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IN THE ECONOMY OF RURAL U.S. COUNTIES, 1969-1986:
AN EXAMINATION EMPLOYING ECONOMIC BASE THEORY

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THE ROLE OF NONEMPLOYMENT INCOME IN THE ECONOMY OF RURAL U.S. COUNTIES, 1969-1986: AN EXAMINATION EMPLOYING ECONOMIC BASE THEORY

By

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ABSTRACT

THE ROLE OF NONEMPLOYMENT INCOME IN THE ECONOMY OF RURAL U.S. COUNTIES, 1969-1986: AN EXAMINATION EMPLOYING ECONOMIC BASE THEORY

By

Ron O. Cox

Nationwide, nonemployment income (NI) makes up one third of total personal income (TPI) and in some rural U.S. counties it composes two thirds of TPI. This dissertation examines the impact of NI upon the economic base of rural counties by employing economic base theory. U.S. Bureau of Economic Analysis county-level data were used to examine the nonmetropolitan counties. Economic activities were classified as basic versus nonbasic by means of *ad hoc* assignment and location quotient techniques. Multiple regression analysis produced differential multipliers for the six basic sectors for eight subsets of counties (Appendix B) for fifteen years.

The two NI sectors, property and transfer income, both produced positive and significant multipliers which were larger than the multipliers produced by primary activities (agriculture) and manufacturing. The nonmetropolitan nonadjacent counties did not produce multipliers for the NI sectors which were greater than the multipliers for the nonmetropolitan adjacent counties, as had been hypothesized. Counties with larger places (towns) generally had larger multipliers than those with smaller places. Counties with high levels of both NI sectors had lower multipliers than the

counties with average levels of NI. There was a general tendency for the size of the multipliers to decline from 1972-1986. The impact does not necessarily decline because the impact is the product of the multipliers and the absolute value of TPI. Therefore, the impact may be remaining constant or even increasing over time.

DEDICATION

I would like to dedicate the innumerable hours of effort, energy, frustration, and enthusiasm which went into the completions of this dissertation to my daughter Kris Y. Cox and my parents Orvin R. and Joan M. (Holm) Cox. Kris is such a source of joy, happiness, love, learning, and excitement--an eternal source of sunshine for me. I hope this insignificant dissertation can serve as a source stimulation and encouragement for Kris to live her life in such a way to make her contribution for the betterment of society.

I would like to thank my parents who have done their very best to continually provide guidance and support for me. They have taught me through example, lessons and values which tower above that which I have learned in the many classes extending from kindergarten to my Ph.D. program. I consider myself extremely fortunate to have been blessed with such loving parents and such a fantastic daughter. I am very proud of all three of them.

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I would like to extend my gratitude to Dr. Bruce Pigozzi, the chairman of my dissertation committee and my advisor, and to the members of my dissertation committee for their support and assistance. Drs. Gary Manson, Assefa Mehretu, and Pigozzi were especially helpful in writing the proposal which succeeding in obtaining financial support for this research.

I would like to thank the Aspen and Ford Foundations for awarding me the Woodrow Wilson Rural Policy Fellowship. The grant provided financial support which allowed me to purchase the computerized data needed for this research and also provided me with tuition and a generous stipend.

Numerous people assisted me in a variety of ways which made it possible for me to complete this research. They include Dr. Roy Cole, Nick Hinkle, Michael J. Lipsey, Scott Thomas, and Spring Wu. My wife Induck was supportive.

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THE ROLE OF NONEMPLOYMENT INCOME

CHAPTER 1

In the creation of policy designed to promote economic growth of rural counties, the approach is usually to expand the economic base of the region by increasing the basic sector, frequently by attracting additional industrial employment. Industry, sometimes tourism and increasingly services, are thought to be keys to growth in the local economy. However, a little-recognized income source, nonemployment income, has been rapidly increasing over the past 50 years and has now become a major component of total personal income.[1] Much of the initial research on nonemployment income suggests this income source may have a greater relative impact in many rural areas than does industrial income (Hirschl and Summers, 1982).

Nonemployment income is considered to be part of the basic sector (Fortune, 1938; Andrews, 1953b; Weiner and Hoyt, 1954; Alexander, 1956; Isard, 1960: 194-195; Tiebout, 1962: 40; Bolton, 1966: 29; Beyers, 1979: 42; Harmston,

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[1]Nonemployment income is composed of two components--property income and transfer payments. Property income is the collective term for income such as interest, dividends, royalties, and rentals. Transfer payments include all transfer income from both government and business, such as Social Security benefits, unemployment compensation, retirement benefits, veterans' benefits, and welfare payments and benefits.

1981: 47; Bender, 1987: 62; Manson and Groop, 1988: 7). All too frequently, however, research which examines the economic impact of the basic sector upon the economy of a region omits nonemployment income entirely or includes only a portion of it. Such research provides an incomplete picture of the economy of the region, leaving planners and policy makers uninformed about this increasingly important footloose component of the basic sector.

This research will contribute analysis and information about the impact of nonemployment income upon the nonbasic sector of the rural economy using economic base theory by examining the impact of nonemployment income on the rural counties of the United States. The research has three specific foci. The first is the absolute impact of both property and transfer income and their relative impacts when compared to primary activities and manufacturing. The second is the manner in which the impact of the two nonemployment sectors varies across the rural-urban continuum. The final focus is the effect the nonemployment sectors have when they exhibit abnormally high or low levels.

ECONOMIC BASE THEORY

Economic base theory has evolved over the past seventy years in order to help explain the economy of a region, most often a city or metropolitan area. The first essential step of the theory is to separate the economic activity into two components--basic or "city-building" (Pfouts, 1970: 1) and

nonbasic or "city-serving" activities.[1] The "basic" activities are considered to be the foundation or "base" of the economy which then supports the "nonbasic" or "city-building" activities.[2] Once the basic activities create the foundation, then the nonbasic activities become established to serve the needs of those employed in the basic activities.

A hypothetical historical example might help to clarify this relationship. As Europeans began to settle in northern Michigan, lumbering was an important activity. Initially logging was the only activity in a specific area but soon other businesses, such as a general store and/or a tavern, became established to serve the needs of the lumberjacks. As time progressed, additional services followed, such as schools, churches, doctors, barbers, and community government. In this simplified, hypothetical example, lumbering provided the foundation upon which the overall economy of the community developed. In reality, the foundation is rarely built exclusively on a single basic activity, but frequently one type of activity such as mining, agriculture, or manufacturing is dominant, especially in smaller communities.

The ghost towns of the American West are examples of communities which were built upon a single basic activity

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[1]Ullman, Dacey, and Brodsky (1971: 3) list ten or more synonyms for each of the two sectors.

[2]Harold McCarty use a similar analogy in 1942 when he described the basic activities as the foundation of the "occupational pyramid" (Alexander, 1956).

(Blumenfeld, 1955: 130). When that activity, mining, failed the economy of the entire community soon collapsed. However, if the economy of the community was not solely dependent upon mining, the community may have survived. The legalization of gambling in Deadwood, South Dakota is an example of a community formerly dominated by mining that is diversifying its economy by promoting tourism via gambling.

The nonbasic sector does not respond instantaneously to changes in the basic sector, but responds only after a period of time. In the example, the logging preceded the general store which preceded the other services. The length of this time lag from the change in the basic sector to the response by various portions of the nonbasic sector is an additional consideration in applying the economic base theory. It will be discussed in more detail later.

The essence of economic base theory is that the basic activities are the driving force which create, indirectly through labor and households, the need for the nonbasic sector. The basic activities are so essential to the economy of the community because they bring income into the community from outside sources. The basic component can be considered the "wage earner" for the community family. On the other hand, nonbasic activities are not considered as fundamental to the economy of the community because "...the inhabitants of the towns could not be expected to live by taking in each others' washing" (J. H. Jones, 1944 as cited by Alexander, 1956).

As noted above, the basic activities bring income into the community from external sources. The income is most frequently derived from the export of goods, such as the sale of primary or secondary goods to external markets (e.g. grain or television sets). This emphasis on exports explains why economic base theory is sometimes called "export base theory" (Richardson, 1973). However, the name "export base" is sometimes construed to restrict basic activities exclusively to the export of goods and omits other sources of income from outside sources. Therefore, the use of the term "exogenous sector" seems to be more appropriate than "export base" since it includes all outside influences (Richardson, 1978: 12).[3] The exogenous sector includes exported services (e.g. insurance), sale of goods or services to non-local residents (e.g. tourists), or income from nonemployment sources (e.g. Social Security or property income).

As noted before, the core of economic base theory is that the basic activities determine the demand for the nonbasic activities. From our fictitious example, the need for the services of general stores, taverns, and schools would be a function of the number of lumberjacks or miners in the area. In other words, when the income from the basic activity is expended locally to pay for goods (e.g. food, shelter) and services (e.g. education, medical care), the

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[3]Throughout the remainder of this paper, the terms "basic" and "exogenous" (and their counterparts--"nonbasic" and "endogenous") will be used interchangeably while referring to the broader definition of basic.

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basic sector is driving the nonbasic (local or endogenous) sector by increasing nonbasic income.

The early research using economic base theory focused on the ratio of the basic and nonbasic sectors. In 1936, when Homer Hoyt developed some of the essential outlines of the theory, he initially conceived that the ratio of basic to nonbasic activity in terms of employment was 1:1 for all cities. However, he quickly realized that the ratio varied from city to city (Andrews, 1953a) as illustrated by a table compiled by Edward L. Ullman (Weiner and Hoyt, 1954). In the table, which included studies made from 1937 to 1953, the basic to nonbasic employment ratio varied from 1.0:0.6 for Oshkosh, Wisconsin (population of 42,000) to 1.0:2.1 for the New York City Metropolitan Area (population of 12,000,000). The results of these studies, while difficult to compare because the various researchers used different techniques, strongly suggest that as the size of the city increases, the role of the nonbasic sector increases (i.e. the basic/nonbasic ratio will decrease in size).

This change in ratio is supported by the central place theory. As one examines places within the various levels of the hierarchy of places, an additional level of services is added at each higher level of the hierarchy. Therefore, services (nonbasic activities) would be expected to play a larger role for cities higher up the hierarchy of central

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places, explaining why the ratio tends to decline with increasing city size.[4]

The concept that the exogenous (basic) sector determines the endogenous (nonbasic) sector can be described mathematically by the equation:[5]

$$\text{Endogenous} = b\ (\text{Exogenous}) \qquad [1.1a]$$

Other researchers became interested in being able to develop multipliers which can be used in planning and policy making. The early multipliers which were calculated were a revised way of stating the ratio of basic to nonbasic (or exogenous to endogenous). If equation [1.1a] is rewritten in abbreviated form (equation [1.1b]) and rearranged (equation [1.2]), then the relationship of the ratio of endogenous activity ("Y") to exogenous activity ("X") is given by "b".

$$Y = b\ (X) \qquad [1.1b]$$

$$Y/X = b \qquad [1.2]$$

While the ratio ("b") is the inverse of that expressed by Hoyt above, it portrays the same relationship. The "b" is a coefficient which indicates the relationship of the change resulting in the endogenous sector ("Y") when a unit change

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[4]The author realizes that relative location of the central place can be as important as, or more important than, population size within central place theory. The hypotheses in the dissertation will include consideration of both population size and relative location.

[5]Throughout this discussion of economic base theory, economic activity is measured in terms of personal income, i.e. the endogenous sector means the endogenous activity as measured in terms of personal income. Another unit of measurement of economic activity which is commonly used is employment. While the theory could also be discussed in terms of employment data, this discussion is done in terms of personal income. Personal income data was used exclusively in this dissertation.

occurs in the exogenous sector ("X"). The multiplier can then be derived from the coefficient, as will be seen below in equation [1.5].

Economic base theory generally assumes that all economic activities are either exogenous or endogenous. Hence the total economy is the sum of the exogenous and the endogenous activities. In terms of an equation, the relationship would be written:

$$\text{Total} = \text{Exogenous} + \text{Endogenous} \qquad [1.3]$$

By substituting the values from equation [1.1b] into equation [1.3], equation [1.4] is derived.

$$\text{Total} = X + bX \qquad [1.4]$$

By factoring the right side of equation [1.4] by X, equation [1.5] is produced.

$$\text{Total} = (b+1)\,X \qquad [1.5]$$

The "b+1" is called the multiplier.

Both Garrison (1972) and Sasaki (1963) used the generic relationship expressed in equation [1.5] to determine composite multipliers for their research but each used a different technique to derive their multipliers. In his study of rural Kentucky counties, Garrison (1972) used a ratio technique, similar to that used by Hoyt in the above discussion, to determine his composite multipliers. Sasaki (1963), on the other hand, estimated his composite multipliers by use of simple regression rather than the ratio technique when he did his research on Hawaii.

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Such multipliers are called composite multipliers because they are a single multiplier for the entire exogenous sector of the region(s) in question, rather than for specific subsectors of the exogenous activity, such a manufacturing or mining. When a single composite multiplier is determined for all exogenous activity, each individual industrial subsector within the exogenous sector is assumed to have the same impact, an assumption which is unrealistic (Sasaki, 1963: 302; Isserman, 1977: 39).

Several more recent studies have used multiple regression to estimate differential multipliers which produce different multipliers for each industrial subsector within the exogenous sector (Weiss and Gooding, 1968; Braschler, 1972; Braschler and Kuehn, 1975; McNulty, 1977; Hirschl and Summers, 1982; Bain, 1984). This approach allows one to use economic base theory to examine the differential impact of various components within the exogenous sector, enhancing the usefulness of empirical results (Shahidsaless, Gillis, and Shaffer, 1983: 88).

Differential multipliers are estimated by using an expanded version of equation [1.1b] from page 7. The expanded equation (equation [1.6]) estimates a separate coefficient for each exogenous sector included on the right side of the equation.

$$Y = b\ (X) \qquad [1.1b]$$

$$Y = b_1X_1 + b_2X_2 + b_3X_3 + \ldots\ b_nX_n \qquad [1.6]$$

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The coefficient "b_1" expresses the relationship between exogenous sector X_1 and the endogenous sector ("Y"). Each succeeding coefficient expresses the relationship between its exogenous sector and the endogenous sector. A specific multiplier for each exogenous sector is produced by adding 1.0 to the coefficient, as was indicated in the discussion of equation [1.5] (page 8). For example, the multiplier for sector X_1 would be (b_1 + 1) and for X_2 would be (b_2 + 1).

While not all researchers are unanimous, economic base theory has been, and can continue to be, useful in examinations of economic structure. The central logic of the economic base multiplier has generally been accepted (Shahidsaless, Gillis, Shaffer, 1983: 84). The economic base theory continues to be used because it provides a reasonable approximation of differential regional multipliers and it is relatively simple, quick, and inexpensive in comparison to the alternatives (Greytak, 1969: 387; McNulty, 1977: 366; Isserman, 1977: 33)

ROLE OF NONEMPLOYMENT INCOME

"Nonemployment income" is not a readily recognizable term even though its role in the economic base of a region was acknowledged as early as 1938 (Fortune). This problem partially arises from the absence of a single term for the concept represented by the term "nonemployment income". Other terms which have been used to name the concept include "nonearnings", "nonwork", "nonwage", "unearned", or

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"passive" income. The term "nonemployment income", rather than its "synonyms", is used throughout this paper since it best expresses the source of the income it represents--income obtained from sources other than employment. "Nonearnings" or "unearned" income, although used by some authors, are considered inappropriate because the majority of nonemployment income would, by most definitions, be considered earned.

Nonemployment income is one of the most rapidly growing components in personal income and made up one third of total personal income in 1986 (Manson and Groop, 1986: 1). An example of this growth is illustrated by data from Nebraska. Nonemployment income as a percentage of total personal income in Nebraska rose from 15 percent in 1935 to 34 percent in 1980 (Nebraska Statistical Handbook, 1982-1983). This change is a result of a greatly reduced rural population, a larger percentage of the population being retired, and the increased presence of transfer income due to the formation of retirement programs and social security. In some rural Nebraska counties, nonemployment income accounted for two-thirds of total personal income. The absolute and relative importance at the national level of property and transfer income are emphasized in a report by Herman Bluestone (1979). He found that transfer and property income were each contributing larger absolute increases than any other component of total personal income. Together they composed over thirty percent of the increase

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in total personal income over the time period with transfer payments increasing at the rate of 236 percent (nearly three times the rate of growth of the total income). The high percent of growth is partially attributed to a small initial base of transfer income, but still the amount of absolute increase for transfer income was greater than the absolute increase for manufacturing or any other sector except property income (Table 1.1, page 14 adapted from Bluestone, 1979: 3).

Besides Bluestone, several other researchers have investigated some aspect of nonemployment income. These studies range from some early work in the mid 1950s to more current research in the mid 1980s which is more similar to this dissertation research. However, none of the research examines the impact of both property and transfer income on the nonbasic sector of the economy of nonmetropolitan U.S. counties. The research by McNulty (1977), Hirschl and Summers (1982), and Bain (1984) are the most closely related work to this dissertation. The emphasis of this research is related to that of Hirschl and Summers (1982) and Bain (1984) while the data and methods used are more similar to those used by McNulty (1977). The following paragraphs discuss some of the relevant research which has emphasized that nonemployment income is an important component of the basic economy of many parts of the United States.

Data compiled by Bluestone (1979) show the importance of nonemployment income in both nonmetropolitan and

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metropolitan areas. Table 1.1 (pg 14) compares absolute and relative importance of nonemployment income in nonmetropolitan and metropolitan counties with several important sectors of "earnings" income. Between 1968 and 1975, property income and transfer payments accounted for the two largest absolute increases in total personal income of any of the income components in both the metropolitan and nonmetropolitan counties. The relative growth rates of nonemployment income over the period was substantially higher than the growth rates for "earned" income for both county groups.

Nonemployment income tends to play a larger role in nonmetropolitan counties than in metropolitan counties. Between 1968 and 1975, it comprised a larger percent of total personal income (TPI) in nonmetropolitan counties than in metropolitan counties (27.8% to 23.4%) and a larger percent of the increase in total personal income (33.2% to 29.3%). Briggs and Rees (1982: 1660-1665) found similar results in their examination of Bureau of Economic Analysis data for 1977. They found that the general pattern of nonemployment income comprising a larger percentage of total personal income (as seen in Table 1.1, pg 14) continued as the county varied from more urban oriented to less urban oriented. In other words, counties in which the largest place was relatively small had a larger portion of personal income coming from nonemployment sources than those in which the largest place was relatively large. Stated another way,

within nonmetropolitan counties, a negative relationship existed between the size of the largest place in the county and the percentage of total personal income comprised by nonemployment income. They concluded that nonemployment income ". . . was a major causal factor in the growth of nonmetropolitan America in the 1970s" (1982: 1665).

Table 1.1. Components of change in Total Personal Income, metropolitan and nonmetropolitan counties in the U.S., 1968-75.

County status and income component	1975 Values		increase 1968-1975		Growth rate for 1968-1975
	Total	Percent of T.P.I.	Total	Percent of increase in T.P.I.	
Metro	979,267	100.0	430,838	100.0	78.6
Nonemploym't inc.	229,240	23.4	126,413	29.3	122.9
Property inc.	141,723	14.5	63,968	14.8	82.3
Net transfer	87,517	8.9	62,445	14.5	249.1
Other earnings	750,027	76.6	304,424	70.7	68.3
Manufact.	194,712	19.9	62,057	14.4	46.8
Govt.	135,261	13.8	62,294	14.5	85.4
Trade	130,152	13.3	53,986	12.5	70.9
Services	129,390	13.2	59,911	13.9	86.2
Nonmetro	278,268	100.0	137,719	100.0	98.0
Nonemploym't inc.	77,277	27.8	45,609	33.2	144.0
Property inc.	40,930	14.7	21,025	15.3	105.6
Net transfer	36,347	13.1	24,584	17.9	209.0
Other earnings	200,991	72.2	92,110	66.9	84.6
Manufact.	48,559	17.4	19,561	14.2	67.5
Govt.	38,063	13.7	17,843	13.0	88.2
Trade	29,195	10.5	13,295	9.7	83.6
Services	22,747	8.2	10,505	7.6	85.8

Source: (Bluestone, 1979: 3).

The data in Table 1.1 indicate that nonemployment income makes up a substantial portion of total personal income but does not indicate what impact nonemployment income has upon the overall economy of nonmetropolitan, or

rural, counties.[6] Several researchers have emphasized the need to examine the role of nonemployment income in the development of local economies (Beyers, 1979: 43, Smith, Hackbart, and Van Veen, 1981: 19; Bender, 1987; Bolton, 1985; Manson, 1986; Mulligan, 1987; Rural Development Perspectives, 1987; Manson and Groop, 1988). The contribution of this research is to examine the impact of both property income and transfer payments on the economy of rural counties in the United States.

A SURVEY OF RESEARCH ON NONEMPLOYMENT INCOME

While no research has been done on the role of both components of nonemployment income on the nonbasic portion of the rural U.S. economy, several researchers have included portions of nonemployment income in their examination of the economic base. Bolton (1966: 37), Garrison (1972: 334), McNulty (1977: 365), Forward (1982: 289) and Norcliffe (1983: 162, 167) each included property and transfer income in the exogenous sector in order to more accurately measure the economic base of the area. Bolton (1985: 515) notes that "nonearnings income is an extremely (quantitatively) important part of any regional economy" and questions why it

[6]The counties examined in this research are nonmetropolitan counties, but the term "rural" is often used to describe them. While the author realizes that "rural" and "nonmetropolitan" are not synonymous, they are often used interchangeably and will thus be used interchangeably here. Nonmetropolitan counties, in which the largest urban places are less than 50,000 people, can be subdivided into nonmetropolitan adjacent counties (those nonmetropolitan counties contiguous to metropolitan counties) and nonmetropolitan nonadjacent (those not contiguous to metropolitan counties).

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is not included more often in regional modelling. Smith, Hackbart, and Van Veen (1981: 19, 21) state that the omission of nonemployment income will bias upward the traditional economic base ratios.

Andrew Wilson (cited by Isard, 1960: 194-195) included nonemployment income in a study of the Tucson, Arizona metropolitan area in 1955. He attempted to include the influence of "unearned" income by using estimates of income payments. The importance of nonemployment income was emphasized by the fact that it made up nearly 20 percent of the total estimated income payments.

Matsumoto (1972) examined the impact on the economy of a portion of nonemployment income. He used an input-output approach to examine three widely differing counties in three states and found that food stamps had a significant employment multiplier. If food stamps have an impact on employment yet compose only 3.1 percent of transfer income (Rural Development Perspectives, 1987: 32), then transfer payments should have a larger impact, as should the more-inclusive nonemployment income.

Summers and Hirschl (1985) used regression analysis to estimate differential multipliers to examine the impact of Social Security payments on the generation of nonbasic employment in 170 nonmetropolitan U.S. counties.[7] The resulting multipliers indicated that only $4,000 in Social

[7]Social Security makes up about 45 percent of total transfer payments and so should provide a closer approximation of the impact of the transfer payments than would food stamps.

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Security payments were needed to produce a new job compared to $91,743 in manufacturing wages and salaries or $64,515 in agricultural sales. Stating these results in a different way, the impact of the Social Security income is 16 times larger than that of agricultural sales and 23 times larger than for wages from manufacturing. Similarly, Smith, Hackbart, and Van Veen (1981: 20) estimated that only $4,425 in transfer income was needed in Kentucky to produce a job. Even though the results of Smith support those of Summers and Hirschl, a value of only $4,000 to produce a new job is extremely low, especially considering the values required by manufacturing and agriculture. These results are highly questionable, and other interpretations of them will be discussed later.

However, one shortcoming of the research by Summers and Hirschl is that they used data that are not comparable! Agricultural sales, which they used, are not measured in a unit equivalent to Social Security payments or manufacturing wages and salaries, which they also used. The agricultural sales would be gross income rather than net income. If net profits from agricultural sales could have been used by Hirschl and Summers, then the data would be comparable. My research will not suffer from this inconsistency since all the independent variables, and the dependent variable, will be measured in the same units--dollars of personal income.

Bain (1984) compared the impact of transfer income with all other income in effecting change in the retail sales of

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20 rural Wisconsin counties. He found that an increase in transfer payments had over three times the impact as an equal change in all other income. Mulligan (1987) examined the effects of public transfer payment upon employment multipliers for several Arizona communities. He found that transfer payments significantly affected the levels of nonbasic employment in three of the four functional types of communities. He then added that

> given the increasing importance of public transfer payments (and private payments as well) in generating . . . income (employment) in local and regional economies, it is somewhat surprising that so little research has been devoted to clarifying the role of such payments in either growing or declining small-area economies. This is certainly a research area that deserves both further theoretical and empirical attention (1987: 11).

The previous research indicates that transfer income has a significant impact on the nonbasic sector in some areas but does not discuss property income, which comprises an equally large percentage of total personal income. McNulty (1977) examined SMSA's in the Southeast U.S. and found that property income was more important to the economy than transfer income and that transfer income was frequently statistically insignificant.

McNulty's results (1977) appear to conflict with those of Hirschl and Summers (1982). However, the major differences in the research design and target areas make comparison of the two studies very difficult, if not inappropriate. While McNulty used income as a measure of both the independent and dependent variables, Hirschl and

Summers used it only for the independent variable and measured the dependent variable in terms of employment. Hirschl and Summers used only Social Security payments while McNulty used total transfer payments. Hirschl and Summers did not include property income; so the omission of a relevant variable would tend to bias their estimates. McNulty did include property income. The other independent variables (included as exogenous) differed for the two models. The size of the geographical unit and the location of the two studies are also different. McNulty's research area was the Southeast of the U.S. while Hirschl and Summers chose counties nationwide. McNulty's unit of observation was the SMSA, which tends to more closely approximate a functional unit. Hirschl and Summers focused on small rural counties. It should be noted that as the population of the observational unit changes, the ratio of the exogenous activity (e.g. income) to the total activity (e.g. income) changes, causing different multipliers (Richardson, 1979: 88; Harvey, 1973: 471; Mulligan, 1987: 2). Therefore, comparison of the two studies is quite difficult. The propensity to consume locally would most likely be lower in the small rural counties than in SMSAs.

The increasingly important role of nonemployment income is examined in a U.S. Forest Service research report by Salazar, Schallau, and Lee (1986) entitled "The Growing Importance of Retirement Income in Timber-Dependent Areas." The authors note that retirement income, a portion of total

transfer payments, has become a dominant economic sector in the three Oregon and two Washington counties examined. They found that the importance of timber to the economic base of the counties is slowly declining while that of retirement income is steadily increasing. Retirement income as a percentage of all export base earnings ranged from 22.5% to 32.3%. The authors note that the inclusion of property income could have enlarged the role of the retirement sector.[a] I also believe that property income would definitely increase the importance of retirement income, possibly doubling it.

RESEARCH QUESTIONS

The research done by Bluestone (1979) indicated that the level of nonemployment income tends to vary by subset of counties examined. This research will examine the comparative impact of both property and transfer income on the nonbasic portion of various subsets of nonmetropolitan counties. The following four hypotheses will introduce the research questions, with each being more thoroughly discussed later in the dissertation.

Previous research has found that property income and various levels of transfer payments have had significant impacts on the nonbasic portion of the economy. Some results (Summers and Hirschl, 1985; Smith, Hackbart, and Van Veen, 1981) have indicated some questionably large impacts

[a]They correctly assumed that not all property income is retirement income and were unable to allocate the proportion of property income which was retirement income.

produced by some components of transfer income. McNulty's results (1977) contained some relatively high multipliers for property income. Thus, the impact of both property and transfer income appear to be quite important and possibly more important than other exogenous sectors which are frequently considered to be major driving forces in the economy.

One reason for the greater impact of the nonemployment income is attributed to different spending habits of the persons receiving nonemployment income (Bain, 1984: 8). Manson and Groop (1988: 4) have shown a strong correlation between high levels of nonemployment income and the elderly. The elderly are assumed to be less mobile and have greater tendency to shop locally (Bain, 1984: 8) so that less leakage is likely to occur from their income than from employment income. It can be said that they have a greater propensity to consume locally. Therefore, the multiplier effect of nonemployment income is hypothesized to be greater than that of other exogenous sectors.

A second reason why the nonemployment sectors are hypothesized to have larger coefficients is related to health care for the elderly (Hirschl and Summer, 1982: 308). People have been living longer because of improved health care, but as more and more people grow older, more health care is required. Doeksen and Lenard (1980) documented increased demand for ambulance service, visits to physicians, and hospital usage as people become older. In

his study of Vandalia, Missouri (population 3500), Harmston (1981: 44, 54) found that retirees generated 44% of the income of the health services industry, even though the community contained no clinics, hospitals, or retirement centers (nursing homes).

As people live longer, more and more reach a stage at which they are less able to care for themselves. Formerly, most elderly were cared for by the extended family but now they are more often cared for in retirement centers or nursing homes. The cost of staying in a nursing home can be several times the cost of caring for oneself. So when some elderly stay in health service centers, they spend considerably more per person than would younger people who care for themselves. Some elderly spend their entire retirement income as well as any savings to pay for extended care. As a result, some are totally dependent upon transfer income (a combination of social security and welfare, and possibly other pensions) for their support. The total transfer income of these elderly is sometimes received directly by the health care centers in which they are housed. In this case, zero leakage occurs, accounting for a large multiplier effect. If some of the retirees in the survey by Harmston had been in nursing homes, the impact of elderly upon the health service sector would have been even greater.

The first research hypothesis is:

Property and transfer income for nonmetropolitan counties will have positive, significant multipliers which

are larger than the multipliers for the income for manufacturing and primary activities (agriculture, forestry, fishing, and mining).

This first hypothesis examines the absolute and relative role of property and transfer income in nonmetropolitan counties. However, questions arise about how these impacts tend to vary when subpopulations are examined. Three different groupings of counties will be examined by the next three hypotheses.

The structure of the economy tends to change as the size of the largest place in the county varies. As the size of cities increases, they offer a greater selection of goods and services. This results in a positive relationship between city size and the nonbasic to basic ratio. Thus, aggregate multipliers would be expected to become larger as the size of cities increase.

The second hypothesis focuses on the significance of relative geographic location as it examines and compares the impact of nonemployment income for nonmetropolitan counties adjacent to metropolitan counties and those not adjacent. The third hypothesis examines only nonadjacent counties to determine the impact of nonemployment income depending upon the size of the largest place in the county.

Manson and Groop (1986) note that nonemployment income tends to be "hidden" by the high levels of employment income in urban and suburban areas and tends to comprise a larger percent of income in more rural areas. In the adjacent counties, a spillover is likely to occur from the

metropolitan counties and produce a different economic structure than would occur in the nonadjacent counties. If nonmetropolitan adjacent counties have different multipliers than nonadjacent counties, that difference will be attributed to their relative proximity to metropolitan counties. This leads to the second hypothesis which examines the importance of relative geographic location.

Nonmetropolitan adjacent counties will have different multipliers than nonmetropolitan nonadjacent counties.

The third hypothesis is derived from the realization that employment or income multipliers are noted to change with changes in the size of the population of a region (Braschler, 1972: 461; Harvey, 1973: 471; Richardson, 1979: 88; Smith, Hackbart, and Van Veen, 1981: 20; Mulligan, 1987: 2). Recognizing this relation, Braschler and Kuehn relied upon population size to create groupings of counties which would have relatively homogeneous multipliers (Braschler, 1972: 461; Braschler and Kuehn, 1975: 83). Differences in multipliers for different regions are actually a measure of the variation in the structures of the economies of the regions being compared. The economies of nonmetropolitan counties with small urban places will be different from those of counties with larger urban centers and therefore would be expected to have different multipliers. By estimating differential multipliers rather than a single composite multiplier, the differences in impacts of several exogenous sectors can be estimated. Therefore, a variation in the importance of different exogenous sectors (i.e. a

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greater role played by the manufacturing sector as compared to the property or transfer income sectors) should produce different multipliers for the various sectors. So if nonemployment income comprises a greater percentage of total personal income in Region A than in Region B, the multipliers for nonemployment income for Region A would be expected to be different from those for Region B. Manson and Groop (1986: 2) have shown that rural areas tend to have higher levels of nonemployment income than urban areas. That is to say, nonemployment income is not distributed evenly across geographic space. Following this pattern, nonmetropolitan counties with smaller urban places are more likely to be more dependent upon nonemployment income than counties with larger urban centers which are likely to have a diversified economy.

The counties with places having populations of less than 2500 are less likely to have a broad range of consumer services available, and especially less likely to have health-related facilities, such as retirement centers, nursing homes, or hospitals. Other consumer services, such as chain stores, chain restaurants, and specialty services tend to be available only in communities larger than 2500. These services are more frequently found in the larger communities so that counties with larger places are more likely to capture the income being spent by the elderly. Because more goods and services are available in larger places, the residents of the larger places have a greater

propensity to consume locally than do residents of smaller places. Therefore, these counties with larger places would be expected to have larger multipliers for the nonemployment sectors than counties with smaller places. The third hypothesis is:

> Nonmetropolitan counties in which the largest urban center is less than 2500, will have smaller multipliers for both property and transfer income than will nonmetropolitan counties which have larger urban centers.

The question arises as to how important is retirement income in the rural counties. Two case studies have been carried out; both examine the role of retirees upon the economy of the community. One studied a rural county seat in central Oklahoma (Doekson and Lenard, 1980). The income of the elderly was estimated to produce an income multiplier of 1.94, which generated about ten million dollars in community income. The ten million dollars would provide an average annual income of over $1500 per non-elderly person in the community.

The second study surveyed the elderly in two northern Wisconsin counties where recreation is a major industry (Hewitt, Staniforth, and Christiansen, 1967). The authors concluded that the retirement households were financially sound. Their spending strengthened the economic base of the community and provided stability to a region which was highly dependent upon the seasonal recreation industry. The study also identified two distinct populations of retirees--the "natives" and the "immigrants". On average the immigrants, who represented 45% of those interviewed, were

better off financially, receiving about 235% of the income received by the natives, and lived in newer, more modern houses. This identification of two groups--of those who tend to retire in a place and those who have the financial means to relocate--is significant. For the purpose of promoting retirees as a growth industry, policy makers need to aware of that only a portion of retirees are willing and financially able to relocate.

Just as the amenity-rich forest and lake region of northern Wisconsin has attracted retirees, so have portions of the Pacific Northwest. The Forest Service research report by Salazar, Schallau, and Lee (1986) entitled "The Growing Importance of Retirement Income in Timber-Dependent Areas", cited earlier, stated that retirement income was becoming increasingly important to the local economy in several Pacific Northwest timber-dependent counties. With the growth in the elderly population and the likelihood of reduced lumbering in this region as the result of restrictions imposed to protect the spotted owl, the importance of retirement income is expected to increase. The Forest Service report indicated that retirement income, as a percentage of the export base, has grown and will likely continue to grow.

As noted previously, retirement income can comprise a significant portion of nonemployment income. Thus, higher levels of retirement income will produce higher levels of nonemployment income, so that attraction of retirees may be

means to help stimulate the local economy (Summers and Hirschl, 1985; Manson, 1986: 53). Summers and Hirschl (1985) discuss "Retirees as a Growth Industry," suggesting that high levels of nonemployment income will provide a greater stimulus to a local economy than low levels of nonemployment income. A region with a high percentage of total personal income (TPI) derived from nonemployment sources will have a different economic structure than one with a low percentage of TPI from nonemployment sources. Therefore, the one region would be expected to have different multipliers from the other. For planners and policy makers to better understand the structure of the economy when high levels of both property and transfer income are present, a fourth hypothesis is proposed. It examines the uneven distribution of nonemployment income across the geographic space of the nonmetropolitan nonadjacent counties.

Nonmetropolitan, nonadjacent counties which have a high percent of the total personal income coming from both property and transfer income will have different multipliers for each of the nonemployment sectors than those which have a low percent of the total personal income derived from the two sectors.

SUMMARY

Nonemployment income, widely considered to be a component of the exogenous sector, has become an increasingly larger portion of personal income in the rural counties. Previous research indicates the need to include nonemployment income into the exogenous sector and suggests

that the components of nonemployment income may be more important than other exogenous sectors which have often been considered as cornerstones to the economy. This research will use economic base theory to examine the impact of both components of nonemployment upon the endogenous income of the rural counties of the United States. Differential multipliers for exogenous sectors will be estimated to allow for comparisons of the relative importance of those sectors within various subsets of nonmetropolitan counties.

The next chapter will discuss the data set and the research methods employed. Chapter 3 develops the first hypothesis which examines the absolute and relative impact of property and transfer income. The fourth chapter investigates the structural change within the economy which exists across the rural-urban continuum. It also examines the importance of relative geographic location, while both chapters 4 and 5 examine the differential impacts which result from an uneven distribution of nonemployment income across geographic space. The focus of this uneven distribution in chapter 5 is upon those counties which have high levels of both property and transfer income. The final chapter, number 6, consists of the summary of the research and the conclusions.

RESEARCH METHODS AND DATA

CHAPTER 2

In estimating multipliers using economic base theory, a wide selection of options is available to the researcher. Factors such as the unit of measurement of economic activity (employment or income), size of region (city, county, SMA, state), variables included, classification of variables as either exogenous or endogenous, and time frame all must be considered in estimating multipliers. Few researchers use exactly the same set of factors, so that comparing results can frequently be difficult. This chapter will discuss the data used and the methods by which the multipliers are estimated.

The decision to use a model which would estimate differential multipliers rather than a single aggregate multiplier was discussed in Chapter 1 and the generic equation was developed. Before being able to estimate the multiplier (coefficients) using the model, a number of factors must be decided. The unit of measurement of economic activity which will be utilized must be selected. Then a data set must be selected or compiled and the variables to be included must be determined. A means of dividing the economic activity into basic and nonbasic

sector must be chosen and employed. The last consideration is how to include a time factor in the model. Chapter 2 will discuss these considerations and explain the techniques selected for this research.

MEASURES OF THE ECONOMIC BASE

A variety of measures of the basic-nonbasic dichotomy have been used by various researchers. They include income, sales, employment, wage bills, net output, gross output, physical production, value added, or money income and expenditure accounts (Leven, 1956: 253; Tiebout, 1962: 45-46; Richardson, 1969: 167). Employment has been the most widely used measure mainly because of the greater availability of employment data, not its superiority as a measure. Income is the preferred measure (Isard, 1960: 194-195; Tiebout, 1962: 67; Bolton, 1966: 20; Weiss and Gooding, 1968: 242; Moody and Puffer, 1970: 97; Garnick, 1970: 44; Garrison, 1972: 334-335; McNulty, 1977: 359; and Richardson, 1979: 89), but lack of appropriate data has limited its use. McNulty (1977: 359) notes that the local personal income data produced by the Bureau of Economic Analysis can be "extremely useful in providing both cross-section and time-series estimates of regional economic base multipliers", especially for the estimation of differential regional multipliers.

The reason why income is a more sensitive measure of economic activity than is employment (Garrison, 1972: 336), is shown by Tiebout (1962: 67) who provides an interesting

example of a merry-go-round owner-operator at a local amusement park. He/she will work a full, but not a very busy day, if unemployment is high in the area but will be much busier and have a higher income if the economy is prospering and people are spending more readily. Employment did not change but income did. In his research of rural Kentucky counties, Garrison (1972: 336) found personal income to be "a more sensitive indicator" because of underemployment of farmers in the area. He calculated consolidated multipliers for both income and employment and found that the income multipliers were surprisingly stable but "prediction based upon the employment relationship existing for a particular year would seriously overestimate" the effect on the nonbasic employment.

The use of employment as a measure has other problems. Leven (1956: 253) states that "employment is unsuitable as a measure" since it does not take into account the differences in wage rates. It would likely take several minimum wage jobs to produce the same income as one in automotive manufacturing or a highly-paid professional field.

Leven also notes the need to include transfer and property income into his model, sectors which are overlooked when only employment data are used. Others have used income as a measure so that they may include transfer or property income in their exogenous sector (Bolton, 1966: 37; Garrison, 1972: 334; McNulty, 1977: 366; Harmston, 1981: 43, 52; Forward, 1982: 289; Hirschl and Summers, 1982;

Norcliffe, 1983: 162, 167; Bain, 1984; Salazar, Schallau, and Lee, 1986: 3; Bender, 1987: 67). Of the ten papers cited for including nonemployment income, one was published in the 1960s, two in the 1970s, and seven in the 1980s. This increasing inclusion of nonemployment income in research is probably a result of two factors: 1) the greater availability of income data over the past twenty years and 2) the increasing realization of the importance of nonemployment income in the economy. Some researchers have noted their inability to include components of nonemployment income because of the absence of data (Smith, Hackbart, and Van Veen, 1981: 21; Hirschl and Summers, 1982: 304).

An interesting variation on the use of income as a measure was employed by Mulligan (1987) when he attempted to incorporate transfer payments into an economic base analysis using employment as a measure. Transfer payments for the Arizona communities in the study were converted into employee equivalents and employment multipliers calculated. He found that omission of transfer payments tended to bias the multiplier upward. These results support the inclusion of transfer payments in the exogenous sector, since transfer payments were shown to impact the multiplier.

Income data is clearly the preferred measure when utilizing the economic base theory for the reasons discussed above. Its use also allows for the direct inclusion of nonemployment income without the type of adaptation employed by Mulligan (1977). In light of the preference for income

data, one might question why Hirschl and Summers (1982) would use income to measure the exogenous activity but use employment to measure the endogenous activity. The total reliance by McNulty (1977) upon the use of income data to measure all economic activity is more appropriate. Income data will be used exclusively in this research to measure all sectors of the economy.

DATA

The data set used in this research was income data which allowed property and transfer income to be handled as separate variables rather than being aggregated as a single nonemployment income variable. The data, Personal Income by Major Source and Earnings by Industry (1969-1986), released in 1988, was purchased on magnetic tape from the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce.[1] The data set provided eighteen years of industry-specific annual data for the entire country at the county, state, and national levels.[2] The industrial sectors are disaggregated to the two-digit level of the Standard Industrial Classification (SIC) system, providing seventy-three

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[1]Published data are available in the government documents departments of libraries under the title "Local Area Personal Income."

[2]The estimates are revised regularly so that the 1969-1986 data set, which was used in this research, might have slightly different values for the 1970s than did earlier versions of the data set.

subsectors which were aggregated to form the seven variables used in the model.[3]

The BEA data set was used for several reasons. An earlier version of this BEA data set was used by McNulty (1977) who found it to be appropriate for such analysis. The data were available on computer tape which eliminated the need to keypunch the data into a computer from printed sources and thus reduced the likelihood of error from data handling. It provided the disaggregated data for property and transfer income as well as many other industrial sectors which were needed to produce the necessary exogenous and endogenous variables for the model. The data allowed for both a broad spatial and temporal analysis.

The third hypothesis examines the role nonemployment income when nonmetropolitan nonadjacent counties are grouped by the largest place in the county. However, the BEA data did not include the population of the largest place in each county, so those data were collected manually from Local Population Estimates, produced by the Bureau of the Census. The 1980 census values were used since the 1980 census tended to be nearer the middle of the time period (1969-1986) than was the 1970 census. The population values and metropolitan/nonmetropolitan-adjacency/nonadjacency classification for each county, discussed in the following paragraph, were added to the original BEA data set.

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[3]Appendix A provides a complete listing of all the industrial sectors and subsectors used in the research. The individual sectors will be defined and discussed later.

This research is focused broadly upon all nonmetropolitan counties, with a more specific focus upon the nonmetropolitan, nonadjacent counties. In order to include information not found in the BEA data set, the determination of whether a county was classified as 1) metropolitan, 2) nonmetropolitan, adjacent, or 3) nonmetropolitan, nonadjacent was done manually by using Bureau of the Census maps for the 1980 census showing counties classified as metropolitan. Other counties were classified into the two remaining categories by visually determining if they were contiguous to the metropolitan counties or not.

COUNTY SUBSETS

To test the four hypotheses, eight subsets of counties were identified. The subsets of counties were selected to reveal differences in the impact of the sectors when considering 1) relative geographic location by examining the proximity to metropolitan areas (Subsets 1-2), 2) the size of the largest place in the county (Subsets 3-5), and 3) counties that exhibit either high levels of both property and transfer income or low levels of both (Subsets 6-8). Table 2.1 (pg 37) is a simplified list of the eight county subsets while Appendix B (pg 145) provides more detailed information. It lists the eight subsets of counties by name and number and includes the definition of the subset and the sample size for each subset.

All the counties in each of the eight subsets are nonmetropolitan counties and all except Subset 2 are nonadjacent, nonmetropolitan counties. Subset 1 (nonmetro-

Table 2.1. Subsets of Nonmetropolitan Counties.

Subset Number	Subset Name	Description of Subset
1	Nonadjacent	
2	Adjacent	
3	Rural	Subset 1 (Nonadjacent counties) is subdivided by the size of the largest place in the county to produce Subsets 3-5.
4	Town	
5	City	
6	Low	Subset 1 (Nonadjacent counties) is subdivided by the level of property and transfer income to produce Subsets 6-8.
7	Medium	
8	High	

politan, nonadjacent counties) is disaggregated twice, once to produce Subsets 3-5 and a second time to create Subsets 6-8. The size of the largest place in the county is used to create Subsets 3-5. The percent of total personal income which is provided by property and transfer income is used to subdivide the nonadjacent counties into Subsets 6-8. The Low counties (Subset 6) have low levels of both property and transfer income and the High counties (Subset 8) have high levels of both property and transfer income. The Medium counties have neither high nor low levels of property or transfer income. Subsets 6-8 will be discussed more fully in the discussion of hypothesis 4 (pg 112-113).

CLASSIFICATION AS BASIC OR NONBASIC

The industrial sectors must be classified as exogenous or endogenous before they can be included in the regression equation. But before classifying the sectors as exogenous or endogenous, those sectors which are being included in the model must be identified. While the research model will not be fully developed until later in this chapter (pg 50-57), a version of the model will be presented at this time to identify the sectors which will be included. The simplified version which has been adapted from equation [1.6] (pg 9) is:

$$\text{Endogenous Income} = f(\text{Prop, TPay, Prima, Manuf, Other, Fedgov}). \qquad [2.1]$$

where:

Prop = Property Income
TPay = Transfer Income
Prima = Income from Primary Activities (Farming, Forestry, Fishing, and Mining)
Manuf = Income from Manufacturing
Fedgov = Income from Federal Government
Other = Income from All Other Exogenous Activities.

Having identified the sectors to be included in the model, definitions of these sectors need to be addressed. Property income, which composed 17% of total personal income in 1986, is composed of dividends, interest, and rent. It is compiled by place of residence.[4] Transfer income consists of both government and business payments to individuals and makes up 15% of total personal income. The government

[4]Complete BEA definitions and percentages of total personal income can be found in Local Area Personal Income, 1981-86 (U.S. Department of Commerce: 1988).

transfers include a variety of pensions payments, both military and civilian; social security; medical payments; income maintenance payments; unemployment benefits; and veterans benefits. The majority of transfer payments is oriented to retirement with the total of income maintenance and unemployment benefits equaling less than 12% of total transfer payments. Transfer income, like property income, is compiled by place of residence while the various employment sectors are compiled by place of work. The employment sectors are all listed in Appendix A.

Proprietors' income, "the income (including income-in-kind) of sole proprietorships and partnerships and of tax-exempt cooperatives", was not included in this model, since this model focused on nonemployment income. While a portion of proprietors' income may be exogenous, the majority is probably endogenous since it is produced by smaller firms which are mainly service oriented. If we accept the assumption that proprietors' income is mainly endogenous, its omission from the model tends to reduce the size of the multipliers for the exogenous variables. However, the reduction in the multipliers would not be differential so that the omission would not alter the relative impact of nonemployment income when compared to the other exogenous sectors.

The task now at hand is to allocate the correct portion of each sector's activity to the exogenous and endogenous classifications so as to identify each of the seven

variables above. This is difficult since few sectors are purely exogenous or purely endogenous, while many are mixed.

Various approaches to the allocation process have been developed. Tiebout (1962: 46-51) presents a discussion of direct measures (surveying the local economy and measuring commodity and money flows) and indirect measures. While direct measures, especially the survey approach, tend to be more accurate and more complete, they are very costly and time consuming. Since direct methods are so costly in time and money, indirect measures are more frequently used by researchers than the direct measures. This research will employ indirect measures.

The three indirect measures discussed by Tiebout (*a priori* assumptions, location quotient, and minimum requirements) are the most well known (1962: 46-49).[5] Researchers have been known to use a combination of all three approaches (Sasaki, 1963; Braschler, 1972; Garrison, 1972). This dissertation research will use a combination of two of those techniques: the *a priori* assumptions approach and the location quotient approach.

The *a priori* assumptions approach, called *ad hoc* assignment by Richardson (1978: 12), requires the researcher to classify each sector as either exogenous or endogenous. Since most sectors are mixed, this approach is criticized but is still frequently used as the sole means of

[5]Richardson (1985: 615) summarizes two other approaches which are less commonly used. The minimum requirements technique is thoroughly discussed by Ullman and Dacey (1960) and Ullman, Dacey, and Brodsky (1971).

determining the exogenous activity (McNulty, 1977; Hirschl and Summers, 1982; Bain, 1984). McNulty (1977: 364) indicates that pure assumption may work better than other indirect methods for certain cases, as illustrated by the research of Braschler (1972: 464).

The reason that *ad hoc* assignment tends to produce better estimates than the location quotient technique when examining nonmetropolitan counties is related to the changing structure of the economy as the size of cities increase. In nonmetropolitan counties, especially those with only small towns, most materials produced by primary activities and manufacturing are exported. Those regions would tend to have a relative small nonbasic to basic ratio. The inclusion of large metropolitan areas, which tend to have a large nonbasic to basic ratio, in the national data bias the location quotient estimates of average local consumption. This bias inflates the multipliers for nonmetropolitan areas by overestimating the endogenous sector and underestimating the exogenous sector (Smith, Hackbart, and Van Veen, 1981: 19).

The location quotient technique, also known as location coefficient (Bolton, 1966: 30), is thoroughly discussed and championed by Andrew Isserman (1977). Its use is readily found in the literature on economic base analysis.

LOCATION QUOTIENT

The location quotient technique has had its share of critics (Isard, 1960; Tiebout, 1962; Greytak, 1969: 394; Leigh, 1970; Richardson, 1978: 14) yet it continues to be a popular technique for estimating multipliers, probably because it "requires little data and analytical skill and can be carried out quickly and inexpensively" (Isserman, 1977: 33). In spite of its limitations, if it is carefully applied, it can provide reasonable estimates of the upper limits of the actual multipliers.

The location quotient (LQ) measures whether an industry has a larger share of the economic activity of a region than does the same industry with respect to a larger economy (usually the nation). It is a ratio of ratios. The economic activity has usually been measured by employment but income or other measures could be used. For example, Roger Bolton (1966: 30) used income to calculate his location quotients.

The location quotient (LQ_i) for an industry "i" is calculated using income data with the following formula:

$$LQ_i = [I_{ir}/I_{tr}]/[I_{in}/I_{tn}] \qquad [2.2]$$

where:

I_{ir} = the income in industry "i" in region "r",
I_{tr} = the total income in region "r",
I_{in} = income in industry "i" in the nation, and
I_{tn} = total income in the nation (Richardson, 1979: 89).

The LQ approach generally assumes that if an industry has an LQ > 1, then that industry is exporting. To calculate the portion of the industry which is exogenous, an income

version of the Richardson's (1978: 12) employment approach can be used.

$$X_{ic} = [(I_{ic}/I_{tc}) - (I_{in}/I_{tn})]\, I_{tc} \qquad [2.3]$$

where:

X_{ic} = the exogenous income for industry "i" in county "c",
I_{ic} = the income from industry "i" in county "c",
I_{tc} = the total income in county "c",
I_{in} = income from industry "i" in the nation, and
I_{tn} = total income in the nation.[6]

The endogenous income (N_{ic}) for industry "i" in county "c" is calculated by subtracting the exogenous income (X_{ic}) for industry "i" in county "c" from the total income (I_{tc}) for industry "i" in county "c" (equation [3.3]).

$$N_{ic} = I_{tc} - X_{ic} \qquad [2.4]$$

The LQ method is the most widely used technique for classifying economic activity as exogenous or endogenous (Mayer and Pleeter, 1975: 343; Richardson, 1985: 611-612). The LQ method was employed in this research because it provided a practical means of classifying economic activity for an extremely large data set at a relatively low cost.

ADJUSTMENT OF THE LOCATION QUOTIENT

Isserman (1977: 37) has developed his "adjusted" location quotient technique in which the LQ approach is overridden by declaring some sectors as exogenous by a

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[6]Since this research utilizes the BEA data set Personal Income by Major Source and Earnings by Industry, "income" in the equation and throughout this discussion is understood to be personal income. The value for X_{ic} was calculated only when the LQ $\geq$ 1, i.e. when $[(I_{ic}/I_{tc}) - (I_{in}/I_{tn})]$ was positive or zero.

priori assignment and then using the LQ technique with all remaining industrial sectors. This adjustment of the location quotient technique was used in this dissertation because it produces adjusted multipliers which tend to be lower and more in line with the real multipliers (Isserman, 1977).

Several sectors are generally considered to be totally exogenous. One such sector is federal government expenditures since they are not influenced by local conditions (Tiebout, 1962: 40-42; McNulty, 1977: 363; Isserman, 1977: 36; Kuehn and Bender, 1985; Salazar, Schallau, and Lee, 1986; Bender, 1987: 64). However, some researchers have failed to include federal expenditures as exogenous in their model (Hirschl and Summers, 1982). Primary activities have been widely considered as completely exogenous (Braschler, 1972: 463-464; Garrison, 1972: 331; Braschler and Kuehn, 1975: 84; McNulty, 1977: 363; Hirschl and Summers, 1982: 298, 302; Shahidsaless, Gillis, and Shaffer, 1983: 88; Bender 1987: 65). As noted previously, nonemployment income should be included in the basic so that both property and transfer income can be considered totally exogenous. In this research, federal government expenditures, primary activities, and property and transfer income will be considered wholly exogenous.

The remaining sectors tend to be considered nonbasic but none are truly 100 percent nonbasic. For example, anytime tourism is important in an area, then a portion of

most service sectors becomes basic (that portion which serves the tourist). In Honolulu, Hawaii, the direct and indirect impacts of tourism compose a substantial portion of the local economy.

Cities which are regional service centers also have a portion of the service and trade sectors which is basic. In the hierarchy of places, the lower the place in the hierarchy, the more closely these sectors in question are 100 percent basic. Larger places tend to be higher up the hierarchical ladder of places and thus they have larger service areas so that they tend to serve people from outside the local community. The change which has taken place in the Great Plains states provides a good example of this. Sixty years ago, the difficulty of travel and the higher population density created the demand for services at each small community. Each small town (population of five hundred) had most of the needed retail outlets (clothing stores, lumber yards, etc.) and services (doctor, dentist, movie theater, etc.).

Today, however, many of these activities are available only at places in the higher levels on the hierarchy of places, so that the residents of the small places are more dependent upon the larger places to meet their needs. Thus, a grocery store in the small place tends to be totally endogenous while a similar store (though larger in size) at a medium-sized place would have a portion of its business which is exogenous, due to the sale of groceries to

customers who reside outside that community. Wholesale trade would tend to be concentrated in the larger places to serve the small places, so a portion of it would also be basic. Therefore, in some communities, a portion of wholesale and retail trade would be considered exogenous.

The propensity to consume locally would vary across geographic space. Residents of smaller places would have a lower propensity to consume locally because of the limited availability of goods and services than would residents in larger places. The geographic proximity to a larger place would also affect the tendency to buy locally. The greater the distance from a place to a larger service center, the greater the propensity to purchase in your place of residence.

Specific services tend to be centralized and exported. Within the finance, insurance, and real estate sector (F.I.R.E.), finance and insurance tend to be far more centralized than real estate. Des Moines, Iowa is known as an insurance center so that a large percent of insurance employment in that city is exogenous due to its export nature.

State and local government are classified as either exogenous or endogenous depending upon the scale of the unit of observation. When using a single city as an observation, then state government and a portion of local government could be exogenous. When the county or SMSA (MSA) is the unit of observation, then state government would still be

exogenous but local would not. The BEA data does not disaggregate state and local government, so the LQ technique can be used to separate the exogenous portion in this research.

The location quotient technique also provides a means to identify the exogenous insurance activity of Des Moines or the exogenous service activity of Honolulu (from tourism) or a major service center in the Great Plains. In this research, the dependent and two independent variables were generated by use of the LQ technique (Table 2.2, pg 48).

APPLICATION OF BASIC-NONBASIC CLASSIFICATION

The process of data manipulation which extracted the dependent and independent variables from the data involved the aggregation of variables in the raw data to form the seven specific variables needed to run the research model. This extraction of variables is summarized in Table 2.2 and described in more detail in the following paragraphs.

As noted in the previous section (pg 41), this research follows the position championed by Andrew Isserman in which he advocated an adjustment to the location quotient approach so as to produce multipliers which tend to be lower and more in line with the real multipliers. Using this adjustment process, income from property (Prop), transfer payments (TPay), the federal government (Fedgov), and primary activities (Prima) were classified as wholly exogenous while

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Table 2.2. Aggregation of 76 sectors into one dependent and six independent variables by two techniques.

BEA DATA		INDEPENDENT VARIABLES	DEPENDENT VARIABLE
Prop*		Prop	
Tpay*		Tpay	
Fedgov* 3 sectors summed		Fedgov	
Prima* 5 sectors summed		Prima	
Manuf 22 sectors	-- LQ	Manuf (exogenous)	
	LQ		Manuf (endogenous)
Other 44 sectors	-- LQ	Other (exogenous)	
	LQ		Other (endogenous)
			Endogenous Income -sum of 66 sectors
76 Sectors		6 Independent Var.	1 Dependent Var.

*Application of *a priori* assignment is denoted by an asterisk and the location quotient technique by an "LQ".

the exogenous and endogenous portions of all other sectors of the economy were determined by use of the LQ equation.[7]

The exogenous and endogenous income for each of 66 different sectors were calculated by using the most disaggregated level of data available in the BEA data set. The BEA data set existed at the two-digit level of the Standard Industrial Classification (SIC) code.* The

[7]Appendix A lists each of the six exogenous sectors (independent variables) and all subsectors which are components of the six variables.

*From a theoretical perspective, four-digit-level data would have been optimal for producing more realistic multipliers. However, I am not aware that four-digit-level data are available for the U.S. at the county level and, if they were, the cost of computation using such data would have made this research impractical.

exogenous income of 22 of the 66 sectors was combined to become the exogenous manufacturing income (Manuf) which would be one of the six independent variables in the regression model. The other independent variable (Other) was created by combining the exogenous portions of the remaining 44 sectors.[9] The four other independent variables (Prop, Tpay, Prima, and Fedgov), which were developed by *a priori* assignment, were composed of ten sectors.[10] The dependent variable in the regression model was created by combining the endogenous income of all 66 sectors, the exogenous portions having composed the independent variables manufacturing (22) and Other Sectors (44).

To better appreciate the magnitude of the calculations, additional discussion is relevant. The BEA data included all of the over 3000 counties for an eighteen-year period (1969-1986). Since Prop, Tpay, Prima, and Fedgov were allocated by *a priori* assignment, the involved process of determining the LQ value for those sectors was not necessary. Property and transfer income were read directly from tape but primary activities and federal government required the summing of five and three subsectors, respectively. To calculate the exogenous income for manufacturing for one county for one year, equation [2.3]

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[9]When referring to the variable "Other", the capitalized "Other Sectors" will be written to differentiate from a generic reference to other sectors. Throughout the discussion, Other Sectors will be capitalized while the other exogenous variables will not be.

[10]Appendix A (pg 142) lists the subsectors of each variable.

(pg 43) needed to be estimated 22 times (once for each of the 22 2-digit subsectors of manufacturing) and the 22 results summed to become the exogenous income for county "i" in year "t". The same process was used to determine the exogenous income for one county for one year for the independent variable Other Sectors except that equation [3.2] was estimated 44 times (once for each of the 44 2-digit subsectors) and the 44 results summed. The dependent variable (endogenous income) required that the process be repeated 66 times (manufacturing [22] plus Other Sectors [44]) using equation [2.4] (pg 43) and summing the 66 results. Completing this process for all 2392 nonmetropolitan counties for each of 18 years illustrates that when Isserman (1977: 33) states that the LQ technique "can be carried out quickly and inexpensively," he meant relative to more involved techniques.

MODEL

Model selection begins by examining the theory behind the research. Economic base theory states that the exogenous sector drives the endogenous sector. Since a causal relationship exists, regression analysis can be used with the exogenous sector(s) (X) being the independent variable(s) and the endogenous sector (Y) being the dependent variable, as expressed in equation [1.6] (pg 9).

The six exogenous sectors were independent variables so that six differential multipliers were estimated for each

time period. Since property and transfer income are the focus of this research, they were handled as separate independent variables rather an aggregated nonemployment income variable and thus a coefficient was estimated for each. Manufacturing and primary activities are two sectors frequently considered as important economic engines driving the economy of rural counties. They were included as separate variables to allow for comparison of their estimated coefficients with the coefficients of property and transfer income. Two other independent variables, income from the federal government and all other exogenous activity (a composite entitled "Other" or "Other Sectors"), were included so that the model was correctly specified. The reader should note that the omission of relevant variables tends to bias the estimates produced (Johnson, Johnson, and Buse, 1987: 279). This biasing of estimates by the omission of a relevant variable was found empirically by Mulligan (1987) in his research on transfer income in several Arizona communities. On the other hand, the inclusion of irrelevant variables produces estimates which do not have minimum variance (Johnson, Johnson, and Buse, 1987: 283).

The implicit or generic equation is:

$$\text{Endogenous Income} = f(\text{Prop, TPay, Prima, Manuf, Other, Fedgov}). \quad [2.1]$$

The explicit equation used to estimate the differential multipliers is an adaptation of the generic model (equation [1.6], pg 9).

$$Y = b_1X_1 + b_2X_2 + b_3X_3 + \ldots + b_nX_n \qquad [1.6]$$

$$Y_i = b_o + b_1P_i + b_2T_i + b_3PA_i + b_4M_i + b_5O_i + b_6F_i + U_i. \qquad [2.5]$$

The explicit model includes the subscripts "i" where:
i = each observation which is a separate county.

The model is linear and additive. The additive and linear functional form of the equation has been widely used in an economic base analysis to produce multipliers (Weiss and Gooding, 1968; McNulty, 1977; Hirschl and Summers, 1982; and Bain, 1984). The intercept (b_o) is included in Equation 2.2 so as to have a properly specified model (Johnson, Johnson, and Buse, 1987: 93).

TIME CONSIDERATION

Equation 2.5 does not include a time consideration. Since specific subscripts for time are not included, the time frame for each variable would be considered to be the same. However, a lag between the growth of the exogenous activity and the resulting change in the endogenous activity would likely exist (Hirschl and Summers, 1982; Shahidsaless, Gillis, and Shaffer, 1983: 88) as was discussed in the fictitious example of northern Michigan in Chapter 1. In equation [2.5], a different lag could occur between each exogenous variable and the dependent variable, which is the endogenous activity. Because I judge the term "lead" to be a more appropriate description of the phenomena, "lead" will be used rather than "lag" throughout the remainder of this

paper. To incorporate the potential different lead times for each separate exogenous sector equation [2.6] was adapted from equation [2.5].

$$Y_{it} = b_o + b_1P_{it-n1} + b_2T_{it-n2} + b_3PA_{it-n3} + b_4M_{it-n4} + b_5O_{it-n5} + b_6F_{it-n6} + U_{it}. \quad [2.6]$$

The three subscripts included in the model are:

i = each observation which is a separate county.

t = the one year duration over which the observation of county "i" is made.

n_k = the number of years of the lead of the independent variable. The "n" could be different for each independent variable so are represented by n_1 to n_6.

The lead values for each of the independent variables must be determined before the model can be run.

Determination of the Lead for the Independent Variables

To determine the individual leads for each independent variable, correlation between each of them and the dependent variable was run. This process took several steps and the process was completed separately for each of the eight subsets of counties. For each subset of counties, the mean for each of the independent variables and the dependent variable for each of the eighteen years in the study period was calculated. This produced a 7 by 18 matrix (7 variables by 18 years). The dependent variable (endogenous income) was then lagged from zero to eight years, producing nine variations of the dependent variable, each being shifted one year from the previous one. (See the first column in Table

2.3 [pg 55] where Endog represents a lag of zero years, Endog1 represents a lag of one year, Endog2 represents a lag of two years, etc.) Correlations were run between these nine lagged dependent variables (Endog to Endog8) and each of the independent variables (Prop to Fedgov, columns two through seven). The correlation coefficients generally produced a pattern with a distinct peak value for each of the independent variables (Table 2.3, pg 55). This peak created by the largest correlation coefficient would determine the lead time selected for that independent variable. Eight sets of leads, one for each of the eight subsets of counties, were determined (Table 2.4, pg 55) for use in the eight sets of regression equations.

The resulting leads were found to be very consistent (Table 2.4, pg 55). The leads for property income, transfer payments, and federal government were consistently three years. The correlation coefficients indicated that no lead existed (zero lead) for primary activities and manufacturing. Within these five exogenous sectors, nearly all of the variation occurred within the county subset Low (bottom row). Also considerable variation occurred in the leads for Other Sectors (last column). If only the first five exogenous variables for the first seven county subsets (shown in bold in Table 2.4) are discussed, the only deviation from complete consistency is the one-year differences for the High counties for manufacturing and

Table 2.3. Correlation coefficients for exogenous variables and lagged endogenous variables for the county subset Nonadjacent counties (first row in Table 2.4).

Lagged Endogenous Variable	EXOGENOUS VARIABLES					
	PROP	TPAY	PRIMA	MANUF	OTHER	FEDGOV
Endog	.9771	.9807	.6829	.9414	.9899	.9812
Endog1	.9849	.9892	.6653	.9250	.9933	.9873
Endog2	.9916	.9951	.6419	.9111	.9932	.9910
Endog3	.9964	.9976	.6282	.8904	.9938	.9985
Endog4	.9892	.9934	.5975	.8839	.9921	.9960
Endog5	.9777	.9831	.6176	.9014	.9827	.9879
Endog6	.9656	.9733	.6233	.9003	.9767	.9777
Endog7	.9565	.9666	.6300	.9098	.9664	.9697
Endog8	.9533	.9633	.6338	.9008	.9636	.9652
LEADS	3	3	0	0	3	3

Table 2.4. Leads for the exogenous sectors (columns) for the eight subsets of counties (rows). (The county subsets are described in Appendix B, pg 145).

	PROP	TPAY	PRIMA	MANUF	FEDGOV	OTHER
NONADJ	3	3	0	0	3	3
ADJ	3	3	0	0	3	1
SMALL	3	3	0	0	3	3
MID-SIZE	3	3	0	0	3	0
LARGE	3	3	0	0	3	1
HIGH	3	3	0	1	2	1
MEDIUM	3	3	0	0	3	0
LOW	0	5	3	3	0	4

Leads are given in years. Consistent results are shown in bold.

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federal government. This high degree of consistency suggests that a general pattern exists.

The inconsistency of the leads for Other Sectors is most likely related to the variable being a composite variable--an aggregate of 44 different industrial subsectors (Appendix A, pg 142). The county subset Low varies even more dramatically and produces the only leads which are greater than three years. The inconsistency displayed by the Low subset creates questions as to whether the subset will be comparable with the other subsets. This reservation will be kept in mind when discussing the results of the Low counties.

Once the lead time was known then a specific regression equation were specified and run. Three simplified regression equations for the nonmetropolitan, adjacent counties illustrate the relationship of the dependent variable with each of the independent variables given a consistent lead for each independent variable (as shown in the second row entitled "Adj" in Table 2.4, pg 55):

$$Y_{it} = b_0 + b_1P_{it-n1} + b_2T_{it-n2} + b_3PA_{it-n3} + b_4M_{it-n4} + b_5O_{it-n5} + b_6F_{it-n6} + U_{it}. \quad [2.6]$$

$$\text{Endog72} = \text{Prop69} + \text{TPay69} + \text{Prima72} + \text{Manuf72} + \text{Other71} + \text{Fedgov69} \quad [2.7]$$

$$\text{Endog73} = \text{Prop70} + \text{TPay70} + \text{Prima73} + \text{Manuf73} + \text{Other72} + \text{Fedgov70} \quad [2.8]$$

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$$\text{Endog74} = \text{Prop71} + \text{TPay71} + \text{Prima74} + \text{Manuf74} + \text{Other73} + \text{Fedgov71}^{11} \quad [2.9]$$

REGRESSION EQUATIONS

Once the raw data was transformed into appropriate variables, the model was specified, and the leads for each of the independent variables were determined, then the model was run to produce coefficients for each independent variable. A set of fifteen such equations was designed and run for seven of the eight subsets of counties and a set of thirteen equations for the subset Low.[12] Ordinary least squares (OLS) regression analysis was used for the various runs for each of the eight county subsets. The regression analysis produced a set of fifteen multipliers (thirteen for the county subset Low) for each of the six independent variables--one multiplier for each of the fifteen (thirteen) years for which data was available when a lead time of three years is considered. This resulted in a total of 117 regression equations being estimated, producing a total of 702 coefficients. The resulting multipliers for the independent variables will be examined and discussed for each of the eight subsets of counties.

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[11]Endog72 represents the value of the endogenous income for the year 1972. Since Prop, TPay, and Fedgov each had a lead of three years, they are represented by Prop69, Tpay69, and Fedgov69. The leads for Prima, Manuf, and Other were zero, zero, and one year, respectively.

[12]Because of a lead time of five years and data set of eighteen years, only thirteen equations were run for the Low subset of counties. Since the maximum lead was consistently three years for all of the other seven subsets, each produced a set of fifteen equations.

SUMMARY

Economic base theory was used to examine the impact of property and transfer income. The data set of personal income from the Bureau of Economic Analysis for the nonmetropolitan counties in the U.S. was supplemented by adding the size of the largest place in each county. To test the four hypotheses, eight subsets of counties were examined, with the focus mainly upon the nonmetropolitan nonadjacent counties. Six exogenous (basic) variables--property income, transfer income, primary activities, manufacturing, federal government expenditures, and a composite of services (Other Sectors)--were defined as the independent variables while proprietors' income was omitted. The dependent variable was endogenous income. Both *ad hoc* assignment and the location quotient techniques were used to define the independent variables. A lead time was determined for each of the independent variables. Multiple regression analysis was used to generate six differential multipliers for each of fifteen years for each subset of U.S. counties.

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ABSOLUTE AND RELATIVE IMPACT OF PROPERTY AND TRANSFER INCOME

CHAPTER 3

As the percentage of total personal income accounted for by property and transfer income has steadily increased over the past years, the question has arisen as to how important is the impact of nonemployment income upon the nonbasic sector. This research seeks to answer that question. It breaks new ground because it examines the impact of both transfer and property income on the nonbasic portion of economy in nonmetropolitan U.S. counties. This chapter investigates whether their impact is significant and then compares their impact with the impact of other basic sectors of the economy.

The first hypothesis examines whether the impacts of the two components of nonemployment income are statistically significant, i.e. whether the coefficients for property and transfer income are positive and significantly different than zero. The first hypothesis also questions whether the multipliers produced by property and transfer income are larger than those produced by the exogenous sectors manufacturing and primary activities. For the reader's convenience, Hypothesis 1 is restated here from page 22.

Property and transfer income for nonmetropolitan counties will have positive, significant multipliers which

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are larger than the multipliers for the income for manufacturing and primary activities (agriculture, forestry, fishing, and mining).

It contains two comparisons--a measure of the absolute impact for property and transfer income and a measure of the relative impact of those two sectors when compared to manufacturing and primary activities. Therefore, in order to test each part of the hypothesis, the parts must be stated separately. They must also be stated in terms of equation [2.6] (pg 53), which has been reproduced here.

$$Y_{it} = b_0 + b_1P_{it-n1} + b_2T_{it-n2} + b_3PA_{it-n3} + b_4M_{it-n4} + b_5O_{it-n5} + b_6F_{it-n6} + U_{it}. \quad [2.6]$$

ABSOLUTE IMPACT OF PROPERTY AND TRANSFER INCOME

To determine the absolute impact, the coefficients for both property and transfer income are estimated by using equation [2.6] and the coefficients are examined to discover if they are significantly different from zero. In order to test if the coefficients are significant, Hypothesis 1 is subdivided into four parts, each with a research and null hypothesis. The first two sub-hypotheses (1.1 and 1.2) examine the absolute impact of property and transfer income, and the third and fourth sub-hypotheses, which will be discussed later, examine the relative impact of the nonemployment components.

Hypothesis 1.1: For all nonmetropolitan counties, the coefficients for property income are positive and significant.[1]

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[1]The research (H_1) and null (H_0) hypotheses are mathematically stated in terms of the parameters from equation [2.6]. The alpha level used for each hypothesis

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H_1: $b_1 > 0$
H_o: $b_1 \leq 0$

Hypothesis 1.2: For all nonmetropolitan counties, the coefficients for transfer payments are positive and significant.

H_1: $b_2 > 0$
H_o: $b_2 \leq 0$

The coefficients for property and transfer income, as estimated by equation [2.6], are "b_1" and "b_2", respectively. Coefficients are estimated for each of fifteen different years, yielding fifteen b_1's and b_2's for each subset of counties. The coefficients are listed for the nonmetropolitan, nonadjacent counties in Table 3.1 (pg 63) and the nonmetropolitan, adjacent counties in Table 3.2 (pg 63).

For both property and transfer income the coefficients are positive and statistically significant at a level of confidence well above the 95% level established as an acceptable level.[2] These significant coefficients strongly support the research hypothesis. In other words the null hypothesis would be rejected and the research hypothesis would be accepted. The adjusted coefficient of determination (R^2) for the equations had a mean value of .93, indicating that the six independent variables explained

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throughout this research was .05. However, the statistical package used (SAS) provided the alpha at which each parameter was found to be significant. Therefore, some of the tables may indicate smaller alpha levels, such as 0.0001, which is equivalent to a 99.99% level of confidence.

[2]In order to avoid repeating the level of confidence at each successive test, all further tests are understood to be at a 95% level of confidence unless otherwise stated.

93% of the variation in the dependent variable.[3] These results are in general agreement with the findings of McNulty (1977), Hirschl and Summers (1982), and Bain (1984).

While all the coefficients are statistically significant, the trend is for the coefficients for both property and transfer income to decline over the period (Figures 3.1 to 3.4, pg 64-65). Kendall (1989: 58) found similar results in her examination of the coefficients of combined nonemployment income in the rural counties of Michigan, despite the fact that her model varied in numerous ways from the model used in this research.

This trend for the coefficients of these nonemployment components to decline is rather surprising. Bluestone (1979) found that the two variables increased in both absolute and relative terms in the nonmetropolitan areas between 1968 and 1975. So while they are increasing over time, their impact is declining in importance over the same period.

However, other research discusses a similar relationship. Braschler (1971: 111) discussed this relationship in regard to manufacturing employment. He noted that while manufacturing employment may be declining as a percentage of total employment, it is not necessarily less important as a causal variable related to area economic

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[3]The value of each adjusted coefficient of determination for each equation is shown in Appendix C (pg 146) as well as the mean value for the 15 (13) equations for each county subset. The mean value for each county subset was very high, ranging from .89 to .98.

Table 3.1. Coefficients for the six independent variables for the Nonmetropolitan, Nonadjacent counties, 1972 to 1986.

YR	PROP	TPAY	PRIMA	MANUF	OTHER	FEDGOV
72	1.225	1.749	.207	.531	1.184	.159
73	1.280	1.659	.180	.521	1.210	.177
74	1.303	1.392	.207	.608	1.290	.215
75	1.289	1.249	.217	.680	1.432	.282
76	1.469	1.143	.208	.638	1.389	.302
77	1.537	1.255	.177	.569	1.162	.203
78	1.822	1.241	.217	.554	.617	.213
79	1.760	1.294	.208*	.570	.678	.175
80	1.568	1.216	.222	.594	.907	.171
81	1.436	1.036	.249	.602	1.102	.244
82	1.215	.964	.248	.601	1.119	.292
83	1.161	.859	.196*	.536	1.073	.294
84	1.115	.859	.121	.551	.913	.272
85	1.060	.949	.047**	.561	.781	.258
86	1.050	.968	.061**	.615	.695	.280

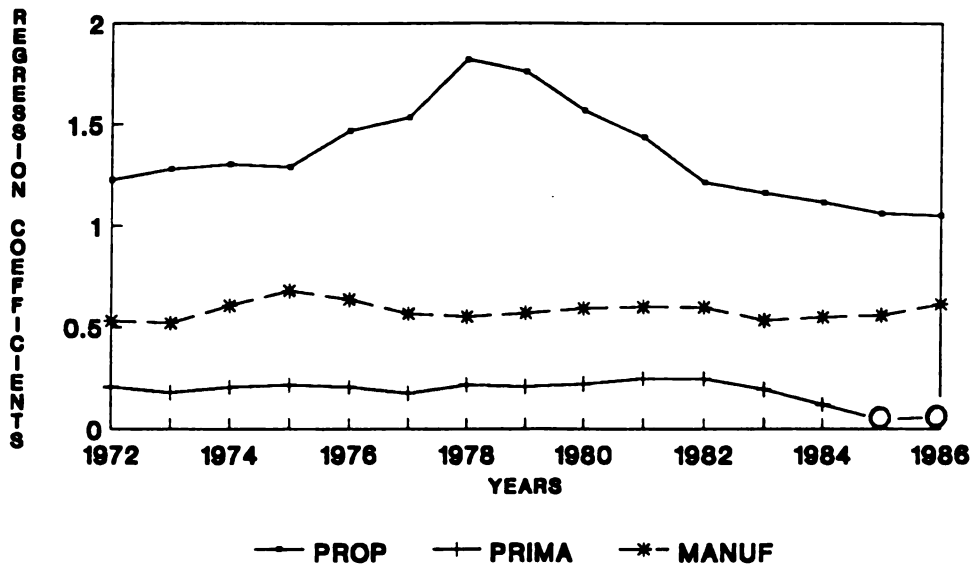
All coefficients are significant at a 99.99% level of confidence (l.o.c.) unless otherwise noted. Coefficients significant at 95% l.o.c. are marked by * and those which are not significant at a minimum of a 95% l.o.c. are marked by **.

Table 3.2. Coefficients for the six independent variables for the Nonmetropolitan, Adjacent counties for 1972 to 1986.

YR	PROP	TPAY	PRIMA	MANUF	OTHER	FEDGOV
72	1.957	2.023	.047**	.421	.188	.150
73	1.979	1.868	.067*	.437	.216	.159
74	1.822	1.788	.123	.476	.263	.175
75	1.674	1.772	.189	.523	.388	.181
76	1.638	1.781	.149	.503	.422	.195
77	1.515	1.744	.164	.490	.444	.176
78	1.539	1.563	.188	.464	.512	.187
79	1.509	1.614	.178*	.500	.475	.158*
80	1.350	1.679	.143	.506	.435	.143*
81	1.200	1.682	.141	.503	.443	.116*
82	1.088	1.527	.150	.533	.404	.142*
83	1.029	1.413	.081*	.449	.382	.150*
84	.910	1.374	.058**	.451	.463	.156*
85	.988	1.266	.018**	.436	.455	.208*
86	.970	1.298	-.001**	.466	.487	.229*

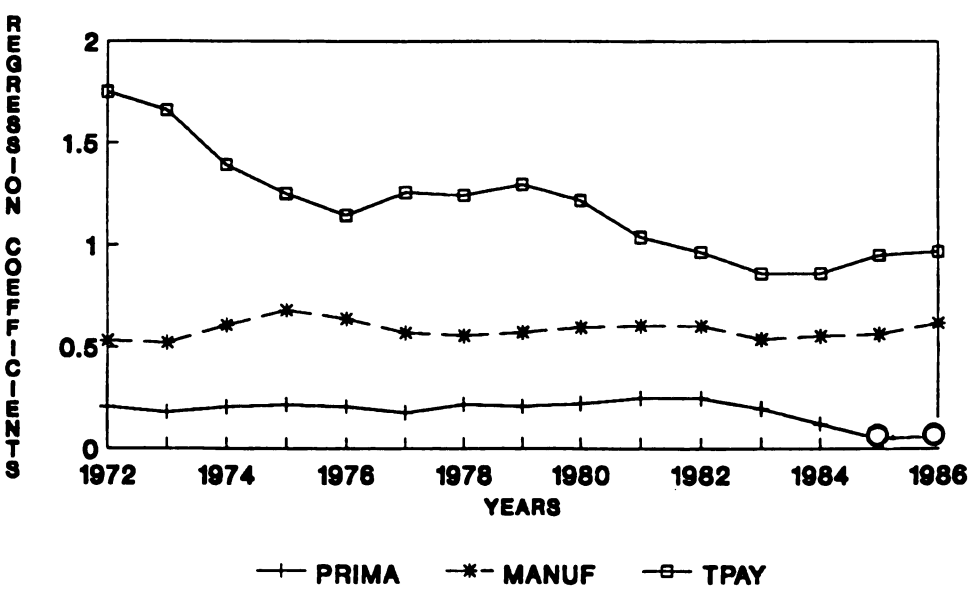
All coefficients are significant at a 99.99% level of confidence (l.o.c.) unless otherwise noted. Coefficients significant at 95% l.o.c. are marked by * and those which are not significant at a minimum of a 95% l.o.c. are marked by **.

FIGURE 3.1. PROPERTY INCOME COMPARED TO PRIMARY AND MANUFACTURING INCOME FOR ALL NONMETROPOLITAN NONADJACENT COUNTIES



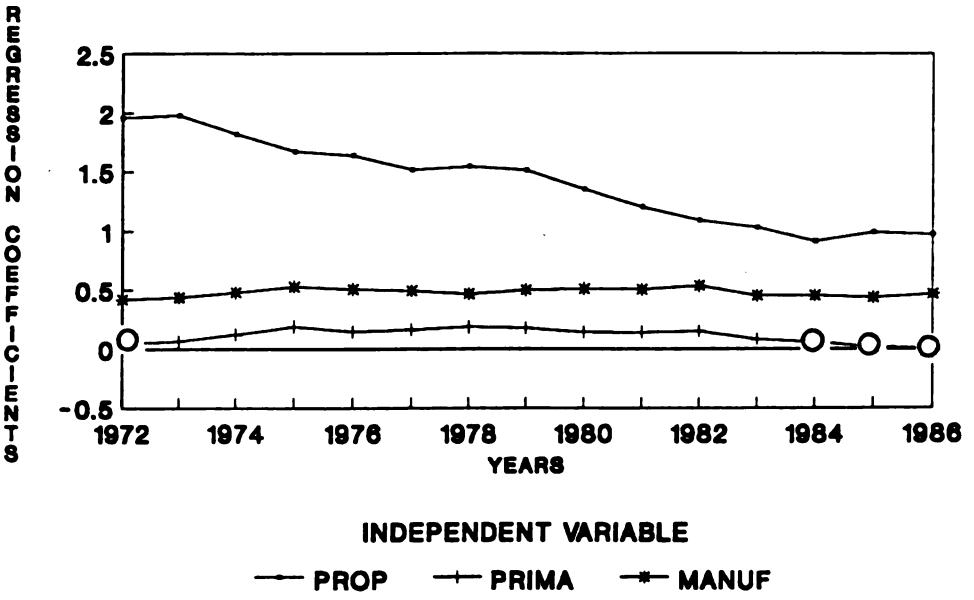
Dependent variable = endogenous income.
Circles=values which are not significant

FIGURE 3.2. TRANSFER INCOME COMPARED TO INCOME FROM PRIMARY ACTIVITIES AND MANUFACTURING FOR ALL NONMETROPOLITAN NONADJACENT COUNTIES



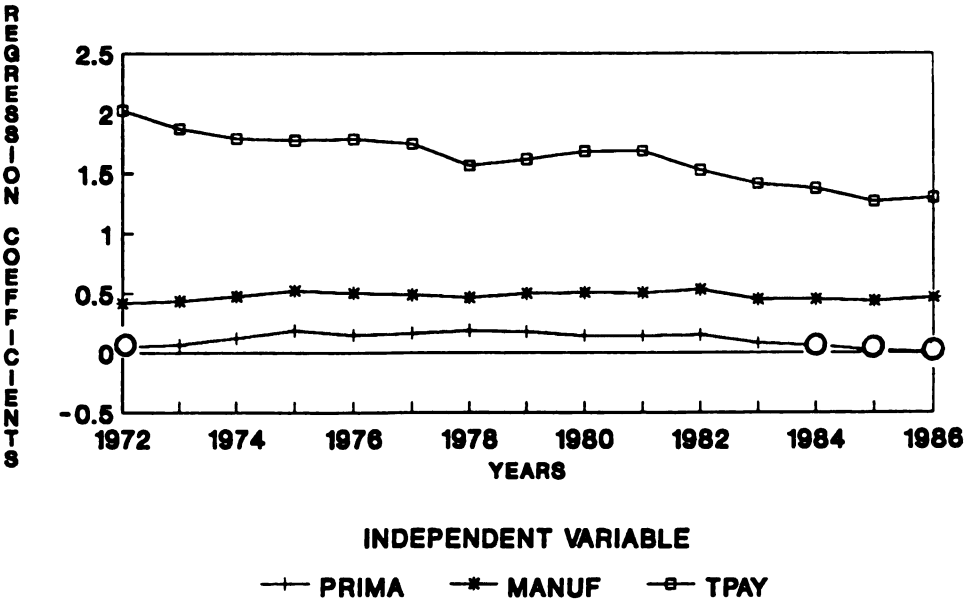
Dependent variable = endgoenous income.
Circles=values which are not significant

FIGURE 3.3. PROPERTY INCOME VS INCOME FROM PRIMARY ACTIVITIES & MANUFACTURING FOR ALL NONMETRO ADJACENCT COUNTIES



Dependent variable = endogenous income.
Circles=values which are not significant

FIGURE 3.4. TRANSFER INCOME VS INCOME FROM PRIMARY ACTIVITIES & MANUFACTURING FOR ALL NONMETRO ADJACENT COUNTIES



Dependent variable = endogenous income.
Circles=values which are not significant

growth. "A decline in percent of total employment accounted for by manufacturing may simply mean a higher total multiplier impact from the manufacturing component . . . " (1971: 111). The relationship for nonemployment income between its multiplier and the percentage of total personal income would appear to be just the reverse of the relationship for manufacturing employment which Braschler described.

The graphed coefficients for the nonemployment sectors (Figures 3.1 - 3.4), produced very similar patterns except for the anomalous peak for 1978 for property income in the nonmetropolitan nonadjacent counties. The pattern is one of decline over the study period.[4] Is this pattern related to the U.S. economy over the study period?

From 1969 to 1986, the U.S. economy was one of growth at a rate of 2.5% annually, but with two recessionary periods (Liesner, 1989: 327). The first was related to the Arab-Israeli War of October 1973 and the resulting steep rise in the cost of petroleum and the second occurred in 1979-80 following the Iranian Revolution (McKay, 1990:42). During both periods, the Gross National Product declined slightly, unemployment ran from 7.6 - 9.5 percent, gross private domestic fixed investment declined, and inflation hovered around ten percent (U.S. Bureau of the Census, 1981 and 1991; Liesner, 1989). These bad times might be expected

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[4]Later results for the nonemployment sectors of other county subsets will produce very similar patterns, adding support to the idea that a general pattern does exist.

to generate a "blip on the radar screen" as the economy falters, but no anomalies are apparent in Figure 3.1 - 3.4. Remembering that the unit of study is nonmetropolitan counties, it might be that a general decline in the local economy was occurring before, during, and after the periods of recession, so that a shrinking of the endogenous sector was occurring, as will be discussed later (pg 72-73).

During a recessionary period, one might expect transfer income to produce a larger coefficient, but no increase in impact was apparent. A portion of property income arises from the rental of property, so a change in the value and related rental value of farm land might generate a change in the impact of property income. An examination of the value of farm land in the Midwest and Rocky Mountain states, where the majority of the nonmetropolitan nonadjacent counties are located, found no relationship between land values and the coefficients for property income. The land values generally rose sharply (about 300-400 percent) from 1970 to 1980. The values tended to peak from 1980 to 1984 and then followed a pattern of general decline (Pennsylvania Agricultural Statistics Service, 1988: 79).

RELATIVE IMPACT OF PROPERTY AND TRANSFER INCOME

In rural counties, manufacturing and primary activities are often considered to be the foundation upon which the economy of the county can be expanded. However, previous research by Summers and Hirschl (1985) and Smith, Hackbart,

and Van Veen (1981) suggests that nonemployment income is more important than these sectors in producing change in the endogenous sector. This leads to the next two sub-hypotheses (1.3 and 1.4), which are developed from the Hypothesis 1.

Hypothesis 1.3: For all nonmetropolitan counties, the coefficients for property income are greater than the coefficients for primary activities and manufacturing.

H_1: $b_1 > b_3$ and $b_1 > b_4$
H_0: $b_1 \leq b_3$ and $b_1 \leq b_4$

Hypothesis 1.4: For all nonmetropolitan counties, the coefficients for transfer payments are greater than the coefficients for primary activities and manufacturing.

H_1: $b_2 > b_3$ and $b_2 > b_4$
H_0: $b_2 \leq b_3$ and $b_2 \leq b_4$

The estimated coefficients which allow for the comparison are provided in tabular (Tables 3.1 and 3.2, pg 63) and graphic form (Figures 3.1 and 3.4, pg 64-65).

Primary activities have relatively small coefficients which range from .249 to values which are not significantly different from zero.[5] The coefficients for manufacturing are all significant at an alpha of .05 and tend to be quite consistent, ranging form .421 to .680. The four graphs (Figures 3.1 to 3.4, pg 64-65) clearly illustrate that the coefficients of both property and transfer income are

[5]Six of the thirty estimate coefficients (20%) for primary activities for the nonmetropolitan counties were found to not be significantly different from zero at a 95% level of confidence. These six coefficients are the only ones found to be insignificant out of the 180 estimated for the six independent variables in testing Hypothesis 1 (Tables 3.1 and 3.2, pg 63).

substantially larger than those of either manufacturing or primary activities. When tested, the nonemployment coefficients were found to be significantly different from those of primary activities and manufacturing at the 95% level of confidence.[6] The coefficients of both are generally two to three times those of manufacturing and five to six times those of primary activities. Thus, Hypotheses 1.3 and 1.4. are accepted. In the nonadjacent counties (subset #1), the tolerances for property and transfer income fell within the ranges of .23-.28 and .19-.24, respectively. The adjacent counties (subset #2) had values within the ranges of .19-.22 and .17-.20 for property and transfer income, respectively. These tolerance values indicate that for property and transfer income about one-sixth to one-fourth of the variance within the variable is not explained by the other independent variables in the equation. These relatively low values are a result of a weakness of the model when using regression.

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[6]To test whether two coefficients (such as b_1 and b_2) were significantly different from each other, the 95% confidence interval was found for each. Then each coefficient was examined to determine whether it fell within the 95% confidence interval of the other for each of the fifteen years of the study period. If neither coefficient falls within the other's confidence interval for that year, the coefficients are considered to be significantly different for that particular year. Otherwise, the coefficients were considered not to be significantly different at the 95% level of confidence. This procedure was used throughout this research to determine whether two coefficients were signifi-cantly different from each other. Later results will note that coefficients were significantly different from each other without referring to this procedure.

If the coefficients of both property and transfer continue on the general trend of declining and the coefficients of manufacturing remain constant, then they will converge in about five to ten years. Kendall's (1989: 50) research produced similar results. She regressed nonbasic income upon the two exogenous variables--basic income and nonemployment income. Her coefficients for nonemployment income generally declined from 1.5 to .7 while those of basic income rose steadily from .2 to .6 (Appendix B, pg 145).

McNulty (1977: 365) had found the coefficients from property income to be larger than those for manufacturing in five of the seven periods over which he examined the SMSAs in the Southeast of the United States. However, he found transfer payments to produce larger coefficients for only two of those seven time periods. While McNulty's results provide only mixed support for the findings of this research, it must be remembered that the populations being examined are different (nonmetropolitan counties in this research versus SMSAs in McNulty's). Another difference is that McNulty did not use a lead period for any of his independent variables and used a duration of several years. The use of only *a priori* assignment to divide the economic activity into basic or nonbasic rather than also include the LQ technique is another methodological difference between McNulty's and this research. Because of these numerous

differences, the results of this research would not be expected to be identical to McNulty's.

The substantially larger coefficients of transfer income compared to manufacturing and primary activities are supported by the findings of Hirschl and Summers (1982: 311). They included only Old Age and Survivor's Insurance (OASI) (Social Security) to measure cash transfer and found that it produced a multiplier many times larger than both manufacturing and agriculture. They note that the resulting multiplier "may be an inflated estimate", since OASI would likely be highly correlated with property income. In other words, OASI may act as a surrogate variable for all nonemployment income, i.e. the total of all transfer income plus all property income. Smith, Hackbart, and Van Veen (1981: 21) agree that the omission of property income would bias the multipliers upward.

These findings suggest that property and transfer income each have a very substantial impact upon the nonbasic sector of the economy in nonmetropolitan areas. Their importance does appear to be declining but if the trend continues, they would continue to have the largest multipliers for another decade or two. Even if a future decline does occur, the multipliers for the components of nonemployment income will still be about the same magnitude as those for manufacturing.

Another consideration which might be overlooked is that the size of the multipliers alone does not reveal the entire

impact of an exogenous sector. The full impact of any sector is the combined effect of the multiplier and the magnitude of the economic activity itself (the number of dollars of property or transfer income being received within the region). Therefore, since both components of nonemployment income have been increasing at a steady rate over the past decades, the effect of a declining multiplier may be that the total impact remains relatively constant or even increases.

A third factor which must be considered is the growth of the endogenous sector in the nonmetropolitan counties. If the endogenous sector is growing more slowly than nonemployment income, then the multipliers for nonemployment income cannot increase. In areas such as the Great Plains, the population is becoming more concentrated around the metropolitan areas and the larger urban centers in the nonmetropolitan counties. In many nonmetropolitan counties, the population is declining because of greater mechanization in agriculture and out-migration of the younger population, resulting in an older population. With the elderly receiving the majority of their income from nonemployment income and more of the population composed of elderly, a greater percent of the personal income is derived from nonemployment sources.[7] At the same time, the need for

[7]This process is just the opposite of that described by Groop and Manson (1986: 2) when they mentioned that nonemployment income tends to be "hidden" by employment in the urban and suburban areas. Since the level of employment income is relatively low, the nonemployment income becomes more important.

services has been decreasing because of the decline in population in the rural areas and greater reliance upon higher-order central places, which has been made possible by greatly improved transportation. The multipliers for nonemployment income are unlikely to remain constant or increase in counties experiencing such transformations. Yet the impact of nonemployment income would still be very important. However, in areas where retirees have migrated into regions, such as those mentioned by Manson and Groop (1988: 3) and Hewitt, Staniforth, and Christiansen (1967), the possibility for the multipliers to remain constant or increase is greater. The fourth hypothesis, comes closer to approaching the question of what impact exists where high levels of nonemployment income is found when subsets of counties with high levels of nonemployment income are compared to counties with low levels (Subsets 6-8). It is discussed in Chapter 5.

A fourth consideration is the difference in the way in which the data are organized. Property and transfer income are reported by county of residence while the employment income is reported by the county where the work occurs. Therefore, cross-county commuting creates inconsistencies in the data. The main focus of this research is the nonmetropolitan nonadjacent counties where cross-county commuting is expected to be much less significant than in the metropolitan and the nonmetropolitan adjacent counties.

The cross-county commuting has differing impacts upon two sets of counties: 1) the "residence" counties and 2) the "work-place" counties. The "residence" county is the county in which the worker lives and from which he commutes to his place-of-work county. Since the true income in the "residence" county is underestimated (because wages are reported in the "work-place" county), the coefficients would be overestimated. Just the reverse relationship would exit in the "work-place" counties--the true income would be overestimated and the coefficients would be underestimated. One must be aware that a county could possibly be both a "residence" and "work-place" county with some workers commuting into and some commuting out of the county. Most counties have some level of both in- and out-commuting but either the in- or out-commuting tends to dominate in a given community rather than balance each other.

The occurrence of commuting is not expected to be evenly dispersed across space but would have a greater impact in certain geographic areas. Both absolute and relative location are factors. In the eastern states (absolute location) where the geographic size of the counties tend to be small relative to the western states, cross-county commuting would be occurring at a higher level than in the western states. With regard to relative location, the commuting is more likely to be out of counties with small places (cities and towns) and into counties with larger central places. The counties containing these larger

central places would predominantly be "work-place" counties with the surrounding counties being primarily "residence" counties.

The limitations of the data to include cross-county commuting have been acknowledged in this dissertation. In future research, it might be possible to make adjustments for the commuting factor.

SUMMARY

The results of testing Hypotheses 1.1 and 1.2 indicated that both property and transfer income have a significant impact upon the endogenous sector of nonmetropolitan counties in the U.S. Their impact is also found to be greater than the impact of primary activities and manufacturing (indicated by the results of testing Hypotheses 1.3 and 1.4). The six independent variables in the equation explained 93% of the variance in the endogenous sector. The coefficients for both nonemployment sectors showed a trend of decline over time. This trend of decline does not necessarily indicate that the total impact is declining since the total impact is the product of the multiplier and the size of the sector. The reason for the decline in the size of the coefficient is not known but may be related to a mathematical relationship within the regression model, with similar results found by Braschler (1971: 111). However, the decline might be a result of a changing economic structure within and across counties, as

the economic and demographic factors change over time in the nonmetropolitan counties of the U.S.

STRUCTURAL CHANGE ACROSS THE RURAL-URBAN CONTINUUM

CHAPTER 4

This chapter focuses upon the difference in structure of local economies, which occurs as the size of economies varies. As noted previously (pg 6), Homer Hoyt originally thought that the ratio of basic to nonbasic activity remained constant from city to city, but later realized that the ratio varied. Edward L. Ullman (Weiner and Hoyt, 1954) compiled a table of basic to nonbasic ratios from early studies, which strongly suggested that a positive relationship existed between the size of a city and the portion of the economy which was nonbasic (endogenous). Stated another way, the percentage of total economic activity which is basic tends to fall as the size of the city becomes larger (Richardson, 1969: 168; Ullman, Dacey, Brodsky, 1971; Mulligan, 1987: 2). This is partially because the larger size allows for exploitation of economies of scale. Also, nonbasic activities comprised a larger percentage of the total because of import replacement (Richardson, 1979: 88).

This relationship can be shown mathematically by using examples. The examples will use data from Ullman's table (Weiner and Hoyt, 1954) and equation [1.2] (pg 7).

$$Y/X = b \qquad [1.2]$$

Thus, by combining some of the empirical examples with the formula for deriving the coefficient, a relationship between city size and the resulting multiplier can be more fully understood.

Table 4.1. Multipliers being derived for two different cities which have different basic to nonbasic ratios.

City	Population (Year)	Ratio	Coefficient	Multiplier
Oshkosh, WI	42,000 (1950)	1.0/0.6	b = .6	b+1 = 1.6
New York Metro Area	12,000,000 (1940)	1.0/2.1	b = 2.1	b+1 = 3.1

To examine the impact that structural differences would have upon the multipliers of the various exogenous sectors, Hypotheses 2 and 3 were formulated. Hypothesis 2, a comparison of relative geographic location, examines the difference between the nonmetropolitan counties adjacent to the metropolitan counties and those nonmetropolitan counties not adjacent. Hypothesis 3 examines the variation in impact which occurs as the size of the largest place in the county varies.

ADJACENCY TO METRO AREAS VERSUS NONADJACENCY

The existence of the accepted use of the terminology "nonmetropolitan adjacent counties" versus "nonmetropolitan nonadjacent counties" implies that the counties are

consistently thought to be different enough to warrant being placed in separate categories (Bluestone, 1979; Briggs and Rees, 1982). The rationale for this is that the adjacent counties are impacted by the contiguous metro areas. Often, the ring of adjacent counties forms exurbs for the metro area. Many of the residents in the adjacent counties are employed in the metro areas and also utilize their commercial and service facilities. In contrast, the nonadjacent counties, more distant from the metro centers, are more likely to develop their own central place functions and be less tied to the metro areas. Bluestone (1979: 10) noted that the difference in where local income was spent explains why less leakage occurs in the nonadjacent counties than in the adjacent counties.

An example of this spatial differentiation was noted by Groop and Manson (1986: 2). They found that nonemployment income tended to be "hidden" by the high levels of employment income in the urban and suburban areas and tended to comprise a larger percentage of total personal income in the more rural areas. Since different levels of nonemployment income are expected between the adjacent and nonadjacent counties, then different multipliers would also be expected for the two groupings of counties.

Hypothesis 2, restated below from Chapter 1, is divided into two sub-hypotheses to allow for separate testing for property and transfer income.

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The nonmetropolitan nonadjacent counties will have larger multipliers for the nonemployment income sectors than the nonmetropolitan adjacent counties.

PROPERTY INCOME

The sub-hypothesis which examines property income is:

Hypothesis 2.1: The coefficients for property income for the nonmetropolitan, nonadjacent counties are larger than the coefficients for property income for the nonmetropolitan, adjacent counties.

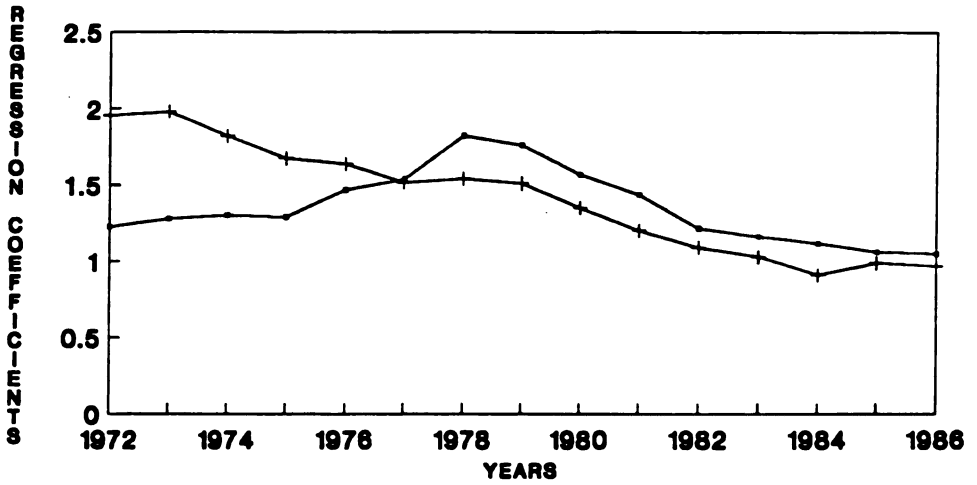
$$H_1: \; b_{1N} > b_{1A}$$
$$H_0: \; b_{1N} \leq b_{1A}$$

where:

b_{1N} = the coefficient for property income for the nonmetropolitan nonadjacent counties.
b_{1A} = the coefficient for property income for the nonmetropolitan adjacent counties.

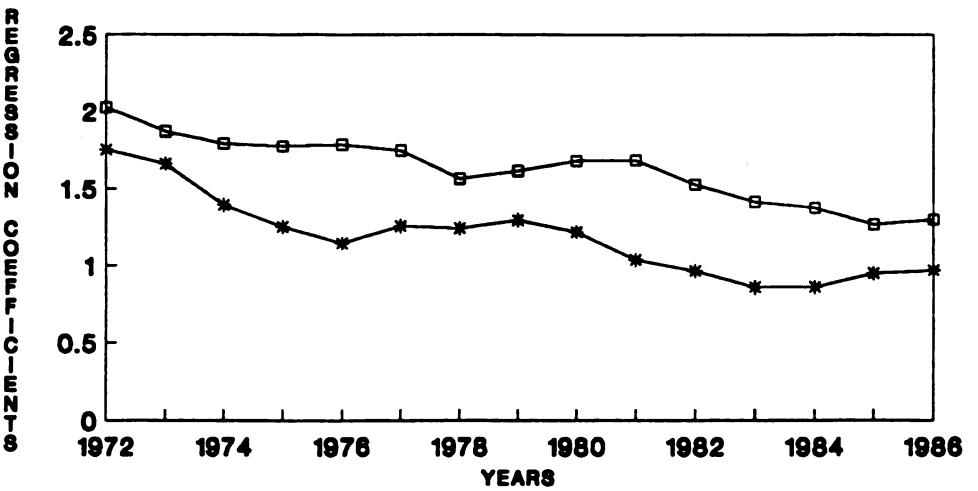
The estimated effects of property income for the nonadjacent counties can be compared with those for the adjacent counties. The coefficients for the adjacent counties (column two, Table 3.2, pg 63) are, initially, substantially greater than those for the nonadjacent counties (column two in Table 3.1), but then the estimates for nonadjacent increase so that they are greater than those of the adjacent counties (Figure 4.1, pg 81). The coefficients are statistically different from each other for each year for all except three years (1977, 1985, 1986), but the coefficients for the nonadjacent counties are statistically significantly larger than those for the adjacent counties only from 1978 to 1984. The values tend to converge from 1978 to 1986; and they become close enough

FIGURE 4.1. COMPARISON OF PROPERTY INCOME FOR THE NONADJACENT AND ADJACENT NONMETROPOLITAN COUNTIES



Dependent variable = endogenous income.

FIGURE 4.2. COMPARISON OF TRANSFER INCOME FOR THE NONADJACENT AND ADJACENT NONMETROPOLITAN COUNTIES



Dependent variable = endogenous income.

in value that they are no longer significantly different in 1985 and 1986. Therefore, the null hypothesis is accepted, and the research hypothesis is rejected.

TRANSFER INCOME

A second sub-hypothesis, derived from the Hypothesis 2, compares the coefficients for transfer payments.

Hypothesis 2.2: The coefficients for transfer payments for the nonmetropolitan, nonadjacent counties are larger than the coefficients for transfer payments for the nonmetropolitan, adjacent counties.

$$H_1: \quad b_{2N} > b_{2A}$$
$$H_0: \quad b_{2N} \leq b_{2A}$$

where:

b_{2N} = the coefficient for transfer payments for the nonmetropolitan nonadjacent counties.
b_{2A} = the coefficient for transfer payments for the nonmetropolitan adjacent counties.

The estimated coefficients for the adjacent counties (column three of Table 3.1, pg 63) are significantly larger than those for the nonadjacent counties (Table 3.2, pg 63 and Figure 4.2, pg 81). The coefficients for adjacent counties range from 13% larger in 1973 to 65% larger in 1983. While some convergence does occur toward the end of the period, the values for adjacent counties is 34% larger during the last year in the period. This relationship is just the opposite of what had been hypothesized, and the research hypothesis must be rejected.

DISCUSSION OF ESTIMATED COEFFICIENTS

For both property and transfer income, the resulting coefficients tended to be higher for the adjacent counties than for the nonadjacent counties. This relationship was just the opposite of what had been hypothesized. The nonadjacent counties had been hypothesized to experience less leakage and thus produce larger coefficients. This result did not happen for either property or transfer income but did occur for another exogenous sector called Other Sectors. The coefficients for Other Sectors for the Nonadjacent counties ranged from about 50% to 500% larger than those for the adjacent counties. Other Sectors, being a composite of a variety of service sectors, contain many of the subsectors which would tend to expand as a place becomes a more important service center. All other factors being equal, a place more distant from the metropolitan area would become a more important service center. This theoretical concept is supported by the resulting coefficients for Other Sectors. The nonadjacent places produce larger estimates, suggesting less leakage and a more developed exogenous sector, which helps produce larger coefficients.

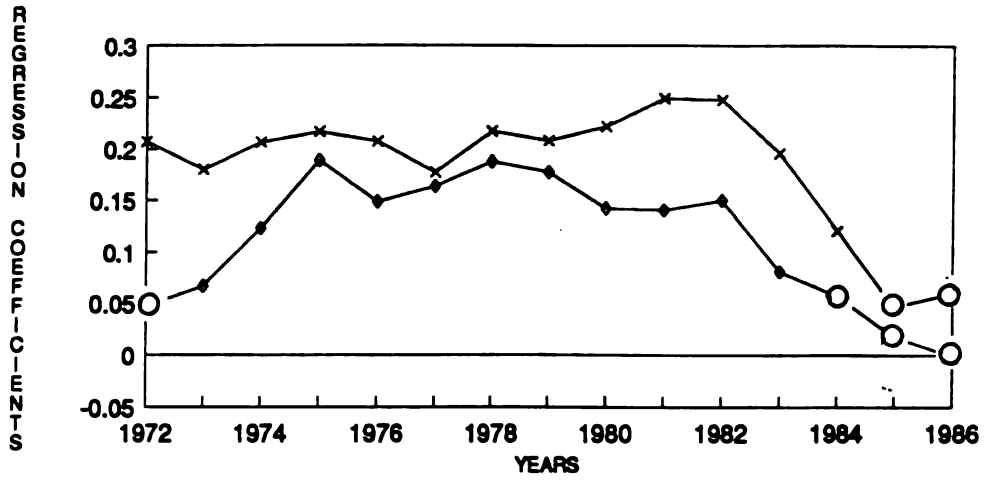
The results produced by the two nonemployment income sectors were opposite those which were hypothesized. These results are somewhat perplexing, especially when compared to the coefficients estimated for the other four exogenous sectors. Those four sectors--primary activities, manufacturing, Other Sectors, and federal government--produced

coefficients for the nonadjacent counties which were greater than those for the adjacent counties for all years in the study period (Figures 4.3 - 4.6, pg 85 - 86). Why did these four exogenous sectors produce the expected results without exception while the nonemployment sectors did so less than a quarter of the time?

An initial explanation is that the nonemployment income is spent differently than the other exogenous income. Hypothesis 1 supports this idea. However, the explanation of why nonemployment income produced larger multipliers was that a larger percentage of it tended to be spent locally, and less leakage occurred. In apparent contradiction to that explanation, one interpretation of the results from the Hypothesis 2 suggest that greater leakage occurred in the nonadjacent counties than in the adjacent, which produced smaller multipliers in the nonadjacent counties. Therefore, it would appear that leakage cannot explain both Hypotheses 1 and 2. Upon more thorough examination, what would appear to be a contradiction may not be. In both the adjacent and nonadjacent nonmetropolitan counties, both nonemployment income sectors have larger coefficients than the other four exogenous sectors, suggesting less leakage from the nonemployment income sectors. A general ranking of the size of coefficients from highest to lowest is (pg 63):

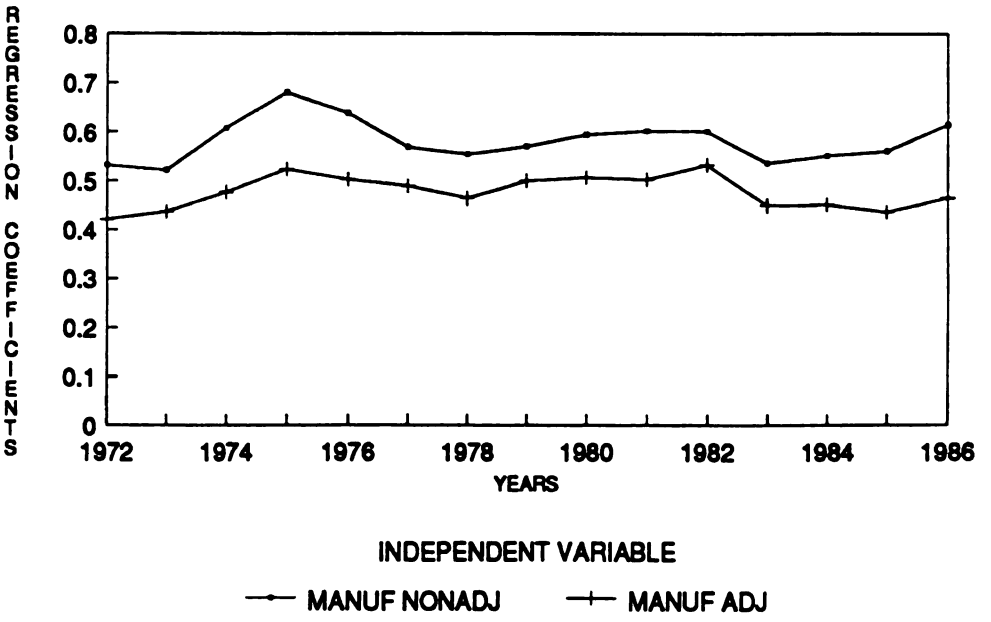
1) Property and transfer income for adjacent counties.
2) Property and transfer income for nonadjacent counties.
3) Other four exogenous sectors for nonadjacent counties.

FIGURE 4.3. COMPARISON OF PRIMARY ACTIVITIES FOR THE NONADJACENT AND ADJACENT NONMETROPOLITAN COUNTIES



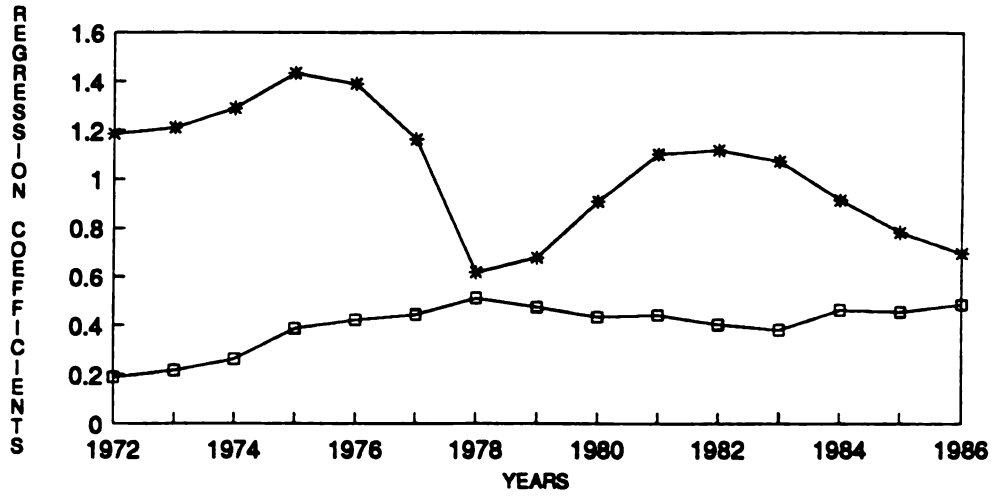
Dependent variable = endogenous income.
Circles=values which are not significant

FIGURE 4.4. COMPARISON OF MANUFACTURING INCOME FOR THE NONADJACENT VS ADJACENT NONMETROPOLITAN COUNTIES



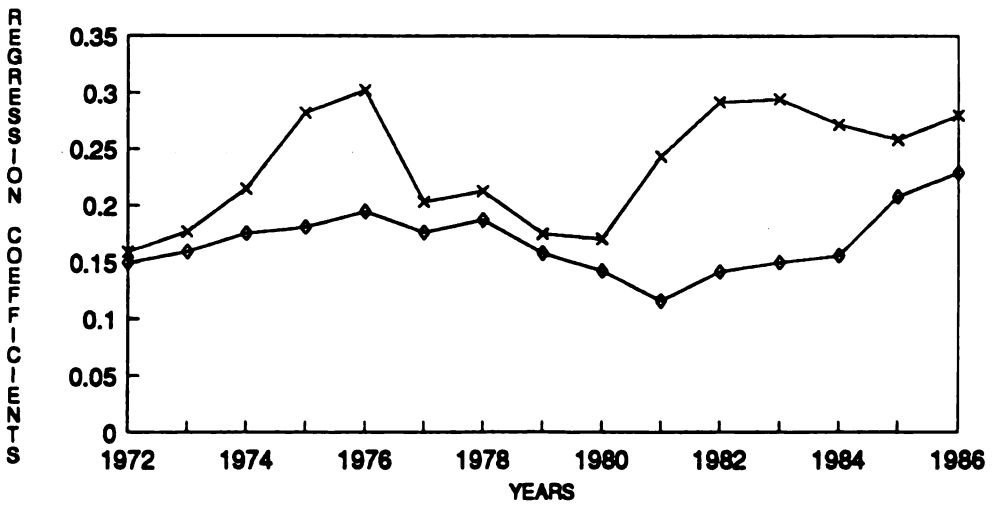
Dependent variable = endogenous income.

FIGURE 4.5. COMPARISON OF INCOME FROM OTHER SECTORS FOR THE NONADJACENT AND ADJACENT NONMETROPOLITAN COUNTIES



Dependent variable = endogenous income.

FIGURE 4.6. COMPARISON OF INCOME FROM FEDERAL GOVERNMENT FOR THE NONADJACENT AND ADJACENT NONMETROPOLITAN COUNTIES.



Dependent variable = endogenous income.

4) Other four exogenous sectors for adjacent counties.[1]

This ranking shows that the coefficients for property and transfer income in the nonadjacent counties are smaller than those for property and transfer income in the adjacent counties but still larger than those of the other four exogenous sectors in the nonadjacent counties. The nonemployment income sectors and the other four exogenous sectors tend to have different impacts in the adjacent and nonadjacent counties. Still, the nonemployment income sectors in the nonadjacent counties produce larger coefficients than do the other four sectors in those counties, suggesting that the leakage for nonemployment income in those counties is still less than the leakage for the other four sectors.

The lack of complete compatibility of the data from the BEA data set was also thought to help explain this contradiction of results. However, rather than help explain the contradiction, it creates a greater contradiction. The income from nonemployment sources was reported by place of residence while the income from employment sources was compiled by place of work. Note that the data for the four exogenous sectors which produced results compatible with those hypothesized were recorded by place of work. Some residents of the adjacent counties might work in metropolitan areas, which would result in an undercounting

[1]Within some of the coefficients, a slight deviation exists but this ranking presents the general pattern.

of employment income in the adjacent counties. Thus, if this income were counted by place of residence instead of place of work, then the employment income would increase which would result in a lower multiplier for the adjacent counties. In other words, the current multipliers are biased upward because of the undercounting of employment income in the adjacent counties. This would cause an even greater difference between the multipliers for the adjacent and nonadjacent counties.

The question remains as to why the two nonemployment sectors produced smaller coefficients for the nonadjacent counties than the adjacent counties while the four employment sectors all produced larger coefficients for the nonadjacent counties than for the adjacent counties. Future research may provide the answer.

ROLE OF CITY SIZE

Hypothesis 2 examined the geographic location of nonmetropolitan counties relative to metro areas to determine if different multipliers would be produced. Hypothesis 3 examines the effect of different-sized cities within the nonadjacent counties. Hypothesis 3 is restated here from Chapter 1:

> Nonmetropolitan counties in which the largest urban center is less than 2500 will have smaller multipliers for both property and transfer income than will nonmetropolitan counties which have larger urban centers.

Since the counties in the City subset have a larger population, the nonbasic to basic ratio would be larger so that a larger multiplier would be produced in the counties of the City subset (Braschler, 1972: 461; Harvey, 1973: 471; Richardson, 1979: 88; Smith, Hackbart, and Van Veen, 1981: 20; Mulligan, 1987: 2). In the less-urbanized counties, the materials produced by the primary activities (e.g. grain, livestock) are more likely to be exported unprocessed in the smaller town (Smith, Hackbart, and Van Veen, 1981: 19) than in the urban centers, where more of the processing would occur. Braschler (1972: 464-465) found that counties with larger towns had larger multipliers for agriculture and manufacturing (and nearly all other sectors) than counties with towns of less than 2500, indicating more leakages from small communities than from large ones. Thus, the counties with the larger cities would have a larger multiplier than those with smaller cities or towns.

In order to examine the effect of different-sized places in the county, the set of all nonmetropolitan, nonadjacent counties was subdivided by the size of the largest place in each county. Using the 1980 population for the largest place in the county, three groups of counties were created, following a classification scheme used by Briggs and Rees (1982: 1652). The three categories of nonmetropolitan, nonadjacent counties included (Appendix B):

Rural -- places with populations of less than 2500.
Town -- places with populations of 2500 to 10,000.
City -- places with populations of greater than 10,000 and less than 50,000.[2]

The 2500 cutoff was selected because places of less than 2500 are defined as rural by the Bureau of the Census. The division at 10,000 rather than a larger value was chosen since cities of 10,000 have an adequate selection of services to provide a focus for economic activity (Roepke and Freudenburg, 1981: 580). The value of 10,000 is also used by the Bureau of the Census to separate nonmetropolitan urban counties from nonmetropolitan rural counties.

PROPERTY INCOME COMPARED BY CITY SIZE

Hypothesis 3 was restated as two sub-hypotheses (3.1 and 3.2) which could then be tested using equation [2.6] (pg 53).

$$Y_{it} = b_0 + b_1P_{it-n1} + b_2T_{it-n2} + b_3PA_{it-n3} + b_4M_{it-n4} + b_5O_{it-n5} + b_6F_{it-n6} + U_{it}. \qquad [2.6]$$

Hypothesis 3.1: For all nonmetropolitan nonadjacent counties, the coefficients for property income are directly related to the size of the largest place in the county for the county subsets Rural, Town, and City.

H_1: $b_{1R} < b_{1T}$; $b_{1T} < b_{1C}$
H_0: $b_{1R} \geq b_{1T}$; $b_{1T} \geq b_{1C}$

The coefficient b_{1R} (along with b_{2R} to b_{6R}) was estimated by including only the 507 counties with the largest places

[2]Since these are all nonmetropolitan counties, the largest place in a nonmetropolitan county must be less than 50,000 or it would be classified as a metropolitan county.

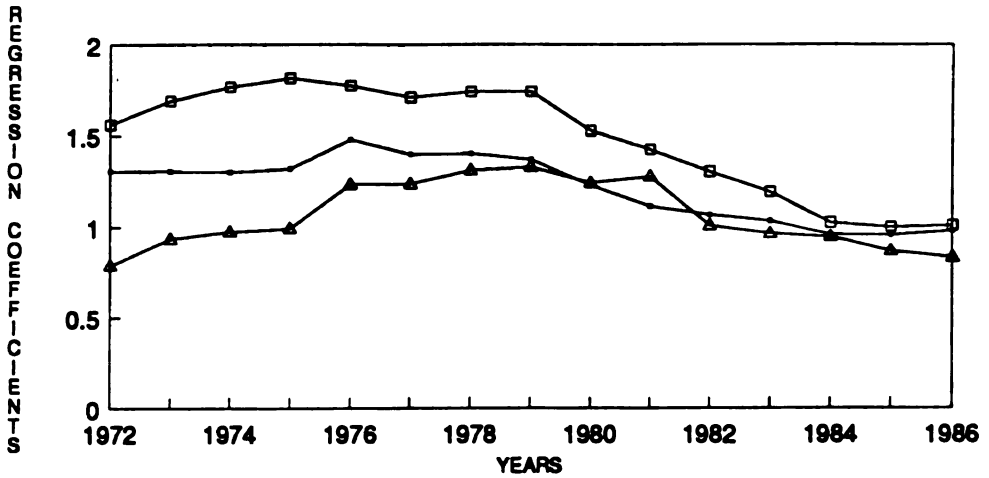
having populations of less than 2500 (the Rural counties). Likewise, b_{1T} was estimated using only the 484 Town counties and b_{1C} was estimated using only the 219 City counties (Appendix B, pg 145).

The adjusted coefficients of determination (R^2) for these equations were very high, indicating that a mean of 89 to 92 percent of the variation within the endogenous sector was accounted for by the six independent variables.[3] The coefficients for property income for all three categories are significant and relatively large. The estimates of all three categories tend to follow the same general pattern--rising slightly over the first several years and then declining over the later period (Figure 4.7, pg 92). The pattern of the coefficients is one of a general convergence. The values of the three sets of coefficients are substantially different during the initial years but become nearly equal toward the end. However, the coefficients only partially conform to that which was hypothesized because medium-sized places have the largest coefficients, followed by the smallest places.

The coefficients for the Rural counties are consistently smaller than those for the Town counties, as had been hypothesized, but the difference between the two is not significant over the last three years (Table 4.5, pg 94). These results alone would provide support for the

[3]The values for the coefficients of determination are listed in Appendix C, page 146.

FIGURE 4.7. COMPARISON OF PROPERTY INCOME BY SIZE OF LARGEST PLACE IN COUNTY.

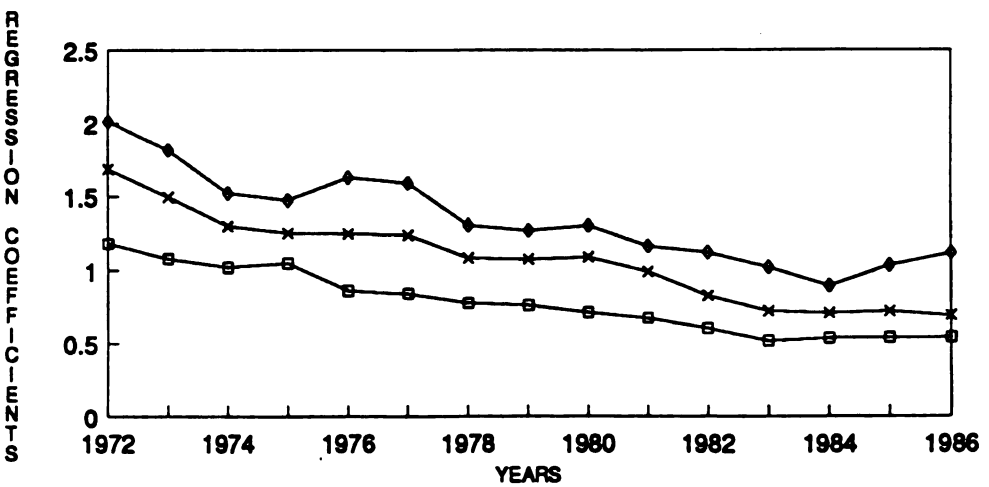


INDEPENDENT VARIABLE

RURAL TOWN CITY

<2500=R 2500-10,000=T >10,000=C
Dependent variable = endogenous income.

FIGURE 4.8. COMPARISON OF TRANSFER INCOME BY THE SIZE OF LARGEST PLACE IN COUNTY.



INDEPENDENT VARIABLE

RURAL TOWN CITY

<2500=R 2500-10,000=T >10,000=C
Dependent variable = endogenous income.

Table 4.2. Coefficients for the nonadjacent Rural counties.

YR	PROP	TPAY	PRIMA	MANUF	OTHER	FEDGOV
72	1.305	1.181	.129	.575	.115*	.299*
73	1.306	1.078	.086	.564	.168	.370*
74	1.302	1.020	.109	.526	.182	.237*
75	1.319	1.047	.112	.519	.158	.160**
76	1.479	.861	.124	.601	.123	.076**
77	1.399	.841	.096	.573	.125	.160**
78	1.404	.777	.105	.645	.212	.108**
79	1.371	.762	.115	.706	.209	.073**
80	1.228	.712	.129	.746	.213	.015**
81	1.112	.672	.110	.776	.145	.052**
82	1.066	.602	.087	.838	.090	.158*
83	1.032	.516	.079	.895	.081*	.280*
84	.957	.535	.059	.785	.070*	.356
85	.954	.538	.033**	.821	.060*	.293*
86	.979	.539	.029**	.907	.070	.343

All coefficients are significant at a 99.99% level of confidence (l.o.c.) unless otherwise noted. Coefficients significant at 95% l.o.c. are marked by * and those which are not significant at a minimum of a 95% l.o.c. are marked by **.

Table 4.3. Coefficients for the nonadjacent Town counties.

YR	PROP	TPAY	PRIMA	MANUF	OTHER	FEDGOV
72	1.560	1.689	.126	.258	.459	.047*
73	1.691	1.497	.103	.238	.453	.051**
74	1.767	1.299	.141	.275	.420	.057**
75	1.816	1.252	.120	.264	.440	.048**
76	1.775	1.247	.087	.269	.416	.065**
77	1.712	1.238	.078	.256	.397	.055**
78	1.742	1.082	.113	.250	.462	.062**
79	1.743	1.073	.109	.274	.475	.036**
80	1.527	1.087	.121	.277	.559	.029**
81	1.423	.989	.135	.292	.601	.032**
82	1.301	.825	.178	.312	.613	.066**
83	1.190	.720	.225	.300	.608	.060**
84	1.022	.706	.190	.308	.612	.035**
85	.998	.718	.158	.350	.638	.063**
86	1.008	.688	.153	.378	.641	.067**

All coefficients are significant at a 99.99% level of confidence (l.o.c.) unless otherwise noted. Coefficients significant at 95% l.o.c. are marked by * and those which are not significant at a minimum of a 95% l.o.c. are marked by **.

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Table 4.4. Coefficients for the nonadjacent City counties.

YR	PROP	TPAY	PRIMA	MANUF	OTHER	FEDGOV
72	.788	2.011	.342	.605	1.124	.167*
73	.935	1.818	.392	.584	1.004	.145*
74	.973	1.523	.328	.666	.988	.182*
75	.992	1.475	.387	.706	1.028	.186*
76	1.233	1.632	.355	.614	.593	.159*
77	1.236	1.593	.330	.570	.609	.147*
78	1.312	1.304	.363	.592	.792	.160*
79	1.329	1.268	.226*	.595	.999	.150*
80	1.241	1.302	.220	.584	.975	.154*
81	1.275	1.161	.345	.595	.929	.213*
82	1.007	1.117	.397	.550	.892	.238*
83	.963	1.018	.193*	.528	.910	.237*
84	.945	.891	.334	.607	.907	.321*
85	.867	1.031	.369	.584	.780	.210*
86	.835	1.113	.306*	.655	.696	.227*

All coefficients are significant at a 99.99% level of confidence (l.o.c.) unless otherwise noted. Coefficients significant at 95% l.o.c. are marked by * and those which are not significant at a minimum of a 95% l.o.c. are marked by **.

Table 4.5. Determination of whether the coefficients for Property Income for the three subsets of counties (Rural [R], Town [T], and City [C]) are significantly different from each other at the 95% level of confidence for the given years.

County Subsets	Percentage of the Years Significantly Different	Significantly Different	Number of Years	Duration
R vs T	80%	Yes	12	1972-83
		No	3	1984-86
T vs C	73%	Yes	11	1972-82
		No	4	1983-86
R vs C	27%	Yes	4	1972-75
		No	11	1976-86
Total	60%	Yes	27	
		No	18	

hypothesis, but the remaining results do not. The coefficients for the City counties were hypothesized to be the larger than those for both the Town and Rural counties but were not found to be significantly larger than either for even a single year. In fact, the coefficients for the City counties were generally the smallest of all the coefficients. A general trend for the three groups to converge during the later years of the study period is apparent. The estimates of the three subsets were found to be significantly different during the initial years of the study period but tended to converge over the latter years, and none were significantly different during the final years of the study. Therefore, the hypothesis must be rejected.

TRANSFER INCOME COMPARED BY CITY SIZE

Transfer income was hypothesized to produce results similar to property income.

Hypothesis 3.2: For all nonmetropolitan nonadjacent counties, the coefficients for transfer income are directly related to the size of the largest place in the county for the county subsets Rural, Town, and City.

$$H_1: \; b_{2R} < b_{2T}; \quad b_{2T} < b_{2C}$$
$$H_0: \; b_{2R} \geq b_{2T}; \quad b_{2T} \geq b_{2C}$$

The general pattern of the results for transfer income varies substantially from that for property income. The coefficients for transfer income for the three categories produce three similar patterns of consistent decline in value over the period of the study (Figure 4.8, pg 92). The

convergence of coefficients, which was dominant in the comparison of the estimates for property income (Figure 4.7, pg 92), was absent in the estimates for transfer payments. The magnitude of the estimates is relatively large even though they decline over the period. Most importantly, the pattern of results conforms to that which had been hypothesized. The counties with the largest places have the largest coefficients, and the counties with the smallest places have the smallest, with middle-sized places in between. These results definitely contrast with the resulting coefficients for property income. They do, however, support the hypothesis since the estimated coefficients for each county subset are significantly larger than those of the smaller counties. Therefore, the hypothesis would be accepted.

The multipliers for the nonemployment sectors are generally larger than those of the other exogenous sectors but tend to decline over the study period. If the larger multipliers result from a greater propensity to consume locally and the decline is a function of improved transportation which lessens the propensity to consume locally, then where is the consumption occurring? It would expectedly occur in the urban centers. Kendall (1989: 57-59) found that the coefficients for nonemployment income declined over time in the rural counties but not in the metropolitan or nonmetropolitan urban.[4] Therefore, the City

[4]The nonmetropolitan urban counties in her study were found to not be statistically different from the metropol-

counties in this research, which are similar but do include some counties with smaller cities than Kendall's nonmetropolitan urban, would be expected to have coefficients for the nonemployment income which would remain constant or possibly increase rather than decline. Since Kendall's nonmetropolitan urban contained only places of 20,000 to 49,999, the multipliers for those counties would be expected to be larger than those for the City counties, which contained counties with places of 10,000 to 49,999. The coefficients for property income for the City counties do show some support for this idea. While those coefficients were not larger than those for the Town and Rural counties, as had been hypothesized, they did tend to increase over the period, which produced a general pattern of convergence of the three sets of coefficients (Figure 4.7, pg 92). However, the coefficients for transfer income for the City counties do not provide any support for the hypothesis that the coefficients of the larger cities would remain constant over time. Instead, the coefficients of the City counties (Figure 4.8, pg 92) tend to mirror those of the Town and Rural counties, which decline steadily over the period. Therefore, the leakage hypothesized for transfer payments in the Rural and Town counties must also occur in the City counties. Thus, the resulting coefficients for the City counties provide mixed support for the hypothesis of less leakage in the counties with larger places.

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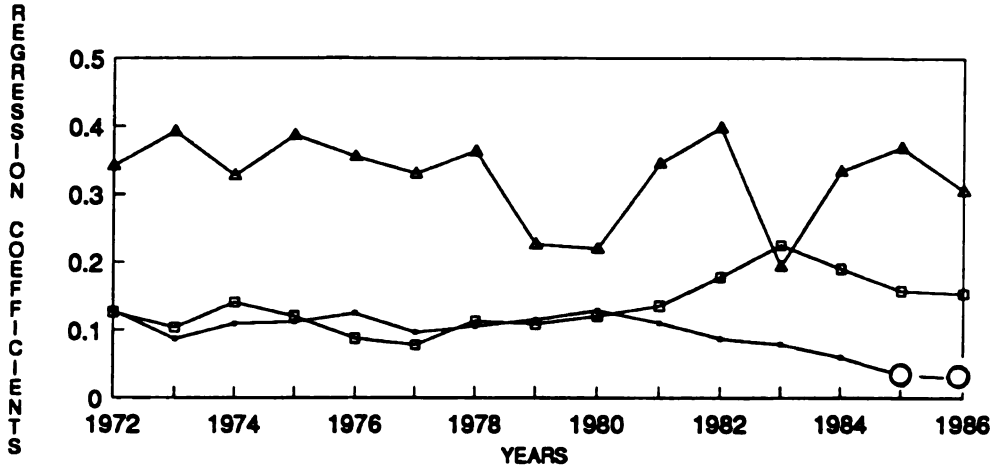
itan counties, possible because of the small sample size (N=13) for the nonmetropolitan urban counties.

In comparison of coefficients for the question of adjacency/nonadjacency, the estimates for the two nonemployment sectors failed to support the hypothesis while the four other exogenous sectors provided very strong support. When one considers counties by size of the largest place, one finds that the coefficients for transfer payments conformed exactly to the hypothesized pattern but those of property income provided only very marginal support for the hypothesis. The four other exogenous sectors also provide mixed support for the hypothesis (Figures 4.9-4.12, pg 99-100). The coefficients for the City counties were generally larger than those for the Town counties. In the manufacturing and federal government sectors, on the other hand, the values for the Rural counties were often larger than for either the Town or City counties. In Other Sectors (Figure 4.11, pg 100), the results complied with those hypothesized, while in primary activities, the results supported the hypothesis about 90% of the time (Figure 4.9, pg 99).

The three subsets of counties produced significantly different coefficients for the nonemployment sectors, as well as the other exogenous sectors. This suggests that each county subset might have different coefficients for the different exogenous sectors. Planners and policy makers would find a comparison of the results helpful. Therefore, the exogenous sectors important for each of the three groups of counties will be discussed separately.

FIGURE 4.9. COMPARISON OF INCOME FROM PRIMARY ACTIVITIES BY SIZE OF LARGEST PLACE IN COUNTY.

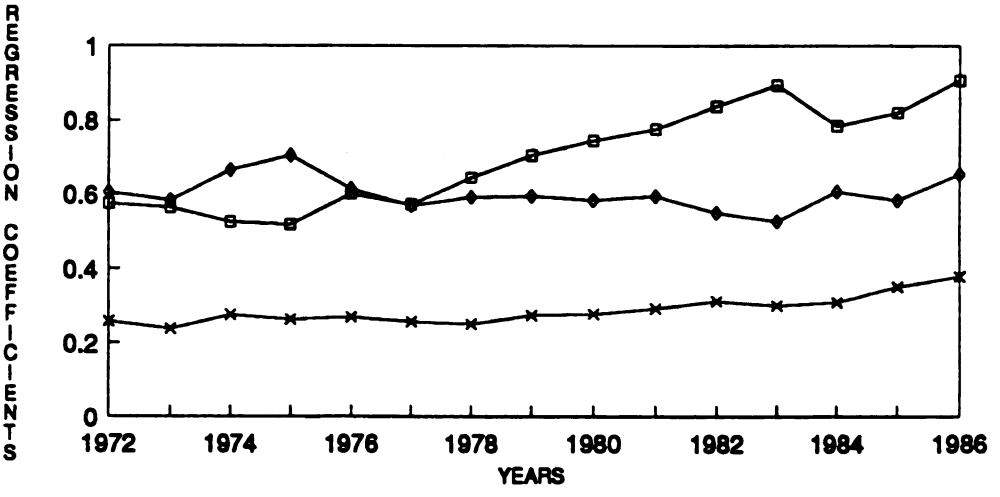


INDEPENDENT VARIABLE

RURAL TOWN CITY

<2500=R 2500-10,000=T >10,000=C
Dependent variable = endogenous income.
Circles=values which are not significant

FIG 4.10. COMPARISON ON INCOME FROM MANUFACTURING BY SIZE OF LARGEST PLACE IN COUNTY.

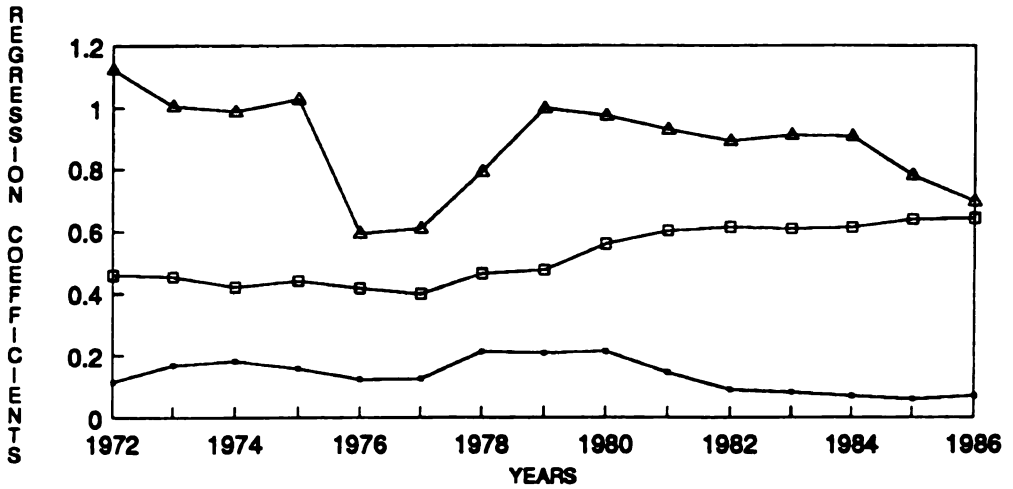


INDEPENDENT VARIABLE

RURAL TOWN CITY

<2500=R 2500-10,000=T >10,000=C
Dependent variable = endogenous income.

FIGURE 4.11. COMPARISON OF INCOME FROM OTHER SECTORS BY SIZE OF LARGEST PLACE IN COUNTY.

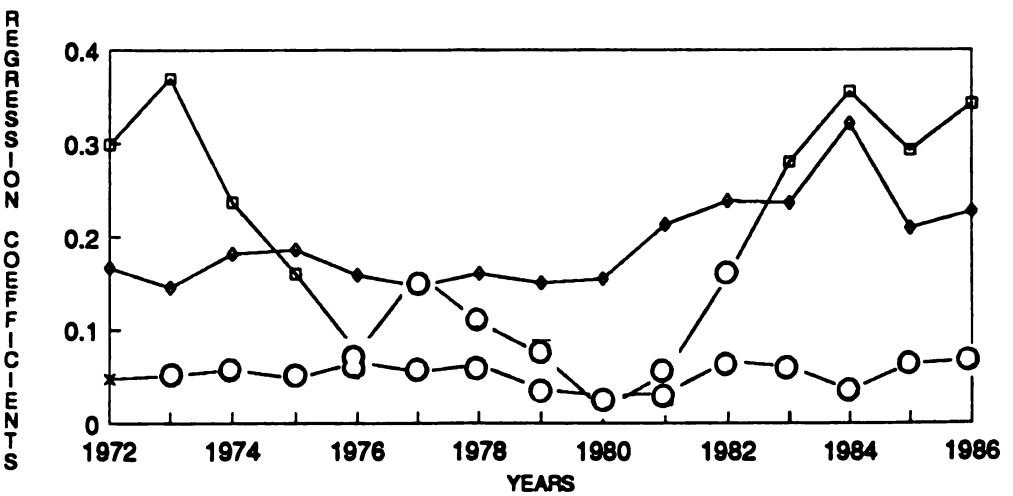


INDEPENDENT VARIABLE

RURAL TOWN CITY

<2500=R 2500-10,000=T >10,000=C
Dependent variable = endogenous income.

FIGURE 4.12. COMPARISON OF INCOME FROM FEDERAL GOVERNMENT BY SIZE OF LARGEST PLACE IN COUNTY.



INDEPENDENT VARIABLE

RURAL TOWN CITY

<2500=R 2500-10,000=T >10,000=C
Dependent variable = endogenous income.
Circles = values which are not significant.

IMPORTANCE OF EXOGENOUS SECTORS BY SIZE OF THE LARGEST PLACE

The impact of the nonemployment sectors was consistently important in the nonmetropolitan nonadjacent counties across the different size categories. The impact of important other sectors tended to fluctuate with the size of the largest place (Table 4.6). Manufacturing was important in all three categories, but surprisingly had its greatest impact in the smallest size category. Likewise, primary activities had a relatively important impact in the largest size category while they might have been expected to be more influential in counties which lack larger urban places, since the more rural counties tend to have a greater reliance upon primary activities. The variable Other Sectors (mainly service sectors) tended to be more important in counties with larger urban places than in counties with small urban places.

Table 4.6. The main exogenous sectors by size of the largest place in the county.

RURAL		TOWN		CITY	
Sectors	Range of Coefficients	Sectors	Range of Coefficients	Sectors	Range of Coefficients
Prop	.954-1.479	Prop	.998-1.775	Tpay	.891-2.011
Tpay	.516-1.181	Tpay	.688-1.689	Prop	.789-1.329
Manuf	.519- .907	Other	.397- .641	Other	.593-1.124
		Manuf	.238- .378	Manuf	.528- .706
				Prima	.193- .397

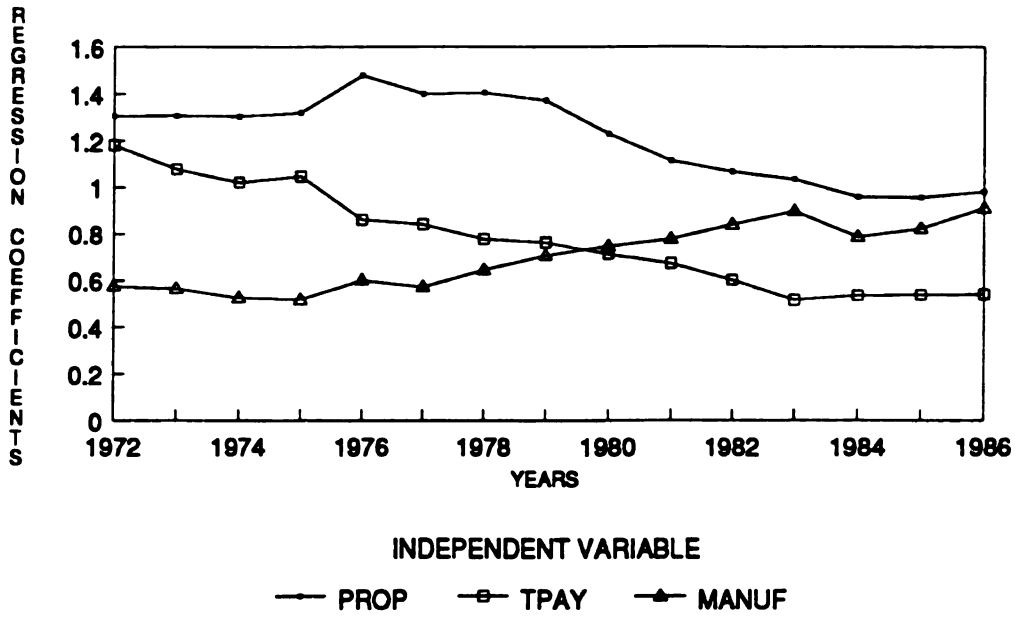
Subset of Rural Counties

For nonmetropolitan, nonadjacent counties which have a largest place of less than 2500, three exogenous sectors have sizeable regression coefficients. The relative size of the estimates changes over the study period (Figure 4.13, pg 103). Throughout the period, the largest estimates are produced by property income. The coefficients for transfer income are initially almost as large as those of property income, but they decline to about 50% of their initial value by the end of the period. The coefficients for manufacturing begin substantially lower than those for the nonemployment sectors but increase by 50% of their original value.

The nonemployment sectors have consistently been the sectors with some of the largest coefficients not only when comparing the size of the largest place in the county but also in nearly all of the various subsets of counties examined. The coefficients for manufacturing would surprisingly appear to be more important in counties with small places than in any of the other county groupings (Figure 4.4, pg 85; Figure 4.10, pg 99; Figure 4.14, pg 103).

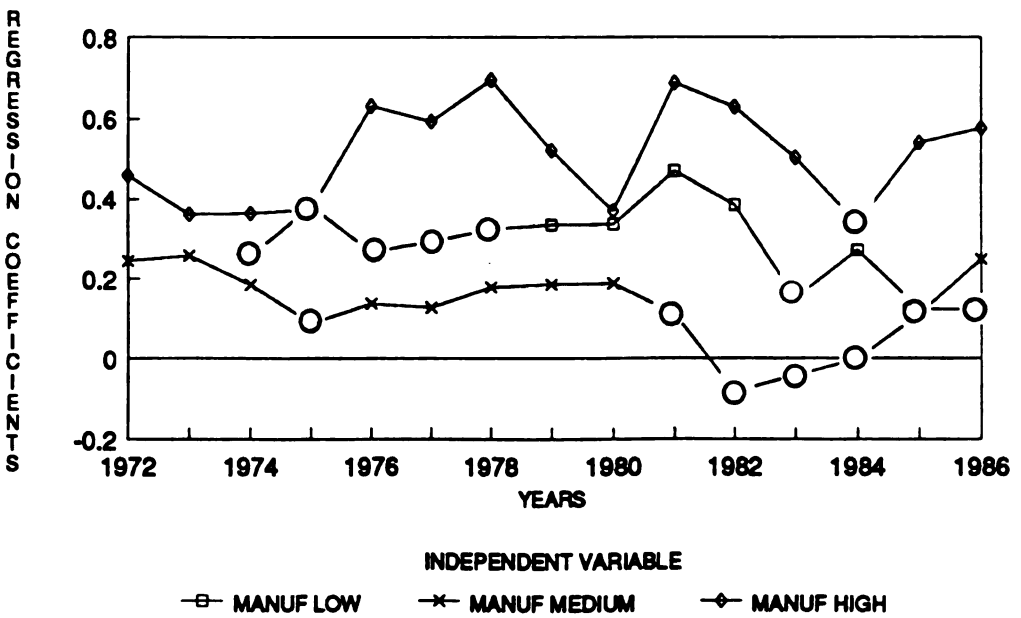
Why should an increase in manufacturing income be so important in counties with small towns and be more important there than in counties with larger urban places? Since the overall economy of the county is smaller in size and diversity, any increase in income is thought to rollover

FIGURE 4.13. COMPARISON OF THE MAIN EXOGENOUS SECTORS WITHIN THE RURAL SUBSET OF COUNTIES.



Dependent variable = endogenous income.
Rural = places with <2500 population.

FIGURE 4.14. COMPARISON OF COEFFICIENTS FROM MANUFACTURING INCOME FOR THE LOW, MEDIUM, AND HIGH SUBSETS OF COUNTIES.



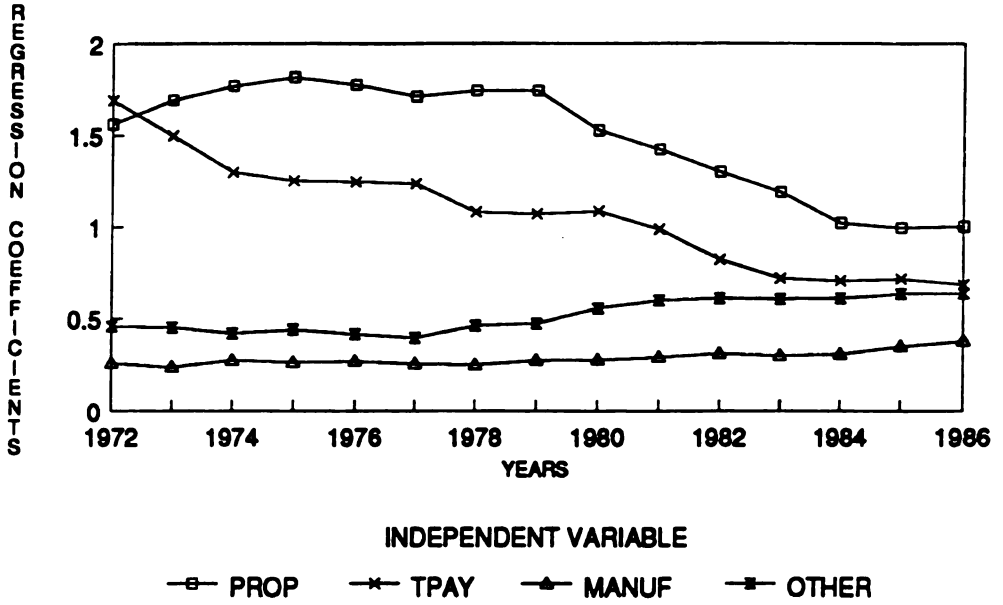
Dependent variable = endogenous income.
Circles = values which are not significant.

less within the community and is more likely to pass part of its impact to larger centers. That is to say, counties with smaller places would be expected to have greater leakage. The leakage in the counties with smaller places results because the propensity to consume locally is lower in the counties with small places and greater in the counties with larger places. This is directly related to the greater availability of a wider range of goods and services in the larger places. Therefore, the coefficients are more likely to be smaller in smaller communities. However, a small absolute increase in manufacturing income in the smaller community would produce a greater relative increase in the overall economy in the small community than in a a larger community. But this still does not explain why the multiplier effect would be greater. This situation warrants additional study.

Subset of Town Counties

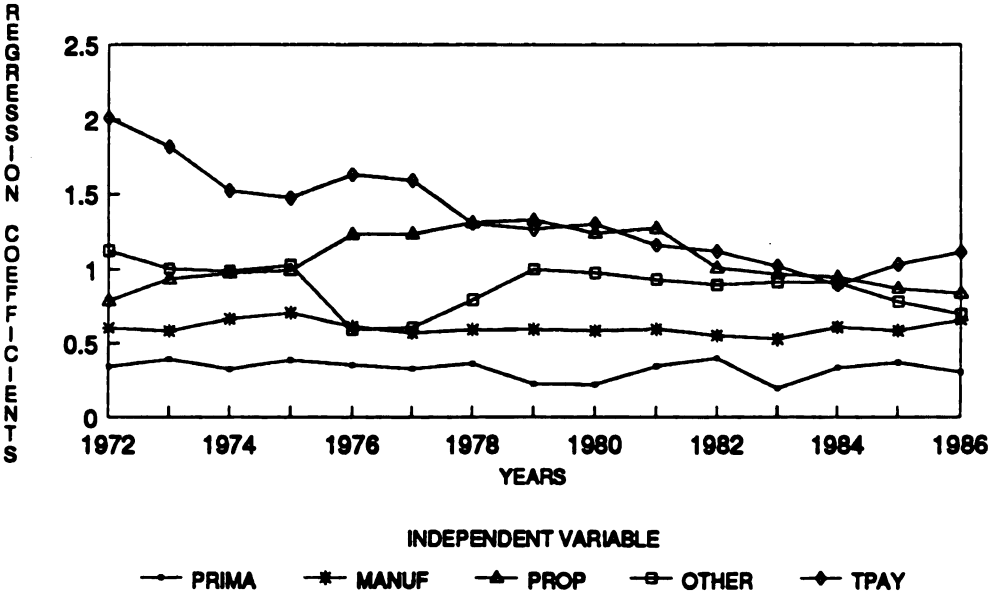
The counties in the subset Town have central places with populations of 2500 to 10,000. The nonemployment sectors have the greatest impact within this category while the variable Other Sectors and manufacturing are also relatively important (Figure 4.15, pg 105). The coefficients for property income are the largest throughout the period and remain at a value of 1.0 at the end of the period despite a steady decline in value. Likewise, the values for transfer income are substantial but decline over

FIGURE 4.15. COMPARISON OF COEFFICIENTS FROM THE MAIN EXOGENOUS SECTORS FOR THE TOWN SUBSET OF COUNTIES.



Town=places with population=2500-10,000.
Dependent variable = indogenous income.

FIGURE 4.16. COMPARISON OF COEFFICIENTS FROM THE MAIN EXOGENOUS SECTORS FOR THE CITY SUBSET OF NONMETROPOLITAN COUNTIES.



City = places with population > 10,000.
Dependent variable = endogenous income.

the period. The estimates of both Other Sectors and manufacturing are smaller but increase gradually to the extent that Other Sectors is nearly equal to transfer income in 1986. Other Sectors becomes more important in contributing to the endogenous sector.

Subset of City Counties

The largest places in the counties in the subset City had populations of 10,000 or more and were generally important central places in the nonmetropolitan landscape because of their relatively large size and relative geographic location (somewhat distant from metropolitan areas). The nonemployment sectors continued to dominate, but three other sectors also produced relatively large coefficients (Table 4.6, pg 101; Figure 4.16, pg 105). Transfer income initially had very large estimates, but by 1978 those values had declined and those of property income had risen until they were essentially equal. They had nearly identical estimates as they declined slightly until 1984, when they began to diverge slightly. The coefficients for Other Sectors were consistently around 1.0, the strongest showing in any of the three county subsets (Figure 4.11, pg 100). Manufacturing and primary activities each yielded coefficients which were relatively important and consistent over the period.

Primary activities are frequently thought of as a major industry in rural areas, one might expect the Rural subset

of counties to have a larger multiplier than the City subset. In this research, the opposite occurred. However, one should remember that the multiplier measures the impact of one exogenous sector upon the endogenous sector and not the overall importance of that sector to the economy of the region. Thus, primary activities might be the dominant economic activity in the region and still have a small multiplier effect. The explanation of why an exogenous sector can be important yet still have a small multiplier lies in the structural differences of the economies of the counties.

SUMMARY

Property and transfer income consistently have the largest coefficients throughout the study period for each of the three subsets of counties examined. While manufacturing was found to be relatively important in all three subsets, the importance of Other Sectors was positively related to the size of the largest place in the county increased.

The estimated coefficients provide reliable approximations of the true multipliers and indicate the relative importance of the different sectors for counties when the size of the largest place in the county is known. The independent variables accounted for about 90 percent of the variation within the dependent variable, indicating that the model did very well in explaining the endogenous sector. The subdividing produces a set of counties which are more homogeneous than the larger aggregation of counties.

Therefore, in order to obtain a more accurate estimate of the coefficient for a given exogenous sector, the set of nonadjacent counties should be subdivided by the size of the largest place in the county.

DIFFERENTIAL IMPACT OF HIGH VERSUS LOW LEVELS OF NONEMPLOYMENT INCOME

CHAPTER 5

Chapter 3 presented evidence that property and transfer income have impacts upon the endogenous sector as large as any other exogenous sectors when considering nonmetropolitan counties. Also, Summers and Hirschl (1985), in their study of rural counties entitled "Retirees as a Growth Industry", discussed the large multipliers produced by a portion of transfer payments. Other research discussed in Chapter 1 indicates that the income of elderly has become increasingly important in some areas (Salazar, Schallau, and Lee, 1986) and can produce a large income multiplier (Doekson and Lenard, 1980). How important is retirement income to the economy of rural counties?

To understand the total importance of retirement income, one must not only know the percentage of the basic sector which it composes but also the impact that it has upon the endogenous economy. The problem is that data which can delimit only retirement income are not readily available. Therefore, another approach is needed.

The research discussed in Chapter 1 emphasized the concept of the income of retirees as a substantial component of the economic base of some regions. If retirees are

promoted as a growth industry, then retirement income would comprise a larger part of the total income. Groop and Manson (1987b: 106) have shown a strong correlation, both cartographically and statistically, between elderly in-migration and nonemployment income. Their work emphasizes that in some counties in northern Michigan, nonemployment income, which comes mainly from retirement income, accounts for approximately two-thirds of total personal income (Manson, 1986: 51). Thus, a large portion of total personal income in some counties is derived from retirement income, but the economic impact upon the nonbasic sector is yet to be known (Manson and Groop, 1986).

In general, most of property and transfer income is received by the same people--the retired elderly. Groop and Manson (1987b: 106) have shown a high correlation between nonemployment income and the elderly. Over 75% of transfer payment is associated with retirement (Rural Development Perspective, 1987). People tend to accumulate more capital over time, and as they age their property income tends to increase. Thus, property income should have a high correlation with age. Most retired people receive social security and often some other pension (Hewitt, Staniforth, and Christiansen, 1967: 14), producing a relatively even base level of income for most people. However, the more affluent may receive additional pensions and higher levels of property income. So, while most retired people would receive some property income (Hewitt, Staniforth, and

Christiansen, 1967: 14), the more affluent elderly would receive higher levels of property income. This is supported by Manson's (1986: 51-53) division of the recipients of nonemployment income into three groups--"the moderately affluent, the unemployed, and the retired poor." However, some transfer and property income is also received by younger people, such as people on public assistance or anyone with investment income. The young wealthy are likely to receive high levels of property income. Therefore, differentiating two separate groups--one which receives property income and the other which receives transfer income--is generally not possible. Thus, the explanation that the different forms of nonemployment income are received by different recipients may be valid to a degree but identifying the different groups is difficult if not impossible.

Since the data are not available for retirement income alone, then nonemployment income might be used as a surrogate, even though not all nonemployment income is retirement income. Areas which would have high levels of retirement income would also have high levels of nonemployment income, since all retirement income would be considered nonemployment income. Regions which have low levels of nonemployment income would also have low levels of retirement income. Using nonemployment income as a surrogate for retirement income, this research will examine

the difference in impact between areas with high levels of nonemployment income and areas with low levels.

Counties in which a large percentage of total personal income (TPI) comes from nonemployment income will have a different economic structure than those which have a small portion of TPI derived from nonemployment income. Since the economic structure is different, the components of nonemployment income should produce different income multipliers. This leads to Hypothesis 4.

Nonmetropolitan nonadjacent counties which have a high percent of total personal income coming from both property and transfer income, will have different multipliers for both of the nonemployment sectors than those which have a low percent of the total personal income derived from the two sectors.

COUNTIES WITH HIGH LEVELS OF PROPERTY AND TRANSFER INCOME

Property and transfer incomes as percentages of TPI were used to divide nonmetropolitan nonadjacent counties into groups. Both property and transfer income, as percentages of TPI, were divided into three divisions: 1) less than -0.5 standard deviations, 2) -0.5 to +0.5 standard deviations, and 3) greater than +0.5 standard deviations. The "High" counties had high levels of both property and transfer income and the "Low" counties had low levels of both. The Medium counties were those that fell in between the Low and High counties. They had none of the following: 1) high property income, 2) high transfer income, 3) low property income, or 4) low transfer income. The "High" and

"Low" groupings were selected to contrast those counties with high levels of both components with those of low levels of both components of nonemployment income. The Medium counties were included as a control group.

Table 5.1. Division of nonmetropolitan nonadjacent counties into Low, Medium, and High subsets.

Subset Name	Level of Property Income*	Level of Transfer Income*	Sample size (number of counties)
Low	< -0.5	< -0.5	93
Medium	$\leq +0.5$ & ≥ -0.5	$\leq +0.5$ & ≥ -0.5	125
High	$> +0.5$	$> +0.5$	76

*Measured in standard deviations.

IMPACT OF PROPERTY INCOME

Hypothesis 4 can be restated as two sub-hypotheses, which can be tested using equation [2.6] (pg 53). The first sub-hypothesis (4.1) examines property income and the second (4.2) looks at transfer income.

Hypothesis 4.1: For all nonmetropolitan nonadjacent counties, the coefficients for property income for the Low, Medium, and High counties are different.

$$H_1: \; b_{1L} \neq b_{1M}; \;\; b_{1L} \neq b_{1H}; \;\; b_{1M} \neq b_{1H}$$
$$H_0: \; b_{1L} = b_{1M}; \;\; b_{1L} = b_{1H}; \;\; b_{1M} = b_{1H}$$

To derive estimates b_{1L}, b_{1M}, and b_{1H}, (and coefficients for the other exogenous sectors) three different sets of regressions were run using equation [2.6] (pg 53), one set

each for the Low, Medium, and High counties. These three sets of runs produced 15 estimates for the 15 years for each of the six exogenous variables (b_1 to b_6 from equation [2.6]) for the High and Medium counties and 13 estimates for 13 years for the Low counties.[1]

The three subsets of counties produced coefficients for property income which were significantly different from zero. When the coefficient of one subset is compared with the coefficient of another subset (i.e. b_{1L} with b_{1M} or b_{1M} with b_{1H} or b_{1L} with b_{1H}), they were found to be significantly different. A graphic display of the difference between county subsets is shown in Figure 5.1 (pg 115).[2] The adjusted R^2 values for the three subsets of counties had means of .96 to .98, indicating that the independent variables accounted for nearly all of the variation within the dependent variable.[3] The results strongly support the research hypothesis.

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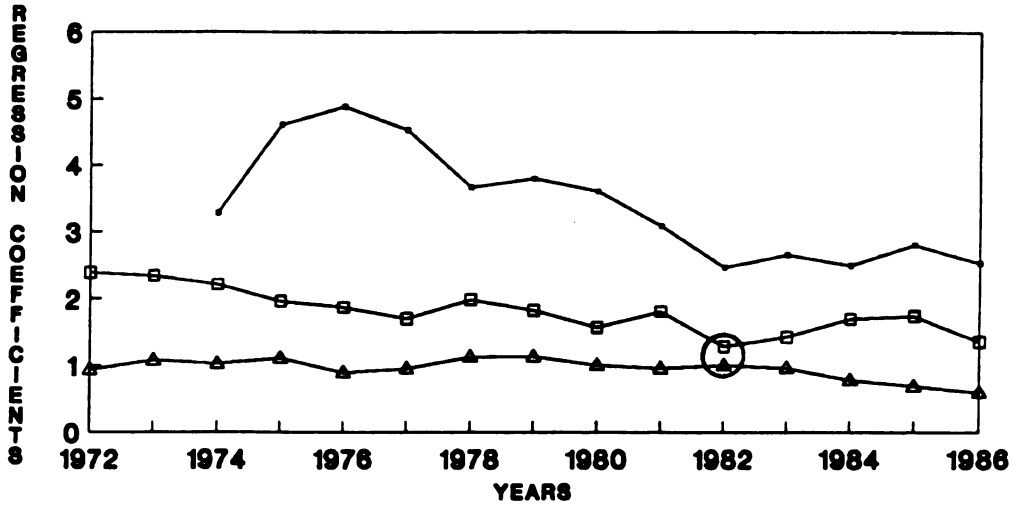
[1]Since the Low subset of counties had a lead time of five years for one of the independent variables and data for eighteen years, only thirteen years remained to run regression equations (Table 2.3, p 55). Therefore, the Low subset did not have regression coefficients for the years 1972 and 1973 (Table 5.2, pg 116) to compare with the other two subsets (Tables 5.3 and 5.4).

[2]The one case in which the coefficients are not significantly different is the coefficient for the year 1982 for High and Medium counties (circled in Figure 5.2).

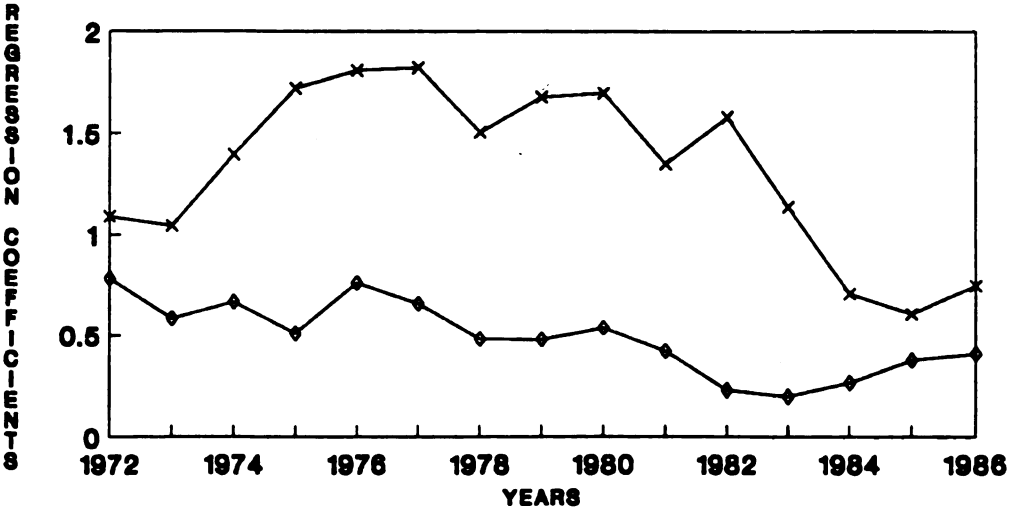
[3]The values of the coefficients of determination are listed in Appendix C.

FIGURE 5.1. COMPARISON OF COEFFICIENTS FROM PROPERTY INCOME FOR THE LOW, MEDIUM, AND HIGH SUBSETS OF COUNTIES.



Dependent variable = endogenous income.

FIGURE 5.2. COMPARISON OF COEFFICIENTS FROM TRANSFER INCOME FOR THE HIGH AND MEDIUM SUBSETS OF COUNTIES.



Dependent variable = endogenous income.

Table 5.2. Coefficients for the nonadjacent Low counties.

YR	PROP	TPAY	PRIMA	MANUF	OTHER	FEDGOV
74	3.281	1.067**	-0.102**	.255**	.682	.092**
75	4.606	-2.077**	-0.031**	.383**	1.150	.368*
76	4.883	-1.967*	-0.033**	.268**	1.052	.317*
77	4.528	-1.429*	.072**	.292**	.805	.293*
78	3.661	.327**	.077**	.324**	.582	.013**
79	3.792	.157**	.140**	.335*	.231	.030**
80	3.611	-0.293**	.148*	.337*	.272	.050**
81	3.081	-0.617**	.226*	.470*	.469	.061**
82	2.461	.061**	.175*	.386*	.724	.135**
83	2.649	.163**	-0.006**	.151**	.543	.161**
84	2.491	.242**	.029**	.272*	.470	.209*
85	2.796	.192**	.033**	.122**	.233*	.212*
86	2.521	.562**	-0.042**	.123**	.221*	.155**

All coefficients are significant at a 99.99% level of confidence (l.o.c.) unless otherwise noted. Coefficients significant at 95% l.o.c. are marked by * and those which are not significant at a minimum of a 95% l.o.c. are marked by **.

Table 5.3. Coefficients for the nonadjacent Medium counties.

YR	PROP	TPAY	PRIMA	MANUF	OTHER	FEDGOV
72	2.386	1.090	.133**	.245	.635	.293**
73	2.339	1.045	.201*	.257	.698	.273**
74	2.207	1.396	.131*	.184*	.609	.278**
75	1.958	1.721	.175*	.088**	.699	.193**
76	1.863	1.809	.157**	.137*	.676	.166**
77	1.695	1.821	.140**	.127*	.700	.046**
78	1.979	1.507	-0.053**	.178*	.679	.142**
79	1.821	1.679	-0.061**	.186*	.646	.135**
80	1.567	1.698	.059**	.188*	.656	.177**
81	1.801	1.352	.144**	.110**	.620	.048**
82	1.280	1.580	.191*	-0.083**	.676	.017**
83	1.423	1.139	.136**	-0.042**	.692	.119**
84	1.691	.707*	.151**	-0.001**	.613	.151**
85	1.735	.605*	.024**	.111**	.643	.213**
86	1.350	.746	.126**	.249*	.940	.151**

All coefficients are significant at a 99.99% level of confidence (l.o.c.) unless otherwise noted. Coefficients significant at 95% l.o.c. are marked by * and those which are not significant at a minimum of a 95% l.o.c. are marked by **.

Table 5.4. Coefficients for the nonadjacent High counties.

YR	PROP	TPAY	PRIMA	MANUF	OTHER	FEDGOV
72	.935	.784	.106*	.459*	.675	1.003
73	1.076	.584*	.087	.361*	.799	1.185
74	1.024	.667	.142	.364*	.642	1.239
75	1.106	.510*	.137	.375*	.842	1.280
76	.889	.763	.295	.632	.876	.846*
77	.949	.658	.119*	.593*	.769	.815*
78	1.121	.481	.099*	.696	.824	.884*
79	1.128	.480*	.106*	.522*	.730	1.135
80	1.000	.537*	-0.037**	.370*	.643	1.241
81	.955	.422*	.223*	.689	.678	.608**
82	1.002	.229**	.173*	.630*	.695	.448**
83	.958	.199**	.123**	.504*	.671	.455**
84	.779	.266*	.059**	.339**	.741	.804**
85	.691	.375*	.014**	.541*	.640	.555**
86	.594	.407	.081**	.577*	.779	.740**

All coefficients are significant at a 99.99% level of confidence (l.o.c.) unless otherwise noted. Coefficients significant at 95% l.o.c. are marked by * and those which are not significant at a minimum of a 95% l.o.c. are marked by **.

IMPACT OF TRANSFER INCOME

The second sub-hypothesis derived from Hypothesis 4 examines the coefficients for transfer income. It also can be tested using equation [2.6] (pg 53).

Hypothesis 4.2: For all nonmetropolitan nonadjacent counties, the coefficients for transfer payments for the Low, Medium, and High counties are different.

$$H_1: b_{2L} \neq b_{2M};\ b_{2L} \neq b_{2H};\ b_{2M} \neq b_{2H}$$
$$H_0: b_{2L} = b_{2M};\ b_{2L} = b_{2H};\ b_{2M} = b_{2H}$$

The resulting coefficients for transfer payments present a quite different pattern from those of property income. While all of the coefficients for property were

significant (even at the 99.99% level), many of the coefficients for transfer income were not significantly different from zero, mostly for the Low counties (Tables 5.2 to 5.4, pg 116-117). The coefficients for property income for the Low counties were amazingly large--the largest for any variable in any of the eight subsets of counties. In contrast, most of the coefficients for transfer payments in the Low counties were not significantly different from zero. Those that were significant were negative! The difference in impact caused by these two components of nonemployment income is very striking, since by definition of the county subset, both components make up a low percentage of total personal income in these counties (Low counties). In no other subset of the eight subsets of counties examined did such a vast difference exist between the estimated coefficients for property and transfer income.

These results would strongly support the idea that two separate populations are receiving property and transfer income and that differential spending patterns has resulted in different impacts. In her study of Michigan counties, Kendall (1989) suggests that the recipients of transfer income tend to be a separate population from the recipients of property income.[4] She hypothesized that transfer income

[4]Manson (1986: 51-53) indicates that his results suggest "three constituencies as recipients of nonemployment income in northern Michigan--the moderately affluent retired, the unemployed, and the retired poor." All three groups are likely to receive transfer payments, but only the first group would be expected to receive substantial levels of property income.

would have a greater impact than property income, but her results led her to reject the hypothesis (1989: 53-54). The results from the Low counties, however, suggest that at least in some counties, property and transfer income have very different impacts, possibly because they are being received by different populations.

The coefficients for transfer payments for the High and Low counties would be expected to be different since a different economic structure would exist in regard to these exogenous sectors. The coefficients for transfer payments were significantly different when comparing the Low versus Medium counties and the Medium versus High counties, but not the High versus Low counties (Table 5.5). Therefore, Hypothesis 4.2 would not be accepted.

Table 5.5. Determination of whether the coefficients for Transfer Income for the three subsets of counties (Low [L], Medium [M], and High [H]) are significantly different from each other at the 95% level of confidence for the given years.

County Subsets	Percentage of the Years Significantly Different	Significantly Different	Number of Years	Duration
L vs M	69%	Y	9	1975-83
		N	4	1974, 1984-1986
M vs H	87%	Y	13	1973-84, 1986
		N	2	1972, 1985
L vs H	38%	Y	5	1975-77, 1980-81
		N	8	1974, 1978-79 1982-86
Total	66%	Y	27	
		N	14	

From Hypothesis 1, the coefficients for property and transfer income are expected to be significant and positive. Of the thirteen coefficients for transfer income for the Low counties, only two (-2.0 for 1976 and -1.4 for 1977) were significantly different from zero (Table 5.2, pg 116). Those two were also the only significant and negative coefficients found for property and transfer income from all eight subsets of counties. With only two of thirteen coefficients being significantly different from zero, one cannot draw definite conclusions.

One similarity exists between the estimates for property and transfer income for these subsets of counties. The coefficients for the Medium counties tend to be different from, and larger than, those of the High counties (Figures 5.1 and 5.2, pg 115).

COMPARISON OF EXOGENOUS SECTORS IN THE HIGH COUNTIES

The focus is placed upon the High subset of counties in order to learn more about the impact when both property and transfer income comprise high levels of total personal income. Most of the coefficients for the six sectors are significantly different from zero and all of those that are significant are positive.[5] Property income and Other Sectors are the two sectors which are always significant and

[5]The coefficients which are not significantly different from zero all fall within the 1980s and are mostly in primary activities and federal government (Table 5.4, pg 117).

both are relatively large, with property income generally larger than Other Sectors. The federal government sector produces relatively large coefficients which tend to be larger than property income but are not significant for six of the fifteen years. Transfer payments and manufacturing consistently produce positive coefficients.

The impact an exogenous sector is a product of its multiplier and its size. With property and transfer income each comprising approximately twenty percent of total personal income, their impact is substantial. Because of its large relative size and the fact that it has one of the largest coefficients, property income would be expected to have a very impressive, and most likely, the largest impact of any exogenous sector in the High counties. Transfer payments would also have a major impact. This considerable total impact by nonemployment income would strongly support the idea that retirement income would also have a substantial impact in those counties where it is a major income source. Therefore, retirees would appear to be a growth industry in some nonmetropolitan counties.

SUMMARY

Of the two sub-hypotheses used to test the relationship of property and transfer income in the High, Medium, and Low counties, one was accepted and the other rejected. Sub-hypothesis 4.1 was accepted because the coefficients for property income were found to be significantly different for

all three sets of counties. However, sub-hypothesis 4.2 was rejected because the counties did not have significantly different coefficients for transfer income.

The High counties have smaller coefficients for both nonemployment sectors than the Medium counties, and the coefficients for property income are smaller than those for property income for the Low counties (Figure 5.2, pg 115). These relatively low values for the coefficients in the High counties would suggest that as the level of nonemployment income tends to comprise a larger percentage of the total, the coefficients produced become relatively smaller. This inverse relationship between percent of the total and the size of the multiplier was noted by Curtis Braschler (1971: 111) in his discussion of manufacturing (pg 62, 66). This relationship was also found numerous times throughout this research. Thus, as the percentage of total personal income derived from nonemployment income tends to increase, the size of the coefficient will decline, all other factors being constant.

While the coefficients for both property and transfer income (Table 5.4) were not the largest coefficients estimated for the three subsets of counties, they were positive and significant. By definition, all counties in the High subset have over forty percent of total personal income coming from nonemployment income sources and for some it may be over 65 percent. Thus, the absolute, as well as

the relative, size of the impact is considerable.[6] Therefore, the impact of the two nonemployment income sectors in the High counties tends to be substantial.

[6]The counties in the High subset have a level of property income as a percentage of total personal income of greater than 19% and a level of transfer income of greater than 21%.

SUMMARY AND CONCLUSIONS

CHAPTER 6

This research has examined the role of nonemployment income in the economic base of the nonmetropolitan counties of the United States. Nonemployment income has been growing steadily and has become a major component of personal income, yet little research has been done which examines the impacts of property and transfer income on the economy of the nonmetropolitan counties. Not only does omitting nonemployment income present an incomplete picture of the economic base, but such omission biases the resulting multipliers as well.

SUMMARY

Economic base theory was employed to develop a model which would estimate differential multipliers. Multipliers were estimated for each exogenous sector included in the model, which allowed the relative importance of each exogenous sector to be compared for the specific groups of rural counties examined. The primary hypothesis, which was tested in this research, is that property and transfer income tend to be more important to the local economy than other exogenous sectors which are often assumed to drive the local rural economy. The secondary hypothesis is that the

role of the nonemployment sectors will change as the structure of the local economy varies. The variations examined in this research sought to reveal differences in the impact of the sectors when considering 1) the proximity to metropolitan areas, 2) the size of the largest place in the county, and 3) counties that exhibit either high levels of both property and transfer income or low levels of both.

IMPORTANCE OF PROPERTY AND TRANSFER INCOME

Previous research by Bain (1984), Hirschl and Summers (1982), and McNulty (1977) indicated that some portion of property and/or transfer income could be as important or more important than other exogenous sectors often considered to be the cornerstones of the economy of nonmetropolitan counties. The nonemployment sectors were hypothesized to produce larger multipliers because they are highly correlated with the elderly (Manson and Groop, 1988: 4). The elderly are considered to have a greater tendency to shop locally (Bain, 1984: 8) and consume a substantial portion of the local health care (Harmston, 1981: 54). Therefore, nonemployment income would produce less leakage from the local economy than would employment income.

The research found that in the nonmetropolitan counties, the coefficients for property and transfer income were positive, highly significant, and economically important. In the eight different subsets of counties examined, the two sectors of nonemployment income

consistently produced some of the largest, if not the largest, coefficients of all the exogenous sectors.

An examination of the nonadjacent and adjacent counties showed that the coefficients for property income tended to be from two to four times the size of those for manufacturing, which is often considered a key sector in promoting economic growth of the local economy. Primary activities, often thought to be another important sector in the local rural economy, produced coefficients which were frequently not significantly different from zero. When they were significant, they were only about one-tenth to one-twentieth the size of those of property income.

While the two nonemployment sectors consistently produced some of the largest coefficients, a general tendency of the coefficients to decline over the study period was noted. The tendency for the coefficients of property and transfer income to decline is thought to be related to increased mobility of the elderly because of improved transportation (Kendall, 1989: 58-59). This improved mobility has made access to the larger urban centers much easier. Not only has the improved road network led to time-space convergence in terms of physically travelling across space, but people are psychologically more closely connected to urban areas because of increased availability and use of telephones, television, radio, and newspapers. Many of the younger rural people have attended college in the urban centers or have migrated to the urban

areas so that many of those people remaining in the rural areas now have family connections to the urban areas. The isolation that rural people once felt or were forced to endure is disappearing. Even the most remote ranch home most likely has a telephone, radio, and television and frequently a satellite dish to connect it to the world. Thus, improved communications and increased electronic and printed advertising have enticed more and more of rural elderly to shop and socialize in the larger centers. The improved financial security afforded by the nonemployment income has allowed the elderly more freedom to become more mobile. The more affluent elderly have a greater degree of freedom and tend to be more mobile than the less affluent. Some of the more well-to-do elderly make up the "Snowbirds" who travel south during the winter. Others travel in the United Stated and foreign countries during their golden years.

Despite the decline in the size of the coefficients of the nonemployment sectors, the sectors are expected to continue to have a major impact on the endogenous portion of the economy. The impact is a function of the relative size of the income source as well as the coefficient, so that as the relative size of the nonemployment sectors increases over time, the overall impact will remain relatively constant or even increase.

PROXIMITY TO METROPOLITAN AREAS

The nonadjacent counties were expected to produce larger multipliers for the nonemployment sectors than the adjacent counties, since the adjacent counties were expected to experience a great deal of leakage to the contiguous metropolitan centers. While the hypothesized relationship did occur for the other four exogenous sectors, it did not occur for the nonemployment sectors. The coefficients for property and transfer income for the adjacent counties were significantly different from those for the nonadjacent counties. The production of different coefficients by the two sets of counties indicates that the economic structure of the two sets are different. Therefore, future researchers or planners who will estimate the coefficients of any of the exogenous sectors should disaggregate all nonmetropolitan counties into a more homogeneous group so that the estimated coefficients are more accurate. The use of a single estimate for all nonmetropolitan counties would produce misleading results.

The reason why the two nonemployment sectors produced coefficients different from those hypothesized while the other four exogenous sectors produced coefficients which adhered to those hypothesized is not evident. The larger size of the coefficients for the nonemployment income sectors appears to be explained by less leakage than occurs in the other exogenous sectors.

ROLE OF THE LARGEST PLACE IN THE COUNTY

The third hypothesis was based upon the theoretical concept that the size of the coefficient is directly related to the size of the largest place in the county. The larger cities will have a more fully developed endogenous sector, and thus the nonbasic to basic ratio increases with an increase in size of the place. Therefore, the counties with the largest places would expectedly have larger coefficients. This relationship held for property income in the comparison of Rural and Town counties. When the City counties are added, the relationship no longer follows the hypothesis, and the hypothesis must be rejected. Transfer income, on the other hand, provides a perfect empirical example of the theoretical pattern of the size of the coefficients being directly related to the size of the largest city within the county. The City counties produced the largest coefficients, the Rural counties the smallest coefficients, and coefficients produced by the Town counties were intermediate between those of the other two.

HIGH AND LOW LEVELS OF BOTH PROPERTY AND TRANSFER INCOME

Property and transfer income have been shown to have coefficients which are positive and highly significant and to change as the structure of the economy changes. Nonemployment income is highly correlated with the elderly population, and as the number of elderly increases in a

population, nonemployment income is expected to rise. How would a high level of nonemployment income impact the local economy? Hypothesis 4 examined counties which had high levels of both components of nonemployment income to determine if the coefficients would be different than for counties with low levels of both or those without extreme levels of either.

When comparing the High, Medium, and Low subsets of counties, the coefficients for property income were found to be significantly different for all years. The coefficients for transfer income are significantly different for the subsets except when comparing the Low and High counties. The relative importance of the coefficients for the High counties was found to be less than that for the Medium counties all of the time and sometimes less than the Low counties. Thus, nonmetropolitan counties with High levels of both property and transfer income would expectedly have smaller multipliers than those with average levels of nonemployment income.

One possible explanation of the strikingly different coefficients produced by property and transfer income for the Low counties is the difference in lead time. For all other county subsets, the lead time for both components was three years, but for the Low counties, property income had a lead of zero while transfer income had a lead of five years (Table 2.3, pg 55). The leads for all the exogenous variables for the Low counties were inconsistent with those

found for the other seven subsets of counties. Rerunning the regressions for the Low counties using leads similar to those for the other county subsets would likely produce different coefficients. Another approach would identify the counties in the subset to determine if they, as a group, had a set of characteristics that might differentiate them from other counties. These counties could have other factors which influence the different impacts of property and transfer income. Why is the impact of property income very large (coefficients ranging from 2.5 to 4.9) while that of transfer payments is generally not significant? When it is significant, why is it negative (coefficients of -1.4 and -2.0)? This question provides a stimulating topic for future research.

CONCLUSIONS

In this research economic base theory was used, as was done in most of the reviewed research. The use of input-output (I-O) analysis by some researchers (Matsumoto, 1972; Doeksen and Lenard, 1980; Harmston, 1981) produced multipliers which sometimes varied from the results of this research, as will be noted later.[1]

The two methods of analysis both account for the direct, indirect, and induced effects, with I-O separating each effect and economic base lumping them all together. I-O is frequently considered to do a better job of measuring

[1]Matsumoto's results were discussed earlier and will not be repeated here.

the indirect effects. Some indirect effects, such as nonbasic activities consumed by basic sectors, are difficult to measure. Since these activities are part of the production process within basic industries, they are actually basic rather than nonbasic. The survey technique, often used to collect data for I-O, would be able to place these activities into the correct sector. While economic base theory is sometimes considered less able to capture this indirect effect, the use of the LQ method does accomplish this goal (Hoover and Giarratani, 1984: 318). In this dissertation, the LQ technique was used with the most disaggregated data available from the BEA data to capture the indirect effects within the model. The I-O method would not have been a feasible approach to use when examining all nonmetropolitan nonadjacent counties in the United States. Therefore, in this dissertation economic base theory was used to produce a differential multiplier for each exogenous sector.

The exogenous sectors, which were the independent variables within the model, consistently accounted for over 90 percent of the variation within the endogenous sector. This strongly supports the validity of the model.

The research indicates that the coefficients for property and transfer income are positive, statistically significant, and important in comparison to other exogenous sectors. While the multipliers for both components of nonemployment income tended to be larger than 1.94 estimated

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by input-output analysis by Doeksen and Lenard (1980) for a central Oklahoma community and the 1.92 for cash transfers estimated by Harmston (1981), most fell within the range of 1.5 to 3.0.[2] The multipliers would be expected to be larger than those found by Doekson and Lenard. First, the economic base multipliers are generally considered to be approximations of the upper limits of the real multipliers (Isserman, 1977) and would be expected to be larger than an input-output multiplier. Secondly, some of the county subsets contained counties with larger cities than the Oklahoma community, so the multipliers would be expected to be larger. Overall, the results of this research would not conflict with those results found by Doeksen and Lenard.

Harmston estimated the multipliers for manufacturing (2.72), agriculture (2.92), trade (2.87), and other sectors (2.98) to be larger than the multipliers for retired persons (1.92) in his input-output examination of Vandalia, Missouri. Because of the many differences between the studies--input-output versus economic base theory, retired persons versus nonemployment income, a single community versus a national cross section of counties--the results are not directly comparable. Despite the differences, the absolute values of the multipliers for several of the sectors were similar. The relative size of the nonemployment multipliers also supports the findings of Bain (1984) in his study of Wisconsin counties, where the

[2]The coefficients for property income for the Low counties were quite high--3.5 to 5.9.

estimates for the nonemployment income were about three times the size of the other exogenous income.

The apparent discrepancy between these results and those of Hirschl and Summers (1982) may not be as great as the initial comparisons suggest. Their results, which were at least partially supported by the findings of Smith, Hackbart, and Van Veen (1981), show that a portion of transfer income had multipliers sixteen times those of agriculture and 23 times those of manufacturing (1982: 308-310). Hirschl and Summers (1982: 312) noted that their multiplier for cash transfers was over-estimated because they failed to include total transfer income or any portion of property income. Theoretically, the omission of a relative variable (property income and the remainder of transfer payments, in this case) will bias upward the resulting estimates (Pindyck and Rubenfeld, 1981: 128-130). Mulligan (1987) provided empirical support for the theory by including transfer income in his model. Therefore, if the multiplier for the cash transfers has been lowered to compensate for the upward bias, it would then be more in line yet still larger than the results of this research have been.

The multipliers produced by property and income are important enough that planners and policy makers need to be aware that these are influential components in the exogenous sector. They should be included in models estimating multipliers even if researchers are not concerned with

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nonemployment income. Failure to include them will yield an improperly specified model, which will produce biased estimates for those variables included. This dissertation, as well as all the research reviewed within it, omitted proprietor's income. Proprietor's income, like property and transfer income, might be a relevant variable so that its exclusion may bias these results.

One result of this research did provide support for less leakage in the larger urban places. In an examination of the mapped residuals for the nonmetropolitan, nonadjacent counties, those counties for which the endogenous sector was underestimated by at least one standard deviation were found to be the City counties (Figure 6.1, pg 136). Nationwide, 91% of the counties for which the nonbasic sectors were under estimated were the City counties and in the Midwest and Great Plains regions, 100% were City counties. This indicates that the exogenous sector of the individual county does not explain the endogenous sector of that county. The reason is that these counties contain cities which are higher order central places within the central place theory hierarchy. They are regional trade centers which are attracting business from the surrounding counties, i.e. the leakage from the surrounding counties is being captured by the county with the trade centers.

This under-estimation of the nonbasic sector becomes even more significant when the data problems are acknowledged. Since the employment income is recorded by

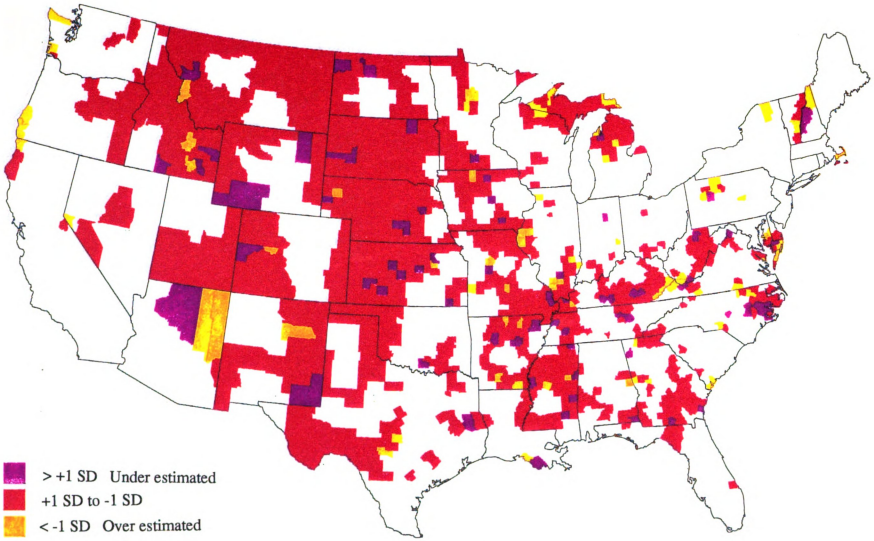

Figure 6.1. Mapped Residuals for Nonmetropolitan Nonadjacent Counties, 1980.

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place of work, the City counties have inflated values for employment income. Many of the employees in these larger central places commute to work from other counties (pg 73-75). If the employment data were recorded by place of residence, then the City counties would have lower levels of employment income, and the level of endogenous income would also be expected to be lower. The importance of the leakage from the counties in the trade region to the central place is even more significant. Therefore, the decline in coefficients of the nonemployment sectors over time is very likely a result of improved communications (such as advertising) and transportation. These improvements have encouraged the elderly to shop at other places, resulting in a decline in the propensity to consume locally.

When the nonmetropolitan counties were disaggregated into various county subsets, the coefficients for the nonemployment sectors were statistically significantly different for the different subsets. The resulting coefficients for the subset may not have upheld the hypothesized relationship, but they were nearly always significantly different. If future researchers plan to use economic base theory to produce estimates, the sample population should be disaggregated to form more homogeneous subsets of counties, allowing for more accurate estimates. If, after the initial disaggregation along adjacency or size of place guide lines, the subset is again divided by geographic considerations, the resulting subset will

probably be more homogeneous. Of course, continued disaggregation could result in a very small sample size, which could reduce the reliability of some statistical analysis.

The examination of high levels of both property and transfer income in comparison to average or low levels of both was unsatisfactory. The different lead times for the High and Low counties made the comparison of results between those subsets or other county subsets difficult. The extreme difference in the leads for the Low counties when compared to any other subset of counties caused estimates for the Low counties to be suspect.

The purpose of examining the high and low levels of nonemployment income was to determine if such extreme levels of nonemployment income were associated with a different economic structure which would produce different multipliers. If retirees are to be considered as a growth industry, one must know how high levels of nonemployment income impacts the endogenous sector. Many of the counties which had high levels of total nonemployment income did not fall within the High county subset. Some counties had very high levels of property income but only average or below average levels of transfer income. The use of high and low levels of total nonemployment income may have been more appropriate than the use of high and low levels of both individual components of nonemployment income.

To better understand how high levels of nonemployment income might impact the local rural economy, other county subsets might be examined. Besides the high levels of total nonemployment income, it would be enlightening to identify and examine counties which have only high level of property income or high levels of transfer income.

Another approach would be to select counties which have had significant in-migration of retirees during the study period. Then examine whether the in-migration impacted the economy, by investigating whether the level of nonemployment income was altered or the coefficients produced by nonemployment income sectors changed.

Hypothesis 4 was conceived as a means of examining the concept of "Retirees as a Growth Industry" but proved to be less than satisfactory. A more beneficial test might be to distinguish two separate sets of counties with a relatively high percentage of elderly. One set of counties would be those which have large elderly populations because of retirement in place and simultaneous out-migration by the younger people. Much of the Great Plains region exhibits this characteristic. The second set of counties would be those where in-migration of retirees was the primary cause for an older population. These two groups are considered important to distinguish because they would be expected to have different financial status, as found by Hewitt, Staniforth, and Christiansen (1967). Harmston (1981: 42) distinguishes between those who retire in retirement

communities and those who stay in their own communities. He infers that those in retirement communities tend to be more affluent. Those who retire in place generally have a lower net worth and most are financially unable to migrate. The impact upon the local economy of those who retire in place could be determined and would be expected to be different from those who migrate upon retirement.

The migrants, by definition, will be more mobile and likely to have connections with other regions, which could include investments in those regions. The migrants may include "Snowbirds", people who live in the northern part of the United States and spend their winters in the Sunbelt. While the migrant retirees are more likely to have greater financial assets which could produce a greater impact on the local economy, they also tend to be more mobile and have greater ties to other regions so that their impact may be significantly lessened by leakage. Places such as the Ozarks and northern Michigan and Wisconsin would likely yield the regions of substantial in-migration of retirees. However, both groups would be selected by demographic profiles rather just selecting a likely geographic region. Examination of the differential impact of these two groups of retired people poses an interesting topic for future research.

This research evolved many more questions to be answered. However, it has shown that property and transfer income both have significant impacts upon the nonbasic

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activity in the nonmetropolitan counties. Their impact is larger than most other exogenous sectors and is likely to remain so in the near future, even if the size of the multiplier declines slightly. The impact changes over the rural-urban continuum and is quite important in counties which have high levels of both property and transfer income. Nonemployment income has been shown to be a significant factor in the economy of nonmetropolitan counties and should be included in any future research which examines those geographic regions.

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A P P E N D I X A

EXOGENOUS AND ENDOGENOUS VARIABLES

EXOGENOUS VARIABLES

PROP Property income
- total value given in BEA data tape.

TPAY Transfer Payments (transfer income)
- total value given in BEA data tape.

PRIMA Primary Activities
- sum of farming, agricultural services, forestry, fisheries, and mining.

FEDGOV Federal Government
- sum of federal civilian government, military, and other.[1]

MANUF Manufacturing
- sum of the exogenous portions of the subsectors of nondurable and durable manufacturing.

  Nondurable Manufacturing
  - Food and kindred products
  - Textile mill products
  - Apparel and other textile products
  - Paper and allied products
  - Printing and publishing
  - Chemicals and allied products
  - Petroleum and coal products
  - Tobacco manufactures
  - Rubber and misc. plastics products
  - Leather and leather products

[1]Other consists of the wages and salaries of residents of the United States who are employed by international organizations and foreign embassies and consulates in the United States.

Durable Manufacturing
- Lumber and wood products
- Furniture and fixtures
- Primary metal industries
- Fabricated metal products
- Machinery, except electrical
- Electric and electronic equipment
- Transportation equipment excluding motor vehicles
- Motor vehicles and equipment
- Ordnance
- Stone, clay, and glass products
- Instruments and related products
- Miscellaneous manufacturing industries

OTHER Other Sectors
- sum of the endogenous portions of each subsector of 1) transportation and public utilities, 2) construction, 3) wholesale trade 4) retail trade, 5) finance, insurance, and real estate (FIRE), 6) services, and 7) state and local government.

Transportation and Public Utilities
- Railroad transportation
- Trucking and warehousing
- Water transportation
- Local and interurban passenger transit
- Transportation by air
- Pipelines, except natural gas
- Transportation services
- Communication
- Electric, gas, and sanitary services

Construction
- General building contractors
- Heavy construction contractors
- Special trade contractors

Wholesale Trade

Retail Trade
- Building materials and farm equipment
- General merchandise stores
- Food stores
- Automotive dealers and service stations
- Apparel and accessory stores
- Furniture and home furnishings stores
- Eating and drinking places
- Miscellaneous retail stores

Finance, Insurance, and Real Estate (FIRE)
Banking and credit agencies
Security and commodity brokers & services
Insurance carriers
Insurance agents, brokers, and services
Real estate
Combined real estate, insurance, etc.
Holding and other investment companies

Services
Hotels and other lodging places
Personal services
Private households
Business services
Auto repair, services, and garages
Miscellaneous repair services
Amusement and recreation services
Motion pictures
Health services
Legal services
Educational services
Social services
Museums and botanical & zoological gardens
Membership organizations
Miscellaneous services

State and Local Government

ENDOGENOUS VARIABLE

ENDOG Endogenous variable
- sum of the endogenous portions of each subsector of:
Transportation and public utilities,
Construction,
Wholesale trade
Retail trade,
Finance, insurance, and real estate (FIRE),
Services,
State and local government,
Nondurable manufacturing, and
Durable manufacturing.

A P P E N D I X B

SUBSETS OF COUNTIES

Subset Number	Subset Name Definition of county subset	Sample Size
1	Nonadjacent Not contiguous to metropolitan counties.	1210
2	Adjacent Contiguous to metropolitan counties.	1182
3	Rural Largest place less than 2500.	507
4	Town Largest place, 2500 to 10,000.	484
5	City Largest place greater than 10,000.	219
6	Low Property income less than negative five-tenths of one standard deviation and Transfer income less than negative five-tenths of one standard deviation.	93
7	Medium Property income more than negative five-tenths of one standard deviation, and Transfer income more than negative five-tenths of one standard deviation, and Property income less than positive five-tenths of one standard deviation, and Transfer income less than positive five-tenths of one standard deviation.	125
8	High Property income more than positive five-tenths of one standard deviation and Property income more than positive five-tenths of one standard deviation.	76

All counties examined are nonmetropolitan counties. Subsets 3 to 8 are all nonadjacent counties.

A P P E N D I X C

ADJUSTED R^2 VALUES

YR	NONADJ	ADJACENT	RURAL	TOWN	CITY
72	.9328	.9558	.9211	.8904	.8900
73	.9334	.9549	.9260	.8947	.8878
74	.9326	.9537	.9388	.8919	.8791
75	.9188	.9519	.9405	.8972	.8915
76	.9198	.9454	.9394	.8972	.8768
77	.9340	.9428	.9423	.9059	.8759
78	.9230	.9442	.9395	.9104	.8878
79	.9256	.9414	.9375	.9069	.8977
80	.9330	.9343	.9386	.9060	.9010
81	.9397	.9292	.9289	.9000	.9078
82	.9297	.9245	.9197	.8942	.8868
83	.9378	.9243	.9091	.9030	.8902
84	.9394	.9254	.8993	.9017	.9108
85	.9378	.9216	.8997	.9025	.9063
86	.9388	.9169	.8897	.9090	.9075
MEAN	.9317	.9378	.9247	.9007	.8931

YR	LOW	MEDIUM	HIGH
72	--	.9778	.9549
73	--	.9769	.9615
74	.9654	.9813	.9637
75	.9180	.9804	.9649
76	.9290	.9812	.9720
77	.9528	.9809	.9707
78	.9698	.9830	.9761
79	.9624	.9825	.9678
80	.9625	.9808	.9645
81	.9606	.9756	.9601
82	.9652	.9749	.9534
83	.9663	.9789	.9581
84	.9678	.9724	.9494
85	.9675	.9723	.9564
86	.9710	.9764	.9576
MEAN	.9583	.9784	.9621

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