DETERMINATION OF RELATIONSHIPS BETWEEN LOCAL GOVERNMENT SERVICES AND SOCIO-ECONOMIC STRUCTURES IN MICHIGAN: AN EXPLORATORY APPROACH

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ABSTRACT

DETERMINANTS OF RELATIONSHIPS BETWEEN LOCAL GOVERNMENT SERVICES AND SOCIO-ECONOMIC STRUCTURES IN MICHIGAN: AN EXPLORATORY APPROACH

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Relationships between economic development and local governmental services are not well defined. If one assumes industrial expansion is synonomous with economic development, most "location" studies indicate local community factors have relatively little importance in economic development. However, many studies contain observations implying that community factors may be important in final industrial location decisions. Descriptive studies of depressed areas frequently cite the absence or inadequacy of local governmental services. Investigators of developed areas frequently stress the availability and general adequacy of such services.

The objectives of this study were to determine relationships between local governmental services and socio-economic measures of local areas and to examine those

relationships for consistency among different levels of government. No single measure adequately accounts for differences in economic growth because of interrelated socio-economic occurrences. Also, governmental revenues-expenditures may be highly interrelated. Therefore, factor analysis was used to account for the linkages of interrelationships in two ways: 1) To develop separate regional configurations from socio-economic characteristics, aggregated county area government characteristics, and county government characteristics. 2) To develop conceptual variables (factors) from the separate interactions of socio-economic and governmental data. Results of the two were then compared.

Regression techniques were utilized to examine the degree and strength of association between socio-economic and governmental variables. First, selected governmental characteristics were examined as dependent variables with selected socio-economic characteristics as independent variables in order to establish a benchmark. Second, using identical governmental characteristics, socio-economic conceptual variables were used as independent variables both alone and in conjunction with socio-economic regions. Lastly, selected governmental conceptual variables were analyzed with socio-economic conceptual variables and regions.

Results were contradictory. For example, socio-economic regions, county area government regions, and county governmental regions developed from factor analysis had few

similarities. Since regional patterns differed for the two types of governmental regions, it was concluded that interactions between governmental revenue-expenditure characteristics also differ. Inconsistency between socio-economic and governmental regions indicated that socio-economic structure and governmental services were not associated.

Factor analysis was also used to develop conceptual variables (factors) from socio-economic and governmental characteristics. Comparison of the two types of governmental conceptual variables (CV) indicated that the interactions of revenues-expenditures are not similar. This analysis supported the conclusion of the regional analysis.

A benchmark was established by selecting governmental characteristics as dependent variables for analysis with socio-economic characteristics selected as independent variables. The coefficient of determination adjusted for degrees of freedom varied from a high of 70 per cent to a low of 7 per cent. Substitution of socio-economic CVs as independent variables generally improved the adjusted coefficient of determination with explanatory powers more than doubled in several cases.

Socio-economic regions were then added as discrete independent variables. In general, insertion of these regions increased the adjusted coefficient of determination. Using socio-economic regions in regression analysis indicated per capita governmental revenues-expenditures vary by geographic location.

Significant relationships between socio-economic CVs and governmental variables also were examined. It was assumed that accounting for linkages of the socio-economic structural system would assist the location of ubiquitous associations. Instead, governmental characteristics were related to the total socio-economic system. For specific governmental characteristics, only unique relationships were present. This conclusion was not altered when governmental conceptual variables were used instead of individual governmental characteristics.

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TABLE OF CONTENTS

LIST OF TABLES

PAGE

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The Problem Setting

It has become quite obvious that certain segments of our society have not shared in the economic prosperity of the rest of the U.S. Much of the concern for those economically bypassed has been concentrated in urban centers because there the poverty is visibly apparent and is relatively concentrated, thereby making assistance programs relatively easy to administer. But success has been relatively limited. Regional Economic Development Commissions were established to stimulate economic development in rural areas and thereby alleviate poverty but have faced unique difficulties.[1] Although it is known that the poor exist in rural areas, it is frequently difficult to identify exactly where the poor are located. Once pockets of poverty are located, they may be distributed over hundreds of square miles making tentative programs difficult to administer.

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[1]The Coastal Plains, Four Corners, New England, Ozarks, and Upper Great Lakes Regional Commissions were established under Title V of the Public Works and Economic Development Act of 1965. The Appalachian Regional Commission was established under the Appalachian Regional Development Act of 1965.

For both urban and rural areas, more remains to be done than has already been accomplished. This has been caused, in part, by an inability to visualize many of the problems of rural and urban areas as interacting problems.

In many respects, poverty is a relative concept. If everyone has identical income, no one necessarily feels impoverished. With a disparity of incomes, however, poverty can indeed be felt by the individual. Individual poverty, as important as it is, may be secondary to the total effects of an impoverished area.

> The comparative aspects of poverty may make it easier to bear for the individual, but it makes substantial progress or corrective measures enormously greater for the community. A poor community is likely to lack leadership, personal drive among its inhabitants, and economic resources for local betterment. In such a community, many people retreat from the outside world, become indrawn, develop strong personal ties to the community, and do not exert efforts to better their economic situation. Education and other services nearly always suffer. A vicious circle is begun and becomes self-prepetuating. Moreover, in a country such as the United States, where communication is highly developed, it is harder for any locality to take comfort in mutual poverty; the example of higher income areas is too inescapable.[1]

Ready examples of prosperous areas illustrated by mass media coupled with prosperity "surrounding" central city dwellers may also create internal strife and turmoil. As Mukherjee noted in discussing such problems in India: "It cannot be

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[1]Marion Clawson, "Rural Poverty in the United States," Journal of Farm Economics, Vol. 49 (December 1967), p. 1228.

denied that the co-existence of affluence and poverty is not only the basic cause of tensions, but a potential danger to the unity of the country."[1] Perhaps more developed countries should pay heed to the "potential danger to the unity of the country" resulting from the co-existence of affluence and poverty.

Many of the present depressed rural areas existed on a mining or agrarian economic base. Technological advances and resulting increased efficiencies in both agriculture and mining paradoxically contributed greatly to the depression of rural areas.[2] The substitution of capital for labor released a sizable labor force from the production of primary products. As many rural areas lacked adequate alternative job opportunities, many of those displaced migrated to urban areas where there was more hope for employment. With migration, however, there was frequently no longer a sufficient population base for the existing retail and service sectors of rural areas resulting in a second stage reduction in economic activity. In addition, migration caused considerable strain on the cities.

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[1] B. K. Mukherjee, "Regional Dispersal of Industries," Eastern Economist, Vol. 47 (September 9, 1966), p. 477.

[2] Some of the governmental support programs also contribute to the problem, albeit that was not the intention. The reduction in acreage under the Cotton Program with the immediate impact of putting many thousands out of work is one example.

Continual movement of people from rural to urban areas, for example, often causes unfilled public needs in both farm and city communities. Urban centers frequently experience difficulties in public service programs that expand too slowly to adequately serve a growing population. At the same time, rural areas are often subject to an erosion of their economic tax base in the form of loss of population and of taxable incomes needed to support desired levels of public services.[1]

The environment into which many migrants moved may be less than what modern standards would dictate. As Bonnen observed: "The reason for an immense migration of rural poor is easily seen. As bad as life in the central city ghetto is, it is still more attractive, holds more opportunities for the poor than does the rural life."[2]

Migration is not just a shift in population however. Migration can negate local efforts to alleviate social and economic problems, hinder potential development of the area of migrant origin, and create unfulfilled service needs at both point of origin and point of arrival. Detroit's

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[1]John E. Thompson, "Meeting Unfilled Public Service Needs in Rural Areas," Journal of Farm Economics, Vol. 45 (December 1963), p. 1140.

[2]James T. Bonnen, "Progress and Poverty: The People Left Behind," paper presented at the Minneapolis Farm Forum, Minneapolis, Minnesota, March 6, 1968, p. 7. For a similar observation, see Clawson, "Rural Poverty," p. 1232.

experience in attempting to solve a social and economic dilemma is a prime example of migration negating local initiative. After the Detroit riot of 1967, a group of citizens worked hard to create 55,000 new jobs of which at least 15,000 went to hard core poor. At the same time, an influx of migrants caused unemployment to rise by 1,000.[1] Schachter has adequately pointed out the adverse impact on development efforts resulting from the migration of the labor force from depressed regions in Greece, Spain, Portugal, and Italy.[2] And as noted above, services in both rural and urban areas may suffer from migration.[3]

In the U.S., the age of massive migration may be behind us. Reports from the 1970 Census of Population indicate that fewer areas had an absolute decline from migration during the 1960's than during the 1950's. Many areas still suffered a loss of population from migration, but the loss was not as severe as during the 1950's. Whether a similar slowing or a reversal will be prevalent in the 1970's will depend upon our ability to strengthen the rural hinterland. As agricultural operations continue to be consolidated, the rural economy may actually go into a third stage reduction

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[1]Bonnen, "Progress and Poverty," p. 7.

[2]Gustav Schachter, "Regional Development in the Italian Dual Economy," Economic Development and Cultural Change, Vol. 15 (July 1967), p. 410.

[3]John E. Thompson, "Public Service Needs," p. 1140.

in economic activity. That is, absolute population may not diminish greatly, but they may pursue their economic activities outside of the local area. This has already occurred in some cases. As stated by Clawson:

> Business and social services of all kinds are declining in the small rural towns; the small rural community has been by-passed, both by farmers, who no longer support it, and by the public programs, which are generally inapplicable to it. A large proportion of small rural communities are no longer viable and many will vanish in time.[1]

A Suggested Solution--Community Facilities

One possible way to alleviate problems associated with the emigration from rural areas and immigration into urban areas is to increase the attractiveness of rural areas. Attractiveness must include development of economic opportunity if poverty and migration is to be reduced. It is doubtful, however, that modern man will respond to economic opportunities alone. He is also concerned with adequate housing, quality educational opportunities for his children, modern and convenient health and hospital services, good roads, adequate police and fire protection for his family and property, etc. In addition, he may want cultural and recreational facilities nearby.

Although much has been said about importance of community facilities in economic development, relatively little

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[1]Clawson, "Rural Poverty," p. 1233.

empirical work has been done. Most empirical work has been generated through industrial location studies and is therefore not necessarily directly relevant to the present study. If one assumes that industrial development in an area is synonomous with economic development, the studies become slightly more relevant.

Almost without fail, the four most important considerations found for industrial location are markets, transportation, labor, and raw materials. Responses to the relative importance of community attitudes, community facilities such as hospitals, education, housing, police and fire protection, cultural aspects of the community, etc. invariably indicate that these factors are of only secondary or minor importance in location decisions.[1] The primary reason that these studies do not show the importance of community

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[1]Mirze Amjad Ali Beg, Regional Growth Points in Economic Development (with special reference to West Virginia), Economic Development Series, No. 8, Bureau of Business Research, West Virginia University (December 1965); Thomas P. Bergin and William F. Eagan, "Economic Growth and Community Facilities," Municipal Finance, Vol. 33 (May 1961); Melvin L. Greenhut, "An Explanation of Industrial Development in Underdeveloped Areas of the United States," Land Economics, XXXVI (November 1960), Melvin L. Greenhut, Plant Location in Theory and in Practice, (Chapel Hill, North Carolina: The University of North Carolina Press, 1956); Louis K. Loewenstein and David Bradwell, "What Makes Desirable Industrial Property," Appraisal Journal, XXXIV (April 1966); T. E. Mc Millan, Jr., "Why Manufacturers Choose Plant Locations vs. Determinants of Plant Location," Land Economics, XLI (August 1965); and V. W. Ruttan and L. T. Wallace, "The Effectiveness of Location Incentives on Local Economic Development," Journal of Farm Economics, XLIV (November 1962).

facilities may be that they are based on either national or regional types of surveys. Unfortunately studies dealing with decisions for more local areas indicate a similar hierarchy of characteristics.[1] For example, Ruttan's and Wallace's study of industrial location in southern Indiana found community facilities ranked from medium to low in importance. They noted however:

> There was an indication that noneconomic or amenity factors were also influential in the local decision. The evidence is of two types. First, the relative importance placed on noneconomic factors rose as the number of skilled workers or managerial personnel transferred from other locations rose. The unwillingness of personnel to live in communities that do not possess a minimum of civic facilities and amenities is a factor considered by the firm in the location process. Salary increases and/or promotions were cited as ways of overcoming this unwillingness. Second, comments from firm officials indicated that they did not consider noneconomic factors an issue about which they could bargain with community leaders. If the minimum level of community facilities and amenities was not met, there was a tendency to simply omit the community from further consideration.[2]

Although most locational analyses conclude that community facilities are not important in attracting industry (and thereby stimulate economic development), responses as noted above and frequently contained within such studies

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[1]The difference in importance for certain considerations vary by whether one has a regional, or site perspective. For example, see U.S. Department of Commerce, Industrial Location As A Factor in Regional Economic Development, Economic Development Administration, (Washington, D.C.: U.S. Government Printing Office, n.d.p. 14).

[2]Ruttan and Wallace, "Location Incentives," p. 976-77.

leave room for broader interpretation. Attributes noted for industrial parks or considered important by industrial researchers also seem to favor a broader interpretation than usually found in location studies.[1] The reason location studies generally fail to substantiate the relative importance of local facilities is that perhaps the correct questions are not asked. As stated by Smith:

> Locational-economics models of the conventional varieties beg the primary development issues. They analyze optimum locations, assuming as given those cost and productivity facts, such as forest-land yields under gross mismanagement, and ill-adapted property institutions, which are (or should be) the primary objects of development policy. Finally, they assume away important instrumentalities of control, such as subsidies in various disguises, restrictions on property rights of various kinds, calculated discrimination in the taxation of foreign corporations, and the like, by which underdeveloped countries, with varying degrees of skill, manipulated these factors.[2]

"Conflicting" views of whether or not local community facilities play a role in attracting new industry persists into the discussion of depressed areas. Beg, for example, believes that such facilities are quite important.

> The development of an appropriate social infrastructure must always precede further economic development. Moreover, social overhead capital should be distributed equitably over the area, rather than concentrated in

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[1]Advisory Commission on Intergovernmental Relations, State-Local Taxation and Industrial Location, A-30, (Washington, D.C., April, 1967) pp. 71-72, and 74-75; and McMillan, Jr., "Why Manufacturers Choose," p. 245.

[2]Eldon D. Smith, "Restrictions on Policy Alternatives Relating to Underdeveloped Regions of Developed Countries," Journal of Farm Economics, Vol. 48 (December 1966) p. 1231.

> islands of relative prosperity. Education, for example, brings awareness of the rights and responsibilities of citizenship, whereas illiteracy or lack of adequate education and training excludes the human resources from full participation in the process of growth. If such exclusion is due to the lack of regionally diffused social overhead, the backward area may constitute a drag on the national economy and may even cause stagnation in an otherwise accelerated pace of economic growth.
>
> Similarly, adequate means of transportation insure access to--and mobility of--resources. The economy becomes more flexible, viable, and resilient when changes occur. If communication media and transportation facilities are concentrated in the primate cities, the impulses of growth are restricted to the already developed areas.[1]

Friedmann, on the other hand, states that "as important as (community facilities) are for enhancing the quality of life, man-made amenities play a very subordinate role in guiding the location of productive facilities."[2] The conflict is not even resolved at a national or international level. In developing countries, for example, differences in opinion on unbalanced growth versus balanced growth is an issue of considerable importance.[3]

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[1]Beg, Regional Growth Points, p. 11.

[2]John Friedmann, "Regional Planning in Post-Industrial Society: Some Policy Considerations," Journal of Farm Economics, Vol. 45 (December 1963), p. 1077.

[3]For a discussion of Hirschman's unbalanced growth theory, see W. F. Ilchman and R. C. Bhargava, "Balanced Thought and Economic Growth," Economic Development and Cultural Change, Vol. 14 (July 1966) p. 390. For balanced growth, see W. Arthur Lewis, Development Planning: The Essentials of Economic Policy, (New York: Harper & Row, Publishers, 1966) pp. 97-102.

The issue of whether or not community facilities play a role in the economic development of an area is more than a moot point. It has been shown that many public services or community facilities in depressed regions of the U.S. are either inadequate or lacking. In studying Appalachia, Grossman and Levin cited obsolescent community facilities as one of six obstacles to the economic development of the region.

> In many of the region's farming and mining areas important public facilities and services are either substandard or non-existent, residential and commercial structures are dilapidated and community planning efforts have not been in evidence. Education and health levels are low, particularly in the agricultural areas. Lacking the basic preparation necessary for technical training, many of the region's residents have been relegated to marginal, low-paying jobs in factories and service establishments.[1]

The noted absence of local facilities may make future development of such areas more difficult. At the same time, the advantages of already developed areas are:

> In short, the developed areas can offer immediately certain external economies to new or expanding industry that the less developed cannot offer. These advantages

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[1]David A. Grossman and Melvin R. Levin, "The Appalachian Region: A National Problem Area," Land Economics, XXXVII (May 1961), p. 136. For similar comments on the Ozark Region, see Max F. Jordan and Lloyd D. Bender, An Economic Survey of the Ozark Region, Agricultural Economics Report No. 97, U.S. Department of Agriculture, Economic Research Service, Washington, D.C., 1966, pp. 67-68. This situation is not unique to the U.S. Similar discussions related to rural areas in Israel are in Raanan Weitz, "Rural Development Through Regional Planning In Israel," Journal of Farm Economics, Vol. 47 (August 1965), p. 644.

> are a result of past development and facilitate future development. The developed areas currently possessing certain external economies will attract new or expanding industry more readily than will less developed areas currently possessing few of these man-made advantages. Obviously, the existing geographical distribution of external economies is in part attributable to historical accident and in part to public policies.[1]

The ability of less developed areas to offset the external economies available in more developed areas may be quite limited as it would take a much larger infusion of money than has been made available.[2]

In general, relationships between economic development and local governmental services are not well defined in the sense that there are considerable contradictory opinions available. If one is willing to assume that industrial expansion in an area is synonomous with economic development, most of the empirical "location" studies indicate that local community factors are of relatively minor importance. At the same time, many of these studies contain internal observations implying that the role of community factors may be relatively important in final industrial location decisions. Descriptive studies of depressed areas frequently

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[1]William E. Laird and James R. Rinehart, "Neglected Aspects of Industrial Subsidy," Land Economics, XLIII (February 1967), p. 28.

[2]Grossman and Levin, "The Appalachian Region," p. 140; and Niles M. Hansen, "Some Neglected Factors in American Regional Development Policy: The Case of Appalachia." Land Economics, XLII (February 1966), pp. 5-6.

cite the absence or inadequacy of local governmental services whereas comments on developed areas stress availability and general adequacy of such services. However, there are those that discount the significance of local governmental services in the developmental processes. Although there is hardly a concensus on either side of the issue, it appears that the availability of local governmental facilities does have a role in the process of local economic development.

The Objectives and Hypotheses

Objectives

Relationship between economic development and local governmental services have not been well established. The literature is divided as to the importance of governmental services for rural economic development. And yet, development of rural areas may be essential to alleviate the congestion and possible collapse of large urban centers. It is therefore essential to quantify the relationships between services and development in a more complete form than has previously been found.

The objectives of this study are:

1. To determine the relationships between local governmental services and socio-economic measures of local areas.

2. To examine the relationships found in objective one for consistency between different levels of government and for influence of geographic location.

Hypotheses

The working hypotheses to accomplish the objectives set forth for this study are:

1. There is a positive relationship between socio-economic measures of local areas and local governmental services.
2. The relationships developed from diverse characteristics will establish similar geographic patterns (regions).
3. The relationships found in hypothesis one will vary by type of governmental unit studied.

Procedure

References were made in prior sections to "socio-economic measures" and "local governmental services" without defining the terms. The socio-economic measures include population characteristics, income characteristics, business characteristics, agricultural characteristics, labor characteristics, etc.[1] These characteristics were included in several ways. The first was level of performance such as

[1]These characteristics are explicitly identified in Appendix A.

wholesale sales per capita for a given period. The second was distribution of performance such as percentage of the population with less than $3,000 income for a given period. The third was a change in level and distribution of performance as measured by relative changes in income, sales, etc. over time.

"Local governmental services" includes revenues and expenditures by function on a per capita basis.[1] Again, characteristics were examined on the basis of level, distribution, and changes in level and distribution of performance.

The purpose of this paper is to examine the relationship between local socio-economic structure and local governmental revenue-expenditure patterns. For the most part, the socio-economic structure will be a proxy for past economic development. Further, it is assumed that governmental revenue-expenditure patterns will be adequate measures of available local governmental facilities and services. The relationships between the two will then be examined by two methods. First, "regions" and "conceptual variables" developed from the socio-economic characteristics and from the governmental characteristics are examined. Second, "conceptual variables formed from both the socio-economic and

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[1]These characteristics are explicitly identified in Appendix C, p. 159.

governmental characteristics are examined by ordinary least square regression analysis.[1]

Assumptions and Limitations

Several limiting assumptions are necessary to make the project feasible. The first is that availability of local governmental facilities can be measured by revenues and functional expenditures of a governmental unit. If a governmental unit has expenditures for a given function, it can be assumed that the service is provided. If there are no expenditures for a given function, it will be assumed that the service is not provided. The latter assumption may not always be true, but almost all services require expenditures before the service can be delivered. Ideally, one would have first hand knowledge of the existence of a service, the number of people it serves, the product being provided, etc. Unfortunately, it would be necessary to have a complete inventory for several broad areas to obtain the crucial information and was therefore considered to be impractical for this study.

The second assumption, related to the first, is that a dollar of expenditure will buy an equal quantity and quality of service anywhere in the State. Variations in

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[1]The procedure for forming the "regions" and the "conceptual variables" will be discussed in Chapter II.

expenditure are therefore assumed to be proxies of variations in adequacy or quality of service. This is perhaps the most limiting, and potentially least realistic, assumption made. A natural conclusion arising from the assumption is that if one government is spending more than another, the larger spender is providing a higher level of service. While this is undoubtedly partly true, there are characteristics which can negate this conclusion. If substantial economies of scale are present, a given dollar expenditure will not buy an equal amount and quality of service.

In addition to and coexistent with the problem associated with scale, scale may be associated with a change in product available. For example, the "product" available from a small town police force may be considerably different from that produced by a metropolitan police force. Although the small town "product" may be completely adequate for most problems, it is unlikely to be sufficiently sophisticated for all possible situations. The same can be said for a small community hospital versus a large metropolitan hospital. The small hospital may be quite adequate for routine surgery and care but specialized treatment and care may have to be obtained in a large hospital that can afford the expensive modern equipment and related personnel. In addition, large hospitals may also be involved in teaching. The "products" available are therefore not the same. An additional complicating factor is that the cost of delivering

the service may not be the same. Distance, for example, has an associated cost. Two school districts may have identical total expenditures per pupil and equal enrollments. But if one school district has a sizable transportation expense and the other has none at all, there is an immediate difference in the cost of delivering the service.

Despite the disadvantages, the assumption that expenditures are a proxy for service levels is practical. It would be necessary to inventory size and itemize the different services available and costs associated with each to have a reasonable approximation of the mix of production functions for a given service. Although efforts expended in this area may be quite fruitful, it was considered to be beyond the scope of this project.

A third assumption is that socio-economic structures found will approximate various levels of local economic development. Instead of assuming that economic development areas could be designated on the basis of a few key characteristics such as per capita income, unemployment rates, change in retail sales, etc., the present study delineates areas on the basis of over 100 socio-economic characteristics.[1] The rationale for this approach is that development, or lack of it, hinges on more than pure economics. Areas

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[1]The statistical method for delineating the areas is discussed in Chapter II.

that are depressed or are developed may well have distinct differences in their socio-demographic attributes. If so, these characteristics should also be considered.

CHAPTER II

THE METHODOLOGY

The attempt to unite the relationships between economic development and local governmental services is, in part, unique. As noted previously, several studies of depressed areas indicated the relative lack of governmental services, but there appear to be no studies that attempt to systematize the relationships. At the same time, however, there have been studies of governmental expenditures and revenues which include certain variables that would usually be expected to be associated with economic development.

The "Determinants" Approach

The "determinants" studies examined relationships between governmental expenditures for a particular function (dependent variable) and various selected socio-economic characteristics (independent variables). A least squares regression model was used to "determine" the percentage of variance of the dependent variable explained by the independent variables.[1]

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[1]The results of many of these studies (and their detractors) were published in the early 1970's. Some examples

"Determinants" studies examined relationships for per capita (or total) spending patterns for cities, counties, school districts, etc. Generally these studies cut across state boundaries but some used the state as the aggregative observation unit and others examined only a local area. Total and functional expenditures such as education, highways, police, and fire were usually included as separate items for analysis with most studies modifying the data to exclude capital expenditures.

The most popular independent variables utilized in "determinants" studies included total population, population density, a measure of personal income, and a measure of educational attainment. Not all studies included the same set

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are: Glenn W. Fisher, "Determinants of State and Local Government Expenditures, A Preliminary Analysis," National Tax Journal, XIV (December 1961), pp. 349-355; Glenn W. Fisher, "Interstate Variations in State and Local Government Expenditure," National Tax Journal, XVII (March 1964), pp. 57-74; Werner Z. Hirsch, "Determinants of Public Education Expenditures," National Tax Journal, XIII (March 1960), pp. 29-40; Ernest Kurnow, "Determinants of State and Local Expenditures Reexamined," National Tax Journal, XVI (September 1963), pp. 252-255; Seymour Sacks and Robert Harris, "The Determinants of State and Local Government Expenditures and Intergovernmental Flows of Funds," National Tax Journal, XVII (March 1964), pp. 75-85; Henry J. Schmandt and G. Ross Stephens, "Local Government Expenditure Patterns in the United States," Land Economics, XXXIX (November 1963), pp. 397-406; Elliott R. Morss, "Some Thoughts on the Determinants of State and Local Expenditures," National Tax Journal, XIX (March 1966), pp. 95-103; George B. Pidot, Jr., "A Principal Components Analysis of the Determinants of Local Government Fiscal Patterns," The Review of Economics and Statistics, LI (May 1969), pp. 176-188; Roy W. Bahl, Metropolitan City Expenditures: A Comparative Analysis, (Lexington: University of Kentucky Press, 1969).

of independent variables but even accounting for these different studies frequently had different independent variables as the most important explanatory variables. Masten and Quindry examined this problem by studying Wisconsin cities of different sizes and concluded "City size...is an extremely important factor in determining the relative explanatory ability of other socio-economic factors."[1] Using the same set of variables, different "most important" variables were obtained for different city sizes.

The major focus of many determinants studies appeared to be on the improvement of the coefficient of determination. That is, how much greater is the percentage of a prticular functional expenditure explained by one model versus another model. The second focus was on direction (and slope) of different relationships as indicated by partial regression coefficients. It is not the purpose of the present study to question the implied objectives of these studies. However, one aspect that apparently was not adequately considered was the possibility that some socio-economic (independent) variables would work together into an interlocking system.[2] The same can be said for

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[1]John T. Masten, Jr., and Kenneth E. Quindry, "A Note on City Expenditure Determinants," Land Economics, XLVI (February 1970), p. 81.

[2]Two exceptions to thi are: Pidot, "Principal Components Analysis," and Bahl, Metropolitan City Expenditures.

classification of expenditures by function (dependent variables) since various functional expenditures may well be mutually interdependent. Therefore, instead of examining relationships between single variables or partial relationships between a small group of variables, this study concentrates on the identification of linkages between socio-economic characteristics and between governmental characteristics to develop conceptual variables. One method of doing this is through the use of factor analysis.

The "Interactions" Approach[1]

The view held in this study is an attempt to relate economic development with local governmental expenditure patterns requires the use of a multivariate technique. No single measure (such as change in per capita income) can adequately account for differences in economic growth across a state or nation since economic development is a complex

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[1]This section is at best rudimentary. There are several good references available from which the majority of this discussion is based. In order of increasing sophistication, these are: Benjamin Fruchter, Introduction to Factor Analysis (Princeton, N.J.: D. Van Nostrand Company, Inc., 1954); Raymond B. Cattell, Factor Analysis: An Introduction and Manual for the Psychologist and Social Scientist (New York: Harper & Brothers, 1952); Raymond B. Cattell, "Factor Analysis: An Introduction to Essentials. I. The Purpose and Underlying Models," Biometrics, Vol. 21 (March 1965), pp. 190-215; Raymond B. Cattell, "Factor Analysis: An Introduction to Essentials. II. The Role of Factor Analysis in Research," Biometrics, Vol. 21 (June 1965), pp. 405-435; and Harry H. Harman, Modern Factor Analysis, (Second Edition, Revised; Chicago: University of Chicago Press, 1967).

of interrelated occurrences or manifestations. Also, revenues and functional governmental expenditures may also be strongly interrelated. Therefore, a technique that utilizes a complex linkage of interrelated manifestations would be extremely useful.

Factor analysis has the unique capability to consider a large number of interrelated characteristics (manifestations) and reduce these into a smaller number of factors (conceptual variables). As stated by Fruchter:

> More and more it is being realized that the end product of science is in the form of statements concerning the interrelationships between things. It is also realized that the most fruitful type of concept of the things related is in the form of variables or dimensions. The major problems are therefore correlation problems. Where the appropriate variables are readily observable or easily inferred from objective data, one may proceed to the discovery of the interrelationships. ...where the number of potential variables is very large and the useful variables that we need for economical and dependable descriptive purposes are overlaid with multiplex manifestations, the demand for some method that will facilitate the discovery of those underlying variables is very great. It is in the fulfillment of this objective that we find factor-analysis methods to be of greatest value.[1]

In addition, factor analysis provides more freedom in initial stages of analysis since it does not force premature assumptions on possible interrelationships of characteristics and their relative importance in determining areal environments.

> Factor analysis provides...a method far more free than most methods from the necessity to elaborate rigid

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[1]Fruchter, Introduction to Factor Analysis, p. vii.

> hypotheses. It is the ideal method of open exploration in regions unstructured by present knowledge. In embarking upon a factor analysis one need have no more definite idea than Columbus had of America in regard to what may be found. It is sufficient to hypothesize that some structure lies there.[1]

Although the development of factor analysis began almost 70 years ago, its primary usage has been in fields related to psychology and aptitude testing. As factor analysis is not a common technique employed in other fields, a brief description is in order.

Basically, factor analysis begins with a square simple correlation matrix. (The diagonal of this matrix is a crucial issue which will be discussed under communalities.) The simple correlation matrix is factored giving the principal factor solution. But, this solution does not yield a framework which is easily interpreted. As stated by Cattell,

> "...factors may be, indeed, almost certainly are, quite remote from correspondence with the patterns of any of the real influences behind the data. Indeed, the arrangement of factors as they come fresh from the computer is affected by such accidental matters as the raw score scaling (in the case of the principal axis solution)..."[2]

Therefore, a rotation of the principal factor solution may be performed.

Rotation of factors does not affect the percentage of total variance explained by the factors but redistributes

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[1]Cattell, Factor Analysis: An Introduction and Manual, p. 14.

[2]Cattell, "Factor Analysis Purpose," p. 205.

their explanatory functions among a corresponding number of new factors. The rotation does affect the magnitude of factor loadings as they tend toward unity and zero, thus lending toward more accurate interpretation of the factors. The varimax rotation "...is a precisely defined method which indeed approximates orthogonal simple structure."[1]

With the introduction of several terms in the discussion above, these terms will now be discussed in detail. The terminology is used for both principal factors and rotated factors. Factor loadings are crucial as their respective values for each variable in combination with the variables which cluster together are what the analysis hinges upon. Each variable has a factor loading on each factor, and the loading can be considered similar to a simple correlation between a variable and a factor. Like a simple correlation coefficient, the value of a factor loading varies from -1.0 to +1.0 with the sign indicating whether the variable varies directly or inversely with the factor.

The classical factor analytic model is designed to maximally reproduce correlations and has the general form:

$$1. \quad Z_i = a_{i1}F_1 + a_{i2}F_2 + \ldots + a_{ip}F_p + a_iU_i$$

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[1]Harman, Modern Factor Analysis, p. 310. There is considerable argument for using an oblique rotation solution as this would permit the development of correlated factors, a situation which would be most likely to exist in the real world. At the time this study was conducted however, oblique rotations were not available as part of the factor analysis program package.

where there are i = 1,2, ...n variables, p = 1,2, ...p common factors, with a_{ip} being the factor loading for the ith variable on factor p, with F being common factors and a_i and U being the unique factor loading and unique factor, respectively. The basic problem of factor analysis is to determine common factor loadings (i.e. the a_{ip}'s).

The a^2_{ip} is the proportion of variance of variable i explained by factor p. The proportion of total variance explained by a factor is

$$2.\ V_p = \sum_{i=1}^{n} a^2_{ip} \div \text{(trace of the matrix)}$$

The form to determine the percentage of the variable's variance accounted for by the total solution (i.e. the variable's communality) is

$$3.\ h^2 = a^2_{i1} + a^2_{i2} + \ldots + a^2_{ip}$$

Note that only loadings of the common factors are utilized in computing communality.

Two different types of factors were introduced above. These are distinguished by:

1. Common factors involve <u>more than one</u> variable.
   a. General factor--almost all variables load highly on one factor.
   b. Group factor--more than one variable but not all variables loaded on the factor.
2. Unique factors involve a single variable.

Common factors account for the variables intercorrelations whereas unique factors represent that portion of a variable not accounted for by its correlations with other variables in the set.

An issue deferred earlier was that of communality. As previously mentioned, factor analysis begins with a square, simple correlation matrix. Each diagonal element equals unity because of perfect correlation of a variable with itself. The issue of communality is whether or not a diagonal element should be left equal to unity or should be estimated. Harman devotes an entire chapter to selection of communality so this discussion will cover only the point as to whether one should use unities or some other estimate of communality.[1]

The use of unities as the communality estimate is frequent but Cattell feels this "closed" model should be called only "component analysis."[2] He also believes that the use of the closed model is misleading.

> ...it is wildly unlikely that the small sample of variables employed will actually represent within themselves all the real common influences required to account for all the variance of all the performances. The trick of putting ones in the diagonals, though comforting in accounting fully for the variance of variables,

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[1]Harman, Modern Factor Analysis, Chp. 5.

[2]Cattell, "Factor Analysis Role," p. 411.

> perpetrates a hoax, for actually it really drags in all the specific factor and error variance...to inflate specious, incorrect common factors.[1]

Cattell prefers to reserve the use of the term "factor analysis" to the "open" model where estimates of communality are something less than one. The estimate is only for the initial matrix as from there on, the communalities are reiterated at each step to the final solution. Communality selection can be crucial as noted by different results found from different estimates by Harman.[2] Most researchers, however, will find that the greater constraint on selection of "appropriate" communality estimates lies more on options available in standard computer programs than on theoretical soundness of different estimates.[3]

One last point remains for clarification. In normal correlation analysis, two characteristics are correlated over a series of individuals. When the pair-wise correlates are drawn over a number of characteristics, the correlation matrix for the usual R-technique of factor analysis (or

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[1] Cattell, "Factor Analysis Purpose," p. 201.

[2] Harman, Modern Factor Analysis, pp. 88-90.

[3] The program used in this study was: Anthony V. Williams (revised by James Peterson and Robert Paul), Factor AA, Technical Report No. 34.1, Computer Institute for Social Science Research, Michigan State University, East Lansing, Michigan (May 1969). The communality estimates available were ones, highest correlations, and Guttman communalities. Highest correlations were used as estimates in early stages of the study. However, the resulting factors violated the "orthogonality" constraints of the Varimax rotation. Therefore, one's were used as communality estimates throught this study despite the difficulties noted by Cattell.

simple correlation matrix for regression analysis) results. "The transpose of the R-technique is that in which people are correlated in pairs, instead of performances, the correlation being over performances..." and is called the Q-technique.[1] One particular use of the Q-technique is that it "...is most useful if one wishes immediately to see how many types there are in a population and to divide it up into types. This usually has merely descriptive value."[2]

The Model

As noted previously, the usual "determinants" of governmental revenue expenditures studies use ordinary least squares regression models as the analytic tool. With regression analysis, one is faced with selecting independent variables which may only be proxies for a whole set of interrelated variables. Regression analysis can account, in part, for interrelationships of variables through partial correlation coefficients but assumes that "independent" variables are in fact independent.

Adelman and Morris indicate concisely the difference between regression analysis and factor analysis.

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[1]Cattell, "Factor Analysis Role," p. 415. Also see Cattell, Factor Analysis: An Introduction and Manual, Chp. 7.

[2]Cattell, Factor Analysis: An Introduction and Manual, p. 101.

> Technique of factor analysis shares certain characteristics with both nonquantitative comparative studies and statistical regression analyses. In essence, it is equivalent to a systematic application of comparative studies which simultaneously tests a large number of ceteris paribus propositions.
>
> As in regression analysis, factor analysis breaks down the original variance of a variable into variance components associated with the variation of a set of other quantities. In regression analysis, the variable whose variations are decomposed in this manner is known as the dependent variable, and the variables that account for different portions of its variation are the independent variables. In factor analysis, all variables are *dependent and independent in turn*. Thus, by contrast with regression analysis, which is a study of dependence, factor analysis is a study of mutual interdependence. (Emphasis mine.)[1]

This study uses the technique of factor analysis as its basic model to utilize the information available in mutual interdependence. Although the same basic model is used, it is used in two separate ways. The first is the analysis of county correlates drawn over a number of socio-economic characteristics and is called the R-technique. The result will be a clustering of individual variables into a component which is called a conceptual variable. The second use of the factor model will be the correlation of counties in pairs with the correlation being over characteristics and is called the Q-technique.

The result will be a conceptual regionalization or typology of counties based on socio-economic characteristics. To avoid difficulty of scale of the data when the data

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[1] Irma Adelman and Cynthia Taft Morris, Society, Politics, and Economic Development: A Quantitiative Approach, (Baltimore: The John Hopkins Press, 1967), p. 131.

matrix is transposed (a problem directly parallel to having extreme observations in simple correlation analysis), all data for the Q-technique will be normalized.[1] Governmental data will be analyzed in the same two ways as the socio-economic data.

Although results from the factor analysis could be considered as final output, the conceptual variables will be utilized as inputs into the final analysis. This will entail usage of conceptual socio-economic variables as independent variables and conceptual governmental variables as dependent variables in an ordinary least squares regression model. Conceptual socio-economic and governmental regions found from the Q-technique will be compared for similarities and differences. If similar area configurations are found for each, differences between areal groups will be examined.

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[1]The formula for normalizing the data was:

$$Z_i = (X_i - \bar{X}_i) / \sigma i$$

CHAPTER III

SOCIO-ECONOMIC STRUCTURE

The primary objective of this study is to determine relationships between public community facilities and socio-economic measures of local economic development. To accomplish this objective and to account for the mutual interdependence likely to be found, conceptual socio-economic variables and conceptual socio-economic regions are developed. Regions are developed to illustrate the homogeneity--heterogeneity of socio-economic characteristics between and among geographic areas. Conceptual variables are developed to illustrate the homogeneity--heterogeneity between and among selected socio-economic characteristics and to provide integrated "variables" for final analysis.

The Regionalization

Linkages of and mutual interdependence of socio-economic characteristics do not necessarily stand alone. Different geographical areas may be affected differently by similar characteristics. Therefore, this study divided Michigan's counties into different types on the basis of selected socio-economic characteristics. One approach

frequently followed for regionalizing any given area is to select a few key characteristics and then match areal configurations on the basis of those selected characteristics. The approach followed here is quite similar but considers many characteristics simultaneously. The mutual interdependence of the selected characteristics is analyzed instead of making the implicit assumption that such characteristics are basically independent. In addition, there is no constraint on configurations found. For example, there is no assumption that like areas must be conterminous, although this modification could be made.

To develop regions, 110 socio-economic characteristics were selected for analysis.[1] These characteristics can be classified into three basic types: (1) level of performance such as per capita wholesale and retail sales, per capita income, education, etc., for a base year, (2)

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[1]These variables are explicitly identified in Appendix A. Originally, 203 characteristics were analyzed. Ninety-three variables indicating employment and relative change in employment by SIC code and occupations were included with the final 110. These employment variables were excluded from this analysis because their inclusion resulted in finding two non-discriminating regions for the state. Specific employment data are apparently enough different from general socio-economic data to cause general distortions. This implies, however, that if one's objective was to unite type of employment with socio-economic structure, employment would have to be considered separately. For the objectives established for this study, specific types of employment were not considered to be strategic characteristics and the 93 related variables were therefore dropped.

distribution of performance as indicated by percentage of population with less than $3,000 income, four years of high school education or more, urban, etc., for a base year, and (3) change in level and distribution of performance as measured by relative changes in income, sales, per cent urban, etc. over time. Therefore, level of, distribution of, and change in performance are analyzed simultaneously.

The socio-economic characteristics were normalized and transposed so that counties were correlated in pairs with correlations generated being over performances.[1] The resulting linkages from the factor analysis gave the areal configuration.

Thirteen basic socio-economic regions (factors) were found for Michigan with each region containing from one to 25 counties.[2] Each region is technically orthogonal (i.e.

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[1]See Chapter II, pp. 29-32 for the details.

[2]The following assumptions and constraints were made in determining the final regionalized solution: (1) communality estimates were made equal to unity, (2) rotation of factors was constrained to all factors with an eigenvalue equal to or greater than 1.5. It would have been equally as possible to set the number of factors to be rotated or to adjust the eigenvalue. For example, given assumption 1, and factoring with an eigenvalue equal to 0, there would be as many factors as variables but many factors would be nonsignificant. Therefore, to keep the number of factors manageable and to avoid the necessity of predetermining the number of factors by specifying the number to be rotated, the eigenvalue of 1.5 was selected. (3) a county was assumed to be in any given region only if it had a factor loading equal to or greater than $\pm$ .40. (i.e. at least 16 per cent of the county's variance was assignable to the given region.)

not correlated with the other regions) and therefore contains unique attributes. Since bi-polar factors were found in most factors, each pole may represent a unique sub-region. The complete set of counties within a given region were affected by identical characteristics and were therefore classified together; but they were affected by those characteristics in directly opposite ways.

Region (factor) one was made up of 25 counties located in the Lower Peninsula and was bi-polar (Table 1).[1] As indicated by Table 1, the poles had approximately equal representation with 12 counties in one sub-region and 13 counties in the other. Although 110 variables entered into consideration of the region, only 8 variables were of primary importance.[2] These were: per cent of the population non-farm, fertility rate, per cent of the employed labor force working outside of the county, relative change in the per cent of families with less than $3,000 income, percentage change in the number with $3,000 income, per cent of the

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[1]The counties included in a region are listed numerically in Table 1. The numerals correspond to the county numbers in Figure 1.

[2]Primary importance was determined from the respective factor score associated with each variable. The factor score for a variable is computed by: $FS_k = \Sigma_{i=1}^{n} a_{ki} X_{ki}$ where i=1...n is the number of counties (83) and k stands for the variable. To be considered "important" for this discussion, $FS_k \geq \pm 2.0$ meaning that the variable FS was more than 2 standard deviations from the mean FS since factor scores are normalized values.

Table 1. Socio-economic regions formed from factor analysis.

Region[a]	Counties included[b]	Region[a]	Counties Included[b]
1a	35,36,43,46,47,50, 52,56,59,60,61,63	1b	1,3,9,10,11,12,17 21,22,25,26,29,32
2a	69,70,72,73,75,76, 79,80,82	2b	3,55
3a	19,20,39	3b	31,33,34,41,50,52
4a	2,5,15,16,18,23,24 25,27,38	4b	13,69,70,74,77,83
5a	1,7,8,14,35	5b	66,73
6a	5	6b	53,64,82
7a	43,44,49	7b	33
8	54,61,65,67,74,81		
9a	27	9b	40,48,71
10	30,42,55		
11	45,58,63		
12a	37	12b	25,26,28,32
13	62		
NA[c]	4,6,51,57,68		

[a]The numeral corresponds with the factor number from the analysis. The letter classification is followed for bi-polar factors.

[b]County numbers are keyed to the numerals associated with the counties on Figure 1.

[c]Counties not allocated to any region by the factor analysis.

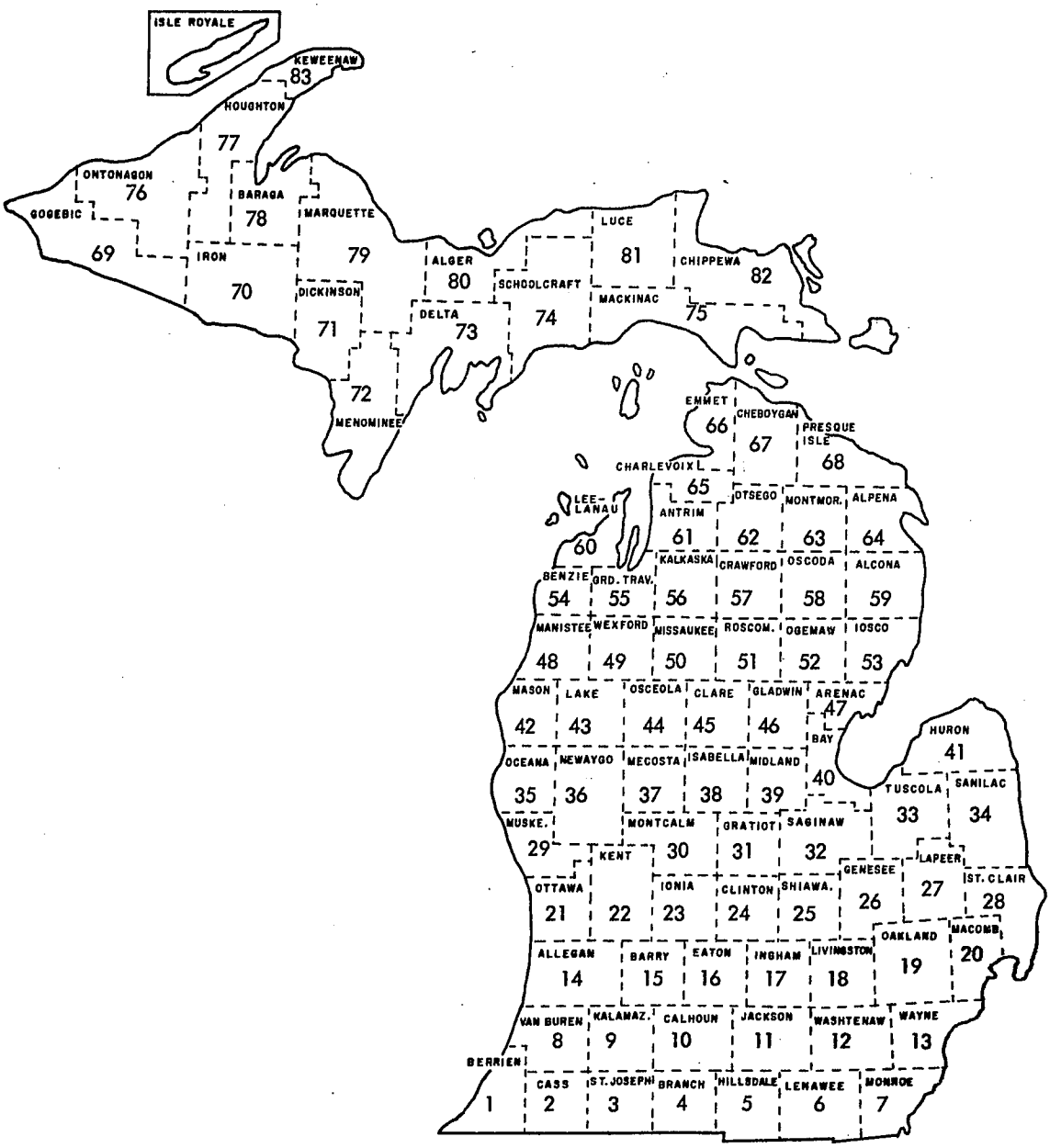

Figure 1. Numerical System For Identification of Regions.

population urban, bank deposits per capita and effective buying income per capita. The last three characteristics operated inversely to the other "important" variables. For Region 1a, the counties were directly related to the first five characteristics above and indirectly related to the final three. For Region 1b, just the opposite is the case.[1]

Regions formed from factor analysis are "unique" so far as their relationships with the "important" variables are concerned. To test the uniqueness of the regions for more general characteristics, means and standard deviations of ten variables were computed for each region. All variables selected, except 1970 population, were included in the factor analysis.[2] Although sharp differences between means of some variables (especially population) were found for different regions, variances around the different means were quite large (Table 2). In most cases, if one takes into account the variance, the differences found between the different basic regions are negligible.

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[1]The counties within each region are identified in Table 1. Although individual characteristics affecting each of the 13 major regions could be reported in depth here, they are listed instead in Appendix B. Individual items going into each region are not of primary importance for the purposes of this study but are presented in the Appendix for those interested in the key relationships.

[2]Of the nine variables included in the factor analysis, the 1960 population, and the two variables for income distribution were the only ones that were not included as an "important variable" for any region. Changes in income distribution were included as an "important variable" for several regions however.

Table 2. Means and standard deviation of selected variables for the basic socio-economic regions.

Region	No. of Counties	Population		Income[a]	Pop. Growth[b]	Urban[c]	Youth[d]	Aged[e]	Family Income		Education[h]
		1970	1960						Low[f]	High[g]	
	no.	no.	no.	dol.	pct.	pct.	pct.	pct.	pct.	pct.	no.
1	25	110,137 (127,802)[i]	94,594 (109,056)	1,618 (419)	15.0 (13.1)	33.3 (33.3)	32.7 (2.0)	14.9 (3.9)	24.4 (11.8)	10.9 (5.6)	10.3 (1.0)
2	11	26,778 (18,848)	25,330 (15,883)	1,475 (181)	6.1 (11.3)	37.9 (22.5)	32.7 (1.8)	14.7 (2.0)	24.8 (4.6)	7.1 (2.5)	10.1 (0.8)
3	9	196,978 (331,017)	145,624 (239,403)	1,597 (402)	29.3 (42.5)	32.7 (36.6)	35.0 (2.7)	13.1 (4.4)	24.7 (11.9)	12.8 (7.8)	10.1 (1.4)
4	16	202,951 (657,293)	197,376 (658,520)	1,579 (266)	11.6 (16.5)	34.0 (24.1)	31.9 (3.5)	14.6 (2.6)	22.8 (5.1)	9.4 (4.6)	10.3 (0.8)
5	7	68,192 (54,588)	60,551 (48,986)	1,567 (215)	15.9 (14.7)	31.5 (20.0)	33.9 (1.4)	14.7 (2.4)	21.7 (4.9)	9.4 (3.2)	10.0 (0.6)
6	4	31,299 (5,064)	28,114 (8,155)	1,518 (105)	25.2 (19.5)	32.7 (26.7)	33.8 (1.9)	13.1 (2.2)	23.7 (3.9)	8.2 (1.2)	10.8 (0.9)
7	4	22,205 (18,538)	20,176 (16,343)	1,333 (136)	3.1 (6.9)	17.3 (25.9)	31.9 (2.2)	18.6 (5.0)	31.9 (11.3)	6.5 (2.5)	9.4 (0.6)
8	6	11,556 (4,330)	10,493 (2,884)	1,212 (95)	-1.6 (4.1)	28.2 (22.9)	32.1 (2.2)	17.3 (1.4)	30.0 (3.7)	6.3 (2.7)	9.8 (0.7)

9	4	53,375 (45,010)	47,982 (40,585)	1,526 (196)	9.3 (11.7)	49.9 (26.8)	32.3 (2.4)	15.1 (3.5)	21.3 (4.8)	9.4 (3.1)	10.0 (0.4)
10	3	33,816 (9,706)	30,405 (7,430)	1,524 (49)	13.2 (5.4)	39.6 (17.4)	31.5 (1.2)	16.7 (1.0)	24.0 (3.1)	8.6 (2.1)	10.5 (0.2)
11	3	8,889 (6,765)	6,506 (4,479)	1,260 (201)	10.3 (3.2)	0 0	31.6 (1.4)	18.0 (1.8)	36.9 (5.2)	5.0 (0.8)	10.1 (0.3)
12	5	175,065 (167,101)	149,353 (141,207)	1,830 (332)	21.3 (10.5)	56.2 (16.4)	33.4 (3.1)	12.5 (2.2)	19.4 (8.5)	11.9 (3.3)	10.5 (0.3)
13	1	10,422	7,545	1,186	17.2	34.0	33.0	14.6	27.2	6.1	9.6

[a]Effective buying income per capita, 1960.

[b]Relative net population growth, 1950-1960.

[c]Percentage of population living in urban places, 1960.

[d]Percentage of population under 15 years old, 1960.

[e]Percentage of population age 60 or more, 1960.

[f]Percentage of families with less than $3,000 income, 1960.

[g]Percentage of families with $10,000 income or more, 1960.

[h]Median educational attainment of population 25 years old or more, 1960.

[i]Standard deviations are in parentheses ( ).

As indicated previously, however, most basic regions (factors) consisted of two basic sub-groups since the factors were bi-polar. Therefore, means and standard deviations for the same variables were computed for each sub-region to examine whether or not sub-regions were in fact different (Table 3). For Region 1, for example, one sub-region had an average population of less than 10,000 people in 1960 and a per capita buying income of less than $1,230. The other sub-region of Region 1 had an average population of over 170,000 and an effective buying income of over $1,975. At the same time, standard deviations for these two variables were smaller than those found for the basic region. The differences in means between these sub-regions for the remaining variables, except youth, were also quite large. Likewise, standard deviations for sub-regions were consistently smaller than those associated with basic regions.

Differences between sub-regions are not unique to Region 1. Sharp contrasts were found between sub-regions of each bi-polar region although not for all variables. It was not expected that differences would exist for all selected variables for all sub-regions since the variables selected for comparisons were only a small part of the total number of variables entering into the regionalization framework. Therefore, even though basic regions were formed on the basis of counties being affected by the same variables,

Table 3. Means and standard deviations of selected variables for the bi-polar socio-economic regions.

Region[a]	No. of Counties	Population		Income[b]	Pop. Growth[c]	Urban[d]	Youth[e]	Aged[f]	Family Income		Education[i]
		1970	1960						Low[g]	High[h]	
	no.	no.	no.	dol.	pct.	pct.	pct.	pct.	pct.	pct.	no.
1a	12	11,367 (6,536)[j]	9,833 (5,660)	1,229 (128)	3.6 (6.8)	1.2 (4.0)	32.2 (1.9)	18.1 (2.8)	35.7 (5.6)	5.9 (1.8)	9.5 (0.5)
1b	13	201,310 (117,757)	172,835 (99,704)	1,977 (213)	25.7 (6.9)	62.9 (14.8)	33.2 (2.1)	11.9 (1.6)	14.0 (2.0)	15.5 (3.3)	11.0 (0.7)
2a	9	23,109 (18,883)	22,535 (16,189)	1,442 (167)	3.3 (10.4)	36.0 (24.3)	33.1 (1.7)	14.4 (2.0)	26.0 (4.3)	6.1 (1.3)	9.9 (0.7)
2b	2	43,284 (5,814)	37,911 (6,252)	1,625 (219)	18.9 (2.5)	46.4 (12.2)	30.8 (0.7)	16.3 (1.0)	19.6 (1.3)	11.5 (0.7)	10.9 (0.2)
3a	3	532,316 (429,666)	382,504 (320,041)	2,086 (252)	79.3 (37.8)	76.5 (19.6)	38.0 (1.8)	7.5 (0.9)	10.7 (2.5)	22.3 (5.7)	11.7 (0.6)
3b	6	29,308 (16,248)	27,183 (15,178)	1,352 (134)	4.3 (7.8)	10.8 (16.2)	33.5 (1.4)	15.9 (1.4)	31.7 (7.1)	8.1 (1.5)	9.3 (0.6)
4a	10	50,834 (10,602)	40,315 (6,842)	1,587 (139)	21.8 (9.7)	27.0 (11.5)	33.7 (1.3)	13.3 (1.6)	20.7 (3.0)	11.0 (1.4)	10.7 (0.5)
4b	6	457,730 (1,082,252)	459,145 (1,081,341)	1,566 (421)	-5.5 (9.2)	45.8 (35.1)	28.8 (4.0)	16.8 (2.5)	26.4 (6.0)	6.8 (6.8)	9.8 (0.8)
5a	5	84,617 (57,015)	74,731 (51,743)	1,623 (236)	22.2 (11.9)	24.3 (17.8)	34.0 (1.5)	14.2 (2.7)	20.5 (5.3)	10.6 (2.9)	9.8 (0.4)
5b	2	27,128 (12,440)	25,101 (13,006)	1,427 (14)	0.2 (5.7)	49.4 (15.3)	33.7 (1.3)	15.8 (0.9)	24.7 (2.8)	6.2 (1.0)	10.6 (0.6)

6a	1	37,171	37,742	1,496	8.9	21.9	31.9	15.7	26.6	9.8	11.4
6b	3	29,342 (3,936)	25,905 (8,395)	1,526 (127)	30.5 (19.8)	36.3 (31.6)	34.4 (1.7)	12.2 (1.7)	22.7 (4.1)	7.6 (0.7)	10.5 (1.0)
7a	3	13,405 (7,137)	12,466 (6,636)	1,289 (127)	-0.3 (1.6)	18.3 (31.6)	31.4 (2.4)	20.0 (5.3)	34.7 (11.9)	5.7 (2.4)	9.5 (0.7)
7b	1	48,603	43,305	1,464	13.2	14.4	33.7	14.7	23.3	8.9	9.1
9a	1	52,317	41,926	1,366	17.1	14.7	33.6	12.9	22.4	10.9	9.7
9b	3	53,729 (55,119)	50,000 (49,459)	1,579 (202)	6.7 (12.8)	61.7 (15.8)	31.9 (2.7)	15.9 (3.9)	20.9 (5.8)	8.9 (3.6)	10.1 (0.4)
12a	1	27,992	21,051	1,383	11.0	41.3	28.1	15.1	33.5	7.1	10.6
12b	4	211,833 (167,981)	181,429 (140,452)	1,942 (252)	23.9 (10.1)	59.9 (16.3)	34.7 (0.9)	11.9 (2.0)	15.9 (3.6)	13.2 (2.1)	10.5 (0.3)

[a]Regions 8, 10, 11, and 13 did not consist of two discrete groups of counties. Therefore, the appropriate data are found in Table 1.

[b]Effective buying income per capita, 1960.

[c]Relative net population growth, 1950-1960.

[d]Percentage of population living in urban places, 1960.

[e]Percentage of population under 15 years old, 1960.

[f]Percentage of population age 60 or more, 1960.

[g]Percentage of families with less than $3,000 income, 1960.

[h]Percentage of families with $10,000 income or more, 1960.

[i]Median educational attainment of population 25 years old or more, 1960.

[j]Standard deviations are in parentheses ( ).

the nine bi-polar regions had distinct and separate sub-groups indicating that variables affected those sub-groups in opposite ways. Also, the existence of sub-regions may also explain the relative absence of sharp contrasts among the basic regions.

Comparisons across sub-regions also indicated substantial differences in averages found for the selected variables. For example, sub-regions 2a, 3b, 5b, 6b, and 12a each had an average 1960-70 population between 20,000 and 30,000 (Table 3). The number of counties contained within each varied from one in 12a to nine in 2a. Even though average county population for these five regions was approximately the same, the ranges of values for other variables were in some cases quite large. Per capita income for example ranged from $1,352 for Region 3b to $1,526 for Region 6b. Change in population between 1950-60 varied from 0 in Region 5b to 30 per cent in Region 6b. The average percentage of the population classified as urban varied from 11 per cent in Region 3b to 49 per cent in Region 5b. Similar ranges were found for the remaining selected variables. Each sub-region had at least one extreme value. Therefore, even though average populations were approximately the same, the average performance recorded for other characteristics indicated that the regions were uniquely different in at least one of the selected attributes. Even if this were not found to be the case it would not mean that

the sub-regions were totally alike since the variables examined represent less than ten per cent of all variables that went into the regionalization.

In summary, this study developed 22 socio-economic regions given the assumptions stated at the beginning of this chapter. These 22 regions were the outgrowth of 9 bi-polar factors (regions) and 4 single pole factors (regions). As indicated by means and standard deviations computed for ten selected variables, it is necessary to consider each pole of a bi-polar region as two separate regions. The socio-economic regions described above will be compared with governmental revenue-expenditure regions developed in the next chapter. If similar regionalizations are found between the two types of regions it can be stated that, so far as 110 socio-economic variables are representative of the social and economic structure, there is a relationship between socio-economic structure and governmental structure. Actual quantification of the structure is still to be developed. The first input into that quantification is discussed in the next section.

The Conceptual Variables

The mutual interdependence of attributes of counties and the resulting regionalization was discussed above. The primary objective of this section is to develop the mutual interdependence of socio-economic variables into a smaller

set of conceptual variables (factors). The R-technique of factor analysis (as discussed in Chapter II) was used to develop the factors.

The 110 socio-economic characteristics previously discussed formed the base of the analysis for conceptual variables. The number of variables which could be utilized in the R-technique was constrainted to less than 100 by computer program capacity. The necessary reduction in variables was accomplished by examining the simple correlation matrix. One of each pair of variables with a simple correlation coefficient equal to or greater than $\pm$ .90 was dropped from further consideration. The decision as to which of two variables should be dropped was somewhat arbitrary but followed the general rule of retaining the variable which would be easiest to interpret. The selection process reduced the number of variables to 93 and are the first 93 variables of Appendix A. The variables deleted are those from 94 to 110 of Appendix A.

An alternative selection process for reducing the number of variables would be eliminating those characteristics which one assumed to be of limited value. The process actually completed however was preferred since it eliminated only redundant information. The information eliminated is considered redundant because both variables from a given high correlation would be loaded onto the same

factor (conceptual variable.) If it had not been necessary to reduce the number of variables, the redundancy would not be of special interest.

Factor analysis and rotation reduced the original 93 variables to 16 "conceptual variables" (factors) accounting for 78 per cent of the total variance.[1] By reducing the original variables to "conceptual variables", the number of "variables" is reduced by more than 80 per cent. And yet, 78 per cent of the variance explained by the original variables is retained. Conceptual variables and individual variables are shown in Table 4. The first conceptual variable (CV) will be called General Socio-Economic Structure 1 for two reasons. First, 20 of the original 93 variables were associated with this CV. Secondly, those associated variables included characteristics such as income (agricultural and general), education and age composition, population distribution, fertility-birth rates, employment,

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[1]The assumptions and constraints made in determining the final conceptual variable solution were identical to those made for regionalization except for item 3 (See footnote 2 page 35.) The third item is modified here by assuming that a variable enters into the naming process only if it had a factor loading equal to or greater than $\pm$ .50. (i.e. at least 25 per cent of the variable's variance was assignable to a given conceptual variable.) It should be emphasized that selection of critical factor loadings affects the visual representation of the factor pattern and the "naming" process only since all factor loadings (weights) are taken into consideration in determining factor scores. Factor scores are the primary objective of the analysis as they will be the inputs into the final analysis.

Table 4. The socio-economic conceptual variables and associated factor loadings.

	Conceptual Variables[b]																
Item[a]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	h^{2c}
2[d]	.63		-.56														.95
9	.73																.67
11	.85																.94
14	.67																.83
18	.53																.91
22	.54																.79
24[d]	.55		-.70														.89
27	.64																.76
35	.81																.86
38	.54																.81
80	.82																.78
87	.81																.87
4	-.73																.77
6[e]	-.55								.54								.77
21	-.50																.77
33	-.86																.85
34	-.95																.94
39	-.56																.74
88	-.69																.85
93	-.82																.84
29		.75															.92
30		.87															.90
67		.71															.85
69		.66															.61
81		.89															.96
83		.88															.87

63	-.60								.92
64[f]	-.71	.59							.87
65	-.63								.95
72	-.75								.88
79	-.58								.89
92	-.58								.88
53		.56							.68
73		.74							.76
3		-.54							.72
13[g]		-.58	-.51						.85
46		-.77							.80
89		-.53							.77
31			-.76						.84
50			-.76						.82
52			-.83						.80
84[h]			-.50					-.62	.87
1				.70					.72
8				.72					.82
10				.57					.81
42				-.52					.74
15					.62				.72
28					.70				.77
90					.64				.69
58					-.53				.66
36						-.54			.50
57						-.71			.61
66						-.86			.87
19							.89		.90
20							.86		.93
16								.58	.86
86								.75	.83
85								-.66	.70

Table 4. Continued.

Item[a]	Conceptual Variables[b] 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	h^2[c]
68										.90							.92
82										.89							.93
12											.59						.73
23											.61						.78
7											-.72						.80
40												-.85					.86
41												-.89					.86
61													.58				.59
62													.71				.58
78														.73			.85
91														.68			.85
71															.59		.55
77															-.60		.71
70																-.61	.76
74																-.70	.67
Prop. Var.[i]	.15	.11	.06	.07	.04	.03	.04	.04	.04	.03	.03	.03	.02	.03	.02	.03	
Cum. Prop. Var.[j]	.15	.26	.32	.39	.43	.46	.50	.54	.58	.61	.65	.68	.70	.73	.75	.78	

[a]The item numbers identify the individual variables as listed in Appendix 1.

[b]The names of the conceptual variables are as follows: (1) General Socio-Economic Structure 1. (2) Agricultural Business Composition 1. (3) Absence of Growth. (4) Agricultural Business Composition II. (5) Agglomeration. (6) Economic Well-Being.

(7) Recent Agricultural Adjustments. (8) Non-agricultural Employment Opportunities. (9) Population Characteristics. (10) Dairy. (11) General Socio-Economic Structure II. (12) Unemployment. (13) Recent Business Activity. (14) Rural Non-Farm Population. (15) Agricultural Business Composition III. (16) Agricultural Business Composition IV.

[c]The final communality estimate represents the percentage of the variance of a variable explained by the 16 conceptual variables.

[d]Variable associated with Conceptual Variable 1 and Conceptual Variable 3.

[e]Variable associated with Conceptual Variable 1 and Conceptual Variable 9.

[f]Variable associated with Conceptual Variable 2 and Conceptual Variable 4.

[g]Variable associated with Conceptual Variable 3 and Conceptual Variable 5.

[h]Variable associated with Conceptual Variable 4 and Conceptual Variable 16.

[i]The percentage of the variance of the total matrix explained by a particular Conceptual Variable.

[j]The cummulative percentage of the variance of the total matrix explained by successive Conceptual Variables. The total does not necessarily equal the sum of its parts at each stage due to round off error.

etc. It would be possible to name this conceptual variable INCOME since most of those characteristics not directly associated with income tend to be related to income. For example, percentage of the population employed, migration, and percentage of the population aged 25 or over with 4 years of high school or more would all be expected to be directly related to income levels. Fertility and birth rates, per cent of the population aged 60 or over and percentage of the population classified as rural non-farm would be expected to be inversely related to income levels. These expected relationships were found in their association with the CV. Although it would be legitimate to call CV 1 Income, the General Socio-Economic Structure title is retained to indicate the more general nature of the factor.

The second CV will be called Agricultural Business Composition 1 because 10 of the 12 "important" characteristics deal directly with agricultural enterprise composition or change in number of farms. The remaining two variables are measures of rural farm population. The third CV will be considered a measure of Absence of Growth since measures of migration, change in buying income, change in dwellings and change in families with less than $3,000 income overpower the two cropland variables. If the signs of the individual characteristics were changed, the CV could be called Growth.

Conceptual variable four is called Agricultural Business Composition II since its component parts are quite similar to those found in CV 2. The fifth CV is primarily affected by total population, level of wholesale sales and bank deposits per capita, per cent of the population employed, and per cent of the 1960 population who lived in a different county five years earlier. As these relationships would be expected to be associated with urbanization this variable will be called Agglomeration.

Conceptual variable 6 is called Economic Well-Being since it is primarily affected by per cent of residential dwellings that are dilapidated, percentage change in families with more than $10,000 family income and is inversely related to non-farm business income per farm. The negative relationship found for non-farm business income could indicate that farmers earn enough income from the farm and therefore do not pursue off-farm employment. On the other hand, this variable could be interpreted as indicating that there are few off-farm employment opportunities available. If the latter alternative was found to be the actual case, it would indicate that instead of measuring well-being, the CV is actually a measure of ill-health. The variable for crop value as a per cent of farm product sold does not directly enter into the process of selecting a name.

The seventh conceptual variable is a measure of Recent Agricultural Adjustments since two of its major

components are related to change in farm products sold between 1959-64. Change in wholesale sales per capita between 1948-58 is also highly associated with CV 7 but its presence is not indicated by the name. CV 8 is made up of the per cent of farm operators working off of the farm 100 or more days and the per cent of farm operators with income from agriculture being less than other income earned by the family. Non-agricultural Employment Opportunities is therefore the title of CV 8.

Conceptual variable 9 is called Population Characteristics with the relative change in educational attainment level, percentage of labor force that is male, and fertility rates being the major components of the variable. Major components of CV 10 are measures of dairy enterprises so this CV will be called Dairy. The eleventh CV is called General Socio-Economic Structure II because characteristics entering into CV 11 are similar to those in CV 1.

Conceptual variable 12 will be called Unemployment since percentage change in total unemployment and change in per cent unemployed were the only variables that were associated with CV 12. CV 13 measures Recent Business Activity with its highest associations being with percentage change in wholesale sales per capita and value added by manufacturing per capita between 1958-64. CV 14 consists of two measures of the rural non-farm population and is therefore called Rural Non-farm Population.

CV 15 and CV 16 will be called Agricultural Business Composition III and Agricultural Business Composition IV, respectively, because of the similarity of their component parts with CV 2 and CV 4.

Naming these 16 conceptual variables is a subjective process. Others could examine the component parts of these variables and decide that perhaps another name would be better and be justified in that belief. It should be noted however, that variables associated with the conceptual variables but at a value lower than that selected for tabular representation were examined to assist in assignment of a name. The purpose of naming conceptual variables is only to provide a means of identification and to provide a feel for the types of variables that go into the CV. Factor scores computed for each CV are developed from all 93 socio-economic variables and not just those selected for assisting in determination of the name.

In summary, the original 93 socio-economic variables analyzed were reduced by over 80 per cent to 16 conceptual variables. These conceptual variables retained 78 per cent of the original information found in the total matrix. Conceptual variables 2, 4, 7, 10, 15 and 16 were related to agricultural activities. The remaining 10 conceptual variables were related to different aspects of socio-economic structure. Conceptual variables found in this analysis and

factor scores generated for each provide one of the basic inputs into the analysis of relationships between socio-economic structure and governmental revenue-expenditure structure.

CHAPTER IV

GOVERNMENTAL REVENUE-EXPENDITURE STRUCTURE

As indicated previously, the primary objective of this study was to determine the relationships between public community facilities and socio-economic measures of local economic development. The first step towards the satisfaction of that objective was completed in Chapter III with the development of socio-economic regions and socio-economic conceptual variables. In this chapter, governmental regions will be developed to examine the homogeneity--heterogeneity of governmental revenue and expenditure patterns between and among geographic areas. Conceptual governmental variables will be developed to examine the homogeneity--heterogeneity between and among the selected revenue and expenditure characteristics and to provide integrated "variables" for final analysis.

The Regionalization

The mutual interdependence of the governmental revenue-expenditure characteristics may vary by geographic areas. That is, different geographical areas may have different interrelationships for similar characteristics.

Therefore, Michigan's counties were divided into different regions on the basis of selected governmental characteristics.

To develop governmental regions, 90 governmental revenue-expenditure characteristics were selected for analysis.[1] These characteristics can be classified into three basic types: (1) level of activity such as specific per capita revenue or per capita expenditure for a base year, (2) mix of activity such as per capita expenditure for a specific function relative to total per capita expenditures, and (3) change in level of activity as measured by relative changes in per capita revenues or expenditures over time. Therefore, level of, mix of, and change in activity are analyzed simultaneously.

Governmental characteristics used in this study were stated as percentages or on a per capita basis. To obtain relevant population estimates for the governmental data, 1962 and 1967 populations were estimated by a straight line

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[1]The variables are explicitly identified in Appendix C. The data were collected by the U.S. Bureau of the Census during the 1962 and 1967 Censuses of Governments. The data identified in Appendix C are sometimes more detailed than those available in U.S. Bureau of the Census, Census of Governments, (Washington, D.C.: U.S. Government Printing Office, various volumes.) This is because original data tapes were used instead of available published reports. Data used for this study can be aggregated into classes similar to those published in the Census of Governments.

extrapolation from the 1960 and 1970 population censuses. Therefore, the per capita values are based on estimated populations for 1962 and 1967.

Capital expenditures are not included in this analysis with the exception of "total capital expenditures per capita" and "relative change in total capital expenditures per capita." Capital expenditures data were available by specific function but were not used since capital expenditures tend to be lumpy. The use of total capital expenditures should reduce the unevenness. Individual expenditure items used in this study are therefore direct, current expenditures since capital expenditures are excluded.

Governmental revenue-expenditure regions were formulated on the same basis as the socio-economic regions. That is, governmental characteristics were normalized and transposed so that counties were correlated in pairs with the correlations being over performances.[1] The resulting linkages from the factor analysis gave the areal configuration.

Two types of governmental regionalizations were accomplished. The first was for county area government which is synonymous with the "county area" classification reported in the Census of Governments. County area

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[1]See Chapter II, pp. 30-32 for the details.

government is the simple summation of all revenues and direct expenditures of all local governments (county, municipalities, townships, school districts, and special districts) located within a county. The second type of regionalization was for county government and was based on its revenues and direct general expenditures.

County Area Government

Factor analysis of 90 county area governmental characteristics identified 17 "regions" for Michigan. The number of counties contained within the non-contiguous regions varied from 2 to 17.[1] Bi-polar factors were found for 11 regions with each pole possibly representing a unique sub-region. The complete set of counties within any given region were affected by identical characteristics and were therefore classified together; but the poles were affected by those characteristics in directly opposite ways.

County area governmental region 1 contained 17 counties and was bi-polar.[2] One pole (sub-region) contained 11 counties and the other contained 6 counties (Table 5.) Although 90 variables were considered for the region, only

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[1]Assumptions and constraints made in determining the final regionalized solution were identical to those made in establishing the socio-economic regions. See footnote 2, p. 35.

[2]Counties included in a region are listed numerically in Table 5. The numerals correspond to the county numbers of Figure 1, p. 38.

Table 5. County area governmental regions formed from factor analysis.

Region[a]	Counties Included[b]	Region[a]	Counties Included[b]
1a	15, 43, 51, 52, 56, 59, 60, 63, 67, 75, 83	1b	3, 6, 26, 30, 71, 82
2a	2, 7	2b	66
3a	9, 12, 13, 19, 22	3b	44, 54, 61, 63, 81
4a	27, 37	4b	53, 76
5	50, 68		
6	1, 11, 19, 20, 29		
7a	30, 36, 80	7b	25, 28, 48
8	23, 54, 60, 65		
9a	4, 17	9b	46
10	16, 72		
11	10, 12, 28, 29, 40, 55		
12a	3	12b	43, 45
13a	49, 73, 77, 79	13b	64
14a	39	14b	35
15a	5, 15	15b	57, 62
16	6, 31, 33, 34, 38, 41		
17a	7, 18, 24, 38	17b	69, 70, 74, 78
NA[c]	8, 14, 21, 32, 42, 47, 58		

[a]The numeral corresponds with the factor number from the analysis. The letter classification is followed for bi-polar factors.

[b]County numbers are keyed to the numerals associated with the counties on Figure 1.

[c]Counties not allocated to any region by the factor analysis.

6 were of primary importance.[1] These were: percentage of total expenditures spent for welfare, general control, and general public buildings; per capita expenditures for education and general control; and relative change in per capita educational expenditures.[2] The educational characteristics operated inversely to the other "important" characteristics. Counties of Region 1a were inversely related to educational characteristics and directly related to the remaining important characteristics. For Region 1b, the opposite would be the case.[3]

County area governmental regions formed from factor analysis are "unique" so far as their relationships with "important" variables are concerned. To examine the uniqueness of the regions for more general characteristics, means

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[1]To be considered "important" for this discussion, the factor score for the variable was more than two standard deviations from the mean factor score. For more detail on this particular point, see footnote 2, P. 36.

[2]General control expenditures are for governing bodies, courts, chief executive office, central staff services and agencies concerned with personnel administration, law, planning and zoning, etc. General public buildings expenditures are for the maintenance of public buildings not allocated to particular functions.

[3]The counties within each region--sub-region are listed in Table 5. Although individual characteristics affecting each of the 17 major regions could be reported in depth here, they are itemized instead in Appendix D. Appendix D contains more detail than contained in the discussion since the "critical" factor score value is reduced from 2 to 1.5. Individual items going into each region are not of primary importance for the purposes of this study but are presented in the Appendix for those interested in the key relationships.

and standard deviations of eight governmental variables were computed. All variables selected were included in the factor analysis, and all were included as an "important" variable for at least one region.

It was shown in Chapter III that poles of a given factor are basically unique sub-regions and should therefore be considered separately. This was also found to be the case for governmental regions. Therefore, only unique sub-regions and single pole regions are presented (Table 6.) Differences in means between sub-regions (poles) of a basic region were found to be substantial. For example, charges and miscellaneous revenues were $20 for sub-region 1a and $66 for sub-region 1b. Similar differences occurred for education, hospital, total expenditures, and salaries and wages paid. Capital expenditures for the two sub-regions were identical. The differences noted for these sub-regions also generally occurred for sub-regions of the remaining bi-polar regions although not necessarily for identical characteristics. Absence of differences between sub-regions, such as 7a and 7b, does not alter the general conclusion of uniqueness of sub-regions. The reason is that the characteristics selected represent a small proportion of the total characteristics considered in the regionalization analysis. Therefore, it should not be expected that differences would be found for one selected characteristic for every sub-region.

Table 6. Means and standard deviations of selected per capita area governmental characteristics: single and bi-polar county area government regions.

Region[a]	No. of Counties	Prop. Tax[b]	Charges[c]	Tot. Gen'l Rev.[d]	Ed.[e]	Hosp.[f]	Tot. Exp.[g]	Salaries[h]	Capital[i]
	no.	dol.	dol.	dol.	dol.	dol.	dol.	dol.	dol.
1a	11	82.33 (14.19)[j]	19.87 (9.60)	253.73 (29.65)	94.76 (21.88)	2.92 (6.83)	188.63 (27.88)	121.97 (17.76)	52.15 (24.36)
1b	6	106.40 (22.92)	65.84 (22.90)	312.65 (33.70)	141.12 (12.76)	39.12 (24.32)	251.76 (25.40)	175.13 (20.62)	52.13 (12.08)
2a	2	80.31 (11.91)	19.15 (5.64)	214.49 (4.02)	112.03 (12.37)	4.57 (5.87)	173.57 (11.48)	125.80 (10.53)	51.38 (3.81)
2b	1	97.21	29.77	275.71	126.40	0.45	221.27	142.76	61.06
3a	5	136.33 (15.34)	47.82 (11.38)	301.25 (48.93)	131.73 (17.46)	9.95 (9.29)	224.29 (35.43)	175.22 (36.88)	64.78 (9.72)
3b	5	90.27 (17.45)	30.46 (12.34)	306.35 (20.45)	135.96 (8.62)	8.68 (12.63)	228.79 (13.65)	150.04 (11.70)	58.23 (25.77)
4a	2	62.08 (1.88)	81.74 (32.72)	255.32 (36.62)	95.63 (2.03)	54.69 (37.60)	211.51 (34.87)	130.24 (30.21)	35.57 (15.94)
4b	2	107.47 (43.56)	22.30 (0.73)	301.03 (39.58)	167.54 (2.11)	0.14 (0.20)	237.26 (25.18)	159.29 (7.03)	69.69 (45.29)

5	2	87.53 (2.97)	18.67 (6.61)	296.06 (46.92)	139.89 (42.55)	0 0	232.43 (42.42)	154.31 (32.26)	28.72 (6.58)
6	5	121.58 (14.11)	43.26 (5.53)	294.18 (15.64)	143.80 (8.66)	7.09 (4.05)	228.25 (17.17)	166.25 (12.21)	64.86 (22.08)
7a	3	95.23 (4.69)	25.24 (5.24)	288.30 (16.42)	137.15 (16.40)	3.52 (6.10)	218.27 (8.53)	147.18 (4.32)	37.26 (10.89)
7b	3	102.32 (15.75)	26.73 (12.38)	264.91 (13.63)	117.93 (13.81)	13.70 (5.06)	205.73 (5.52)	145.32 (9.24)	55.86 (14.76)
8	4	93.43 (18.40)	25.24 (14.62)	266.02 (43.23)	117.89 (16.71)	12.59 (6.48)	199.11 (33.15)	139.06 (26.27)	43.17 (10.06)
9a	2	123.52 (36.43)	74.43 (4.43)	326.40 (35.95)	135.04 (17.78)	34.54 (25.32)	248.79 (9.03)	185.69 (33.24)	72.19 (29.24)
9b	1	84.05	14.65	237.63	113.71	1.75	189.41	128.60	30.68
10	2	81.53 (7.78)	27.99 (11.71)	254.36 (11.95)	121.17 (6.07)	18.49 (7.77)	202.02 (10.54)	139.80 (15.24)	71.90 (3.21)
11	6	115.97 (16.79)	42.46 (6.65)	279.04 (16.83)	121.86 (12.79)	9.06 (5.55)	216.58 (16.14)	159.19 (8.59)	60.37 (12.39)
12a	1	100.65	72.90	307.64	141.78	45.40	248.64	173.78	56.88
12b	2	80.19 (21.53)	18.03 (2.86)	257.84 (15.61)	99.31 (38.17)	0.51 (0.73)	193.60 (10.44)	125.69 (8.50)	53.58 (29.11)
13a	4	80.20 (16.73)	27.38 (6.43)	250.03 (20.50)	111.50 (15.93)	5.13 (5.87)	205.76 (11.76)	137.16 (23.73)	38.00 (13.53)

Table 6. Continued.

Region[a]	No. of Counties	Prop. Tax[b]	Charges[c]	Tot. Gen'l Rev.[d]	Ed.[e]	Hosp.[f]	Tot. Exp.[g]	Salaries[h]	Capital[i]
	no.	dol.	dol.	dol.	dol.	dol.	dol.	dol.	dol.
13b	1	162.20	107.24	390.81	134.90	74.40	291.91	198.47	148.92
14a	1	179.23	36.75	324.13	158.84	0	236.48	188.31	102.19
14b	1	66.36	18.11	260.49	101.60	11.17	172.30	106.47	59.37
15a	2	71.55 (4.36)	36.84 (22.82)	234.92 (39.08)	104.19 (19.74)	16.39 (21.19)	185.05 (41.44)	122.58 (43.67)	30.18 (13.31)
15b	2	79.48 (12.67)	20.37 (5.50)	258.73 (14.41)	109.92 (2.20)	0 0	199.89 (3.66)	139.04 (6.78)	42.48 (11.28)
16	6	91.30 (12.08)	31.05 (9.40)	252.54 (25.37)	127.99 (20.62)	8.02 (9.65)	197.65 (26.11)	133.30 (17.54)	41.72 (9.77)
17a	4	76.37 (8.32)	21.75 (5.62)	204.42 (9.37)	105.06 (14.12)	3.22 (6.16)	160.97 (15.62)	113.41 (13.68)	57.92 (5.35)
17b	4	108.20 (33.40)	69.75 (31.69)	365.16 (21.46)	131.36 (14.87)	64.64 (10.46)	305.26 (25.01)	199.01 (10.47)	37.81 (17.97)

[a]The counties contained within each region are identified in Table 5.

[b]Property taxes per capita, 1967.

[c]Charges and miscellaneous revenue, 1967.

[d]Total general revenue per capita, 1967.

[e]Educational expenditures per capita, 1967.

[f]Hospital expenditures per capita, 1967.

[g]Total direct expenditures per capita, 1967.

[h]Salaries and wages paid per capita, 1967.

[i]Capital expenditures per capita, 1967.

[j]Standard deviations are in parentheses ( ).

In summary, 28 county area governmental regions were developed given the assumptions stated at the beginning of this section. These regions were the result of 11 bi-polar regions (factors) and six single pole regions (factors.) It is necessary to consider each pole of a bi-polar region as two separate regions as indicated by means and standard deviations computed for selected governmental variables.

County Government

Regionalization analysis of aggregated county area governments utilized 90 governmental revenue-expenditure characteristics. The analysis for county governments used 82 characteristics since none of the county governments had any activity for eight characteristics.[1] Factor analysis created 18 county governmental regions for Michigan. The humber of counties contained within each region varied from nine to one.[2] All but six regions were found to be bi-polar

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[1]The characteristics, and their respective numbers as identified in Appendix C, are: sales taxes and income taxes per capita (3 and 4), measures of per capita expenditures on higher education (27, 45, and 65), and measures of per capita expenditures on housing and urban renewal (34, 52, and 72).

[2]The assumptions and constraints made in determining the final regionalized solution were identical to those made in establishing the socio-economic and county area governmental regions. See footnote 2, p. 35.

with each pole possibly representing a unique sub-region. The complete set of counties within a given region were affected by the same characteristics and were therefore classified together; but poles were affected by those characteristics in directly opposite ways.

County governmental region one was bi-polar and contained 9 counties.[1] As indicated in Table 7, one pole (sub-region) contained seven counties and the other contained two counties. Only nine characteristics were of primary importance.[2] These were: per capita charges and miscellaneous revenues, total own revenue per capita, and total general revenue per capita; current hospital expenditures as a percentage of total current expenditures; current hospital expenditures and salaries and wages paid per capita; property taxes as a percentage of total own revenue, relative change in current total expenditures per capita, and current public building expenditures as a percentage of total current expenditures.[3] The last three characteristics

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[1]The counties included in a region are listed numerically in Table 7. The numerals correspond to the county numbers of Figure 1, p. 38.

[2]To be considered "important" for this discussion, the factor score for the variable was more than two standard deviations from the mean factor score. For more detail on this particular point, see footnote 2, p. 36.

[3]"Charges and miscellaneous revenues" include all current charges, special assessments, and all other general revenue except taxes and intergovernmental revenue. "Total own revenue" includes all of total own revenue plus intergovernmental revenue. Public building expenditures are for the maintenance of public buildings not allocated to particular functions.

Table 7. County governmental regions formed from factor analysis.

Region[a]	Counties Included[b]	Region[a]	Counties Included[b]
1a	4, 27, 69, 71, 74, 78, 82	1b	39, 64
2a	8, 72	2b	60, 75, 76
3a	1, 21	3b	7, 45, 47, 53, 59, 62, 63
4a	43, 58, 83	4b	13, 19, 20, 24
5a	61	5b	46,48, 50, 65
6	6, 21, 31, 33, 34, 41, 66		
7	67, 80		
8a	2, 3, 7, 16, 17, 18 32	8b	44
9a	62	9b	5, 15, 30
10a	28, 29	10b	36, 49, 52
11a	35,56	11b	8, 68
12	10, 26		
13a	9, 11, 22, 26	13b	43
14a	51, 58	14b	16, 54, 81
15a	13, 29, 66, 75, 77, 79	15b	59
16	22, 42, 55		
17	23		
18	25, 37		
NA[c]	12, 14, 38, 40, 57, 70, 73		

[a]The numeral corresponds with the factor number from the analysis. The letter classification is followed for bi-polar factors.

[b]County numbers are keyed to the numerals associated with the counties of Figure 1, p. 38.

[c]Counties not allocated to any region by the factor analysis.

operated inversely to the other important variables. Therefore, for Region 1a, the counties were affected directly by the first six governmental characteristics and inversely by the last three characteristics. For counties in Region 1b, the opposite would be the case.[1]

County governmental regions formed from factor analysis (as with socio-economic and county area regions) are "unique" so far as their relationships with "important" variables are concerned. Means and standard deviations of seven county governmental variables were computed to illustrate uniqueness of sub-regions.[2] All variables selected were included in the factor analysis and all were included as an "important" variable for at least one region.

It was previously shown that differences in mean values for selected characteristics of basic regions, while generally different for each region, are not particularly

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[1]The counties within each region--sub-region are listed in Table 7. The individual characteristics affecting each of the 18 major regions could be reported in depth here but are itemized instead in Appendix E. Appendix E contains more detail than contained in the discussion since the "critical" factor score value is reduced from 2 to 1.5. The individual items going into each region are not of primary importance for the purposes of this study but are presented in the Appendix for those interested in the key relationships.

[2]The characteristics are identical to those examined for county area regions except that education is not included. Educational expenditures were deleted since education is not generally an important expenditure item for county governments and relatively few county governments have any direct educational expenditures.

significant when standard deviations were considered. This was also true for county governmental regions. Therefore, only means and standard deviations of unique regions are presented (Table 8.)

The means and standard deviations of the selected county governmental characteristics for sub-regions had patterns paralleling those of socio-economic and county area government sub-regions. That is, in general, sub-regions had distinct means and relatively small standard deviations. In sub-regions 1a and 1b for example, the means were very distinct and standard deviations quite small for all variables except per capita property tax revenues and capital expenditures. Absence of differences for respective sub-regions would not necessarily indicate lack of uniqueness since the selected variables represent a small percentage of the total variables considered for the regionalization.

The regionalization process developed 30 county government regions given the assumptions stated at the beginning of this section. These regions were the result of 12 bi-polar factors (regions) and six single pole factors (regions.) It was previously indicated that it is necessary to consider each pole of a bi-polar region as two separate entities. This is supported by the values determined for sub-regions of county governments.

Table 8. Means and standard deviations of selected per capita county governmental characteristics: single and bi-polar county government regions.

Region[a]	No. of Counties	Prop. Tax[b]	Charges[c]	Tot. Gen'l Rev.[d]	Hosp.[e]	Tot. Exp.[f]	Salaries[g]	Capital[h]
	No.	dol.	dol.	dol.	dol.	dol.	dol.	dol.
1a	7	21.95 (6.50)[i]	55.10 (17.49)	131.54 (35.54)	57.95 (11.54)	101.37 (20.89)	53.83 (13.76)	19.19 (16.18)
1b	2	24.46 (5.84)	1.68 (0.02)	53.75 (2.25)	0 0	35.75 (1.31)	16.36 (4.31)	13.73 (0.55)
2a	2	15.57 (1.14)	6.04 (0.56)	59.56 (22.60)	11.99 (16.96)	51.62 (17.69)	27.54 (20.80)	12.68 (5.17)
2b	3	36.42 (10.39)	5.52 (3.26)	102.08 (19.27)	1.17 (2.03)	65.15 (20.61)	29.66 (6.96)	21.79 (12.54)
3a	2	15.52 (3.29)	7.97 (7.15)	48.02 (11.79)	4.61 (6.52)	42.39 (15.68)	15.68 (4.40)	7.66 (2.43)
3b	7	18.31 (4.12)	3.19 (1.43)	76.93 (22.06)	0.21 (0.40)	48.66 (13.42)	25.34 (10.90)	26.96 (9.50)
4a	3	29.80 (11.35)	5.92 (1.86)	147.99 (30.74)	0.23 (0.39)	111.05 (12.97)	58.02 (30.54)	38.21 (36.43)
4b	4	17.04 (5.50)	6.19 (3.86)	47.68 (11.33)	3.17 (3.56)	27.59 (6.43)	14.98 (3.98)	16.00 (5.02)

5a	1	22.99	29.34	98.86	27.71	78.74	37.69	18.41
5b	4	20.78 (3.85)	4.22 (2.78)	91.00 (15.16)	8.46 (9.21)	64.96 (10.02)	39.57 (8.38)	21.94 (2.99)
6	7	17.93 (2.60)	4.60 (1.23)	59.75 (15.13)	2.05 (2.50)	39.90 (7.42)	17.22 (3.16)	17.05 (11.98)
7	2	24.93 (0.72)	4.62 (1.74)	93.81 (16.11)	0 0	61.80 (8.01)	24.35 (8.77)	20.55 (3.70)
8a	7	16.82 (1.75)	7.52 (5.99)	49.94 (4.66)	7.69 (6.01)	35.18 (4.84)	16.64 (3.92)	10.57 (3.99)
8b	1	21.10	6.57	74.07	0	56.86	39.46	4.38
9a	1	19.50	1.64	85.68	0	61.09	36.62	29.44
9b	3	17.35 (1.37)	5.22 (2.06)	63.84 (5.75)	0.47 (0.81)	40.99 (2.49)	15.10 (7.90)	17.42 (3.31)
10a	2	22.74 (2.07)	4.52 (1.85)	55.36 (0.52)	6.37 (2.50)	39.93 (2.67)	15.28 (4.69)	8.61 (2.96)
10b	3	18.00 (1.88)	3.46 (1.09)	83.27 (8.66)	3.56 (6.07)	54.33 (2.15)	28.59 (3.34)	18.92 (1.63)
11a	2	19.52 (2.68)	2.25 (1.29)	96.02 (26.52)	7.29 (5.50)	63.66 (24.83)	31.02 (19.70)	27.66 (3.43)
11b	2	16.65 (2.67)	3.70 (2.76)	71.09 (24.76)	0 0	50.92 (16.71)	22.47 (13.63)	18.08 (12.81)

Table 8. Continued.

Region[a]	No. of Counties	Prop. Tax[b]	Charges[c]	Tot. Gen'l Rev.[d]	Hosp.[e]	Tot. Exp.[f]	Salaries[g]	Capital[h]
	no.	dol.	dol.	dol.	dol.	dol.	dol.	dol.
12	2	19.68 (5.42)	5.33 (1.92)	50.51 (0.34)	8.32 (0.19)	37.52 (4.12)	16.79 (1.33)	7.98 (2.04)
13a	4	20.87 (2.46)	6.01 (1.99)	49.31 (6.51)	5.40 (2.51)	34.49 (1.41)	16.99 (1.99)	10.14 (5.34)
13b	1	27.44	5.14	132.66	0	96.14	53.06	72.54
14a	2	24.58 (6.74)	6.50 (2.71)	113.58 (20.29)	0 0	99.52 (28.60)	46.54 (23.03)	4.50 (6.37)
14b	3	22.52 (4.39)	7.20 (7.18)	113.60 (49.50)	9.39 (8.28)	66.48 (21.51)	34.57 (13.57)	56.79 (39.77)
15a	6	23.08 (5.39)	8.03 (3.74)	76.03 (20.29)	6.17 (4.77)	54.96 (18.45)	21.12 (7.02)	14.57 (12.35)
15b	1	11.60	5.99	85.80	0	56.61	38.07	27.89
16	3	20.09 (1.92)	4.00 (3.18)	62.45 (5.32)	6.72 (6.58)	38.09 (6.16)	17.74 (0.30)	20.98 (6.72)
17	1	13.03	3.99	47.91	0	38.37	16.90	3.83
18	2	17.92 (1.29)	3.07 (0.18)	56.86 (3.25)	5.32 (7.52)	40.71 (0.37)	21.61 (1.46)	16.16 (9.45)

[a]The counties contained within each region are identified in Table 7.

[b]Property taxes per capita, 1967.

[c]Charges and miscellaneous revenue, 1967.

[d]Total general revenue per capita, 1967.

[e]Hospital expenditures per capita, 1967.

[f]Total direct expenditures per capita, 1967.

[g]Salaries and wages paid per capita, 1967.

[h]Capital expenditures per capita, 1967.

[i]Standard deviations are in parentheses ( ).

Governmental Regions Compared

The regionalization process of county area governments and county governments was conducted independently. Although the same types of data were used for each, levels of expenditures and revenues were different since county area data are totals including county government data as well as all other local governmental units within the county. If county government revenue-expenditure structure is an accurate reflection of the structure of total (county area) revenues-expenditures, the regions developed would be similar.

It has been shown that poles of bi-polar regions are unique sub-regions and must therefore be treated as separate entities. Therefore, any regional comparisons must use polar sub-regions in conjunction with single pole basic regions. In addition, to compare regions, it is not necessary for counties in county government Region 1a to be represented in county area government Region 1a since the regional numbering system is arbitrary. What is important is that groups or clusters of counties "stick" together and therefore move to a "new" region more or less intact. Or, if the cluster does not "stick" together, splinter counties should predominate in new regions.

Examination of the regional patterns found in Table 5 and Table 8 indicates that, in general, there are no consistencies between county area governmental and county governmental regions. For example, counties in county area

Region 1a are contained in 10 different county governmental regions. Only three of those regions were "dominated" by the splintered counties.[1] That is, county government regions 2b and 4a each had two counties from county area government Region 1b. Only three counties were in county government Regions 2b and 4a.

In general, regional patterns are scattered between the two types of governmental regions. And it makes relatively little difference whether one attempts to follow the governmental pattern for county areas or for county government. The types of county transfers discussed above are considered to be relatively marginal. Although it is somewhat assuring to know that some of the splits are going together to dominate a different region, there are relatively few of these. In only one case does a major group of counties show any cohesiveness. Counties 6, 31, 33, 34, and 41 of county area Region 16 all transfer to county government Region 6.[2] Only county 38 of Region 16 does not make the transfer, and it is "not allocated" among county government

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[1]Domination of a region by transferred counties was determined to exist only if more than half of the counties within the region came from the original region. At the same time, a region was considered to transfer in a "cluster" so long as more than one-half of the counties transferred together.

[2]The counties discussed here and their identification numbers are: 6) Lenawee, 21) Ottawa, 31) Gratiot, 33) Tuscola, 34) Sanilac, 38) Isabella, 41) Huron, and 66) Emmet.

regions. Only two counties in county government Region 6 did not exist in Region 16. These are county 21 which was "not allocated" among county area government regions and county 66 which was the only county in county area Region 2b. Therefore, with few exceptions, the regions developed from revenue-expenditure patterns of county area governments and county governments are basically different.

Summary

In summary, 28 county area governmental regions and 30 county government regions were developed from revenue-expenditure patterns by factor analysis. It has been shown that for all practical purposes the regionalizations of the two types of governmental regions are basically different. The primary objective of the regionalization analysis was to develop governmental regions that would be used for comparisons with the socio-economic regions developed in Chapter III. If similar regional patterns are found for either of the governmental regional patterns and the socio-economic regions, the assumption is that socio-economic structure is related to governmental revenue-expenditure patterns. If regionalization patterns are found to be different, the reverse assumption would be that socio-economic structure is not related to governmental revenue-expenditure patterns. Governmental and socio-economic regional comparisons will be made in Chapter V.

The Conceptual Variables

Mutual interdependence of local governmental revenue and expenditure data and resulting regionalizations were discussed above. The primary objective of this section is to develop mutual interdependence of revenue-expenditure variables for both county government and all local governmental units (area governments) within a county into a smaller set of conceptual variables. The R-technique of factor analysis was used to develop the conceptual variables.[1]

County Area Government

As indicated previously, revenue and expenditure items for area governments is the summation of items for all local governmental units located within a county. And as was true for the regionalization process, the 90 variables identified in Appendix C were used.

Factor analysis and varimax rotation reduced the 90 variables to 17 "conceptual variables" accounting for 77 per cent of the total variance.[2] By reducing the original variables to "conceptual variables", the number of variables

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[1]See pages 29-32 for a description of this technique.

[2]Assumptions and constraints made in determining the final conceptual variable solution were the same as those made for the socio-economic conceptual variables. (See footnote 1, p. 48.)

are reduced by more than 80 per cent. At the same time, 77 per cent of the variance explained by the original variables is retained. Area government conceptual variables and the individual variables contained within each are shown in Table 9.

The naming process for the first 6 conceptual variables (CV) is somewhat more difficult than was true for the socio-economic conceptual variables. The reason is that the predominant variables are a mixture of items. For example, CV 1 primarily measures distribution of and level of police, fire, sanitation, higher education, and parks and recreation expenditures. Conceptual variable 2 measures distribution of and level of highways, financial administration, and general public buildings expenditures with the distribution of education expenditures operating inversely to the other variables in CV2. Therefore, both CV 1 and CV 2, can be given the general name of Selected Governmental Expenditures with a numeral 1 or 2 to designate the respective CV.

Conceptual variable 3 has six of nine important variables dealing with change in different aspects of revenue. The remaining three variables represent change in level of educational expenditures, level of total expenditures, and level of salaries and wages paid. CV 3 will therefore be called Revenue-Expenditure Change. The idea behind establishing conceptual variables is that it pulls similar variables together. With that in mind, it is interesting

Table 9. County area government conceptual variables and associated factor loadings.

	Conceptual Variables[b]																	
Item[a]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	h^{2c}
21	.74																	.84
22	.80																	.85
25	.71																	.69
27	.65																	.85
31	.68																	.82
39	.70																	.88
40	.76																	.89
43	.67																	.75
45	.66																	.85
49	.66																	.85
56	.70																	.71
76	.68																	.74
20		-.55																.87
23		.61																.89
32		.76																.79
35		.75																.80
41		.69																.90
50		.82																.82
51		.61																.84
53		.82																.81
84		.61																.84
2			.65															.86
16			.62															.71
17			.64															.88
18			.83															.87
19			.93															.92
58			.70															.77
77			.85															.89
81			.70															.75
87			.59															.74

6	-.86								.92
12	.88								.94
14[d]	.53	-.67							.97
15[d]	.55	-.64							.96
29	.93								.90
47	.93								.91
57[d]	.64	-.55							.96
80[d]	.51	-.67							.93
1		-.87							.96
7		-.61							.89
13		-.84							.96
38		-.66							.85
8			-.52						.70
9			-.56						.63
10			-.59						.77
11			-.51						.77
54			-.55						.84
86			-.70						.68
60				.50					.65
89				.55					.71
90				.61					.52
28					-.75				.76
46					-.77				.74
66						.85			.77
67						.82			.74
68						.90			.85
30							.92		.89
48							.92		.90
26								-.80	.88
44								-.83	.88
64								-.57	.69
37									.90 .90
55									.92 .91

Table 9. Continued.

Item[a]	Conceptual Variables[b]																	h^2[c]
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
82													.84					.80
83													.81					.74
79														.75				.62
4															-.83			.86
5															.84			.85
72															-.63			.61
34																.55		.82
52																.56		.84
61																.55		.68
71																	.68	.67
88																	.54	.53
Prop. Var.[e]	10.2	7.8	8.0	7.0	7.0	4.1	2.8	3.0	3.3	2.9	3.8	2.8	3.1	2.7	3.6	2.8	2.3	
Cum. Prop. Var.[f]	10.2	18.0	26.0	33.0	39.9	44.0	46.8	49.8	53.1	56.0	59.8	62.5	65.7	68.4	71.9	74.7	77.0	

[a]The item numbers identify the individual variables as listed in Appendix C.

[b]The names of the conceptual variables are as follows: (1) Selected Governmental Expenditures 1. (2) Selected Governmental Expenditures 2. (3) Revenue Expenditure Change. (4) Revenue-Expenditure Level 1. (5) Revenue-Expenditure Level 2. (6) Intergovernmental Revenue. (7) Capital Expenditures. (8) Library Expenditures. (9) Change in Miscellaneous Expenditures. (10) Health Expenditures. (11) Welfare Expenditures. (12) Natural Resources Expenditures. (13) Asset Position. (14) Change in Interest Payments on Debt. (15) Revenue Items. (16) Housing and Urban Renewal Expenditures. (17) Miscellaneous Items.

[c]The final communality estimate represents the percentage of the variance of a variable explained by the 17 conceptual variables.

[d]Variables associated with Conceptual Variable 4 and Conceptual Variable 5.

[e]The percentage of the variance of the total matrix explained by a particular Conceptual Variable.

[f]The cumulative percentage of the variance of the total matrix explained by successive Conceptual Variables. The total does not necessarily equal the sum of its parts at each stage due to round off error.

that change in per capita educational expenditures, per capita total expenditures, and per capita salaries and wages paid are considered to be "like" the changes in the revenue variables. The implication is that any given change in revenues is accompanied by a directly related and approximately equal change in those three expenditure items.

Conceptual variable 4 is somewhat like CV 3 except level, instead of changes, of revenue and expenditures are the crucial variables. And instead of a variable for change in educational expenditures, variables for level and distribution of hospital expenditures are present. Also, the percentage of the total locally generated revenue that is represented by property taxes is inversely related to the other characteristics. The implications found for the interrelationships of revenues and expenditures in CV 3 carry over to this conceptual variable. In addition, the inverse relationship of the property tax variable implies that as the percentage of locally produced revenue originating from the property tax decreases, the level of the other characteristics increases. CV 4 will be called Revenue-Expenditure Level 1.

The factor creating the fifth CV is more like CV 3 in the types of variables it contains than CV 4 but, like CV 4, deals with level of revenues and expenditures and is therefore called Revenue-Expenditure Level 2. Four variables are held in common between CV 4 and CV 5 and account

for at least 50 per cent of the variables entering into the naming process for each conceptual variable. CV 5 is like CV 3 in that expenditure items are in common. It should be emphasized that with the common elements, CV 4 and CV 5 are approximately the same. And with the exception that CV 3 measures change and CV 5 measures level, CV 3 and CV 5 are approximately the same.

The sixth CV will be called Intergovernmental Revenue since it contains four variables that measure intergovernmental revenue by functional designations and one variable that measures per capita revenue from other local governments. The variable for current correction expenditures per capita is also present but was not included in the naming process since intergovernmental characteristics represented five of the six variables included in the CV.

The only other conceptual variable related to revenue characteristics was CV 15. In this case, per capita income taxes were inversely related to property taxes as a per cent of total taxes. The only other "important" characteristic was the relative change in housing and urban renewal expenditures. Therefore, the name of this CV could reflect either the level or the proportionality variable. It was therefore decided to call this variable Revenue Item.

The remaining conceptual variables (factors) reflect expenditure patterns. Fortunately, similar types of expenditures tend to cluster together. Therefore, a relatively

simple discussion of these CV's will be sufficient except where internal variables are considerably different.

CV 7 is primarily Capital Expenditures, and CV 8 will be known as Library Expenditures. CV 9 contains three variables measuring relative change in current per capita expenditures for libraries, hospitals, and health. Therefore, CV 9 will be named Change in Medical and Library Expenditures.

Health Expenditures will be the name of CV 10, and Welfare Expenditures will be the name of CV 11. CV 12 is a measure of Natural Resources Expenditures. Asset Position is the name of CV 13 whereas Change in Interest Payments on Debt is the name of CV 14. Housing and Urban Renewal Expenditures are represented in CV 16.

Only two variables enter into the naming process associated with CV 17. These are relative change in current general control expenditures per capita and relative change in per capita revenue from the Federal Government. As one is a revenue characteristic and the other is an expenditure characteristic, this CV will be called Miscellaneous Items.

Naming these 17 conceptual variables is a subjective process for the most part. Others could examine the component parts of these variables and decide that perhaps another name would be better and be justified in that belief. The names for CV 7 to CV 17 are relatively dictated by the types of variables contained within the factor. For the

others, more subjectivity is present. The purpose of naming conceptual variables is only to provide a means of identification and to provide a feeling for the types of variables contained in the CV. Factor scores computed for each CV are developed from all 90 county area governmental revenue-expenditure characteristics and not just those selected for assisting in determination of the name.

In summary, the original 90 county area governmental variables analyzed were reduced by approximately 80 per cent to 17 conceptual variables. These conceptual variables retained 77 per cent of the information found in the original variables. Conceptual Variables 3, 4, 5, 6, and 15 were primarily related to revenue characteristics. All remaining CVs except 17 were related to expenditures. CV 17 was noted only as miscellaneous items. It should be emphasized that while the naming process could classify a conceptual variable as either a revenue or an expenditure characteristic, both types of characteristics were frequently contained within any given CV.

Conceptual variables found in this analysis and factor scores generated for each provide one of the basic inputs into the analysis of the relationships between socio-economic structure and governmental revenue-expenditure structure.

County Government

The factor analysis process of reducing the 82 county government revenue-expenditure characteristics into conceptual variables is the same process used for both socio-economic and county area governmental characteristics. The county government characteristics were reduced by 80 per cent into 16 conceptual variables accounting for 78 per cent of the total variance. The county governmental conceptual variables and the individual variables contained within each are shown in Table 10.

The process of assigning names to each of the county conceptual variables was somewhat more subjective than the naming process for county area conceptual variables. The reason for this is that the split between revenues and expenditures is less clear for the first few CVs than it was for county area CVs. For example, CV 1 (Table 10) contains four variables measuring level of revenue, eight measures of level of expenditures, and one measure of distribution of expenditures. Therefore, since four important revenue variables are contained within CV 1, it will be called Governmental Revenue-Expenditure Levels.

CV 2 contains two measures of revenue levels, one of change in revenue, and a measure of level and change for per capita capital expenditures and per capita asset position. In addition, change in interest payments on general

Table 10. County government conceptual variables and associated factor loadings.

	Conceptual Variables[b]															
Item[a]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	h^2[c]
1	.67																.87
13	.68																.87
15	.84																.98
23[d]	.55		.55														.91
39	.50																.73
41	.81																.91
50[e]	.74							.51									.86
51	.79																.80
53	.57																.85
57[d]	.77		-.50														.95
80	.80																.90
84	.88																.93
89[f]	.51	.56															.78
9		.66															.69
19[g]		.55							.55								.91
89		.53															.48
82		.90															.88
83		.68															.79
85		.86															.88
90		.50															.68
6			.89														.90
12			-.92														.90
14			-.86														.91
29			-.92														.94
47			-.94														.95
11				-.88													.82
24				-.94													.94
42				-.92													.91

62	-.96								.95
78	-.68								.75
8		-.95							.92
16		-.70							.72
20		-.97							.97
38		-.96							.97
58		-.95							.93
26			-.52						.79
28			.78						.72
44			-.60						.79
46			.84						.75
64			-.53						.70
66			.62						.54
22				.98					.96
40				.95					.92
60				.98					.97
74				.75					.64
32					.75				.83
33					.57				.72
70					.62				.50
61						.73			.75
77						.80			.84
81						.73			.70
87						.62			.57
25							.94		.92
43							.91		.89
63							.74		.58
36								-.54	.81
54								-.64	.76
56								-.82	.74
76								-.78	.69
37									-.83 .86
55									-.84 .80

Table 10. Continued.

Item[a]	Conceptual Variables[b] 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	h^2[c]
31													.82				.83
49													.85				.86
35														-.65			.78
53														-.59			.85
73														-.60			.55
67															.56		.45
45																-.87	.92
17																-.83	.89
18																-.72	.82
Prop. Var.[h]	10.5	5.5	8.1	6.0	5.7	4.5	4.8	3.6	4.0	4.1	4.6	3.3	3.2	3.0	3.0	4.0	
Cum. Prop. Var.[i]	10.5	15.0	24.1	30.1	35.7	40.2	50.0	48.5	52.5	56.6	61.2	64.5	67.7	70.7	73.6	77.6	

[a]The item numbers identify the individual variables as listed in Appendix C.

[b]The names of the conceptual variables are as follows: (1) Governmental Revenue-Expenditure Levels. (2) Governmental Revenue-Expenditure Items 1. (3) Governmental Revenue-Expenditure Items 2. (4) Sewage Expenditures. (5) Educational Expenditures. (6) Welfare vs. Library Expenditures. (7) Fire Expenditures. (8) Financial Administration Expenditures. (9) Changes in Medical and Library Expenditures. (10) Sanitation Expenditures. (11) Correction and "Other" Expenditures. (12) Natural Resources Expenditures. (13) Parks and Recreation Expenditures. (14) Public Building Expenditures. (15) Change in Hospital Expenditures. (16) Changes in Local Revenue.

[c]The final communality estimate represents the percentage of the variance of a variable explained by the 16 conceptual variables.

[d]Variables associated with Conceptual Variable 1 and Conceptual Variable 3.

[e]Variable associated with Conceptual Variable 1 and Conceptual Variable 8.

[f]Variable associated with Conceptual Variable 1 and Conceptual Variable 2.

[g]Variable associated with Conceptual Variable 2 and Conceptual Variable 9.

[h]The percentage of the variance of the total matrix explained by a particular Conceptual Variable.

[i]The cumulative percentage of the variance of the total matrix explained by successive Conceptual Variables. The total does not necessarily equal the sum of its parts at each stage due to round off errors.

debt is included. In this case, revenue and expenditure variables are also mixed with level and change characteristics. Therefore, CV 2 will be called Governmental Revenue-Expenditure Items 1.

CV 3 is somewhat like CV 1 and CV 2 since the variables contained are mixed. For CV 3, however, the items are either measures of level or of distribution of revenues and expenditures. Therefore, it will follow the more general type of name assigned to CV 2 and will be called Governmental Revenue-Expenditure Items 2.

The only other CV to be primarily influenced by revenue items is CV 16. This conceptual variable measures change in property taxes, change in total tax revenues, and change in locally produced total revenue. As all three items are concerned with local taxes, this CV will be called Changes in Local Revenue.

The remaining factors (conceptual variables) were primarily related to expenditures. The naming process is also generally straight forward since specific functional expenditures tended to cluster together. CV 4 for example primarily contains sewage expenditures and is therefore called Sewage Expenditures. Likewise, CV 5 is called Educational Expenditures.

Conceptual variable 6 is slightly different. The six variables contained in the factor measure only two functional expenditures: welfare and libraries. Also,

the two functional categories are inversely related to each other. Therefore, CV 6 is called Welfare vs. Library Expenditures.

CV 7 is called Fire Expenditures, and CV 8 is primarily Financial Administration Expenditures. CV 9 contains a mixture of expenditures and all deal with the change in expenditures over time. Therefore, CV 9 is called Changes in Miscellaneous Expenditures.

CV 10 is Sanitation Expenditures and CV 11 is Correction and "Other" Expenditures.[1] Natural Resources Expenditures and Parks and Recreation Expenditures make up CV 12 and CV 13 respectively. CV 14 consists of Public Building Expenditures, and CV 15 is the Change in Hospital Expenditures.

Naming these 16 county governmental conceptual variables is a subjective process as was noted previously. Only for conceptual variables dealing with functional expenditures are the names relatively dictated by the types of variables contained within the factor. But, as was true for the naming process of the other conceptual variables, the purpose of naming CVs is only to provide a means of indentification and to provide a feeling for the types of variables that enter into the factor.

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[1]Correction includes expenditures for confinement and correction of persons convicted of offenses against the law, and pardon, probation, and parole activities.

In summary, the original 82 county governmental variables analyzed were reduced by approximately 80 per cent to 16 conceptual variables. These conceptual variables retained 78 per cent of the information contained in the original variables. Only CV 16 was clearly related to revenue characteristics only. Conceptual variables 1, 2, and 3 contain revenue and expenditure items in about the same kind of mix. The remaining CVs are primarily funtional expenditures categories with relatively few other characteristics included.

Governmental Conceptual Variables Compared

The process of developing conceptual variables for county area governments and for county governments was conducted independently. Approximately identical measures were utilized for each. If revenue-expenditure patterns of the two types of governments were similar, one would expect the conceptual variables formed to be similar. However, since functions of county government are different from aggregated area government, it is more likely that the conceptual variables will be different.

In general, the latter viewpoint appears to be more accurate since there is relatively little in common between the conceptual variables of the two types of governments. For example, CV 1, Selected Governmental Expenditures for county area governments contains the distribution and level of expenditures for fire, sanitation, parks and recreation

as well as others. These particular expenditures were, respectively, CV 7, CV 10, and CV 13 for county government. Financial administration and general public buildings expenditures were among those included in CV 2 of county area governments but were represented separately as CV 8 and CV 14 for county governments. Changes in and levels of revenue were reasonably separated from expenditure items in the analysis of county area governments but were not nearly so separated for county governments. Welfare and libraries were treated as separate CVs for area governments and were combined (though operating inversely to each other) for county governments. The only item that retained an independent identity in each case was level and distribution of expenditures for natural resources. This was CV 12 for both types of governments.

Therefore, with few exceptions, conceptual variables formed for county area governments and county governments from factor analysis are unique. This may be caused in part by different functions performed by county governments and aggregated area governments. Also, it may be in part caused by various mixes of revenues and expenditures by different local governments.

Summary

In summary, 17 conceptual variables representing 90 governmental revenue-expenditure characteristics were formed

for county area governments. These 17 conceptual variables reproduce 77 per cent of the information contained in the original variables. Sixteen conceptual variables were formed from 82 county governmental characteristics and account for 78 per cent of the information contained in the original variables. It has been shown that for all practical purposes conceptual variables for the two types of governments are not the same. Where given functional expenditures are identified as independent conceptual variables for one type of government, they generally are included as a part of a cluster of variables for the other type of government. The primary objective of developing conceptual variables was to develop "independent" characteristics that would be utilized in conjunction with the socio-economic conceptual variables developed in the previous chapter. For the few CVs that are "identical" between governmental types, it will be interesting to see if similar governmental socio-economic relationships develop. Also, where individual factors for one type of government appear to be clustered together for another type of government, similarities of linkages will be compared.

CHAPTER V

LINKAGES BETWEEN SOCIO-ECONOMIC AND GOVERNMENTAL STRUCTURE

The objectives established for this study were to determine relationships between local governmental services and socio-economic measures of local areas and to examine these relationships for consistency between different levels of government. The process of establishing relationships was to be two fold. First, socio-economic and governmental characteristics were to be analyzed separately and regional designations made. If linkages are present, the regional patterns found would indicate such linkages. And different governmental patterns would indicate differences between types of governments. The second method of determining linkages was through the development of conceptual variables. That is, the information contained in the original variables is compressed into and represented by a smaller set of independent variables. These conceptual variables then could be analyzed with ordinary least squares regression analysis for linkages.

Chapters III and IV developed the necessary inputs into an analysis of hypothesized linkages between

socio-economic structure and governmental revenue-expenditure structure. The purpose of this chapter is to identify those linkages.

Regionalization Linkages

Three different types of regions were developed in this study. These were socio-economic regions, county area governmental regions, and county government regions. The technique used to develop regions was the same in each case. In earlier discussions of the regions formed, it was shown that poles of a bi-polar region (factor) were unique and therefore should be considered as separate entities. In addition, it was shown in Chapter IV that regions formed for county area governments and county governments were, in general, not related. If linkages are present between socio-economic and governmental characteristics, one may expect the regions formed from those characteristics to be similar. But based on the results indicated in Chapter IV, the linkages will be different for the two types of governments.

Socio-Economic and County Area Regions

Counties contained in socio-economic regions were identified in Table 1, and counties within county area regions were identified in Table 5. It is not necessary for counties of socio-economic Region 1a to be represented in county area government Region 1a to compare the internal

consistencies or overlap of regions. Since the regional numbering system is arbitrary, the important comparisons are whether or not groups or clusters of counties "stick" together and therefore will be found in another region more or less intact. Or, if the cluster does not "stick" together, splinter counties should dominate the "new" region.[1]

A basic difficulty in comparing the internal overlap between different types of regions is that the overlap obtained depends upon which type of region is selected as the starting point of analysis. Using the decision rules established for determination of dominance (overlap), there is little reason to expect similar patterns if a different starting point is established. Therefore, it is necessary to either cross-validate regional overlaps or select a given starting point.[2] For the purposes of this study, it was decided to select a given starting point.

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[1]Domination of a region by transferred or overlap counties was determined to exist only if more than half of the counties within the region came from the original region. At the same time, a region was considered to transfer or overlap in a "cluster" so long as more than one-half of the counties overlapped the same region.

[2]Cross-validation would be reversing the order of examining the composition. For example, one could start with the socio-economic (SE) regions and examine the various governmental regions that "make-up" any given SE region. It should be noted that "make-up" or the number of governmental regions such a SE region is "split" into provides the same answers. The cross-validation would be to start with a governmental region and examine the SE regions that are included within that region.

It was noted previously that one process for identifying linkages between socio-economic and governmental structures would utilize ordinary least squares regression analysis. One aspect of the regression analysis will use regional designations as discrete characteristics to examine dependent governmental characteristics. To minimize interdependencies between the independent and dependent variables, the socio-economic regionalization will be used. Therefore, to maintain consistencies, it was decided that socio-economic regions would also be the starting point for examination of overlap between the different types of regions.

Twenty-two socio-economic (SE) regions and 28 county area (CA) governmental regions were developed in this study. Five SE regions contained only one county each. Using criteria established for this analysis, these regions would generally not enter into the overlap system since they would satisfy the criteria only if related to a one county governmental region. The remaining 17 SE regions were primarily associated with 18 CA regions (Table 11.) That is to say, 18 of the CA regions were found that satisfied at least one of the two stated criteria. Of the 18 CA regions however, eight were unique regions containing only one county. SE Region 1a and CA Region 1a had six counties in common.[1]

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[1]The six counties were: 1) Berrien, 40) Bay, 43) Lake, 45) Clare, 60) Leelanau, and 65) Charlevoix. To determine overlapping counties for other regions, examine the respective regional components as given in Tables 1 and 5.

Table 11. Overlap between socio-economic regions and governmental regions.[a]

Socio-Economic	County Area	County Government
1a	1a 9b*[b] 14b*	5a* 10b 11a 13b* 15b*
1b	3a 6 12a*	3a 12 13a
2a	-	2b
2b	12a*	-
3a	6 14a*	4b
3b	16	6
4a	15a 17a	8a 9b 17*
4b	17b	-
5a	14b*	-
5b	26*	-
6b	13b*	-
7a	-	8b* 13b*
8	3b	5a* 14b
10	-	16
11	-	3b
12b	7b	-
13	-	9a*

[a]The counties contained within each region are identified in the following tables: Socio-Economics, Table 1; County Area Government, Table 5; County Government, Table 8. The overlap with the governmental regions was determined by either more than half of the counties in the governmental region were also in the socio-economic region or more than half of the counties in the socio-economic region were in

Table 11. Continued.

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the governmental region. Counties allocated to more than one region may result in more "single" county regions than actually exist because of double counting.

[b]Regions with only one county.

SE Region 3b had four counties in common with CA Region 16. All remaining regions had three or less counties that would be considered as being in common or overlapping.

Although regional comparisons indicate that there are some linkages between socio-economic and county area regions, the linkages are weak. Almost half of the regions entered into the comparison because they were single county regions. On the face of it, any linkage determinations developed from these would have to be weak at best. Unfortunately, only SE Regions 1a and 3b indicate any linkage with more than just a few counties in common. Therefore, it appears that if linkages exist between socio-economic structure and county area governmental revenues-expenditures, the regionalization approach is not adequate to determine those linkages since similarities between types of regions were not found.

Socio-Economic and County Government Regions

The process of examining overlap and therefore "linkages" of socio-economic and county government (CG) regions is identical to the analysis in the previous section. Thirty CG regions were originally developed. Of the 30, 21 met the overlap criteria developed. But, as was true for the CA regions, eight CG regions contained only one county each. And like the CA regions, only two CG regions had four or more counties in common with the socio-economic regions.

SE Region 1b had four counties in common with CG Region 13a. SE Region 3b had four counties in common with CG Region 6. All remaining regions had two or three counties in common with the SE regions.

Although regional comparisons indicate some linkage between the socio-economic and county area regions, the linkages are relatively marginal. Eight regions entered into the comparison because they were single county regions. Only two regions had as many as four counties each in common with the SE regions. Relatively fewer CG regions were composed of one county than were the CA regions. And both the CA and CG regions had two regions each with four or more counties overlapping the SE regions. In general, however, it appears that regionalization is not the optimal process to identify linkages between socio-economic structure and county government structure.

Regionalization and Type of Government

One objective of this study was to examine differences in assumed linkages between socio-economic structure and governmental revenue-expenditure patterns by type of government. It has already been concluded that, in general, any linkages present from the regionalization approach are weak ones since relatively few counties are clustered together. In addition, it was concluded in Chapter IV that the two types of governmental regions had few counties in common.

Overlap patterns established in Table 11 support the conclusion that relatively few governmental regions have counties in common. For example, for SE Region 1a, the CA regions 1a and 14b have counties in common with CG regions 15b and 11a respectively.[1] The major exception to the overlapping of regions occurs for SE 3b where four counties of CA 16 and four counties of CG 6 are identical. The only other similarities between the relationships of county area and county government regions to the SE regions occur in SE 4a for CA 15a and CG 9b and for SE 8 and CA 3b and CG 14b. Therefore, even though original linkages are weak for both county area and county governmental regions, those linkages are basically unique for each type of region.

Conceptual Variable Relationships

The conceptual variables developed in this study were from three types of data: 1) socio-economic, 2) county area governmental revenue-expenditures, and 3) county government revenue-expenditures. The factor analytic technique was used to develop the conceptual variables (factors) in each case.

Assumed linkages between socio-economic structure and local governmental revenue-expenditure patterns will be examined in several ways. First, relationships of selected

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[1]Designation of counties in common follow the criteria established previously.

governmental characteristics to selected socio-economic characteristics are examined. In general, this approach follows the "determinants" studies discussed in Chapter II. That is what percentage of a given revenue or expenditures item is "explained" by the significant socio-economic characteristics. Also, what are the relationships to the socio-economic characteristics? The purpose of this is to see what can be stated without going through relatively complicated factor analytic techniques. Second, using the same governmental characteristics, what changes occur in the governmental variable's variance explained when one uses socio-economic conceptual variables?

Third, if one utilizes the socio-economic regions developed in this study as discrete independent variables in conjunction with socio-economic conceptual variables, is the percentage of the governmental variable's variation explained more or less than it was in either of the other two cases? Significant conceptual variables and their relationships to the respective governmental variables will also be examined. Fourth, as one of the objectives was to examine variations of relationships between types of governments, results of the analysis will be compared between county area governments (CA) and county governments (CG).

The method of analyzing relationships between governmental and socio-economic variables is an ordinary least squares regression model. In the discussion above, it was

indicated that the analysis would be primarily concerned with "significant" relationships. These "significant" relationships were determined by using a stepwise delete regression model.[1] To take into account varying numbers of significant variables and the existence or absence of regional variables, the following discussion emphasizes the $\bar{R}^2$, the coefficient of determination adjusted for degrees of freedom. The coefficient of determination, (R^2), is presented with the tabular material but not discussed.

Basic Linkages

In an effort to obtain a benchmark from which one could examine the attributes in using "conceptual variables", relationships for normal characteristics were first developed. The technique used by many of the "determinants" studies discussed in Chapter II was to select governmental revenue or expenditure characteristics (dependent variables) and to relate these to selected socio-economic characteristics

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[1]The model is described in Stepwise Deletion of Variables From A Least Squares Equation: (LSDEL Routine) STAT Series Description No. 8, Agricultural Experiment Station, Michigan State University, East Lansing, Michigan, (January, 1968). The "significance" level selected to stop the stepwise deletion process was 10 per cent. That is, when all remaining variables were significant at the 10 per cent level, the process was ended. The only exception to this was where discrete variables for regions were included. In this case, the regional variables were required to stay in the equation with the LSDEL routine applied only to the conceptual variables. The significance level selected was still 10 per cent.

(independent variables). In addition, the R^2 then states the percentage of the dependent variable's variation explained by the set of independent variables.

This "determinants" approach was used to provide a benchmark for this study. Nine county area governmental revenue-expenditure characteristics and seven county government revenue-expenditure characteristics were selected as dependent variables. Ten socio-economic characteristics were selected as independent variables.[1]

For county area governments (CA), property taxes paid per capita were directly related to the significant variables of per capita effective buying income, per cent of the population urban, and per cent of families with $10,000 income or more and inversely related to net migration, and percentage change in population (Table 12.)[2] For county governments (CG), only the variable for percentage change in population was "significantly" related to per capita property taxes (equation B). The coefficient of determination adjusted for degrees of freedom ($\bar{R}^2$) explained

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[1]Dependent variables consisted of two revenue variables and seven (five) expenditure variables for county area (county) governments. Independent variables contained measures of income, population, education, age, urbanization, and labor force mobility. These variables are explicitly identified in Table 12.

[2]Significant variables were determined through a deletion regression routine with significance specified at the 10 per cent level. See footnote 1, p.111, for details on this.

Table 12. Regression relationships between selected governmental and socio-economic characteristics: county area governments and county governments.

Dep. Vbl.[a]		Significant Independent Variables and Related Coefficients[b]	R^2[c]	$\bar{R}^2$[d]
Prop. Tax p.c.:	A[e]	$57.62-.0004(X_1)+.003(X_2)+.04(X_5)+.02(X_7)-.31(X_{10})$	42.7	39.0
	B[f]	$22.91-.15(X_{10})$	13.8	12.7
Tot. Rev. p.c.:	A	$239.41+.01(X_2)-.01(X_3)+.09(X_5)-.05(X_6)-1.55(X_{10})$	39.6	35.7
	B	$117.00-.03(X_6)-.04(X_7)-1.05(X_{10})$	44.2	42.0
Ed. Exp. p.c.[g]:	A	$84.18+.007(X_2)+.04(X_5)+.01(X_7)-.01(X_8)-.001(X_9)$	23.7	18.8
Pol. Exp. p.c.:	A	$2.13-.0002(X_1)+.001(X_4)+.004(X_5)+.001(X_7)+.0001(X_9)-.03(X_{10})$	72.7	70.5
	B	$2.50-.0001(X_2)-.002(X_6)+.0004(X_8)+.01(X_{10})$	23.0	19.1
Hgwy. Exp. p.c.:	A	$45.43+.0001(X_1)-.02(X_6)-.01(X_7)-.0001(X_9)-.25(X_{10})$	43.9	40.2
	B	$33.90+.0002(X_1)-.02(X_6)-.01(X_7)-.0002(X_9)$	40.7	37.7
Sew. Exp. p.c.[g]:	A	$-0.46-.00002(X_1)+.004(X_5)+.00002(X_9)-.03(X_{10})$	21.6	17.5
Hosp. Exp. p.c.:	A	$20.49-.41(X_{10})$	8.8	7.6
	B	$14.72-.37(X_{10})$	10.2	9.1
Tot. Exp. p.c.:	A	$170.83+.007(X_2)-.008(X_3)+.10(X_5)-.05(X_6)-1.30(X_{10})$	36.2	32.1
	B	$83.10-.02(X_6)-.02(X_7)-.79(X_{10})$	40.3	38.0

Cap. Exp. p.c.:	A	$42.89+.003(X_2)+.03(X_6)-.01(X_8)$	10.7	7.3
	B	$28.40-.02(X_7)-.22(X_{10})$	17.6	15.6

[a]Dependent variables. The dependent variables in order are: property taxes per capita, total general revenue per capita, educational expenditures per capita, police expenditures per capita, highway expenditures per capita, sewage expenditures per capita, hospital expenditures per capita, total expenditures per capita, and capital expenditures per capita.

[b]Minimum significance levels required were specified at the 10 per cent probability level. The independent variables are: (X_1) net migration, 1950-1960; (X_2) Effective buying income per capita, 1960; (X_3) Percentage change in effective buying income per capita, 1950-1960; (X_4) Percent of the employed labor force working outside of the county of residence, 1959; (X_5) Percent of the population urban, 1960; (X_6) Percent of the population 60 years old or more, 1960; (X_7) Percent of families with $10,000 income or more, 1960; (X_8) Median educational levels of those 25 years old or over, 1960; (X_9) Extrapolated 1967 population; (X_{10}) Percentage change in population, 1960-1970.

[c]Coefficient of determination.

[d]Coefficient of determination adjusted for degrees of freedom.

[e]County area governments relationships.

[f]County governments relationships.

[g]County governments relationships not computed.

39 per cent and 13 per cent of the variation in per capita property taxes for CA and CG units respectively.

The 70.5 per cent of the variation explained for police expenditures per capita of county area governments was the maximum for any equation. For both per capita hospital expenditures and capital expenditures of CAs, the explained variation was approximately seven per cent. For county governmental units (equation B in each case), the maximum variance explained was 42 per cent for total revenue per capita and the minimum was nine per cent for per capita hospital expenditures (Table 12).

Structural relationships identified for basic characteristics are contained in Table 12. For example, percentage change in population (X_{10}) was a significant variable for 13 of the possible 16 CA and CG regressions. In all cases except for police expenditures of county governments, an inverse relationship existed between change in population and the dependent governmental variables. That is, as the change in population increased (decreased), per capita revenue or expenditure decreased (increased). And even though the number and therefore the composition of significant variables differed between CA and CG units for a particular governmental variable, there was a tendency toward a common structure. For example, the one significant CG variable for property taxes per capita was also significant for CA units. For total revenue and total expenditures

per capita, two of the three significant CG variables were also significant in the respective CA equation. All four significant CG variables for highway expenditures were significant for CA units, and the one signficant variable present for hospital expenditures for both CA and CG was percentage change in the population. On the other hand, there were no common variables present for capital expenditures and the one common variable present for police expenditures indicated opposite relationships.

Therefore, even though significant variables varied by type of governmental characteristic, five of the seven governmental characteristics where relationships for both CA and CG were computed had similar composition. The percentage change in population was significant in all but three of the 16 equations indicating importance for almost all selected governmental characteristics regardless of type of government. On the other hand, the percentage of the population classified as urban in 1960 (X_5) was significant in six out of nine CA equations but was not significant for any CG equations.

Although a certain degree of similarity existed in the composition of compared equations and one variable was present in almost all equations, the strength of any ubiquitous linkage appears to be relatively absent. First of all, the sample relationships computed represent only a small percentage of the total relationships that could be

examined. Secondly, with the exception of county area governments' police expenditures per capita, predictive or explanatory powers of the equations are relatively weak. The percentage of variation explained of a particular characteristic did not vary to any great extent between CA and CG except for property taxes and police expenditures. The next step is to examine the socio-economic conceptual variables developed for relationships among and between governmental characteristics and for improvement of explanatory power of the equations.

Governmental Characteristics--Socio-Economic CVs

Basic relationships between selected governmental and socio-economic characteristics were indicated above. The purposes of this section is two fold. First, if one utilizes the information compressed into the 16 socio-economic conceptual variables developed in Chapter III, is more of the variance of the dependent governmental variables explained than was previously possible? Secondly, with the condensed socio-economic variables, is there an underlying structure that becomes more apparent?

Results of the LSDEL analysis using governmental characteristics discussed in the prior section for both county area governments (CA) and county governments (CG) and socio-economic conceptual variables are presented in

Table 13.[1] Property tax revenue per capita for CAs (equation 1) was significantly associated with eight socio-economic conceptual variables. Property taxes were directly associated with General Socio-Economic Structure 1, Agglomeration, Non-agricultural Employment Opportunities, Population Characteristics, and Recent Business Activity and inversely associated with Economic Well-Being, General Socio-Economic Structure II, and Rural Non-Farm Population.[2] The coefficient of determination adjusted for degrees of freedom ($\bar{R}^2$) was 45 per cent, approximately six percentage points more than when conceptual variables were not used.

Addition of socio-economic regions as discrete variables increased $\bar{R}^2$ another nine percentage points to a total of about 54 per cent of the variance of CA property taxes being explained (equation 2.) Six conceptual variables (CV) were significant in this case but only three of them were also significant in equation 1. These were General Socio-Economic Structure 1, Economic Well-Being, and Recent Business Activity.

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[1] Values of partial regression coefficients associated with the conceptual variables are not presented since individual values of the conceptual variables are a series of index numbers (factor scores) generated by the factor analysis.

[2] It was emphasized previously that the names of the conceptual variables are the result of subjective values. The composition of variables entering into the naming process are shown in Table 4.

Table 13. Regression relationships between governmental characteristics and socio-economic conceptual variables and regions: county area governments and county governments.

Dependent Variables		Significant Conceptual Variables[a]	R^{2}[b]	$\bar{R}^{2}$[c]
Property taxes per capita	1)[d]	1, 5, -6, 8, 9, -11, 13, -14	50.4	45.1
	2)[e]	1, -2, 4, -6, 13, 16	69.5	53.7
	3)[f]	-1, 2, -4, 9, 10, 12, -14	42.7	37.3
Total general revenue per capita	1)	1, -4, 5, 8, 9, -11, -14	38.1	32.4
	2)	5, -14	59.7	43.0
	3)	-1, 2, 3, -4, 6, 8, 10, -14, -15, -16	77.7	74.6
Educational expenditures per capita[g]	1)	1, -2, 8, 9, -14, 15	42.0	37.4
	2)	1, -2, -7, 11, 15, 16	61.4	41.3
Police expenditures per capita	1)	1, 2, -3, 5, -6, 7, 8, 10, -11, 12, -14, 16	78.7	75.1
	2)	1, 4, 5, 8, -9, 16	80.0	69.6
	3)	1, 2, -3, 4, -5, 7, 10, -13, -15	52.4	46.6
Highway expenditures per capita	1)	-1, 2, -4, -5, 6, -11, 12, -13, -14, -15, -16	76.0	72.3
	2)	-1, 2, -4, 6, -11, -13, -14, -15, -16	82.9	72.5
	3)	-1, 2, -4, -5, 6, -11, 12, -13, -14, -15, -16	79.0	75.8
Sewage expenditures per capita[g]	1)	1, 5, 8, 13, -15	30.0	25.4
	2)	1, -2, -6, 13, -15	56.2	34.6
Hospital expenditures per capita	1)	3, -4, 13	16.3	13.2
	2)	-2, 3, -9, 13	67.7	52.7
	3)	3, -4, 13	24.4	21.5
Total expenditures per capita	1)	3, -4, 5, 8, -11, -14	35.4	30.2
	2)	-2, 13, -14, 16	64.6	48.1
	3)	-1, 2, 3, -4, 12, -14, -15, -16	62.1	57.9

Capital expenditures per capita	1)	1, 10	17.6	15.6
	2)	10	36.7	12.0
	3)	-1, 2, -4, 6, 8, 10, -14, -15, -16	57.5	52.2

[a]The names assigned in Chapter 3 to the conceptual variables are: (1) General Socio-Economic Structure 1. (2) Agricultural Business Composition 1. (3) Absence of Growth. (4) Agricultural Business Composition II. (5) Agglomeration. (6) Economic Well-Being. (7) Recent Agricultural Adjustments. (8) Non-agricultural Employment Opportunities. (9) Population Characteristics. (10) Dairy. (11) General Socio-Economic Structure II. (12) Unemployment. (13) Percent Business Activity. (14) Rural Non-Farm Population. (15) Agricultural Business Composition III. (16) Agricultural Business Composition IV. Minimum significance levels required were specified at the 10 percent level.

[b]Coefficient of determination.

[c]Coefficient of determination adjusted for degrees of freedom.

[d]Socio-economic conceptual variables significant for County Area Governments.

[e]Socio-economic conceptual variables significant after socio-economic regions designated and used as discrete variables in the model.

[f]Socio-economic conceptual variables significant for county governments.

[g]Relationships not computed for county governments.

County governments' per capita property taxes were significantly related to seven socio-economic conceptual variables (equation 3.) Three of these variables (CV 1, CV 2, and CV 4) were also significantly related to county governments when regionalization was included in the analysis. But, these three variables were related in opposite directions between equation 2 and equation 3. At the same time, CV 9 and CV 14 were significant for both CG and CA (equation 1) and the relationships were identical. Thirty-seven per cent of the variance in per capita property taxes of CGs was explained by equation 3. This was approximately three times as much as was explained when conceptual variables were not used. The system utilizing socio-economic regional patterns as discrete variables was not computed for county governments.[1]

Therefore, for per capita property taxes, the explained variance was highest where conceptual variables were used in conjunction with the regional variables. And the significant conceptual variables varied by type of

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[1]Relationships between regions, conceptual variables, and selected county governmental characteristics were not computed for two reasons. First, it was doubtful that little additional insight into underlying structure could be obtained. Any advantages associated with using regions as independent variables could be illustrated through the analysis of CA. Secondly, although comparisons between CA and CG where both contained regional patterns could be useful, budgetary constraints were considered to be more important than what would most likely be marginal information.

governmental unit and by whether or not regions were included. For example, there was overlap of significant CVs from the CG equation with both forms of county area government analysis. But, variables that overlapped with the regional equation had opposite signs whereas those that overlapped with equation 1 had identical signs.

In general, use of conceptual variables instead of selected socio-economic characteristics improved the "explanatory" powers of the regression equation. And, the regional form was generally but not always better than when conceptual variables were used alone. For example, the coefficient of determination adjusted for degrees of freedom decreased when regions were added for per capita police expenditures, and per capita capital expenditures. The $\bar{R}^2$ dropped when conceptual variables were used for CAs' per capita total revenue and per capita total expenditures. But for both of these, conceptual variables used in conjunction with regions resulted in an $\bar{R}^2$ substantially larger than the original estimate.

Differences between types of government and their respective relationships are quite striking. For example, use of conceptual variables for county governments improved the $\bar{R}^2$ of per capita total revenues; highway expenditures and capital expenditures by more than 30 percentage points each. Where CA and CG had approximately equal percentages

originally, use of the conceptual variables created a considerable gap for both revenue and capital expenditures variables.

It has been shown that, in general, the use of conceptual variables improves explanatory powers over the original estimates and that, in general, use of regions improves these explanatory powers even more. Per capita hospital expenditures is an example of a large influence from regional patterns. Per capita hospital expenditures is an example of a large influence from regional patterns. The increase in explained variance by using conceptual variables was relatively slight. But, addition of regions to conceptual variables increased the variance explained from 13 per cent to 53 per cent. Since the relationships of conceptual variables to both CA and CG governments are identical, one might expect such a change for county governments as well.

Identical relationships for conceptual variables of both county area and county governments were also found for highway expenditures. In both cases, using conceptual variables doubled the explanatory powers of the respective equations. But, using regions for CAs added little to explanatory powers although it did not cause the $\bar{R}^2$ to decrease.

Relationships between selected governmental characteristics and the information contained within conceptual variables varied. Even though conceptual variables contain

approximately 75 per cent of the information presented in over 90 socio-economic characteristics, it is apparent that there is no general underlying relationships. First of all, some conceptual variables are present in a majority of the computed relationships. For example, CV 1 is present in 18, CV 2 in 15, CV 4 in 14, and CV 13 in 14 of the 25 possible equations. But, the relationships are not always the same. For CV 1 for example, there are 11 positive relationships and 7 negative relationships. And these differences in direction of the relationships are not confined to differences in governmental characteristics. Again using CV 1 as the example, opposite signs exist for property taxes, total revenue, and capital expenditures although the signs do appear to be related to type of government. That is, for those three items, CA governments are all positively related to CV 1 whereas CG governments are all negatively related.

In addition, differences in underlying relationships may vary only in part. For example, police and highway expenditures of county area governments (equation 1) have eight conceptual variables in common. The relationships are opposite however for CVs 1, 5, 6, and 16 and identical for CVs 2, 11, 12, and 14. Approximately the same relationships were present for county governments (equation 3) for these two variables. In this case, only six conceptual variables were present in both equations with four having identical relationships and two having opposite relationships.

Only the relationships found for CA's per capita capital expenditures would be considered spurious. Although names of conceptual variables were assigned subjectively, conceptual variable 10 was named Dairy because it was highly related to dairy farming characteristics. To assume that governmental capital expenditures are related to the dairy industry (and it alone in the case of equation 2) is at best spurious. This spurious association may account in part for the relative low $\bar{R}^2$. Dairy may also be a weak proxy for variables not included in the analysis. Apparently, not even all of the variables originally considered in determination of conceptual variables were adequate in assisting the understanding of capital expenditures.

In summary, many relationships were found between governmental revenue-expenditure characteristics and socio-economic characteristics, socio-economic conceptual variables and socio-economic regions. And as might be expected, relationships varied by type of governmental unit. But one particular aspect became quite clear. There is apparently no specific underlying structure which is ubiquitous to the selected governmental characteristics. As conceptual variables are an expression of many more variables than usually considered, one might expect that certain fundamental consistencies would appear. This was not the case however. Over the range of activities and combinations analyzed, it was shown that even where similar variables were significant,

opposite relationships of part of those significant variables existed between governmental variables such as police and highway expenditures. Therefore it was not possible to draw any definite conclusions as to structural relationships between the selected governmental characteristics as a group and the different socio-economic measures utilized. Instead, relationships tended to be relatively unique for each governmental characteristic.

If one examines the adjusted coefficient of determination for each of the different socio-economic measures, the general conclusion is that $\bar{R}^2$ increases as one moves from individual socio-economic characteristics to conceptual variables and increases even more when the regionalization pattern is added to the conceptual variables. Although no generalized specific structural pattern was present in the examination of individual conceptual variables, the information contained within socio-economic regions was adequate for those regional patterns to add more information to the explanation of variance in governmental expenditures than was lost from having fewer degrees of freedom.

The governmental characteristics analyzed in this section represent a small sample of the total governmental revenue-expenditure characteristics possible. It is possible that there is enough "random" variance in the small sample to make it appear that there is no basic underlying structure with socio-economic conceptual variables. It is

possible that if interrelationships among the governmental characteristics were taken into consideration, a common underlying structure might be more apparent. It is for this reason that governmental conceptual variables were analyzed in conjunction with socio-economic conceptual variables.

Governmental and Socio-Economic CVs

In an effort to provide consistency of analysis with the prior section, it was necessary to isolate the individual governmental characteristic's location in the governmental factors (conceptual variables.) For county area governments, police expenditures were located in CV 1, highway expenditures in CV 2, hospital expenditures, total expenditures and total general revenue in CV 4, total general revenue, property taxes, and educational expenditures in CV 5, and capital expenditures in CV 7. Sewage expenditures did not satisfy the necessary criteria to be listed in Table 9. For county governments, all governmental characteristics analyzed in the previous section, with the exception of hospital expenditures, were in county government conceptual variable 1. Hospital expenditures were in CV 3 (Table 10.)

It should be emphasized that since this discussion concentrates on the above conceptual governmental variables to provide consistency with the governmental characteristics previously discussed, the governmental conceptual variables

are composed of more variables than those listed.[1] The governmental CVs are a group of interrelated variables so more variables are included in conceptual variables than those subjected to the previous analyses.

Socio-economic conceptual variables significantly related to the selected governmental conceptual variables are presented in Table 14. For county area CVs, the percentage of the conceptual variables' variance explained was less than where the governmental characteristic was examined separately, except for hospital expenditures where the $\bar{R}^2$ was the same. On the basis of the adjusted coefficient of determination, one would conclude that the simplest method, the use of governmental characteristics and not governmental conceptual variables, is the better method.

In examining the structure of significant conceptual variables, one finds a considerable overlap of relationships. For example, all significant variables of CA conceptual variables 1 and 5 are also significant for CV 2. In addition, one variable from CV 4 and one from CV 7 were also significant for CV 2. It would therefore appear that there may be a specific underlying structure present. Unfortunately, however, 13 of 16 possible socio-economic conceptual variables were significantly related to CV 2. Therefore, that

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[1]Composition of the conceptual variables is shown in Table 10 and 11 for county area governments and county governments respectively.

Table 14. Regression relationships of selected governmental conceptual variables and socio-economic conceptual variables and regions: county area governments and county governments.

Dep. Vbl.[a]		Significant Conceptual Variables[b]	R^2[c]	$\bar{R}^2$[d]
County Area[e]				
CV 1	A[f]	1, 5, -9, -11, 12, 16	54.2	50.6
	B[g]	1, 5, -9, 16	70.8	57.3
CV 2	A	-1, 2, -4, 5, 6, 8, 9, 10, -11, 12, -14, -15, -16	70.3	64.7
	B	-1, 2, -4, 6, 10, -11, -14, -15, -16	80.0	67.7
CV 4	A	3, -4, 13	16.3	13.2
	B	-2, 3, -9, 13	59.3	40.4
CV 5	A	-1, 6, -9, 14	27.8	24.0
	B	1, -4, -16	52.1	32.3
CV 7	A	-7, 10	11.1	8.8
	B	6, 10, 13	35.0	6.5
County Government[h]				
CV 1	A	-1, 2, -4, 9, 10, -11, 12, -14, -15, -16	81.1	78.5
	B	-1, 2, 10, -14, -15	86.0	79.2
CV 3	A	-3, 4, -13	17.2	14.0
	B	9	40.0	16.7

[a]Dependent governmental conceptual variables.

[b]The names assigned in Chapter 3 to the conceptual variables are: (1) General Socio-Economic Structure I. (2) Agricultural Business Composition I. (3) Absence of Growth. (4) Agricultural Business Composition II. (5) Agglomeration. (6) Economic Well-Being. (7) Recent Agricultural Adjustments. (8) Non-agricultural Employment Opportunities. (9) Population Characteristics. (10) Dairy. (11) General Socio-Economic Structure II. (12) Unemployment. (13) Percent Business Activity. (14) Rural Non-Farm Population. (15) Agricultural Business Composition III. (16) Agricultural Business Composition IV. Minimum significance levels required were specified at the 10 percent level.

[c]Coefficient of determination.

[d]Coefficient of determination adjusted for degrees of freedom.

[e]County area government conceptual variables from Table 11. The individual per capita governmental characteristics from Tables 14 and 15 contained in those conceptual variables are: CV 1, police expenditures; CV 2, highway expenditures; CV 4, total general revenue, hospital expenditures, and total expenditures; CV 5, property taxes, total general revenue, and educational expenditures and; CV 7, capital expenditures.

[f]Socio-economic conceptual variables significant.

[g]Socio-economic conceptual variables significant after socio-economic regions designated and used as discrete variables in the model.

[h]County government conceptual variables from Table 12. The individual per capita governmental characteristics from Tables 14 and 15 contained in those conceptual variables are: CV 1, property taxes, total general revenue, police expenditures, highway expenditures, total expenditures, and capital expenditures; CV 3, hospital expenditures.

the various functional relationships had certain combinations of significant variables in common with CV 2 is not necessarily meaningful. The general conclusion for county area is that since almost all socio-economic CVs are used in "defining" relationships, the underlying structure is the entire socio-economic system originally considered. Examination of the remaining county area governmental conceptual variables tend to support this since few systematic relationships were found except those containing significant variables that were also contained in CV 2.

Socio-economic regional patterns were also used in conjunction with socio-economic CVs in analyzing county area governmental conceptual variables (equation 2, Table 14.) As was true previously, "explanatory powers" were generally increased with the exception of CV 2 where it did not change and CV 7 where the $\bar{R}^2$ decreased. In general, explanatory powers were increased by using regional patterns with socio-economic conceptual variables.

County government characteristics were all contained in county government CV 1 except hospital expenditures which was included in CV 3. In contrast to the CA analysis, the percentage of CV 1's variation explained exceeded the explanatory powers of the functions where the characteristics were examined independently. But since 10 of the possible 16 socio-economic variables were significant, it is an

additional indication that many characteristics need to be considered in analyzing governmental revenue-expenditure patterns.[1]

For county government hospital expenditures, contained in CV 3, the $\bar{R}^2$ was less than when hospital expenditures were studied separately. The significant variables, however, were identical for each. This is one of the few cases where significant relationships were constant between forms of analysis and between types of government. The significant variables were identical when hospital expenditures were analyzed separately for CA and CG governments, and when analyzed as conceptual variables: CV 4 for county areas and CV 3 for county governments. Interestingly enough, CV 4 for county areas also contained total expenditures per capita and total general revenue per capita.

County area and county government conceptual variables not containing governmental characteristics analyzed individually have not been discussed. In general, results of the analysis of these remaining variables conforms to those previously shown. The mixture of significant socio-economic conceptual variables indicated there was no common specific structure. In addition, explanatory powers of the functional relationships were no larger than those shown in

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[1]These 10 significant variables were also significant for CV 2 of county area governments.

Table 14 and were frequently lower. In several cases, none of the socio-economic conceptual variables were significantly related to the governmental CVs. Addition of regional patterns into the analysis had results similar to those previously shown. That is, the general result was that explanatory powers of the functional relationships were improved but not always. Examination of governmental CVs with identical "names" indicated no similarity of relationships.

Development of governmental conceptual variables compressed a considerable amount of information into a smaller set of independent CVs. The use of these CVs in this analysis did not bring any specific structure into view. The analysis did indicate combinations of socio-economic CVs significantly related to the interrelated variables contained in governmental CVs. Therefore, one could then look back into the previous analysis and see some similarities of underlying structure. What became more clear however was the absence of ubiquitous relationships among governmental CVs. It is true that several county area governmental CVs had all of their significant variables also significant for another CV. But, since that CV (CV 2) had so many significant relationships, it was really stating that there is a general relationship. That is, in general, governmental revenue-expenditure patterns are related to almost all of the socio-economic characteristics originally

considered. And yet, for specific governmental functions or for a set of interrelated governmental functions, the relationships are specific for that given set only.

Analysis of a particular governmental conceptual variable indicates the approximate relationships for all of the important governmental characteristics contained within that CV. But examination of those component parts indicate that the relationships between parts may vary significantly. It would therefore appear that the basic value of examining a dependent conceptual variable would be only as a first approximation as to what relationship might be expected. Only for the analysis of county government conceptual variable one was the functional relationship an improvement over the analysis that did not use conceptual variables.

CHAPTER VI

SUMMARY, CONCLUSIONS, RECOMMENDATIONS FOR FURTHER RESEARCH

Summary

In general, relationships between economic development and local governmental services are not well defined in the available literature since there are a number of contradictory opinions. If one assumes industrial expansion is synonomous with economic development, most empirical "location" studies indicate local community factors have relatively little importance. But, many of these studies contain internal observations implying that community factors may be relatively important in final industrial location decisions. Descriptive studies of depressed areas frequently cite absence or inadequacy of local governmental services whereas comments on developed areas stress availability and general adequacy of such services.

The objectives of this study were to determine relationships between local governmental services and socio-economic measures of local areas and to examine those relationships for consistency between different levels of

government. To satisfy these objectives, it was assumed that present socio-economic structure is a proxy for past economic development and, further, that governmental revenue-expenditure patterns are adequate measures of available local governmental facilities and services.

No single measure can adequately account for differences in economic growth across a state or nation since economic development is a complex of interrelated occurrences. At the same time, governmental revenues-expenditures may also be heavily interrelated. Therefore, the factor analytic technique was used to account for linkages of interrelated manifestations. Factor analysis was used in two ways. First, separate regional patterns (factors) were developed from the socio-economic and county area and county governmental characteristics (variables.) Secondly, conceptual variables (factors) utilizing interactions between individual characteristics were also developed from the socio-economic and governmental data. Results from the regionalization and from conceptualizing the variables were then compared.

In addition, ordinary least squares regression techniques were utilized to examine degree and strength of association between the socio-economic and governmental variables. To provide a benchmark, selected governmental characteristics were "regressed" with selected socio-economic characteristics. Then, socio-economic conceptual variables

alone and in conjunction with socio-economic regions were used as "independent" variables. Lastly, selected governmental conceptual variables were used as dependent variables and regressed against socio-economic conceptual variables and regions.

Conclusions

Three working hypotheses were developed at the beginning of this study as being necessary to accomplish the objectives set forth. Several different procedures were followed to satisfy the objectives and to provide the necessary information to "test" the working hypotheses.

The first hypothesis.--was that there is a positive relationship between socio-economic measures of local areas and local governmental services. Results of this study are contradictory for this hypothesis. First of all, it was assumed that if socio-economic phenomena and governmental revenue-expenditures were associated, then regional patterns developed from each by factor analysis would also be related. From regions formed in this study, however, one would conclude that there is relatively little association between socio-economic and governmental revenues-expenditures characteristics. In general, the composition of counties contained within any given socio-economic region did not have any similarity to the composition of the governmental

regions. Even though there were some similarities between a few regions, total relationships would still be considered weak.

On the other hand, use of regression analysis indicated relationships between the socio-economic measures and local governmental services as measured by revenues-expenditures. First, nine (seven) county area governmental (county governmental) characteristics were selected as dependent variables with ten socio-economic characteristics. For the 16 equations, the adjusted coefficient of determination varied from 70 per cent to 7 per cent. The substitution of socio-economic conceptual variables (factors) for the selected socio-economic characteristics generally improved the adjusted coefficient of determination. In several cases, explanatory powers were more than doubled and the coefficient ($\bar{R}^2$) exceeded 70 per cent in four cases. In general, one would conclude from the regression analysis that there is an association between governmental revenues and expenditures and socio-economic characteristics. The ability to "explain" those associations improves when interrelationships among the socio-economic variables are considered.

It was implicit in the hypothesis that by examining the complex interrelationships of a system of variables, a specific relationship could be found that would be appropriate for more than one governmental characteristic. However, it was apparent throughout the analysis of individual

governmental characteristics that there were no specific structural relationships that were ubituitous. Instead, almost all socio-economic factors were considered with unique relationships for specific governmental characteristics. In an effort to incorporate interrelationships among and between the governmental characteristics, governmental conceptual variables (factors) containing specified governmental characteristics were analyzed with the socio-economic conceptual variables (factors.) The structural relationships found indicated support for the conclusion that there were no apparent specific underlying relationships applicable to governmental characteristics in general. Therefore, an association was found between the socio-economic measures of local areas and local governmental services but the implicit hypothesis of isolating a specific association that would be ubiquitous was not satisfied.

The second hypothesis.--was that relationships found in the first hypothesis would vary by geographic area. It has already been shown that regional patterns developed from the socio-economic and governmental characteristics were not similar. Based on the results of comparing the regions developed, the conclusion would be that either there is no association between the selected characteristics and geographic location or that factor analysis was unable to isolate those relationships in a comparative geographic framework. It would appear that the latter alternative may be

the most likely. The socio-economic regions developed from factor analysis were used as discrete variables in the regression equations discussed previously. In general, usage of socio-economic regions added more information to "explaining" the governmental variables' variance than was lost from change in degrees of freedom. That is, the coefficient of determination adjusted for degrees of freedom increased. It was concluded earlier, on the basis of comparing governmental and socio-economic regions, that little geographic similarity was present. But, when those socio-economic regions were included in the regression equations, it was apparent that the governmental characteristics vary by geographic location.

The third hypothesis.--was that relationships found in hypothesis one would vary by type of governmental unit studied. This study analyzed aggregated county area government and county government. Analysis of the governmental conceptual variables (factors) developed indicated little similarity between types of government. Regional patterns developed from factor analysis for both types of government were also different. In addition, the explanatory powers of various regression equations and associations with significant independent characteristics were generally different. Therefore, the evidence supports the hypothesis that any relationships uncovered would vary by type of governmental unit. As different governmental levels have

different mixes of activities and therefore different patterns of revenues and expenditures, the absence of similarity between the two is not unexpected. It does highlight the differences between governmental levels and the difficulty of attempting to make general conclusions relevant to more than one level of government.

In general, all hypotheses could be answered positively, at least in part. However, there was enough contradiction to inhibit any absolute conclusions except for the third hypothesis. It would appear that the techniques used in this study hold considerable promise for obtaining the necessary information to understand the processes and relationships between socio-economic structure and governmental revenue-expenditure patterns. However, refinements beyond those presented in this study may be necessary.

Recommendations for Further Research

While factor analysis has been used in various studies to generate regional classifications and "conceptual variables", it would appear that the factor analysis model could use empirical testing for socio-economic research. For example, how sensitive are the results obtained from the model? If the mix of variables or observations are altered, do the general results change? Results obtained early in this study indicated a given mix of variables could make

regional discrimination difficult at best.[1] Does this then imply that factor analysis is not designed to discriminate between variables that represent a broad spectrum of phenomena? By the same token, would a change in the mix of variables alter the composition of variables included within a given factor? If the composition was found to be sensitive to the mix of characteristics, does this alter the general relationships found when using regression analysis? It was considered to be beyond the scope of this study to examine these questions. At the same time, there is little doubt that answers to these are necessary before the technique of factor analysis can become generally applicable to this problem.

Most, if not all, researchable socio-economic, governmental relationships are the product of a complex, interrelated system of past and present. To obtain a solution that incorporates more than a small part of the different phenomena that need to be considered, it is this author's belief that multi-variate techniques need to be a part of a researcher's tools. The basic strength of factor analysis is that it takes into account the complex interactions among variables and compresses a great deal of information into relatively few "conceptual variables." However, it is this very compression of information that is perhaps its

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[1]See footnote 1, p. 34.

greatest weakness when using those variables in further analysis. As factor scores are basically index numbers generated by the relative weights of each individual characteristic, there is some problem of individual application of regression results in a real world. The conceptual variables are basically abstractions from original relationships. When the conceptual variables are used for both independent and dependent characteristics, a multiple abstraction exists. Future researchers into the subject area covered by this study may want to explore the multi-variate technique of Automatic Interaction Detectors.[1] It is possible that this technique might not have the inherent difficulties associated with factor analysis.

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[1]John A. Sonquist, Multivariate Model Building: The Validation of a Search Strategy, Institute for Social Research, The University of Michigan, Ann Arbor, Michigan, 1970; John A. Sonquist and James N. Morgan, The Detection of Interaction Effects, Monograph No. 35, Institute for Social Research, The University of Michigan, Ann Arbor, Michigan, 1964; and Janos B. Koplyay, C. Deene Gott, and John H. Elton, Automatic Interaction Detector AID-4, Technical Report Preliminary Draft, Personnel Division, Computer and Management Science Branch, Human Resources Laboratory, Air Force Systems Command, Brooks Air Force Base, Texas, January, 1971 (Xerox).

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APPENDICES

APPENDIX A

SOCIO-ECONOMIC CHARACTERISTICS

1. Total population, 1960.
2. Percentage change in effective buying income, 1950-1960.
3. Net migration, 1950-1960.
4. Percent of population rural nonfarm, 1960.
5. Percent of population rural farm, 1960.
6. Cumulative fertility rate, 1960.
7. Value of retail sales per capita, 1958.
8. Value of wholesale sales per capita, 1958.
9. Value added by manufacturing per capita, 1958.
10. Total bank deposits per capita, 1960.
11. Effective buying income per capita, 1960.
12. Percentage change in effective buying income per capita, 1950-1960.
13. Percent of the 1960 population who lived in a different county in 1955.
14. Percent of the population employed, 1960.
15. Percent of total dwelling units dilapidated, 1960.
16. Percent of total labor force male, 1960.
17. Percent of total unemployment male, 1960.
18. Value of farm products sold per farm, 1959.
19. Percent of farm operators working 100 or more days off the farm, 1959.
20. Percent of farm operators with other family income exceeding the value of agricultural products sold, 1959.
21. Acres per farm, 1959.
22. Total number of farms, 1959.
23. Percent of the employed labor force working outside of the county of residence, 1959.
24. Relative Migration (net migration '50-'60 ÷ 1950 population).
25. Percentage change in retail sales per capita, 1948-1958.
26. Percent of population 25 or over with 6 years education or less, 1960.
27. Percent of population 25 or over with 4 years of high school or more, 1960.
28. Crop value as a percent of total farm products sold, 1959.
29. Dairy value as a percent of total farm products sold, 1959.
30. Poultry value as a percent of total farm products sold, 1959.

31. Forest value as a percent of total farm products sold, 1959.
32. Percent of the population less than 15 years old, 1960.
33. Percent of the population 60 years old or more, 1960.
34. Percent of families with less than $3,000 income, 1960.
35. Percent of families with $10,000 income or more, 1960.
36. Percentage change in wholesale sales per capita, 1948-1958.
37. Percentage change in value added by manufacturing per capita, 1948-1958.
38. Percent of commercial farms grossing $10,000 or more, 1959.
39. Percentage change in bank deposits per capita, 1950-1960.
40. Percentage change in total unemployment, 1950-1960.
41. Relative change in percent unemployed, 1950-1960.
42. Relative change in percent of population employed, 1950-1960.
43. Percentage change in dilapidated dwelling units, 1950-1960.
44. Relative change in percent of labor force male, 1950-1960.
45. Relative change in percent of unemployment male, 1950-1960.
46. Percentage change in number of dwelling units, 1950-1960.
47. Percentage change in value of farm products sold per farm, 1949-1959.
48. Relative change in percent of farm operators working 100 or more days off the farm, 1949-1959.
49. Relative change in percent of farm operators with other family income exceeding value of agricultural products sold, 1949-1959.
50. Percentage change in acres per farm, 1949-1959.
51. Percentage change in acres per farm, 1959-1964.
52. Percentage change in cropland acres per farm, 1949-1959.
53. Percentage change in cropland acres per farm, 1959-1964.
54. Non-farm income per farm, 1964.
55. Relative change in percent of farm operators working 100 or more days off the farm, 1959-1964.
56. Wages and salaries per farm, 1964.
57. Percentage change in value of farm products sold per farm, 1959-1964.

58. Nonfarm business and professional income per farm, 1964.
59. Percentage change in bank deposits per capita, 1959-1964.
60. Percentage change in retail sales per capita, 1958-1964.
61. Percentage change in wholesale sales per capita, 1958-1964.
62. Percentage change in value added by manufacturing per capita, 1958-1964.
63. Percentage change in number of farms, 1949-1959.
64. Percentage change in number of farms, 1959-1964.
65. Percentage change in value of farm products sold, 1949-1959.
66. Percentage change in value of farm products sold, 1959-1964.
67. Percentage change in value of crops sold, 1949-1959.
68. Percentage change in value of dairy products sold, 1949-1959.
69. Percentage change in value of poultry products sold, 1949-1959.
70. Percentage change in value of forest products sold, 1949-1959.
71. Percentage change in number of farms grossing $10,000 or more, 1949-1959.
72. Percentage change of land in farms, 1959-1964.
73. Percentage change in cropland harvested, 1959-1964.
74. Percentage change in number of farms grossing $10,000 or more, 1959-1964.
75. Percentage change in crop value sold, 1959-1964.
76. Percentage change in dairy products sold, 1959-1964.
77. Percentage change in poultry products sold, 1959-1964.
78. Percentage change in rural nonfarm population, 1950-1960.
79. Percentage change in rural farm population, 1950-1960.
80. Percentage change in urban population, 1950-1960.
81. Relative change in percent crop value is of total value of farm products sold, 1949-1959.
82. Relative change in percent dairy products value is of total value of farm products sold, 1949-1959.
83. Relative change in percent poultry products value is of total value of farm products sold, 1949-1959.
84. Relative change in percent forestry products value is of total value of farm products sold, 1949-1959.
85. Relative change in percent of population 25 or over with 6 years education or less, 1950-1960.
86. Relative change in percent of population 25 or over with 4 years of high school or more, 1950-1960.

87. Relative change in percent of population less than 15 years old, 1950-1960.
88. Relative change in percent of population 60 years old or more, 1950-1960.
89. Percentage change in families with less than $3,000 income, 1950-1960.
90. Percentage change in families with $10,000 income or more, 1950-1960.
91. Relative change in percent of population classified as rural nonfarm, 1950-1960.
92. Relative change in percent of population classified as rural farm, 1950-1960.
93. Birth rates, 1960.
94. Percentage change in total population, 1950-1960.
95. Cropland acres per farm, 1959.
96. Percent of the population urban, 1960.
97. Percentage change in the total labor force, 1950-1960.
98. Relative change in percentage of dilapidated dwelling units, 1950-1960.
99. Percentage change of land in farms, 1949-1959.
100. Percentage change in forest products sold, 1959-1964.
101. Relative change in percent of all farms grossing $10,000 or more, 1959-1964.
102. Percentage change in population density, 1950-1960.
103. Relative change in percent crop value is of total value of farm products sold, 1959-1964.
104. Relative change in percent dairy products value is of total value of farm products sold, 1959-1964.
105. Relative change in percent poultry products value is of total value of farm products sold, 1959-1964.
106. Relative change in percent forest products value is of total value of farm products sold, 1959-1964.
107. Relative change in percent of families with less than $3,000 income, 1950-1960.
108. Relative change in percent of families with $10,000 income or more, 1950-1960.
109. Death rates, 1960.
110. Median educational level of those 25 years old or over, 1960.

APPENDIX B

"IMPORTANT" VARIABLES ASSOCIATED WITH SOCIO-ECONOMIC REGIONS[a]

Region	Variables[b]
1.	4, 5, 6, 16, 23, 34, 86, 89, 107, -8, -9, -10, -11, -14, -27, -35, -87, -96, -110.
2.	16, 17, 21, 29, 31, 50, 52, 70, 74, 84, -20, -28, -37, -59, -63.
3.	2, 13, 18, 19, 20, 24, 46, 97, 102, 110, -5, -10, -22, -48, -49, -63, -76, -79, -92, -99, -104.
4.	12, 23, 64, 72, 76, 95, -7, -8, -10, -26, -28, -88.
5.	15, 22, 26, 47, 65, 78, 85, 98, -17, -21, -27, -45, -59, -60, -95, -110.
6.	12, 23, 33, 59, 60, 75, 85, 93, 103, 109, -32, -48, -78, -86.
7.	19, 20, 51, 60, 62, 71, 78, -18, -25, -28, -38, -61, -64, -86, -105.
8.	12, 15, 19, 20, 28, 61, 70, 84, 90, 101, -2, -8, -44, -89.
9.	40, 67, 85, 104, -36, -41, -57, -66, -75, -103.
10.	15, 17, 43, 45, 78, 98, -36, -40, -85.
11.	7, 12, 25, 47, 61, 65, 76, 88, 104, -28, -60, -66.
12.	13, 21, 42, 78, 108, -6, -19, -32, -40, -41, -45.
13.	40, 41, 43, 55, 66, 74, 85, 98, 101, -19, -45, -47, -51, -105.

[a] "Important" variables are those associated with a factor score of $\pm$ 1.5 or more.

[b] The numbers are associated with the list of variables from Appendix A. The positive association sign is assumed; the negative association sign is indicated. For the "a" sub-regions, the signs are accurate. For the "b" sub-regions, the signs would all be reversed to indicate the proper association.

APPENDIX C

GOVERNMENTAL CHARACTERISTICS[a]

1. Property taxes per capita, 1967.
2. Relative change in property taxes per capita, 1962-1967.
3. Sales taxes per capita, 1967.
4. Income taxes per capita, 1967.
5. Property taxes per capita as a percent of total tax per capita, 1967.
6. Property taxes per capita as a percent of own total revenue per capita, 1967.
7. Property taxes per capita as a percent of total general revenue per capita, 1967.
8. Intergovernmental revenue for education as a percent of total intergovernmental revenue, 1967.
9. Intergovernmental revenue for health and hospitals as a percent of total intergovernmental revenue, 1967.
10. Intergovernmental revenue for highways as a percent of total intergovernmental revenue, 1967.
11. Intergovernmental revenue for housing as a percent of total intergovernmental revenue, 1967.
12. Charges and miscellaneous revenue per capita, 1967.
13. Total tax revenue per capita, 1967.
14. Total own revenue per capita, 1967.
15. Total general revenue per capita, 1967.
16. Relative change in charges and miscellaneous revenues per capita, 1962-1967.
17. Relative change in total tax revenues per capita, 1962-1967.
18. Relative change in total own revenue per capita, 1962-1967.
19. Relative change in total general revenue per capita, 1962-1967.
20. Current education expenditures as a percent of total expenditures, 1967.
21. Current police expenditures as a percent of total expenditures, 1967.
22. Current fire expenditures as a percent of total expenditures, 1967.
23. Current highway expenditures as a percent of total expenditures, 1967.

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[a]The "relative change" in the governmental characteristics was computed by: Characteristic '67 ÷ Characteristic '62 = Relative Change. The conversion to "percentage change" was not done since there would then be no way to distinguish between "no change" in activity and "no activity."

24. Current sewage expenditures as a percent of total expenditures, 1967.
25. Current sanitation expenditures as a percent of total expenditures, 1967.
26. Current welfare expenditures as a percent of total expenditures, 1967.
27. Current higher education expenditures as a percent of total expenditures, 1967.
28. Current library expenditures as a percent of total expenditures, 1967.
29. Current hospital expenditures as a percent of total expenditures, 1967.
30. Current health expenditures as a percent of total expenditures, 1967.
31. Current parks and recreation expenditures as a percent of total expenditures, 1967.
32. Current financial administration expenditures as a percent of total expenditures, 1967.
33. Current general control expenditures as a percent of total expenditures, 1967.
34. Current housing and urban renewal expenditures as a percent of total expenditures, 1967.
35. Current general public building expenditures as a percent of total expenditures, 1967.
36. Current correction expenditures as a percent of total expenditures, 1967.
37. Current natural resources expenditures as a percent of total expenditures, 1967.
38. Current education expenditures per capita, 1967.
39. Current police expenditures per capita, 1967.
40. Current fire expenditures per capita, 1967.
41. Current highway expenditures per capita, 1967.
42. Current sewage expenditures per capita, 1967.
43. Current sanitation expenditures per capita, 1967.
44. Current welfare expenditures per capita, 1967.
45. Current higher education expenditures per capita, 1967.
46. Current libraries expenditures per capita, 1967.
47. Current hospitals expenditures per capita, 1967.
48. Current health expenditures per capita, 1967.
49. Current parks and recreation expenditures per capita, 1967.
50. Current financial administration expenditures per capita, 1967.
51. Current general control expenditures per capita, 1967.
52. Current housing and urban renewal expenditures per capita, 1967.
53. Current general public building expenditures per capita, 1967.
54. Current correction expenditures per capita, 1967.
55. Current natural resources expenditures per capita, 1967.

56. Current other expenditures per capita, 1967.
57. Current total expenditures per capita, 1967.
58. Relative change in current education expenditures per capita, 1962-1967.
59. Relative change in current police expenditures per capita, 1962-1967.
60. Relative change in current fire expenditures per capita, 1962-1967.
61. Relative change in current highway expenditures per capita, 1962-1967.
62. Relative change in current sewage expenditures per capita, 1962-1967.
63. Relative change in current sanitation expenditures per capita, 1962-1967.
64. Relative change in current welfare expenditures per capita, 1962-1967.
65. Relative change in current higher education expenditures per capita, 1962-1967.
66. Relative change in current library expenditures per capita, 1962-1967.
67. Relative change in current hospital expenditures per capita, 1962-1967.
68. Relative change in current health expenditures per capita, 1962-1967.
69. Relative change in current parks and recreation expenditures per capita, 1962-1967.
70. Relative change in current financial administration expenditures per capita, 1962-1967.
71. Relative change in current general control expenditures per capita, 1962-1967.
72. Relative change in current housing and urban renewal expenditures per capita, 1962-1967.
73. Relative change in current general public building expenditures per capita, 1962-1967.
74. Relative change in current correction expenditures per capita, 1962-1967.
75. Relative change in current natural resource expenditures per capita, 1962-1967.
76. Relative change in current other expenditures per capita, 1962-1967.
77. Relative change in current total expenditures per capita, 1962-1967.
78. Interest on general debt per capita, 1967.
79. Relative change in interest on general debt per capita, 1962-1967.
80. Salaries and wages paid per capita, 1967.
81. Relative change in salaries and wages paid per capita, 1962-1967.
82. Total assets per capita, 1967.
83. Relative change in total assets per capita, 1962-1967.

84. Per capita revenue from State government, 1967.
85. Per capita revenue from Federal government, 1967.
86. Per capita revenue from local governments, 1967.
87. Relative change in per capita revenue from State government, 1962-1967.
88. Relative change in per capita revenue from Federal government, 1962-1967.
89. Total capital expenditures per capita, 1967.
90. Relative change in total capital expenditures per capita, 1962-1967.

APPENDIX D

"IMPORTANT" VARIABLES ASSOCIATED WITH
COUNTY AREA GOVERNMENT REGIONS[a]

Region	Variables[b]
1.	23, 26, 32, 33, 35, 44, 51, 53, 71, -38, -58, -77.
2.	5, 10, 27, 28, 45, 46, 63, -34, -52, -56, -62, -76.
3.	7, 21, 22, 31, 36, 39, 40, 49, 54, 59, -84.
4.	12, 24, 29, 42, 47, -1, -6, -7, -13, -20, -36, -38.
5.	30, 48, 59, 61, 71, 81, 87, -36, -70, -83.
6.	29, 30, 36, 88, 90, -8, -10, -11, -34, -52, -65, -78, -82.
7.	2, 17, 18, 19, 36, 54, 59, 61, -28, -30, -35, -46, -53, -73, -90.
8.	35, 53, 59, 73, -6, -30, -48, -66, -67, -68.
9.	69, 71, 85, 88, -2, -17, -30, -48, -62.
10.	16, 32, 49, 70, -5, -22, -26, -40, -44, -60, -64, -76, -89, -90.
11.	9, 28, 46, 86, -22, -27, -45, -76, -89.
12.	36, 54, 73, 81, -21, -25, -59, -69.
13.	3, 25, 26, 28, 43, 44, 46, 56, 76, -14, -73, -89.
14.	1, 7, 13, 28, 46, -8, -36, -60, -70, -73, -84, -85.
15.	16, 18, 26, 44, 64, 69, 71, 86, -23, -24, -41, -42, -62.
16.	-8, -20, -37, -55.
17.	18, 20, 28, 71, 88, -15, -43, -44, -47, -50, -53, -57, -80, -84.

[a] "Important" variables are those associated with a factor score of ± 1.5 or more.

[b] The numbers are associated with the list of variables from Appendix C. The positive association sign is assumed; the negative association sign is indicated. For the "a" sub-regions, the signs are accurate. For the "b" sub-regions, the signs would all be reversed to indicate the proper association.

APPENDIX E

"IMPORTANT" VARIABLES ASSOCIATED WITH COUNTY GOVERNMENT REGIONS[a]

Region	Variables[b]
1.	5, 12, 14, 15, 29, 47, 57, 80, -2, -6, -17, -28, -35, -61, -77.
2.	16, 19, 59, -1, -7, -13, -33, -51, -86.
3.	5, 16, 18, 30, 48, 61, 77, 81, -32, -46, -50, -66, -89.
4.	41, 44, 57, 59, 81, 84, -24, -33, -36, -42, -62, -78, -82, -83, -86.
5.	16, 18, 32, 70, 71, -5, -30, -46, -48, -67, -86.
6.	37, 39, 86, -32, -50.
7.	2, 5, 10, 19, 23, 28, 46, 86, 90, -9, -21, -30, -39, -67, -78.
8.	28, 32, 33, 39, 46, 59, 70, 73, -1, -13, -21, -31, -41, -44, -49, -53.
9.	53, 54, 61, -5, -26, -44, -64.
10.	5, 7, 35, 46, 66, -36, -54, -59, -86.
11.	10, 67, -28, -46, -61, -66, -71, -77, -81, -86, -87.
12.	6, 9, 35, 67, 68, 71, 73, 81, 87, -16, -18, -39, -66, -78.
13.	25, 31, 36, 43, 63, -78, -89.
14.	35, 53, 73, -9, -79, -82, -89, -90.
15.	2, 17, 18, 56, 76, -35.
16.	22, 40, 60, 74, 79, -50, -70.
17.	2, 13, 17, 90, -1, -5, -61, -68, -81.
18.	55, 61, 69, -31, -49, -59, -66, -71.

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[a] "Important" variables are those associated with a factor score of $\pm$ 1.5 or more.

[b] The numbers are associated with the list of variables from Appendix C. The positive association sign is assumed; the negative association sign is indicated. For the "a" sub-regions, the signs are accurate. For the "b" sub-regions, the signs would all be reversed to indicate the proper association.