Migration and Socioeconomic Change Ohio Counties, 1950-1970*

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Introduction

The relationship between migration and socioeconomic change is generally recognized. However, little of the existing migration literature provides empirical data to support or refute this proposition. At most, researchers merely provide evidences of relationship between economic growth and migration or socioeconomic characteristics (levels) but not socioeconomic change in relation to migration. The lack of this empirical study may be due to at least two reasons: one is the lack of proper data, the other is the complicated nature of migration phenomena. For the traditional mode of migration analysis depended heavily on official statistics collected for other purposes. It is difficult for a researcher to obtain the proper data to prove or disprove a migration model. Although some studies have collected primary data for their own research purposes, they are still limited by their sample sizes and thus reduce their representativeness. Furthermore, the variations in data source used, social situation examined, time period adopted, and research methods applied have made researchers come to contradictory findings in the present topic.

Both for practical and academic purposes, the gap between theory and empirical study should be narrowed. The detailed knowledge of migration would help us to suggest more applicable policies for the social and economic development of a community.

The state of Ohio provides an excellent opportunity for exploring this problem. In past decades it experienced rapid socioeconomic change as well as gain and loss of people through migration. The growth and decline of some socioeconomic factors in accordance with gain and loss of people through

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migration give us a clue to understanding their relationships. Besides, the data needed for our analytical purpose are complete and available and geographical homogeneity is satisfactory, comparing with data from other states.

While in the 1950-60 decade Ohio had a net in-migration of 3.2 percent, an increase of 275,569 people, between 1960 and 1970 it had a net out-migration rate of -1.2 percent. Instead of gaining people, it had lost 114,871 people through migration. It seems that the loss of people through migration is worse in non-metropolitan counties than in metropolitan counties. More precisely, the net migration rate is .26 percent for metropolitan counties and -2.45 percent for non-metropolitan counties. From these figures one might speculate that socioeconomic characteristics and socioeconomic change in each county might be related to the differential net migration rate. What is this relationship? How strong is the relation ? These are the questions present study attempts to answer.

The general objective of the study is to inquire into the relationship between socioeconomic change and migration. The specific objectives are:

1. To identify the relationship between preceeding socioeconomic change and migration;
2. To identify the relationship between socioeconomic level and migration;
3. To identify the relationship between current socioeconomic change and migration;
4. To test the proposition that socioeconomic change affects and is affected by migration.

Based on the discussion in the previous research (e.g. Sly, 1972, Duncan 1940; Lee et al., 1957; Bogue and Harris, 1959; McDonald, 1965) , we advance a general hypothesis that socioeconomic change affects migration and, in turn, migration also affects secioeconomic change. Because of the differential change rate and different socioeconomic base, each place will have a different impact on migration. A place with accelerating change will either pull or push people in or out of that place depending on whether the change is viewed as positive or negative by the potential migrants. As long as change occurs it will create forces which pull in people or push them out. A place with a slow tempo of change will create less forces to

push people out or pull them in. By the same token, a place with a more diverse socioeconomic activities, i.e., more opportunities, will attract more people to move in. Because of the selective nature and redistributive function of migrants we will expect that migration will have further impact on the demographic, social, and economic structure. In other words, migration is a function of preceeding socioeconomic change and socioeconomic level. It is also a determining factor of further socioeconomic change. In order to test this general hypothesis, the abstract framework must be operationalized. Therefore, we break down this general hypothesis into several specific hypotheses. Since not all of the socioeconomic change or socioeconomic levels are responsible for migration and not all of them are affected by migration, the variables chosen should be theoretically sound to be related with migration.

Independent Variables and Hypotheses

Three sets of independent variables are included in the present study. The first set represents socioeconomic change preceeding the migration interval; the second set represents the socioeconomic level at the beginning of the migration interval; the third set represents socioeconomic change with the current migration interval. Each set includes nine individual variables. In other words, these nine variables are observed in different ways at different time periods. Applied in a different time period and different measurement each variable can be further divided into three "sub-variables." Therefore, instead of listing 27 individual variables and 27 specific hypotheses for each group of variables, we list only nine major variables and hypotheses. That is to say, the relationship between migration and each socioeconomic variable in a different time period will be discussed together. For example, in the discussion of the relationship between population change and migration, we will cover the relationship between migration and the population change in the preceeding decade of the migration interval, population density at the beginning of the migration interval, and population change in the current migration level. The variables chosen and their specific hypothesis will be elaborated in the following sections.

1. Population Change and Density:

There is no doubt that the most immediate consequence of migration is its effect on population size. As noted in many migration literature, if the natural increase rates of two places hold constant, a certain number of people in one place moves to another, then the loss of people in that place is exactly the same as the gain in the other place. This reveals the possibility of the effect of migration on population change. But, migration might also be affected by previous population change. Rapid population change in a place for a short time period is largely due to migration rather than natural increase. The increased population through migration of a place implies that it might have some expansion of its socioeconomic base to draw more people. Furthermore, the migrants will provide various information about the place of destination. thus facilitating other potential migrants to move in. For this reason we would expect that population change in the preceding decade might have a positive association with current migration. This relationship might not be valid for a longer period of time, say more than thirty years. For the rapidly increasing population of a place might deter potential migrants to move in. When a place grows and becomes large and the population density exceeds an "optimum" level, this densely settled place tends to be more congested. Crowded living condition may often create social problems. And, the business district may be made inefficient by transportation difficulties. If so, increased density may lessen its competitive position with respect to other less congested areas, and hence cause it to attract fewer migrants and fewer new industries. Bogue and Harris (1954) found no relationship between population density and SMA growth. Tarver (1965) found no real association between migration and population size.

On the contrary, dense settlement and intensive land use may facilitate migration by providing better information channels for migrants and favorable conditions for new expanding industries, hence causing it to attract more migrants and industries. Bogue (1957:73) found significant relationships between population size and net migration in non-metropolitan subregions, but insignificant relationships in metropolitan subregions. Sahota (1968), in a study of migration within Brazil, also found that density

was a strong pull factor in the destination region, but had no effect on migration in the origin region. These findings suggest that population density might have positive and negative effects on migration depending on the developmental stage of the individual places. There is no clear cut way to define this "stage." Since the State of Ohio, in the 1950-60 decade, had a net in-migration but in 1960-70 decade had a net out-migration, we would expect that population density has a negative effect on migration.

Based on the above discussion, our first hypothesis is advanced as follows:

Hypothesis 1: Net migration has a positive association with preceding and current population change and a negative association with population density.

Preceding population change is expressed as a percent change in total population, 1950 to 1960; current population change is expressed as percent change in total population, 1960 to 1970; population density is measured as the number of persons per square mile, 1960.

2. Urbanization

The concept of urbanization has been treated widely and in many different contexts (Davis, 1955; Hauser and Schnore, 1965). The most often used concept of urbanization refers to the proportion of the total population concentrated in urban settlements or else to a rise in this proportion (Davis, 1965: 41-42). Urban centers have been the cradles of civilization, progress, and revolutions. They offer better educational facilities, superior job opportunities and information, wider contacts, and other benefits. Potential migrants may be attracted to these centers. During unemployment periods, there may even be a reverse movement from the cities to the villages. As Sahota (1968:226) points out, the effect of urbanization on migration may go either way.

Bogue (1957) in the study of migration in the United States found no significant relation between urbanization and net migration in metropolitan subregions while it had a significant direct relationship in non-metropolitan subregions. Greenwood (1969) found a positive relationship

between origin urbanization and out-migration in the "present" but negative association between these two variables in the past. He infers that this might reflect a partial exhaustion of the rural-to-urban migration stream. Moreover, urban dwellers are likely to be more aware of the cultural and social amenities of the city, and thus more likely to migrate to other urban areas. Sahota (1968) found a relatively greater tendency on the part of urban people to immigrate, but "the destinations are not necessarily the bigger and bigger cities." He further argues that the direction of migration seems to be determined more by the economic factors than by urbanization per se.

The inconsistent findings of the relationship between urbanization and migration, might be partly due to the different concept of urbanization applied, different indicators of migration used, and different temporal and spacial units studied.

The effect of urbanization on migration is similar to population growth on migration. While a place urbanized rapidly, it might imply that its socioeconomic base also increases rapidly, hence causing more migration. But, after urbanization to a certain level, the population of that place might become too crowded to attract people to move in. Therefore, while we expect positive association between net migration and urbanization (a change of people living in urbanized area); we would expect a negative association between net migration and level of urbanization (proportion of the total population living in urban area). Our second hypothesis is specified as follows:

Hypothesis 2: Net migration has a positive association with preceding and current urbanization (change) and a negative association with level of urbanization.

Urbanization in the present study contains two meanings, static and dynamic. By static we mean level of urbanization; by dynamic we mean change of urbanization. Several different measures have been employed to get at various aspects of urbanization. The measure that we shall use here for level of urbanization is percent urban in the county as of 1960. This is defined as the percent of the total population who resides in urban units. The percent urban change is measured as percent change of

people living in urban units from 1950 to 1960, and from 1960 to 1970. These measurements are independent of the size of the urban population, the number of units, and their average size (Gibbs, 1961:392).

3. White-Collar Employment Change and Level

This is a frequently used indicator of the occupational component of the socioeconomic structure of an area. Bogue (1957) found no significant association with net migration. But, in the analysis of characteristics of migration he found that migrants tended to be in white-collar employment in a larger proportion of cases where the general population was also so employed. In addition, the smaller, less urbanized area tended to provide greater opportunity for migrants to be white-collar workers. The persons in white-collar occupations and communities that have high white-collar employment tend to have a more mobile population than communities with a higher percentage of workers in blue-collar employment. This may result from the present increased emphasis upon tertiary industries.

Tarver (1965) found migration rates are directly correlated with rising proportionate numbers of white-collar workers. He advances three factors for the movement of persons into centers with relatively large numbers of white-collar workers: First, rapid technological advances have created thousands of opportunities for white-collar workers and the rate of increase is much more rapid than for blue-collar workers. Second, educational levels of adults rise as white-collar persons increasingly concentrate, indicating the attractiveness of these centers to migrants; and third, as the proportionate numbers of white-collar workers mount in the SMSA's and urbanized areas the unemployment rate drops and the median family income rises.

Although the net migration, white-collar employment relationship is not well-documented, Duncan and Reiss (1956) found that in the United States rapidly growing communities in 1950 had a larger proportion of white-collar workers than did statable or declining communities. As they indicated, the trend appears to be toward increased emphasis on service, administrative, and distributive activities, and the com-

munities that are in a position to expand white-collar employment appear to have a better chance to attract migrants. Our hypothesis for this relationship is as follows:

Hypothesis 3: Net migration has a positive association with level of white-collar employment, with preceding and current white-collar employment.

Our measure of white-collar employment is the combination of four occupational categories: professional, technical and kindred workers; managers, officials, and proprietors, except farm; clerical and kindred workers, and sales workers. The percent of the population employed in these occupations in 1960 is to be used as level of white-collar employment; percent change of this employment from 1950 to 1960 and from 1960 to 1970 serve as the change variables of this factor respectively.

4. Manufacturing expansion and Level of Manufacturing

Manufacturing is perhaps the variable most often used to represent the industrial-economic dimension in social and economic research. As pointed out by Perloff (1960:382), manufacturing is a dynamic, rapid growth sector of the economy. It has great latitude for response to changing economic environments.

In the past years highly industrial areas were identified as areas of economic opportunity and proved attractive to migrants from less prosperous areas. Thus, the more industrial areas would also have higher net migration. On the other hand, there is reputed to be a relocation of new industries away from present industrial concentrations. This industrial expansion invited an influx of migrants to man the plants and to provide services to the families of production workers. It may be that the counties that had the most rapid growth of population between 1950 and 1970 were also the counties that experienced the greater industrial expansion. But, the past findings for the relationship between industry and migration are confusing. Bogue and Harris (1954), in a study of factors in metropolitan growth, found a negative association of industry level and metropolitan growth, but a positive association of industry expension and metropolitan growth. Sahota (1968:234) found no significant relationship between manufacturing and migration. He argued,

"The possible explanation appears to be that industrialization per se is not particularly attractive to migrants..... Whatever attraction there is in this variable as such is perhaps largely due to the other factors that are associated with industrialization."

Tarver (1965:219) in a study of intercounty migration, found an inverse relationship between the numbers of manufacturing workers and the migration rate. He advanced three reasons for this unexpected finding: First, there has been some expansion in numbers of manufacturing workers but the gains of these workers are not as rapid as those in white-collar jobs. Second, the educational levels of adults in the SMSA's and urbanized areas drop rather steadily as the proportionate number of manufacturing workers rises. Third, the rigidities in labor market sturcture acts as a restraint upon mobility.

In spite of these contradictory findings, we still expect the positive relationship between manufacturing and net migration

Hypothesis 4: Net migration rate is positively related to level of manufacturing, and preceeding and current manufacturing expansion.

Manufacturing activity has been measured in a variety of ways. One is employment in manufacturing, and the other is value added by manufacturing industry. Percent of total employed persons employed in manufacturing industry in 1960 is served as indicator of level of manufacturing, and the percent changes in manufacturing employment in 1950 to 1960, and from 1960 to 1970 are the indicators of manufacturing expansion in preceding and current decades, respectively.

5. Education Change and Education Level

Education is an important variable that may account for systematic differences between individual responses. Educated people are regarded as relatively more mobile and adaptable and also brighter and more alert to changing opportunities (Sahota: 1968). The increased earning capacity per se of the formally educated individuals is widely acknowledged. In general, high-income places are also the high-education places.

Bogue (1957) found a positive association with net migration in metropolitan areas, but no significant association in non-metropolitan areas. Although this relationship is inconsistent, education is an important force contributing to the mobility of the population. He concludes that whether as cause or effect, both persons and communities that have this characteristic tend to have a more mobile population than communities with less-educated citizens.

Greenwood (1969) in a study of labor mobility in the United States found a positive relationship between education and current migration. But an inverse relationship existed between past education and past migration. He further infers that current migrants do not tend to go to states which display high levels of educational achievement. Although past migrants did have some tendency to go to such states.

Tarver (1965) found the positive relationship between migration rate and the rising levels of formal education, but when the effects of education upon migration was found.

As argued by Sahota, since the educated individuals of the origin have to compete with educated individuals of the destination region, ceteris paribus, a high level of education in the destination region may serve as a deterrent to the educated immigrants. Our standpoint is that migrants are usually attracted to high-education places; and since their educational levels are higher than the average of origin and lower than the average of destination (Bogue, 1969:769-770), we would expect the positive relationship between net migration and education level, but negative association with preceding and current education change.

Hypothesis 5: Net migration rate is positively related to the education level of a place, but negatively related to proceding and current education change.

Education level is measured as median years of school completed by residents of each country 25 years of age and over in 1960; preceding and current education change is measured as percent change in median years of school completed by residents of each county 25 years of age

and over, 1950 to 1960, and 1960 to 1970, respectively.

6. Income Change and Level of Income

Internal migration may result from and influence geographical differences in the productivity of labor. The differences are usually reflected in income level. The income is assumed to be an important economic variable influencing migration. The majority of migrants are generally considered to come from low income areas to high income areas. A place with rapid increases in net migration might indicate that there is some expansion of industry or other socioeconomic base. Thus, we would expect the increase of income level accompanying net migration.

The relationship between income and migration is somewhat confusing. Greenwood and Sweetland (1972) in a study of migration between standard statistical areas found no significant relationship between income and migration. They argue that the possible cause for this result is that the destination population variable tends to pick up the effects of destination income and thus makes the income variable insignificant.

Certain previous studies dealing with interstate or interregional migration in the United States have found negative or insignificant association between income and migration. Sjaastad (1961) in a study of income and migration in the United States found a response of migrants to the region-income distribution. While Sahota (1968) in a study of internal migration in Brazil found no such relationship could be established. He attributed the cause of this to the unrepresentativeness of the data on income distribution.

Tarver (1965) found median family income varies directly with population size of the area and with the increasing percentages of workers in manufacturing and in white-collar occupations. After adjusting for the effects of the other independent variables, income has no perceptible influence on migration. He infers that the failure of income to be significantly related with migration at least in part, in both economic and non-economic impediments which produce rather

persistent differential wage and unemployment levels. First, long-term trends in the marginal productivity of labor tend to nullify the effects of income differentials in a short-run period. Second, the migration data used apply to persons of sidely diverse ages and skills, not to a few homogeneous types of labor (1965:221).

Despite these contradictory findings, we would hypothesize that:

Hypothesis 6: Net migration rate is positively related to income level as well as preceding and current income change.

The measure of income that has been used in many of the previous studies, and the one that we will use here, is median family income. Median family income in 1960 is used as an indicator of income level, and percent median family income changes, 1950 to 1960 and 1960 to 1970 are the indicators of preceding and current income changes respectively.

7. Unemployment Change and Unemployment Rate

Although migration may affect the level of unemployment, it is often the unemployment level which influences migration, though this is by no means the sole determinant of movement. As already mentioned, cultural, social and other economic factors may be of crucial importance in explaining the level and magnitude of the movement. Unemployment, however, remains a meaningful and quantifiable indicator of social and economic well-being and a determinant of migration levels. Robinson (1947:39) argued that so long as there was general unemployment, migration would be small but would be increased when, due to a policy of full-employment, there were too few workers in the more prosperous areas to meet their growing demands for labor. The volume of migration tends to vary inversely with the general level of unemployment.

It may well be that workers, on becoming unemployed, tend to wait in the area in order to ascertain the likely trends in the job market. If the unemployment rates worsen they may move out of the area, but if there is a decline in the level of unemployment then the workers are

likely to stay where they are.

There is evidence to suppose that a return movement to the depressed areas also takes place when employment opportunities become available there. It even appears that much out-migration occurs in the hope that the depressed conditions are temporary (Somers, 1954:130).

In a discussion of out-migration and the depressed area problem, Parr (1966:158) concludes that, "Outmigration may be able to reduce unemployment but it can also be the indirect cause of unemployment... It seems unlikely that outmigration will take place from a depressed area unless there is some given differential margin in unemployment rates between the depressed areas and the rest of the nation, particularly the receiving areas. Because of this, it would be unreasonable to assume that the movement of labor could remove these areal variations in unemployment levels completely."

Bogue (1957) found a negative association between unemployment rates and net migration. He concluded that "differences between the place of origin and possible destinations, emerged clearly as one of the driving and guiding forces behind migration (1957 :75)." A place with a high rate of unemployment also had a high rate of out-migration and a low rate of in-migration with a consequent tendency toward negative net migration. This pattern does not necessarily imply that migrants have foreknowkedge of the relative opportunities to be had at all possible destinations and that they choose the most promising one.

Greenwood (1969:192) found that the relationship between the current (1955-60) rate of origin unemployment and out-migration was positive; but the relationship between the two variables in the past (1950) was negative This means past migration tended to be away from states with low rates of unemployment and toward states with high rates of unemployment. His explanation for this is that much past migration was from rural to urban areas. While the rural areas displayed relatively low rates of unemployment, there existed much disguished unemployment in the form of underemployment. On the other hand, unemployment in urban areas tends to be "open" and relatively high.

Tarver (1965) found no significant association between unemployment rates and migration rates.

It seems that change of unemployment, not unemployment level per se, is important to migration. Furthermore, a place with a rapid increase of migrants might also increase its unemployment rate; for the expansion of job opportunities is not fast enough to absorb all the increasing population. Based on the above discussion and empirical findings we hypothesize that:

Hypothesis 7: Net migration is negatively related to the preceding unemployment change, and positively related to current unemployment change, but not related to unemployment level at the beginning of migration interval.

Unemployment level is measured by percent of the civilian labor force unemployed in individual counties during approximately the first week of April, 1960. The preceding and current unemployment change is measured by percent change of male unemployment, 1950 to 1960, and from 1960 to 1970, respectively.

8. Fertility Level and Fertility Change

Of the relationship between migration and various social, economic, and demographic variables the relationship between migration and fertility is least studied. Historically, higher economically developed areas usually have lower fertility levels than that of lower economically developed areas. If we assume that the main direction of migration is from socioeconomically relatively less developed areas to developed areas, then we also have reason to expect the negative relationship between net migration and fertility level. Bogue (1957) found no significant relation between net reproduction rate and net migration in metropolitan subregions, but it had a significant positive relation in non-metropolitan.

As for the relationship between net migration and fertility change, there are two contradictory arguments. As claimed by Petersen (1970:254) that the effect of migration on the size of the population of either of the areas involved cannot be very great because emigrants will eventually

be replaced through a higher natural increase, and immigrants will merely take the place of natives who would otherwise have been born. If we accept this argument, then we would expect a negative relationship between migration and fertility change. On the other hand, if we assume that the people of productive age are the main stock of migrants, then we would expect the positive relationship between net migration and fertility change. The first assumption might be correct in the short term period. Since our analysis of fertility change is based on a ten-year period, we would expect that:

Hypothesis 8: There is a negative association between net migration and fertility level, but positive association with fertility change.

Fertility level is measured by number of children under five years old per 1000 women from 15 to 49 years old in 1960. This measurement is termed the fertility ratio. Fertility change is measured by percent change of fertility ratio from 1950 to 1960, and 1960 to 1970, respectively.

9. Agriculture Change and Agriculture Level

The influence of agriculture activity on migration is multidimensional in character. While farm population has been declining, production has been increasing. Even with the increased production, the relative importance of agriculture has declined in the national economy due to the greater growth of non-agricultural production.

Rural-urban migration dominated migration history for a long period of time. The displacement of people by the development of new agricultural technology forced the surplus of farm labor to move out from rural areas. On the other hand, the expansion of new industry in urban centers created a rapid demand for labor force. These push and pull forces created the main stream of rural-urban migration. There is no doubt, in human history, that the agriculture sector was losing population while a society was undergoing a rapid technological development. There was a negative relationship between in-migration and agriculture. But, recently in the United States, as shown in census data, the decline of farm popul-

ation has leveled off.

This indicates that the deplacement of farm population by technology has already reached a "maximum" point or a plateau. At the same time, the crowded condition of urbanized areas has induced a trend of decentralization. Furthermore, urban to urban migration has replaced rural to urban migration. Therefore, while positive associations between agriculture and out-migration was true in the past, it may not be valid any more. Bogue (1957) found no significant relation between agriculture and net migration in metropolitan subregions, while it had a negative association in non-metropolitan subregions, There is a lack of empirical study to support or deny our postulate. If our conjecture is correct, then we sould expect the following relationship between migration and agriculture industry:

Hypothesis 9 : There is a positive relationship between net migration rate and agriculture change, but no relationship exists between net migration and agriculture level.

Dependent Variables

The net migration rate is both an independent and dependent variable. In regression analysis net migration is dependent on the socioeconomic level at the beginning of migration interval, and socioeconomic change of both preceding decade and concurrent with migration change. But, in path analysis, it is treated as an explanatory variable for socioeconomic change in the same time period with migration change. The net migration rate has been defined as the total number of in-migrants minus the total number of out-migrants in a migration interval, and then divided by the population of a given county at the beginning of this interval. The definition is also applied in the calculation of the change rates of other variables in this study.

There are two reasons for the use of net migration rate instead of using in- or out-migration: First, of three numbers (in-, out-, and net-migration), net migration is considered to be most related to population change which is postulated to be closely related to socioeconomic change. If a place with an equal amount of in- and out-migration, assuming natural increase is held constant, we would expect that it will experience less

socioeconomic change than the place with different in- and out-migration. Hence, net migration is deemed to be more sensitive than the other two indicators for the present study of socioeconomic change. Second, as pointed out by Bogue (1957:8), before valid comparisons between communities or other areas can be made, the fact that some units have larger base populations than other units must be controlled. The use of relative numbers rather than the enumerated numbers rules out the differences induced from size differences and makes all units more comparable with each other. Furthermore, for prediction purpose, the relative frequency of a given event occuring in the population must be known. This requires the use of rates instead of an enumerated number. A rate shows how frequently a given event occurs per unit of a specified size, for example, in present study most of the unit is per 100.

Methodological Consideration

The methods of past efforts by scholars in trying to understand the relationship between socioeconomic change and migration can be differentiated into two types. The first type is the longitudinal study which observes the variation of certain social, economic, and demographic variables in a long period of time in relation to the increase or decrease of migration (see, for example, Lee et al., 1957). The second type is the cross sectional approach which inquires into the relationship between migration and socioeconomic characteristics of a geographical unit within the same time period (see, for example, Bogue, 1957). Both approaches have provided us with valuable knowledge of the general relationship between socioeconomic variables and migration.

Because the purpose of the present research is somewhat different from the previous research, the research design for the present study is in some ways different from the above two approaches. On the one hand some sets of variables chosen for the present study are different from the conventional ones; on the other hand the procedures of analysis are also different. Three sets of independent variables and two steps of analytical techniques are recommended.

The first set of variables represents socioeconomic change in the

preceding decade of migration; the second set of variables represents the socioeconomic level at the beginning of migration interval; and the third set of variables represents the socioeconomic change in the same time period with migration change. Of these three sets of variables only the second set has been discussed most often in the migration literature, the third set of variables has occassionally been discussed; but the first set, to my knowledge, has never been studied before.

To understand the general relationship between the socioeconomic variables chosen and migration, multiple regression analysis is recommended. In this case, net migration is treated as a dependent variables. The preliminary regression analysis will tell us what variables have a higher association with migration and which set of variables has higher explanatory power.

Since we are also interested in testing the general hypothesis that migration is affected by and also affects socioeconomic change, we need to apply another technique to combine these three sets of variables into a testable model. Path analysis is deemed appropriate to serve this purpose. Thus, the second step of analysis following regression analysis will be path analysis. In path analysis, migration will be treated as an intermediate variable and the third set of variables will be treated as the dependent variable. Due to the nature of path analysis it is very difficult, if not impossible, to include too many variables in a path model. Therefore, we also have to find a proper way to reduce the original variables to a manageable number to facilitate our analysis. Thus, the principal component analysis can be introcurced to summarize various socioeconomic variables into one or two composite indexes to serve this purpose.

Data Source and Preparation

The net migration data are obtained from Donald Thomas' work, "Estimated Net Migration, Ohio, 1960-1970," published in the Department of Agricultural Economics and Rural Sociology, The Ohio State University. Thomas (1972) used the residual method to estimate net migration rate.

The socioeconomic data are directly or indirectly drawn from the United States Population Census, 1950, 1960, and 1970. During these two decades there were some changes in the definition of classification in Ohio. Therefore, in order to make the data comparable, whenever there is an inconsistency of classification of definition of variables among these three census data we have had to revise it before further analysis. The following variables have been revised:

1. Civilian Labor Force

In the 1950 and 1960 census, the civilian labor force included ages 14 and over, while in 1970 it included ages 16 and over. However, in the 1970 data there is a classification of total number of civilian labor force in ages 14 and 15, but not the number of this age group in individual industries. Therefore, the alternative way to include this age group in the individual industry is to multiply the total number of civilian labor force in ages 14 and 15 with the percentage of individual industries then added to the number of people employed in that industry. We then get a revised number employed for that industry. For example, in 1970, the manufacturing employment rate for the state of Ohio is 35.6% (1,477,586 persons). This is civilian labor force employed in ages 16 and over; while the civilian labor forces employed at ages 14 and 15 are 39,983 persons. Therefore, in order to get the total number of civilian labor force employed in manufacturing at age 14 and over, we multiply 39,983 by 35.6% and get 14,234 then added to 1,447,586 and get the total of 1,461,820 persons employed in manufacturing. All the other industries have been revised following the same procedure. We then calculated their change rate and level.

2. Unemployment Change

In calculating unemployment change we encounter the same problem as the one shown above. Since in 1970 data we can directly obtain the total number of male and female unemployed at ages 14 and 15, we therefore add male unemployed of this age group to the total male unemployed at age 16 and over. So, the definition of civilian labor force of male unemployment in 1970 census becomes the same as the one shown in 1950 and 1960 census.

3. Fertility Ratio

In 1950 census data there was no fertility ratio category. Therefore, following 1960 and 1970 census definition of fertility ratio we calculated the number of children under five, and the number of women between ages of 15 and 49; and then divided the former by the latter and multiplied by 1000. In this way we can get the fertility ratio of 1950, which has the same definition as 1960 and 1970.

The above revisions have been done for 88 counties in the state of Ohio.

Preliminary Findings

Table 1 shows the zero order correlations between net migration and three sets of socioeconomic variables. The first set of variables is from variable 1 to variable 9, which represent 1950 to 1960 socioeconomic change. The second set of variables is from variable 10 to variable 18, which represent 1960 socioeconomic level. The third set of variables is from variable 19 to variable 27, which represent 1960 to 1970 socioeconomic change.

Among the 1960-70 socioeconomic change variables, population change, white-collar employment change, and urban population change have a higher, positive correlation with net migration. Population change and white-collar employment change have the highest correlation with net migration, $r = .960$ and $r = .886$ respectively. These data reveal the following facts:

1. Socioeconomic change variables chosen in the present study have higher association with net migration than socioeconomic level variables.
2. Among two sets of socioeconomic change variables, the variables for 1960-70 time period have a higher association with net migration than the 1950-60 variables.

Table 1. Zero Order Correlation Between Net Migration Rate (1960-70) and 27 Socioeconomic Variables for Ohio Counties

		Socioeconomic Variables	Correlation Coefficient With Net Migration
1950-60 Socioeconomic Change Variables	* 1.	% Population Change	.706
	* 2.	% Urban Population Change	.530
	3.	% Income Change	.125
	4.	% Manufacturing Change	.167
	* 5.	% White Collar Employment Change	.647
	6.	% Education Change	.067
	7.	% Unemployment Change	.068
	* 8.	% Fertility Change	.287
	9.	% Farm Population Change	.066
1960 Socioeconomic Level Variables	10.	% Urban	.205
	11.	Population Density	.053
	*12.	Family Income	.586
	*13.	% Manufacturing Employment	.272
	*14.	% White Collar Employment	.459
	*15.	Education	.670
	*16.	Unemployment Rate	-.473
	17.	Fertility Ratio	.107
	*18.	% Farm Population	-.241
1960-70 Socioeconomic Change Variables	*19.	% Population Change	.960
	*20.	% Urban Population Change	.515
	21.	% Income Change	.099
	22.	% Manufacturing Change	.191
	*23.	% White Collar Employment Change	.886
	*24.	% Education Change	-.526
	*25.	% Unemployment Change	.338
	*26.	% Fertility Change	-.528
	*27.	% Farm Population Change	.359

* Statistically significant at the .05 level.

3. Of socioeconomic change variables chosen in the present study, only some of them have a significant association with net migration. The magnitude of the association is also different between the two sets of variables.

These relationships are only a first approximation to the study of the relationship between migration and socioeconomic change. It adds little to what we have known about this subject. Before giving any explanation for this finding we have to look more carefully at the data. Due to the inter-correlation among these variables, there is no assurance that each of the variables exerts its influence independently of the other factors. For example, a county that has had a high change rate in white-collar employment is also likely to have a high rate of urban population change. Table 1 indicates that white-collar employment change in 1970 accounted for 74 percent (.886 squared) of the total variance in net migration rate, while percent urban population change accounted for about 26 percent (.515 squared). It is unjustifiable to conclude that urban population change and white-collar employment change accounted for 100 percent of the total variance. Such a conclusion is warranted only if these two variables are completely independent of each other where they are related to the net migration.

preceding Socioeconomic Change and Net Migration

To understand whether each independent variable has a significant contribution to the variance of the dependent variable with all of the other independent variables held constant we use regression analysis. The regression coefficient for each variable in the equation is an index of the weight given the observations for that variable. If these weights are expressed in standard deviation units they are called beta Coefficients. A weight of zero for a beta coefficient implies that the variable is not a factor in accounting for variation in the dependent variables. A value near zero for beta implies that the variable is of comparatively little importance in accounting for the variance of the dependent variable (Bogue and Harris, 1954:3-12).

In the multiple regression analysis, we use net migration as the dependent variable and the aforementioned three sets of socioeconomic variables as independent variables to run three regressions respectively.

Let us first look at Table 2. Of nine independent variables representing 1950-60 socioeconomic change, five of them have no significant association with net migration while other variables are under control. These five variables are fertility change, urban population change, manufacturing change, white-collar employment change, and education change. It is worthwhile to point out that when the effects of other variables are controlled by using regression analysis, the relationship between these independent variables and net migration is quite different from the ones shown in the zero order correlations. Of the zero order correlations shown in Table 1, urban population change and white-collar employment change have a high correlation with net migration while in the multiple regression analysis these two factors sink into insignificance. On the other hand, farm population change, income change, and unemployment change are significant in the regression analysis but insignificant in the zero order correlation analysis. Of the four significant variables, population is the most important one which explains a large amount (49.8 percent) of the total variance of net migration. The other three variables together only add another 5.8 percent of the variance of net migration.

We should be very cautious in explaining this finding. For the first variable entering in stepwise analysis is the variable with highest zero order correlation coefficient with the dependent variable. As long as this first variable has a high zero order correlation coefficient with the dependent variable, its R^2 will be very high. This largely reduces the contribution of other variables to the total R^2 change. Therefore, the proper way to judge the relative importance of independent variables in the account of total variance of the dependent variable is to compare their beta weight coefficients. From this comparison we know that population change is still the most powerful variable account-

Table 2. Stepwise Regression Analysis of Factors Associated with Net Migration, with Preceding Socioeconomic Change As Independent Variables

Independent Variables ** (1950-60)	Regression Coeff.	Beta	Standard Error	Multiple R	R^2
1. *% Population Change	.228	.594	.103	.706	.498
9. *% Farm Population Change	.076	.190	.035	.718	.515
7. *% Unemployment Change	-.022	-.166	.011	.731	.534
3. *% Income Change	.028	.157	.016	.746	.556
8. % Fertility Change	-0.78	-.089	.092	.749	.562
2. % Urban Population Change	.028	.112	.025	.754	.568
4. % Manufacturing Change	-.023	-.124	.019	.757	.573
5. % White Collar Employment Change	.057	.189	.074	.759	.576
6. % Education Change	.034	.022	.136	.759	.577
Constant	-5.751				

* Statistically significant at .05 level.

** Numerical numbers in front of independent variables are the original numbers in Table 1.

$$Y = -5.751 + .228(X_1) + .076(X_9) - .022(X_7) + .028(X_3) - .076(X_8) + .028(X_2) - .023(X_4) + .057(X_5) + .034(X_6)$$

ing for the net migration change. One standard unit change in population change will induce 59.4 percent standard unit change in net migration. The other three variables, farm population change, unemployment change, and income change, have the weights of 19.0 percent, 16.6 percent, and 15.7 percent, respectively. These four variables together explain 55.6 percent of the variance of net migration, while the total R^2 of the nine variables is 57.7 percent. This means that instead of using nine variables to predict net migration we use only four of the significant variables and also come out with similar results. The reader should keep in mind that the socioeconomic change variables used here are for the 1950-60 time period; while net migration is for the 1960-70 time period. The purpose of this analysis is to see whether socioeconomic change expressed in the variables chosen in the preceding decade, 1950-60, has any association with net migration. What is the relationship? What kind of variable is responsible to this relationship? The preliminary analysis shows that net migration (1960-70) tends to vary directly with total population change, farm population change, income change and inversely with unemployment change in the preceeding decade, 1950-60. Although other variables in the model are statistically insignificant, some of them might interact through other variables. For example, correlation matrix (not shown in this paper) shows white-collar employment change has a high correlation (r = .874) with population change, and manufacturing employment change has a median correlation (r= .403) with income change. It is possible that these two variables might have effects on net migration. They might incorporate a large part of the association with population change. Therefore, with the variable of population change in the equation, these two variables will sink into insignificance. To test this possibility, the regression equation has been recomputed without the population change variable. The new result is shown in Table 3. A comparison of this table with Table 2 shows that the removal of the population change variable increases the explanatory weight of four of the variables; white-collar employment change, urban population change, farm population change, and manufacturing employment change. This reduces somewhat the weight of other variables.

Table 3. Stepwise Regression Analysis of Factors Associated with Net Migration, with Preceding Socioeconomic Change As Independent Variables, Excluding Population Change

Independent Variables** (1950-60)	Regression Coeff.	Beta	Standard Error	Multiple R	R^2
5. *% White Collar Employment Change	.207	.680	.033	.647	.418
2. *% Urban Change	.052	.211	.023	.695	.483
7. *% Unemployment Change	-.020	-.157	.011	.711	.506
9. *% Farm Population Change	.078	.194	.036	.723	.523
4. *% Manufacturing Change	-.035	-.189	.019	.735	.540
3. % Income Change	.018	.101	.015	.740	.547
8. % Fertility Change	.049	.057	.074	.741	.550
6. % Education Change	-.024	-.016	.137	.741	.550
Constant	-5.825				

* Statistically significant at the .05 level.

** Numerical numbers in front of independent variables are the original numbers in Table 1.

$$Y = -5.825 + .207(X_5) + .052(X_2) - .020(X_7) + .078(X_9) - .035(X_4) + .018(X_3) + .049(X_8) - .024(X_6)$$

In this new arrangement, white-collar employment change, urban population change, and manufacturing employment change become significantly related to net migration which are subdued by population change when including it; whereas the income variable becomes insignificant. This implies that income might incorporate its association with white-collar employment, urban population change, manufacturing change and gives way to them.

It seems clear now that white-collar employment change and manufacturing change in the preceding decade, 1950-60, have an effect on net migration (1960-70). Their joint effect on net migration is expressed in the form of population change. In other words, if we are talking about causal influence, the effect of population change in previous decade on later migration might be spurious. There is no theoretical support for this causal inference. However, if we are merely talking about the relationship, not causal inference, the strong association between previous population change and net migration might be explained as follows:

A county increasing population rapidly in a previous decade through migration might have some expansion in its socioeconomic base which attracts people to move in. And this same pull force, if continuing, might still attract migrants in later decades; whereas, if the expansion of the socioeconomic base of a county slows down, it might push people away from that county.

A comparison of R^2 in these two tables gives us confidence for our explanation because the removal of population change variable doesn't change the total R^2 very much, from .577 to .550.

The findings for positive association of income change and negative association of unemployment change with net migration is easy to understand. When a county increases its income and reduces its unemployment rate, it will have a greater chance to attract people. However, we should be very careful in the explanation of the positive association between farm population change and net migration. From the face figures we can not say that a county in the 1950-60 period which increased farm population also increased net migration in 1960-70. Neither theory nor fact

supports this argument. For there is no single county which has increased its farm population during the 1950-60 period. Every county, with no exception, has lost farm population during this time period. Therefore, the proper way in expressing this finding is that a county that lost less of its farm population in the 1950-60 period might also have lost less people through migration. The negative association between net migration and manufacturing employment change is difficult to explain soundly. A possible reason might be that a county with a rapid increase in manufacturing employment might have high net in-migration at the same time; therefore, the "opportunities" created by manufacturing expansion have been filled by previous migrants and left less "opportunities" for future migrants.

The failure of fertility change and education change to be significantly related to net migration is comprehensible. For these two variables, in a short term period, might be affected by net migration rather than affect migration themselves.

Socioeconomic Level and Net Migration

We now understand the relationship between socioeconomic change of the Preceding decade, 1950-60, and net migration, 1960-70. Let us turn our attention to the relationship between socioeconomic level and net migration.

This cross-sectional approach within the same time period has been done by most of the migration research in this subject. Table 4 shows the association between nine socioeconomic level variables and net migration. Five of them have a significant association with migration. They are education, income, percent urban, percent white-collar employment, and population density. These five variables have a multiple correlation of .763 with net migration. Squaring it, they explain 58.2 percent of the total variance of migration. The other four insignificant variables, unemployment rate, fertility ratio, percent manufacturing employment, and percent farm population only add 15 percent of total variance of migration.. The total R^2 is .597. This means that nine variables together explain 59.7 percent of total variance of migration. Of the nine variables,

Table 4. Stepwise Regression Analysis of Factors Associated with Net Migration, with 1960 Socioeconomic Level as Independent Variables

Independent Variables**	Regression Coeff.	Beta	Standard Error	Multiple R	R^2
15. *Education	1.739	.215	1.229	.671	.450
12. *Income	.005	.560	.002	.683	.466
10. *% Urban	-.157	-.495	.046	.725	.525
14. *% White Collar Employment	.559	.413	.260	.751	.563
11. *Population Density	-.003	-.218	.002	.763	.582
16. Unemployment Rate	-.576	-.148	.490	.769	.591
17. Fertility Ratio	-.011	-.075	.014	.772	.596
13. % Manufacturing Employment	-.066	-.070	.116	.773	.597
18. % Farm Population	-.016	-.022	.153	.773	.597
Constant	-45.194				

* Statistically significant at .05 level.

** Numerical numbers in front of the independent variables are the original numbers in Table 1.

$$Y = -45.194 + 1.739(X_{15}) + .005(X_{12}) - .157(X_{10}) + .559(X_{14}) - .003(X_{11}) - .576(X_{16}) - .011(X_{17}) - .066(X_{13}) - .016(X_{18})$$

only education, income, and white-collar employment have a positive association with net migration. All others have a negative association with it, although some of them are statistically insignificant. From the comparison of beta weight coefficients, we know that one standard unit of income change will contribute 56.0 percent standard unit of net migration change. Similar important weights are 49.5 percent for percent urban and 41.3 percent for percent white-collar employment. The weights for education and population density are about half of percent urban in explaining net migration change, 21.5 percent and 21.8 percent respectively.

It looks questionable at the first look that the unemployment rate doesn't have a significant association with net migration. There is no doubt for this finding. For the unemployment rate is measured at a certain point of time. In the present study it is measured at the first week of April, 1960; while net migration is measured during ten year period, 1960-70. As long as the unemployment rate has significant changes during this time period, we would expect its association with net migration. This question will become clear when we get into the analysis of relationship between net migration and socioeconomic change in 1960-70 in the next section.

Considering only the variables that have a significant association with net migration our finding is:
A county at the beginning of a migration period with a higher education, income, and white-collar employment rate tends to have higher net in-migration. A county with higher urban population and population density tends to have a lower net in-migration. This latter finding implies that in the state of Ohio, people tend to move out from areas of population concentration. It seems that urbanization no longer attracts people to move in as it used to. People might be tired of population congestion and tend to escape from it.

Comparing the findings of this section and the preceding one, we find that the effects of socioeconomic change and socioeconomic level on net migration are quite different. For example, unemployment rate, percent farm population, and percent manufacturing employment have no asso-

ciation with net migration. Whereas the changes of these same variables in the preceding decade do have an effect on net migration. While education level has a high association with net migration, its change in the preceding decade has no effect on migration. The interesting thing is that these two sets of independent variables, socioeconomic change and socioeconomic level, have similar predictive power to net migration. The R^2 is .577 for the former and .597 for the latter. If we want to predict net migration by using variables of socioeconomic level at the beginning of ten year migration period, education, income, percent urban, white-collar employment rate, and population density are the most powerful ones. They have a multiple correlation coefficient of .763 with net migration. If we want to predict net migration by using preceding socioeconomic change, white-collar employment change, urban population change, farm population change, and manufacturing change are good indicators. They have a multiple correlation coefficient of .735 with net migration.

The time order of these two sets of independent variables happens before the dependent variable. We are justified in calling them predictors.

Current Socioeconomic Change and Net Migration

Let us look at another dimension of this relationship in which the dependent variable and independent variables change in the same time period. There is no appropriate way to differentiate between which is the cause and which is the effect.

Table 5 shows the relationship between socioeconomic change and net migration in 1960-70. Among nine independent variables, again population change is the most powerful one, as we found in the 1950-60 decade. It explains most of the variance of migration. The R^2 for this variable along is .922, which is extreamely high. Together with all other variables, the R^2 is .929, adding only another .005 variation of net migration. It is this population change variable which is so powerful that makes what otherwise might be significant variables, insignificant. The two other significant variables are manufacturing and farm population. In order to make the association of other independent variables with net migration

Table 5. Stepwise Regression Analysis of Factors Associated with Net Migration, with 1960-70 Socioeconomic Change as Independent Variables

Independent Variables**	Regression Coeff.	Beta	Standard Error	Multiple R	R^2
19. *% Population Change	.714	.947	.060	.960	.922
27. *% Farm Population Change	-.011	-.044	.010	.961	.923
22. *% Manufacturing Employment Change	-.023	-.071	.012	.962	.925
21. % Income Change	.031	.040	.030	.963	.927
23. % White Collar Employment Change	.028	.061	.033	.963	.928
25. % Unemployment Change	.008	.021	.012	.964	.929
26. % Fertility Change	.018	.013	.055	.964	.929
20. % Urban Population Change	-.003	-.011	.008	.964	.929
24. % Education Change	.006	.005	.048	.964	.929
Constant	-9.493				

* Statistically significant at the .05 level.

** Numerical numbers in front of the independent variables are the original sequence numbers in Table 3.

$$Y = -9.493 + .714(X_{19}) - .011(X_{27}) - .023(X_{22}) + .031(X_{21}) + .028(X_{23}) + .008(X_{25}) + .018(X_{26}) - .003(X_{20})$$

clearer, we exclude the population change variable and recompute the regression coefficients. The result is shown in Table 6.

The removal of population change reduces the R^2 value from .929 to .798; the magnitude of the R^2 change is much larger than the one shown in 1950-60 decade. This means that population change has much association with net migration. Of the four significant variables shown in Table 6, white collar-employment change has the highest weight accounting for the variation of net migration. A change in one standard unit of this variable will explain 74.1 percent variance of the dependent variable. These four variables, white-collar employment change, education change, farm population change, and unemployment change have a multiple correlation coefficient of .890 with net migration. Squaring it we get a R^2 of .794, a very high predictive value. The other four insignificant variables, income change, urban population change, fertility change, and manufacturing change, only add another .004 of R^2 change.

The negative association of education change with net migration is worthwhile to emphasize. This implies that the migrants reduce the educational level of a destination county; the more net migration a county has, the lower the increase in its educational level. The positive relationship between unemployment change and net migration does not mean that the higher unemployment rate increase a county has, the more net migration it has; rather it implies that the more net migration a county has, the more the unemployment rate will increase. Or the more net migration a county has, the less the unemployment rate will decrease. This significant association between unemployment change conforms to our postulation in the above section, that while unemployment level has no association with net migration, changes in unemployment rate might have a connection with it.

The finding of a positive association of white-collar employment change and farm population change with net migration is consistent with what we have found in the first part of this analysis, Table 2 and Table 3.

Table 6. Stepwise Regression Analysis of Factors Associated with Net Migration, with 1960-70 Socioeconomic Change as Independent Variables, Excluding Population Change

Independent Variables*** (1960-70)	Regression Coeff.	Beta	Standard Error	Multiple R	R^2
23. * White Collar Employment Change	.333	.741	.034	.866	.750
24. * Education Change	-.215	-.173	.073	.882	.778
27. * Farm Population Change	.021	.081	.015	.886	.785
25. * Unemployment Change	.035	.095	.019	.890	.794
21. Income Change	-.049	-.063	.045	.892	.796
20. Urban Population Change	.009	.039	.014	.893	.797
26. Fertility Change	.028	.019	.092	.893	.798
22. **Manufacturing Employment Change	----	----	----	----	----
Constant	-4.208				

* Statistically significant at the .05 level.

** F-Level insignificant for further computation.

*** Numerical numbers in front of the independent variables are the original sequence numbers in Table 3.

$$Y = -4.208 + .333(X_{23}) - .215(X_{24}) + .021(X_{27}) + .035(X_{25}) - .049(X_{21}) + .009(X_{20}) + .028(X_{26})$$

The failure of urban population change, fertility change, and income change to have a significant association with net migration implies that:

1. The tempo of urbanization has been slowed down. Urbanized areas have lost their attraction to migrants.
2. In the short-term period, 10 years, migrants have not had much effect on fertility change.
3. The income level of the migrants is about in the middle of a destination county. Since this variable is measured by median family income change, increase or decrease of migrants does not have much connection with median income change.

From the analysis of data shown in Table 5 and Table 6, we are justified in clamining that net migration does have an effect on socioeconomic change in a destination community, especially in the effect of population change, education change and unemployment change.

We have already analyzed the relationship between net migration and socioeconomic change. And, our finding is that past socioeconomic change does have a significant effect on net migration, and net migration also has a significant effect on socioeconomic change in the same time period. In addition to this finding we also have found that the socioeconomic level of a county at the beginning of a migration period has a significant effect on net migration. The rest of this paper is devoted to testing this overall relationship by using the technique of path analysis.

A Test of the Overall Relationship Between Socioeconomic Change and Net Migration

Due to the nature of path analysis, it is too complicated, if not impossible, to include 28 variables in a path model. To overcome this difficulty we compose the original 27 socioeconomic variables into four indexes by using the technique of principal component analysis.
The 1950 to 1960 socioeconomic change variables

are composed into two indexes, X_1 and X_2; the 1960 socioeconomic level variables are composed into one index, X_3; the 1960 to 1970 socioeconomic change variables are composed into one index, X_5. These four indexes, together with the net migration rate, make the presentation of our finding much easier. In other words, the original 28 variables have now been reduced to five variables. X_1 and X_2 represent 1950-60 socioeconomic change; X_3 represents the 1960 socioeconomic level; X_4 represents net migration rate, 1960-70; and X_5 represents 1960-70 socioeconomic change.

The proportion of each variable explained by each index is shown in Table 7. X_1 and X_2 represent 51 percent of total variance of socioecomic change in 1950-60 as measured by nine original variables. X_1 has a higher negative loading on population change, urban population change, and white-collar employment change; X_2 is negatively related with income change, manufacturing change, unemployment change, and positively related to education change, fertility change. X_3, representing 49 percent of total varance of socioeconomic level in 1960 as measured by nine original variables, is more related with percent urban, population density, income, white-collar employment rate, and negatively related with farm population. X_5, explaining 38 percent of total variance of 1960-70 socioeconomic change as measured by nine variables, has a positive relationship with population change, urban change, white-collar employment change, unemployment change, and is negatively related to fertility change. It is very clear from the data shown in Table 7 that socioeconomic change indexes both for 1950-60 and 1960-70 are representing the same variables, but only in different direction, i.e., positive or negative loading. This consistency is important for our future analysis and inference. For, if the index of socioeconomic change doesn't represent the same phenomena in different time period, it will force us to give up using a composite index.

After compositing original 27 variables into four indexes, our analysis of relationship between socioeconomic change and net migration becomes much easier. Let us first look at the correlation matrix between these new variables. Table 8 shows the highest correlation of these four socioeconomic indexes with net migration is X_5, 1960-70 socioeconomic change, r=

Table 7. Principal Component Loading Matrix of 27 Socioeconomic Variables

Original Variables	X_1	X_2	X_5	Original Variables	X_3
Population Change	-.552	-.184	.499	% Urban	.418
Urban Population Change	-.424	.270	.357	Pop. Density	.310
Income Change	-.157	-.459	.082	Family Income	.438
Manufacturing Change	-.272	-.422	.161	Manufacturing Employment	.294
White Collar Employment Change	-.543	-.079	.480	White Collar Employment	.418
Education Change	-.052	.319	-.355	Education	.334
Unemployment Change	-.257	-.310	.206	Unemployment	-.150
Fertility Change	-.224	.527	-.370	Fertility Ratio	-.039
Farm Population Change	.053	.151	.234	Farm Pop.	-.375
Proportion of Total Variance Explained	.31	.20	.38		.49

SOURCE: Computed from original correlation metrix.

X_1 = 1950-60 socioeconomic change, index 1;

X_2 = 1950-60 socioeconomic change, index 2;

X_3 = 1960 socioeconomic level index;

X_5 = 1960-70 socioeconomic index.

Table 8. Zero Order Correlation Matrix of Composite Indexes and Net Migration

	X_1	X_2	X_3	X_4	X_5
X_1	1.000				
X_2	-.000	1.000			
X_3	*-.307	*.645	1.000		
X_4	*-.660	.192	*.480	1.000	
X_5	*-.719	*.258	*.462	*.889	1.000

* Statistically significant at .05 level.

X_1 = 1950-60 socioeconomic change, index 1; X_2 = 1950-60 socioeconomic change, index 2; X_3 = 1960 socioeconomic level index; X_4 = net migration, 1960-70; X_5 = 1960-70 socioeconomic change index.

Table 9. The Variables and Their Symbols

Independent Variables	
X_1	Socioeconomic change index 1, 1950-60
X_2	Socioeconomic change index 2, 1950-60
Intermediate Variables	
X_3	Socioeconomic level index, 1960
X_4	Net migration, 1960-70
Dependent Variable	
X_5	Socioeconomic change index, 1960-70

.889. Next is X_1, 1950-60 socioeconomic change, r = -.660. The data show that socioeconomic change indexes for 1950-60 and 1960-70 have a high association with net migration. This result is consistent with our previous finding and gives us the confidence to use composite indexes for testing the relationship between net migration and socioeconomic change.

The Path Model

In the path analysis we are concerned with two independent variables, X_1 and X_2; one dependent variable, X_5; and two intermediate variables, X_3, X_4. The specific variables are listed in Table 9. These five variables and the path model are the same both for metropolitan and non-metropolitan counties. That is, the same set of independent variables and intermediate variables are used to determine socioeconomic change in each case.

The path model in Figures 1 and 2 are a three stage multivariate model. The first stage is shown with socioeconomic level as the variable dependent upon the two independent variables. The second stage is represented by causal arrows from the independent variables toward net migration, X_4, which is also shown to be dependent upon socioeconomic level, X_3. The third stage shows socioeconomic change, X_5, is dependent upon X_1, X_2, X_3, and X_4. Since the first stage is only supplementary information which is not our main interest of analysis, we will not analyze it in detail. We will emphasize on the analysis of second and third stage.

The Second Stage

Equation 1 summarizes the overall relationship of this stage which shows that net migration is a function of past socioeconomic change and socioeconomic level. This equation is the same for both metropolitan and non-metropolitan counties.

$$X_4 = P_{41} X_1 + P_{41} X_2 + P_{43}X_3 + P_{4b}X_b \quad \text{----------(Eq. 1)}$$

The variables for this equation are in standard unit form and the

Figure 1. Path Diagram Showing the Relationship between Socioeconomic Change and Net Migration, Metropolitan Counties

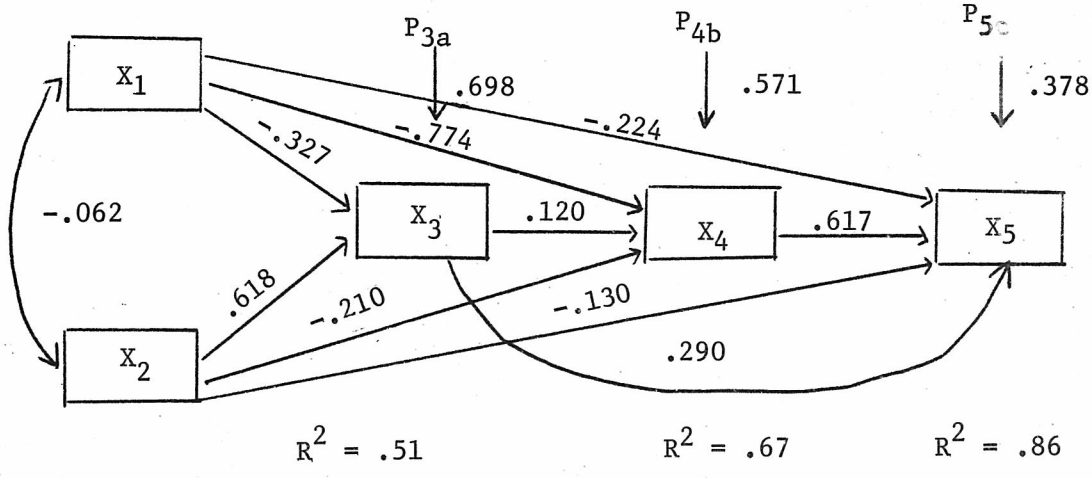
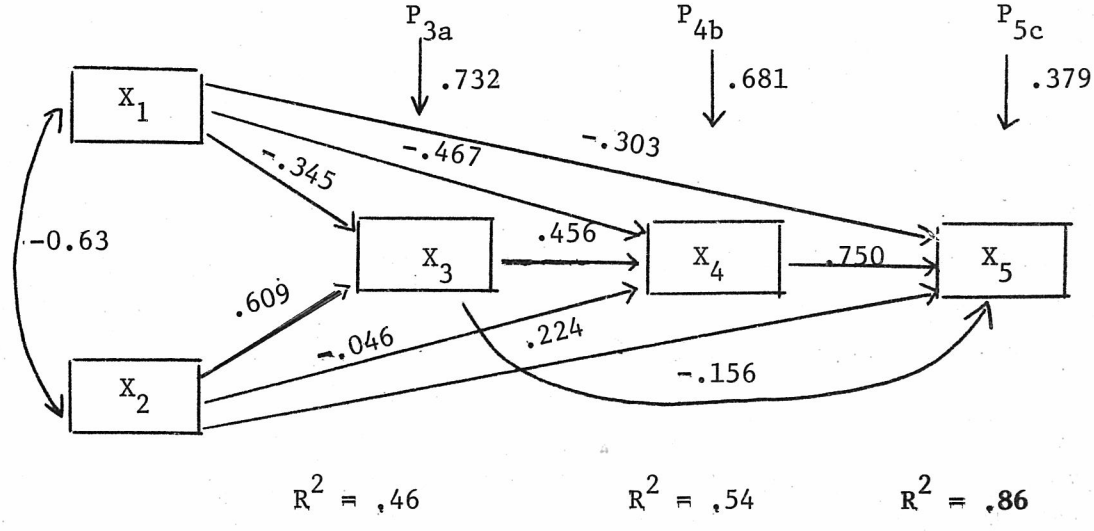


Figure 2. Path Diagram Showing the Relationship between Socioeconomic Change and Net Migration, Non-Metropolitan Counties



path coefficients[1] are nothing other than the beta coefficients in a standard regression problem and may be calculated by the regular system of normal equations for variables in standard form.

Multiple Correlation: In Tables 10 and 11, we find that the independent variables have a multiple correlation coefficient (R) of .819 for metropolitan counties and .735 for non-metropolitan counties with net migration. Squaring these we find that we have explained 67 percent of the variance in net migration for metropolitan counties and explained 54 percent of the variance in net migration for non-metropolitan counties.

The Residual: The residual path is calculated from the formula $P_{4b} = \sqrt{1 - R^2}$.[2] Thus, we have calculated $P_{4b} = .571$ for metropolitan counties and $P_{4b} = .681$ for non-metropolitan counties. Squaring these we find the residual variables explain 33 percent of the variance in net migration for metropolitan counties, 46 percent for non-metropolitan counties.

Direct Effects: Again looking at Figures 1 and 2 or Tables 10 and 11, we can assess the direct effect that each of the three independent variables has on net migration. This direct effect is represented by the path coefficient for each variable. In metropolitan counties the highest direct path in affecting net migration is X_1, socioeconomic change index 1, 1950-60. P_{41} is -.774. This is a negative association. X_2 also has a negative association with net migration although comparing with its standard error this magnitude is statistically insignificant. Since X_1 and X_2 have a negative loading on most of original variables, their negative effect on X_4 is exactly showing that they have positive association with net migration. This overall result also holds

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[1]The path coefficients for the present study are calculated by IBM 370 canned program, "Interactive Path Analyzer Version 2.3," The Ohio State University.

[2]For the derivation of this formula see Duncan (1966:6) and Land (1969:18).

Table 10. Summary of the Two Independent Variables and the Intermediate Variable on Net Migration. Metropolitan Counties

Independent Variables	r	Direct Path	Standard Error	Total Indirect Path	Indirect Path Through X_3
X_1	*-.805	*-.774	.334	-.031	-.044
X_2	-.086	-.210	.191	.124	.077
X_3	* .268	.120	.191	.148	
$R = .819$		$P_{4b} = .571$			
$R^2 = .67$		$P^2_{4b} = .33$			

* Statistically significant at .05 level.

Table 11. Summary of the Two Independent Variables and the Intermediate Variable on Net Migration, Non-Metropolitan Counties

Independent Variables	r	Direct Path	Standard Error	Total Indirect Path	Indirect Path Through X_3
X_1	*-.610	*-.467	.136	-.143	-.140
X_2	.192	-.046	.105	.238	-.166
X_3	* .572	* .455	.105	.117	
$R = .735$		$P_{4b} = .681$			
$R^2 = .54$		$P^2_{4b} = .46$			

* Statistically significant at .05 level.

in non-metropolitan counties although the magnitudes of effect are somewhat different for individual variables. Based on these data we are justified in claiming that the higher socioeconomic change in the preceding decade, the higher net migration in a county. This finding conforms to our previous finding in the regression analysis.

Let us compare the different impact of X_1 on X_4 in both places. Since the standard deviations on X_1 in both places are different, we cannot compare their relative importance of effect on X_4 merely from their face values in the diagram. In other words, the direct path P_{41} is -.774 in metropolitan counties and -.467 in non-metropolitan counties. We cannot thus draw a conclusion that X_1 is more important in metropolitan counties than it is in non-metropolitan counties. Therefore, we compare the ratio between direct paths to decide their relative importance. The ratio of effect on net migration between X_1 and X_3 is -6 : 1 (-.774 : .120) in metropolitan counties and -1 : 1 (-.467 : .455) in non-metropolitan counties. This difference ratio implies that socioeconomic change has a higher impact on net migration in metropolitan counties than that has in non-metropolitan counties. Figures 1 and 2 show that there is a very high positive direct effect from X_2 to X_3, .618 for metropolitan counties and .609 for non-metropolitan counties. And, X_3 also has a direct positive effect on X_4 but X_2 has a negative effect on X_4. Based on this data we have reason to expect it will have a positive indirect effect from X_2 through X_3 on X_4. Even though the direct effect of X_2 on X_4 is insignificant, we are not deleting it because a variable with a very small direct effect could be acting indirectly through other variables in a substantively significant manner. For the convenience of exploring relationships between variables, we are not deleting any path which is statistically insignificant[3]. It is this indirect effect which is important for us to understand the detail relationship between the variables in question.

Indirect Effects: Linear zero order correlation (total effect)between

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[3]From the rule of thumb a path coefficient that is less than twice its standard error will be statistically insignificant. However, according to Land (1969:34), few general prescriptions can be made for the determination of the minimum size of a substantively meaningful path coefficent.

The total indirect effect is the sum of the indirect effects through all individual variables in the system. The general computation formula for individual effect is:

$$\text{Indirect Effect of } X_i \text{ on } X_j \text{ through } X_k = r_{ik} \cdot P_{jk} \quad \text{-----(Eq. 2)}$$

Tables 10 and 11 show the total indirect effect of three independent variables on net migration and the individual indirect effect on X_4 through X_3. With the exception of X_2, the other two variables, X_1 and X_3, their directions (positive or negative) are consistent with the direct effect. This phenomenon holds both for metropolitan and non-metropolitan counties; furthermore, most of the magnitude of the indirect effects are much smaller than the direct effect. This is true for both areas. The TIE of X_2 on X_4 is positive while its direct effect is negative in metropolitan counties although statistically insignificant. This positive indirect effect is largely (about 64 percent) due to its indirect effect through X_3 on X_4. This is true for both places. Again, when we look at the indirect effect of X_1 on X_4 through X_3, in non-metropolitan counties this indirect effect alone explains most of the TIE of that variable, -.140 for the former and -.143 for the latter. In metropolitan counties this indirect effect is over the TIE. This means that there is some other indirect effect through other paths.

The Third Stage

We have postulated that socioeconomic change affects migration and migration in turn affects socioeconomic change. Figures 1 and 2 which we previously used in looking at first and second stage of our model also show the third stage. At this point, migration, X_4, which was the dependent variable in the second stage, becomes the fourth independent variable and an intermediate variable to be used in determining socioeconomic change. The regression is the same as Equation 1, except for the different dependent variable and the addition of migration as a determining variable.

$$X_5 = P_{51}X_1 + P_{52}X_2 + P_{53}X_3 + P_{54}X_4 + P_{5c}X_c \quad \text{----------(Eq. 3)}$$

Table 12. Summary of the Two Independent Variables and Two Intermediate Variables on Socioeconomic Change, Metropolitan Counties

Independent Variables	r	Direct Path	Standard Error	Total Indirect Path	Indirect Path Through X_3	Indirect Path Through X_4
X_1	*-.817	-.222	.254	-.595	-.106	-.497
X_2	.016	-.130	.138	.146	.185	-.054
X_3	* .454	* .290	.138	.164		.165
X_4	* .885	* .617	.138	.268		
$R = .927$		$P_{5c} = .378$				
$R^2 = .86$		$P^2_{5c} = .14$				

* Statistically significant at .05 level.

Table 13. Summary of the Two Independent Variables and Two Intermediate Variables on Socioeconomic Change, Non-Metropolitan Counties

Independent Variables	r	Direct Path	Standard Error	Total Indirect Path	Indirect Path Through X_3	Indirect Path Through X_4
X_1	*-.698	*-.303	.099	-.395	.048	-.458
X_2	* .257	* .224	.064	.033	-.091	.144
X_3	* .497	*-.156	.064	.653		.403
X_4	* .888	* .750	.064	.138		
R = .927		P_{5c} = .378				
R_2 = .86		P^2_{5c} = .14				

* Statistically significant at .05 level.

Tables 12 and 13 show the four independent variables have a very high multiple correlation with socioeconomic change, R = .927. Squaring it we get a R^2 of .86. This is a very high R^2 in sociological studies. The residual path is .377. Squaring it we left 14 percent unexplained total variance in this model. These three values, R, R^2, and residual are the same for both places.

Direct Effect: Among four independent variables, the most powerful direct effect on socioeconomic change, X_5, is net migration, X_4, .617 for metropolitan counties and .750 for non-metropolitan counties. The effects of other three independent variables on socioeconomic change is very small compared with net migration. Furthermore, their effects are also inconsistent in both places. In metropolitan counties the direct effect of X_1 and X_2 on X_5 is insignificant while it is significant in non-metropolitan counties. And X_3 has a positive effect on X_5 in metropolitan counties and negative effect in non-metropolitan counties.

Indirect Effect: Since the direct effect of some variables on socioeconomic change in both places is inconsistent we will look at their indirect effect in detail. Our plan of attack will be to first look at the total indirect effect and then study the individual indirect effect through X_4.

A. Socioeconomic Change, 1950-60, X_1: The largest TIE in metropolitan counties is from X_1 (-.595). As noted previously, this variable has a high negative correlation but a low negative direct effect. Thus, it has a high negative indirect effect. We may further explore this by the use of Equation 2, where we calculate the indirect effect through other independent variables individually. The results for all variables are presented in Tables 12 and 13. Here we find that the influence of the X_1 acting through X_4 is the major path to X_5; -.497 for metropolitan counties and -.458 for non-metropolitan counties. This is a total of effect of all paths that lead from X_1 through X_4 to X_5. Again, this result confirms our previous finding that the high socioeconomic change in the preceding decade, 1950-60, will have high net migration. And, this high change rate also acts through net migration thus

inducing high socioeconomic change in the later period, 1960-70.

B. Socioeconomic Change, 1950-60, X_2 : Of the four independent variables, their relationship with dependent variables, X_2, is the lowest one. For metropolitan counties it is .016, and .257 for non-metropolitan counties. The total indirect effect and indirect effect through X_4 is also low. This might be due to the nature of the composite index where we used principal component analysis to obtain its value. The most powerful component has already been represented in index 1, while index 2 assumed no relationship with index 1; therefore X_2 has a low relation with X_5.

C. Socioeconomic Level, 1960, X_3: In the zero order correlation matrix, X_3 has a medium association with X_5, but when we look at its TIE, we find it has a relatively high TIE on X_5. This amount of indirect effect is mostly from their effect through X_4 (.165 for metropolitan counties and .403 for non-metropolitan counties). It is interesting to note, in non-metropolitan counties, if other variables are held constant and we look only at the direct effect, we might conclude that high X_3 would lead to lower X_5. However, after examining the indirect effect, we would have to conclude that, when the effect of X_4 is taken into account, high X_3 would lead to high X_5. This finding suggests the important role of net migration on socioeconomic c change.

Summary and Conclusion

We have found a very high relationship between socioeconomic change and net migration. In the relationship between net migration and previous socioeconomic change, white-collar employment change, urban population change, unemployment change, farm population change, and manufacturing change have a significant association with net migration. In the relationship between net migration and socioeconomic level, education, income, percent urban, white-collar employment, and population density have a significant association with net migration. In the relationship between net migration and 1960-70 socioeconomic change, population change, white-collar employment change, education change, farm population

change and unemployment change have a significant correlation with net migration. In other words, a county increasing white-collar employment, urban population, farm population and decreasing its unemployment rate and manufacturing employment will increase net migration in the later decade. A county which has a high net migration rate also increases its population, white-collar employment, farm population, unemployment rate, and reduces its education level.

As for the relationship between socioeconomic level and net migration, we have found that a county at the beginning of migration period with higher education, income, white-collar employment, low urban population and population density will have high net migration.

Of the nine hypotheses formulated in this paper, four (hypotheses 1, 3, 7, and 9) of them have been fully supported, three (hypotheses 2, 5, and 6) of them partly supported, and two of them (hypotheses 4 and 8) not supported by the present study.

In hypothesis 4 we postulated positive relationships between net migration and manufacturing level, preceding and current manufacturing changes. But, the data show negative relationships between them, although the relationship between net migration and manufacturing level is statistically insignificant. It might be that a county with a rapid increase in manufacturing employment has a high net in-migration rate at the same time; therefore, the "opportunities" created by manufacturing expansion have been filled by previous migrants and left less "opportunities" for future migrants.

In hypothesis 8, we postulated a negative association between net migration and fertility level, and a positive association between net migration and fertility changes. But, our data show all these relationships are statistically insignificant and the direction of relationship between net migration and current fertility change is opposite to what we have postulated. It might be that in the short-term period migrants have not have much effect on fertility change.

In hypothesis 2 we postulated positive relationships between net migration and preceding and current urbanization change, and a negative

relationship between net migration and level of urbanization. These relationships have generally been supported by our data, although the relationship between net migration and current urbanization is statistically insignificant.

In hypothesis 5 we postulated a positive relationship between net migration and education level, and a negative relationship between net migration and preceding and current education change. These relationships are generally supported by our data, although the relationship between net migration and previous education change is statistically insignificant.

In hypothesis 6, we postulated positive relationships between net migration and income level and preceding and current income changes. Our data show the relationship between net migration and current income change is statistically insignificant. This implies that the income level of the migrants is about in the middle of a destination county. Since this variable is measured by median family income change, increase or decrease of migrants does not have much relation to median income change.

In order to test the overall relationship that net migration is affected by previous socioeconomic change and also affects further socioeconomic change, we combined 27 socioeconomic variables into four composite indexes and used technique of path analysis to study their relation. We have found that socioeconomic change indexes are more related with net migration than socioeconomic level index is. And, the relationship of net migration and socioeconomic change is supported by our analysis both in metropolitan and non-metropolitan counties.

The above findings are limited to the state of Ohio and in 1950-70 time period. As Bogue (1957:72) points out, net migration is the net resultant of the factors favoring in-migration and those favoring out-migration. Factors that are found significant by this study should not be interpreted as being direct causes of net migration. They are simply the characteristics of counties for which one set of forces overbalanced the other to a specified degree.

Implication for Further Research

The present study has been somewhat exploratory in nature, it raises several issues which require further elucidation. Some of these may be considered limitations of the present effort and are recognized as such.

1. Although the analysis succeeded in accounting for almost all of the net migration, the factors considered here, or the relative weights of the various factors, should not be regarded as a final explanation of the net migration. Also, the theoretical basis for the explanatory effect of some variables is not clear or may represent only temporary conditions. For example, manufacturing employment was found insignificant or negatively related to migration. This finding is congruent with lots of literature on migration study. It may be that this variable is significantly related to migration only in a given level of social development, or the conventional use of manufacturing as an indicator for industry is less effective than other indicators such as retailing and business. The current analysis tested a small number of the explanatory variables. Other factors may make a more efficient explanation. For example delinquency ratio, traffic accidents, and housing rent might be included for a start.

2. More than half of the variables used in the present study were identified as being significantly related to migration. We need to look deeper into the relationship that we have uncovered. Before a generally applicable theory of migration concerning these variables can be developed, the analyses of the model we have examined should be repeated for successive periods of time and for a wide variety of areas. One might employ the nation-wide data, or the data in other countries. The developmental stage of societies analyzed also needed to be delineated. In this way we will be able to specify confidently what variables and under what kind of societal development are important to migration.

3. In addition to net migration, the measurement of migration should be extended to in- and out-migration. The units of area should have maximum socioeconomic homogeneity. Wherever possible, the characteristics of migrants such as education, occupation, age, and individual motives of movement in and out of a place should be studied.

4. A limitation of the present study was due to the nature of data. The census data are based on a ten-year period. Although we know there is

some relationship between migration and socioeconomic change, we have no knowledge about how much time it will take for migrants to respond to socioeconomic change? In the same token, we also have no idea about how much time it will take for social and economic structure to have a rapid change caused by migrants. This is a thorny problem unsolved in the existing literature of migration study. This problem might be answered by the further development of research techniques in social science.

5. The theory of the relationship between migration and socioeconomic change is partly supported by the present study. Not all changes in socioeconomic factors have effects on or are affected by migration. Only some of them have this relationship. Therefore, the theory of this nature should be specified under certain conditions. For example, what aspects of socioeconomic change and under what developmental stage of a society will they be related to migration?

Policy Implications

The quantitative estimates of the various factors associated with net migration, and the high predictive power of one half of the variables is valuable information for policy makers. They may be used to predict possible changes in their own county and may serve as policy guides for the planning of social and economic development in the state of Ohio. First, we have found the negative association between net migration and urban population, and population density. This result implies that people tend to escape from a congested area, and urbanization per se no longer attracts people. A policy implication of this finding is that in the state of Ohio, a decentralization of industry and employment does not seem to be detrimental to migration. On the contrary, decentralization will aid in lowering the rate of increase in congestion as well as balancing the differential development. Second, the finding of a negative association of net migration with preceding unemployment change, but positive association with current unemployment change implies that migration per se cannot necessarily reduce the unemployment rate. Probably it merely transfers the unemployment from origin to destination. Therefore, in order to solve the problem of unemployment, other approaches, such as creating job opportunities and/or institutional change should be considered instead of merely encouraging people to move away from high unemployed areas. Third, the

relationship between net migration and manufacturing is a shaky one. This implies in the state of Ohio at the current stage of development, the movement of people is not generally in response to industrial change as before, rather the importance of other socioeconomic variables should be given more weight. Finally, level of education, income, and white-collar employment have a high positive association with net migration, A county with a high level of these factors would expect population increase from migration. In order, not to reduce the educational level of a county, the educational facilities should be well prepared beforehand.

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人口遷移與社會經濟變遷

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中 文 摘 要

人口遷移與社會經濟變遷的密切關係早就被社會及經濟學者所公認，但是很少人提供經驗研究以支持或否定此種假設。本研究試圖探討人口遷移與社會經濟變遷的關係。其具體目的為：一、了解以前的社會經濟變遷與人口遷移的關係；二、辨認社會經濟發展的程度與人口遷移的關係；三、探討同一時期之社會經濟變遷與人口遷移的關係。

這個研究設計與傳統所使用的方法不大一樣。我們採用三組自變數和二個層次的分析方法。第一組自變數代表人口遷移前十年間之社會經濟變遷情形；第二組變數代表人口遷移開始時之社會經濟程度；第三組變數則代表與人口遷移同一時期之社會經濟變遷。

為了了解社會經濟因素與人口遷移的一般關係，本研究採用多變數迴歸分析的方法。為了驗證人口遷移與社會經濟變遷相互影響的理論，則採用路徑分析的技巧。

本研究資料主要取自 1950, 1960 及 1970 美國之人口普查報告書。

就一般而論，社會經濟變遷影響人口遷移，人口遷移也進而影響社會經濟變遷的理論得到本研究的支持。

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