. "Determinants of State and Local Government Expenditures: A Preliminary Analysis", National Tax Journal, Vol. 14, pp. 349-355.

Fisher, Glen W. 1964. "Interstate variation in State and Local Government Expenditure", National Tax Journal, Vol. XVII, No. 1, pp. 57-74.

Fisk, Donald, and Cynthia A. Lancer. 1974. Equality of Distribution of Recreation Services: A Case Study of Washington, D.C.. Washington, D.C: The Urban Institute.

Fortune, Peter. 1983. "A Test of the Cobb-Douglas Assumption for Local Governments", National Tax Journal, June Issue.

Friedman, Lewis B. 1975. Budgeting Municipal Expenditures: A Study in Comparative Policy Making. New York: Praeger Publisher.

Gabler, L.R. 1969. Economies and Diseconomies of Scale in Urban Public Sectors", Land Economics, Vol. 45, No. 4, November issue, pp. 426-434.

Gabler, L.R. 1971. "Population Size as a Determinant of City Expenditure and Employment: Some Further Evidence", Land Economics, Vol. 47, No. 2, May issue, pp. 130-138.

Galambos, Eva C., and Arthur F. Schreiber. 1978. Making Sense Out of Dollars: Economic Analysis of Local Government, Washington, D.C: National League of Cities.

Gardner, John L. 1973. "City Size and Municipal Service Costs", in Report on Spatial Alternatives in Growth, Urban Economics Report. Chicago: University of Chicago.

Gorham, William, and Natal Glazer (eds). 1976. The Urban Predicament. Washington, D.C: The Urban Land Institute.

Greytak, David; Richard Gustly, and Robert Dinlekmeyer. 1974. "The Effects of Inflation on Local Government Expenditures", National Tax Journal, Vol. 27, pp. 583-598.

Greytak, David, and Bernard Jump. 1977. "Inflation and Local Government Expenditures and Revenues: Method and Case Study", Public Finance Quarterly Vol. 5, No. 3, July issue, pp. 275-301.

Grossman, David A. 1979. The Future of New York City's Capital Plant: A Case Study of Trends and Prospects Affecting the City's Public Infrastructure. Washington, D.C.: The Urban Institute.

Gustely, Richard D. 1974. Municipal Public Employment and Public Expenditure. Lexington, MA: D.C. Health and Company.

Hallman, Howard W. 1978. Citizen Involvement in the Local Budget Process. Washington, D.C: Center for Community Change.

Hill, Richard Child. 1975. Exploring an Urban Contradiction: The Divorce of Municipal Expenditures from Social Needs, Madison, WI: Institute for Research on Poverty, University of Wisconsin.

Hirsh, Werner Z. 1960."Determinants of Public Education Expenditure", National Tax Journal, Vol. 13, pp. 29-40.

Hirsh, Werner Z. 1968. "The Supply of Urban Public Services", in Harvey S. Perloff, and Lowden Wingo, Jr. (eds.) Issues in Urban Economics. Baltimore: Johns Hopkins University Press.

Hotaling, Robert B., and Geoffrey V. Moffat. 1980. Michigan Townships Planning and Zoning Handbook. East Lansing: Institute for Community Development, Michigan State University.

Hu, Teh-wei, and Bernard Booms. 1971. "A Simultaneous Equation Model of Public Expenditure Decisions in Large Cities", The Annals of Regional Science, Vol. 5, pp. 73-85.

Hufbauer, G.C., and B.W. Severn. 1975. "Municipal Costs and Urban Areas" Journal of Regional Economics, July issue, pp.6-8.

Isard, Walter, and Robert Coughlin. 1957. Municipal Costs and Revenues Resulting from Community Growth. Wellesley, MA: Chandler-Davis.

Kachigan, Sam K. 1986. Statistical Analysis. New York: Radius Press.

Kasadra, John D. 1974. "The Impact of Suburban Population Growth on Central City Service Function", in W. Patrick Beaton (ed.) Municipal Needs, Services and Financing. New Brunswick: Center for Policy Research, Rutgers University.

Kee, Woo Sik. 1965. "Central City Expenditures and Metropolitan Areas", National Tax Journal, Vol. 18, pp. 337-353.

Kemp, Roger L. 1979. "California's Proposition 13: The Revolution's Aftermath", Assessors Journal, Vol. 14, No. 2, June issue, pp. 117-128.

Kurnow, Ernest. 1963. "Determinants of State and Local Expenditures Re-Examined", National Tax Journal, Vol. 16, pp. 252-255.

Ladd, Helen F. 1976. "Municipal Expenditures and the Composition of the Local Property Tax" in Arthur D. Lynn, Jr. (ed.) Property Taxation, Land Use and Public Policy. Madison, WI: University of Wisconsin Press, pp. 73-98.

Ladd, Helen F. 1978. "An Economic Evaluation of State Limitations on Local Taxing and Spending Powers", National Tax Journal, March issue.

Ladd, Helen F. 1981. "Municipal Expenditures and the Rate of Population Change" in Robert W. Burchell and David Listokin (eds.) Cities Under Stress. Piscataway: The Center for Urban Policy Research, Rutgers University.

Loewenstein, Louis, K. 1963. "The Impact of New Industry on Revenues and Expenditures of Suburban Communities", National Tax Journal, Vol. 16, June issue, pp. 113-137.

Lynn Jr., Arthur D. (ed.). 1973. Property Taxation, Land Use and Public Policy. Madison, WI: The University of Wisconsin Press.

Marini, Frank. (ed.). 1971. Toward a New Public Administration. Scranton, PA: Chandler.

Martin, Joan K. 1982. Urban Financial Stress: Why Cities Go Broke. Boston: Auburn House Publishing Company.

Masten Jr, John T. and Kenneth E. Quindry. 1970. "A Note on City Expenditure Determinants", Land Economics, February issue, pp. 79-81.

McMahon, Walter W. 1970. "An Economic Analysis of Major Determinants of Expenditures on Public Education, Review of Economics and Statistics, Vol. 52, pp. 242-252.

Merget, Astrid D. 1976. "Equalizing Municipal Services: Issues for Policy Analysis", Policy Studies Journal, Spring issue.

Marget, Astrid D., and William M. Wolff, Jr. 1976. "The Law and Municipal Services: Implementing Equity", Public Management, August issue.

Michigan Municipal League. 1981. "Organization of City and Village Governments in Michigan" in Michigan Municipal League: Technical Topics, No. 32, (Revised), March 1981, Ann Arbor.

Mills, Edwin D., and Wallace E. Oates. 1973. Fiscal Zoning and Land Use Controls. Lixington, MA: Lexinton Books.

Minge, David. 1977. "Law as a Determinant of Resource Allocation by Local Government", National Tax Journal, December issue.

Mirer, Thad W. 1983. Economic Statistics and Econometrics. New York: MacMillan Publishing co, Inc.

Morgan, W. Douglas. 1980. "The Measurement of Fiscal Crisis: Another Procedure," National Tax Journal, December issue.

Morris, Douglas E. 1973. Economies of City Size, A Ph. D. Dissertation. Stillwater, OK: Oklahoma State University.

Morss, Elliot R. 1966. "Some Thoughts on the Determinants of State and Local Expenditures", National Tax Journal, March issue.

Muller, Thomas, and Grace Dawson. 1975. An Evaluation of the Subsequent Fiscal Impact of Annexation in Richmond,Virginia. Washington, D.C: The Urban Institute.

Muller, Thomas. 1975. The Impact of Annexation on City Finances: A Case Study in Richmond, Virginia. Washington, D.C: The Urban Institute.

Murphy, Thomas, and Charles R. Warren (eds). 1974. Organizing Services Metropolitan Areas. Lexington, MA: D.C. Health.

Mushkin, Selma J. 1972. Public Prices for Public Products. Washington, D.C: The Urban Institute.

Nathan, Richard P., et al. 1979. Monitoring the Public Service Employment Program: The Second Round. Washington, D.C: U.S. National Commission for Employment Policy.

Neenan, William B. 1970. "Suburban-Central City Exploitation Thesis: One City's Tale", National Tax Journal, June issue, pp. 117-139.

Newton, Keneth. 1975. "American Urban Politics: Social Class, Social Class, Political Structure, and Public Goods", Urban Affairs Quarterly, Vol. 11.

Newton, Kenneth. (ed.). 1981. Urban Political Economy. New York: St. Martin Press.

Palumbo, George. 1983. "City Government Expenditures and City Government Reality: A Comment on Sjoquist", National Tax Journal, June issue.

Pattie, Peterson. 1974. Impacts of Urban Growth on Local Government Costs and Revenues. Oregon State University Extension Service Special Report 423. Corvallis, Oregon: Oregon State University.

Perkins, George E. 1977. "The Demand for Local Public Goods: Elasticities of Demand for Own Price, Cross Prices, and Income" National Tax Journal, December issue.

Peterson, George. 1976. "Finance" in William Gorham and Natal Glazer (eds.) The Urban Predicament. Washington, D.C: The Urban Institute.

Poister, Theodore H. 1978. Public Program Analysis. Baltimore: University Park Press.

Pommerehne, Werner W., and Bruno S. Frey. 1976. "Two Approaches of Estimating Public Expenditures", Public Finance Quarterly, Vol. 4, No. 4. October issue, pp. 395-407.

Popp, Dean, and Walter Vogt. 1979. "Alternative Methods of School Finance: An Empirical Analysis of Cities in San Diego County", American Journal of Economics and Sociology, Vol. 38, No. 4, October issue, pp. 337-348.

Press, Charles, and Kenneth VerBurg. 1979. State and Community Government in Federal System. New York: John Wiley and Sons, Inc.

Rehfuss, John. 1979. "Citizen Participation in Urban Fiscal Decisions", Urban Data Service Report, Vol. 10, No. 8 August issue, pp. 337-348.

Rubin, Irene S. 1982. Running in the Red: The Political Dynamics of Urban Fiscal Stress. Albany: State University of New York Press.

Sacks, Seymor, and Robert Harris. 1964. "The Determinants of State and Local Government Expenditures and Inter-Governmental Flow of Funds", National Tax Journal, Vol. 17, pp. 75-85.

Savas, E.S. 1979. "How much do Government Services Really Cost", Urban Affairs Quarterly, Vol. 15, No. 1, September issue, pp. 23-42.

Sbragia, Albert M. (ed.). 1983. The Municipal Money Chase: The Politics of Local Government Finance. Boulder, Colorado: Westview Press.

Schroeder, Larry D., and D.L. Sjoquist. 1975. The Property Tax and Alternative Labor Taxes: An Economic Analysis New York: New York.

Scott, Stanley, and Edward L. Feder. 1957. Factors Associated with Variations in Municipal Expenditure Levels. Berkeley: Bureau of Public of Public Administration, University of California.

Shalala, Donna, and Astrid E. Merget. 1974. "Transition, Problems Models", in Thomas Murphy and Charles R. Warren (eds.) Organizing Services in Metropolitan Areas. Lexington, MA: D.C. Health.

Sharkansky, Ira. 1967. "Some More Thoughts About the Determinants of Government Expenditure", National Tax Journal, Vol. 20 issue, pp. 171-179.

Sjoquist, David L. 1982."The Effect of the Number of Local Governments on Central City expenditures", National Tax Journal, March issue, pp. 79-87.

Sjoquist, David L. 1983. "Reply and Comment on Palumbo" National Tax Journal, June issue.

Spangler, Richard. 1963. "The Effect of Population Growth Upon State and Local Government Expenditures", National Tax Journal, Vol. 16, pp. 193-196.

SPSSX: Advanced Statistics Guide. 1985. New York: McGraw-Hill Book Company.

Stanley, David T. 1972. Managing Local Government Under Union Pressure. Washington,D.C: Urban Land Institute.

Steiss, Alan Walter. 1975. Local Government Finance: Capital Facilities Planning and Debt Administration. Lexinton MA: Lexinton Books.

Sternlieb, George, et al. 1972. Housing Development and Municipal Costs. New Brunswick: Center for Urban Policy Research, Rutgers University.

Sternlieb, George, and R.W. Burchell. 1974. The Number Game: Forecasting Household Size", Urban Land, Vol. 33, pp. 3-16.

Stocker, Frederick D., and Don Crippen. 1977. Fiscal and Government Reform Options for Cities in Industrial Midwest. Columbus, Ohio: Academy for Contemporary Problems. (n.d., probably 1977), mimeo, pp. xi+65.

Storm, William J. 1977. "Financial Pruning for cities: Some Tools for Making the Cuts Hurt Less", Missouri Municipal Review, Vol. 42, No. 2, February issue, pp. 21-22.

Stuhmer, Paul R. and Roger E. Hamlin. 1977. Planning for the Finance of Community Services. An unpublished paper. East Lansing: Urban Planning Program, Michigan State University.

Stuhmer, Paul R. 1977. Municipal Expenditures and Urban Structure: Planning Implication for Michigan Central Cities. An Unpublished Master's Thesis. East Lansing: Michigan State University.

Sullivan, Patrick J. 1979. "Optimality in Municipal Debt: A Comment and Respecification", Public Finance Quarterly, Vol. 7, No. 3, July issue, pp. 352-363.

Sunley Jr., Emile M. 1971. "Some Determinants of Governmental Expenditures Within Metropolitan Areas", The American of Economics and Sociology, Vol. 30, pp. 345-364.

Tylor, Milton C. and E. Richard Boordon. 1969. Financing Michigan Local Government. East Lansing: Institute for Community Development and Services, Michigan State University.

Vernez, Goerges. 1976. Delivery of Urban Public Services: Production, Cost, and Demand Functions and Determinants of Public Expenditures for Fire, Police, Sanitation Services. Santa Monica, CA: Rand Corporation.

Viscount, Francis. 1985. City Fiscal Conditions and Outlook for Fiscal 1985. Washington, D.C: National League of Cities.

Walzev, Norman, and Peter J. Stratton. 1977. Inflation and Municipal Expenditure Increases in Illinois. Springfield, IL: Illinois Cities and Villages Municipal Problems Commission.

Weicher, John C. 1970. "Determinants of Central City Expenditures: Some Overlooked Factors and Problems", National Tax Journal, December issue, pp. 379-396.

Weicher, John C. 1972. "The Effect of Urban Renewal on Municipal Service Expenditures", Journal of Political Economy, Vol. 80, pp. 86-101.

Weitzman, Joan C. 1979. City Workers and Fiscal Crisis--Cutbacks, Givebacks and Survival: A Study of the New York City Experience. New Brunswick: Institute of Management and Labor Relations, Rutgers University.

Wheaton, William L., and Morton J. Schussheim. 1975. The Cost of Services in Residential Areas. Washington, D.C: G.P.O.

Wilenski, Gail. 1970. "Determinants of Local Government Expenditures", in John P. Crecine (ed.) Financing the Metropolis: Public Policy in Urban Economics. Beverly Hills, CA: Sage Publications.

Wonnacott, Ronald J., and Thomas H. Wannacott. 1970. Econometrics. New York: John Wiley & Sons, Inc.