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Joan Kendall

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NONEMPLOYMENT INCOME AS A FACTOR IN THE ECONOMIC BASE OF MICHIGAN COUNTIES: 1959-1986

By

Joan Kendall

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ABSTRACT

NONEMPLOYMENT INCOME AS A FACTOR IN THE ECONOMIC BASE OF MICHIGAN COUNTIES: 1959-1986

By

Joan Kendall

In the past three decades, nonemployment income has increased at a greater rate than income from most other sources and now makes up approximately one-third of all personal income. Despite this, its impact on local area economies has not been closely examined. This study uses Michigan county data to examine the impact of nonemployment income on nonbasic income over a twenty-seven-year period. This impact is compared to the impact of basic income by employing regression analysis to estimate comparative multipliers for both types of income. Nonemployment income is found to have a significant impact on nonbasic income, particularly in urban and nonmetropolitan urban counties, where its impact is often stronger than that of basic income. When examined for long-term effects, nonemployment income's impact appears to increase. Over time, its strength in nonmetropolitan areas equals its impact in urban areas.

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CHAPTER I

INTRODUCTION

Economic Base is a theory of regional development which is predicated upon the division of the economy into exogenous and endogenous sectors (Richardson, 1978), one which stresses exogenous factors as the explanation of a region's growth. Exogenous factors include the demand for and value placed upon a region's products, the level of outside investment in a region, and external economic or social conditions that affect these factors. Natural and human resources, income levels, and productivity are considered endogenous factors. According to economic base theory, a region's growth is a function of its export activities, which are considered its economic base; all other, nonbasic, industries are seen as consequences of the basic activities. The ratio of nonbasic income or employment to basic income or employment produces a multiplier, and, assuming the relationship to be stable over time, this multiplier is used to forecast the growth in total income or employment which might result given an increase in basic activity.

Nonemployment Income as a Factor in Regional Growth

Although economic base analysis goes back at least to the 1930's and continues to be widely used in regional analysis, it has been the center of considerable

controversy, much of it relating to its emphasis on exports, to the exclusion of internal growth forces and other exogenous factors (Lane, 1968; Leven, 1985; Richardson, 1985). One such exogenous factor which has received very little attention is income from sources other than employment, referred to as nonemployment income. The two major types of nonemployment income are property income (dividends, interest, rents) and transfer income (pensions, social security, unemployment benefits). Such income, like basic income, does not originate from within the local economy, but because at least some of it is probably spent locally, additional demand for nonbasic goods and services is generated.

This type of income has generally been ignored in economic base studies, since it does not result from any type of export. However, as Hoover and Giarratani put it, "What is relevant for the region's development is the income, rather than the movement of the output" (1985, p. 316). In the last decade, several studies have mentioned the failure to include nonemployment income and other exogenous sources of income in economic base studies as one of the sources of inaccurate multiplier estimates (Forward, 1982; Hirschl and Summers, 1982; Mulligan, 1984; Norcliffe, 1983; Richardson, 1985). Manson and Groop's study of nonemployment income in Michigan (1987) suggests that areas with high concentrations of such income may have a higher ratio of service to basic industry. Leven (1985, p. 582)

cites evidence in recent studies of "...regional growth accompanied by apparent contraction, not expansion, of basic employment." There are, as Leven points out, numerous possible explanations. Nonemployment income, since it results in nonbasic spending which is independent of basic income, is one of these explanatory factors. How much such income contributes towards this phenomenon depends upon its proportion of the region's total income, socio-economic characteristics of its recipients, and the region itself.

Characteristics of Nonemployment Income

In 1986, both nationally and in Michigan, almost one third of all personal income was nonemployment income (U.S Department of Commerce). In some Michigan counties, in 1986, it accounted for as much as 65% of all personal income (see Figure 1). From 1976-1986, it was one of the fastest growing sources of personal income. As Table 1 shows, the percent increase in nonemployment income in Michigan for this period was much greater than the increase in income from most other sectors. This type of income is expected to continue to increase, both in absolute terms and relative to basic income, since income from basic industries is declining, proportionally, with increases in productivity (Hirschl and Summers, 1982).

An income source of this magnitude would seem likely to have a major impact on a region's economy and thus needs to be included in any analysis of this economy. In addition, the previously mentioned errors in multiplier estimates for

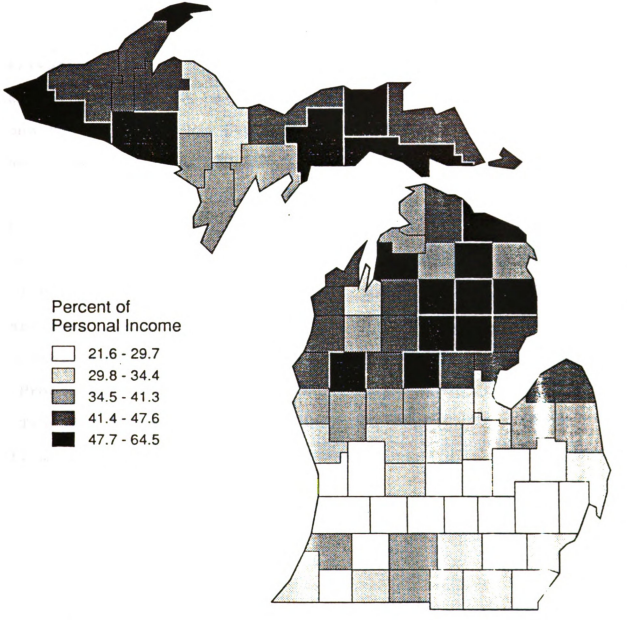


Figure 1. Nonemployment income: 1986

Table 1. Change in Michigan Income: 1976-1986

Derivation	1976 Income* (000)	1986 Income* (000)	% Increase
Agriculture	496,513	680,078	37.0
Construction	2,089,097	4,453,983	113.2
Manufacturing	20,401,131	38,069,413	86.6
Transportation and Public Utilities	2,660,485	5,230,132	96.6
Wholesale	2,457,920	5,420,392	120.5
Retail	4,598,197	8,724,038	89.7
F.I.R.E.	1,792,524	4,301,731	140.0
Services	6,665,008	19,412,410	191.3
Nonemployment Income	15,370,230	41,182,453	167.9
Property Income	7,239,620	20,450,280	182.5
Transfer Income	8,130,610	20,732,173	155.0

*from BEA Local Area Personal Income

other sectors would be significant in areas where nonemployment income represented a large percentage of total income.

Nonemployment income is strongly associated with the 55 and over age group (Manson and Group, 1987), a large proportion of whom are probably retirees. Property income represents a greater proportion of total income in the 55-64 age group, while transfer income accounts for a greater portion in the 65+ age group (Smeeding and Torrey, 1988). Numerous studies have found evidence indicating that the consumption habits of these age groups differ from those of the average consumer (Bain, 1984; Boehm and Pond, 1976; Harmston, 1979; McConnel and Deljavan, 1983).

A characteristic of nonemployment income that is almost overlooked because it is so obvious is that it is not tied to employment. It is, geographically, footloose. Its recipients do not have to live near a source of employment, or even near the source of this income. As a result, such income, as a percentage of personal income, is not evenly distributed, either nationally or, as shown in Figure 1, in Michigan.

The concentrations of nonemployment income evident in this map reflect both the outmigration, from these areas, of younger age groups seeking employment and the tendency of nonemployment income recipients to remain in or migrate to amenity areas. In many cases, these are areas in which people previously vacationed and owned second homes, to

which they moved permanently upon retirement. In general, these are nonmetropolitan areas, areas which have not had well-developed service centers. Shahidsaless, Gillis, and Shaffer (1983) have documented studies showing that such counties have experienced some autonomous growth, independent of changes in basic sector employment.

If the influx of nonemployment income into such areas is resulting in economic growth in the nonbasic sectors, without benefit of any traditional basic industries, an interesting theoretical construct is evolved. Many theories of growth operate on the assumption that people migrate to find jobs, whereas in the scenario just described, jobs might be migrating to the people. One could speculate further that, over time, the growth of such centers might begin to attract basic industries. Such speculation would not be entirely groundless. In the last two decades, a growing tendency toward industrial decentralization has9 resulted from decreasing transportation costs, changes in production techniques which allow capital to be substituted for labor, and other factors such as the lower cost of labor in nonmetropolitan areas (Norcliffe, 1984). Given a choice, industries might be expected to locate in areas that, besides having established service centers, are less congested and have some environmental and cultural attractions. As quality of life considerations become more important, industries locating in such areas will be more attractive to potential employees.

Evidence of increased industrial growth in nonmetropolitan areas is cited by Bluestone (1979), who found that between 1968 and 1975, in nonmetropolitan areas, the most important sources of growth were basic industries and nonemployment income. The possibility that this trend toward industrial decentralization might be following the decentralization of population, as opposed to leading it, is suggested in a study by Giarratani and McNelis (1980) which found strong evidence of bidirectional causality between export and nonbasic income over time. If this nonbasic income which is stimulating basic industry is itself being stimulated by nonemployment income, then increases in nonemployment income are, in the long-run, impacting more than just the nonbasic sectors of the economy. The growth in nonemployment income may be one of the factors responsible for the decentralization of basic industries.

Study Objective

An inquiry into the nature of nonemployment income's impact in a region would seem to be appropriately made within the framework of economic base analysis since, like export related income, nonemployment income is usually introduced into the local economy from the outside. Thus, it seems likely that nonemployment income is contributing to the local economy in somewhat the same manner as a basic industry, i.e. it is creating nonbasic income as it is spent in the local area.

Whether or not such income is a factor that might be altering local economic structure or impacting the economy in other ways that could lead to long-term growth is a less easily answered, but equally important, question. Economic development policies geared to cater to retirees by encouraging health care industries or providing tax breaks for the elderly may not result in any permanent economic advantage, particularly if such policies are not undertaken in conjunction with other necessary steps. It is, therefore, important to go beyond simply establishing a relationship between nonemployment and nonbasic income, and to arrive at a better understanding of where and under what circumstance this relationship occurs, and how it is hanging over time.

The objective of this study is to explore the relationship between nonemployment income and the local economy in Michigan by assessing the impact of such income on the nonbasic sectors, to compare this impact to that of basic income, and to examine these relationships over time.

The following chapter will outline relevant theoretical and empirical evidence and develop hypotheses based upon this evidence. Chapter III will introduce the data to be used in the analysis and provide a detailed explanation of the methodology that will be employed in testing the proposed hypotheses. Chapter IV will present and discuss the results of these tests, and the final chapter will summarize the study and offer concluding comments.

CHAPTER II

NONEMPLOYMENT INCOME AND THE ECONOMIC BASE MULTIPLIER

A regional economic multiplier is defined by Stevens and Lahr (1988, p. 89) as the " ...total economic effect that occurs in a region per unit of the direct economic change that caused the effect." This total economic effect consists of three components: the direct effects, the indirect effects, and the induced effects. In general terms, the direct effects are those that result from income entering the region in response to export demand; the indirect effects occur as a result of inter-industry activities necessary to support the export production; and the induced effects result from the additional demand for goods and services which occurs as a result of income generated by these direct and indirect activities.

Economic base theory considers exports to be the economic base of a region, and the terms basic and nonbasic are usually used to differentiate export-related income from local or service income, which is seen as a consequence of basic income.

The Economic Base Multiplier

Economic base multipliers are usually calculated as the ratio of total economic change to change in basic activity, and generally use either employment or income data.

Compared to input/output multipliers, which reflect the ratio of total economic change to the change in initial investment, economic base multipliers are considered to be less accurate. They can vary considerably, depending upon how basic and nonbasic activity are defined, the level of sectoral aggregation involved, the size of the region involved, and other factors. However, the cost of obtaining the data needed for an input/output study is often prohibitive. Economic base multipliers, while generally thought to be oversimplifications, are used because their estimation is easy, fast, and relatively inexpensive.

The traditional economic base multiplier has been calculated as the ratio of total income to basic income and is represented as

$$M = T/B = (B + NB)/B = 1 + NB/B \qquad (1)$$

where T=total income, B=basic income and NB=nonbasic income. This formulation assumes that all income that is not basic is nonbasic, i.e total income equals B + NB. However, such an assumption will result in a regional multiplier which is inflated in proportion to the degree that a region's total income includes nonemployment income, since total income is actually equal to B + NB + NE, where NE refers to nonemployment income. Therefore, calculating the multiplier as the ratio of total income to basic income, where "basic" is limited to exports, erroneously implies that nonemployment income, since it is included in total income, is induced by basic income, i.e. it is functioning

like nonbasic income. This is the crux of the controversy mentioned in chapter I relating to export base theory's overemphasis on exports. And, as Richardson (1978) points out, criticisms relating to economic base theory's emphasis on exports can be largely neutralized if the exogenous sector is broadened to include more than just exports.

Incorporating Nonemployment Income

The problem that results when nonemployment income is not included in multiplier estimations can be somewhat mitigated by subtracting nonemployment income from total income. However, this does not totally eradicate nonemployment income's influence with respect to total income, since it can be argued that some of the nonbasic income included in the total is induced by nonemployment income. Thus, conceptually, total income is actually equal to $B + NB_B + NE + NB_{NE}$, where NB_B and NB_{NE} are the portions of nonbasic income induced by basic and nonemployment incomes, respectively.

Since there is no way, except conceptually, to distinguish NB_B from NB_{NE}, nonbasic income induced by nonemployment income cannot be subtracted from total income. This will not be a problem, however, if nonemployment income is included, as Richardson suggests, as an exogenous sector and treated the same as basic.

Including nonemployment income in this manner would result in the following expression:

$$M = (B + NB + NE)/(B + NE) = 1 + NB/(B + NE) \qquad (2)$$

Nonbasic income is expressed as a function of both basic income and nonemployment income, and since

$NB = f(B,NE)$, assuming the functional form to be linear, then

$$NB = b(B + NE) \quad (3)$$

and "b" represents the multiplier effect of B and NE. However, given that basic and nonemployment income do not enter the economy in the same way and do not function in the same manner, it seems unlikely that the multiplier effect would be the same for both. The b value associated with basic income would probably not be the same as that for nonemployment income. This can be estimated for each via regression, by changing the form of equation (3) to estimate a separate b value for each, as follows.

$$NB = b_1B + b_2NE \quad (4)$$

This can be expanded to accommodate a disaggregation of nonemployment income into property income and transfer income,

$$NB = b_1B + b_2PR + b_3TR \quad (5)$$

where PR and TR represent property and transfer incomes.

Assessing the impact, on nonbasic income, of basic income and aggregate nonemployment income, as well as the the separate impacts of property and transfer income, can be accomplished by estimating b_1, b_2, and b_3 in equations (4) and (5). These values can then be compared to determine how such impacts are changing, both in relation to each other and over time.

While the above equations can be used to examine the impacts of basic and nonemployment income at different times, they do not allow for any lag time in the occurrence of such impacts. To measure not only initial effects, but also any lagged effects of basic and nonemployment income on nonbasic income, it is necessary to extend the time period over which the impacts of these sectors are measured. This can be done by examining the changes over time for all sectors as follows:

$$\Delta NB = b_1 \Delta B + b_2 \Delta NE \quad (6)$$

or, when nonemployment income is disaggregated,

$$\Delta NB = b_1 \Delta B + b_2 \Delta PR + b_3 \Delta TR \quad (7)$$

By experimenting with change intervals of different lengths, it will be possible to approximate the length of time it takes the total multiplier effect of basic or nonemployment income to be felt in the nonbasic sector.

The Multiplier Process: Indirect and Induced Effects

As previously mentioned, multiplier effects include three components: direct, indirect, and induced. However, economic base multipliers, although they reflect all three of these components, do not measure total effects per dollar invested; they measure primarily induced effects, since they are estimated using either employment or income resulting from basic industries. It can be argued that the employment or income in the basic sectors is a valid surrogate for total basic activity, and when regression is used to estimate differential multipliers for several basic sectors,

this is probably valid. However, nonemployment income, despite the fact that it functions in a manner that parallels the functioning of basic sectors in some ways, is not comparable at the point where it enters the economy. Both nonemployment and basic income induce nonbasic activity when they are spent locally. In the case of basic income, however, the dollar amount of the initial stimulus that produces this income, i.e: the export demand, is not the same as the amount of basic income that ultimately filters down to the consumer to be spent in local economy. In the case of nonemployment income, the initial investment and the income available to the consumer are the same. In a sense, with nonemployment income, the initial investment enters directly into the consumption sector. How this difference affects the comparison of multipliers estimated for basic and nonemployment income is an area that requires further elucidation. But it is an important difference that should not be ignored when interpreting the results of this type of multiplier estimation.

In the case of nonemployment income, no labor or other resources are leaving the region in exchange for such income, since no resource depletion takes place. This point might be used to argue that such income will have a greater effect, at least in the long-run. However, precisely because there is no product being exported in connection with nonemployment income, the indirect effects will be absent. While this point might suggest greater impacts for

basic income, to the extent that the economic base multiplier is really only comparing induced effects, consideration of indirect effects will not be a factor. Most of the multiplier effect measured in this type of analysis will be a reflection of induced effects.

Induced effects are brought about as the additional income, whether received directly or as the result of jobs associated with indirect effects, enters the consumption sector when it is spent within the region. Such effects should occur whether it is nonemployment income or basic income that is being spent.

Empirical support for the idea that nonemployment income can significantly impact a local economy is found in studies which have included nonemployment income as a basic sector (Bain, 1982; Harvey, 1973; Hirschl and Summers, 1982; McNulty, 1977; Mulligan and Gibson, 1984). These have generally taken the form of regression analysis in which a multiplier has been estimated for this sector. All have found nonemployment income to have a significant multiplier effect on nonbasic income, in some cases stronger than that of some traditional basic sectors.

Since both theory and empirical evidence support the idea that a multiplier effect will be associated with the spending of nonemployment income, the following hypothesis is proposed:

1. Nonemployment income will have a significant, positive impact on nonbasic income; the value of

b_2, as estimated by equation 4, will be > 0 and significant.

Nonemployment Income Compared to Basic Income

In general, a region's multiplier depends upon the extent to which its residents consume and invest locally (Tiebout, 1962; Pleeter, 1980). If nonemployment income is locally spent and invested to the same degree, and upon the same goods and services, as income from basic industries, then the aggregate regional multiplier should not change with varying proportions of nonemployment income. However, if the profiles of its recipients differ considerably from those of average wage earners, and research indicates this to be the case (Bain, 1984; Manson, 1986), then the economic structure and multiplier of high nonemployment income regions might be expected to differ from that of other regions. Speculation concerning how multipliers for basic income compare to multipliers for nonemployment income will require further consideration of the recipients of such income.

Nonemployment Income Recipients

According to research cited above, recipients of nonemployment income tend to be older, less mobile, and, more importantly, not working, all of which would seem to foster a greater degree of local consumption. This idea is supported by the research of Beohm and Pond (1976), which

found that the tendency to shop nonlocally increases with distance driven to work and decreases with a person's age.

Of course, if nonemployment income recipients actually spend less, in absolute terms, than the average consumer, this lower level of absolute consumption might offset an increased tendency to consume locally. To compare the degree to which recipients of different types of income consume, locally or otherwise, two relevant factors might be considered: the age group difference and the difference in per capita income.

With respect to age, there is no clear evidence to support decreased spending among retirees. Studies by both Bain (1984) and Harmston (1979) indicate that while retirees tend to spend less on durable goods, they spend more on nonbasic goods and services. Economic theory indicates that people will consume less if they expect to live longer, implying that as they age, they would spend more. However, at least one study has found that households reduce real consumption spending as they age (Hamermesh, 1982).

Nonemployment income has been associated with lower per capita income. However, this association may be misleading. The highest rates of nonemployment income are found in nonmetropolitan areas, where per capita incomes are generally lower than in metropolitan areas. Therefore, any association between nonemployment income and lower per capita income may actually be a reflection of the association between lower per capita income and

nonmetropolitan areas. In fact, studies have shown that in the United States, since 1970, increases in incomes of the aged have been substantially more than increases in the incomes of other age groups (Smeeding and Torrey, 1988).

Based upon the liklihood that nonemployment income recipients will spend as much as recipients of other types of income, but will spend a greater percentage of this income locally, and due to the fact that incomes of nonemployment income recipients are increasing, the following hypothesis is proposed:

2. The impact of nonemployment income will be greater than that of basic income, i.e. as estimated by equation (4), $b_2 > b_1$, and will be seen to increase, relative to basic income, from 1959 to 1986.

The implied difference in propensity to consume locally would probably be greater in the case of transfer income recipients, since this type of income is associated with an older age group and somewhat lower per capita incomes than is property income (Manson and Groop, 1987). As pointed out in the Boehm and Pond study referred to above, the propensity to shop locally increases with age; and, according to Shahidsaless, Gilles and Shaffer (1983), lower income people have a higher marginal propensity to consume locally. For these reasons the following hypothesis is suggested:

3. Transfer income will have a greater impact on nonbasic income than will property income, i.e. as estimated by equation (5), $b_3 > b_2$.

Regional Variation

The propensity to shop locally not only depends upon characteristics of the consumer but also varies with characteristics of the region. Both the availability of local shopping opportunities and the accessibility of alternative opportunities will influence consumption patterns. According to central place theory, the larger the urban place, the greater the variety of goods and services that it will provide (King, 1984). Size, therefore, will both attract shopping from lower-order places and minimize the need for nonlocal shopping. The impact of size upon the multiplier has been documented (Bender, 1987; Harvey, 1973).

Location also can impact a region's multiplier as it will influence the tendency to shop nonlocally. Two communities offering the same level of goods may have quite different multipliers if one is located much nearer to an alternate source of shopping, or closer to a freeway, either of which conditions would increase its propensity to import.

Isolation as a factor in the multiplier impact has been tested in many studies, with somewhat contradictory results. The study by Shahidsaless, Gillis, and Shaffer (1983) used data from nonmetropolitan counties, creating three groups of such counties, based upon their primary source of basic employment. Their findings concerning the effect of

isolation on the multiplier, as measured with a variable for distance to a SMSA, indicated that from 1950 to 1960, this variable correlated positively with changes in the multiplier only for the agricultural counties; coefficients for the other two groups were not significant. When this same relationship was examined over the 1960-1970 time period, one group was negative and significant, with no significant relationships evident for the other two groups. Their study does not really measure isolation as a factor separate from size.

In a somewhat confusing summary of other studies on the isolation question, Shahidsaless, Gilles, and Shaffer appeared to conclude (p. 83) that "...distance to alternate shopping does affect propensity to consume locally." This conclusion was then followed by the comment that "they" (referring to Bender and Coltrane, 1975; Lewis, 1976; and Harvey, 1973) indicate that "...basic sector expansion in communities more remote from a regional trade center would generate more secondary employment and thus a larger multiplier." This implies that remote counties, no matter whether urban or rural, will have greater multipliers than counties which are nearer to urban areas. However, Bender's 1987 study does not support this conclusion.

Bender (1987) examined the ratio of basic income to service employees in 1979, using three size classes of nonmetropolitan counties (counties with urban areas of less than 50,000). He found this ratio, which would be roughly

the reciprocal of the nonbasic/basic ratio, to be highest in the most rural class of counties and lowest in the most urban class of counties. This finding would agree with general theory that the multiplier is larger in urban areas and smaller in rural areas. Each of these classes was also subdivided into adjacent and nonadjacent counties. In the smallest size classification, both adjacent and nonadjacent groups had smaller multipliers than the multipliers for the groups in the middle size classification; likewise, both groups in the middle size classification had smaller multipliers than the groups in the largest size classification. However, within each of these classes of counties, the "nonadjacent" category had a lower ratio of basic income per service employee, i.e. a larger multiplier. Thus while isolation (as expressed by nonadjacent counties) was shown to positively impact the multiplier, it does so only within the context of the county's size classification. In other words, the isolation factor alone will not provide a measure of a region's multiplier, but must be considered in conjunction with the region's size.

It seems likely that the larger, but more isolated community would be expected to have the greater multiplier. Both isolation and size must be taken into consideration, since not only must distance to a metropolitan area discourage nonlocal shopping, but local shopping opportunities must be sufficient. Rural counties, while usually more isolated, are often quite inadequate as local

service centers. This is particularly important in the context of a discussion of the impact of nonemployment income, since many of the recipients of such income migrated from larger metropolitan areas upon retirement and are accustomed to a greater range and variety of goods and services. Stabler's 1987 study of the impact of nonmetropolitan population growth on rural service centers in Canada (the study included only centers with populations of 999 or less) showed that more than one half of such centers declined between 1961 and 1981. He concluded (p. 49) that "...while a growing number of people prefer to live in nonmetropolitan areas, their shopping patterns nevertheless reflect a preference for the quality, variety and lower prices offered in major urban centers."

The areas which Stabler loosely refers to as "non-metropolitan areas" would be the equivalent of our rural counties, defined by the census bureau as those with urban centers of less than 10,000. Thus the nonmetropolitan urban counties (nonmetropolitan urban being defined by the U.S. Census Bureau as counties with cities of between 10,000 and 49,999) might be expected to be more strongly impacted by nonemployment income than the rural counties. It is in these same nonmetropolitan urban counties that nonemployment income has been one of the faster growing sources of income (Bluestone, 1987), and that recent increases in the nonbasic/basic ratio have been noted (Bender, 1983; Leven, 1985; Erdevig, 1987).

While there is considerable evidence that both size and isolation may impact a region's multiplier, size is expected to be a greater factor than isolation in the multiplier effect of nonemployment income. Nonemployment income's impact is primarily dependent upon local consumption, and therefore depends upon a level of services not often available in more isolated areas. Thus isolation alone will not be a significant factor unless the area is of sufficient size to provide such services. Therefore, the hypothesis to be tested will relate to size, rather than isolation; it is:

4. The impact of nonemployment income on nonbasic income will be stronger in nonmetropolitan urban counties than in rural counties.

Temporal Considerations

Since forecasts developed from economic base multipliers often influence public policy decisions, it is important that this multiplier accurately express not only how much impact a given stimulus will have but also the timeframe over which such an impact might be expected to occur. There seems to be little agreement concerning what is often referred to as the long-term/short-term debate, with proponents on both sides offering convincing theoretical arguments and empirical evidence. This controversy was summarized in the North-Tiebout dialogue, with North arguing that the export base of a community was the primary influence on growth in both the long and short term (1955), while Tiebout tended to view the export base

multiplier as valid only in the short-run, citing other factors such as investment and government expenditure as equally or perhaps more important in the long-run (Tiebout, 1956). However, Tiebout later states (1962, p.78) that for long-run forcasts, "The export industries play an even more dominant role." He answers criticisms relating to economic base theory's emphasis on exports by agruing that this theory is not meant to rule out other factors, such as increases in productivity and technological change, as influences on growth, explaining that "Base analysis, qua base analysis, does not focus on these changes." (p. 75).

Lane (1968, p.341) agrees with Tiebout on this point, but stresses that much of the misunderstanding of the economic base concept is a result of planners' belief that "...the base concept implies that an area's exports are its only source of growth" However, Lane goes further to insist that economic base analysis, because of this focus on exports, is not a theory of growth, and that the multiplier measures only short-term fluctuations:

> Given...the fact that exports are likely to be one of the more volatile components of the exogenous sector in the short run, it is quite reasonable to place a high degree of significance on the role of exports as initiators of short run economic fluctuations in an urban area. In the long run, however, it is highly plausible that elements other than exports may play a strategic role in initiating urban growth and change (p.345).

The importance of other elements, factors that can be considered supply related as opposed to demand related, are stressed by many others besides Lane as important to long-

term growth (Giarratani and Hoover, 1985; Perloff, 1963; Pleeter, 1980; Thompson, 1965). These elements include endogenous factors such as resource base, investment, diversity, productivity, agglomeration economies, and import substitution. However, the fact that other factors may have an equal or even greater impact in the long run does not mean that the impact of an export, or other exogenous factor, is limited to a short term. For that matter, it seems likely that, over time, exogenous factors might be instrumental in the development of endogenous factors.

There are three separate questions surrounding this controversy. One question is that of how long it takes for a change in basic activity to produce a change in nonbasic activity; a second question relates to how long it takes for the full effect of this change to be felt in the nonbasic sectors; and, finally, there is the question of whether this impact on the nonbasic sector continues to be felt or subsequently falls off, with the multiplier returning to its original level. The possibility that the impact of a change in basic activity occurs quickly, in no way implies that all of the impact occurs at the outset or that this impact only lasts for a short period of time. These are different questions, and it seems that some of the apparently opposing viewpoints in the short-term/long-term argument are not necessarily in conflict.

Empirical Studies

Empirical studies relating to this controversy are no more definitive. The outcome of such studies can be influenced by the type of data used, the unit of analysis, and the technique used tp determine basic activity. Results relating to the lag time involved in the impact of basic activity on nonbasic activity have ranged from one quarter (Epley, 1983) to one year (Sasaki, 1962) to several decades (Moody and Puffer, 1970). In general, concensus has favored economic base theory as an explanation of short-term economic change, as opposed to long-term regional growth.

However, as pointed out above in relation to the theoretical arguments, these empirical studies are not all asking the same question. Epley's research only purports to test how long it takes for a change in basic employment to be felt in nonbasic activities, not how long this impact lasts. Sasaki's, likewise, was an attempt to determine the lag time involved in the initial impact, and assumes, as pointed out by Gerking and Isserman (1981) that there is no impact beyond the first year. Moody and Puffer's study, on the other hand, implies that the time involved in the multiplier process completely working itself out extends far beyond the initial impact.

A study by McNulty (1977) falls into the category of those examining the question of how long the multiplier impact continues, not how long it takes the initial effect to be felt. His study, which included both property and

transfer income, as well as several basic sectors, estimated multipliers by regressing the change in nonbasic income for intervals of 2, 4, 6, 9, 10, and 19 years on changes in property and transfer income and other basic sectors for these same intervals. While neither type of nonemployment income was significant in the short term (two years), both produced relatively strong multiplier estimates for many of the time periods of four years or more, particularly property income. In general, the other basic sectors followed the same pattern. From this, McNulty concluded that the total adjustment process involved requires a period of more than two years to work itself out, and suggests that these results might validate those of Moody and Puffer (1970), who imply that the full impact might take several decades to be felt.

Both Richardson (1985) and Gerking and Isserman (1981) have criticized McNulty's research design because the time intervals used for both dependent and independent variables were the same. According to Gerking and Isserman (p. 453), McNulty was "...thereby testing the hypothesis that the impact occurs immediately." However, what McNulty is actually measuring with this design is the cumulative long-term effects of change in a given sector on change in nonbasic income. For example, the 1965-69 change in nonbasic income resulting from change in a basic sector reflects more than just the sum of the impacts for the individual years involved. The nonbasic change in a given

year also includes lagged responses to change in basic income in previous years.

Nonemployment Income as an Endogenous Factor

Although nonemployment income has been described thus far as an exogenous influence, it might also be responsible for changes in some of the endogenous factors noted above, particularly those relating to population, diversification, and investment levels. This is significant in relation to the long-term/short-term question because, as previously noted, these endogenous factors are likely to be more relevant to long-term growth.

Since nonemployment income is strongly associated with the in-migration of retirees, an increase in nonemployment income may be accompanied by an increase in population; this will not only add to absolute demand in the area, but will probably create demand for different goods and services. Not only might recipients of nonemployment income be more likely to consume locally, but they will probably also consume differently. Studies of the spending habits of the elderly and retirees generally indicate that these groups spend more on services and time-intensive activities and less on durable goods (Bain, 1984; Harmston, 1979; McConnel and Deljavan, 1983). Harmston found that, compared to non-retirees, retirees spent more on food and drink, transportation and communication, utilities, health services, and finance, insurance and real estate. McConnel

and Deljavan's study indicates that this group spends a greater percentage of its income on housing, health services, utilities, and food in the home, but does not differ significantly from non-retirees in expenditures for transportation. It seems likely, therefore, that increases in nonemployment income might result in increased diversity, which could perhaps lead to changes in the economic structure of the region, a factor that is also more likely to influence long-term growth (Thompson, 1965). Income that is not tied to employment will tend to support certain levels of nonbasic activity in circumstances where basic industry is declining, thus helping to maintain a level of services which can be instrumental in attracting more basic industry.

Because increases in nonemployment income are expected to result not only in increased local spending but in more gradual changes in endogenous conditions, and because McNulty's study suggests that the impact of nonemployment income may be greater in the long-term, the following hypothesis is proposed:

5. The impact of nonemployment income on nonbasic income, as measured by the value of b_2, equation (6), will be greater in the long-run than in the short-term.

So far this discussion has centered on consumption-induced impacts. However, local investment will also have an effect on the regional economy, an effect which is also

likely to be more apparent in the long-run (Tiebout, 1962; Lane, 1968). Two key questions with respect to investment are: how likely are recipients of nonemployment income to invest and to invest locally, and is the level of local investment relevant to the availability of capital at the local level?

The age group most strongly associated with nonemployment income is a group whose incomes have increased significantly in real terms since 1970, and have increased at a rate that is substantially more than general family incomes (Smeeding and Torrey, 1988). It is also a group whose size is increasing, relative to other age cohorts. Thus, to the extent that saving and other forms of investment are contingent upon income levels, this group's potential impact on a region's supply of capital should be increasing. A study by Davies (1981) suggests that as retirees get older, they either continue to save or decumulate much more slowly than would be expected. Property income recipients, who tend to be somewhat younger and more affluent than recipients of transfer income, might be expected to have a greater impact on the local investment sector since the level of individual savings/investment is a function of income. The importance of local savings to the availability of capital, particularly in smaller regions, is supported (Gertler, 1987; Moore, 1981; Thompson, 1965). Thus nonemployment income, particularly property income, could also be adding to the supply of capital in a region, a

factor which would also have greater impact in the long run (Lane, 1968; Tiebout, 1962).

The previous hypothesis suggests that nonemployment income in aggregate will have a greater long-term impact because of its effect on certain endogenous conditions which manifest themselves over longer time periods. One of these conditions relates to the local supply of capital. Since property income is expected to have a greater impact on local investment than transfer income, the following hypothesis is added:

6. Long-run impacts on nonbasic income will be greater for property income than for transfer income; as measured by equation (7), $b_2 > b_3$.

Summary

Nonemployment income has been classified as an exogenous factor that is functioning in the local economy in much the same way as basic income, insofar as it impacts nonbasic income through the consumption sector. However, this impact is not expected to be identical to that of basic income, since there are significant differences in how such income enters and functions in the economy.

Such income does not result from an export, and therefore represents a net addition to a region's resources, a factor that might have greater impact on a region's potential growth. While the indirect effects which occur as a result of export production are not realized from nonemployment income, the emphasis in this type of analysis

is on induced effects in the consumption sector. These effects are expected to be a function of the spending habits of nonemployment income recipients and their propensity to spend locally. Socio-economic characteristics of this group differ from those of earned income recipients, suggesting different consumption habits with regard to both what is consumed and where such consumption occurs. Nonemployment income, in recent years, has increased more than income in many basic sectors, and since it is not tied to employment, its geographic distribution is not the same as that of earned income.

Spatial and temporal differences between nonemployment income and income from traditional basic sectors will be explored through testing of the following hypotheses:

1. Nonemployment income will have a significant, positive impact on nonbasic income; the value of b_2, as estimated by equation (4), $NB = b_1B + b_2NE$, will be > 0 and significant.
2. The impact of nonemployment income on nonbasic income will be greater than that of basic income ($b_2 > b_1$, also estimated by equation 4) and will be seen to increase, relative to basic income, from 1959 to 1986.
3. Transfer income will have a greater impact on nonbasic income than will property income, i.e. $b_3 > b_2$, as estimated by equation (5), $NB = b_1B + b_2PR + b_3TR$.

4. The impact of nonemployment income on nonbasic income, estimated by incorporating dummy variables into equation (5), will be stronger in nonmetropolitan urban counties than in rural counties.
5. The impact of nonemployment income on nonbasic income will be greater in the long run than in the short term. This will be measured using equation (6), $NB = b_1 B + b_2 NE$, and comparing b_2's estimated over different intervals.
6. Long-run impacts on nonbasic income will be greater for property income than for transfer income; $b_2 > b_3$, as estimated by equation (7), $NB = b_1 B + b_2 PR + b_3 TR$.

CHAPTER III

METHODOLOGY

The comparison of the impacts of nonemployment income and traditional basic income will be accomplished by estimating multipliers for these sectors using regression analysis, as outlined at the beginning of chapter II. The following paragraphs describe the data to be used, identify the study area, and explain the method employed to identify basic and nonbasic sectors. This will be followed by a presentation of the models to be used in the regression analysis and a discussion of data modifications necessitated by the assumptions of this type of analysis.

Data

The data for this analysis are from the Bureau of Economic Analysis local personal income series, which decomposes personal income into Earned and Non-earned income. Non-earned income is further divided into Property Income (interest, dividends, and rental income) and Transfer Payments (social security, pensions, and unemployment compensation), while Earned income is provided at the 2-digit SIC code level. All income figures are available for the years 1959, 1962, and 1965-1986. Economic base studies have often used employment data, rather than income, primarily because of its availability. Income data were chosen for this study for two reasons. The first is

consistency; since nonemployment income is to be incorporated, it is more appropriate to use income to measure activity in the other sectors. The second reason is that it is generally felt that income data, if available, is a better measure of economic activity than is employment data (Bain, 1984; Harris, 1987; McNulty, 1977). Employment figures can be inflated if they don't reflect "full-time equivalent" measurements; also, they can change as a result of changes in productivity, with no corresponding change in output or income.

The study area will be the state of Michigan, and county level data will be used. While the BEA also supplies these data by SMSA (MSA), one of the purposes of this study is to consider how the relationships to be examined vary over space. MSA level data could not accomplish this. The state of Michigan was selected because it includes areas with very high concentrations of both types of nonemployment income, and because the BEA data were available through files of the Center for the Redevelopment of Industrialized States (CRIS), located at Michigan State University. The counties classified as urban, rural and nonmetropolitan urban to test for the impact of size are shown in Figure 2.

Income variables to be used for the study are as follows: Property Income; Transfer Payments; Farm Income; Construction; Manufacturing; Transportation and Public Utilities; Federal Civilian Income; Wholesale; Retail; Finance, Insurance, and Real Estate; and Service. State and

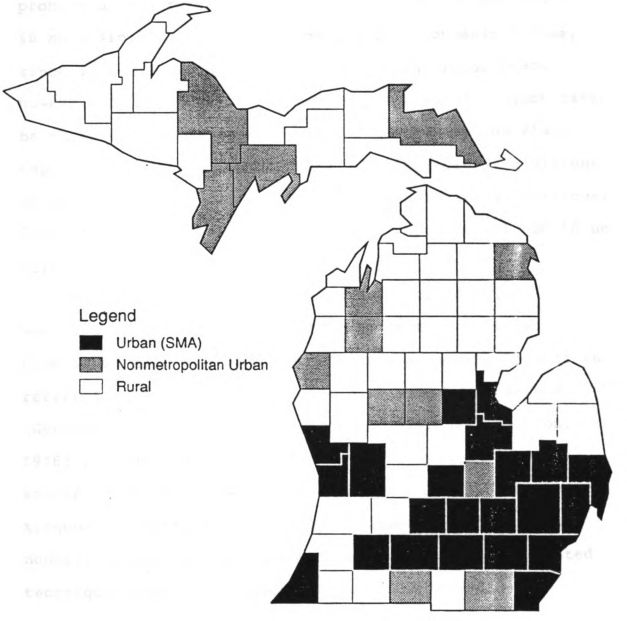


Figure 2. County Classification

Local Government income will not be used because of the problem of determining how much of it is basic and how much is nonbasic. The local portion would be nonbasic income, since it would result from services to the local area. However, for a county, the state portion would in some cases be basic, particularly in Ingham county (where the state capitol is located) and in counties with regional divisions of state government offices. Mining; Agricultural Services, Forestry, and Fisheries; and Military Payrolls all had to be eliminated due to suppressed data.

Property and Transfer Income together comprise Nonemployment Income. The remaining sectors will be classified as either Basic or Nonbasic according to what is referred to as the "assumption" or "assignment" method (Gerking and Isserman, 1981; Isserman, 1980; Richardson, 1978; Tiebout, 1962), an approach which uses a priori knowledge to assign sectors to basic or nonbasic categories. Although allocation of sectors to either the basic or the nonbasic class is often accomplished by more sophisticated techniques such as Location Quotient or Minimum Requirements, there is ample precedent for the use of the assumption method, particularly when using time series data (Hirschl and Summers, 1982; McNulty, 1977; Moody and Puffer, 1970). More to the point, however, is the question of how crucial this is to the present study. If the purpose of this research was simply the estimation of multipliers, the method of allocation used would be more important. However,

since the object of this study is to assess the relative impacts of Basic and Nonemployment Income and to examine changes in this relationship over time, the assumption method is thought to be sufficient. Therefore, following the example of studies cited above, the Basic category will include Agriculture; Manufacturing; and Federal Civilian Income. Nonbasic will consist of Construction; Transportation and Utilities; Wholesale; Retail; Service; and Finance, Insurance and Real Estate.

Analysis

Regression analysis will be used to test the hypotheses that have been proposed. The general form of this analysis will be that of equation (4) from chapter 2:

$$NB = b_1B + b_2NE$$

where NB = nonbasic income

B = basic income

NE = nonemployment income

The actual equation used in the analysis will be as follows:

$$NB_t = a_t + b_{1t}B_t + b_{2t}NE_t + e_t \qquad (8)$$

where t = year or time period. A constant term is included in the equation because this results in higher tolerances for the coefficients estimated (see further discussion below). However, it is not expected to be significant, i.e. $a_t = 0.0$.

Comparative Impacts: Nonemployment Income and Basic Income

The first phase of the analysis will test the four hypotheses which compare nonemployment income's impact to that of basic income. Coefficients for basic and nonemployment income will be estimated over all counties for each of the following years: 1959, 1962, 1965, and 1966-1986. All income variables will be transformed to per capita income.

Per capita income data will be used to correct the problem of multicolinearity which results from total income and population being highly correlated. The counties varied enormously in population, in 1986, ranging from 1,900 for Keweenaw county to 2,164,000 for Wayne county. Thus most of the change over observations was accounted for by differences in population, making change due to differences in the two types of income difficult to distinguish.

Common remedies for the problem of multicolinearity are generally considered to be eliminating a variable, incorporating a new variable, or transforming a variable (Gujarati, 1978; p. 183). Since the first three possibilities were not feasible, transformation was employed to correct the problem.

With time series data, transformations often take the form of converting data to first differences, but this is not always relevant with cross-sectional data. When this technique was tried here, the problem of multicolinearity did disappear, but R^2's were $\frac{1}{4}.1$, indicating that the

relationships were weak. Therefore, transformation of the data to reflect per capita income was considered to be the best possibility, since it would eliminate population as a factor in the variation of these variables. Bain's 1984 study of the impact of transfer payments in Wisconsin counties also transformed income data to per capita income to eliminate the effects of variation in county population.

While per capita income is not the same as the original variable, total income, it is considered to be a reasonable surrogate, since increases in per capita income will generally be accompanied by increases in total income. However, to check the validity of this variable as a surrogate, two series of simple regressions were run so that trends in the coefficients for per capita basic and nonemployment income could be compared with those for total income. These regressions, for both total income and per capita income were estimated using the following equations:

$$NB = a + b_1 B$$

$$NB = a + b_1 NE$$

Although the two different data forms produced coefficients of different magnitudes, trends in these coefficients were similar for both forms of data (see Table 2), and also were were similar to those estimated using per capita data in multiple regression (see Table B1, Appendix). In all cases, coefficients for basic income increased and those for nonemployment income decreased.

Table 2. Simple Regression Results: Impact of Basic and Nonemployment Income on Nonbasic Income

	Regression Coefficients			
	Total Income		Per Capita Income	
Year	B	NE	B	NE
1959	0.941	2.239	0.171	1.487
1962	0.918	2.014	0.192	1.207
1965	0.907	2.100	0.214	0.978
1966	0.921	2.218	0.200	0.906
1967	1.005	2.133	0.213	0.837
1968	0.957	2.258	0.207	0.629
1969	0.972	2.233	0.219	0.777
1970	1.077	2.107	0.248	0.818
1971	1.093	2.061	0.252	0.778
1972	1.047	2.059	0.253	0.808
1973	0.967	2.019	0.269	0.688
1974	1.024	1.827	0.290	0.551
1975	1.056	1.558	0.326	
1976	0.926	1.618	0.343	
1977	0.881	1.694	0.378	
1978	0.881	1.736	0.404	
1979	0.915	1.653	0.446	
1980	1.001	1.353	0.463	
1981	1.033	1.285	0.464	
1982	1.119	1.204	0.543	
1983	1.133	1.213	0.534	
1984	1.083	1.245	0.513	
1985	1.099	1.324	0.492	
1986	1.147	1.367	0.529	

All coefficients significant at .95
(Insignificant coefficients not shown)

A variation of equation (8) will be used in which nonemployment income has been disaggregated into property and transfer income as follows:

$$NB_t = a_t + b_{1t}B_t + b_{2t}PR_t + b_{3t}TR_t + e_t \quad (9)$$

where PR = per capita property income

TR = per capita transfer income

Intercept and slope dummy variables will be incorporated into both equations to test the hypothesis that the region's size impacts the magnitude of the multiplier. The expanded models corresponding to equations (8) and (9) are as follows:

$$NB_t = a_t + b_{1t}B_t + b_{2t}NE_t + b_3D_1 + b_4D_2 + b_{5t}D_1B_t + b_{6t}D_1NE_t + b_{7t}D_2B_t + b_{8t}D_2NE_t + e_t \quad (10)$$

$$NB_t = a_t + b_{1t}B_t + b_{2t}PR_t + b_{3t}TR_t + b_4D_1 + b_5D_2 + b_{6t}D_1B_t + b_{7t}D_1PR_t + b_{8t}D_1TR_t + b_{9t}D_2B_t + b_{10t}D_2PR_t + b_{11t}D_2TR_t + e_t \quad (11)$$

where D_1 = Dummy variable, 1 = rural counties

0 = MSA and nonmetropolitan urban counties

D_2 = Dummy variable, 1 = nonmetropolitan urban counties

0 = rural and MSA counties

A list of all counties and the corresponding dummy variable values is found in Appendix A.

Long-Term Impacts

The long-term impact of nonemployment income will be assessed using an approach very similar to that used by McNulty (1977). He calculated, for property income, transfer income, and income from several basic sectors, the change over time periods ranging from 2 to 19 years, and then estimated multipliers for these sectors by using regression analysis, with the change in nonbasic income for the same intervals as the dependent variable. The coefficients thus estimated represented regional multipliers. By comparing the coefficients to determine at what interval the multiplier effect was the strongest, he was able to arrive at an approximation of how long it takes the full multiplier effect to be felt.

This study uses a similar equation, except that the time periods over which change is measured are different. The four equations used for the long-term analysis, which correspond to equations 8-11 used in the first phase of the analysis, are as follows:

$$\Delta NB_t = a_t + b_{1t}\Delta B_t + b_{2t}\Delta NE_t + e_t \qquad (12)$$

$$\Delta NB_t = a_t + b_{1t}\Delta B_t + b_{2t}\Delta PR_t + b_{3t}\Delta TR_t \qquad (13)$$

$$\begin{aligned}\Delta NB_t = {} & a_t + b_{1t}\Delta B_t + b_{2t}\Delta NE_t + b_3 D_1 + b_4 D_2 + \\ & b_{5t} D_1 \Delta B_t + b_{6t} D_1 \Delta NE_t + b_{7t} D_2 \Delta B_t + \\ & b_{8t} D_2 \Delta NE_t + e_t\end{aligned} \qquad (14)$$

$$\Delta NB_t = a_t + b_{1t}\Delta B_t + b_{2t}\Delta PR_t + b_{3t}\Delta TR_t + b_4 D_1 + b_5 D_2 + b_{6t} D_1 \Delta B_t + b_{7t} D_1 \Delta PR_t + b_{8t} D_1 \Delta TR_t + b_{9t} D_2 \Delta B_t + b_{10t} D_2 \Delta PR_t + b_{11t} D_2 \Delta TR_t + e_t \quad (15)$$

where t = the interval over which change will be measured. Definitions of all terms are the same as in equation (8) through (11), except that all income variables will be expressed as the rate of change in total income over the specified time period.

While McNulty measured change over seven different time periods, most of which did not have common base years or common ending years, this study examines thirteen different time intervals, generated in two series.

The intervals in the first series share a common beginning year, 1959, with change computed for intervals ending 3, 6, 8, 10, 15, 20, and 27 years later. Intervals were computed as follows:

$$\Delta X_{1959+1} = (X_{1959+1} - X_{1959})/X_{1959}$$

where 1 = 3, 6, 8, 10, 15, 20, 27

Those in the second series share a common ending year, 1986, with intervals beginning at 1986 minus 3, 5, 7, 10, 15, and 20 years. (The 27 year interval is the same for both series.) These intervals were computed as follows:

$$\Delta X_{1986-1} = (X_{1986} - X_{1986-1})/X_{1986-1}$$

where 1 = 3, 5, 7, 10, 15, 20

The following table lists the intervals and corresponding years for the two series.

Interval	Base59 Series	End86 Series
3	1959-62	1983-86
5	-	1981-86
6	1959-65	-
7	-	1979-86
8	1959-67	-
10	1959-69	1976-86
15	1959-74	1971-86
20	1959-79	1966-86
27	1959-86	1959-86

Since the transformation to a change ratio is being employed, problems with multicolinearity are not anticipated; therefore, all change ratios are calculated using total, not per capita, income. This is felt to be a better measure to use for this phase of the analysis because the point of looking at long-term impacts is to determine if nonemployment income is a factor in a regions development, not just a cause of short-term fluctuations. Since per capita income can increase without corresponding increases in the total income of a regions, it would not be as valid an indicator of long-term growth.

To compare results of long-term intervals to short-term intervals using the same data form, four one-year change ratios will also used for the following years: 1970-71, 1975-76, 1980-81, and 1985-86.

This analysis, like that used to test the first four hypotheses, will begin with regression of nonbasic income on basic income and aggregate nonemployment income, expand to disaggregate nonemployment income, and finally add dummy variables.

The results of both phases of the analysis are presented in the following chapter, along with a discussion of these results. Detailed regression results will be presented in tabular form in Appendix B.

CHAPTER IV

ANALYSIS AND RESULTS

This analysis was performed in two phases. The first section concentrated upon the impact of nonemployment income in years over a 27-year period, comparing it to the impact of basic income for the same years. The second part of the analysis was concerned with determining the time interval which captured the greatest cumulative effect of nonemployment income; basic income was also analyzed in this manner for purposes of comparison.

Both phases of the analysis were accomplished by regressing nonbasic income on basic and nonemployment income, in its aggregate form and in its disaggregated forms, i.e. property income and transfer income. Spatial variations in the impacts of both types of income were also examined in both phases, through the incorporation of dummy variables into the regression equations.

Comparative Impacts

The questions comparing the impacts of basic income and nonemployment income, as well as those comparing the impacts of property income and transfer income, were expressed in the first four hypotheses. Equations 8 through 11 were used to test these hypotheses, and per capita income figures were used for all variables, to alleviate the problem of multicolinearity.

Nonemployment Income Compared to Basic Income

Since both basic income and nonemployment income, as measured by this analysis, are forms of personal income, both should function in the same manner, i.e they will impact the nonbasic sectors as they are spent in the local economy. Distinctions between their impacts, therefore, will generally result either from differences in the recipients of the two types of income or from differences in the geographic areas in which each is concentrated.

The first hypothesis states that nonemployment income has a significant, positive impact on nonbasic income and was tested first by the simple regression of nonbasic income on nonemployment income for each year from 1959-86 (excluding 1960, 1961, 1963, and 1964). The results of this series of regressions are shown in Table 2, Chapter 3. Although with per capita data the results are not very conclusive, a more definitive pattern appears when multiple regression is used to include both basic and nonemployment income. This is accomplished using equation (8), reproduced here for the reader's convenience:

$$NB_t = a_t + b_{1t}B_t + b_{2t}NE_t + e_t$$

The coefficients generated by this equation, which is run for each year, are displayed in Figure 3 (for complete regression results see Table B1 in the Appendix). Based upon this series of regressions, the hypothesis that nonemployment income has a significant, positive impact upon nonbasic income can definitely be accepted.

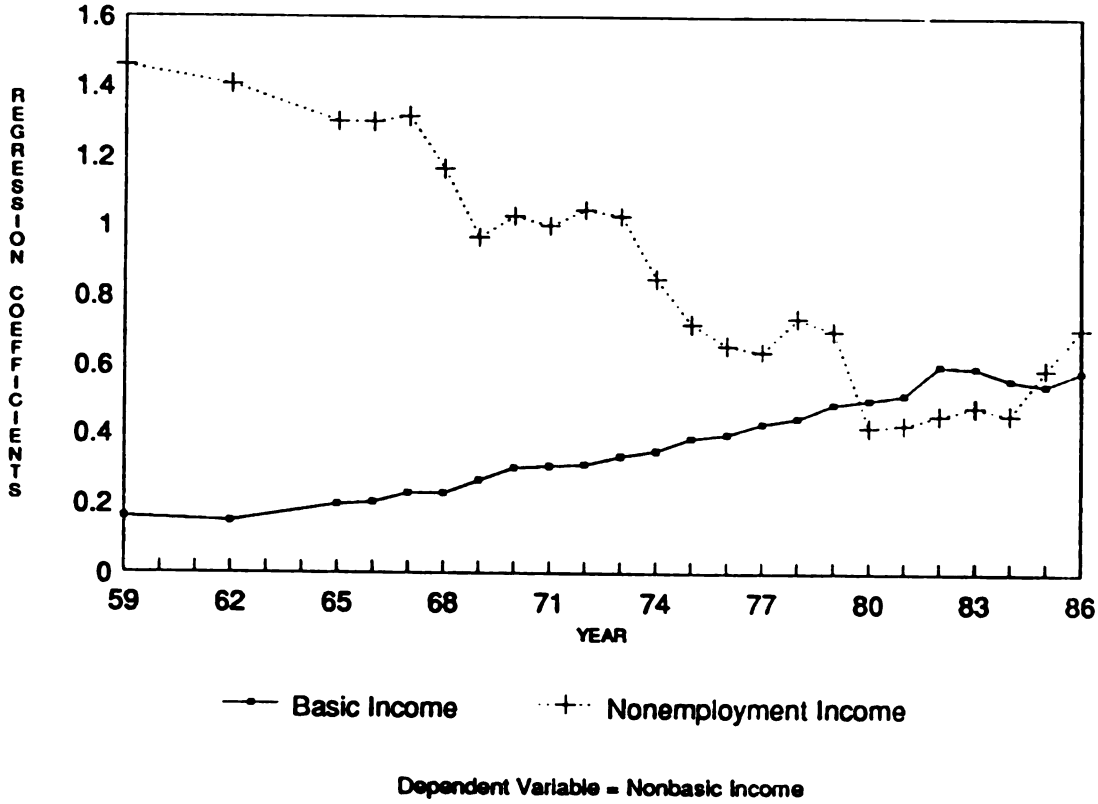


Figure 3. Regression Results: Equation 8

Also tested with equation (8) was the second hypothesis, that the impact of nonemployment income will be greater than that of basic income and will increase relative to that of basic income over the 27-year period. This hypothesis must be rejected. While the pattern seen in Figure 3 does show the impact of nonemployment income to be stronger than that of basic income for most years, this impact appears to be decreasing while the impact of basic income increases.

The expectation that nonemployment income would have a stronger impact than basic relates to differences in propensity to spend locally on the part of the recipients of

such income. Nonemployment income recipients were assumed to be older and less mobile and, therefore, more likely to consume locally.

A second reason why this model (as expressed by equation 8) might be expected to produce stronger results for nonemployment income has to do with differences in the reporting of the income figures used. Basic income figures reported include contributions to social programs such as social security, taxes, and pay-in-kind which is considered income. None of these forms of income are received by the wage-earner in the sense that they can be spent in the local economy. In comparison, a greater proportion of nonemployment income is available to enter into consumption, particularly transfer income, most of which is not taxable.

Another factor influencing the multiplier impact of nonemployment income is that all of this type of income is received by people who live in the region. BEA data for nonemployment income is necessarily measured by place of residence, whereas earned income is measured by place of employment. Therefore, some of basic income attributed to a county goes to nonresidents, who are more likely to spend it outside of the county.

The declining importance of nonemployment income relative to basic income must be explained by other external factors. It has been suggested that sometimes an inverse relationship exists between these two sources of income (Stevens and Lahr, 1988); however, this probably does not

explain very much of the pattern seen in Figure 3. Transfer income will tend to decrease as basic income increases only to the extent that transfer income includes unemployment compensation and other forms of transfers which would result from lack of employment. Only a small portion of transfer income is accounted for by these types of payments. In 1986, unemployment benefits made up only 3.2% of all transfer payments. However, the extreme drop in the impact of nonemployment income between 1980 and 1984 does coincide with a period of high unemployment, a period during which unemployment compensation would have accounted for a larger proportion of nonemployment income. This probably explains some of the inverse pattern of basic and nonemployment income for these years.

Since the impact of nonemployment income is estimated in relation to that of basic income, some of the relative decline in the impact of nonemployment income will be the result of increases in the impact of basic income. Over time such increases might be expected to occur, as the development of industries supporting basic activities leads to increased indirect effects.

Finally, a likely explanation for much of the overall relative decline in the impact of nonemployment income might lie in the role of local spending in the multiplier process, as it relates to changes in mobility over the years. It has already been noted that increases in mobility tend to be associated with smaller multipliers, due to the resulting

increases in the propensity to spent nonlocally. Between 1959 and 1986, technological changes have increased mobility for everyone; and sociological changes, as well as improved medical treatment, have led to increased mobility for the older segment of the population. The development of extensive highway systems has reduced relative distances between points, particularly in the more remote areas, where nonemployment income constitutes a greater proportion of personal income. This increased mobility, particularly among the elderly, who are recipients of a significant share of nonemployment income, is likely to be reflected in a decrease in the multiplier impact of this type of income.

Property Income vs. Transfer Income

Nonemployment income is generally divided into two types: transfer income (social security, pensions, unemployment income) and property income (dividend, interest, and rental income). The third hypothesis states that transfer income will have a greater impact than property income. This is tested using equation (9), shown below, which incorporates the disaggregated forms of nonemployment income.

$$NB_t = a_t + b_{1t}B_t + b_{2t}PR_t + b_{3t}TR_t + e_t$$

As can be seen in Figure 4, this hypothesis cannot be accepted. Although transfer income's impact, when significant, is stronger than that of property income, after 1967, it is not significant. Property income, however, continues to be a strong influence throughout the period.

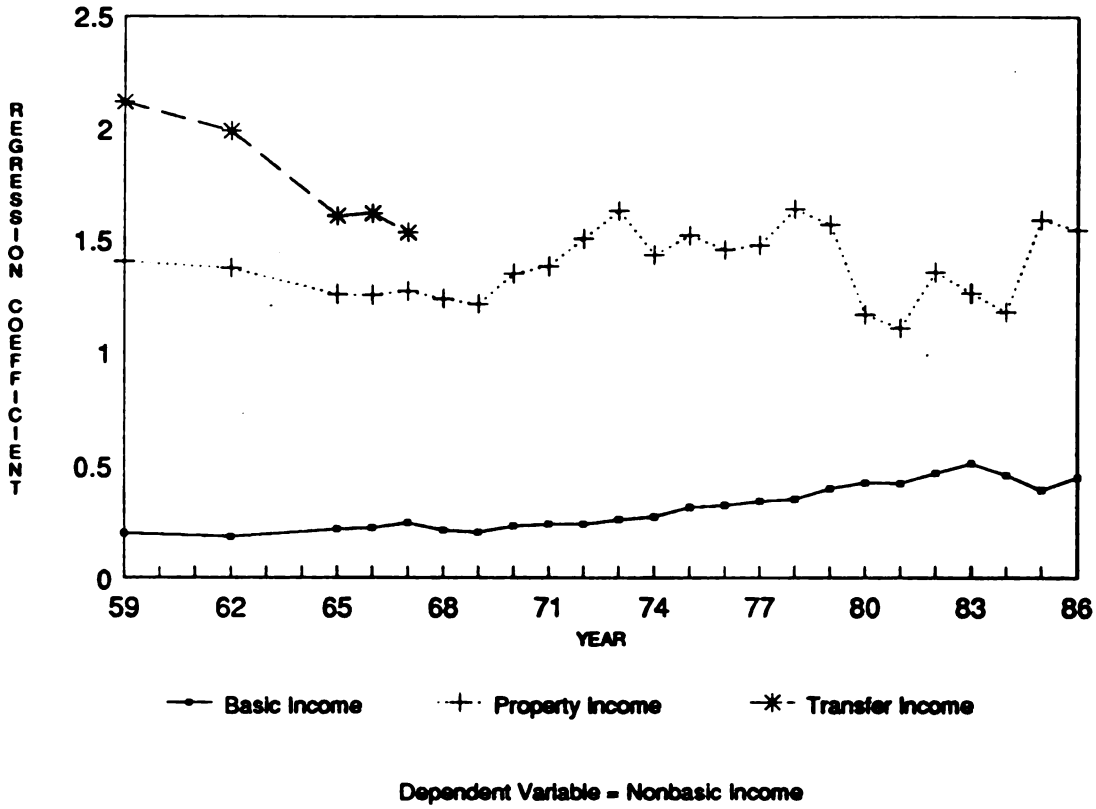


Figure 4. Regression Results: Equation 9

This hypothesis was predicated primarily on the logic that transfer income recipients would be more likely to consume locally, and the most salient point made with respect to local consumption has to do with the mobility of the consumer. It was assumed that recipients of transfer income would be older and less mobile, and therefore more likely to spend locally than would recipients of property income. At the beginning of the study period, when transfer income's impact was significant, this was probably more likely to be true. However, as discussed in connection with the second hypothesis, nonemployment income recipients, like the general population, are probably more mobile now than they were 27 years ago. A greater relative increase in

mobility may be occurring among transfer income recipients, resulting in a greater relative increase in nonlocal spending. If property income recipients' higher overall income levels are not offset by a greater propensity to shop locally on the part of transfer income recipients, the impact of property income will be greater.

Another possible explanation which relates to nonemployment income recipients' propensity to shop locally is the influence of preestablished shopping patterns on the recipients of such income who have migrated from more urbanized areas. Since, as previously noted, transfer income is more strongly associated with in-migration of retirement-age people than is property income, more of this income might be spent nonlocally. This would be consistent with Stabler's 1987 study, discussed in Chapter 2, which indicated that the inmigration of people to the rural towns of Saskatchewan did not improve their status as trade centers.

Variation Over Space

The effect of size on the multiplier was tested by examining variations in the impact of nonemployment income in different types of counties. This was accomplished by incorporating dummy variables into the analysis to distinguish between SMA, nonmetropolitan urban, and rural counties. Both aggregate nonemployment income and property and transfer income are analyzed in this manner.

Hypothesis four, which relates to aggregate nonemployment income states that the impact of such income on nonbasic income will be stronger in nonmetropolitan urban counties than in rural counties, thus suggesting that county size will influence the multiplier. This hypothesis was tested using equation (10), reproduced here:

$$NB_t = a_t + b_{1t}B_t + b_{2t}NE_t + b_3D_1 + b_4D_2 + b_{5t}D_1B_t + b_{6t}D_1NE_t + b_{7t}D_2B_t + b_{8t}D_2NE_t + e_t$$

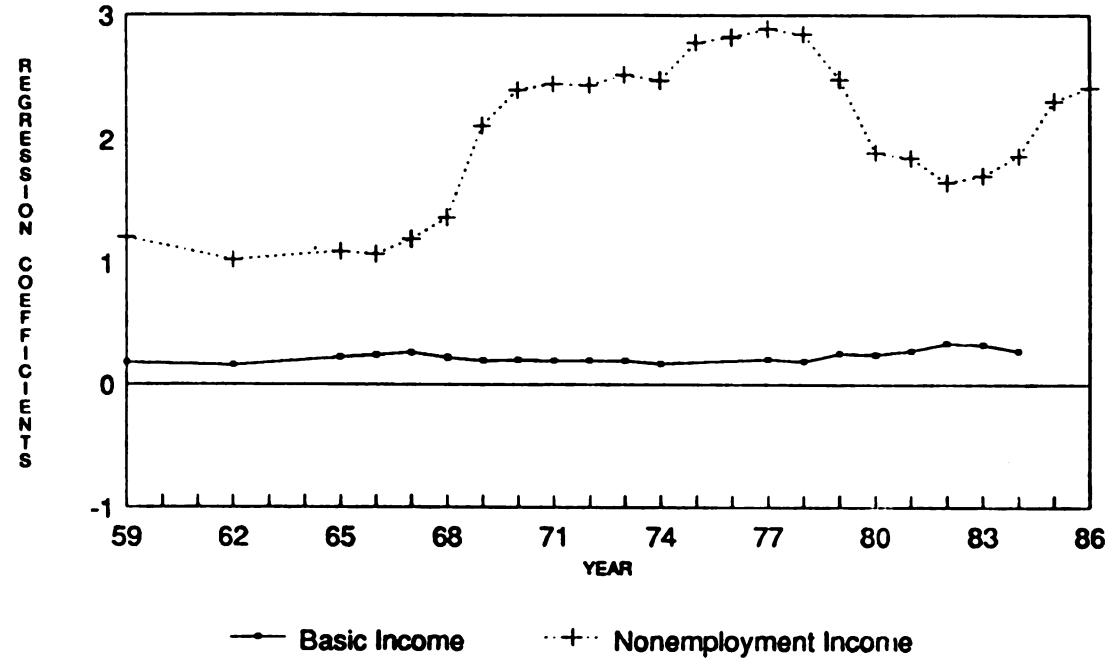
As a comparison of Figures 5a and 5b illustrates, this hypothesis can be accepted. The results reflected in Figures 5a and 5b also seem to indicate that for urban and nonmetropolitan urban counties, the second hypothesis, that nonemployment income's impact is increasing relative to that of basic, could be accepted. It is only in the rural areas (see 5c) that its impact appears to be declining.

Spatial variation in the impacts of property and transfer income are examined using equation (11), as follows:

$$NB_t = a_t + b_{1t}B_t + b_{2t}PR_t + b_{3t}TR_t + b_4D_1 + b_5D_2 + b_{6t}D_1B_t + b_{7t}D_1PR_t + b_{8t}D_1TR_t + b_{9t}D_2B_t + b_{10t}D_2PR_t + b_{11t}D_2TR_t + e_t$$

The results, seen in Figure 6, indicate that both types of income have a greater impact in urban and nonmetropolitan urban counties than in rural counties. Property income, however, performs much better in the rural areas than does transfer income, and its impact is increasing in the urban

a. Urban Counties, 1959-1986



b. Nonmetro Urban Counties, 1959-1986

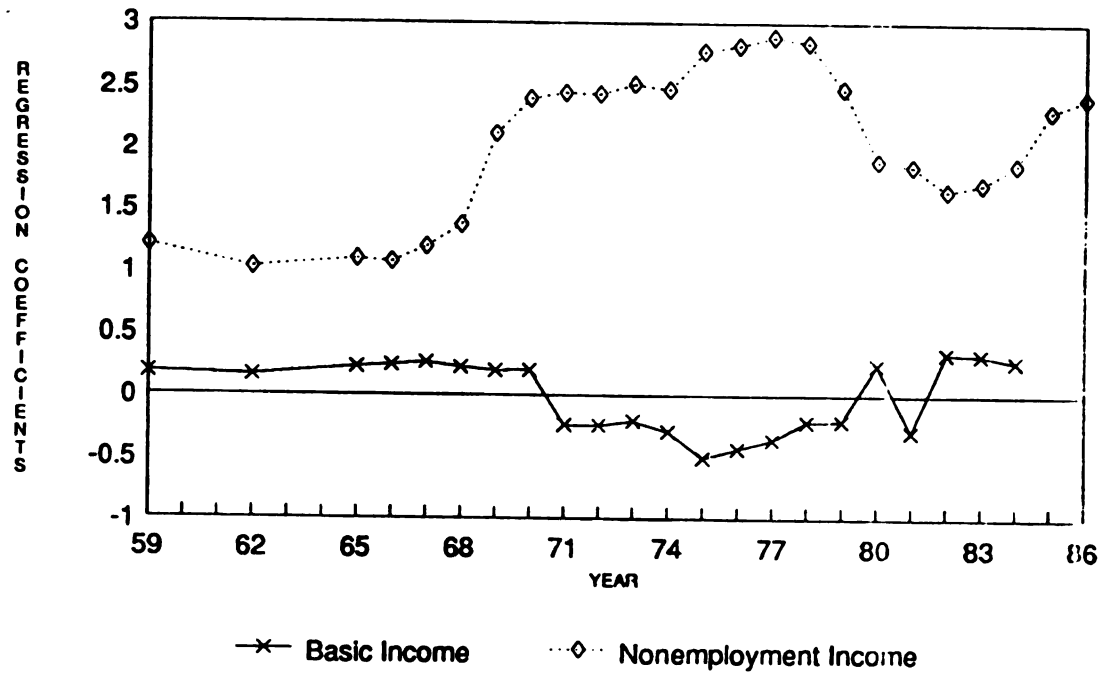
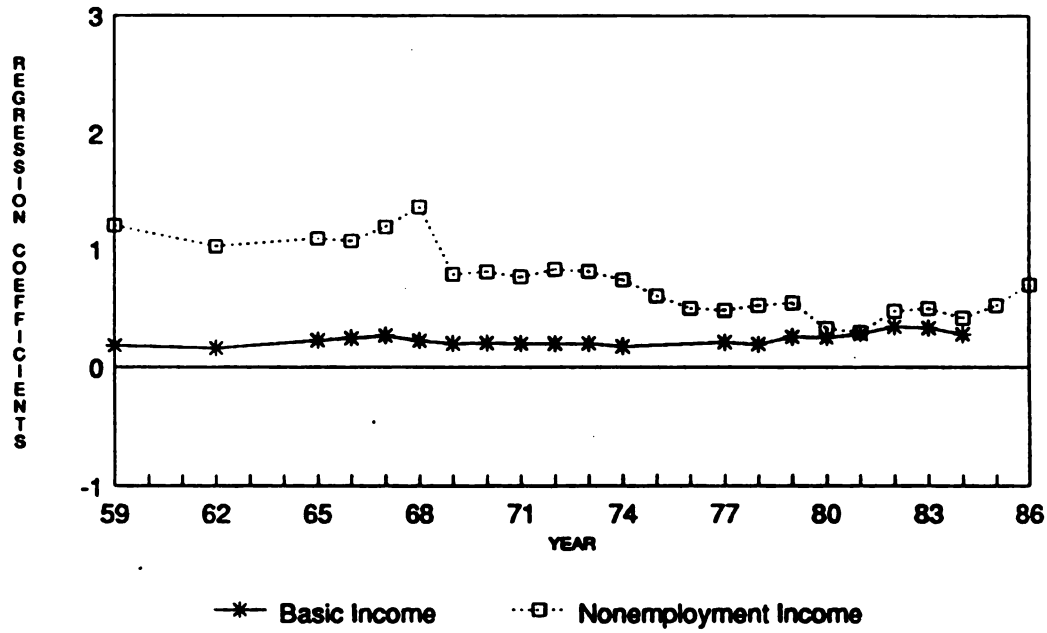


Figure 5. Regression Results: Equation 10

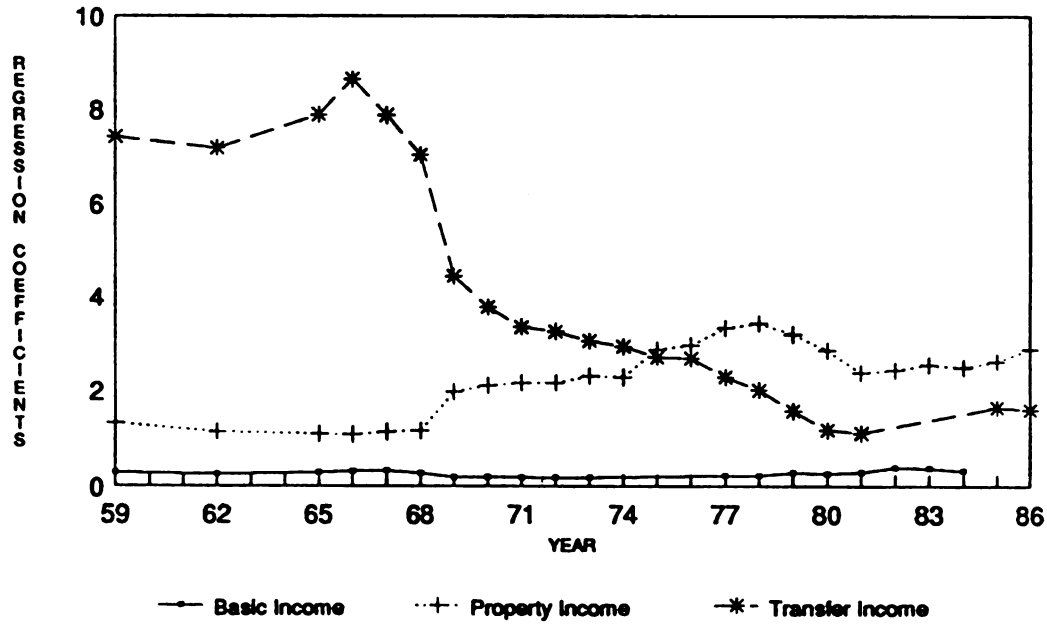
Figure 5 (con't.)

c. Rural Counties, 1959-1986



Dependent Variable = Nonbasic Income

a. Urban Counties, 1959-1986

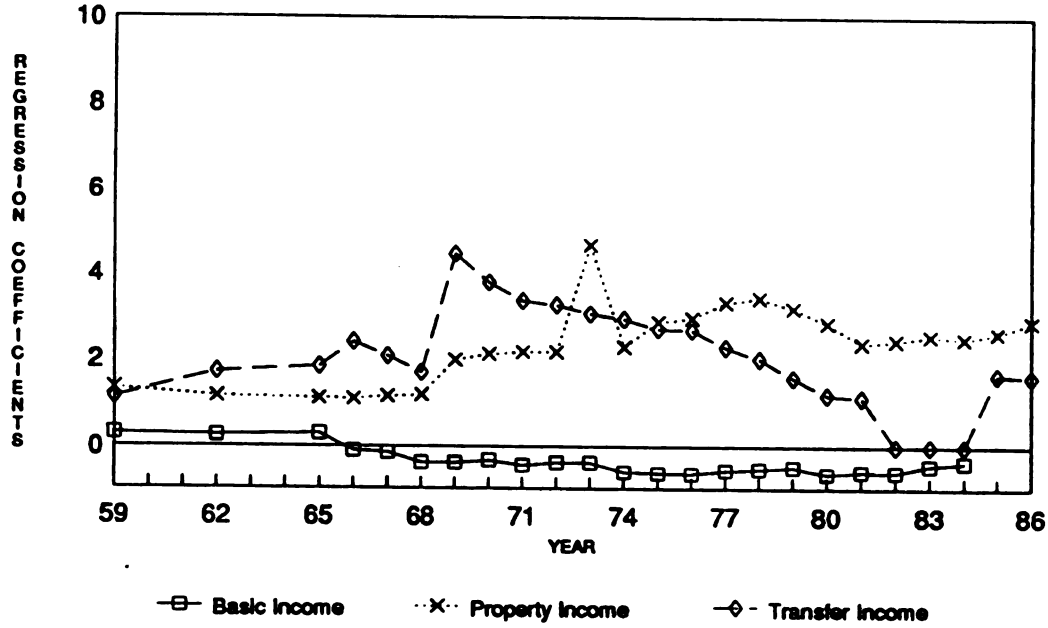


Dependent Variable = Nonbasic Income

Figure 6. Regression Results: Equation 11

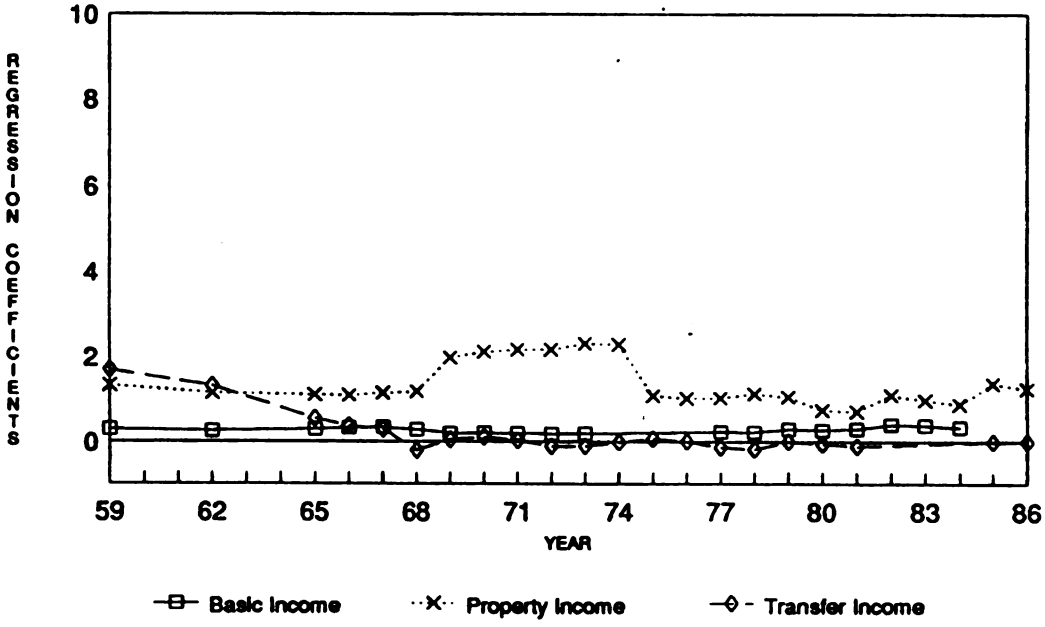
Figure 6 (con't.)

b. Nonmetro Urban Counties, 1959-1986



Dependent Variable = Nonbasic Income

c. Rural Counties, 1959-1986



Dependent Variable = Nonbasic Income

and nonmetropolitan urban counties, while tranfer income's impact is declining.

Distinctions between the rural and the nonmetropolitan urban counties exist not only for nonemployment income, but also for basic income, as reflected in both Figures 5 and 6. For basic income, however, it is the rural areas in which the impact is stronger. This is probably related to the difference in the employment status of the recipients of these types of income. As a result of intercounty commuting to work, not all of the basic income earned in a particular area is earned by residents of that area. More rural residents probably travel to nearby urban or nonmetropolitan urban counties to work, yet spend a good share of their wages in the county in which they live. This would tend to inflate the multiplier estimated for basic income in the rural counties. The reverse is true for nonmetropolitan urban counties which, if they are surrounded by rural areas (as most of those in this study area are), are more likely to draw employees from the surrounding area than a rural county would be. Thus more of the earned income attributed to nonmetropolitan urban counties is likely to be spent elswehere, therefore causing a smaller multiplier to be estimated for these counties. This situation is obviously not a problem when estimating multipliers for nonemployment income, since all such income is recorded in the same area in which its recipients reside.

Another reason why the impact of basic income is stronger in rural counties might be the omission of "agricultural services" from basic income (necessary because of missing data). This type of income would probably make up a greater proportion of basic income in rural counties than in urban or nonmetropolitan urban counties, and would certainly account for some spending in the nonbasic sectors of these counties. Thus its absence from the analysis might be producing a somewhat inflated multiplier for basic income in the rural counties (since it would be likely to vary with agriculture, which is included in basic income).

Finally, a characteristic of the internal economy that has some bearing on the multiplier for basic income is the "excess capacity" which exists within a region. As pointed out by Mulligan, 1984; Richardson, 1978; and Shahidsaless, Shahin, Gillis, and Shaffer, 1983; if a region is experiencing full employment, then increases in basic employment will tend to shift employment away from nonbasic activities, thus decreasing the nonbasic/basic ratio, at least in the short run. Since the rural areas of Michigan experience greater unemployment (The Detroit News, 8/7/88), this is less likely to occur. In these areas, nonbasic activities will be able to expand to meet the additional demand created by wages from increased basic activity. Furthermore, under conditions of higher unemployment, incommuting for work, which results in a greater percentage of wages being spent outside the region, is less likely to

occur. As a result, in areas characterized by "excess capacity," the nonbasic/basic ratio, and thus the multiplier, will tend to increase. However, it is important to keep in mind that to whatever extent data reporting idiosyncrasies result in the overestimation of the impact of basic income in rural areas, this impact is probably underestimated in the other areas.

As expected, the constant term was not significant for equations (8) and (9). However, when the dummy variables were incorporated, the constant was significant for most time periods. This indicates the existence of a significant level of nonbasic income which is related to those categories of basic income which had to be omitted from this analysis because of missing data. This problem occurred far more often in the rural and nonmetropolitan urban areas, and was therefore probably masked when dummy variables were not used.

The Long-Term Impact

This section of the analysis examines the impact of nonemployment income when it is measured over extended periods of time in order to include lagged effects. As in the first section, both aggregate nonemployment income and property and transfer income are investigated, and spatial variations in these impacts are identified. While the equations used in this analysis (numbers 12 through 15) parallel those used in the first phase, the form of the data is different. All income variables, instead of being

converted to per capita figures, are expressed as the change ratio over varying intervals of time.

Basic and Nonemployment Income

The fifth hypothesis stated that the long-term impact of nonemployment income would be greater than its short-term impact. This hypothesis was based upon the expectation that, in addition to its impact on consumption, nonemployment income would also affect internal factors that are likely to contribute to long-term growth, factors such as income levels and economic diversification. This hypothesis was tested by regressing change in nonbasic income, over varying time periods, on change in nonemployment income for corresponding intervals. Two series of intervals were used (Base59 and End86), with both simple and multiple regression. When simple regression was used, the Base59 series produced no significant coefficients for nonemployment income over any of the time periods. With the End86 series, however, several of the intervals were significant, beginning with the three year time period. In comparison, none of the coefficients for the one-year intervals were significant.

When the same comparison is made based upon the multiple regression series, using equation (12), reproduced here,

$$\Delta NB_t = a_t + b_{1t}\Delta B_t + b_{2t}\Delta NE_t + e_t$$

substantially the same pattern is found. The short-term (1-year) intervals produced no significant coefficients, and

the Base59 series again produced no significant long-term results for nonemployment income (Figure 7a). However, results of the End86 series (Figure 7b) indicate that the long-term impacts of both basic and nonemployment income are significant for many of the intervals. Since none of the one-year intervals were significant, hypothesis five can be accepted.

These results agree somewhat with results of both McNulty's research, which found significant coefficients for intervals of four years or greater, and the Moody and Puffer study, which suggested that the reaction time involved in the multiplier process was much longer than expected. However, although the long-term results are stronger than those for the one-year intervals, they generally decrease, rather than increase, as the intervals widen.

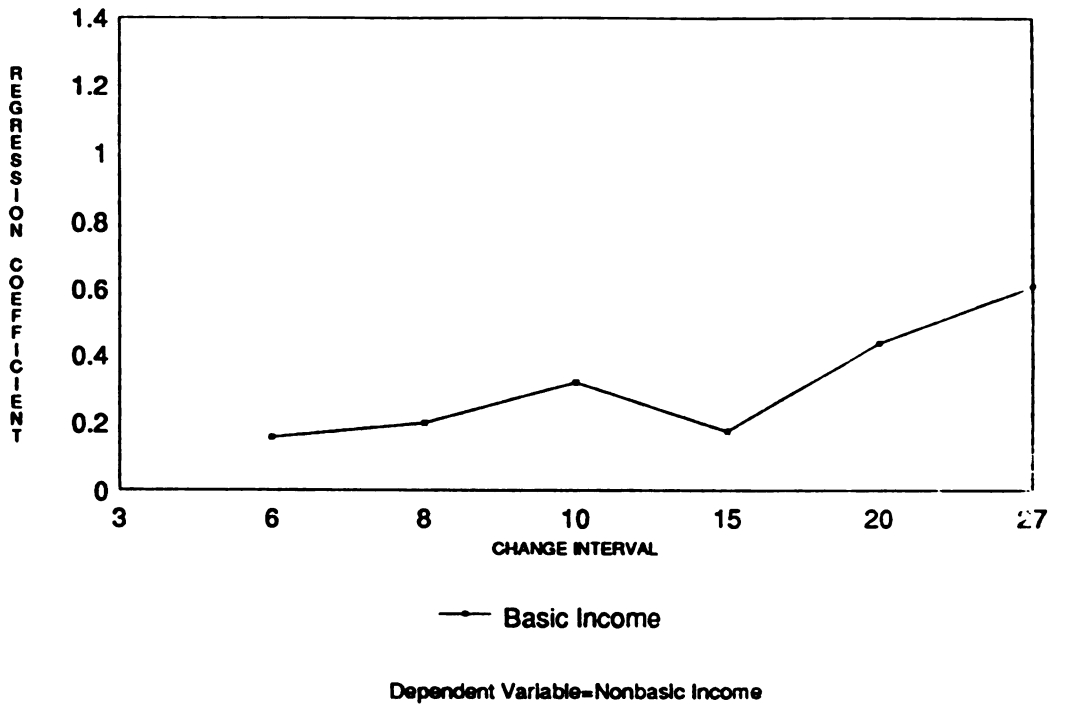
Property and Transfer Income

Hypothesis six stated that the long-term impact of property income would be greater than that of transfer income. This was tested with equation (13), reproduced here for the reader's convenience.

$$\Delta NB_t = a_t + b_{1t}\Delta B_t + b_{2t}\Delta PR_t + b_{3t}\Delta TR_t$$

As indicated by Figures 8a and 8b, transfer income's long-term impact is generally greater than the long-term impact of property income, particularly for the Base59 Series (in which the only significant coefficient for property income is at the six year interval and is negative). Thus hypothesis six must be rejected.

a. Base59 Series



b. End86 Series

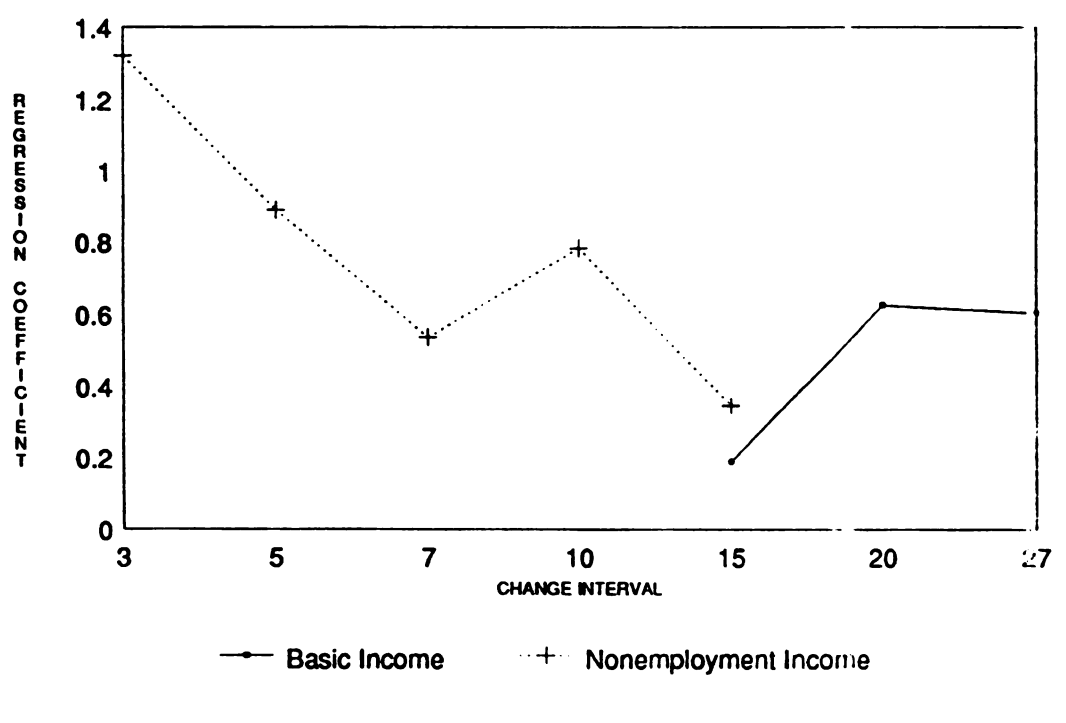
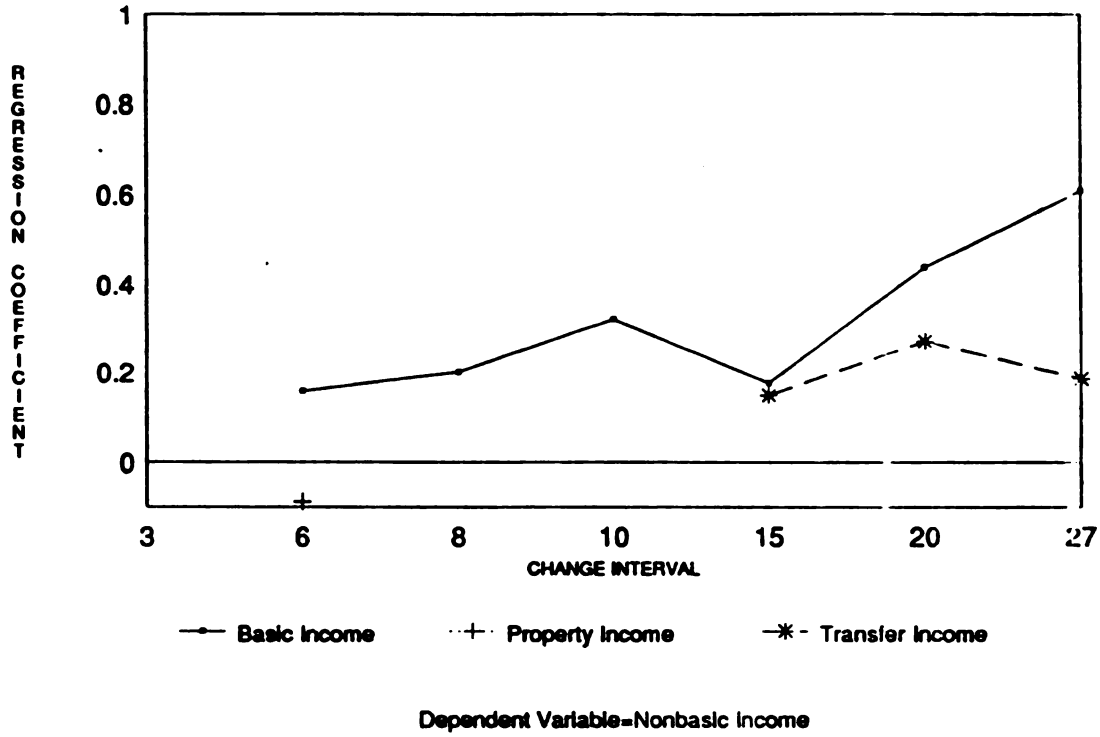


Figure 7. Regression Results: Equation 12

a. Base59 Series



b. End86 Series

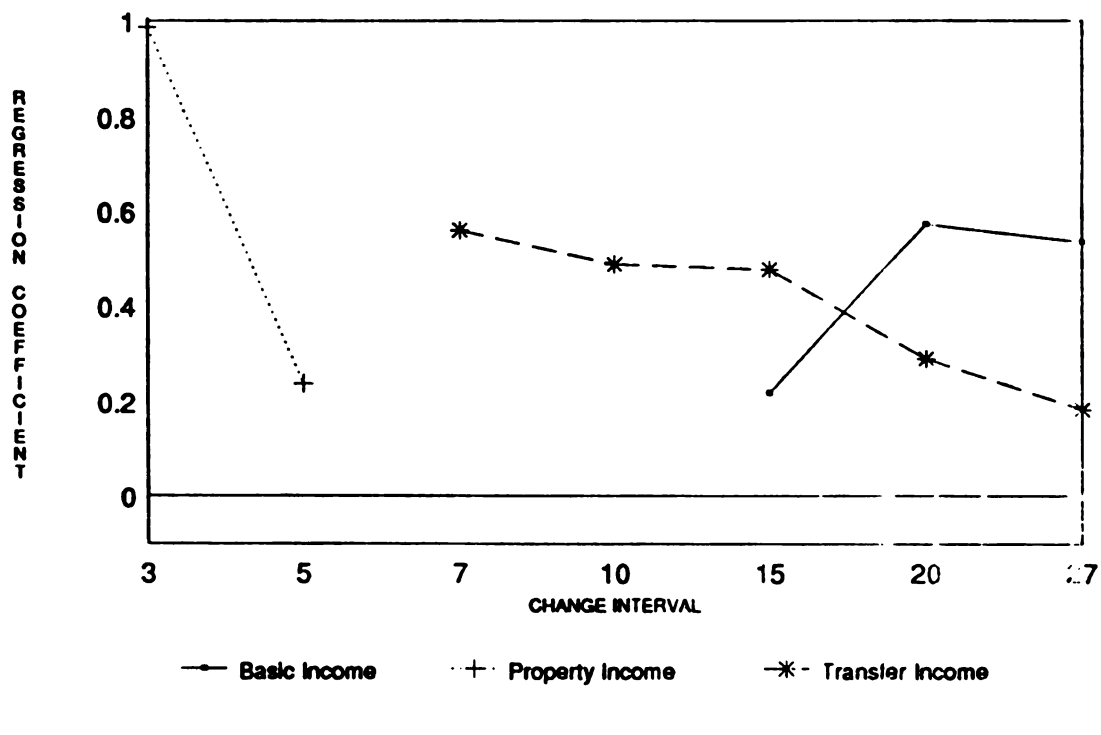


Figure 8. Regression Results: Equation 13

That property income does not appear to have a stronger impact than transfer income in the long run is contrary not only to the hypothesis proposed by this study but also to McNulty's (1977) findings. McNulty found that property income was highly significant in four of the five intervals of four years or more, while transfer income was significant for only two of these periods. Some of the differences between McNulty's findings and the results of this study might be accounted for by the differences in study areas, since McNulty's study included only SMSA counties.

The primary theoretical reasons for the hypothesis that property income would generate more nonbasic income over time than would transfer income had to do with its potential impact on the region's supply of capital. Rejection of this hypothesis suggests either that property income is not associated with increased levels of local investment (to a greater extent than is transfer income), or that the supply of capital at the local level is not particularly relevant to a region's development. Just as migrants to a region may retain previously established shopping patterns, so might they also adhere to previous investment arrangements, and probably more easily, since investment generally is not as dependent upon spatial proximity as is consumption.

Differences in the profiles of property and transfer income recipients might also provide some of the explanation for the stronger long-term impact of transfer income. These differences were discussed previously when comparing

recipients of nonemployment income in aggregate with recipients of basic income. Property income recipients are more likely to also be wage-earners, and employed people, as pointed out by Boehm and Pond, are more likely to spend nonlocally.

Spatial Variation

To examine how the long-term impacts of basic and nonemployment income vary over space, equation (14), reproduced below, was employed.

$$\Delta NB_t = a_t + b_{1t}\Delta B_t + b_{2t}\Delta NE_t + b_3 D_1 + b_4 D_2 + b_{5t} D_1 \Delta B_t + b_{6t} D_1 \Delta NE_t + b_{7t} D_2 \Delta B_t + b_{8t} D_2 \Delta NE_t + e_t$$

For nonemployment income, the differences in multiplier impacts among urban, rural, and nonmetropolitan urban counties, seen in the first phase of the analysis, have disappeared. As seen in Figure 9, no significant differences were apparent for any of the intervals.

For basic income, however, distinct spatial patterns are still evident in the long-term, although they are not the same patterns evidenced in the first phase of the analysis (compare Figure 5 to Figure 9). In that analysis, basic income's impact was weakest in the nonmetropolitan urban areas. When measuring long-term impacts, however, its impact is weakest in the rural counties. When the time interval examined is increased, basic income's impact in the nonmetropolitan areas appears to increase, and by the 20 and 27 year intervals, this impact is equal to that found in

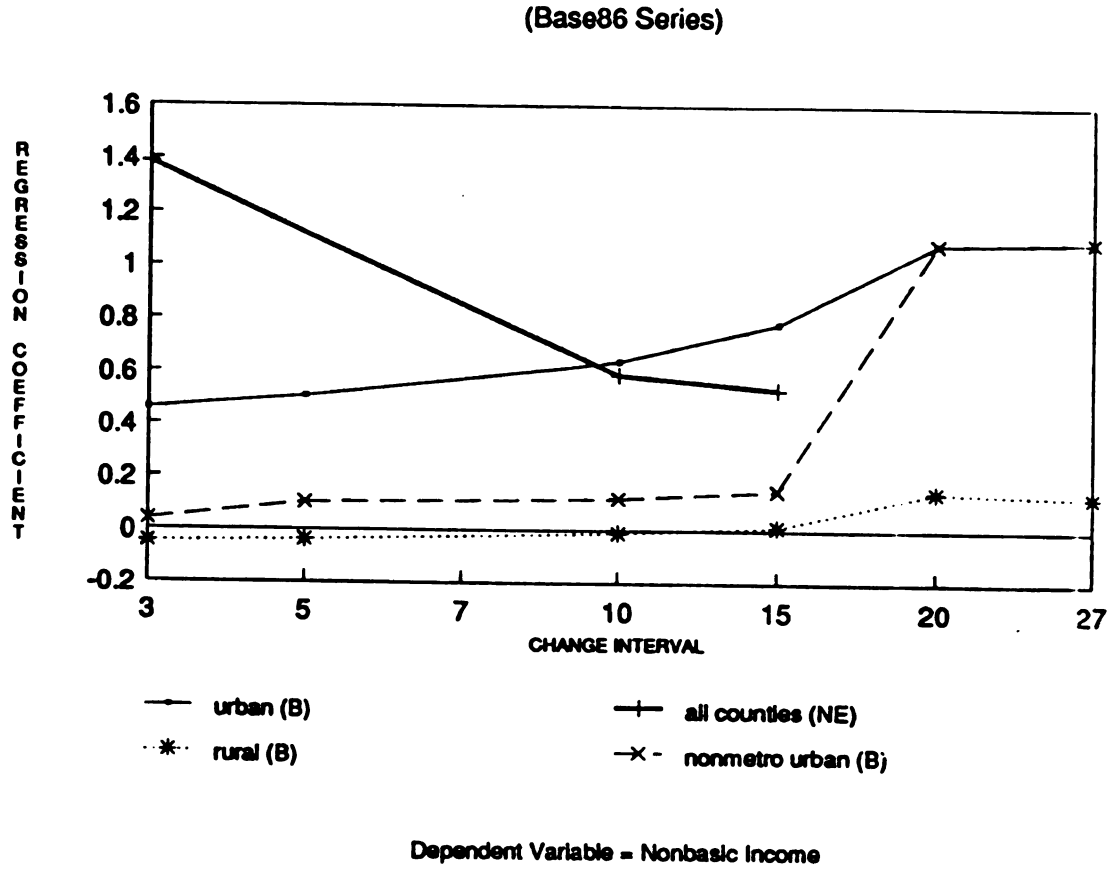


Figure 9. Regression Results: Equation 14

urban areas. It is possible that this change is related to the increasing decentralization of people to nonmetropolitan urban areas, a trend that has been increasing since the beginning of the study period (Keinath, 1982). This decentralization would probably result in a decrease in spending leakages, as the area would be less likely to import labor, and therefore more of the earned income would remain in the region.

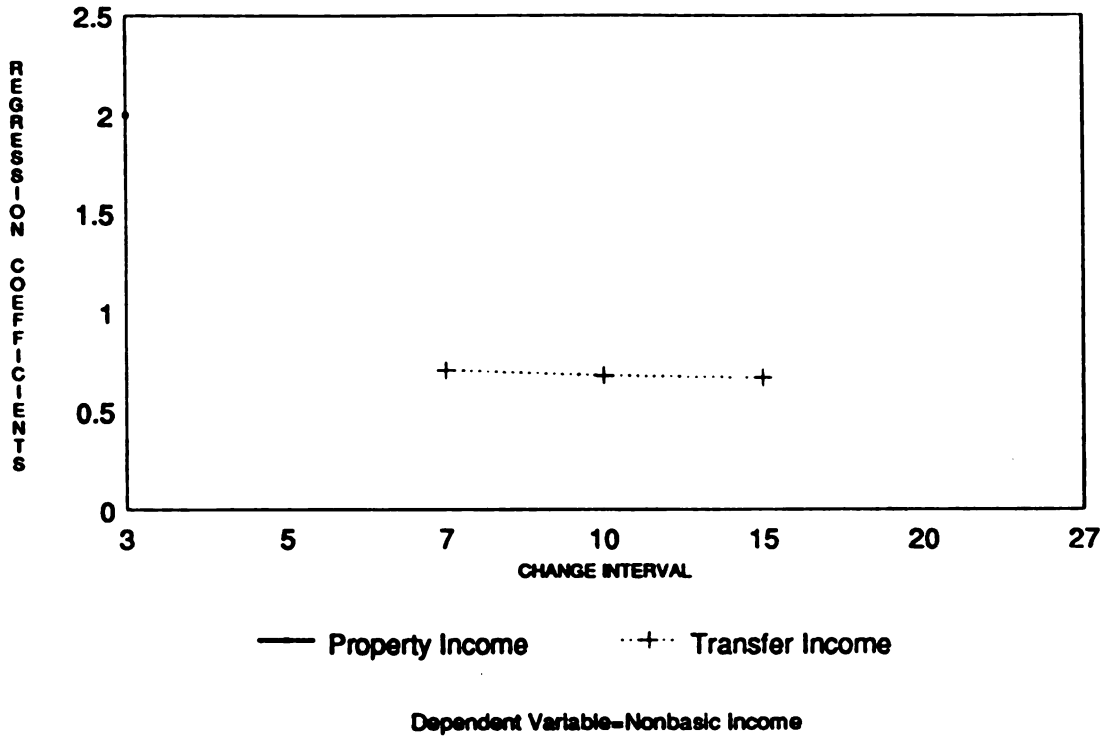
The effect of county size on the long-term impacts of property and transfer income is tested by equation (15), shown below.

$$\Delta NB_t = a_t + b_{1t}\Delta B_t + b_{2t}\Delta PR_t + b_{3t}\Delta TR_t + b_4 D_1 + b_5 D_2 + b_{6t} D_1 \Delta B_t + b_{7t} D_1 \Delta PR_t + b_{8t} D_1 \Delta TR_t + b_{9t} D_2 \Delta B_t + b_{10t} D_2 \Delta PT_t + b_{11t} D_2 \Delta TR_t + e_t$$

It appears that property income's impact is weakest in the rural areas (see Figure 10), and is not significant after the three year interval except in the nonmetropolitan urban counties. Transfer income, in contrast, is significant for several of the intervals in all types of counties, and is strongest in the rural counties at the five year interval. This represents a change from the first phase of the analysis, in which property income displayed a stronger impact in the rural areas than did transfer income.

The constant term was not significant in any of the long-term results when the End86 series was used. However, for many of the intervals in the Base59 series, particularly the earlier years, it was significant. Again, this is assumed to be a reflection of missing data, a problem which occurred far more often in the earlier years of the study period.

a. Urban (End86 Series)



b. Nonmetropolitan Urban (End86 Series)

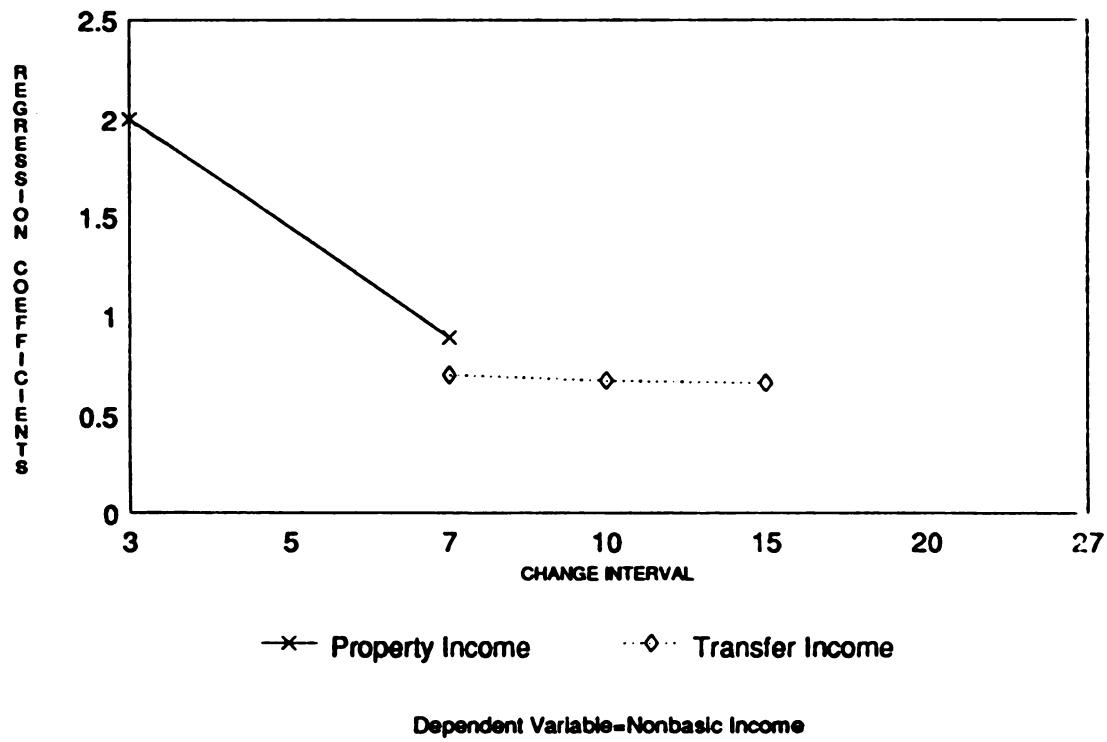
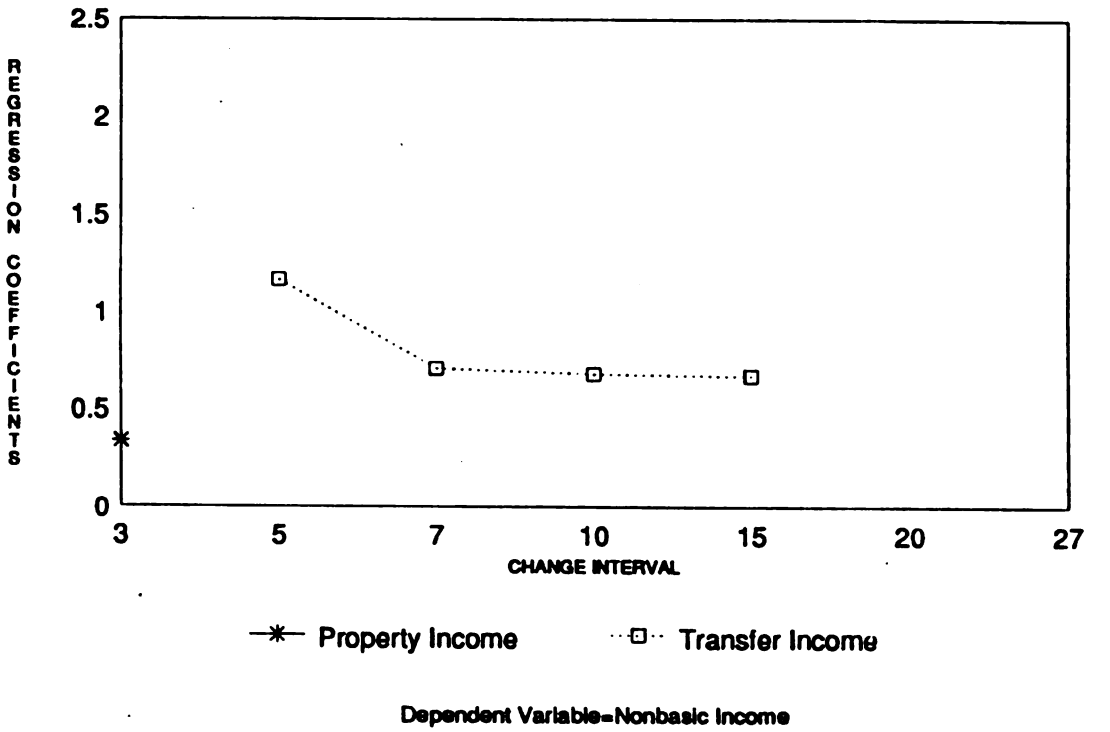


Figure 10. Regression Results: Equation 15

Figure 10 (con't.)

c. Rural (End86 Series)



CHAPTER V

SUMMARY AND CONCLUSION

Summary

This study has examined nonemployment income as a factor in the economic base of Michigan counties, analyzing it within the framework of economic base theory. Until recently, this type of income was largely ignored in economic base studies, despite the fact that it currently makes up approximately one third of all personal income. Failing to consider an income source of this magnitude when identifying a region's economic base presents an incomplete picture of the region's economic structure and results in the estimation of erroneous, usually inflated, multipliers for its traditional basic sectors.

Within the economic base framework, nonemployment income was treated as a basic sector, since it brings money into a region from outside and will have a multiplier effect associated with it when it is spent in the local area. Regression analysis was employed to estimate coefficients which approximate the sectoral multipliers, both for nonemployment income and for basic income. Nonemployment income was disaggregated into property and transfer income, and the impacts of these types of income were also estimated. Multiplier impacts for a 27-year period, as well as changes in these impacts over varying intervals, were examined. Variation in impacts over space were also

considered, with counties classified as urban (SMA), rural, or nonmetropolitan urban.

The first phase of the analysis examined the impacts of basic and nonemployment income over the period from 1959 to 1986. Like the few recent studies which have considered nonemployment income in regional analyses, this study found that nonemployment income does have considerable impact on the local economy. The multiplier impacts estimated for nonemployment income over this period indicate that this type of income not only has a significant impact, but that it is stronger than that of basic income for most years. This was the expected finding, since it was argued that nonemployment income recipients would be more likely to spend locally. This argument was based upon the fact that they would be less likely to be working (and thus trips to work did not take them out of the area) and because, as a group, they were expected to be older and less mobile. Other reasons why this analysis might be expected to result in greater multiplier impacts for nonemployment income relate to differences in the reporting of the two types of income, discussed in Chapter IV.

A somewhat surprising finding was that, although since 1959, nonemployment income has been increasing at a much faster rate than any type of basic income, its overall impact, relative to the impact of basic income, has not been increasing. Perhaps recipients of nonemployment income are becoming more mobile and, therefore, tending to consume more

nonlocally. This explanation is consistent with socio-economic changes in the age group which is most strongly associated with such income. It is also consistent with results of the spatial analysis, which indicated that it is in the rural areas that nonemployment income's impact has decreased over the years. Since these are the areas which offer the least goods and services, they are most likely to be neglected when alternate shopping opportunities are more accesible. The spatial analysis indicates that in the urban and nonmetropolitan urban areas, the impact of nonemployment income is not declining, either absolutely or relative to that of basic income. The increasing relative impact of basic income can be attributed to its apparent increasing impact in rural areas (see Figure 5c, p. 58). In addition to the reasons discussed above, this is probably also the result of factors such as the "excess capacity" in rural areas; since such areas are less likely than urban or nonmetropolitan urban areas to be at full employment, new basic activity does not tend to shift employment away from the nonbasic inductries. Also, many residents of rural areas earn their wages outside of the area. While such income is reported in the area earned, much of it is probably spent in the area in which the wage-earner lives.

Counter to what was hypothesized, this study found that property income has a stronger impact than transfer income. As discussed in Chapter II, the expectation that transfer income's impact would be stronger was based upon the

argument that transfer income recipients would be more likely to consume locally than property income recipients. While this argument may be correct, increased local consumption may be offset by an increase in absolute spending on the part of property income recipients, whose overall personal income is somewhat higher than that of transfer income recipients. It may be, however, that differences in mobility between property and transfer income recipients, like the differences between basic income recipients and nonemployment income recipients in general, are not as significant as in previous years. Or that transfer income income recipients, more likely to have migrated from other areas at retirement, tend to return to these areas to shop. Stabler's study, which found that nonmetropolitan population growth in Canada did not significantly impact rural trade centers, supports this possibility.

The analysis of spatial variation in multiplier impacts indicated that both nonemployment income and basic income have greater multiplier effects in urban areas. However, nonemployment income is a stronger influence in nonmetropolitan urban areas than in rural counties, while basic income is stronger in the rural areas than in the nonmetropolitan urban areas. Property income is stronger in rural areas than transfer income, and in later years, also stronger than transfer income in the nonmetropolitan urban counties.

The second phase of the analysis examined the impact of changes in basic and nonemployment income over varying time intervals on changes in nonbasic income over the same intervals. As hypothesized, both property and transfer income, as well as aggregate nonemployment income, appear to have greater impacts on the nonbasic sectors when measured over intervals greater than one year. However, the long-term impact of property income was not, as hypothesized and as indicated by limited empirical evidence, stronger than that of transfer income. The impact of transfer income is not only much stronger than that of property income after a five-year interval, but is also stronger than that of basic income until a 20-year interval, after which the impact of basic income is stronger.

When long-term impacts of nonemployment income are examined, the effect of county size on this impact diminishes. Nonemployment income's impact in nonmetropolitan urban and rural counties is not significantly different from its impact in urban counties for any of the intervals examined. For basic income, however, this is not the case. The impact of basic income calculated over long-term intervals still varies with county size. This variation, however, is not the same as that seen in the first phase of the analysis, which indicated that basic income's weakest impact was in the nonmetropolitan urban areas. Basic income's impact in nonmetropolitan urban areas increases as the interval examined increases,

equalling that in the urban areas for the 20 and 27-year intervals.

Conclusions

The results of this study indicate that nonemployment income generates a significant amount of nonbasic income in a region's economy, and is a factor that needs to be considered in assessing the economic base of the region. In addition, the significant multiplier estimates that resulted from the long-run analysis indicate that nonemployment income may be a factor in long-term regional growth. There are, however, some conceptual difficulties with the using regression analysis to estimate comparative economic base multipliers for basic and nonemployment income.

One problem arises from the fact that nonemployment income is not totally analagous to income from basic sectors with respect to how it enters the local consumption sector. It is true that personal income from nonemployment income is spent in the local economy in the same manner as personal income from basic income, both types generating induced effects. However, changes in basic income, since they presumably result from changes in basic industry, are probably accompanied by changes in other nonbasic industries which provide inputs to the basic industry. Changes in nonemployment income, since they are not directly related to changes in an industry, are not as likely to be associated with such indirect effects. Using corporate income to measure basic activity presents other difficulties relating

to the comparability of the multipliers estimated for basic and nonemployment income. Ideally, nonemployment income needs to be assessed in the framework of an input/out model, with households treated as endogenous.

Another difficulty results from differences in income reporting. While nonemployment income is reported in the region in which its recipients reside, wage income is reported in the area where it is earned, which is not necessarily the area of residence. The bias that results from this is not geographically random. For basic income, the multiplier tends to be underestimated in nonmetropolitan areas and overestimated in rural areas. The reverse may be true for nonemployment income. Although it is received where it is reported, because it is calculated in relation to basic income, estimates of its impact will also contain some bias.

The spatial variation in multiplier impacts which is reflected in this study's results is not surprising; these results reinforced both existing theory and empirical evidence which indicate that higher order places will have larger multipliers (Bender, 1987; King, 1984; Richardson, 1985). However, the change that occurs in this pattern when these impacts are examined over longer time periods suggests that given time, the response in less developed regions will often equal that found in urban areas. The results further suggest that when nonemployment income is the stimulus, this response occurs more quickly than with basic income. Thus,

programs to attract and retain the recipients of nonemployment income would be particularly appropriate economic development strategies in the nonmetropolitan areas. However, it is important to allow a sufficient period of time (results of this study suggest three years) over which to measure the impact of this type of income. The impact occurring in a rural area over a given time period cannot be compared with the impact which will result in an urban area within the same period.

While not all of nonemployment income is received by retirees, a significant proportion of it is. A 1985 study prepared for the Michigan senate by the Hudson Institute stresses the fact that the shrinking workforce in the automotive industry is likely to result in large early retirement programs, and concludes, (p.xix):

> Whether the large numbers of social security and pension checks due to auto industry retirees are mailed to addresses in Tucson or Traverse City will have a great impact on the economic health of the state over the next twenty years.

According to this report, the relative rate of increase of the age group receiving a significant proportion of nonemployment income is expected to be greater in Michigan than nationally, due to the out-migration of younger people looking for employment. This potential change in Michigan's demographic structure takes on added significance considering that "The elderly are now less poor - after taking non-cash benefits into account - than the rest of the U.S. population ..." (Downs, 1983, p.4).

Further study to identify which nonbasic sectors would be most likely to respond to increases in nonemployment income would be extremely useful. Small businesses, because their workforces are not dependent upon such a large population base, and because they generally place less stress on the environment, would seem appropriate in areas hoping to attract retirees. And, since small businesses are more dependent upon levels of local investment (Thompson, 1965; Clark, Gertler and Whiteman, 1986), they might attract some of the investment income that leaves the area.

Although considering nonemployment income recipients as consumers and attempting to identify which goods and services they might consume is an important area for further research, it is not the only approach to attracting this group of people. At least as important (and possibly more so to them) are policies that will allow them not to spend their money, e.g. tax breaks for the elderly in such areas as real estate, state intangibles, and inheritance taxes. In a current dispute related to these issues, a Michigan congressman has stated that repeal of the inheritance tax would benefit the state by removing an incentive for retirees to leave the state (Lansing State Journal, 16 December 1988, p. B4). Determining whether the cost to the state in lost revenues would be offset by the economic benefit which would result from the income of these retirees will require a more accurate means of assessing the impact of this type of income.

Other factors to consider in attracting recipients of nonemployment income center on cultural, recreational, environomental, and general quality of life considerations, i.e amenities. These factors have been increasing in importance as people live longer, are more active and have more time for leisure activities, and have more money to spend. Since retirees' choice of residence is not constrained by the need to locate near employment, amenity areas become extremely important as potential places of residence for this group. Policies geared to control development will be important. In some cases, the quality of life may be increased by further development, especially that providing greater cultural or educational opportunities. In other cases, the opposite may be true if too much development leads to degradation of the environmemt and deterioration of the qualities that are most attractive to those likely to migrate. As stressed by Conley (1988, p.8), an important area of research with respect to local economic development is "...the need to assess the interrelationships between human resource and quality of life issues and the local economy."

Because it has many areas of great natural beauty, and a relatively well-developed intrastate highway system which makes such areas accessible, Michigan might be said to enjoy a comparative advantage with respect to nonemployment income. And the fact that its climate is not as temperate as that found in many parts of the sunbelt is at least

somewhat offset by a lower cost of living than is found in many of those areas. As a result of both its geographic attractiveness and its demographic profile, nonemployment income is not only currently a significant factor in Michigan's economy, but it has the potential of becoming even more important in the future.

BIBLIOGRAPHY

Bain, John S. (1984). "Transfer Payment Impacts on Rural Retail Markets: A Regression Analysis." Regional Science Perspectives, 14, 1, 3-17.

Bender, Lloyd D. and Larry C. Parcels (1983). "Structural Differences and the Time Pattern of Basic Employment." Land Economics, 59, 2, 220-234.

Bender, Lloyd D. (1987). "The Role of Services in Rural Development Policies." Land Economics, 63, 1, 62-71.

Beyers, William B. (1979). "Contemporary Trends in the Regional Economic Development of the United States." Professional Geographer, 31, 34-44.

Bluestone, Herman (1979). "Income Growth in Nonmetro America, 1968-1975." Rural Development Research Report No.14, Department of Agriculture, Washington D.C.

Clark, Gordon L. and Meric S. Gertler and John Whiteman (1986). Regional Dynamics: Studies in Adjustment Theory: Allen and Unwin.

Conley, Gary N. (1988). "Economic Theory and Data." Economic Development Commentary, 12, 2, 5-8.

Davies, James B.(1981). "Uncertain Lifetime Consumption and Dissaving in Retirement." Journal of Political Economy, 89, 3.

Doeksen, Gerald A. and Vanessa Lenard (1980). Presented at Ozark Regional Commission's Governors Conference on Aging in Kansas City, Oct. 30.

Downs, Anthony (1988). "The Outlook for Economic Development: What Lies Ahead?" Economic Development Commentary, 12, 2, 3-4.

Erdevig, Eleanor H. (1987). "Service Sector Growth in the Seventh District." FRB Chicago Economic Perspectives, September/October, 15-26,

Forward, Charles N. (1982). "The Importance of Nonemployment Sources of Income in Canadian Metropolitan Areas." Professional Geographer, 34, 289-96.

Gerking, Shelby D. and Andrew M. Isserman (1981). "Bifurcation and the Time Pattern of Impacts in the Economic Base Model." Journal of Regional Science, 21, 4, 451-467.

Gertler, Meric S. (1987). "Capital, Technology and Industry Dynamics in Regional Development." Urban Geography, 8, 3, 251-63.

Giarratani, Frank and Paul D. McNelis (1980). "Time Series Evidence Bearing on Crude Theories of Regional Growth." Land Economics, 56, 2, 238-48.

Gibson, Lay James and Marshall A. Worden (1981). "Estimating the Economic Base Multiplier: A Test of Alternative Procedures." Economic Geography, 57, 146-59.

Gujarati, Damodar (1978). Basic Econometrics. New York: McGraw Hill Book Company.

Hamermesh, Daniel S. (1982). "Life-cycle Effects on Consumption and Retirement." NBER Working Paper No. 976, September, 1-28.

Harmston, Floyd K. (1979). "A Study of the Impact of Retired People on a Small Community." Presentation to Midcontinent Regional Science Association.

Harris, R.I.D. (1987). "The Role of Manufacturing in Regional Growth." Regional Studies, 21, 4, 301-312.

Harvey, Andrew S. (1973). "Spatial Variations of Export Employment Multipliers: A Cross-sectional Analysis." Land Economics, 49, 469-74.

Henry, Mark S. and J.C.O. Nyankori (1981). "The Existence of Short-Run Economic Base Multipliers: Some New Empirical Evidence." Land Economics, 57, 3, 448-58.

Hirschl, Thomas A. and Gene F. Summers (1982). "Cash Transfers and the Export Base of Small Communities." Rural Sociology, 47, 295-316.

Hudson Institute Final Report (1985). Michigan Beyond 2000. Indianapolis: Hudson Institute Incorporated.

Isserman, Andrew M. (1980). "Estimating Export Activity in a Regional Economy: A Theoretical and Empirical Analysis of Alternative Methods." International Regional Science Review, 5, 2, 155-84.

Keinath, William F. Jr. (1982). "The Spatial Component of the Post-industrial Society." Economic Geography, July, 223-239.

Lane, Theodore (1966). "The Urban Base Multiplier: An Evaluation of the State of the Art." Land Economics, 42, 3, 339-47.

Leven, Charles L. (1985). "Regional Development Analysis and Policy." Journal of Regional Science, 25, 4, 569-92.

Manson, Gary (1986). "Nonemployment Income in Michigan." The East Lakes Geographer, 21, 49-53.

_____ and Richard Groop (1987). "Nonemployment Income and Migration in Michigan." The East Lakes Geographer, 22, p. 103-109.

McCarthy, Kevin F. and Peter A. Morrison (1977). "The Changing Demographic and Economic Structure of Nonmetropolitan Areas in the United States." International Regional Science Review, 2, 2, 123-42.

McConnel, Charles E. and Firooz Deljavin (1983). "Consumption Patterns of the Retired Household." Journal of Gerontology, 38, 4, 480-90.

McNulty, James E. (1977). "A Test of the Time Dimension in Economic Base Analysis." Land Economics. 53, 3, 359-68.

Moody, Harold T. and Frank W. Puffer (1970). "The Empirical Verification of the Urban Base Multiplier: Traditional and Adjustment Process Models." Land Economics, 46, 91-98.

Moore, Craig L. (1979). "Banking and the Regional Income Multiplier." Northeast Regional Science Review, 9, 1-7.

Mulligan, Gordon F. and Lay James Gibson (1984). "Regression Estimates of Economic Base Multipliers for Small Communities." Economic Geography. 60, 225-37.

Mulligan, Gordon F. (1987). "Employment Multipliers and Functional Types of Communities: Effects of Public Transfer Payments." Growth and Change. summer, 1-11.

Norcliffe, Glen B. (1984). "Nonmetropolitan Industrialization and the Theory of Production." Urban Geography, 5, 1, 25-42.

Pleeter, Saul (1980). "Methodologies of Economic Impact Analysis: An Overview." Economic Impact Analysis: Methodology and Applications (Saul Pleeter, ed.), Boston: Martinus Nijhoff Publishing.

Richardson, Harry W. (1985). "Input-Output and Economic Base Multipliers: Looking Backward and Forward." Journal of Regional Science, 25, 4, 607-661.

_____ (1978). "The State of Regional Economics: A Survey Article." International Regional Science Review, 3, 1, 1-48.

Roepke, Howard G. and David A. Freudenberg (1981). "The Employment Structure of Nonmetropolitan Counties. Annals of A.A.G., 71, 580-92.

Sasaki, Kyohei (1963). "Military Expenditures and the Employment Multiplier in Hawaii." Review of Economics and Statistics, 45, 298-304.

Shahidsaless, Shahin, William Gillis, and Ron Shaffer (1983). "Community Characteristics and Employment Multipliers in Nonmetropolitan Counties, 1950-1970." Land Economics, 59, 1, 84-93.

Smeeding, Timothy M. and Barbara Boyle Torrey (1988). "An International Perspective on the Income and Poverty Status of the U.S. Aged." Economic Outlook USA, 14, 4, 13-19.

Stabler, Jack C. (1987). "Nonmetropolitan Population Growth and the Evolution of Rural Service Centres in the Canadian Prairie Region." Regional Studies, 21, 1, 43-53.

Stevens, Benjamin H. and Michael L. Lahr (1988). "Regional Economic Multipliers: Definition, Measurement, and Application." Economic Development Quarterly, 2, 1, 88-96.

Tiebout, Charles M. (1962). The Community Economic Base Study. New York: Committee for Economic Development.

Thompson, Wilbur R. (1965). A Preface to Urban Economics, Baltimore: The Johns Hopkins Press.

Ullman, Edward L., Michael F. Dacey and Harold Brodsky (1971). The Economic Base of American Cities. Seattle: Center for Urban and Regional Research, University of Washington.

U.S. Department of Commerce, Bureau of Economic Analysis (1959-1984). "Local Area Personal Income."

APPENDIX A

Table A1. County Classification

County	D1	D2	County	D1	D2
Alcona	1	0	Lake	1	0
Alger	1	0	Lapeer	0	0
Allegan	1	0	Leelanau	1	0
Alpena	0	1	Lenawee	0	1
Antrim	1	0	Livingston	0	0
Arenac	1	0	Luce	1	0
Baraga	1	0	Mackinac	1	0
Barry	1	0	Macomb	0	0
Bay	0	0	Manistee	1	0
Benzie	1	0	Marquette	0	1
Berrien	0	0	Mason	0	1
Branch	0	1	Mecosta	0	1
Calhoun	0	0	Menominee	0	1
Cass	1	0	Midland	0	0
Charlevoix	1	0	Missaukee	1	0
Cheboygan	1	0	Monroe	0	0
Chippewa	0	1	Montcalm	1	0
Clare	1	0	Montmorency	1	0
Clinton	0	0	Muskegon	0	0
Crawford	1	0	Newaygo	1	0
Delta	0	1	Oakland	0	0
Dickinson	1	0	Oceana	1	0
Eaton	0	0	Ogemaw	1	0
Emmet	1	0	Ontonagon	1	0
Genesee	0	0	Osceola	1	0
Gladwin	1	0	Oscoda	1	0
Goebic	1	0	Otsego	1	0
Grand Traverse	0	1	Ottawa	0	0
Gratiot	1	0	Presque Isle	1	0
Hillsdale	1	0	Roscommon	1	0
Houghton	1	0	Saginaw	0	0
Huron	1	0	St. Clair	0	0
Ingham	0	0	St. Joseph	1	0
Ionia	1	0	Sanilac	1	0
Iosco	1	0	Schoolcraft	1	0
Iron	1	0	Shiawasee	0	1
Isabella	0	1	Tuscola	1	0
Jackson	0	0	Vanburen	1	0
Kalamazoo	0	0	Washtenaw	0	0
Kalkaska	1	0	Wayne	0	0
Kent	0	0	Wexford	0	1
Keweenaw	1	0			

1,0 = rural
0,1 = nonmetropolitan urban
0,0 = urban (MSA)

APPENDIX B

Table B1. Regression Results - Equation (8)

t	a	B	NE	R2	F
1959	-27.773	.160	1.457		
	(105.078)	(.057)**	(.280)**	.401	18.097
1962	-93.321	.149	1.485		
	(122.240)	(.058)*	(.292)**	.392	17.095
1965	-73.080	.197	1.300		
	(151.374)	(.059)**	(.293)**	.376	16.347
1966	-104.912	.203	1.299		
	(177.287)	(.062)**	(.306)**	.341	14.215
1967	-179.226	.229	1.315		
	(211.031)	(.066)**	(.325)**	.326	13.344
1968	-138.273	.229	1.167		
	(243.609)	(.068)**	(.330)**	.286	11.007
1969	-30.362	.266	.967		
	(197.447)	(.058)**	(.222)**	.312	16.843
1970	-174.711	.302	1.030		
	(239.866)	(.067)**	(.246)**	.298	15.836
1971	-170.350	.307	1.001		
	(275.757)	(.071)	(.257)**	.277	14.209
1972	-233.426	.311	1.049		
	(309.961)	(.072)**	(.267)**	.277	14.239
1973	-322.073	.335	1.030		
	(334.083)	(.065)**	(.258)**	.316	17.179
1974	-255.645	.350	.848		
	(364.725)	(.069)**	(.239)**	.295	15.673
1975	-204.122	.387	.719		
	(423.346)	(.078)**	(.235)**	.274	14.023
1976	-95.248	.398	.657		
	(427.832)	(.069)**	(.220)**	.322	17.612
1977	-92.470	.428	.639		
	(469.114)	(.068)**	(.223)**	.357	20.470
1978	-253.330	.445	.735		
	(552.744)	(.072)**	(.247)**	.366	20.954
1979	-344.968	.484	.698		
	(600.456)	(.071)**	(.238)**	.404	24.406
1980	124.832	.498	.419		
	(606.891)	(.077)**	(.192)*	.370	21.519
1981	-67.981	.513	.426		
	(621.568)	(.075)**	(.170)*	.394	23.726
1982	-326.376	.590	.454		
	(717.656)	(.088)**	(.183)*	.400	23.011
1983	-375.141	.593	.478		
	(732.992)	(.082)**	(.174)**	.430	26.322
1984	-325.555	.557	.456		
	(752.822)	(.077)**	(.170)**	.434	26.730
1985	-.819	.542	.590		
	(.893)	(.077)**	(.189)**	.423	26.243
1986	-1.361	.582	.707		
	(1.016)	(.086)**	(.213)**	.412	25.152

*Significant at .95
**Significant at .99
()Standard Error of Coefficient

Table B2. Regression Results - Equation (9)

t	a	B	PR	TR	R2	F
1959	-152.818	.200	1.403	2.118		
	(168.818)	(.071)**	(.286)**	(.753)**	.400	12.338
1962	-222.516	.185	1.374	1.990		
	(189.128)	(.071)*	(.295)**	(.715)**	.389	11.618
1965	-144.064	.218	1.258	1.609		
	(207.768)	(.072)**	(.307)**	(.681)*	.366	10.817
1966	-185.814	.224	1.256	1.620		
	(243.212)	(.076)**	(.321)**	(.722)*	.331	9.410
1967	-239.904	.247	1.273	1.534		
	(265.535)	(.081)**	(.346)**	(.660)*	.314	8.790
1968	-97.070	.213	1.238	.991		
	(279.169)	(.085)*	(.402)**	(.656)	.272	7.232
1969	115.266	.204	1.216	.462		
	(222.407)	(.072)**	(.285)**	(.426)	.321	12.024
1970	-4.671	.233	1.351	.479		
	(257.601)	(.078)**	(.309)**	(.409)	.316	11.772
1971	-7.064	.241	1.385	.467		
	(287.338)	(.079)**	(.336)**	(.297)	.298	10.775
1972	-24.793	.241	1.507	.423		
	(320.075)	(.078)**	(.346)**	(.405)	.309	11.298
1973	-143.051	.261	1.630	.393		
	(327.870)	(.068)**	(.338)**	(.348)	.370	14.709
1974	-37.756	.275	1.433	.235		
	(360.261)	(.072)**	(.322)**	(.330)	.350	13.564
1975	-61.162	.316	1.520	.137		
	(406.256)	(.070)**	(.340)**	(.275)	.392	16.045
1976	-4.122	.325	1.457	.125		
	(406.256)	(.070)**	(.340)**	(.275)	.392	16.045
1977	95.300	.343	1.477	-.024		
	(443.447)	(.069)**	(.333)**	(.293)	.436	19.016
1978	-130.053	.353	1.639	.054		
	(515.823)	(.072)**	(.354)**	(.306)	.451	19.897
1979	-235.002	.399	1.570	.032		
	(556.860)	(.071)**	(.333)**	(.291)	.489	23.030
1980	198.953	.426	1.168	-.111		
	(570.593)	(.075)**	(.298)**	(.246)	.444	19.609
1981	63.691	.423	1.108	-.113		
	(578.931)	(.074)**	(.254)**	(.223)	.476	22.225
1982	-279.659	.468	1.359	-.151		
	(645.003)	(.085)**	(.278)**	(.223)	.516	24.416
1983	-454.352	.511	1.265	-.027		
	(663.842)	(.077)**	(.255)**	(.204)	.533	26.521
1984	-393.088	.461	1.180	-.035		
	(692.194)	(.076)**	(.255)**	(.207)	.522	25.408
1985	-1036.32	.392	1.594	-.013		
	(772.140	(.077)**	(.291)**	(.221)	.539	27.926
1986	-864.787	.449	1.547	-.090		
	(940.461)	(.086)**	(.298)**	(.290)	.507	24.613

*Significant at .95
**Significant at .99
()Standard Error of Coefficient

Table 83. Regression Results - Equation 10

t	a	B	ME	D1	D2	D1B	D1ME	D2B	D2ME	R2	F
1959	59.281	.180	1.205	-117.697	-324.055	-.100	.349	-.184	1.463		
	(182.061)	(.080)*	(.433)**	(280.058)	(504.039)	(.177)	(.647)	(.256)	(1.568)	0.382	5.109
1962	86.865	.158	1.024	-348.419	-431.632	-.070	.756	-.181	1.471		
	(186.695)	(.079)*	(.390)*	(320.659)	(543.850)	(.166)	(.681)	(.242)	(1.442)	0.411	5.368
1965	31.678	.223	1.093	-176.299	-259.713	-.137	.370	-.290	1.140		
	(220.080)	(.083)*	(.389)**	(404.402)	(621.755)	(.190)	(.681)	(.227)	(1.393)	0.306	5.214
1966	5.081	.241	1.071	-55.081	-662.665	-.192	.206	-.292	1.881		
	(254.850)	(.088)**	(.407)*	(441.054)	(789.673)	(.187)	(.677)	(.219)	(1.532)	0.373	4.784
1967	-109.150	.263	1.193	70.287	-516.271	-.223	-.014	-.316	1.437		
	(313.461)	(.093)**	(.465)*	(520.111)	(871.967)	(.213)	(.716)	(.238)	(1.700)	0.360	4.432
1968	-192.567	.221	1.368	175.118	-743.694	-.205	-.297	-.332	1.616		
	(367.690)	(.092)*	(.538)*	(586.920)	(1037.767)	(.220)	(.740)	(.247)	(1.694)	0.357	4.474
1969	-713.743	.196	2.110	885.540	-448.579	-.115	-1.327	-.320	1.026		
	(436.318)	(.088)*	(.588)**	(610.285)	(786.789)	(.150)	(.639)*	(.200)	(1.113)	0.486	8.622
1970	-1086.443	.200	2.396	1166.422	-319.523	-.118	-1.580	-.329	.767		
	(481.991)*	(.097)*	(.586)**	(574.964)*	(768.954)	(.162)	(.647)*	(.213)	(.975)	0.511	10.158
1971	-1244.105	.195	2.443	1374.577	-443.501	-.142	-1.683	-.437	.933		
	(548.582)*	(.098)*	(.610)**	(663.269)*	(875.031)	(.182)	(.677)*	(.251)	(1.014)	0.501	9.647
1972	-1317.522	.196	2.434	1357.955	-642.193	-.085	-1.609	-.422	1.128		
	(589.683)*	(.102)*	(.609)**	(731.556)*	(944.890)	(.183)	(.687)*	(.234)*	(1.006)	0.505	9.806
1973	-1551.140	.197	2.515	1527.752	-412.801	-.050	-1.708	-.406	.770		
	(555.943)**	(.091)*	(.533)**	(743.224)*	(937.001)	(.163)	(.625)**	(.197)*	(.907)	0.567	12.447
1974	-1827.162	.172	2.472	1738.286	-122.316	.000	-1.735	-.486	.446		
	(602.177)**	(.094)*	(.491)**	(783.417)*	(1026.840)	(.155)	(.568)**	(.236)*	(.872)	0.589	12.543
1975	-2545.020	.095	2.775	2550.565	274.596	.063	-2.176	-.509	-.006		
	(643.513)**	(.096)	(.452)**	(872.837)**	(1123.965)	(.181)	(.533)**	(.255)*	(.811)	0.606	14.373
1976	-2766.301	.127	2.822	3000.202	453.337	.053	-2.328	-.433	-.151		
	(717.701)**	(.087)	(.477)**	(912.833)**	(1165.755)	(.171)	(.538)**	(.223)*	(.769)	0.629	15.864
1977	-3213.472	.208	2.891	3545.823	108.413	-.050	-2.413	-.570	.208		
	(841.654)**	(.086)*	(.525)**	(1041.499)**	(1383.137)	(.166)	(.576)**	(.230)*	(.855)	0.646	17.123
1978	-3227.506	.191	2.844	3595.522	442.134	-.060	-2.325	-.406	-.151		
	(930.643)**	(.094)*	(.536)**	(1173.711)**	(1561.028)	(.181)	(.600)**	(.247)	(.874)	0.631	15.776
1979	-3167.174	.253	2.481	3315.846	836.085	-.041	-1.942	-.462	-.248		
	(1051.084)**	(.100)*	(.532)**	(1314.846)*	(1703.021)	(.185)	(.596)**	(.248)*	(.832)	0.625	15.359
1980	-2741.977	.247	1.890	3263.248	310.964	-.029	-1.567	-.500	.021		
	(1170.630)*	(.115)*	(.485)**	(1418.567)*	(2114.966)	(.201)	(.532)**	(.308)	(.847)	0.583	12.261
1981	-3331.717	.278	1.850	3878.795	1293.300	-.070	-1.559	-.575	-.248		
	(1212.322)**	(.108)*	(.431)**	(1494.367)*	(2049.403)	(.207)	(.476)**	(.287)*	(.726)	0.581	13.637
1982	-3305.665	.339	1.651	2879.544	1616.661	.073	-1.180	-.616	-.309		
	(1462.706)*	(.147)*	(.480)**	(1781.572)	(2568.550)	(.245)	(.531)*	(.385)	(.844)	0.524	10.085
1983	-3620.975	.328	1.707	3075.242	1438.684	.155	-1.216	-.582	-.281		
	(1521.501)*	(.131)*	(.460)**	(1834.969)	(2730.609)	(.235)	(.507)*	(.362)	(.821)	0.548	11.153
1984	-4261.325	.276	1.865	4140.935	3067.188	.083	-1.453	-.283	-.819		
	(1589.666)*	(.128)*	(.462)**	(1896.336)*	(2914.407)	(.206)	(.504)**	(.338)	(.850)	0.558	11.554
1985	-5742.206	.180	2.306	5181.669	3893.236	.202	-1.788	-.171	-1.109		
	(1810.276)**	(.126)	(.503)**	(2185.412)*	(3296.430)	(.228)	(.554)**	(.338)	(.917)	0.551	11.565
1986	-6145.273	.134	2.411	4700.082	3965.076	.302	-1.717	-.072	-1.156		
	(2038.924)**	(.150)	(.552)**	(2585.094)*	(3870.224)	(.265)	(.619)**	(.361)	(1.010)	0.542	11.194

*Significant at .95
**Significant at .99
()Standard Error of Coefficient

Table B4. Regression Results - Equation (11)

t	a	b	PR	TR	D1	D2	D1B	D1PR	D1TR	D2B	D2PR	D2TR	R2	F
1959	-899.913	.286	1.315	7.412	822.648	736.202	-.200	.190	-5.752	-.437	3.051	-6.306		
	(326.372)**	(.076)**	(.302)**	(1.866)**	(420.837)*	(543.338)	(.173)	(.760)	(2.286)*	(.289)	(2.104)	(2.718)*	.904	5.720
1962	-987.446	.256	1.135	7.170	802.149	710.775	-.194	.899	-5.965	-.348	2.128	-6.475		
	(297.350)**	(.071)**	(.333)**	(1.473)**	(403.727)*	(536.513)	(.156)	(.796)	(1.854)**	(.234)	(1.880)	(2.225)*	.874	7.121
1965	-1197.874	.287	1.092	7.085	1179.809	913.488	-.246	.910	-7.343	-.416	1.964	-6.067		
	(356.897)**	(.074)**	(.338)**	(1.896)**	(480.954)*	(625.122)	(.172)	(.833)	(2.030)**	(.235)	(2.070)	(2.212)**	.882	6.714
1966	-1500.079	.328	1.076	8.837	1596.902	816.287	-.328	.896	-8.274	-.427	2.672	-6.256		
	(429.149)**	(.078)**	(.351)**	(1.888)**	(566.288)*	(776.069)	(.173)	(.833)	(2.230)**	(.212)*	(1.881)	(2.473)*	.833	6.292
1967	-1803.779	.327	1.132	7.872	1713.712	841.708	-.334	.892	-7.584	-.478	2.829	-5.819		
	(436.854)**	(.066)**	(.394)**	(1.800)**	(583.781)*	(911.812)	(.199)	(.860)	(1.828)**	(.238)*	(2.291)	(2.253)*	.834	6.306
1968	-1547.104	.275	1.163	7.838	1719.838	567.876	-.328	.748	-7.245	-.486	3.828	-5.383		
	(470.898)**	(.066)**	(.464)*	(1.532)**	(636.579)*	(966.252)	(.197)	(.836)	(1.913)**	(.299)*	(2.144)	(2.301)*	.827	6.672
1969	-1311.292	.198	1.964	4.436	1756.148	544.237	-.217	-.866	-4.396	-.576	2.623	-3.183		
	(488.219)**	(.084)*	(.561)**	(1.156)**	(662.460)*	(823.868)	(.161)	(.643)	(1.291)**	(.247)*	(1.368)	(1.843)	.838	7.903
1970	-1423.881	.197	2.183	3.778	1796.878	568.348	-.213	-.881	-3.868	-.525	2.121	-2.487		
	(488.828)**	(.093)*	(.584)**	(.984)**	(666.766)*	(884.321)	(.167)	(.671)	(1.066)**	(.249)*	(1.215)	(1.749)	.848	8.728
1971	-1488.838	.186	2.153	3.341	1866.884	388.436	-.236	-.898	-3.318	-.827	2.436	-1.829		
	(563.791)*	(.088)*	(.627)**	(.882)**	(883.288)*	(928.880)	(.186)	(.724)	(1.038)**	(.275)*	(1.278)	(1.810)	.834	8.281
1972	-1528.749	.179	2.151	3.247	2019.829	157.958	-.286	-.821	-3.364	-.862	2.318	-1.227		
	(588.314)*	(.088)	(.627)**	(.873)**	(748.031)*	(1034.515)	(.196)	(.731)	(1.013)**	(.290)*	(1.224)	(1.668)	.845	8.508
1973	-1670.269	.181	2.296	3.043	2142.834	488.246	-.184	-.823	-3.187	-.585	2.387	-1.827		
	(530.288)**	(.088)*	(.542)**	(.728)**	(722.867)*	(949.903)	(.161)	(.681)	(.863)**	(.206)**	(1.120)*	(1.388)	.828	11.883
1974	-1961.563	.158	2.277	2.928	2367.182	834.268	-.117	-1.102	-2.845	-.894	2.818	-1.679		
	(502.863)**	(.091)	(.515)**	(.688)**	(794.813)*	(1066.181)	(.160)	(.614)	(.812)**	(.239)*	(1.140)	(1.410)	.888	10.988
1975	-2538.722	.098	2.887	2.893	2888.888	1489.488	-.884	-1.786	-2.833	-.823	1.848	-2.236		
	(806.131)**	(.091)	(.532)**	(.533)**	(839.819)*	(1161.382)	(.175)	(.837)**	(.858)**	(.244)*	(1.123)	(1.228)	.883	12.788
1976	-2742.988	.133	2.861	2.868	3286.888	1439.296	-.883	-1.842	-2.871	-.841	1.875	-1.988		
	(871.788)**	(.882)	(.538)**	(.587)**	(884.474)*	(1183.817)	(.167)	(.825)**	(.881)**	(.222)**	(1.878)	(1.882)	.877	14.388
1977	-3849.862	.223	3.314	2.273	3884.481	1894.512	-.287	-2.298	-2.418	-.787	1.488	-1.173		
	(796.894)**	(.879)**	(.562)**	(.622)**	(976.922)*	(1348.831)	(.163)	(.831)**	(.784)**	(.225)**	(1.865)	(1.178)	.796	18.257
1978	-3868.884	.222	3.418	2.882	4831.822	1448.815	-.283	-2.298	-2.188	-.753	1.385	-1.351		
	(824.485)	(.886)*	(.547)**	(.822)**	(1861.842)*	(1433.838)	(.178)	(.838)**	(.717)**	(.242)**	(1.842)	(1.186)	.713	18.881
1979	-3862.333	.287	3.179	1.868	3818.388	2887.733	-.186	-2.138	-1.878	-.771	.788	-1.282		
	(925.868)**	(.889)**	(.548)**	(.886)*	(1178.888)*	(1883.378)	(.172)	(.837)**	(.888)*	(.238)**	(.961)	(1.838)	.718	18.238
1988	-2986.758	.288	2.834	1.173	3783.481	2137.251	-.138	-2.181	-1.234	-.883	1.178	-1.327		
	(1821.347)**	(.188)*	(.538)**	(.491)*	(1244.748)**	(1898.321)	(.188)	(.888)**	(.884)*	(.291)**	(1.819)	(.988)	.678	13.883
1981	-3867.343	.296	2.388	1.118	3835.296	1784.451	-.188	-1.887	-1.225	-.884	1.887	-.975		
	(1888.883)**	(.887)**	(.444)**	(.888)*	(1348.888)**	(1888.888)	(.181)	(.816)**	(.884)*	(.278)**	(.925)	(.882)	.873	14.182
1982	-3824.788	.387	2.421	.887	3824.887	1847.448	-.184	-1.348	-.722	-.888	.883	-.884		
	(1278.788)*	(.138)**	(.497)**	(.841)	(1588.182)*	(2248.747)	(.225)	(.867)*	(.813)	(.388)**	(1.887)	(.882)	.838	11.883
1983	-3488.838	.378	2.138	.788	3828.287	2188.184	.822	-1.884	-.822	-.811	.313	-.844		
	(1339.387)*	(.117)**	(.488)**	(.513)	(1818.888)	(2428.158)	(.218)	(.888)**	(.888)	(.327)*	(.987)	(.944)	.888	12.324
1984	-3738.295	.327	2.477	.831	3773.787	3121.588	-.888	-1.811	-.774	-.887	.487	-1.182		
	(1424.248)*	(.118)**	(.488)**	(.582)	(1887.811)*	(2882.888)	(.182)	(.843)**	(.812)	(.331)*	(1.881)	(.888)	.882	12.386
1985	-8148.988	.188	2.887	1.838	4588.228	3886.537	-.888	-1.248	-1.881	-.882	.377	-1.824		
	(1883.248)**	(.114)	(.486)**	(.828)*	(2814.881)*	(3818.528)	(.218)	(.812)*	(.888)*	(.333)	(1.122)	(1.882)	.833	11.814
1986	-8828.718	.144	2.887	1.884	8838.183	3888.178	.128	-1.838	-1.888	-.487	.848	-1.814		
	(1884.888)**	(.138)	(.488)**	(.874)*	(2428.838)*	(3878.388)	(.258)	(.888)*	(.787)*	(.378)	(1.328)	(1.182)	.812	18.878

*Significant at .95
**Significant at .99
()Standard Error of Coefficient

Table B5. Regression Results - Equation (12)

a. Base59 Series

t	a	B	NE	R2	F
3	.052	-.001	-.061		
	(.022)*	(.072)	(.090)	.000	.231
6	.282	.156	.001		
	(.070)**	(.080)*	(.130)	.037	1.955
8	.510	.199	-.063		
	(.107)**	(.082)*	(.116)	.071	2.925
10	.627	.319	.109		
	(.187)**	(.102)**	(.102)	.156	5.424
15	1.552	.174	.057		
	(.312)**	(.094)*	(.056)	.062	2.597
20	1.951	.436	.135		
	(.777)*	(.136)**	(.086)	.217	7.517
27	2.623	.606	.094		
	(1.278)*	(.143)**	(.074)	.335	12.088

b. End86 Series

t	a	B	NE	R2	F
3	.043	-.016	1.322		
	(.053)	(.039)	(.301)**	.215	9.619
5	.022	.039	.891		
	(.094)	(.051)	(.253)**	.160	7.092
7	-.071	.047	.538		
	(.181)	(.057)	(.197)**	.105	4.693
10	-.319	.058	.784		
	(.245)	(.050)	(.149)**	.339	17.378
15	.459	.190	.348		
	(.510)	(.089)*	(.122)**	.200	8.892
20	2.042	.627	.084		
	(1.010)*	(.168)**	(.103)	.269	9.108
27	2.623	.606	.094		
	(1.278)*	(.143)**	(.074)	.335	12.088

*Significant at .95
**Significant at .99
()Standard Error of Coefficient

Table B6. Regression Results - Equation (13)

a. Base59 Series

t	a	B	PR	TR	R2	F
3	.054	.003	-.086	.031		
	(.022)*	(.072)	(.059)	(.079)	.000	.726
6	.305	.140	-.088	.210		
	(.072)**	(.077)	(.053)	(.131)	.098	2.812
8	.402	.164	-.095	.523		
	(.168)*	(.085)*	(.074)	(.534)	.089	2.633
10	.564	.307	.043	.114		
	(.200)**	(.103)**	(.066)	(.098)	.151	3.841
15	1.017	.167	.036	.147		
	(.345)**	(.090)	(.053)	(.059)*	.155	3.927
20	.723	.352	.014	.268		
	(.788)	(.128)**	(.063)	(.079)**	.342	9.150
27	1.668	.536	-.038	.184		
	(1.228)	(.136)**	(.061)	(.060)**	.426	11.866

b. End86 Series

t	a	B	PR	TR	R2	F
3	.011	-.011	.987	.202		
	(.065)	(.040)	(.262)**	(.271)	.175	5.468
5	.048	.042	.497	.296		
	(.099)	(.052)	(.238)*	(.306)	.121	3.944
7	-.077	.050	.013	.560		
	(.188)	(.056)	(.161)	(.183)**	.131	4.154
10	-.135	.078	.205	.489		
	(.316)	(.055)	(.167)	(.165)**	.232	7.436
15	.568	.219	-.176	.478		
	(.494)	(.085)*	(.129)	(.115)**	.293	9.720
20	.061	.573	-.062	.291		
	(1.040)	(.156)**	(.093)	(.083)**	.418	11.519
27	1.668	.536	-.038	.184		
	(1.228)	(.136)**	(.061)	(.060)**	.426	11.866

*Significcant at .95
**Significant at .99
()Standardd Error of Coefficient

Table B7. Regression Results - Equation (14)

a. Base59 Series

t	a	B	NE	D1	D2	D1B	D1NE	D2B	D2NE	R2	F
3	.080	-.275	.010	-.032	-.153	.311	-.138	.340	.460		
	(.035)*	(.146)	(.132)	(.032)	(.066)*	(.165)	(.175)	(.268)	(.319)	.218	2.764
6	.210	.286	.094	.156	-.283	-.269	-.219	-.167	.700		
	(.110)	(.183)	(.203)	(.146)	(.289)	(.224)	(.269)	(.172)	(.591)	.112	1.788
8	.441	.390	-.070	.136	-.443	-.271	-.052	-.268	.588		
	(.177)*	(.205)	(.200)	(.230)	(.395)	(.241)	(.259)	(.248)	(.427)	.099	1.688
10	.666	.395	.031	-.110	.029	-.226	.196	.123	-.079		
	(.323)*	(.268)	(.175)	(.472)	(.571)	(.310)	(.258)	(.341)	(.332)	.100	1.664
15	1.015	.441	.101	.016	-1.050	-.336	.053	.253	.123		
	(.664)	(.288)	(.106)	(.898)	(1.483)	(.307)	(.146)	(.461)	(.251)	.074	1.481
20	.994	.549	.291	.249	-2.093	-.293	-.064	-.133	.226		
	(1.142)	(.264)*	(.146)*	(1.745)	(2.362)	(.313)	(.199)	(.416)	(.303)	.341	4.045
27	.342	1.098	.149	1.574	-.721	-.970	-.667	.051	.150		
	(1.624)	(.258)**	(.115)	(2.530)	(3.919)	(.317)**	(.351)	(.150)	(.277)	.554	7.830

b. End86 Series

t	a	B	NE	D1	D2	D1B	D1NE	D2B	D2NE	R2	F
3	-.087	.459	1.385	.157	.267	-.506	-.422	-.196	-1.091		
	(.095)	(.133)**	(.497)**	(.118)	(.147)	(.140)**	(.161)*	(.641)	(.878)	.349	5.218
5	.099	.506	.441	-.043	-.151	-.545	0.405	.389	.497		
	(.171)	(.161)**	(.482)	(.207)	(.278)	(.171)**	(.191)*	(.574)	(.770)	.270	3.966
7	.327	.300	.099	-.388	-.842	-.304	-.158	.409	.884		
	(.299)	(.232)	(.350)	(.397)	(.575)	(.241)	(.260)	(.450)	(.662)	.170	2.612
10	-.336	.639	.588	.316	-.040	-.650	-.521	.006	.153		
	(.340)	(.149)**	(.222)*	(.431)	(.668)	(.156)**	(.173)**	(.273)	(.434)	.589	12.452
15	-.947	.781	.534	1.315	.274	-.769	-.633	-.142	.055		
	(.757)	(.228)**	(.232)*	(.952)	(1.474)	(.248)**	(.261)*	(.264)	(.403)	.518	9.455
20	.562	1.086	.185	-.722	-1.837	-.941	-.725	.185	.298		
	(1.320)	(.308)**	(.171)	(2.364)	(3.361)	(.392)*	(.423)	(.256)	(.415)	.447	5.438
27	.342	1.098	.149	1.574	-.721	-.970	-.667	.051	.150		
	(1.624)	(.258)**	(.115)	(2.530)	(3.919)	(.317)**	(.351)	(.150)	(.277)	.554	7.830

*Significcant at .95
**Significant at .99
()Standard Error of Coefficient

Table B8. Regression Results - Equation (15)

a. Base59 Series

t	a	B	PR	TR	D1	D2	D1B	D1PR	D1TR	D2B	D2PR	D2TR	R2	F
3	.085	-.288	.009	-.025	-.040	-.124	.321	-.078	-.008	.445	-.008	.342		
	(.041)*	(.157)	(.092)	(.110)	(.061)	(.075)	(.175	(.130)	(.183)	(.299)	(.266)	(.213)	.172	1.946
6	.241	.264	-.053	.196	.094	-.143	-.268	.091	-.392	-.101	-.109	.827		
	(.125)	(.181)	(.094)	(.194)	(.158)	(.258)	(.221)	(.133)	(.304)	(.225)	(.242)	(.494)	.140	1.741
8	.259	.313	-.089	.751	.653	-.780	-.067	.204	-2.752	-.155	.271	1.625		
	(.289)	(.207)	(.126)	(.902)	(.379)	(.541)	(.250)	(.175)	(1.349)*	(.246)	(.293)	(1.339)	.202	2.149
10	.538	.250	-.008	.207	.008	.253	-.100	.152	-.127	.335	-.229	-.064		
	(.350)	(.317)	(.124)	(.223)	(.501)	(.628)	(.358)	(.201)	(.276)	(.391)	(.305)	(.324)	.069	1.322
15	.520	.303	.048	.199	.432	-.875	-.202	.080	-.110	.412	.141	-.023		
	(.669)	(.294)	(.116)	(.117)	(.879)	(1.495)	(.312)	(.162)	(.148)	(.496)	(.378)	(.337	.106	1.520
20	-.350	.348	.114	.353	1.430	-.548	-.087	.059	-.283	-.030	.347	-.261		
	(1.213)	(.262)	(.136)	(.140)*	(1.789)	(2.315)	(.308)	(.187)	(.180)	(.418)	(.324)	(.296)	.407	3.934
27	-.508	.937	.079	.148	1.809	-1.046	-.810	.084	-.084	-.667	.343	-.141		
	(1.721)	(.282)**	(.124)	(.119)	(2.969)	(4.321)	(.338)*	(.184)	(.141)	(.417)	(.367)	(.247)	.548	5.854

b. End86 Series

t	a	B	PR	TR	D1	D2	D1B	D1PR	D1TR	D2B	D2PR	D2TR	R2	F
3	-.267	.222	2.001	.103	.376	.392	-.280	-1.666	.636	-.188	-1.545	-.107		
	(.142)	(.183)	(.704)**	(.471)	(.180)*	(.221)	(.189)	(.768)*	(.639)	(.205)	(.999)	(.655)	.316	3.646
5	.108	.419	.844	-.450	-.056	-.179	-.462	-.680	1.184	-.320	-.099	.622		
	(.186)	(.178)*	(.534)	(.530)	(.223)	(.293)	(.188)*	(.599)	(.660)	(.207)	(.842)	(.909)	.254	2.982
7	.216	.271	-.428	.705	-.166	-.714	-.269	.406	-.269	-.131	.892	-.245		
	(.317)	(.228)	(.319)	(.358)*	(.416)	(.607)	(.236)	(.401)	(.432)	(.255)	(.424)*	(.659)	.196	2.396
10	-.268	.796	-.092	.678	.210	-.145	-.812	.369	-.358	-.657	.337	-.151		
	(.415)	(.181)**	(.307)	(.291)*	(.555)	(.753)	(.188)**	(.360)	(.329)	(.203)**	(.432)	(.546)	.554	8.220
15	-1.261	.840	-.147	.666	2.096	.245	-.813	.132	-.365	-.669	.140	.014		
	(.744)	(.241)**	(.354)	(.307)*	(1.026)*	(1.500)	(.259)**	(.398)	(.327)	(.271)*	(.454)	(.490)	.528	7.397
20	-.885	.917	.109	.226	1.018	-1.248	-.763	-.012	.002	-.849	.520	-.120		
	(1.490)	(.320)**	(.211)	(.157)	(2.733)	(3.664)	(.402)	(.313)	(.199)	(.596)	(.595)	(.269)	.461	4.426
27	-.508	.937	.079	.148	1.809	-1.046	-.810	.084	-.084	-.667	.343	-.141		
	(1.721)	(.282)**	(.124)	(.119)	(2.969)	(4.321)	(.338)*	(.184)	(.141)	(.417)	(.367)	(.247)	.548	5.854

*Significant at .95
**Significant at .99
()Standard Error of Coefficient