THE EFFECT OF POPULATION GROWTH AND OTHER VARIABLES ON PER CAPITA EXPENDITURES IN KANSAS COUNTIES

by

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CHAPTER I

INTRODUCTION

Problem

The cost of local government is of increasing concern to many people. Local governments are faced with providing public services to the populace and providing those services at reasonable cost, cost that the general public accepts as reasonable. If those governments fail to meet that goal, the voters can change the system and elect new officers to perform the duties. Those governments must provide the services demanded without incurring additional costs that the public view as excessively high. Even in times of inflation, public officials are faced with the task of keeping a rein on public expenditures.[1] That is a problem since public expenditures have not declined except in rare cases over past years. Factors such as rising cost of resources, inflation, and increased demand for more or better services have increased the expenditures of local governments. When methods are found that offer possible control of expenditures, local governments will consider their use.

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[1]Expenditures, expenses, and costs are often used as synonyms. Since they do have different meanings, they will be defined. Expenditure refers to the actual outlay of funds for the service with no measure of the resulting product. Expenses are costs incurred when goods or services are consumed, not when goods and services are bought. Cost refers to the expenditure necessary to generate a known amount of output. The terms are defined so accurate interpretation can be used in the paper. The sources of the definitions were: Donald B. Erickson, Arlo W. Biere, and John B. Sjo, City and County Public-service Expenditures, Kansas, 1960 to 1970, (Agricultural Experiment Station, Kansas State University, Bulletin 578, Feb. 1974) p. 5, and Patricia Davis, Arlo W. Biere, Donald B. Erickson, and John Sjo, "Public-service Accounting Systems", Public Affairs Pamphlet Series, (Agricultural Experiment Station, Kansas State University, Dec., 1974) pp. 2-3.

When the total expenditures that local governments make are considered, the likelihood of a reduction seems remote. But if total expenditures are difficult to lower it then seems likely that the per capita costs could be reduced if more people were included within the jurisdiction of the local government because there are more people to spread the cost over. Lower expenditures per individual could be passed to the taxpayer as lower taxes per person. If per capita taxes could be reduced, taxpayers would support such a procedure. The problem facing local governments is finding means to lower per capita expenditures. That could be accomplished if there are economies of scale by increasing the size of the jurisdiction. Expansion to take advantage of economies of scale results in several problems. The present legal structure of governments, public dissatisfaction with increased size, and operational problems may restrict enlargement of the operations. Also expansion may not lower per capita expenditures. Expansion may add new costs to provide public services.

The future financial structure and operational ability of Kansas counties may depend upon finding methods to at least slow rising expenditures, if reduction or stabilization seems unlikely. During the 1960's Kansas counties were confronted with rising expenditures. Finding ways to cope with those growing expenditures was a question facing counties. If ways are found to help administrators solve that problem, the counties of Kansas will be better able to provide services that the public needs and desires. Finding those methods and then using them is a goal local governments would like to fulfill.

Objectives

Determining whether economies of scale exist in the public sector of the economy as it does in private industry is a question confronting county governments. If there are economies of scale in the public sector, the unit cost of the output could be reduced: or, as scale increases, per capita expenditures decrease. The objective was to test whether economies of scale do exist for public services.

I also studied the factors that affect per capita expenditures. In the analysis, population growth was a factor of special interest. In a Colorado study by Therese C. Lucas, The Direct Costs of Growth, a comparison of changes in local government expenditures in growth and nongrowth counties in Colorado was made.[2] Lucas was concerned whether population growth increased expenditures in Colorado counties. She analyzed the effects of population growth and nongrowth on local government expenditures. The data available for Kansas counties is more detailed than was the Colorado data.

The effect of population growth through time series and cross-sectional analysis on per capita expenditures was a major phase of this study. Identifying other important variables that influence per capita expenditures was also a goal. By considering growth and other variables I sought to determine if economies of scale existed in the public sector.

In Chapter II the terms economies of scale and economies of size are defined. Included in the chapter is a conceptional identification of

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[2]Lucas, Therese C., The Direct Costs of Growth, (Denver, Colorado: The Colorado Land Use Commission, April, 1974).

the variables influencing per capita expenditures. Also a discussion about population changes in the 105 counties of Kansas from 1960 to 1971 is within the chapter. In Chapter III the models are developed and the analysis discussed.

CHAPTER II

VARIABLES AND ECONOMIES OF SCALF

Introduction

Before a model can be developed to test the relationship between per capita expenditures and relevant independent variables several concepts should be clarified. The term economies of scale needs to be defined as well as distinquished from economies of size. Those terms are sometimes interchanged although the concepts are different. A discussion of the variables that influence per capita expenditures will follow. Population growth patterns in Kansas are a part of this chapter.

Economies of Scale

The Private Sector and Economies of Scale

In private industry profit is a major concern so when methods of reducing per unit costs are found they are implemented. If economies of scale exist, an increase in output will lower the per unit costs to the firm. Industries are faced with three types of economies of scale: (1) internal economies of scale to the firm, (2) economies of scale external to the firm but internal to the industry (localization economies), and (3) economies of scale external to the industry (urbanization economies). Each has an effect on the average costs. By defining economies of scale as it relates to industry, the relationship to public services is an expansion of the concept. Although industries function differently than local governments, the existence of economies of scale is a possibility.

The different types of economies affect costs in different ways. Internal economies of scale exist if the average cost is reduced along the same cost curve when output is expanded. The firm can reduce costs within its own structure. Localization economies exist when a specialized firm performs a function for several firms. The specialization reduces the average cost curve. Reductions in cost that result from using other services such as lawyers, bankers, and accountants, are urbanization economies. Firms would use such services to lower their average cost curve. The relationship of those economies are discussed later.[1]

The Public Sector and Economies of Scale

Since a goal of local governments is to reduce per capita expenditures, expansion of one operation or consolidation of several operations will do that if there are economies of scale. There were three types of economies discussed and the possibility of each existing for public services were evaluated. Considering the characteristics of public services, internal economies seem the most likely to exist, although localization and urbanization economies could exist in certain situations.

Internal economies of scale would more likely be realized if the service or activity was specialized, repetitive, and standardized. In private industry if the inputs are specialized in a repetitive productive process, the product is standardized, the demand is stable for the output, and there is high managerial capability, internal economies of scale are very likely.[2] When the process is routine, machines are used, and new

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[1]M. Jarvin Emerson and F. Charles Lamphear, Urban and Regional Economics, Structure and Change (Boston: Allyn and Bacon, Inc., 1975), pp. 108-113.

[2]Hugh O. Nourse, Regional Economics (New York: McGraw-Hill Company, 1968), p. 87.

technology is easily adopted, county governments are very likely to have economies of scale. Private industry can find processes where economies of scale exist much easier than the public sector. They can specialize their process and produce the same quality output. Governments providing public services find it more difficult to specialize services. Many times the services provided require creativity and face-to-face contact. That type of process is very difficult to specialize into a routine procedure. Each situation may be very individualistic requiring a face-to-face time consuming interaction. Such services include health care, education, law enforcement, and welfare. Services like roads and bridges, general government operations, and water and sewage are more likely to be specialized, where the process is routine or machines are used.[3]

Localization and urbanization economies may also exist for public services, although they are not as likely as internal economies. Localization economies may exist if some service of the jurisdiction could be performed by a different company or agency. The local government might contract with a private firm to provide water and sewage services. That type of alternative would be performed basically in services that could be specialized and machines used. When there are economies for a service removed from a local government's jurisdiction, such as welfare, that is also localization economies. Urbanization economies of scale are less likely. They may occur when a local government used some outside service such as banking and legal services.[4]

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[3]John Sjo, Donald B. Erickson, Arlo W. Biere, "An Introduction to Public Services," Public Affairs Pamphlet Series, (Agricultural Experiment Station, Kansas State University, Dec., 1974), p. 4.

[4]Nourse, op.cit., pp. 87-90.

Complications of An Economies of Scale Study

If economies of scale exist for public services, the expansion of the output or increased size of the jurisdiction would reduce per unit costs. Several problems arise in economies of scale studies. Whether using time series or cross-sectional data, the problems of measuring output and the unit cost of production, comparability among costs, standardizing output, and the lack of incentive for government to reduce costs all affect a study of economies of scale.

To identify and measure output is the first problem. In private industry output is easily measured as the number of cars or television sets, or bushels of wheat. In public services the output is not as easily measured. The services of law enforcement, health care, welfare, and education do not produce a unit of output that is easily measured. Those services affect people in a more intangible manner and are difficult to identify and measure.

The cost of production must also be determined. Determining the average unit cost of the output is an important part of economies of scale studies. The direction unit costs move indicates whether there are economies, diseconomies, or constant returns to scale.

To determine the effects of size on the unit costs of production, costs and outputs must be comparable among jurisdictions. Different jurisdictions may provide different kinds of services. Comparing them may cause problems in the analysis. The quality of resources may vary among jurisdictions and affect the costs of production. Differing price levels, such as geographical wage and salary variation, make comparison among different government units difficult.

Public service output varies both quantitatively and qualitatively among government units. Not only must the output be measured but the quality of output must also be specified. Private industry can control the quality of a product so a desired level of quality can be established and maintained. The quality of public services may differ among different government units or even within the same jurisdiction over time. Larger governments may be able to provide better health care or educational services than smaller governments. Or possibly, smaller jurisdictions may have better police or welfare services than larger areas. The quality can vary among locations or change through time within the same community.

Comparison of different jurisdictions also may be difficult because the quantity of services are not equal. A larger area probably provides a larger library and hospital than a smaller community. The quantity of services must be considered along with the quality of services.

The relationship between the geographical size of a government unit and its expenditures affect per unit costs. Jurisdictions of the same size but with a different rural-urban community structure will not have comparable costs. If one community has one large city and the other has several small towns, the comparison could be biased.[5]

The demand for public services depends on the location and the size of a community, the life style, the values, and personal preferences of people. People are not the same everywhere and they demand different services. Even the same community through a time lapse will have changes in its demand schedule.

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[5]D. J. Alesch and L. A. Dougharty, Economies of Scale Analysis in State and Local Government (Council on Intergovernmental Relations, State of California, Department of Housing and Urban Development, May, 1971), pp. 20-29.

In private industry the decision of what output to produce is influenced by profit expectations. Management produces that product returning the highest profit. Public services are not produced for a profit. They are provided to satisfy the needs and wants of the general public. The incentive to local governments is the voting public. How the public votes influences the government's decision to provide public services. Even if economies of scale exist, the local jurisdiction may not take advantage if the general public votes for a different alternative.[6]

The Conceptual Basis for the Analysis

To construct a model for studying economies of scale in public services, many ideas and concepts are involved. First it was necessary to develop a method to measure the output and the average cost of that output. Since public service output is difficult to measure a proxy, the number of people served, was used. The proxy provides an approximate estimate of the scale of output. Expenditure by the unit producing the service approximates the cost. Therefore per capita expenditures were used to approximate the average unit cost of the output. Per capita expenditures were used to determine how size, the number of people served, affects costs.

When the effect of size, as measured by population, on per capita expenditures was considered, the analysis is one of *economies of size*, not economies of scale. Economies of size was used in this study.

The second step in developing the model was to identify which variable was the dependent variable. Per capita expenditures, as the proxy

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[6]Sjo, Erickson, and Biere, "An Introduction to Public Services," pp. 4-5.

for average costs, was identified as the dependent variable in many other economies of size studies. This author also identified the dependent variable as per capita expenditures.

Identifying the independent variables that influence per capita expenditures presents some problems. Many of the variables that affect expenditures are intangible. They are externalities that are difficult to identify and difficult to measure. That complicates accurately describing the true relationship among the variables. Before constructing the model used for the statistical analysis of the data, the variables that seemed to influence per capita expenditures were identified and their effects described. The identified variables were:

(1) The quantity of services demanded.

(2) Cost of resources--the price of labor, machinery, equipment, and raw materials.

(3) Availability and mobility of resources used for public services.

(4) Location and jurisdictional extent of the government unit.

(5) General economic conditions.

(6) Population density.

(7) Wealth of the jurisdiction.

(8) Population of the jurisdiction.

(9) Population growth of the jurisdiction.

The Quantity of Services Demanded

The quantity demanded of services offers some explanation of the level of per capita expenditures. If there are economies of size, an increase in the the quantity demanded would increase the public service output without raising per capita expenditures. Even if there were not economies of size, if the quantity demanded increased due to the population growing more rapidly than the output, per capita expenditures would not increase. As services were increased, the added number of people would keep the per capita expenditures from rising. If the quantity demanded rose with a proportionally smaller population increase, the government would be faced with higher expenditures with no additional people over which to spread the costs. Per capita expenditures would increase.

The effect of a population increase might not be as simple as stated. More people could also demand better quality or increased per capita quantity of services. That would result in rising per capita expenditures even if the population increased.

The effect of the quantity demanded on per capita expenditures depends on the source of the change; an increase in the number of people served, the desire for a better type service or services, or a desire to increase the per capita magnitude of some service. The effect is very difficult to measure. The quantity demanded was not included in the model.

Cost of Resources

The price of resources affects local government per capita expenditures directly. If the price of resources is higher in one area than the price of that resource in another area or higher than the price at some time in the past, then per capita expenditures will be higher, assuming all other factors constant.

Resource expenditures to produce public services include labor, machinery, equipment, and raw materials. Wage rates are usually higher in densely populated urban areas than in sparsely populated rural areas. Labor unions would also affect labor expenditures. Prices for hardware equipment may be lower for large purchases such as in an urban area. Smaller jurisdictions could lose such advantages. Prices for raw materials are usually lower in the areas they are found. In smaller counties the law requires all offices to be filled even when the amount of work required of that position does not require a full-time employee. The official is then underemployed. Also equipment and machinery can be underemployed if they are not used to their full potential. Since there are difficulties in measuring the cost of resources and comparing the results, they were not included in the model.

Availability and Mobility of Resources

When discussing resources, their availability should also be considered. The availability of resources alters expenditures. Larger communities would probably have more people available for employment in nonelective positions. A larger county may have better qualified employees for some positions because of a larger number of people from which to select and the higher wages paid.

Availability of other resources may affect expenditures. If gravel and rock are readily available for road surfacing per capita expenditures will be lower than if they must be transported to the jurisdiction. The farther the needed resources are from the place used, the higher the expenditures.

The availability of resources relates very closely to their mobility. If the needed resources are not available and not mobile, expenditures will increase. Such resources include land and building materials. When land is highly productive and fully used, the local government expenditures for land would be greater than in counties where land was readily available. Land is not a mobile resource. If the building material needed for construction was available only at so great a distance as to be functionally immobile, a less desirable material would have to be substituted. Mobility is not as great a problem for equipment and machinery. The farther the distance moved the higher the expenditure may be, but it would be an unusual case where costs would prohibit their transfer. Because of the difficulty of measurement, availability and mobility of resources was not included in the model as a variable.

Location of the Government Unit

The location of a government unit relative to other government units can influence the per capita expenditures. For example in urban areas, the city or cities may provide many of the services that a county in a rural area without a city would have to supply. The city may furnish services such as recreational facilities, hospitals, contracted fire protection, and electrical services. The externalities of the city spill over into the county. That situation allows a county with such a city to have lower per capita expenditures than counties without major or secondary cities. Examples of counties would include Sedgwick (Wichita), Shawnee (Topeka), Wyandotte and Johnson (Kansas City), Finney (Garden City), and Ellis (Hays).

Other location factors affecting expenditures include the location of universities or colleges or federal government installations in or near a local government unit. Such factors could alter expenditures in several ways. New people are attracted increasing the population base. The amount of funds available to the local government from state or federal subsidies could be increased.

The effect of location could also influence the type of service desired by the general public. Assuming more people were attracted to the county, the structure of the community could be changed if those people attracted were of a different background. That could alter the demand for public services which could alter the expenditures spent on the services.

Location, as a variable, has many facets. There are several ways location can influence per capita expenditures and many are intangible. They are forces that are difficult to observe and quantify, so location was not included as a variable in the model.

General Economic Conditions

The general economic conditions affecting industries, the area, the state, or even the nation affect local government per capita expenditures. General economic conditions alter the psychology of people to the point where life styles can be changed. In an area where economic conditions are bullish and people are prosperous, people want more services from the local government. In prosperous times recreational services may be newly demanded and others such as roads may be expanded. The results of prosperity may cause per capita expenditures to rise. People are better able to pay for those increased services.

During depressed times the use of most public services declines. Although some services as police and fire protection, hospitals, roads, sewage and water services, and schools, are required even in depressed times. Many times depressed areas also have a declining population that offsets any reduction in expenditures.

Inflation has a profound effect on local government expenditures. With inflation at the rate it has been during the 1960's and early 1970's, local governments are faced with another reason per capita expenditures increase. Between 1960 and 1970, the consumer price index, which is a measure of inflation, rose 31.1 percent. The average annual inflation increase for the first four years of the 1970's was ten percent. Expenditures would have to increase at the inflation rate to maintain the same level of services. There is no allowance for increased quantity or quality of services unless the efficiency of producing the public services improved.[7]

The general economic conditions influence the level of per capita expenditures. Measuring is very difficult so the variable was not included in the model.

Population Density

Population density affects per capita expenditures. Population density indicates the number of people per square mile within the government's jurisdiction. The denser the population the more people in the county. If economies of size exist for public services, the denser the population the lower the level of per capita expenditures unless density increases the need for the service proportionally more than benefits derived from economies of size.

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[7]Sjo, Erickson, and Biere, "An Introduction to Public Services," P. 2.

Wealth

The wealth of the people in local government units influences per capita expenditures. Wealth may be measured by the assessed property value in the jurisdiction, the income of the residents, and the buying power of the residents.

Of the three possibilities, income and buying power are not as related to local government per capita expenditures as is assessed property value. Income and buying power of residents indicate the well-being of a community but is not directly associated with the level and quality of public services. The assessed property value relates in a more direct manner because property values are the basis of the property tax which is a large share of local government revenues. Since expenditures are paid out of the revenues of the county and property tax accounts for a large share, wealth defined as property value would be more directly related to per capita expenditures.

Population

Population is the author's measure of size. It was hypothesized that size affects per capita expenditures. The greater number of people served the lower the per capita expenditures expected.

Population Growth

Population change as it affects per capita expenditures was the basic factor to be studied in this thesis. The initial goal of the author was to evaluate the effect of population changes of Kansas counties on their per capita expenditures. Does population growth result in lower per capita expenditures? Per capita expenditures was assumed to be the dependent variable and population change was assumed to be the independent variable of the relationship.

Causation asks the question, "Which variable affects the other?" Does population change affect per capita expenditures or the reverse?[8] Population growth results from an in-migration and/or a natural increase due to births outnumbering deaths. A population decline results from out-migration and/or deaths greater than births. If population change is assumed to be the independent variable, people then must migrate for reasons other than the level of local government per capita expenditures. Rather, people move because of job opportunities. It is not likely that a family would move because per capita expenditures were higher in their present community than in some other community. A person would be more motivated to move if the opportunities for employment were increased and if his family's general well-being were improved.

The observation of Kansas data supports the assumed direction of causation. The growth areas were communities that had growing employment opportunities. Those areas were also areas with lower per capita expenditures in most cases, but the indication is that the population change accounted for some decline in per capita expenditures.

Growth within a county even if it does not lower absolute per capita expenditures, may lower them in relation to nongrowth counties. If economies of size exist for public services, results would indicate that growth counties had lower per capita expenditures than nongrowth counties.

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[8]Daniel Lerner (ed.), Cause and Effect (New York: The Free Press, 1965), pp. 101-104.

Review of Variables

The variables just discussed are assumed to influence per capita expenditures. Not all were included in the models because of difficulties. The quantity demanded, the cost of resources, the availability and mobility of resources, the location of the jurisdiction, and the general economic conditions were the variables not included in the model. They were not used because they are difficult to measure and a proxy is difficult to select to represent them. The population density, wealth, population, and population growth were included as variables in the model. The variables were easily identified and the data was readily available.

Growth in Kansas

The population growth rates in Kansas counties were hypothesized to influence local government per capita expenditures. In testing the hypothesis the counties were divided into categories according to the size of population change. The categories were analyzed in a time series analysis, with population change as the independent variable. A lagged population change was used in a cross-sectional analysis.

The categories were divided according to the percentage change of population over the entire period studied, 1960 through 1971. The entire period was used for several reasons. First, a change of population from year to year showed no significant movement of population over that short a time. The change from one year to the next was so small as to be insignificant. The effect of from zero to one or two percent change would not show any correlation to per capita expenditures. Secondly, the long run change from 1960 to 1971 accounted for the effect of the changes within the counties in Kansas. Any effects or forces acting on the population would be visible in that length of time.

For the study the counties were classified into five categories. The percentage changes 1960 to 1971 were used as the basis for classification:

(1) Rapidly increasing population counties--greater than ten percent increase.

(2) Slightly increasing population counties--greater than five percent increase and less than ten percent increase.

(3) Stable population counties--less than five percent decrease and less than five percent increase.

(4) Slightly decreasing population counties--greater than five percent decrease and less than ten percent decrease.

(5) Rapidly decreasing population counties--greater than ten percent decrease.

As stated earlier, the changes of population from year to year were not of a large magnitude. The categories that were established allowed a significant relationship to be realized. There were classification problems included in the study. Major population changes during the period that are canceled out at the end are not shown. For example, if a county had large decreases of population during the middle years that were offset by an increasing population near 1971 would show no population change. Also the classification may put counties in one category while the county is very close to being in another category. There is little difference between a negative 9.9 percent population change and a negative 10.1 percent change. There were several counties that were very close to being included in another category.

The distribution of the counties within their respective categories is shown in Figure 1, and Table 1 of the Appendix. The map of Kansas shows the population changes within Kansas between 1960 and 1971. The table shows

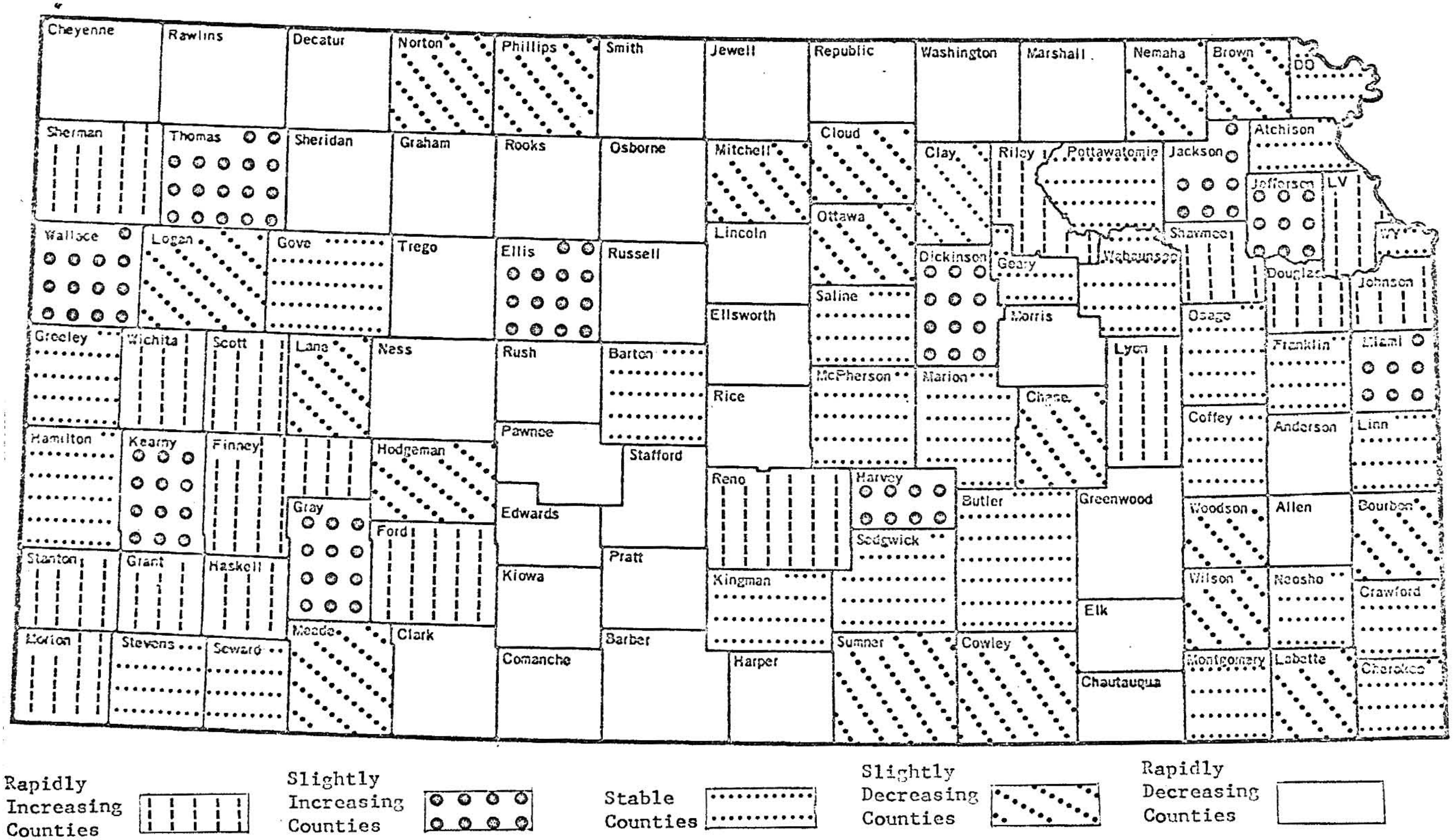

FIGURE 1

POPULATION CHANGE CATEGORIES, 1960 TO 1971 the counties according to categories and the percentage changes. Specific areas of growth were in the east, around Kansas City, west to Riley County, the southwest part of the state, and a couple of separate areas. When considering an increase in population, the slightly increasing counties should also be considered with the rapidly increasing category. Those counties were also found in the same areas as the rapidly increasing counties. The two categories form a triangle of growth in eastern Kansas from Kansas City to Saline County to Sedgwick County. In the triangle are the largest cities and major industries, other than agriculture, in Kansas. The major areas of growth in Kansas have been within counties that had:

(1) Colleges or universities (Riley, Linn, Ellis, Douglas, Lyon)

(2) Major cities (Kansas City - Wyandotte, Leavenworth, and Johnson; Wichita - Sedgwick; Topeka - Shawnee)

(3) Other important cities (Garden City - Finney; Manhattan - Riley; Goodland - Sherman)

(4) Major industries

    Aircraft (Sedgwick, Reno, and Harvey)

    Agriculture

        Farm Machinery (Harvey)

        Irrigation (Southwest Kansas - Wichita, Scott, Kearney, Finney, Stanton, Grant, Haskell, Gray, Ford, and Morton)

(5) Mineral Resources

    Natural Gas (Southwest Kansas - Grant, Stanton, and Haskell)

Counties with such influences were the ones that grew between 1960 and 1971.

The counties that declined in that time period lacked the preceding characteristics. They lacked the basis to attract or at the least stop out-migration of people. The major declining areas were the northern tier of counties, the central area from the northern to the southern border, and the southeast part of Kansas. There are signs that the southeast region is reversing the out-migration trend. The declining areas were those of least economic development in Kansas.[9]

The relationship between migration, population change, and the economic conditions is further shown by considering the migration of the productive age group. Urban areas experienced an in-migration of young people over the time period while rural areas faced out-migration. The areas already described as growth counties experienced the productive group in-migration. The declining areas experienced the out-migration.[10]

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[9]Bucher and Willis Planning Consultants and Kansas Department of Economic Development, Regional Review for Planning in Kansas, Region 01 through Region 11 (State of Kansas Economic Development Planning Program, May, 1968).

[10]Cornelia B. Flora, The Impact of Migration on Kansas (Agricultural Experiment Station, Kansas State University, Bulletin 570, June, 1973), pp. 11-13.

CHAPTER III

THE ANALYSIS OF GROWTH AND OTHER FACTORS INFLUENCING PER CAPITA EXPENDITURES

Introduction

The variables identified as affecting local government per capita expenditures for which there was adequate data were tested for degree of influence on per capita expenditures. First, the relationship between growth, or population change, and per capita expenditures was analyzed and compared to the findings of Lucas in Colorado.[1] She studied Colorado local governments to determine if those with population growth had lower per capita expenditures than nongrowth units. Other variables were tested for their effect on per capita expenditures.

Colorado Study

Population growth was tested as a variable that influenced per capita expenditures in a study of Colorado local governments. Therese C. Lucas conducted the study, The Direct Costs of Growth, for the Colorado Land Use Commission. Lucas analyzed the costs of growth, whether population growth increased local government expenditures. The analysis was based on 1960 and 1970 data for three groups of selected counties with different population changes: rapid population growth, stability of population size, and declining population. There were four types of local

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[1]Therese C. Lucas, The Direct Costs of Growth (Denver, Colorado: The Colorado Land Use Commission, April, 1974).

government expenditures studied in each county: county governments, municipalities, school districts, and special districts (water, fire, and hospital). All local government expenditures within a county's jurisdiction were included.[2] Lucas compared the total per capita expenditures of the three population change categories. The expenditures of each type of local government in the county was compared. The different services provided by the local governments were examined. The relationship between personal income and expenditures for public services was also studied.

The major findings of the study were:

1. The sum total per capita expenditures by all local governments was lowest in the growth counties and highest in the declining population counties. Growth resulted in lower direct costs.
2. As a percentage of total personal income, total local government expenditures were lowest in growth counties and highest in declining counties. Residents in declining counties do not necessarily bear a heavier tax burden.
3. The rank, highest to lowest, of per capita expenditures by the type of government was:
    a. school districts
    b. county governments
    c. municipalities
    d. special districts

    School districts accounted for at least 44 percent of all expenditures in the three population groups.
4. Per capita personal income was greater in growth counties than

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[2]Lucas used costs and expenditures interchangably.

in declining counties between 1960 and 1970. The rate of increase was greater in growth counties.

5. Per capita expenditures by county governments in both 1960 and 1970 were lowest in the growth county group and highest in the declining county group. The two most costly services were welfare and highways.

6. Per capita expenditures by municipalities in both 1960 and 1970 were lowest in the declining group and highest in the stable group. The two most costly services were public safety and water.

7. Per capita expenditures by school districts in 1970 were almost equal for the growth and declining county groups and much lower in the stable group.

8. Per capita expenditures by special districts in 1960 and 1970 were lowest in the declining group and highest in the growth county category.

The purpose of the study was to determine if growth increases local government expenditures; to find the direct cost of growth for different patterns of population changes. The indirect costs, not included in the study, were social costs, externalities, and disbenefits to people such as increased commuting time, more air pollution, crowded highways, more noise, less open space, and just more people. Those factors add to the cost of delivering public services, but are difficult to measure; therefore, Lucas excluded them as a part of expenditures.

Lucas also considered the relationship between personal income and growth. The counties that were growing had the highest per capita personal income. Growth tends to generate economic activity. Increased income generates tax revenue to pay for public services. Growth may result in higher costs but also increases the ability to pay those costs.

In the analysis of county government, by itself, the growth group had the lowest per capita expenditures and the declining category had the highest. The largest percentage increase between 1960 and 1970 was in stable counties and the lowest increase was in the growth counties. The functions county governments perform were:

1. general administration
2. highways
3. public safety
4. welfare
5. capital outlay
6. others (particularly hospitals and recreation)

Welfare was the most costly function for the growth and stable categories while highways were the most costly in the declining group. Lucas concluded declining population counties had higher per capita expenditures because they provided the same services as a more populated county but there were fewer people over which to spread the cost. She reasoned that declining counties have small populations and lack economies of scale.

Municipal per capita expenditures were lowest in declining counties because rural counties have very few cities, although actual per capita expenditures were almost equal for the growth and declining categories. Stable counties had higher expenditures because those cities were competing with larger cities to attract people without the same tax base to pay for the same services.

School districts and special districts provide specific services to the public. Of all local government units, school districts had the highest per capita expenditures but they receive outside tax support to help finance the service. Special districts are supported almost entirely by the people they serve. Growth counties have the highest costs for special districts but they also have more special districts than the other two categories.[3]

Criticisms

Lucas in her Colorado study on the costs of growth concluded growth was an important factor influencing per capita expenditures. Growth may be an important variable but some of the methods and assumptions Lucas used were weak supports to that conclusion. Robert Ekland in a critique of the study stated that there was a problem of scale. Lucas compared groups of counties of different magnitudes. The growing county category was so much larger than the declining county group that comparing them implies a lack of validity as to whether the results indicate that per capita expenditures were lower in the growth category.[4]

The other major criticism is that Lucas assumes growth is the only variable that influences per capita expenditures. Growth may be a major factor affecting the expenditures of local governments but there are other variables that are also influences. Lucas did not consider the location, whether urban or rural, wealth, geographic size, quantity and quality differences, and resources costs. Those variables may affect per capita expenditures.

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[3]Lucas, The Direct Costs of Growth, pp. 1-76.

[4]Letter criticizing The Direct Costs of Growth by Robert L. Ekland, August 1, 1974.

The Time Series Model

In the Colorado study, Lucas considered the affects of population change on expenditures. That same relationship was tested using more detailed Kansas data. For the Kansas data, 1960 to 1971, a time series model was specified:

$$T.PCE = f(PG_t)$$

where

T.PCE = total per capita expenditures for Kansas county governments which includes all county public services, 1971

PG_t = population change, or growth, of counties in a time series which is the percentage change from a base year, 1960, for each successive year (population change can be positive, negative, or stable).

The independent variable, population change, was hypothesized to be negatively correlated to per capita expenditures. An increase in the population was expected to cause the per capita expenditures to decrease. That assumption was supported by Lucas' conclusion, that growth did not increase per capita expenditures.

The counties of Kansas were divided into five change categories.[5] By analyzing each county separately and then comparing the groups, the effects of different population changes were observed. The data from counties that grew in population over the twelve years were analyzed separately from declining population counties. The results of the time series analysis would indicate whether population growth caused lower per capita expenditures.

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[5]See the section "Growth in Kansas" in Chapter II and Figure 1.

The quality of services was assumed constant among counties and was not a variable in the analysis. The variation in quality was partially accounted for when the counties were studied by change categories.[6]

Time Series Model Results

The estimated equation for each county was derived using least squares regression with the variable defined as linear.[7] The results wer evaluated with respect to the population change categories. Each of the categories were analyzed to explain the relationship of population change to per capita expenditures.[8]

The estimated regression equations for the rapidly declining population counties showed a negative correlation between the two variables in all but one county. The sign of the coefficient for each county was as expected, except for the one county. As population in a county decreased, per capita expenditures increased. The results indicate that if a county loses population, per capita expenditures increase. The coefficients for all of the counties were significant except for Chautauqua county. The R^2 values were generally above .75 with only five of the 34 counties having a R^2 below .63 value.

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[6]The source of data for the time series analysis was: Donald B. Erickson, Arlo W. Biere, and John Sjo, City and County Public-service Expenditures, Kansas, 1960 to 1970 (Agricultural Experiment Station, Kansas State University, Bulletin 578, Feb., 1974) and additional unpublished data for 1971. The dollar figures used in all the analysis were in current dollar terms. Inflation was not accounted for because counties do not spend dollars in real terms but current dollars. When the county is considering the budget, they are concerned about the current value of money.

[7]The estimated equations for each county are in the Appendix, Table 2.

[8]Throughout the paper, the following notations for significance level will be used: * = significance probability .05 or better ($\alpha \leq .05$)
** = significance probability .01 or better ($\alpha \leq .01$)

Counties with rapidly increasing populations had the opposite correlation from the rapidly decreasing counties. In all 16 rapidly increasing counties, the sign of the coefficient was positive. As population grew, per capita expenditures also grew. The coefficients were significant for all the equations with the R^2 above .50 in all but three counties. The results imply that counties with large population increases have diseconomies of size. The quantity of services demanded grows faster than population. They did have lower per capita expenditures than the declining population counties at the beginning of the time period and at the end for most of the counties.

The other three change categories, slightly declining, stable, and slightly increasing, follow the same trends as the rapidly decreasing and increasing counties. The slightly declining category had a negative sign for the coefficient in all but one county, the same as in the rapidly decreasing category. In the slightly increasing group the coefficient was positive for all the counties. Stable counties usually had negative coefficients for the negative population changes and positive coefficients for the positive population changes. The R^2 values for those three categories were generally lower than for the first two categories considered. Also fewer coefficients were significant. The lower R^2 and fewer significant coefficients were expected because the observed data points were more clustered than were the data points for the rapidly decreasing and increasing counties.

The results can partly be explained by the nature of the data. All 105 counties had rising per capita expenditures over the twelve years; therefore, if population increased the correlation would have been positive. As the percentage change from the base grew larger for each successive year, the estimated line would slope upwards because the per capita expenditures also increased. Counties that had a population decline would have a negative correlation. Per capita expenditures in declining counties increased with each successive year resulting in a downward sloping curve.

The results did not show that growing counties had diseconomies of size. They had lower per capita expenditures than declining population counties. Increasing population counties had lower per capita expenditures but over time the estimated equation showed their per capita expenditures increasing. That indicates growth increases per capita expenditures but leaves those counties still with lower per capita expenditures than non-growth counties. Growth may cause per capita expenditures to decrease but if the quantity demanded increased or there was at the same time inflation they could partially offset each other. The strongest force would have the greatest influence. The growth counties are also the largest counties in Kansas, in most cases. That indicates a possible connection between the rate of growth and the size of the county. A discussion of that relationship is presented later.

The results of the time series analysis did not show that growth reduced per capita expenditures. To further analyze the per capita expenditures--population growth relationship, the data was analyzed in a cross-sectional model.

Cross-Sectional Model

To further develop the analysis, the effect of growth on per capita expenditures was analyzed in a cross-sectional framework. The model specified was of the following form:

$$T.PCE = f(PG_c)$$

where

T.PCE = total per capita expenditures, 1971

PG_c = population change or growth of counties in a cross-sectional study where the change is a six year lag.

$$\left(\frac{\text{Population (1971)} - \text{Population (1966)}}{\text{Population (1966)}} \right)$$

The independent variable was lagged to show the influence of past population movements on present per capita expenditures. The time period selected accounted for the significant movements of population that influenced the expenditures. Quality and quantity were assumed constant for all the cross-sectional models.[9]

Also considered in the analysis was the effects of different sized counties. Size was not a variable within the function, but was analyzed as a separate factor. The counties of Kansas were divided into four categories with the absolute population size as the identifying factor. Counties were divided so that the counties in each group provided basically the same public services.

The four categories were distinguished as follows: zero to 8,000 population, 8,000 to 20,000 population, 20,000 to 35,000 population, and over 35,000 population. Within the categories there were 46 counties in the smallest population group, 32 counties in the second group, 14 counties in the third group, and 13 counties in the largest group.[10]

Classification by size permitted growth to be evaluated at different population levels. Economies of size was tested in two ways: by considering growth and the absolute size of a county. If a large county has lower

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[9]The source of data was the same as the time series analysis.

[10]List of size categories in Appendix, Table 3.

per capita expenditures, growth may further lower those expenditures. The analysis may also show if counties reach a size when diseconomies of size exist.

Results of Cross-Sectional Growth Analysis

When the entire state was analyzed for total per capita expenditures using least squares regression, the equation estimated was:

$$(1)\quad T.PCE = 161.5 - 2.731^{**}PG_c$$

$$(t = -3.326) \qquad R^2 = .09697$$

The negative sign of the coefficient was as expected. As population increases, per capita expenditures decrease. The coefficient was significant implying growth does influence per capita expenditures. But only 1/10 of the variation of per capita expenditures was explained by population change. The results indicate there are several important factors excluded from the model, or the effect on per capita expenditures are random in nature. The results are presented in Figure 2.

As is shown in the graph, the correlation between the variables was negative. But there was a high degree of variance that lowers the R^2 value. The outliers that caused the high variance were counties with a very high per capita expenditure, compared to the other counties, and had either a positive or only slightly negative population change. Except for one of those counties, all are located in far western or southwestern Kansas.[11] They are all in growth areas or near growth areas and they all fall into the smallest size category. They had similar characteristics, they were all faced with growing or stable populations in areas where the quantity

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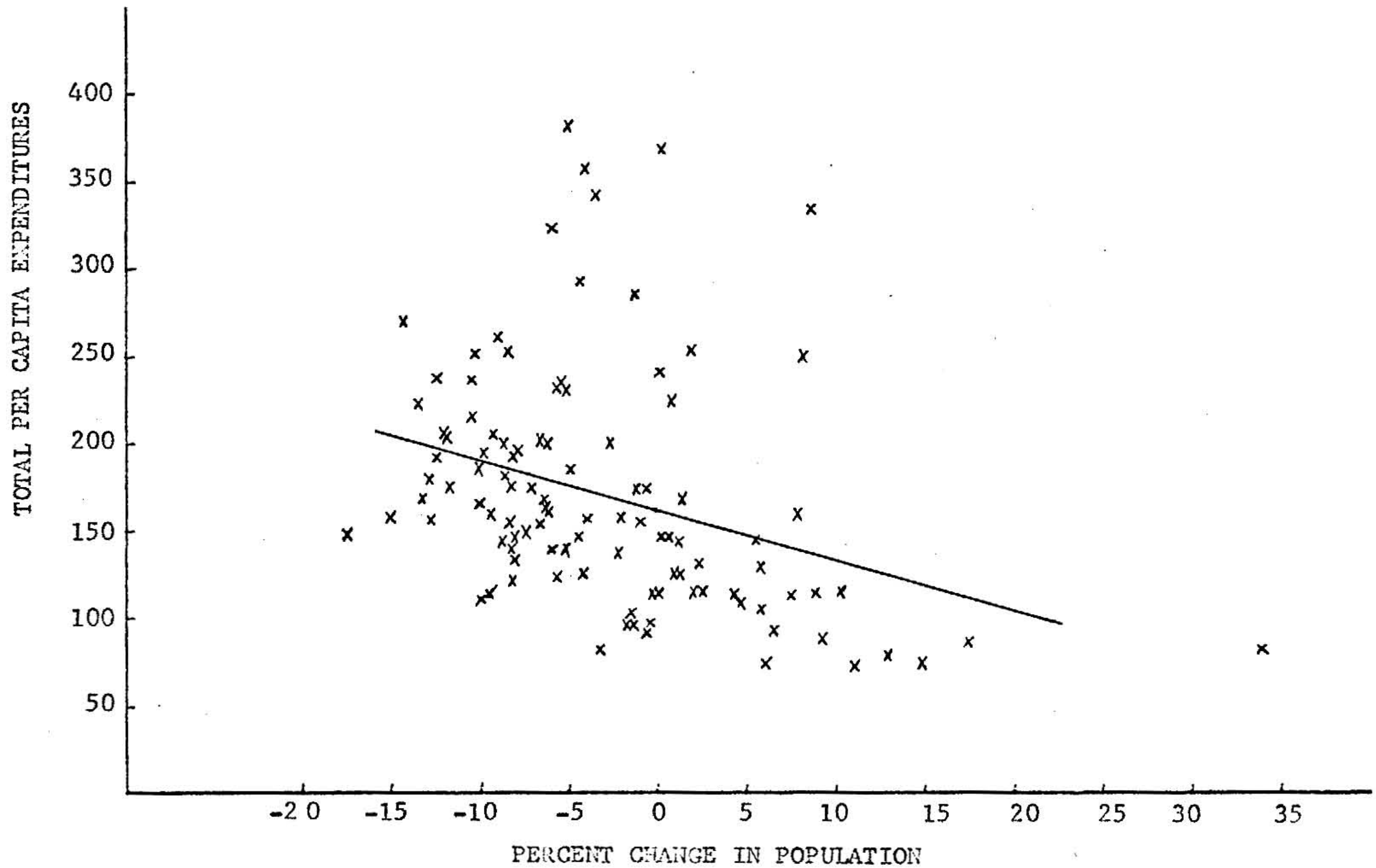
[11] The counties were: Chase, Grant, Gray, Greeley, Haskell, Hodgeman, Kearney, Morton, Stanton, Stevens, Wallace, and Wichita.

FIGURE 2

TOTAL PER CAPITA EXPENDITURES VERUS PERCENT CHANGE IN POPULATION



demanded for public services was increasing. The growth in the small counties did not lower per capita expenditures. If they were eliminated from the relationship the R^2 was significantly higher. That also indicates there are other important variables that influence per capita expenditures.

The smallest counties, population between zero and 8,000 people, had an estimated equation of:

$$(2) \quad T.PCE = 238.0 + 2.801PG_c \qquad (t = 1.599) \quad R^2 = .05493$$

The results of the equation show less explanation of the variation of per capita expenditures than the equation for the entire state. The coefficient was not significant indicating population change was not an important variable for counties of that size. The positive sign of the coefficient also indicates growth would increase per capita expenditures.

Counties in the 8,000 to 20,000 populated group category had an equation estimated as:

$$(3) \quad T.PCE = 140.3 - 1.587PG_c \qquad (t = -1.992) \quad R^2 = .11679$$

The equation shows a negative correlation between the variables. The coefficient of population change was not significant at the five percent level but it was at the ten percent level. The reliability of the estimate is questionable. With an R^2 of only .11679 the indication again was that there are unidentified factors affecting per capita expenditures.

The estimated equation for the 20,000 to 35,000 populated group was:

$$(4) \quad T.PCE = 119.4 - 1.485^{*}PG_c \qquad (t = -2.580) \quad R^2 = .35675$$

With an R^2 of .35675, the equation explained more of the variation than was explained in the other size categories. The results indicate that the equation is reliable because the coefficient was significant. The sign of the coefficient was negative implying per capita expenditures decrease as population increases. Growth has its greatest influence on counties between the 20,000 to 35,000 population size limits.

The largest group of counties over 35,000 population had an estimated equation in the form:

$$(5) \quad T.PCE = 107.4 - 1.334PG_c$$

$$(t = -1.997) \quad R^2 = .26618$$

The correlation was again negative between the two variables. But the R^2 value was lower than for the 20,000 to 35,000 size group. The coefficient was not significant at the five percent level but it was at the ten percent level. The results indicate that there are other unidentified variables, and growth for counties of very large size may be a nonsignificant factor.

Implications

The author concluded population change affects per capita expenditures. Growth has more influence on medium sized to large counties with populations over 20,000. Although the variation accounted for by population change was only about 1/3 at the highest level, the indication is that growth at that stage is more likely to reduce per capita expenditures than growth in smaller counties. Large counties with a growing population have greater economies of size than smaller counties with a growing population.

The results showed that economies of size exist to some extent for all the size categories and the entire state except for the smallest county size group. The indication for small counties, zero to 8,000 people, is that they lack factors that allow a reduction in per capita expenditures as population increases. For them to reduce per capita expenditures by increasing the population may not be practical because the increase needed would be impossible for the county to accomplish. Even if economies of size exist, the county may not be able to increase size to take advantage. The results from the largest counties indicate they have reached a level of size where some diseconomies exist. Such counties may not lower per capita expenditures when they increase size as much as slightly smaller counties. The results infer that counties with a population between 20,000 and 35,000 people have the greatest economies of size as population grows.

Comparing those results to those of Lucas support her findings that growth was correlated negatively to per capita expenditures. The evaluation of the effect of growth on the level of per capita expenditures may not be sufficient. To say that counties with growing populations have lower per capita expenditures than counties with declining or stable populations may not be entirely true. The size of the county at the time period considered may alter the effect of growth and the results indicate that the size is important. Growing counties tend to be larger in size although it is not always the case. If the county is large, growth will influence expenditures more than growth in small counties.

The Kansas results indicate that a growing population is associated with decreased per capita expenditures or at least smaller increases than found in declining counties. But the results indicate the size of the county also influences the effect of growth.

Expanded Cross-Sectional Model

As was indicated in the cross-sectional analysis of growth, there are other variables that affect per capita expenditures. In the conceptional discussion of variables, several possible factors were identified. But as was noted, several of the variables are not measurable and for which it is difficult to find a valid proxy. Two of the discussed factors were added to further identify the components that influence per capita expenditures. The model specified was in the form:[12]

$$T.PCE = f(PG, PD, W)$$

where

T.PCE = total per capita expenditures, 1971
PG = population change (positive, stable, or declining)

$$\left(\frac{\text{Population (1971) - Population (1966)}}{\text{Population (1966)}} \right)$$

PD = population density, 1971
W = wealth, 1971

The added variables, population density and wealth, were easily measured. Data was readily available for them. Population change is the same variable used in the section on the growth cross-sectional model. Population density is the number of people per square mile in each county. The denser the population the more likely a city or major business area is present. The less densely populated an area, the higher the chances that the area is rural. Wealth is the assessed property value of the county.

The hypothesized correlation of the independent variables with per capita expenditures was negative. As population, population density, and wealth increase it was hypothesized per capita expenditures decrease.

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[12]Refer to the Appendix, Table 4 for a listing of the data used in the analysis.

Size was again considered separately in the analysis. Size categories were used as they were in the previous analysis. The breakdown allowed the data to be analyzed in different categories so the influence of size could be examined in greater detail. It also allowed the other variables to be studied in more detail.

In the analysis of the expanded model several specific expenditure categories were considered. Along with total per capita expenditures, the expenditure categories of health, roads and bridges, law enforcement, and salaries of employees were analyzed. The four categories account for a large share of county expenditures and are of major concern today. If they can be controlled then the total per capita expenditures will be under better control.

Total Per Capita Expenditure Results

When ordinary lease squares multiple regression with all variables defined as linear was used for the entire state the equation was estimated as:

$$(1)\quad T.PCE = 171.1 - \underset{(t = -2.606)}{2.221^{*}PG} - \underset{(t = -.6039)}{.03950PD} - \underset{(t = -1.094)}{(.9449 \times 10^{-7})W} \qquad R^2 = .13579$$

Population change, growth, was the only significant variable and along with wealth explained most of the variation.[13] Without population density, wealth was also a significant variable.[14] Even though they were the important variables in the relationship, they only explained 1/8 of the variation. The results indicate that there are other variables that influence per capita expenditures.

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[13] The coefficients are so small for wealth because the values of the observation points are quite large.

[14] The analysis showed wealth and population density had some degree of multicolinearity between them. They were both considered as important variables and both were left in the model throughout the analysis.

The next step was an analysis of total per capita expenditure by size groups. The smallest counties had an equation of the form:

$$(2)\quad T.PCE = 258.4 + \underset{(t = 1.180)}{1.501PG} - \underset{(t = -6.195)}{21.09^{**}PD} + \underset{(t = 5.450)}{(.3267 \times 10^{-5})^{**}W} \qquad R^2 = .57561$$

Again the first two variables to enter the equation were the most significant, although they were not the same two. The two significant variables were population density and wealth. Over 1/2 the variation was explained by the variables. The signs for wealth and population growth were positive. Small counties which usually have a negative population change and have less wealth than larger counties do not seem to lower per capita expenditures as those values increase. Also small wealthy counties can afford higher per capita expenditures which would partially account for the positive correlation. The results show that the three variables, especially population density and wealth, are major factors influencing per capita expenditures.

For the category of 8,000 to 20,000 population, the estimated equation was:

$$(3)\quad T.PCE = 184.7 - \underset{(t = -1.254)}{.8217PG} - \underset{(t = -4.597)}{2.083^{**}PD} - \underset{(t = -.2879)}{(.1008 \times 10^{-6})W} \qquad R^2 = .50014$$

The results show negative coefficients. Of the three variables only one, population density, was significant. It also accounts for almost all of the variation explained by the equation. Population density was the major variable of the three.

The 20,000 to 35,000 population category had an equation of the form:

$$(4)\quad T.PCE = 154.3 - \underset{(t = -2.444)}{1.385^{*}PG} - \underset{(t = -1.065)}{.3836PD} - \underset{(t = -1.631)}{(.3239 \times 10^{-6})W} \qquad R^2 = .50986$$

The variation explained was again above 1/2 for the three independent variables. The signs of the coefficients were negative. Of the three factors, population growth was the only significant one, which was different from the smaller counties. Population growth was more of a factor for the larger counties while population density was the major factor in the smaller counties.

The largest county category had an estimated equation of the form:

$$\text{(5)}\quad T.PCE = 105.9 - 1.280PG + .01004PD - (.5187 \times 10^{-8})W$$
$$(t = -1.714) \quad (t = .3660) \quad (t = -1.223) \qquad R^2 = .27767$$

The explained variance was lower than for the other three size categories. Also the factor population density had a positive value and none of the three variables were significant. The indication was that there were other variables of more importance than population change, population density, and wealth for large counties.

The expanded model implies that the variables tested do influence per capita expenditures. But the analysis also indicates that there are other important variables. The correlation shown between population change and per capita expenditures suggests that there are economies of size, although the relationship could be due to other factors. The results indicate that larger counties would be more likely to reduce per capita expenditures if they grew, than smaller counties. The results infer the smallest counties are too small to take advantage of growth, and increased wealth does not lower per capita expenditures. Population density and wealth were the most significant variables of the three studied. Population density was also the most significant factor for the second sized group. The results indicate the larger the county the lower the per capita expenditures. Population change was the most significant variable for the largest counties category and for the entire state. Growth was important to counties of large sizes. The larger counties were usually the growing counties. Thus most of the positive changes would occur in the larger categories. Although other factors could further clarify the relationship, the results of the analysis of total per capita expenditures suggest that there may be a causational relationship between growth and per capita expenditures.

Health Per Capita Expenditure Results

Counties provide health care to the general public. Included in the analysis of health were expenditures for hospital, mental health, and health. Expenditures by size groups were also analyzed.

The use of least squares multiple regression estimated the equation for health per capita expenditures for the entire state as:

$$(1)\quad H.PCE = 4.189 - \underset{(t = -.4024)}{.02336PG} - \underset{(t = -.7286)}{.003246PD} + \underset{(t = .3779)}{(.2432 \times 10^{-8})W} \qquad R^2 = .00741$$

As can be seen, less than one percent of the per capita expenditures variation was explained by the independent variables. Although the signs of population change and population density were as predicted, the significance of the equation was nill. The wealth variable was positive which could be interpreted as causing per capita expenditures to increase as wealth increases but again there was very little correlation. When the entire state was considered, the results showed no relationship between per capita expenditures and the independent variables.

The smallest group of counties had an estimated equation of:

$$(2)\quad H.PCE = 7.878 + \underset{(t = 1.401)}{.1922PG} - \underset{(t = -2.785)}{1.023^{**}PD} + \underset{(t = 2.954)}{(.1911 \times 10^{-6})^{**}W} \qquad R^2 = .28904$$

The independent variables accounted for a little over 1/4 of the variance for small counties, which still implies there are other variables that influence per capita expenditures. But the value was significantly different than the R^2 of the equation for the entire state. The variables considered were of more importance for smaller counties.

Two of the variables, population density and wealth, show significance. Population density had a negative value while wealth and population showed a positive relationship. The wealth and population coefficients suggest that as a county gets richer and grows, the demand for either increased health services or quality of health services increase. Since most of the health services of smaller counties was for hospitals, as size increased the demand might include increased mental health and county health services or larger better equipped hospitals. But the results indicated that there are other factors that influence health per capita expenditures in small counties.

Counties with a population between 8,000 and 20,000 people had an estimated equation of:

$$(3)\quad H.PCE = 3.838 - \underset{(t = -.2950)}{.01476PG} - \underset{(t = -2.124)}{.07344^{**}PD} + \underset{(t = .07224)}{(.1930 \times 10^{-8})W} \quad R^2 = .16064$$

The variance explained was again low. The indication was that there were also other important variables. Population density was significant and the sign was negative, population change had a negative value and wealth had a positive value but there was very little correlation.

The estimated equation for the 20,000 to 35,000 population category was:

$$(4)\quad H.PCE = 2.22 - \underset{(t = -.5695)}{.0242PG} + \underset{(t = .8095)}{.02186PD} - \underset{(t = -.2472)}{(.3681 \times 10^{-8})W} \quad R^2 = .09148$$

The variables were all nonsignificant and the R^2 was low. There was very little correlation between the independent variables and per capita expenditures for counties of this size.

The largest counties had the highest R^2 value. The estimated equation was:

$$(5)\quad H.PCE = 1.694 - .03012PG - .0010142PD + (.6143 \times 10^{-8})^{*}W$$
$$(t = -.7505)\quad (t = -.7064)\quad (t = 2.694)\quad R^2 = .49522$$

Although half of the variation was explained by the variables, the only significant factor was wealth and it had a positive coefficient. The indication was that very large counties had higher per capita expenditures for health care, or as wealth increased per capita expenditures tended to rise. Also large counties may have a larger portion of their population on welfare, which requires more health care, as compared to small counties. The other variables were nonsignificant.

The analysis of health care indicates that the three variables considered are not the only factors that influence health per capita expenditures. Also concluded from the analysis was that economies of size are not likely to exist in health care services. Health care lacks the characteristics of an economies of size enterprise when population change, population density, and wealth are considered for different sized counties. Health is usually a one-on-one situation, and many of the services of health care can not be mechanized. If a small county has a hospital, its per capita expenditures will probably be higher than a larger county's hospital per capita expenditures because there are fewer people over which to spread costs. Larger counties may have other expenditures small counties do not have, or services a small county hospital provided are provided elsewhere in a large county. Per capita expenditure levels may be different for different sized counties but increased size does not necessarily lower per capita expenditures and may increase them.

Road and Bridge Results

Expenditures on roads and bridges include the budget categories of roads and bridges, secondary roads, and special roads and bridges. Road and bridge services were expected to have economies of size. The type of work lends itself to specialization of labor, improved management, and using larger and more efficient equipment. The construction and maintenance of roads is basically mechanical. Labor is easily specialized and the job is repetitive making management easier to handle. Since equipment used depreciates over time, using it to capacity provides more service than if it was not used at its full capacity. The results of the analysis should show that the variables are negatively correlated to per capita expenditures.[15]

The analysis of all counties in Kansas had an estimated equation of:

$$(1)\quad R.B.PCE = 46.56 - \underset{(t = -4.299)}{1.081^{**}PG} - \underset{(t = -1.317)}{.02539PD} - \underset{(t = -1.785)}{(.4974 \times 10^{-7})W} \qquad R^2 = .31580$$

All the variable coefficients were negative. But with per capita expenditures as the dependent variable 1/3 of the variation was explained and only one variable was significant. In the equation though, if population density was not inserted both wealth and population change were significant. Population change and wealth are variables that influence road and bridge per capita expenditures but there are other important factors when all of Kansas is considered.

The category of counties with zero to 8,000 population had an estimated equation of the form:

$$(2)\quad R.B.PCE = 67.63 - \underset{(t = -.9974)}{.5129PG} - \underset{(t = -2.202)}{3.023^{*}PD} + \underset{(t = 1.366)}{(.3312 \times 10^{-6})W} \qquad R^2 = .12667$$

For small counties there was a less significant relationship than for the whole state between the variables and per capita expenditures as only 1/8

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[15]Donald B. Erickson, John Sjo, and Arlo W. Biere, "Road Facilities," Public Affairs Pamphlet Series (Agricultural Experiment Station, Kansas State University, Dec., 1974), pp. 2-6.

of the variation was explained. Only one of the variables, population density, was significant. The relationship was negative. But the variables analyzed were of small importance as factors influencing per capita expenditures in small counties.

The next sized category, counties with an 8,000 to 20,000 population, had the equation defined as:

$$(3)\quad R.B.PCE = 58.16 \underset{(t = -1.327)}{- .4369PG} \underset{(t = -4.159)}{- .9467^{**}PD} \underset{(t = -.0937)}{- (.1648 \times 10^{-7})W} \quad R^2 = .46070$$

Population density was again the only significant variable, but the R^2 value was .46070, significantly larger than the smallest county category. The relationship was also negative. There are other factors influencing per capita expenditures but population density is an important variable.

For counties between 20,000 and 35,000 people, the estimated equation was:

$$(4)\quad R.B.PCE = 43.63 \underset{(t = -1.539)}{- .3730PG} \underset{(t = -1.813)}{- .2794PD} \underset{(t = -1.255)}{- (.1066 \times 10^{-6})W} \quad R^2 = .44042$$

The R^2 implies some relationship in the equation. But none of the variables were significant at the five percent level. The results were not conclusive as to the significance of the variables.

The largest sized counties had an equation estimated as:

$$(5)\quad R.B.PCE = 18.99 \underset{(t = .2122)}{+ .02989PG} \underset{(t = -1.636)}{- .008465PD} \underset{(t = -1.356)}{- (.1085 \times 10^{-7})W} \quad R^2 = .53961$$

The variation explained was over 1/2, but none of the variables were significant. Population density and wealth showed some degree of being important variables. The variables do offer some explanation of factors influencing per capita expenditures, but there are other variables.

Considering roads and bridge public services indicates that the variables are negatively correlated to per capita expenditures except for wealth in the smallest category and population change in the largest category. But the fact that two of the equations had high R^2's and no significant variables cast some doubt on the validity of the relationships. Except for the entire state and the smallest county equations, the R^2 values were close to one-half. The results indicate that small counties may not have economies of size for roads and bridges. Increasing the size may reduce road and bridge per capita expenditures. The results for counties of larger sizes indicate that economies of size may exist. But there are other variables that have not been measured and analyzed.

Law Enforcement Analysis Results

Considering law enforcement presented several problems in the analysis. There are two major influences that affect the per capita expenditures, increased size resulted in greater operating efficiency by spreading the costs over more people and increased size resulted in an increasing crime control problem. They have opposite influences on per capita expenditures. Law enforcement is a face-to-face type service. Identifying and measuring the independent variables is difficult because of the two opposing factors. Munson in his study, "An Economic Analysis of Police and Fire Protection in Kansas Cities," encountered many identification difficulties. The identified variables did not account for very much of the explanation of the variance and his conclusion was that there were several important variables excluded from the model and economies of size were not prevalent in law enforcement.[16]

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[16]Robert Clayton Munson, "An Economic Analysis of Police and Fire Protection in Kansas Cities," (Unpublished Master's thesis, Kansas State University, 1971), pp. 31-33.

The estimated equation for the entire state was:

$$(1)\quad L.E.PCE = 1.473 + (.8557 \times 10^{-3})PG - (.3047 \times 10^{-3})PD - (.1148 \times 10^{-8})W$$
$$(t = .07542) \qquad (t = -.3500) \qquad (t = -.9127)$$
$$R^2 = .02629$$

The results showed no significant relationship between the variables and per capita expenditures.[17]

The counties with populations between zero and 8,000 people had an equation of:

$$(2)\quad L.E.PCE = 1.317 - .01874PG - .1171PD + (.2799 \times 10^{-7})^{*}W$$
$$(t = -.6897) \quad (t = -1.608) \quad (t = 2.185) \quad R^2 = .11946$$

Of all the estimated equations, the present equation had the only significant variable, wealth. The sign of the coefficient was positive indicating a positive correlation. But the R^2 was low indicating that variables may be excluded.

Counties in the next category, 8,000 to 20,000 population, had an equation of:

$$(3)\quad L.E.PCE = 2.623 + .04532PG - .02218PD - (.1971 \times 10^{-7})W$$
$$(t = 2.019) \quad (t = -1.430) \quad (t = -1.645) \quad R^2 = .24697$$

The variation of per capita expenditures explained by the variables was the highest for any of the equations. The equation did not have any significant variables at the five percent level, although population change was significant at the ten percent level and the sign of population change was positive.

The equations for the last two categories were:

$$(4)\quad L.E.PCE = 1.824 - .004021PG - .001701PD - (.3945 \times 10^{-8})W$$
$$(t = -1.524) \quad (t = -.1014) \quad (t = -.4268) \quad R^2 = .02035$$

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[17]The salaries of law enforcement personnel are not included in the law enforcement per capita expenditures. The salaries are in the category of salaries of officers because the division was not distinguished in the county government budgets. The law enforcement per capita expenditures include the budget categories of sheriff expenses, prisoner and jail expenses, and coroner expenses.

for the 20,000 to 35,000 population counties, and

$$(5)\quad L.E.PCE = 1.158 - \underset{(t = -.2401)}{.003765PG} - \underset{(t = -.1189)}{(.6852 \times 10^{-4})PD} - \underset{(t = -.7549)}{(.6725 \times 10^{-9})W}$$

$$R^2 = .10085$$

for the largest counties. The equations show no significant correlation between the variables and per capita expenditures. The variables population change, population density, and wealth have very little influence in the two equations.

The public service of law enforcement has few of the characteristics that would indicate economies of size exist. The analysis of law enforcement per capita expenditures indicates that there might be diseconomies of size. But the results are not conclusive. What is conclusive is that population change, population density, and wealth are not strong influences on per capita expenditures for law enforcement. There are other variables that are more important.

Salaries of Employees Results

The category, salaries of employees, includes the budget divisions of salaries of officers and salaries of county commissioners and is a part of the general operating function of county governments. The hypothesized relationship between the variables and per capita expenditures was negative. They are expected to be negative because the salaries of employees could be spread over more people as size increased, although the salaries of employees could be higher in larger counties which would cause a positive relationship. If the number of people served is increased, employees may serve th public more efficiently and there would be less chance of being under-employed.

The estimated equation for salaries of employees for the entire state was:

$$(1)\quad S.PCE = 12.86 - .1814^{*}PG - .002747PD - (.9241 \times 10^{-8})W$$
$$(t = -2.556)\ (t = -.5045)\ (t = -1.174)\quad R^2 = .13335$$

The coefficients of the variables were all negative, as the variables increase per capita expenditures decline. But the variance explained was only 1/8 of the total. That indicates other variables are important to the relationship. Of the variables present, population change was the only significant one, although if population density was not inserted into the equation, wealth was also significant.

The zero to 8,000 population category had an equation of:

$$(2)\quad S.PCE = 27.40 + .1176PG - 1.965^{**}PD + (.8547 \times 10^{-7})W$$
$$(t = 1.112)\ (t = -6.940)\ (t = 1.715)\quad R^2 = .53904$$

The R^2 value of the equation indicates the variables do influence per capita expenditures. The only variable that proved to be significant was population density, and it also was negative. The denser the population the lower the per capita expenditures on salaries. Wealth and population change coefficients were positive implying the wealthier growing smaller counties had increasing per capita expenditures. The coefficients were not significant although before population change was added to the equation, wealth was significant.

Counties with a population between 8,000 and 20,000 people had an estimated equation of the form:

$$(3)\quad S.PCE = 12.20 - .05743^{*}PG - .1260^{**}PD - (.2051 \times 10^{-8})W$$
$$(t = -2.055)\ (t = -6.524)\ (t = -.1374)\quad R^2 = .67678$$

Population change and population density explain 2/3 of the variation of per capita expenditures. Since they were both significant and negative, the results indicate that the more people served, the lower the per capita expenditures.

The estimated equation for the second largest category was:

$$(4)\quad S.PCE = 9.648 - \underset{(t = -.7989)}{.03906PG} - \underset{(t = .8104)}{.02579PD} - \underset{(t = -.5434)}{(.9303 \times 10^{-8})W} \qquad R^2 = .15080$$

The results show very little relationship between the independent variables and per capita expenditures. The R^2 was very low and none of the variables were significant. The results suggest that counties with a population between 20,000 and 35,000 people had variables excluded from the relationship.

The largest group of counties had an equation with all the coefficients positive. The equation was:

$$(5)\quad S.PCE = 6.595 + \underset{(t = 1.058)}{.02350PG} + \underset{(t = .8956)}{(.7311 \times 10^{-3})PD} + \underset{(t = 1.166)}{(.1472 \times 10^{-8})W}$$

$$R^2 = .37431$$

Although there were no significant variables, the positive values would suggest diseconomies of size. The R^2 value again infers that there are other important variables for the largest counties.

Within the general operations of county government, the analysis of the category of salaries of employees showed that economies of size may exist for small counties but not for large counties. The counties between 8,000 and 20,000 population had the most significant relationships. The three independent variables also are important factors influencing per capita expenditures depending on county size. In the analysis of salaries, size was an important factor determining the results of the analysis.

Implications of the Expanded Model

The analysis of the model with population change, population density, and wealth as the independent variables in relation to different sized counties, showed that they all are important under some circumstances. The three variables do influence per capita expenditures. The results do indicate that other variables are also important.

Economies of size were indicated for some of the expenditure categories. Total, road and bridge, and salaries of employees per capita expenditures showed some indications of economies of size. The results suggested that law enforcement and health care per capita expenditures had diseconomies of size. The results of the analysis of law enforcement and health care also inferred that population change, population density, and wealth were not the only factors affecting per capita expenditures. The independent variables accounted for more of the explanation of variation in the total, road and bridge, and salaries categories. The results differed by size groups. The larger county's results, in the total and salaries of employees categories, had lower R^2 values indicating the variables were of less importance than in the smaller categories. Increased size at that level does not suggest that per capita expenditures declined.

The results indicate that growth was a factor influencing per capita expenditures and that economies of size may exist. But the results also inferred that there were other variables besides those tested that are major factors.

Size as a Variable

In the analysis of the model just discussed, size was considered by evaluating counties, by population size. When using the 1971 population size of each county as an independent variable, the estimated equation became:

$$T.PCE = 143.1 - \underset{(t = -2.216)}{1.655^{**}}PG + \underset{(t = 1.718)}{.1655}PD + \underset{(t = 5.400)}{(.2042 \times 10^{-5})^{**}}W - \underset{(t = -5.812)}{(.506 \times 10^{-2})^{**}}S$$

$$R^2 = .35401$$

The variables of the equation were all significant at the five percent level except population density which was significant at the ten percent level. There was a strong relationship between per capita expenditures and the independent variables.[18] The results also indicated that there were variables excluded from the model. But the results showed size as a major influence. The signs of the coefficients inferred that economies of size may exist. As population change and size increased, per capita expenditures tended to decrease. Wealth and population density had positive values. The wealthier the county the higher were the per capita expenditures. The sign of the population density inferred that the denser the population the higher the level of per capita expenditures. The results suggest that the variables are important.

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[18]The variables wealth and size were almost perfectly correlated. But they both seemed important because of their high t-values. Wealth and population density also showed some multicolinearity although both showed significance at lease at the ten percent level.

CHAPTER IV

SUMMARY OF CONCLUSIONS AND IMPLICATIONS

Comparison of Colorado and Kansas Studies

The question of whether growth was a factor that influences per capita expenditures was a goal of both studies. Rising per capita expenditures are a concern of public officials and the control of those expenditures is a goal of local governments. Lucas attempted to determine if growth counties had lower per capita expenditures than nongrowth counties. She found per capita expenditures were lower for growth counties. That was evidence there were economies of size in local governments. The author of this paper used regression analysis to determine if population change was a factor that influenced per capita expenditures. The result showed a negative relationship between population change and per capita expenditures, implying there were economies of size for counties. The results suggested per capita expenditures were reduced if the number of people served was increased.

In the two studies there were different means of approaching the problem. Lucas considered just population change and its influence on per capita expenditures. Her only concern was whether per capita expenditures were greater in growth counties than in nongrowth counties. No other variables were considered. The author of this paper concluded that population change is a factor, but there were other variables that are also important. Growth does result in lower per capita expenditures in some cases, but there are other variables that can change the results.

Implications of Results

Local governments are expected to provide public services that are needed and demanded by the general public. Those same governments are finding it more difficult to provide the same level of services, a higher quality of services, or a larger per capita magnitude of services because of rising costs. When the quantity and quality demanded increases, governments are often expected to provide the services without raising taxes. When ways are found that lower total per capita expenditures, keep them stable, or slow the rate of increase, county governments will consider their use. In private industry average costs are many times lowered by expanding the scale or size of the output. If there were economies of size in public services, increasing the output, the number of people served, total per capita expenditures could be reduced.

The author analyzed per capita expenditures to determine if there were economies of size in county government. Population increases resulted in lower total per capita expenditures, the magnitude depended on the county size. Large growing counties had lower per capita expenditures than small growing counties. The size of the county seemed to determine whether population growth reduced per capita expenditures. Even if a small county could reduce per capita expenditures by growth, they might not be able to take advantage of that. Increasing its size could be very difficult because of legal restrictions or poor economic conditions that would not generate growth. The size needed to lower per capita expenditures might also be too large a magnitude for the county to reach in a length of time acceptable to the general public. Growth could also increase expenditures to smaller counties because economies might not exist at small sizes.

Population change does influence per capita expenditures, as shown by the results of the study. The results also indicate that there were other important variables in the relationship. Of the variables discussed in Chapter II, population density, wealth, and size were added to the analysis. Each affected per capita expenditures under some conditions. In each of the different expenditure categories considered, population change was usually significant for the larger counties and population density and wealth were the important variables for the smaller counties. That would indicate that wealth and density usually identify the level of per capita expenditures for smaller counties and population growth is more important for counties of a larger size. When size was inserted as an independent variable it was also significant. The results indicate that size is a factor influencing per capita expenditures.

The effect of the independent variables differed by the type of service studied. There was little correlation between per capita expenditures for health care and law enforcement and the independent variables. In those two categories there was little evidence of economies of size. The results of the analysis of roads and bridges and salaries of employees showed evidence of economies of size. The results of the analysis of total per capita expenditures also showed evidence of economies of size.

The results indicate that counties do have economies of size, and that per capita expenditures can be decreased if more people are served. Several ways of increasing the number served existed. Encouraging population growth was one, particularly for the largest counties. Also small counties were less likely to have population growth than the largest counties. They usually have net out-migration, not growth. Consolidation of functions of governments, either consolidation of departments within counties or consolidation of services with neighboring counties can result in a larger number of people being served. That way is often limited by legal constraints. The decision to increase size and the method used is determined finally by the public's votes.

Suggestions for Further Study

Further studies could define and measure the variables discussed in Chapter II. By finding accurate measures, the relationship between per capita expenditures and the independent factors could be better explained. A better understanding of per capita expenditures could be developed. Also economies of size could be explained in more detail. That would give local governments a more detailed explanation of ways to reduce per capita expenditures.

APPENDIX

TABLE 1

PERCENTAGE CHANGES OF POPULATION BETWEEN 1960 AND 1971
FOR COUNTY CHANGE CATEGORIES

Rapidly Decreasing Counties

County	Percent Change	County	Percent Change
Allen	-11.50	Marshall	-12.29
Anderson	-11.95	Morris	-10.19
Barber	-17.02	Ness	-10.18
Chautauqua	-18.22	Osborne	-11.82
Cheyenne	-11.72	Pawnee	-10.13
Clark	-13.72	Pratt	-16.94
Comanche	-11.68	Rawlins	-13.38
Decatur	-11.99	Republic	-14.50
Edwards	-13.97	Rice	-12.80
Elk	-22.17	Rooks	-18.68
Ellsworth	-13.55	Rush	-15.67
Graham	-12.34	Russell	-13.40
Greenwood	-17.52	Sheridan	-10.97
Harper	-15.45	Smith	-11.55
Jewell	-17.66	Stafford	-19.82
Kiowa	-10.60	Trego	-15.37
Lincoln	-16.90	Washington	-12.88

Slightly Decreasing Counties

County	Percent Change	County	Percent Change
Bourbon	-7.16	Meade	-9.25
Brown	-6.34	Mitchell	-8.08
Chase	-8.32	Nemaha	-5.93
Clay	-5.39	Norton	-7.83
Cloud	-8.31	Ottawa	-9.58
Cowley	-5.60	Phillips	-6.34
Hodgeman	-8.09	Sumner	-8.87
Labette	-5.08	Wilson	-5.93
Lane	-5.69	Woodson	-9.40
Logan	-5.99		

TABLE 1--Continued

Stable Counties

County	Percent Change	County	Percent Change
Atchison	-3.17	Linn	-3.28
Barton	1.21	Marion	-2.99
Butler	0.99	McPherson	2.60
Cherokee	-4.93	Montgomery	-1.54
Coffey	-3.66	Neosho	-3.25
Crawford	-2.13	Osage	4.80
Doniphan	-1.08	Pottawatomie	2.14
Franklin	-1.19	Saline	0.82
Geary	3.16	Sedgwick	1.76
Gove	-4.30	Seward	4.19
Greeley	-3.26	Stevens	-0.42
Hamilton	-3.83	Wabaunsee	-2.89
Kingman	-4.34	Wyandotte	-2.67

Slightly Increasing Counties

County	Percent Change	County	Percent Change
Dickinson	5.41	Jefferson	7.87
Ellis	6.46	Kearney	5.15
Gray	5.22	Miami	6.84
Harvey	6.24	Thomas	5.34
Jackson	8.59	Wallace	7.18

Rapidly Increasing Counties

County	Percent Change	County	Percent Change
Douglas	52.71	Morton	11.25
Finney	28.83	Reno	15.25
Ford	15.11	Riley	23.30
Grant	25.38	Scott	14.61
Haskell	30.44	Shawnee	16.43
Johnson	61.43	Sherman	16.22
Leavenworth	24.21	Stanton	12.19
Lyon	12.86	Wichita	20.43

Source: Calculated from population figures of the Kansas State Board of Agriculture

TABLE 2

ESTIMATED REGRESSION EQUATIONS FOR
THE TIME SERIES ANALYSIS

Rapidly Decreasing Counties

County	Equation	
Allen	T. PCE = 103.5 $- 1.845^{**}PG_t$ (t= -3.127)	R^2 = .49442
Anderson	T. PCE = 105.7 $- 2.967^{**}PG_t$ (t= -4.338)	R^2 = .65300
Barber	T. PCE = 86.35 $- 4.570^{**}PG_t$ (t= -17.16)	R^2 = .96715
Chautauqua	T. PCE = 153.1 $+ 1.273PG_t$ (t= .5602)	R^2 = .03042
Cheyenne	T. PCE = 114.5 $- 8.151^{**}PG_t$ (t= -13.86)	R^2 = .95052
Clark	T. PCE = 166.5 $- 9.976^{**}PG_t$ (t= -5.448)	R^2 = .74799
Comanche	T. PCE = 133.0 $- 8.966^{**}PG_t$ (t= -3.443)	R^2 = .54244
Decatur	T. PCE = 110.9 $- 5.233^{**}PG_t$ (t= -7.339)	R^2 = .84343
Edwards	T. PCE = 106.3 $- 6.043^{**}PG_t$ (t= -10.67)	R^2 = .91927
Elk	T. PCE = 129.2 $- 5.309^{**}PG_t$ (t= -8.00)	R^2 = .86486
Ellsworth	T. PCE = 91.96 $- 4.770^{**}PG_t$ (t= -17.36)	R^2 = .96790
Graham	T. PCE = 157.0 $- 7.893^{**}PG_t$ (t= -3.456)	R^2 = .54429
Greenwood	T. PCE = 145.8 $- 2.036^{**}PG_t$ (t= -3.359)	R^2 = .53014
Harper	T. PCE = 106.5 $- 4.809^{**}PG_t$ (t= -8.759)	R^2 = .88468

TABLE 2--Continued

County	Equation	
Jewell	T. PCE = 137.4 − 3.876**PG_t (t= −6.455)	R^2 = .80644
Kiowa	T. PCE = 153.8 − 12.35**PG_t (t= −6.837)	R^2 = .82375
Lincoln	T. PCE = 127.4 − 5.512**PG_t (t= −9.103)	R^2 = .89232
Marshall	T. PCE = 84.30 − 4.758**PG_t (t= −4.613)	R^2 = .68032
Morris	T. PCE = 104.5 − 6.494**PG_t (t= −10.18)	R^2 = .91202
Ness	T. PCE = 130.2 − 8.185**PG_t (t= −6.286)	R^2 = .79807
Osborne	T. PCE = 93.22 − 7.792**PG_t (t= −4.823)	R^2 = .69938
Pawnee	T. PCE = 98.26 − 6.239**PG_t (t= −8.619)	R^2 = .88135
Pratt	T. PCE = 103.3 − 2.804**PG_t (t= −5.221)	R^2 = .73163
Rawlins	T. PCE = 99.62 − 7.654**PG_t (t= −7.214)	R^2 = .83882
Republic	T. PCE = 117.6 − 6.305**PG_t (t= −10.55)	R^2 = .91757
Rice	T. PCE = 97.71 − 5.408**PG_t (t= −6.533)	R^2 = .81017
Rooks	T. PCE = 93.46 − 4.079**PG_t (t= −5.640)	R^2 = .76084
Rush	T. PCE = 118.4 − 6.517**PG_t (t= −9.595)	R^2 = .90202
Russell	T. PCE = 107.3 − 6.394**PG_t (t= −5.288)	R^2 = .73655

TABLE 2--Continued

County	Equation	
Sheridan	T. PCE = 133.3 − 11.54**PG_t (t= −6.880)	R^2 = .82559
Smith	T. PCE = 133.7 − 4.251**PG_t (t= −4.137)	R^2 = .63119
Stafford	T. PCE = 106.4 − 4.893**PG_t (t= −10.34)	R^2 = .91448
Trego	T. PCE = 94.10 − 7.589**PG_t (t= −9.497)	R^2 = .90020
Washington	T. PCE = 98.60 − 6.535**PG_t (t= −9.048)	R^2 = .89116

Slightly Decreasing Counties

County	Equation	
Bourbon	T. PCE = 118.9 + .9874PG_t (t= 1.251)	R^2 = .13537
Brown	T. PCE = 121.4 − 7.815*PG_t (t= −2.426)	R^2 = .37042
Chase	T. PCE = 183.5 − 10.00**PG_t (t= −3.955)	R^2 = .61002
Clay	T. PCE = 113.5 − 5.670*PG_t (t= −2.885)	R^2 = .45422
Cloud	T. PCE = 122.2 − 5.938**PG_t (t= −3.145)	R^2 = .49724
Cowley	T. PCE = 76.23 − 1.825PG_t (t= −1.700)	R^2 = .22411
Hodgeman	T. PCE = 199.2 − 19.02**PG_t (t= −6.91)	R^2 = .82893
Labette	T. PCE = 123.8 − 1.935PG (t= −.7950)	R^2 = .05944

TABLE 2--Continued

County	Equation	
Lane	$T.\ PCE = 162.3 - 9.828^{**}PG_t$ (t= −3.952)	$R^2 = .60961$
Logan	$T.\ PCE = 145.8 - 4430^{*}PG_t$ (t= −2.764)	$R^2 = .43313$
Meade	$T.\ PCE = 139.4 - 9.098^{**}PG_t$ (t= −4.539)	$R^2 = .67327$
Mitchell	$T.\ PCE = 102.6 - 4.604^{**}PG_t$ (t= −3.614)	$R^2 = .56642$
Nemaha	$T.\ PCE = 85.59 - 10.32^{**}PG_t$ (t= −5.166)	$R^2 = .72745$
Norton	$T.\ PCE = 100.4 - 5.830^{**}PG_t$ (t= −6.308)	$R^2 = .79914$
Ottawa	$T.\ PCE = 162.5 - 7.519^{**}PG_t$ (t= −5.331)	$R^2 = .73969$
Phillips	$T.\ PCE = 121.6 - 4.436^{**}PG_t$ (t= −5.114)	$R^2 = .72341$
Sumner	$T.\ PCE = 103.8 - 6.272^{**}PG_t$ (t= −3.109)	$R^2 = .49144$
Wilson	$T.\ PCE = 124.8 - 2.362PG_t$ (t= −1.364)	$R^2 = .15687$
Woodson	$T.\ PCE = 62.33 - 11.35^{**}PG_t$ (t= −3.501)	$R^2 = .55069$

Stable Counties

County	Equation	
Atchison	$T.\ PCE = 85.03 - 4.55PG_t$ (t= −1.361)	$R^2 = .15630$
Barton	$T.\ PCE = 64.26 + 3.865PG_t$ (t= .6627)	$R^2 = .04207$

TABLE 2--Continued

County	Equation	
Butler	T. PCE = 95.42 + $3.286PG_t$ (t= 1.542)	R^2 = .19215
Cherokee	T. PCE = 143.6 − $2.214PG_t$ (t= −.7379)	R^2 = .05164
Coffey	T. PCE = 104.2 − $3.144PG_t$ (t= −1.601)	R^2 = .20411
Crawford	T. PCE = 104.6 − $3.384PG_t$ (t= −2.060)	R^2 = .29795
Doniphan	T. PCE = 111.9 − $3.498PG_t$ (t= −.4710)	R^2 = .02170
Franklin	T. PCE = 98.80 + $2.251PG_t$ (t= .8882)	R^2 = .07312
Geary	T. PCE = 80.79 − $1.800^{*}PG_t$ (t= −2.716)	R^2 = .42454
Gove	T. PCE = 169.7 − $12.52^{**}PG_t$ (t= −3.923)	R^2 = .60613
Greeley	T. PCE = 236.7 − $4.700PG_t$ (t= −.5568)	R^2 = .03007
Hamilton	T. PCE = 198.3 − $10.87^{*}PG_t$ (t= −2.459)	R^2 = .37683
Kingman	T. PCE = 89.77 − $11.71^{**}PG_t$ (t= −4.365)	R^2 = .65583
Linn	T. PCE = 125.8 − $7.680^{*}PG_t$ (t= −2.203)	R^2 = .32680
Marion	T. PCE = 116.0 − $7.478PG_t$ (t= −1.846)	R^2 = .25414
McPherson	T. PCE = 83.52 + $7.379^{*}PG_t$ (t= 3.013)	R^2 = .47589
Montgomery	T. PCE = 95.52 + $3.035PG_t$ (t= .7699)	R^2 = .05596

TABLE 2--Continued

County	Equation	
Neosho	T. PCE = 96.36 − $1.853PG_t$ (t= −.9289)	R^2 = .07943
Osage	T. PCE = 86.15 + $3.743PG_t$ (t= 1.603)	R^2 = .20443
Pottawatomie	T. PCE = 103.0 + $.3663PG_t$ (t= .09774)	R^2 = .00095
Saline	T. PCE = 78.47 − $.3519PG_t$ (t= −.2093)	R^2 = .00436
Sedgwick	T. PCE = 74.47 + $3.314^{*}PG_t$ (t= 2.203)	R^2 = .32681
Seward	T. PCE = 109.5 − $1.844PG_t$ (t= −.9752)	R^2 = .08685
Stevens	T. PCE = 302.5 − $23.81^{*}PG_t$ (t= −2.783)	R^2 = .43646
Wabaunsee	T. PCE = 95.00 − $10.50PG_t$ (t= −1.837)	R^2 = .25229
Wyandotte	T. PCE = 62.33 − $11.35^{**}PG_t$ (t= −3.501)	R^2 = .55069

Slightly Increasing Counties

County	Equation	
Dickinson	T. PCE = 89.11 + $.9538PG_t$ (t= 4.097)	R^2 = .01651
Ellis	T. PCE = 66.58 + $3.686^{**}PG_t$ (t= 3.493)	R^2 = .54957
Gray	T. PCE = 135.3 + $9.628PG_t$ (t= 1.883)	R^2 = .26173

TABLE 2--Continued

County	Equation	
Harvey	T. PCE = 77.65 + $5.905^{**}PG_t$ (t= 5.570)	R^2 = .75623
Jackson	T. PCE = 128.8 + $.6084PG_t$ (t= .9060)	R^2 = .07585
Jefferson	T. PCE = 106.9 + $2.956^{*}PG_t$ (t= 2.652)	R^2 = .41292
Kearney	T. PCE = 230.6 + $6.907PG_t$ (t= .6394)	R^2 = .03928
Miami	T. PCE = 110.1 + $3.198^{**}PG_t$ (t= 3.184)	R^2 = .50338
Thomas	T. PCE = 91.83 + $4.319^{**}PG_t$ (t= 3.291)	R^2 = .52001
Wallace	T. PCE = 151.8 + $9.178PG_t$ (t= 1.676)	R^2 = .21940

Rapidly Increasing Counties

County	Equation	
Douglas	T. PCE = 65.60 + $.4777^{*}PG_t$ (t= 2.838)	R^2 = .44607
Finney	T. PCE = 70.26 + $1.471^{**}PG_t$ (t= 4.012)	R^2 = .61686
Ford	T. PCE = 52.09 + $3.258^{**}PG_t$ (t= 8.212)	R^2 = .87086
Grant	T. PCE = 69.24 + $9.305^{**}PG_t$ (t= 6.250)	R^2 = .79619
Haskell	T. PCE = 84.96 + $4.790^{**}PG_t$ (t= 4.432)	R^2 = .66264

TABLE 2--Continued

County	Equation	
Johnson	T. PCE = 28.19 + .5805** PG_t (t= 6.391)	R^2 = .80334
Leavenworth	T. PCE = 58.83 + 1.448** PG_t (t= 4.926)	R^2 = .70814
Lyon	T. PCE = 75.96 + 3.225* PG_t (t= 3.038)	R^2 = .48002
Morton	T. PCE = 157.3 + 3.642 PG_t (t= 1.197)	R^2 = .12524
Reno	T. PCE = 66.18 + 1.069** PG_t (t= 4.656)	R^2 = .68433
Riley	T. PCE = 45.04 + 1.348** PG_t (t= 7.712)	R^2 = .85605
Scott	T. PCE = 71.47 + 4.641** PG_t (t= 4.445)	R^2 = .66392
Shawnee	T. PCE = 42.72 + 1.716** PG_t (t= 4.244)	R^2 = .64302
Sherman	T. PCE = 89.72 + 3.612** PG_t (t= 4.938)	R^2 = .70913
Stanton	T. PCE = 106.3 + 9.088* PG_t (t= 2.757)	R^2 = .43179
Wichita	T. PCE = 132.2 + 5.148** PG_t (t= 7.836)	R^2 = .85996

TABLE 3

COUNTIES IN SIZE CATEGORIES

Counties of Zero to 8,000 Population		
Barber	Haskell	Rawlins
Chase	Hodgeman	Rush
Chautauqua	Jewell	Scott
Cheyenne	Kearny	Sheridan
Clark	Kiowa	Sherman
Comanche	Lane	Smith
Decatur	Lincoln	Stafford
Edwards	Logan	Stanton
Elk	Meade	Stevens
Ellsworth	Morris	Thomas
Gove	Morton	Trego
Graham	Ness	Wabaunsee
Grant	Norton	Wallace
Gray	Osborne	Wichita
Greeley	Ottawa	Woodson
Hamilton		

Counties of 8,000 to 20,000 Population		
Allen	Jackson	Phillips
Anderson	Jefferson	Pottawatomie
Atchison	Kingman	Pratt
Bourbon	Linn	Republic
Brown	Marion	Rice
Clay	Marshall	Rooks
Cloud	Mitchell	Russell
Coffey	Nemaha	Seward
Doniphan	Neosho	Washington
Greenwood	Osage	Wilson
Harper	Pawnee	

Counties of 20,000 to 35,000 Population		
Barton	Ford	Lyon
Cherokee	Franklin	McPherson
Dickinson	Geary	Miami
Ellis	Harvey	Sumner
Finney	Labette	

TABLE 3--Continued

Counties of 35,000 and Above Population		
Butler	Leavenworth	Saline
Cowley	Montgomery	Sedgwick
Crawford	Reno	Shawnee
Douglas	Riley	Wyandotte
Johnson		

TABLE 4

THE DATA USED FOR TOTAL, HEALTH CARE, ROADS AND BRIDGES, LAW ENFORCEMENT, AND SALARIES OF EMPLOYEES PER CAPITA EXPENDITURES ANALYSIS FOR THE 105 KANSAS COUNTIES

County	Total[a] Per Capita Expend. 1971	Health[b] Care Per Capita Expend. 1971	Roads and[c] Bridges Per Capita Expend. 1971	Law[d] Enforcement Per Capita Expend. 1971
Allen	114.0	1.21	26.90	0.85
Anderson	140.0	5.90	38.90	1.20
Atchison	98.1	2.13	18.70	0.69
Barber	168.0	0.00	44.30	0.81
Barton	93.5	2.62	14.30	1.21
Bourbon	111.0	1.94	30.30	1.33
Brown	154.0	1.93	39.90	0.93
Butler	148.0	2.72	27.80	1.85
Chase	286.0	3.23	115.00	1.15
Chautauqua	180.0	2.80	66.80	1.35
Cherokee	158.0	2.72	27.70	1.73
Cheyenne	200.0	5.07	55.40	0.18
Clark	270.0	3.07	68.40	2.98
Clay	174.0	2.86	42.80	1.19
Cloud	161.0	3.83	52.70	1.39
Coffey	131.0	5.65	38.30	4.74
Comanche	251.0	9.61	76.40	2.38
Cowley	83.2	2.15	15.10	1.02
Crawford	97.6	1.62	17.70	0.41
Decatur	160.0	4.84	38.80	2.73
Dickinson	113.0	1.40	19.20	0.89
Doniphan	156.0	0.99	40.30	1.20
Douglas	83.2	1.92	21.70	1.08
Edwards	182.0	2.97	51.90	2.29
Elk	238.0	8.09	62.10	0.73
Ellis	103.0	1.22	28.60	0.69
Ellsworth	162.0	3.06	43.40	2.04
Finney	117.0	2.40	24.50	1.43
Ford	115.0	2.91	27.40	1.36
Franklin	122.0	5.09	37.10	1.09
Geary	87.8	3.62	14.10	2.16
Gove	232.0	7.84	78.50	0.95
Graham	237.0	5.53	66.50	1.73
Grant	334.0	24.00	53.90	1.51
Gray	241.0	2.62	84.90	1.41
Greeley	323.0	14.00	49.70	1.62
Greenwood	177.0	4.00	54.90	1.11

TABLE 4--Continued

Salaries[e] of Employees Per Capita Expend. 1971	Pop.[f] Change 1971 Minus 1966	Pop.[g] Density 1971	Wealth[h] 1971	Pop.[i] Size 1971
8.33	-9.53	28.9	36,411,175	15,049
10.30	-6.06	14.7	29,953,267	8,495
7.21	-1.22	46.9	36,439,672	19,768
12.60	-10.00	6.3	36,944,974	7,264
7.17	-0.80	39.9	120,208,996	34,561
9.36	-10.50	23.8	34,644,642	15,231
9.15	-6.82	23.5	41,847,144	13,615
6.37	0.19	26.6	115,763,016	38,501
20.30	-1.33	4.7	26,010,174	3,647
16.20	-12.90	7.6	14,377,475	4,951
7.59	-4.00	36.7	50,616,580	21,594
14.10	-6.13	4.0	19,684,560	4,196
24.10	-14.30	3.0	27,984,387	3,012
10.70	-0.65	15.5	35,566,798	10,227
9.41	-6.08	19.1	45,022,981	13,640
9.97	2.38	12.6	23,431,625	8,319
22.50	-10.30	3.6	18,067,052	2,904
7.11	-3.24	30.8	86,189,146	35,037
5.40	-0.45	63.9	57,593,609	38,240
13.50	-9.52	5.9	22,257,209	5,387
6.87	7.43	27.7	59,689,029	23,742
10.20	-1.02	26.9	20,873,246	10,232
7.36	33.86	115.5	131,488,170	54,080
16.50	-8.76	7.7	27,595,820	4,741
15.70	-12.50	6.4	17,134,249	4,174
6.87	-1.40	24.6	66,482,106	22,210
14.30	-6.35	9.8	42,162,222	7,106
7.78	10.30	15.5	82,889,850	20,260
10.50	3.88	21.3	78,428,401	23,137
9.02	-5.79	34.9	48,925,286	20,169
7.52	17.50	59.1	40,577,939	23,611
14.30	-5.87	3.8	23,010,963	4,119
19.40	-10.50	5.5	30,819,097	4,974
14.90	8.63	11.5	81,292,864	6,545
20.20	-0.06	5.3	27,979,875	4,638
31.70	-5.98	2.6	20,026,007	2,107
13.40	-7.10	8.2	34,420,840	9,544

TABLE 4--Continued

County	Total Per Capita Expend. 1971	Health Care Per Capita Expend. 1971	Roads and Bridges Per Capita Expend. 1971	Law Enforcement Per Capita Expend. 1971
Hamilton	234.0	5.89	75.20	0.37
Harper	193.0	5.06	77.60	1.17
Harvey	124.0	2.69	24.20	1.18
Haskell	253.0	1.16	80.60	0.46
Hodgeman	258.0	15.00	109.00	2.12
Jackson	130.0	1.10	43.50	1.76
Jefferson	145.0	1.73	39.00	2.20
Jewell	192.0	4.03	74.80	1.16
Johnson	74.1	2.15	9.88	0.48
Kearney	369.0	30.50	91.90	5.10
Kingman	157.0	3.93	50.40	0.87
Kiowa	253.0	8.98	62.50	4.50
Labette	122.0	1.98	22.30	1.22
Lane	230.0	13.50	50.40	2.70
Leavenworth	79.4	1.52	12.40	0.91
Lincoln	223.0	4.00	85.10	1.11
Linn	175.0	1.23	55.80	1.45
Logan	169.0	8.12	37.10	2.14
Lyon	109.0	1.87	36.10	1.70
Marion	136.0	2.23	50.10	0.93
Marshall	140.0	1.46	29.00	0.16
McPherson	115.0	3.54	29.90	1.66
Meade	216.0	1.52	57.00	1.40
Miami	115.0	2.04	30.80	1.42
Mitchell	156.0	4.18	43.30	0.98
Montgomery	148.0	1.69	15.50	0.59
Morris	167.0	4.15	55.70	0.88
Morton	292.0	14.40	45.70	0.94
Nemaha	147.0	1.45	39.30	0.37
Neosho	99.0	1.30	27.30	0.89
Ness	206.0	2.28	77.70	0.47
Norton	149.0	5.64	36.70	0.85
Osage	106.0	1.16	24.30	1.37
Osborne	134.0	5.51	40.40	0.49
Ottawa	198.0	3.29	73.10	1.14
Pawnee	155.0	1.34	34.80	1.47
Phillips	186.0	6.30	59.90	1.01
Pottawatomie	116.0	1.43	32.30	1.07

TABLE 4--Continued

Salaries of Employees Per Capita Expend. 1971	Pop. Change 1971 Minus 1966	Pop. Density 1971	Wealth 1971	Pop. Size 1971
25.80	-5.55	3.0	21,313,105	3,065
11.90	-8.18	10.4	43,660,234	8,353
8.43	1.21	50.7	76,612,520	27,384
17.00	1.84	6.7	41,089,944	3,929
31.80	-4.12	3.3	22,307,757	2,864
9.84	5.81	17.1	23,335,583	11,273
9.38	5.48	22.1	27,217,011	12,147
13.10	-12.50	7.0	26,318,868	6,356
7.75	14.80	471.4	525,803,321	224,390
28.10	0.12	3.7	50,141,615	3,222
10.80	-2.12	11.5	51,824,943	10,025
17.50	-8.38	5.7	41,259,716	4,124
7.86	-8.20	38.2	55,001,294	25,015
23.80	-5.17	4.1	16,844,466	2,969
7.70	12.90	9[illegible].7	64,267,912	46,377
14.90	-13.50	6.9	27,159,378	5,011
12.20	-1.25	13.7	34,127,678	8,308
14.50	-13.20	3.6	20,504,295	3,909
6.51	4.77	32.5	80,976,780	27,745
9.84	-2.31	15.7	50,711,874	15,070
9.81	-5.18	15.9	43,686,265	14,527
8.64	0.04	27.3	89,918,548	24,508
18.80	-10.40	5.1	38,896,385	5,045
8.85	4.26	34.3	51,547,385	20,279
11.20	-12.80	11.5	30,374,023	8,248
5.84	0.31	70.5	75,954,181	45,792
13.00	-6.28	9.7	25,167,900	6,894
18.80	-4.45	5.0	47,720,318	3,690
10.20	-4.55	17.8	37,123,778	12,634
7.22	-1.67	32.6	42,853,212	19,168
15.00	-9.23	4.7	34,645,048	5,116
10.20	-8.09	8.6	23,368,271	7,623
7.89	5.80	19.1	39,364,376	13,808
11.50	-8.08	7.5	28,660,752	6,757
15.10	-8.00	8.7	35,514,499	6,335
11.10	-8.40	11.2	40,054,783	8,396
10.60	-4.95	9.3	35,262,059	8,512
9.52	2.51	14.5	35,555,509	12,385

TABLE 4--Continued

County	Total Per Capita Expend. 1971	Health Care Per Capita Expend. 1971	Roads and Bridges Per Capita Expend. 1971	Law Enforcement Per Capita Expend. 1971
Pratt	148.0	2.41	59.20	1.41
Rawlins	194.0	2.64	65.40	0.61
Reno	76.8	1.21	13.60	0.46
Republic	202.0	3.01	65.70	1.35
Rice	149.0	1.84	45.60	0.61
Riley	72.8	4.49	13.70	1.47
Rooks	158.0	1.48	54.70	1.04
Rush	204.0	6.13	70.90	3.55
Russell	177.0	1.85	45.90	1.58
Saline	93.8	1.67	22.40	1.95
Scott	168.0	2.50	31.00	0.79
Sedgwick	116.0	7.58	7.81	0.81
Seward	126.0	3.45	27.30	1.67
Shawnee	88.4	2.09	11.10	0.67
Sheridan	261.0	6.71	71.70	0.62
Sherman	160.0	4.84	31.80	1.37
Smith	186.0	4.10	66.20	1.05
Stafford	205.0	1.63	63.00	1.45
Stanton	342.0	9.84	51.50	2.47
Stevens	382.0	6.55	94.60	2.45
Sumner	145.0	3.04	34.50	3.11
Thomas	116.0	1.37	26.90	1.49
Trego	200.0	6.08	60.10	0.47
Wabaunsee	144.0	1.85	45.00	2.09
Wallace	224.0	2.95	64.10	1.42
Washington	175.0	5.25	38.30	0.98
Wichita	250.0	8.83	47.00	1.21
Wilson	140.0	2.20	43.30	1.02
Woodson	200.0	1.59	75.00	1.37
Wyandotte	126.0	3.35	4.61	0.93

TABLE 4--Continued

Salaries of Employees Per Capita Expend. 1971	Pop. Change 1971 Minus 1966	Pop. Density 1971	Wealth 1971	Pop. Size 1971
12.20	-17.60	13.7	46,782,206	10,033
16.60	-9.78	4.3	22,948,742	4,661
7.40	6.00	54.2	165,255,652	68,130
10.20	-6.74	11.9	35,362,850	8,621
10.20	-7.52	16.9	66,454,457	12,244
7.70	11.10	59.2	70,325,017	36,972
11.30	-15.00	9.0	34,897,362	8,002
12.80	-11.90	7.4	30,959,330	5,366
11.50	-8.33	11.4	40,413,088	10,262
7.91	1.40	65.0	97,458,199	46,840
11.20	1.21	8.3	29,525,037	6,008
8.14	-0.29	331.4	741,481,372	331,128
9.76	0.93	26.1	68,220,394	16,695
7.25	9.24	287.1	356,035,254	156,522
16.40	-8.96	4.3	20,061,584	3,913
11.10	7.79	7.4	33,335,297	7,816
12.60	-10.10	7.8	26,982,825	7,043
13.60	-12.00	7.8	40,993,481	6,264
28.20	-3.61	3.5	28,663,861	2,402
24.00	-5.08	5.9	71,133,200	4,302
9.98	-8.75	20.1	65,536,814	23,817
9.54	1.97	7.3	35,848,009	7,914
17.10	-8.77	5.2	22,289,121	4,715
14.60	1.17	8.2	24,003,776	6,546
25.30	0.68	2.6	16,108,145	2,373
11.80	-10.70	11.0	43,701,845	9,884
18.60	8.05	4.6	25,278,140	3,396
8.60	-8.29	23.0	32,902,204	13,231
14.30	-2.86	10.0	18,845,716	5,059
8.10	-4.18	1,258.7	385,568,160	188,809

Footnotes to TABLE 4

Sources:

[a]Calculated from the per capita expenditure and population data from: Donald B. Erickson, Arlo W. Biere, and John Sjo, City and County Public-service Expenditures, Kansas, 1960 to 1970 (Agricultural Experiment Station, Kansas State University, Bulletin 578, Feb., 1974) and additional unpublished data for 1971. The data was tabulated from the county annual "Budget and Financial Statements" filed with the state auditor and the Kansas State Board of Agriculture, Population of Kansas, as reported by the county assessors.

[b]Ibid.

[c]Ibid.

[d]Ibid.

[e]Ibid.

[f]Population data from the Kansas State Board of Agriculture, Population of Kansas, as reported by the county assessors.

[g]The Institute for Social and Environmental Studies, Kansas Statistical Abstract, 1971, (Lawrence, Kansas: The University of Kansas, 1972), pp. 17-18.

[h]Property Valuation Department, Kansas Statistical Report of Property Valuations, 1971, (Topeka, Kansas), pp. 23-128.

[i]Population of Kansas, Kansas State Board of Agriculture, Topeka, Kansas, as reported by the county assessors.

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THE EFFECT OF POPULATION GROWTH AND OTHER VARIABLES ON PER CAPITA EXPENDITURES IN KANSAS COUNTIES

by

VERNON LEE WALDREN

B.S., Kansas State University, 1975

AN ABSTRACT OF A MASTER'S THESIS

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MASTER OF SCIENCE

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County governments are faced with rising per capita expenditures for public services. When ways are found to lower per capita expenditures, stabilize them, or slow their increase, counties will want to implement their use. If economies of size exist for public services, increasing the number of people served is a method to lower per capita expenditures.

The initial goal of the author was to determine if population growth reduced per capita expenditures. Therese Lucas conducted a study in Colorado on local governments, analyzing whether growth counties had lower local government per capita expenditures than nongrowth counties. She concluded that growth results in lower per capita expenditures. In analyzing the Kansas data I concluded that growth was a factor influencing per capita expenditures and they were negatively correlated. But I did not assume growth was the only variable that affected per capita expenditures.

Also included in the study was a discussion of other variables that influence expenditures. The factors discussed were: (1) the quantity of services demanded, (2) cost of the resources, (3) availability and mobility of the resources, (4) location of the jurisdiction, (5) general economic conditions, (6) population density, (7) wealth, (8) population, and (9) population growth. Population density, wealth, population, and population growth were analyzed to determine their relationship to per capita expenditures.

Population growth was analyzed to determine its effects on expenditures in a time series and a cross-sectional study. In the time series analysis, growth was considered for five population categories. The results did not show that growth caused lower per capita expenditures. The results of the cross-sectional analysis indicated that larger growing counties are more likely to have lower per capita expenditures than smaller growing counties. Economies of size are more likely for large growing counties.

The factors population density and wealth were added to population growth as variables and analyzed for the different size categories. The relationship between the variables was analyzed for total, health care, roads and bridges, law enforcement, and salaries of employees per capita expenditures. The results showed the variables were more significant for total, roads and bridges, and salaries of employees per capita expenditures and population density and wealth were more often significant for smaller counties and population growth was important to larger counties. The results also suggest size was an important factor, when it was added as an independent variable.

The results indicated that the four factors were important influences on per capita expenditures under different expenditure categories and size groups. But the results infer that the other variables are also important to the relationship.