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Industrialization, Location and Rural Income Levels

W. Keith Bryant and Anne Elizabeth Hammill

Some idea of the level of development in different geographic areas can be obtained by comparing the well-being of the areas' residents. And, by relating economic and social factors in an area to an indicator of its residents' well-being, something can be learned about why one area is more developed than another. This issue of *Farm Business Notes* summarizes some of the preliminary findings of a study in which these comparisons were made for rural people in Minnesota.

Median family income of rural residents was used as the indicator of well-being for rural people. Family income, rather than individual income, was used because the family is the basic consuming unit in our society. A person living alone was considered a family. Rural families were those living on farms, in the open country, and in villages not classified as urban by the census of agriculture.

For most of Minnesota, the county is the local laborshed—the area in which most of the residents work. Near the Twin Cities, near other large Minnesota towns (St. Cloud, Rochester, Mankato), and near large border towns (Grand Forks, Fargo-Moorhead, La Crosse) many people live in one county and work in another. In these cases, counties were grouped together. Figure 1 shows the local laborsheds defined for this study.

The study is based on 1960 data except for two items that measure changes from 1950 to 1960. Though the study describes conditions that existed 7 years ago, the relationships that existed among local laborsheds then probably are relevant today.

The median incomes of rural families for the state's local laborsheds are shown in figure 2. Incomes were divided into four groups: $2,000-$2,999; $3,000-$3,999; $4,000-$4,999; and $5,000-$5,999.

Citizens with the highest rural income levels lived in the Twin Cities metropolitan area, where numerous opportunities exist for part-time, off-farm employment and for full-time, nonfarm employment of rural residents. Those with the next highest rural incomes lived in areas adjacent to Rochester, Fargo-Moorhead, Grand Forks, Duluth, and St. Cloud. High rural income levels also were found in the northeastern part of the state.

Rural incomes of $3,000-$3,999 were recorded in the Red River Valley, in central and southeastern Minnesota, and in a few other counties. People with the lowest rural income levels lived in a band extending from the southwest through the central part of the state. There are no large cities in this area.

Several factors generally are important in explaining why the rural income level in one laborshed is different from that in another. They are: characteristics of the labor force and the population; the structure of industry, including agriculture; the location of the laborshed relative to urban concentrations; the availability of capital; and the natural resource base in the laborshed. These five factors were studied to the extent possible with available data.

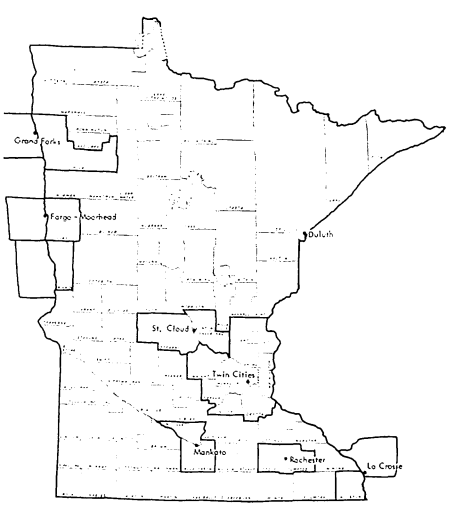

Figure 1. Local laborsheds, Minnesota, 1960

The Population and Labor Force

Three interrelated measures of the population were studied: age, education, and net migration from 1950 to 1960.

Age distribution determines the "dependency" of the population and, to a certain extent, determines its productivity. The young and the old are highly dependent on those in the working ages. The young either do not work or earn low incomes because of lack of experience and education. Old people either are retired or, because of lack of education or reduced physical capabilities, earn low incomes when they are employed. Therefore, the more young and old people there are relative to people in the prime working ages, the lower the rural income level of an area will be.

In this study, the percentage of the rural population made up of those under 25 and the percentage made up of those over 45 were used to determine the effect of age upon rural income level. A preponderance of rural young people did not affect rural income level in Minnesota's laborsheds. However, the higher the proportion of rural people over 45, the lower was the income level.

Education level affects rural income level. While the proportion of rural people with less than 7 years of formal schooling does not seem to affect the rural income level in Minnesota laborsheds, the proportion of rural people with at least a high school education is important. The higher the proportion of rural people with at least a high school education in a laborshed, the higher is rural income.

Net migration between 1950 and 1960 reflects a host of interrelated forces that are very difficult to untangle. In 1960, those laborsheds in Minnesota that had experienced net out-migration in the 1950's had more rural people over 45, fewer rural people with at least a high school education, a higher proportion of rural residents, and larger average farm size than other laborsheds. The more net in-migration a laborshed experienced during the 1950's, the higher was its rural income level in 1960. Conversely, the more net out-migration a laborshed had during the 1950's, the lower was its rural income level.

It is easy to speculate that out-migra-

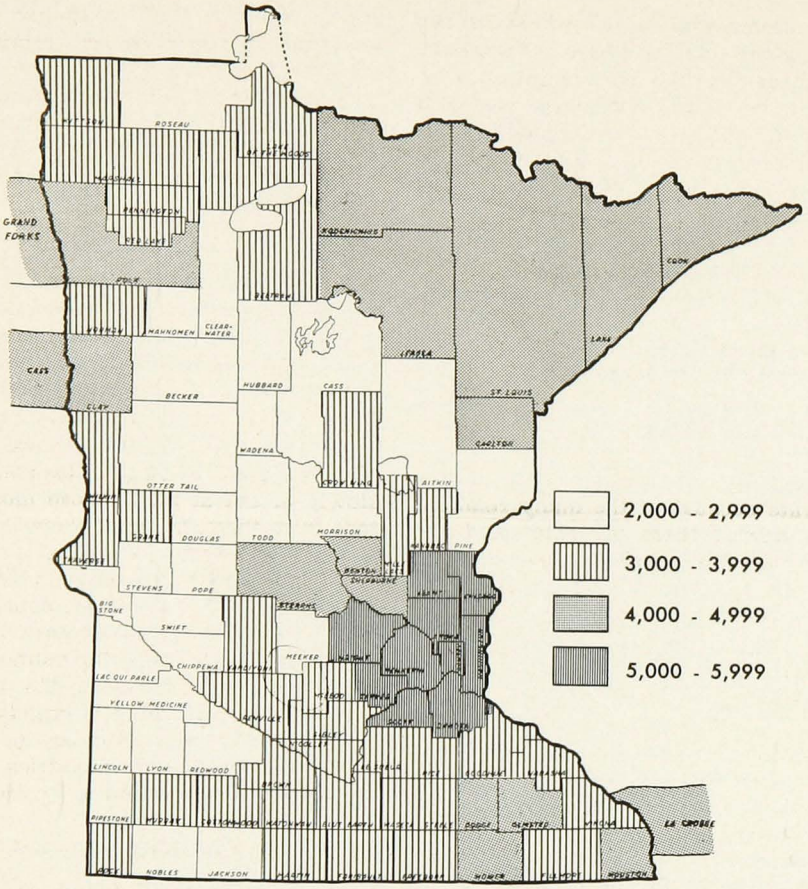

Figure 2. Median family rural income, 1960

tion was one of the factors that permitted farm size to increase and so increased rural income levels. But outmigration also left an older, more poorly educated rural population that should have lowered rural income level. Finally, those laborsheds that were relatively urban in 1950 attracted migrants during the 1950's, making them more urban in 1960. Increasing urbanization typically raises rural income level. The net result was that those laborsheds with heavy net outmigration in the 1950's had lower rural income levels in 1960 than those that experienced net in-migration or light net out-migration. If each factor's effect could be separated and measured, the effect of urbanization probably would dominate the others. Net migration mostly reflects how urban a laborshed is as well as the effect of urbanization on its rural income level.

Industry and Agriculture

The structure of industry and agriculture was viewed in a number of ways in this study. Changes in employment by industry during the 1950's were studied, as were specific characteristics of agriculture.

In 1960, when each relationship was viewed **separately**, changes in employment in agriculture, forestry, manufacturing, transportation, and communications; wholesale and retail trade; and finance, insurance, real estate, and services were each related to rural income level. But when other variables were taken into account, only the changes in manufacturing employment during the fifties were important. Holding other variables constant, the more rapid the growth in manufacturing employment, the higher was the income level of rural families in a local laborshed in 1960.

With the exception of employment in forestry and mining, changes in employment by industry in a laborshed during the 1950's were highly related to the distance from large cities. The closer to a large city, and the larger the city, the more rapidly employment in manufacturing grew not only during the fifties but during the 1940's as well. Clearly, the rapid growth of nonfarm jobs (except in forestry and mining) has added to rural income level, especially near large cities.

Average farm size in acres was used as the measure of structure in agriculture. Although farm size was not as important as some of the other variables, laborsheds with large average farm size did have higher rural income levels than other laborsheds in 1960 if other variables were held constant. Average farm size was a factor in the high rural income levels found in south central Minnesota and in the Red River Valley.

The Capital Market

Another factor thought to be important in development is the availability of capital for investment. Even if investment in farm and nonfarm firms is expected to be profitable, investment will not be made unless risk capital is available. When profitable investment opportunities exist, the amount of investment depends on the amount of capital available.

Obtaining a measure of capital availability in a local laborshed is difficult; no satisfactory measure was found. The ratio of bank loans and discounts to bank deposits in each laborshed was used in this study. Presumably, the lower this ratio is, the more capital is potentially available. Holding other variables constant, this measure of capital availability was not important in explaining differences in rural income levels among laborsheds in the state. The relationship revealed by the study was not only weak, but negative. That is, the lower the ratio of bank loans and discounts to deposits in a laborshed, the higher was rural income level. Thus, the more capital available from local banks in a laborshed relative to other areas, the higher was rural income level.

Natural Resource Endowments

Some writers stress the importance of natural resource endowments to an area's development, while some maintain that they are of little importance. Others believe that a natural resource base is important during an area's early growth but becomes less so as industries not based on natural resources grow in importance.

There is no adequate conceptual or empirical definition of a natural resource base. For instance, an area's location relative to other market areas and to transportation routes sometimes is classified as part of it. Certainly the natural resource endowment of an area changes as man's knowledge and production methods change. And the mineral and forest resource bases change as man finds new uses for minerals and forest products and new ways of refining and processing them.

This study attempted to construct measures of the agricultural, forest, and mineral resource endowments of local laborsheds. These attempts were successful only to a limited extent. The measure of the agricultural resource

base was an index of the 1959 value per acre of the major crops grown in a laborshed. The 1959 value of the growing stock of soft and hardwoods in the major timber producing laborsheds was used as a crude measure of forest resource endowment. No account was taken of the value of forests for recreational use. And, failing other measures, important iron producing laborsheds were studied separately from other local laborsheds.

The crop index was important in explaining rural income level in local laborsheds. Other factors being constant, the higher the crop index, the higher was rural income. Combined with the finding that average farm size in acres in a laborshed also was somewhat important in explaining rural income level, this finding clearly indicates that both the intensity of agricultural production and the size of productive farm units are important determinants of rural income level in Minnesota laborsheds. However, agriculture is not a dominant factor in most areas. In some laborsheds, the crop index is rather low. In others, the joint effects of other factors overshadow agriculture.

The variables used to measure the resource endowment of minerals and forestry did not seem to be important influences on rural income level. This result is inconclusive, however, since the measures used were crude. Furthermore, since the measures for forest and mineral resource endowments were highly related to each other, a clear indication of their separate influences could not be obtained.

Location of Laborsheds

Location relative to urban centers and to concentrations of industry and commerce is important to the development of rural laborsheds. The local markets—credit, labor, product, and input—serving rural people are thought to be more efficient when the laborshed is close to an "industrial-urban concentration." Living in such an area, farmers have opportunities to work in part- or full-time nonfarm jobs, as do their sons, daughters, and wives. Thus, the closer a laborshed is to such a center, and the larger the center, the higher rural income level should be. In the southeastern United States, the facts have supported these ideas. In the Great Plains, the Southwest, and the Rocky Mountain States, the facts do not support them. Some contend that in these latter areas the development of nonfarm industries and commerce is dependent on the development of agriculture rather than the reverse.

Minnesota appears to be between the parts of the country where the presence of industrial-urban centers affects rural income level and the parts where it does not. This study included three variables bearing on this question: (1) how urban a laborshed was relative to others, (2) whether a laborshed contained a "complete shopping center"—one that offered a complete line of consumer goods and services plus the basic inputs and repair services for agriculture, and (3) the distance each laborshed was from a large city—the Twin Cites, Duluth, Fargo-Moorhead, and Sioux Falls—taking into account their population sizes.

The results were mixed and hard to separate because of the many relationships among these variables and the other variables studied. How urban a laborshed is and whether it contains a complete shopping center are highly related and provide measures of the same factors. Conversely, the extent of urbanization in a laborshed and its distance from large cities were less closely related to one another and thus provided measures of different factors.

Holding other variables constant, neither local urbanization nor the distance of a laborshed from large cities had any effect on rural income level. However, since these two variables are closely related to each other and to other variables, these findings should be interpreted cautiously.

The degree of local urbanization in a laborshed and the net migration that it experienced during the 1950's are closely related. Also related are the distance between each laborshed and large cities and the rapidity of a laborshed's employment growth in manufacturing during the 1950's. Both net migration and employment growth in manufacturing during the 1950's are significantly related to rural income levels in local laborsheds in Minnesota. Therefore, these relationships reflect in part the effects on rural income levels of location relative to local urban centers and to the large industrial-urban centers of Minneapolis-St. Paul, Duluth-Superior, Fargo-Moorhead, and Sioux Falls.

The data allow a further examination of these location relationships. Location relative to large cities is closely related to the changes in the entire industry structure in local laborsheds (with the exceptions of mining and forestry) during the 1950's. During that period, the closer a laborshed was to an industrial-urban center and the larger the center, the more rapidly the laborshed's employment grew in manufacturing, transportation and communications, and finance, insurance, real estate, and services. The closer it was to an industrial-urban center, the more rapidly the laborshed's employment in agriculture and wholesale trade declined. Furthermore, the more urban a laborshed was relative to others in 1960, the more rapidly its employment in agriculture and wholesale trade declined and the more rapidly its employment in finance, insurance, real estate, and services grew.

These data provide the following picture. (And, we would argue, these developments are taking place today.) During the 1950's, industrial growth took place most rapidly in those laborsheds adjacent to large cities and more slowly or not at all in those most distant from them. In small, remote urban centers, the service, financial, and real estate sectors grew most rapidly. And, the closer they lived to an urban center—large or small—the more rapidly people left agriculture for nonfarm opportunities or retirement. The growth in forestry and mining is largely independent of these particular locational factors because these industries are so closely related to resource location.

Some Concluding Thoughts

Education is important in influencing the income level of rural people in local laborsheds in Minnesota. Important also are agriculture, industry, and commerce. But agriculture appears to be most important in areas far from large cities, and industry and commerce appear to be most important in areas close to them. Industry and commerce are spreading out from large industrial-urban centers, and some commercial growth is occurring in small urban centers—the larger the center, the more rapid the growth.

Planning for the future growth of rural areas in Minnesota must include consideration of these relationships. Can planned programs "hurry along" industrial and commercial growth? If they can, where will they reap the greatest gains—in areas near large cities or in communities away from them?

What will these programs cost relative to their impact on income levels? Given the importance of agriculture (in terms of average farm size and the agricultural resource base), would programs to change the structure of agriculture in the areas farthest from the large cities be cheaper and have a greater impact on income level than an emphasis on achieving industrial growth? This study cannot answer these questions. But, in light of our results, they are crucial questions. ■

In Perspective

A National Look at Rural Farm Incomes

J. F. O'Connor

The main article in this issue concerns the factors influencing the income level of rural families in Minnesota laborsheds. This article presents a national look at a closely related topic—the factors affecting the average income of rural farm residents per county.[1] This article is based on the results of a study investigating the reasons for differences among counties in average income of their rural farm residents in 1959.

Generally speaking, per capita rural farm income in a county depends on certain social and economic characteristics together with the location of the county relative to large urban centers. Social characteristics include the age and education of the rural farm population; the economic characteristics of the area, including the degree of industrialization; the extent of long term unemployment in the county; and the quantity of capital per worker in farming. The importance of all these factors varies from one region of the country to another. This article focuses on the importance of education, long term unemployment, and location.

Education

Education is one of the most important factors affecting the per capita income of rural farm residents. In all regions of the country, the average income of the rural farm population increases as the average number of years of school completed increases. Except in the South, if the effects of average years of schooling and other factors are held constant, per capita income increases as the proportion of more highly educated people increases.

Two reasons may account for income increasing as the level of education increases. First, the well educated farmer is more likely to be a good manager than a less educated farmer. And the rural farm resident who works in nonfarm employment can obtain a more remunerative job if he has a good education.

Long Term Unemployment

Conditions in the local nonfarm labor market affect rural farm income to the extent that rural farm residents are able to find nonfarm jobs. If the nonfarm labor market is depressed, rural farm residents are unable to obtain suitable off-farm employment. With underemployment in agriculture, a depressed local labor market will tend to reduce per capita rural farm income. When the supply of local nonfarm jobs is limited, farms absorb workers, particularly rural farm residents, even though the said workers do not contribute very much in terms of increased output. Thus farming must provide an income for a greater number of people than it would under better local nonfarm labor market conditions. The extent of long term unemployment is one measure of the state of the local labor market. In most regions of the country, considerable local long term unemployment in a county is accompanied by low per capita rural farm income.

Location

The proximity of a county to metropolitan areas results in increased per capita rural farm income by providing farmers with outlets for higher-priced commodities and by providing them with needed inputs more efficiently. In counties within commuting distance of a metropolitan area, there are increased opportunities for nonfarm work for members of a farm family and for other rural farm residents.

Location is an important factor in the Pacific Northwest and in the regions east of the Mississippi, except for the Atlantic metropolitan belt (Boston to Washington), the southeast coast and Gulf Coast region, and the Upper Great Lakes region. The latter region includes the northern part of Minnesota, except for the Red River Valley. County location is important in the Corn Belt, which includes southern Minnesota. The positive effect of location is present in the Upper Great Lakes region, but it is much less important than in other regions. Location is not an important factor in the Great Plains region, which includes the Red River Valley.

[1] The rural farm population consists of those rural residents who live on farms. In 1960, there were 13.4 million rural farm people in the United States.

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