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Effects of rural industrialization on rural development in Iowa

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Effects of rural industrialization on rural development in Iowa

by

Shyamal Roy Chowdhury

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CHAPTER I. INTRODUCTION

Problem Setting

The national economic and employment policy since World War II in America was mostly a strategy of national growth without regard to its distributional aspects. This single-valued objective of 'national growth' was pursued for two reasons:

1. The national growth without regard to its geographical distribution was followed as the major means to maintain full employment.
2. Economic growth in North America and the OECD countries was thought to be a necessity in the Cold War competition which prevailed so intensely in the 1950's and 1960's.

This obsession with growth in GNP or national growth without regard to its distributional aspects made a little and more often negative impact on the rural communities. Whereas the country as a whole marched on the path of rising per capita income, the rural communities living in rural towns continued to decay. The large cities in the nation became larger and the metropolis continued to expand into a megalopolis with the out-migration of people from rural areas looking for jobs and opportunities. The industries preferred to build a new plant in the metropolitan area rather than in a rural town, simply because the resource base and good markets are readily available. As a result, U.S. rural economy is very nearly destroyed. Lack of opportunities and jobs have led many young people to leave the countryside and to migrate to large cities where opportunities are plentiful and life is attractive. The sad, desolate

conditions of the rural towns can be observed in the form of vacant and abandoned business buildings, unused school buildings, obsolete and deteriorating public capital (e.g., streets), smaller church congregations and sometimes an expressed feeling of frustration and even hopelessness.

The above state of affairs prevailed for two decades after the World War II. It is only recently, since the 1960's there is a widespread national concern over the economic and social plight of rural communities. In the 1950's there were some small rural development programs. But these were only aimed for some specific distressed areas and their achievements were quite modest. It was generally thought that the growth of GNP will eventually take care of all the ills and problems of the rural communities, and quite a few economists contributed to that thought. But the solution with a dosage of increment of GNP did not solve the problems of rural communities. After a long-time neglect, now we have wide public and national concern over the economic plight of rural communities. Suddenly, every politician aspiring for national or state legislature is talking about it and laying down hasty proposals. Urban leaders are talking about it, perhaps not so much out of concern for rural communities, but more for attaining the objectives of the cities (restrain population concentration, environmental hazards, violence, etc.). Unless we hear the voice of the rural community itself through its leaders, possibly rural communities will end up getting only some standardized economic relief which will not alleviate their problems.

The traditional rural community consists of a small town and a surrounding countryside. The town primarily acts as a farm service center. People living in the countryside earn their incomes mainly in farming. Agriculture is the principal or only industry based on export demand. The incomes from farming are spent on marketing services, farm supplies and consumer products provided by town. The incomes of town people are derived mainly through personal services and the merchandising of imported goods. Goods imported are paid in majority through the exports of farm products.

This was the picture of traditional rural community at some time in the past. Then came the nonfarm export industries with the result that cities and metropolitan areas are formed. Many rural communities possibly endowed with a good resource base took this chance of transition and became metropolitan areas or cities. But still a larger number remained as it was.

During the past three decades, the traditional rural community has been subjected to strong adjustment pressures. Remarkable technical change in agriculture and national economic growth coupled together to depress the relative income earning opportunities on all but the big commercial farms. The farm programs during the 1960's and 1970's favored the larger commercial farms with its higher support prices and payments to commercial farmers. The articles by Heady (17) and Kaldor (29) have stressed this point. This caused a further decline of employment and economic opportunity in rural towns because they accentuated the trend to fewer and larger farms. With the decline in the number of farms and

the fact that the large commercial farms use capital heavily, a sizable work force in agriculture has become redundant. Because of the niggardly absolute benefits on small farms with highly underemployed labor, the small operators could best gain through capital gains in land sold to more highly capitalized larger operators in a position to realize scale economies. Because of the reduced farm numbers and a reduced agricultural work force, the very foundation of the rural economy is destroyed. Rural community business sector also used a larger volume of capital inputs as a substitute for farm labor. The labor released from agriculture could not be absorbed for lack of employment opportunity. Because of the lack of income opportunities, and attractiveness of nonfarm employment with higher returns, there is a heavy out-migration from many agricultural areas as many farm people have left for better opportunities. Although this has helped to boost the per capita farm income, the decline in the number of farms and farm population has tended to reduce the relative size of the farm market for some of the goods and services offered by rural towns. The larger industrial centers for U.S. with better endowments experienced a rapid growth and increased employment. This drew population out of the countryside particularly because of the higher demand of personal services in industrial centers with rising per capita income and employment.

Having recognized the need of a rural development program the important question is how do we go about it. Can we build a policy model which will crank out the solution to solve all the problems of a rural community? It is heartening to notice the concern expressed by many

groups ranging from policymakers to community leaders. There is already a number of programs initiated by federal and state governments to eradicate rural poverty and related problems. But most of these, like the Food Stamps Program and the Direct Food Distribution Program do not really develop the rural economy. They are just relief measures against the poverty.

Before doing anything on rural development, we should understand clearly the problems. Comprehensive research is needed to find out multidimensional problems existing in the rural community. After assessing the problems, we can then propose various policy measures and evaluate them thoroughly and choose the appropriate ones. This is the proper way to tackle the rural development problem. According to Madden (35) research and data are needed in the following problem areas:

I. Improvement of the economic opportunities of rural people.

II. Improving rural community institutions and the delivery of services. Analysis will be needed on the economies and diseconomies of city size and on the design of communities and institutions that will best meet the needs of the nation.

III. Meeting the housing needs of rural families.

IV. Finding the causes of and cures for poverty among rural people.

V. Isolating social and economic barriers to change and determining feasible ways to overcome these barriers.

Within each of these problem areas, several interrelated pieces of research are needed:

A. Determine the existing situation, including definition, description, and measurement of the target population.

B. Analyze the relevant forces impinging upon the target population, including estimation of key causal relations.

C. Study the effects of current intervention programs.

D. Evaluate potential innovations in intervention programs, using pilot studies where possible.

E. Pull together from all the studies a wide range of readily accessible information and knowledge so that policy makers at all levels can make informed decisions in program formulation.

At this point we should explain the concepts of growth and development. This is somewhat necessary if we want to suggest policy measures on rural development.

The terms economic growth and economic development are often applied interchangeably to indicate some measure of improvement in the capacity to produce or the well-being of a country or a region. A distinction is sometimes made between them on the basis of initial economic magnitudes which prevail within a nation or a region at the time of observation (19).

An increase in income per capita during some designated time period might be described as growth in a 'mature' economy where initial economic magnitudes were relatively high and as development in a 'less mature' economy.

This parody is resolved and a more useful distinction is obtained by focusing on a multi-dimensional array of variables which commonly serve as indicators of national and regional status. In a Tinbergen policy

model, this array would be target variables like level of income, income per capita, and distribution of income; level of output, output per employee, geographical and industrial distribution of output; level of employment, employment per capita and occupational distribution of employment; public and private investment, consumption, transfers, etc. Additionally, it may include sets of political and sociological variables such as the political system, community participation levels, political sensivity and stability, population magnitudes, educational opportunity and attainment levels, nutritional levels and incidence of disease (13), (34), (40), (53). 'Development' should be recognized to involve several variables and is a multi-dimensional concept.

As opposed to 'development', 'growth' is a one-dimensional concept. 'Growth' is used to describe increments in the numerical magnitude of any status indicator like GNP, per capita income or per capita output.

'Rural development' encompasses many facets of life in the rural communities. Enhancing the welfare of the rural people should be the objective of a rural development plan. What comprises welfare? Obviously, welfare has many dimensions. Welfare is not just increasing income opportunities through industrialization, though it may be one of the important objectives. Welfare comprises better income opportunities, better housing, various education facilities, a good medicare system, recreational and other facilities available in large cities and a host of other variables. It is evident that a rural development program should not only rely on economics but also on sociology and other disciplines.

Objectives of the Study

The objective of this study is to evaluate the contribution of rural industrialization to the 'development' of rural Iowa. The welfare of rural people has many dimensions. Obviously, jobs and incomes are the means for achieving some of the important goals of rural people. For some analysts and policy makers, the creation of new jobs and the improvement of rural incomes are the beginning and end of rural development. While this is a much too narrow point of view, rural development without adequate attention to jobs and incomes is likely to be both quite sterile and unsatisfactory for most rural people. Rural industrialization is a big hope for those communities which have the characteristics favoring it. We can find many outstanding examples where the initiation of a new plant by an outside firm caused a turn around in the employment and income decline of a rural community. To an extent, national leaders equate rural development with rural industrialization. The thrust is to spread plants over the country and disperse economic activity, employment and the population. It would be fine if all rural communities faced with economic decline, and who want it, could have industrialization to serve these needs. But unfortunately, not all rural communities are the same. We have to realize that a fraction of the rural communities have the proper resources and facilities to embrace industrialization. Heady (17) has divided the rural communities into three classes:

1. Endowed communities Endowed communities possess the characteristics of location, leaders who can generate local support for an industrial park, improved water and sewer facilities, transportation

facilities, closeness to larger urban centers of greater cultural scope and similar items. These communities have hope to get industrialization through outside firms and capital inflow.

2. Bootstrap communities Bootstrap communities possess none of the above characteristics. If they get industrialization, it will be because of the imagination or luck of a local individual or small group that strikes upon a successful product and can corral the capital to start up.

3. Purely agricultural communities Purely agricultural communities lack endowments as above and are never blessed with the 'bright individual' who starts up on his own. This group includes the majority of typical rural communities. Income of their citizens will be increased more through a restructuring of farms into more efficient units and the training and transfer of workers for employment elsewhere. Largely, their long-run answer is in restructuring of the community to a declining resource base, rather than restructuring to meet industrial growth.

Plan of the Study

The study pursued here can be divided as:

1. Analyze the distribution of population over the decades in counties, State Planning Board Areas and the whole state of Iowa.
2. Analyze the change in employment structure in agriculture, manufacturing and service sectors over the last decade in counties, State Planning Board Areas and the whole state of Iowa.

3. Analyze in detail the location, growth and trends of firms of different sizes in different industries (S.I.C. classes) in counties (both rural and metropolitan), State Planning Board Areas and the whole state of Iowa in the last decade.
4. Estimate the production functions relating value added and capital expenditure in different S.I.C. industries for the whole of U.S.
5. Evaluate rural industrialization over the past decade on the basis of production functions estimates.
6. Evaluate growth, structure and developmental impacts of rural industrialization with empirical findings.
7. Suggest policy measures on the basis of observations and findings.
8. Suggest some ideas for further research.

Chapter II reviews relevant literature. Particular stress is given to literature dealing with costs and benefits of rural industrialization and impacts of industrial development on rural communities. Chapter III explains the basic concepts and definitions useful for this study. Chapter IV develops the model for estimating the production functions of different industries.

Chapter V deals with the population distribution. Population and migration trends in rural and metropolitan counties, State Planning Board Areas and Standard Metropolitan Statistical Areas are analyzed in detail using appropriate tables.

Chapter VI examines trends in employment structure in agriculture, manufacturing and service sectors in counties, State Planning Board Areas and the whole of Iowa. A small statistical model for income distribution is also developed in this chapter.

Chapter VII is an important one. It contains the detailed analysis of location, growth and trends of firms of different sizes in different industries for both rural and metropolitan areas.

Chapter VIII deals with the direct developmental characteristics of the industries moving to rural Iowa. Stability, safety, long-term and short-term development characteristics of the important industries of rural Iowa are examined in this chapter.

Chapter IX contains the production functions estimates. Three types of production functions estimates for S.I.C. industries are presented. The impact on rural industrialization in relation to the production functions estimates are analyzed.

In Chapter X a summary of the study incorporating general implications and suggestions for further research is given.

CHAPTER II. REVIEW OF LITERATURE

Literature on rural development and rural industrialization is sparse. Most papers are of recent origin. As of now, a concrete theory on rural development is still lacking. A few good ideas are given in some papers. The area really needs some concentrated and systematic research, better jointly from people belonging to interdisciplinary sciences. In this chapter I shall review some papers, specially dealing with the impacts of industrial development on rural communities.

Impact of Industrial Development on Rural Communities

This section is mainly based on two papers by Scott (49) and Scott and Summers (50). When an industry moves into a community certain changes can be observed on the community profile. First change to be observed is the land itself. Land relates to all the locational questions in the local area, as well, such as zoning and access to railroads, highways, airports, water, sewers, drainage and other utilities.

Whenever a site is acquired for industrial use, a number of changes occur which frequently result in problems not anticipated. A large proportion of the site will be either under roof or paved parking lot, multiplying the amount of water runoff - taxing the ability of sewers, storm systems, and previous or natural drainage ways. This in turn often results in flooded basements, soil erosion, flooded streets, standing water, and other types of damage. It may require large capital outlays using local tax resources to solve such land use created problems. The

handling of water runoff may be a minor problem when compared to public resources required to handle both industrial and human liquid and solid wastes, especially as the general public demands greater pollution control restrictions.

The resource and product profile of the community's agricultural sector will be affected in several ways. The two main sources of impact are from land acquisition for the various nonfarm uses - in industry, business, residential - and from the labor demands - the rising wage rate and lowering supply of labor. Since often agriculture and industry desire to acquire the same type of land, they find themselves in direct competition for land. While the reduction in agricultural production by local land acquisition for nonfarm use may be important in the product profile for that community, it is of little consequence in the aggregate for the whole nation.

The change in the local labor demand and supply will have a much more profound effect on the agricultural sector than land acquisition if it is a small proportion of total land. As wage rates increase and the availability of labor decreases during industrialization, the larger farms which depend more on hired labor are forced to shift away from livestock production which is more labor intensive. The higher wage rates and reduction of business volume reduces income on the large farms. Under the impact of industrialization, the income of small farmers is increased. This comes about not from any increase in return for their farming operation but because many small farmers are under-employed and now they have off-farm earning opportunities. These farmers

frequently take full-time off-farm jobs and also continue their farming operation with some organizational modification. The net result is usually an increase in income for the small family farmer. These smaller farmers spend a higher proportion of their income and spend it locally. This will tend to stimulate local business. These results imply that the family farm which uses only its own labor will likely persist longer than larger farms as industrialization of a rural area occurs. The trend toward larger farms may even be slowed or arrested. Growth of large farms will be limited by the higher wage rates, lower labor availability, and the development of newer more capital intensive technologies for agricultural production that are now being used by these larger farmers.

One of the most important resources for industry is labor. Who these workers are, where they come from, where they live, their wage level, age, sex, and ethnic background are factors which may alter the community profile. The size of the industry work force compared to the size of the community will have a direct effect on altering the character of the community. The hiring and training policy of the company directly affects the character of the work force.

When a plant that hires mostly women comes into a community, the effect on the population profile will be quite different than a plant that hires mostly men. There is a high elasticity of supply for women in the work force in most rural communities because there is not as much opportunity for women to do remunerative work outside the home. The effects and noneffects of hiring mostly women will be reflected in higher per capita consumption and savings - more and higher priced cars,

more convenience foods, more household services outside the home, more laundry and drycleaning, more eating out, more and higher quality women's clothes. There will be little increase in population or new households and no reduction in average age. There will be no housing boom, no residential land development, no water or sewer extensions needed, or any other profile changes ordinarily associated with an increasing population. In this case we have 'development without growth' in population. Jordan's (28) study in Arkansas documented the possibility of increasing unemployment with a factory hiring women, because when men in the households were unemployed, there was more reluctance to move out of the area to new employment opportunities as long as the women were holding jobs.

A factory hiring mostly men will have quite different effects on the community profile. The aggregate income added to the community (per new job) will be more, because men are paid more and the job categories added have a higher wage structure. However, the per capita income may not rise much because adding males normally means adding some new households. In fact, the per capita income might conceivably fall if mostly young men were hired and there was essentially full employment in the area before the factory moved in.

Added male employment will include the following effects and non-effects: An increase in population and aggregate income, an increase in housing and furnishing, lower cost food sales, lower cost car sales, little change in restaurant business, increases in demand for public services such as the common schools, water, sewers, streets, and fire and police protection. At least there is much greater potential for the

kind of expansion of trade and services normally associated with growth and development of a community. These changes can be substantially diluted and spread by conscious hiring policies, however.

Studies have shown that when a new plant goes into operation, total community employment does not increase as much as expected even with a relatively large plant compared to the size of the community. The large commuting area is one reason. But frequently a more important reason in many rural areas is the subsequent reduction of disguised unemployment. Some workers, previously employed at jobs which could go undone without really changing the total product of the community, now move up the employment ladder. Local employers are often unaware of these impending changes. They lose their better employees to the new industry and then have to replace them with the formerly disguised unemployed, because some local employers cannot or will not raise their going wage rate to compete with the incoming industry, thus creating the trickle up effect on the employment ladder leaving some of the bottom rungs unfilled. Also, some small farmers take full-time off-farm employment. Likewise, it gives an opportunity for some of the small declining one-man retail or service businesses to gracefully fold up shop and get alternative employment. Thus a community labor market profile can change through reducing disguised unemployment and increasing upward job mobility without much visible change in total employment.

Benefits and Costs of Rural Industrialization

Benefits

The case for rural industrialization rests heavily, but not exclusively, on income and employment arguments. We consider some of the major potential benefits of rural industrialization:

Increase in income and employment The creation of new jobs through rural industrialization can increase both the quantity and quality of employment in the community. The magnitude of the increase depends largely on the size and kind of business expansion that occurs. If a new, highly automated production facility locates in the community, the impact on the demand for local labor is likely to be small. On the other hand, if an export service firm comes to town which uses a high proportion of labor to other inputs, the increase in labor demand is likely to be relatively large, assuming both operations have equal output capacity.

The initial increase in labor demand because of a new production facility may draw people into the labor force. Some people who are already in the employed labor force may move up to better paying jobs. This will open up old jobs for other people. If there has been unemployment in the community, it is likely to be reduced. In general, people who are working at the new facility will experience an increase in income. Local business firms selling goods and services to the new enterprise will also experience increased incomes.

Of course, the income and employment effects do not end with the initial impact. The initial increase in income will induce increased spending by the workers employed at the new facility. This spending will

be allocated over a wide range of locally supplied goods and services. As a result, local businesses generally will experience improved incomes. If demands increase enough, business men may hire additional workers and perhaps expand their physical facilities which will further increase the demand for local resources. Once the community's labor supply is "fully employed", new demands for labor will have to be met by in-migration. Wages may have to rise to encourage the inflow unless there is significant unemployment elsewhere. Thus for the depressed rural community, industrialization can bring a new economic vitality that would be extremely difficult to achieve any other way.

Structural adjustment and improved resource returns in farming

If industrialization occurs within commuting distance, the operator experiencing low labor returns in farming may take a job in town and continue to farm. This will tend to happen if there has been serious underemployment of operator and family labor. If the farmer is an owner-operator he may rent out his land, take a job in town and continue to live in the country. If the new job opportunity is beyond commuting distance, he may quit farming, take a nonfarm job and move his residence to town. Of course, the opening up of job opportunities may also attract farm operators' wives and older children into nonfarm employment so that farm families may experience an increase in the number of income earners also.

When the farm operator who takes a nonfarm job quits farming, land is released for use by others. This might be a new entrant or a present farm operator. Because of economies of size made possible by modern

machine technology, many farmers are looking for additional land to buy or rent. Their present farms are too small in terms of land and capital to make the most productive use of available labor and modern technology. Insofar as the released land is consolidated with existing farms operated by these farmers, they will experience an increase in labor returns also. However, if the released land is taken over by beginning entrants, this improvement in labor returns will not occur. But rural industrialization can influence the rate of entry into farming also. By providing attractive nonfarm job opportunities in a rural setting for young men who would otherwise go into farming, more of the land released by operators who die, retire or quit to take nonfarm jobs can be consolidated with existing units that are too small to provide parity returns for labor. If the creation of rural nonfarm jobs reduced labor input in farming to the point where total farm output started to decline because of extensification, government costs of price and income support programs could be reduced without adversely affecting farm prices or the incomes of farmers generally.

Reduction of family income differences in rural communities

Industrialization can reduce family income differences in the community by raising the incomes of relatively low income families more than the incomes of relatively high income families. When industrialization occurs in a rural community, a selectivity process is set in motion that determines who will be employed in the new jobs. The selection of workers for the new or expanded business is influenced by the nature of the new demands for labor and also by the nature of the supply of workers offering labor services. To simplify the argument, we will assume that the

new demands for labor involve skills and knowledge either generally available in the community or capable of being acquired after a period of training provided by the firm. With this assumption, the selection of workers will depend largely on who offers labor services.

People who apply for the new jobs are not likely to be a random sample of the local labor force. In general, an offer of labor service may be expected when the new job pays a wage plus fringe benefits that exceed the marginal return in present use. Thus, the offers of labor services are likely to be heavily weighted with farm operators from small farms, people who are unemployed and persons in nonfarm jobs paying a lower rate of return. In general, these are the people in the community who have relatively low incomes. As a result, much of the initial income effect from employment at the new or expanded business is likely to have its incidence among lower income families, raising their incomes absolutely and relative to the incomes of other people in the community. Evidence that this actually occurred among farm operator families was uncovered in a study of the impact of new industry on a rural community of Eastern Iowa.

Reversal of out-migration from rural communities Much of the depopulation of many rural communities can be explained by the lack of attractive local employment opportunities for labor released from farming and for residents of the town. By providing such opportunities, industrialization can not only reduce or prevent further out-migration, but also encourage in-migration and an increase in community population.

This way, industrialization can solve the many direct and indirect problems of both metropolitan areas and rural areas.

Increase in the tax base of local and state governments By improving incomes, increasing population and expanding the value of business properties, rural industrialization can enlarge the revenue base of local and state governmental units. But the gain in income tax, sales tax and property tax revenue is not likely to be a net gain, since industrialization is likely to induce an increase in demand for public services also. However, insofar as there are size economies in the supplying of public services, the increased demand for public revenue to provide the same per capita services would not expand as much as the supply of public revenue. So per capita services might be increased or the tax load might be tightened.

Leakages in benefits A recent study by Shaffer (51) has shown that each permanent job directly provided by an industry is worth 38,000 dollars on the average to the community over a period of time. There would, of course, be a wide variation in this figure depending on the average level of income per worker in the industry involved and the multiplier effect of that particular industry. This means that theoretically, at least, a community could afford to subsidize an incoming industry up to $38,000 for each permanent job provided by the industry. However, the economic advantage of a new industry to the local economy of the host community must be considered cautiously. There is the danger of considerable leakage of the economic advantages as has been demonstrated by Wadsworth and Conrad (68). They identify at least four sources of

leakage. The first major leakage is payroll carried out of the host community by non-resident, commuting workers and spent in nearby towns and cities. A second leakage, though Wadsworth and Conrad choose not to call it that, is due to the incidence of local residents previously working in nearby towns and cities who quit those jobs to accept work in the new industry. Thus there is little net increase from this shift. Another leakage is the amount of savings and/or delayed spending. And finally there is leakage due to paying off old debts before incurring new ones. The extent of these leakages clearly depend on two factors: (1) the delimitations of boundaries for the local economy, and (2) the nature of the work force of the new industry. Thus, the dollar value of each new permanent job provided by incoming industry is elusive at best and it is highly probable that many reported values of new jobs or investment multipliers are overestimated. The smaller the region or economic area, the lower the multiplier, because the greater is the leakage. Clearly, in an ill defined small area where there are no political borders and no trade, communication, or transportation barriers, there is much greater leakage.

These facts, while frequently not recognized by local community leaders trying to bring industry to their community, lend very strong support to the practice of several adjacent communities pooling their efforts to develop new economic activity in their region. Such regional efforts probably should be centered on a large growth center and its surrounding satellite communities. Otherwise, it becomes fairly obvious that a good share of the expenditure and effort made by a small individual

in securing new industry becomes only a charitable effort for surrounding communities. The real problem with inducing industry to locate is that while the idea has merit when applied to larger geographic areas (like states and areas) where these areas tend to be more like closed economies, it fails to meet its specific objectives when applied to single communities within the larger areas. To see this, recall that in the early 1960's Fox and Kumar (10) advanced the concept of "functional economic area" which suggested that an area could be delineated within which economic activity and employment (and, more generally, social activity) would tend to be inwardly directed and self-serving but for sub-areas within the FEA, economic activity and employment would tend to be more outwardly directed. The idea is that with an arbitrary selection of relative services to export employment, one could draw a line around a body of economic and social activity so that the activities circled ("boxed" in Fox's conception) would respond primarily to the demands and employment needs of the people within the geographically delineated. So, the imported industry problem can be thus viewed: By attracting an industry into an FEA, regardless of the town within the FEA that is actually selected, the income and employment benefits would tend to be distributed over the people within the FEA, not on the people living within the selected areas.

Costs

While rural industrialization may generate large benefits, these benefits cannot occur without costs. Of course, many of the costs involved in rural industrialization are compensated costs. This is typically true of the resource costs involved in establishing and operating the new or expanded production facility, at least insofar as the business covers its factor costs and survives. But there are likely to be uncompensated costs also. These are the costs that normally do not get counted by firms in making their benefit-cost calculations that influence the decision to locate or expand. In some cases, however, it is difficult to determine whether the cost is fully compensated, partially compensated or wholly uncompensated. It also needs to be recognized that sometimes what is viewed as a cost by one person may be viewed as a benefit by another person. This may happen when the dimensions of individual welfare are in conflict.

Among the costs of industrialization that are likely to be uncompensated, those that involve the environment appear to be particularly significant. A new industrial facility coming to a rural town may increase congestion and traffic. It may add to the noise level and dirty the air and water. The magnitude of environmental effects will depend on the kind and size of the industrial facility. Because of differences in production processes, some industries pollute more than others. The effects also will depend on the extent to which government policies internalize these costs by encouraging businesses to develop and use pollution reducing technologies and emission control devices.

Rapid and extensive industrialization in a rural community may increase insecurity of life and property by attracting people who are prone to make a living outside the law. If it results in heavy concentration of people with widely different backgrounds and value systems, there also may be an increase in social tensions and conflicts. As a result, the community may have to devote additional resources to police protection and to working out more effective mechanisms for resolving internal conflict.

The uncompensated costs are not likely to fall equally on all individuals in the community. Moreover, their incidence will not necessarily be in accord with any of the commonly used principles for distributing public costs. However, by appropriate public policies, there may be opportunities to transform some of the uncompensated individual costs into compensated public costs with the burden being distributed on basis of the tax structure.

When a site is acquired for industrial use, the acquisition itself affects different people in the community in different ways. In the past we have frequently concerned ourselves with proper compensation to the land seller - how he can get the most for his property, how he can reinvest the sale proceeds to minimize taxes, and so on. These are, of course, proper concerns for any economic man, but often we have had little concern for other people involved and affected by this transfer of land ownership to new use. The immediate others affected are usually tenants of the property involved.

If the site is in an incorporated area it may be tenanted by small businesses or residents. Sites which become industrial on the edge of small communities often are tenanted by older residents with low incomes who may have real difficulty in obtaining other economically comparable housing, and also it may be physically, emotionally, and socially difficult for them to move.

Small towns in rural areas have long functioned as "retirement villages" because of their relative advantages in living costs. Because of the fixed incomes of many such retired people they constitute a segment of the community most vulnerable to negative effects of a rise in cost of living. If industrial development increases the demand for housing and services, it is reasonable to expect a resultant rise in cost of living. Thus, it is possible that industrial development will erode the relative advantages of small towns as retirement places.

Industrial Efforts and its Impact on Rural Communities

Towns do not simply industrialize. Rather, persons make conscious decisions, some of which they hope will lead to an industry's locating within their borders. Today, state and community leaders, and the commissions they form, function to promote the apparent competitive and comparative advantages of their own jurisdictions. In Iowa alone, a recent survey of 115 communities of 1,000 to 8,500 persons done by Kaldor and Dahlke (30) showed that at least 284 separate organizations were active in the effort to attract industry to their community. The organizations

were in the main, led by well established and middle-aged businessmen, bankers or professionals who devoted from 137 to 656 hours per year and between $338 to $623 per year to the effort, and had direct success of about one in three firms contacted deciding to locate in the town. But, when put in perspective against the fact that the number of firms locating in those towns that had no contact with the local development organization was more than double the number which located in the same towns that had contact with the development organization, the successes accruing to organized effort seem modest.

Interest in bringing manufacturing to rural towns arises as a readily accepted answer to the problems created by declining populations in rural towns and communities. Leaders reason that as agricultural technology has developed to give a less labor intensive production process, alternate sources of employment are required in the community to keep the "freed" population from migrating to urban areas. They see that if out-migration persists then local service trades, community services, and institutions lose support and can only survive at higher unit cost to those remaining. This in turn, makes the rural community a less desirable place to live for those who can migrate (the younger, the better-educated, those with more work experience) leaving a residual of "people left behind" by aggregate economic progress and mobility who are disproportionately poor, aged, and unable to live at acceptable levels unaided. Therefore, the appeal of bringing industry to the town is great, since it is believed that this will stabilize population or lead to population growth and lead to new rounds of progress through strengthening of the export base of the community.

It is certainly not surprising that those most active in attempts to recruit manufacturing firms for communities are the well-established and middle-aged bankers, businessmen and professionals that Kaldor and Dahlke discovered. This class of persons has the investment of a life-time committed to the service industry which is place specific. The decision to establish the service industry component was made on the basis of an expected catchment population (trade area) with an expected level of demand and competing supply. This is as true for local hardware store proprietors as for local physicians or dentists. Population changes that were not expected or foreseen erodes the soundness of the original decision and forces the businessmen to adjust at a time in life when this is most costly. That such persons use every means available to them to try and preserve the value of their accumulated capital is also understandable, just as it is understandable that having acquired position and political power in the communities, these persons should perceive of the well-being of the population in the community is best served by the means that preserves their own personal well-being.

Kaldor and Dahlke report:

> In response to the question: Do most people in your community want industrial development? -- only 5 percent of the community industrial leaders said no.

Therefore, the leadership embarks on a course that commits the community to a program whose benefits may not be focused on the community itself but whose cost will most certainly be centered on the community.

The Fundamental Development Issues in Rural Industrialization

As a general rule, benefits of industrializing rural communities will tend to exceed the costs, particularly if the areas are large enough to cover functional economic areas. The central developmental issues in rural industrialization, however, revolve around expectations that the benefits of industrialization of rural communities will not be distributed under currently existing structures of municipalities, in a socially acceptable manner relative to the distribution of the costs of industrialization. The costs of industrialization will tend to fall on the community in which the industry locates, while the benefits will tend (in most cases) to be distributed over the functional economic area in which the town is located. And even within the community that undergoes the industrialization, there will be a maldistribution of costs relative to benefits. For as the costs of services become translated into higher property taxes, an upward mobility in labor force leads to a restructuring of the service trades sector and as expectations of larger family incomes spurs rising prices in local retail establishments for all, persons with little or no mobility such as those already employed fully and those with fixed incomes (such as the aged) will have their well-being threatened. Again, these expectations are already known to most community leaders as Kaldor and Dahlke (30) discovered. Yet, suspecting this, movement for industrialization persists.

This persistence highlights another fundamental issue, namely the selection of a program for community development that has major emphasis on one element, when it is clear that other elements would be needed if the well-being of various sections of the community are to be met. The problem is that of implicitly expecting a single instrument of policy to attain several goals. In this case, it is the implicit belief that a desired change in the production-oriented distribution of income (functional income distribution) will motivate a desirable change in the distribution of personal income. What has occurred in the minds of the industrial development leaders is that a bonafide necessary condition for the economic (and probably social) development of an area is elevated to the status of a sufficient condition for development for a community. It has not always been made clear, furthermore, in the advice given to community leaders that the desirability of industrialization as a tool for development of the community depends on the specific community's attributes, including those of the people that live there. More nearly, the attitude implied in the advice given to communities and the state and federal programs designed to assist them, is that if a community has not attracted an industry there must be something wrong with it that needs changing.

This attitude rests on the failure to view development as an evolution of a group towards their own perceived goals. Thus, where industrialization may be viewed as "developmental" from the selected viewpoint of a community leader, whose well-being depends most on the ongoing economic interaction of production and exchange, it may have no

developmental content for an older person whose well-being is best served through stable prices, and the availability of services to consume out of a fixed income. To be sure, there is a role for industrialization in meeting the developmental goals of the older person, but without specific attempts to link this type and other economic out-liers to the system that is presumably benefitting from industrialization, industrialization will be a burden that they bear for the benefit of others.

CHAPTER III. DATA, CONCEPTS, AND DEFINITIONS

In this chapter we explain the concepts and definitions which will be relevant for later chapters. Also, we will indicate the sources of data used.

Data used in this study mainly came from secondary sources such as: the Directory of Iowa Manufacturers (20, 21, 22, 23, 24), the U.S. Census of Manufacturers (56, 57, 58, 59), the U.S. Census of Agriculture (60, 61, 62, 63, 64, 65), and the U.S. Census of Population (66, 67). Besides these main sources, we used data from population studies conducted by Chang (4) and Tait and Johnson (54).

IBM 360 in the computer center was used to make all the tables, to estimate the production functions based on regression analysis. Tables were done mostly by FORTRAN IV, and the regression analysis was done by OMNITAB and SAS.

Coding of Variables

Size of firms

We followed the Directory of Iowa Manufacturers (24) to classify the firms in Iowa in these different categories:

Size of firm	Number of employees
A	1-20
B	21-50
C	51-100
D	101-250
E	251-500

Size of firm	Number of employees
F	501-1,000
G	over 1,000

Size of towns

The town size is determined by the average population in the town in the year 1960. The following are the town sizes used:

Size of town	Population
1	under 1,000
2	1,000- 2,499
3	2,500- 4,999
4	5,000- 9,999
5	10,000-14,999
6	15,000-24,999
7	25,000 or over

According to the above classifications most of the towns in Iowa have less than 25,000 population. Only fifteen towns have a population of 25,000 or more. They are:

Name of the town	County
Ames	Story
Burlington	Des Moines
Cedar Falls	Black Hawk
Cedar Rapids	Linn
Clinton	Clinton
Council Bluffs	Pottawattamie
Davenport	Scott

Name of town	County
Dubuque	Dubuque
Fort Dodge	Webster
Iowa City	Johnson
Mason City	Cerro Gordo
Ottumwa	Wapello
Sioux City	Woodbury
Waterloo	Black Hawk
Des Moines	Polk

Coding of the towns and counties

Towns are coded according to their alphabetical order. Counties are coded also according to their alphabetical order.

Classification of industries

The industries are classified according to the standard S.I.C. classification:

19 Ordnance and Accessories

- 192 Ammunition except for small arms
- 195 Small arms
- 196 Small arms ammunition
- 199 Ordnance and accessories, not elsewhere classified

20 Food and kindred products

- 201 Meat products
- 202 Dairy products
- 203 Canned and preserved fruits, vegetables and sea foods

204 Grain mill products

205 Bakery products

206 Sugar

208 Beverages

209 Miscellaneous food preparations and kindred products

21 Tobacco manufactures

211 Cigarettes

212 Cigars

213 Chewing and smoking tobacco

214 Tobacco stemming and redrying

22 Textile mill products

222 Broad woven fabric mills, man-made fiber and silk

223 Broad woven fabric mills, wool including dyeing and finishing

225 Knitting mills

227 Floor covering mills

229 Miscellaneous textile goods

23 Apparel and other finished products made from fabrics and similar materials

231 Men's, youths' and boys' suits, coats and overcoats

232 Men's, youths' and boys' furnishings, work clothing and allied garments

233 Women's, misses' and juniors' outerwear

234 Women's, misses', children's and infants' undergarments

235 Hats, caps and millinery

236 Girls', children's and infants' outerwear

237 Fur goods

238 Miscellaneous apparel and accessories

239 Miscellaneous fabricated textile products

24 Lumber and wood products, except furniture

241 Logging camps and logging contractors

242 Sawmills and planing mills

243 Millwork, veneer, plywood and prefabricated structural wood products

244 Wooden containers

249 Miscellaneous wood products

25 Furniture and fixtures

251 Household furniture

252 Office furniture

253 Public building and related furniture

254 Partitions, shelving, lockers and office and store fixtures

259 Miscellaneous furniture and fixtures

26 Paper and allied products

263 Paperboard mills

264 Converted paper and paperboard products, except containers and boxes

265 Paperboard containers and boxes

266 Building paper and building board mills

27 Printing, publishing and allied industries

271 Newspapers - publishing, publishing and printing

272 Periodicals - publishing, publishing and printing

273 Books

274 Miscellaneous publishing

275 Commercial printing

276 Manifold business forms

277 Greeting card publishing

278 Blankbooks, loose leaf binders and bookbinding and related work

279 Service industries for the printing trade

28 Chemicals and allied products

281 Industrial inorganic and organic chemicals

282 Plastics materials and synthetic resins, synthetic rubber, synthetic and other man-made fibers, except glass

283 Drugs

284 Soap, detergents and cleaning preparations, perfumes, cosmetics and other toilet preparations

285 Paints, varnishes, lacquers, enamels and allied products

286 Gum and wood chemicals

287 Agricultural chemicals

289 Miscellaneous chemical products

29 Petroleum refining and related industries

295 Paving and roofing materials

299 Miscellaneous products of petroleum and coal

30 Rubber and miscellaneous plastics products

301 Tires and inner tubes

302 Rubber footwear

303 Reclaimed rubber

306 Fabricated rubber products, not elsewhere classified

307 Miscellaneous plastics products

31 Leather and leather products

311 Leather tanning and finishing

314 Footwear, except rubber

315 Leather gloves and mittens

316 Luggage

317 Handbags and other personal leather goods

319 Leather goods, not elsewhere classified

32 Stone, clay, glass and concrete products

321 Flat glass

322 Glass and glassware, pressed or blown

323 Glass products, made of purchased glass

324 Cement, hydraulic

325 Structural clay products

326 Pottery and related products

327 Concrete, gypsum and plaster products

328 Cut stone and stone products

329 Abrasive, asbestos and miscellaneous nonmetallic mineral products

33 Primary metal industries

331 Blast furnaces, steel works and rolling and finishing mills

332 Iron and steel foundries

333 Primary smelting and refining of nonferrous metals

334 Secondary smelting and refining of nonferrous metals

335 Rolling, drawing and extruding of nonferrous metals

336 Nonferrous foundries

339 Miscellaneous primary metal products

34 Fabricated metal products, except ordnance, machinery and transportation equipment

341 Metal cans

342 Cutlery, hand tools and general hardware

343 Heating apparatus (except electric) and plumbing fixtures

344 Fabricated structural metal products

345 Screw machine products, and bolts, nuts, screws, rivets and washers

346 Metal stampings

347 Coating, engraving and allied services

348 Miscellaneous fabricated wire products

349 Miscellaneous fabricated metal products

35 Machinery, except electrical

351 Engines and turbines

352 Farm machinery and equipment

353 Construction, mining and materials handling machinery and equipment

354 Metalworking machinery and equipment

355 Special industry machinery, except metalworking machinery

356 General industrial machinery and equipment

357 Office, computing and accounting machines

358 Service industry machines

359 Miscellaneous machinery, except electrical

36 Electrical machinery, equipment and supplies

361 Electric transmission and distribution equipment

362 Electrical industrial apparatus

363 Household appliances

364 Electric lighting and wiring equipment

365 Radio and television receiving sets, except communication types

366 Communication equipment

367 Electronic components and accessories

369 Miscellaneous electrical machinery, equipment and supplies

37 Transportation equipment

371 Motor vehicles and motor vehicle equipment

372 Aircraft and parts

373 Ship and boat building and repairing

374 Railroad equipment

375 Motorcycles, bicycles and parts

379 Miscellaneous transportation equipment

38 Professional, scientific and controlling instruments - photographic and optical goods - watches and clocks

381 Engineering, laboratory and scientific and research instruments and associated equipment

382 Instruments for measuring, controlling photographic and optical goods and indicating physical characteristics

383 Optical instruments and lenses

384 Surgical, medical and dental instruments and supplies

385 Opthalmic goods

386 Photographic equipment and supplies

387 Watches, clocks, clockwork operated devices and parts

39 Miscellaneous manufacturing industries

391 Jewelry, silverware and platedware

393 Musical instruments

394 Toys, amusement, sporting and athletic goods

395 Pens, pencils and other office and artists' materials

396 Costume jewelry, costume novelties, buttons and miscellaneous notions, except precious metal

399 Miscellaneous manufacturing industries.

State planning board regions

Sixteen planning and administrative regions commonly known as SPB regions were designed in 1967 by the office for Planning and Programming, State Capitol, Iowa (42). Recently small revision has been on two regions. The boundary of each region is shown in Figure 3.1. These regions have been designed to meet existing and future needs for:

1. A common geographic base for the planning, coordination, and administration of state services and programs.

2. A base for regional planning, programming, and development - through the identification of common problems, goals, and opportunities at the regional level, and through the integration of state and local development policies and goals.

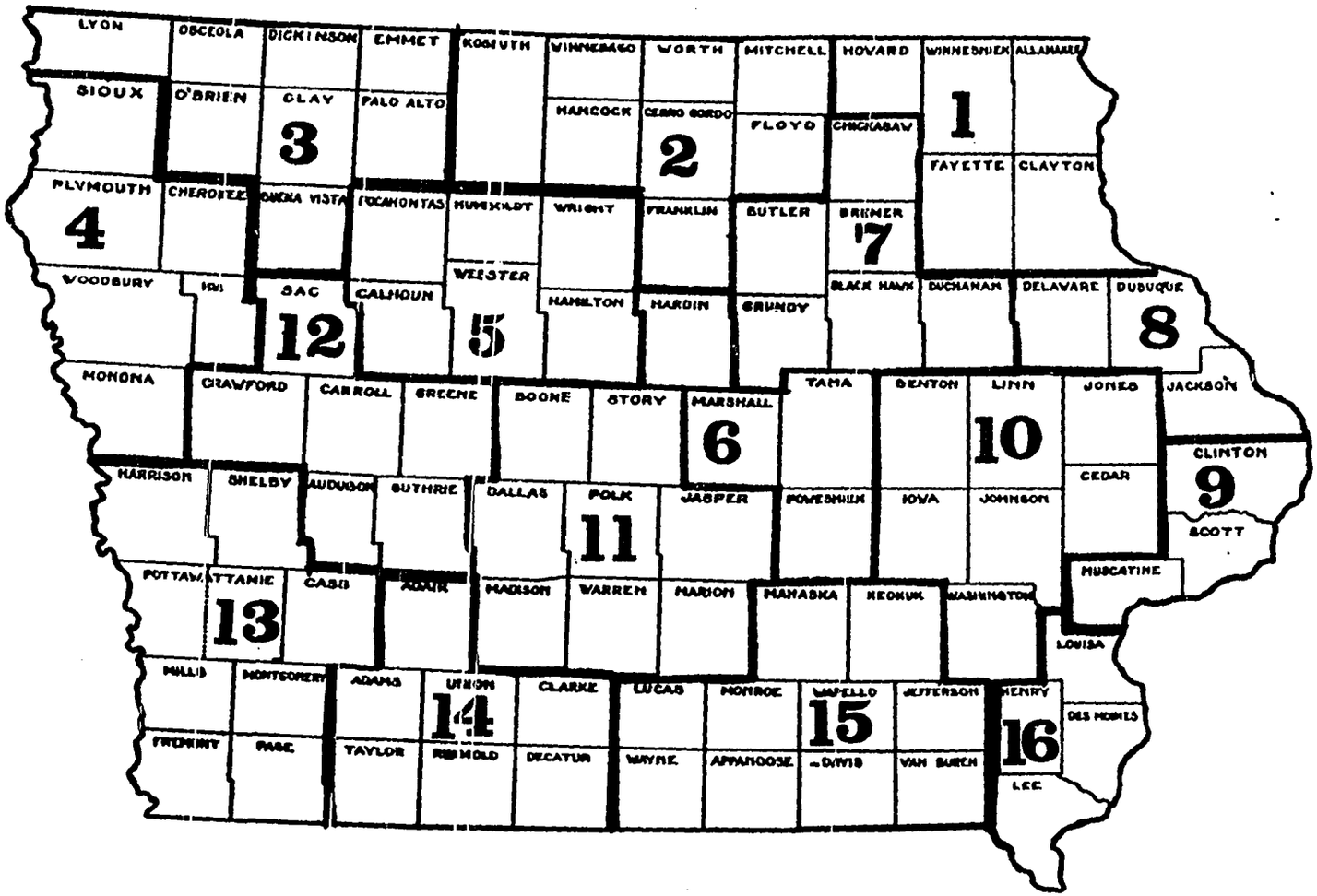

Figure 3.1. State planning board regions of Iowa (SPB)

3. A base for the greatest utility of local resources through the identification and use of the most appropriate state and federal programs.

4. Sub-units of a statewide information system.

The following types of services might be located in the sixteen regional centers (area cities):

5. Those services that require frequent contact between the citizen and the state agency providing the services; especially the young, the elderly, or the indigent.

6. Those state services whose effectiveness is strongly influenced by face-to-face contact with the citizens; e.g., those related to human resource development, such as vocational rehabilitation, health services, employment services, parole services, etc.

7. Those state services whose utility is dependent upon tightly-knit, area-wide cooperation and coordination.

For those state agencies that would not find it feasible to locate within each region, oversized facilities, located in established regional centers, capable of serving two or more entire regions effectively and efficiently, should be developed.

The sixteen area cities designated are:

Area 1 Decorah	Area 7 Waterloo	Area 13 Council Bluffs
Area 2 Mason City	Area 8 Dubuque	Area 14 Creston
Area 3 Spencer	Area 9 Davenport	Area 15 Ottumwa
Area 4 Sioux City	Area 10 Cedar Rapids	Area 16 Burlington
Area 5 Fort Dodge	Area 11 Des Moines	
Area 6 Marshalltown	Area 12 Carroll	

The following is the distribution of counties over the sixteen planning areas:

Area 1	Area 2	Area 3
Howard	Kossuth	Osceola
Winneshiek	Winnebago	Dickinson
Allamakee	Worth	Emmet
Clayton	Mitchell	O'Brien
Fayette	Hancock	Clay
	Cerro Gordo	Palo Alto
	Floyd	Buena Vista
	Franklin	Lyon

Area 4	Area 5	Area 6
Sioux	Pocahontas	Hardin
Plymouth	Humboldt	Marshall
Woodbury	Wright	Tama
Monona	Calhoun	Poweshiek
Cherokee	Webster	
Ida	Hamilton	

Area 7	Area 8	Area 9
Butler	Delaware	Clinton
Grundy	Dubuque	Scott
Chickasaw	Jackson	Muscatine
Bremer		
Black Hawk		
Buchanan		

Area 10	Area 11	Area 12
Benton	Boone	Crawford
Linn	Story	Sac
Jones	Dallas	Carroll
Iowa	Polk	Greene
Johnson	Jasper	Audubon
Cedar	Madison	Guthrie
Washington	Warren	
	Marion	

Area 13	Area 14	Area 15
Harrison	Adair	Mahaska
Shelby	Adams	Keckuk
Pottawattamie	Union	Lucas
Cass	Clarke	Monroe
Mills	Taylor	Wapello
Montgomery	Ringgold	Jefferson
Fremont	Decatur	Wayne
Page		Appanoose
		Davis
		Van Buren

Area 16
Louisa
Henry
Des Moines
Lee

Methods used in the determination of SPB regions

No single set of multi-county areas can serve as a framework for every purpose, but a common geographical base is a vital first step for a study of problems, for establishing a framework for coordinated planning, and for effective administration and implementation of programs offered by the state. Questions concerning the efficient use of human and natural resources are real. To the extent multiple federal, state, and local programs needlessly duplicate each other - or underutilize resources - there is waste. Elimination of such waste is a long-term goal. Reduction of it is an intermediate and continuing objective.

Multi-county areas can become a tool for analyzing public needs, for policy planning, and for program implementation. As the total society becomes more diffuse, and as social and economic development programs become even more prolific at all levels of government, the need for a device to permit selective allocation of programs for the areas of greatest deficiency grows more urgent.

The following are the specific purposes for multi-county area delineation of Iowa as visualized by the Iowa Office for Planning and Programming:

1) Planning, coordination, administration of state services

2) Establishing and financing future state facilities

Although the purposes described above are the major purposes for multi-county areas, it was recognized that other related purposes may assume increasing importance in the future. Two important ones are:

1) A framework for taking state government to the people

2) Multi-county areas for federal programs.

Four major criteria were used for making decisions about the number of multi-county areas and the boundaries of the multi-county areas in Iowa. These major criteria were:

1) Identification with focal point or central place

2) Convenience of the citizen consumer

3) Efficiency of field worker

4) An adequate economic base.

Rural and Metropolitan County, Rural and Metropolitan Region

Our emphasis is on rural areas in Iowa. Hence, we should clarify what we mean by rural area, rural county, etc. Many authors have defined rural areas in various ways. Broadly a rural area is any community and its surrounding territory that depends substantially upon agriculture for its economic reason for existence. For this study, we have adopted the following:

Nonmetropolitan county

A nonmetropolitan county is one which does not include any town with a population of 25,000 or more according to 1960 census. The census for 1960 is used because it is the base year.

Metropolitan county

Any county which is not a nonmetropolitan county is a metropolitan county. A metropolitan county evidently includes one or more towns with population of 25,000 or more according to 1960 census.

There are in all 99 counties in Iowa. Of the 99 counties, 14 are metropolitan counties and 85 are nonmetropolitan counties. Non-metropolitan counties and metropolitan counties are shown in Figure 3.2.

Another useful classification of counties in Iowa

The counties that had no incorporated places of 2,500 or more according to 1960 census are called 100% rural counties.

The counties where over 50% but less than 100% of the population according to 1960 census live in rural areas are called semi-rural counties.

The counties where over 50% of the population live in urban areas are called urban counties.

A map showing 100% rural counties, semi-rural counties and urban counties is given in Figure 3.3.

Rural and urban areas

The urban areas will comprise of all areas where people live in communities with 2,500 inhabitants or more. All other areas not included in the urban areas will be classified as rural areas.

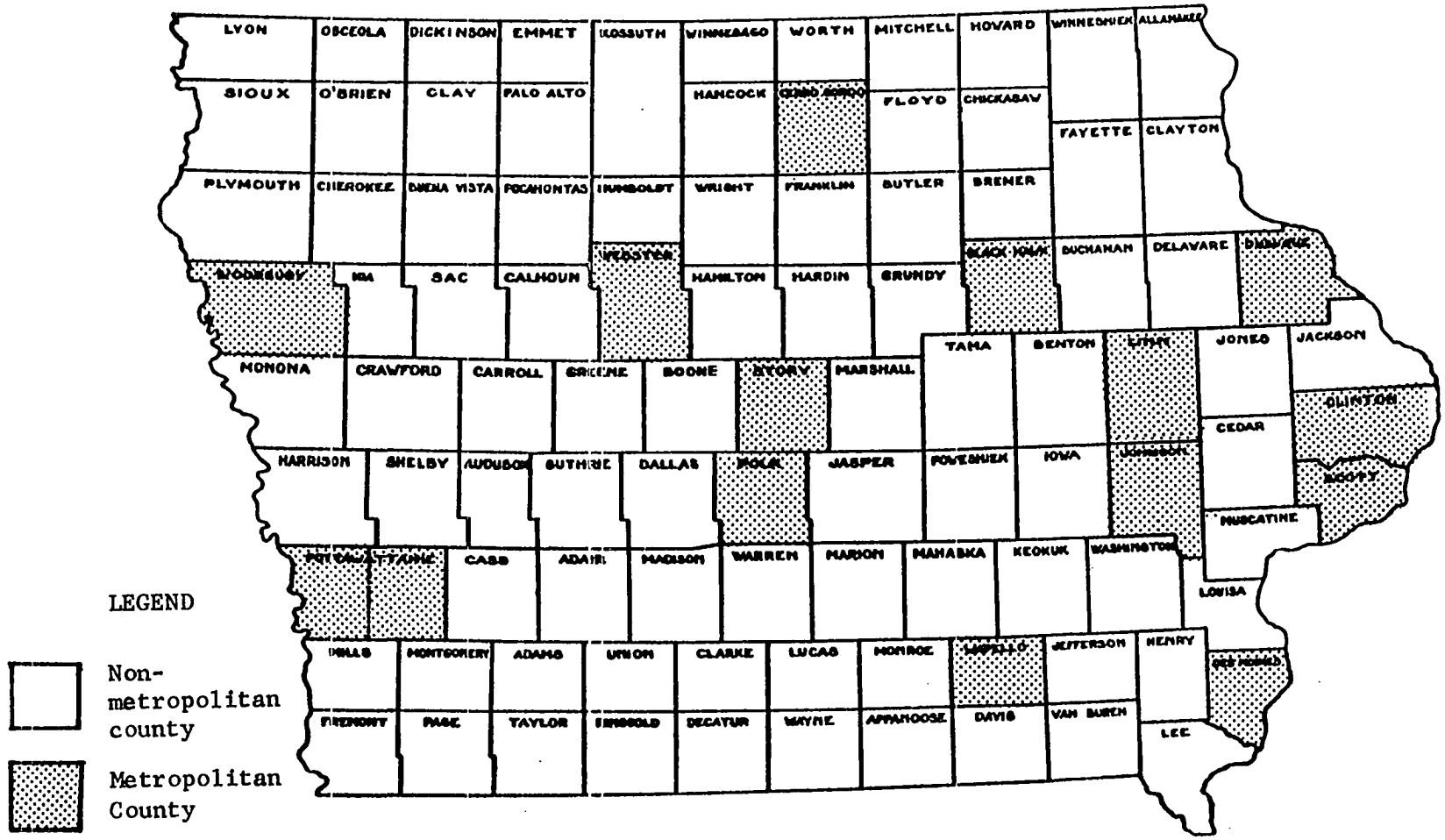

Figure 3.2. Metropolitan and nonmetropolitan counties of Iowa

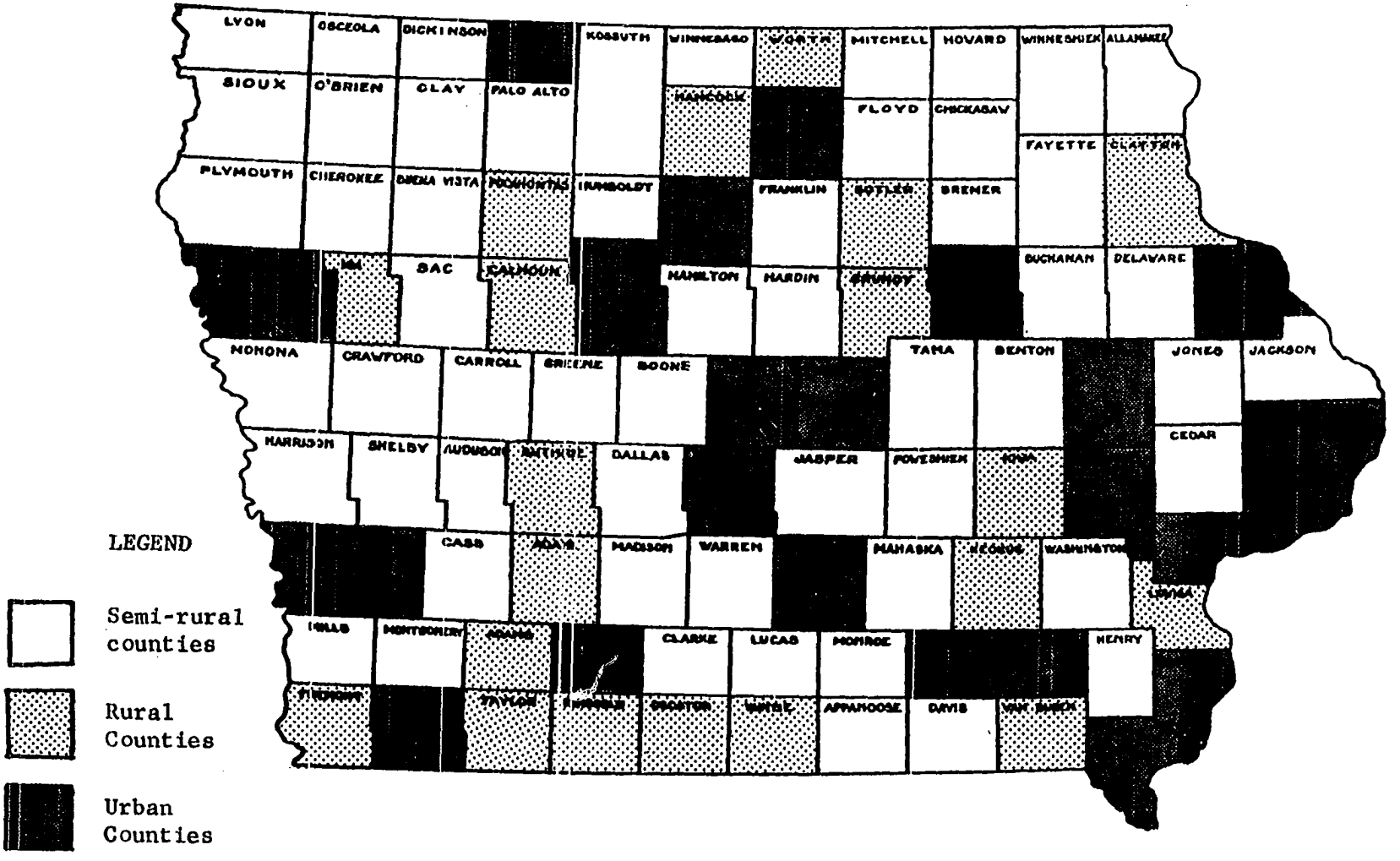

Figure 3.3. Rural, semi-rural and urban counties of Iowa

Standard metropolitan statistical areas

According to the 1970 Census, except in the New England states, a standard metropolitan statistical area or a SMSA is a county or group of contiguous counties which contains at least one city of 50,000 inhabitants or more, or "twin cities" with a combined population of at least 50,000. In addition to the county, or counties, containing such a city or cities, contiguous counties are included in an SMSA if, according to certain criteria, they are socially and economically integrated with the central city.

The population living in SMSA's is designated as the metropolitan population. This population is subdivided as "inside central city or cities" and "outside central city or cities". The population living outside SMSA's constitutes the now metropolitan population. For SMSA areas of Iowa, see Figure 3.4.

Metropolitan areas and nonmetropolitan areas

The metropolitan areas will comprise all areas where people live in communities with 25,000 inhabitants or more.

All other areas not included in the metropolitan areas will be classified as nonmetropolitan areas.

Definitions of Variables

Establishment

The Census of Manufacturers is conducted on an establishment basis. That is, a company operating establishments at more than one location is required to submit a separate report for each location; also, companies

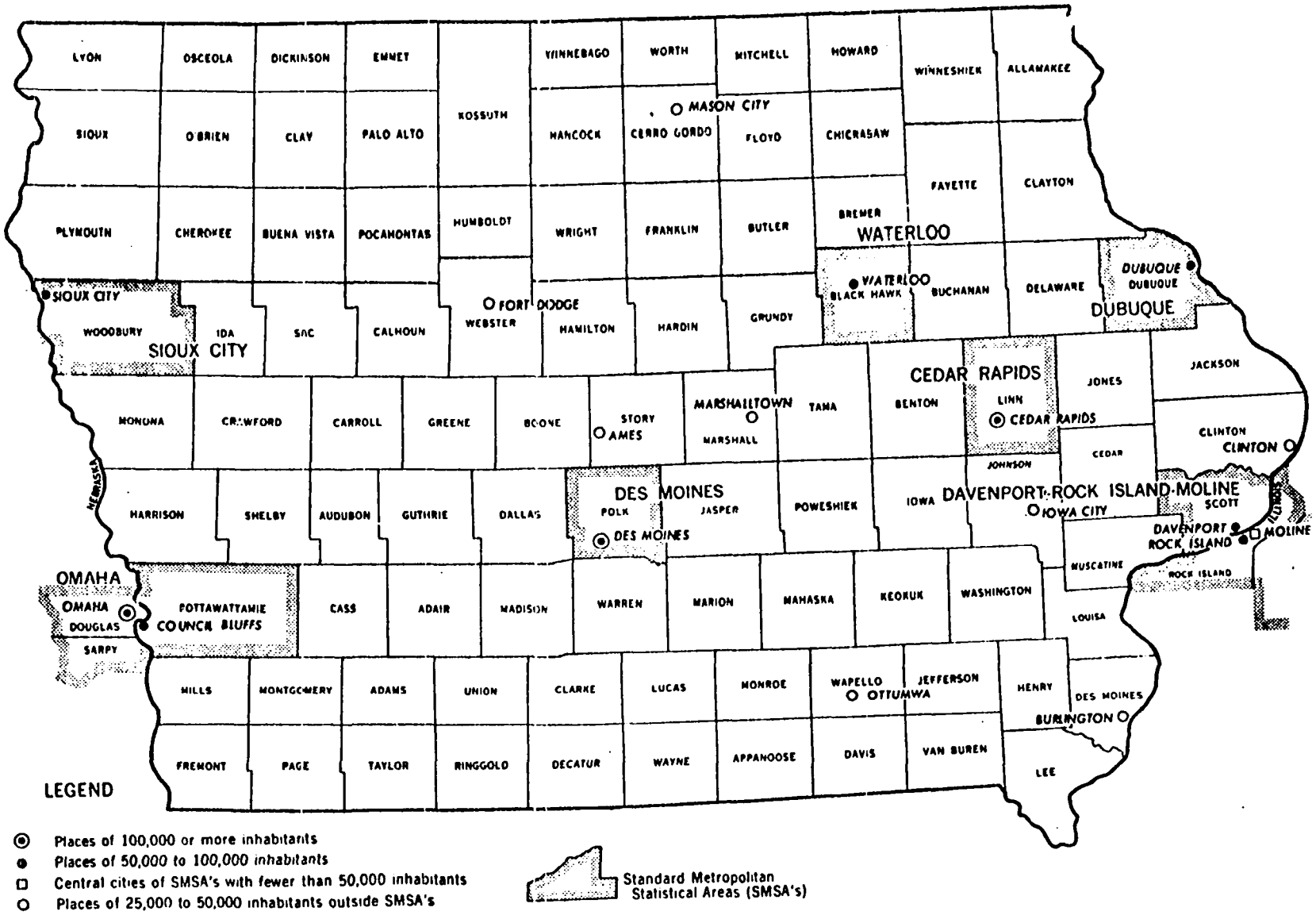

Figure 3.4. Standard metropolitan statistical areas of Iowa (SMSA)

engaged in distinctly different lines of activity at one location are required to submit separate reports if the plant records permit such a separation and if the activities are substantial in size.

All employees

The category "all employees" comprises all full-time and part-time employees on the payrolls of operating manufacturing establishment, who worked or received pay for any part of the pay period ended nearest the 15th of the months specified on the report form. Included are all persons on paid sick leave, paid holidays and paid vacation during these pay periods; excluded are members of the armed forces and pensioners carried on the active rolls but not working during the period. Officers of corporations are included as employees; proprietors and partners of unincorporated firms, are, however, excluded from the total.

Payrolls

This total includes the gross earnings paid in the calendar year to all employees on the payroll of operating manufacturing establishments. Respondents were told they could follow the definition of payrolls used for calculating the Federal withholding tax. It includes all forms of compensation such as salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. The total includes salaries of officers of these establishments, if a corporation; it excludes payments to the proprietor or partners. Also

excluded are payments to members of armed forces and pensioners carried on the active payroll of manufacturing establishments.

Value added in industries

This measure is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electric energy, and contract work, from the value of shipments of manufacturing establishments. It avoids, therefore, the duplication in the value of shipments figure which results from the use of products of some establishments as materials by others. It is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

Value added by manufacture should not be confused with "national income originating in manufacturing", as presented in the national income estimates compiled by the Office of Business Economics, Department of Commerce. The letter measure is the sum of factor costs incurred by an industry in production. It excludes, in addition to cost of materials, such other costs as depreciation charges, state and local taxes (other than corporate income taxes), allowance for bad debts, and purchases of services from nonmanufacturing enterprises, such as contract costs involved in maintenance and repair, services of development and research firms, services of engineering and management consultants, advertising, telephone and telegraph expense, insurance, royalties, patent fees, etc. It is, therefore, a more "net" concept of value added than that used in the Census of Manufacturers.

In part, the "national income originating" estimates are prepared from company rather than establishment data. This results in the inclusion of some part of the net value added (or a logical approximation of it) by nonmanufacturing establishments of companies classified as being primarily manufacturing; and conversely, in the exclusion of some part of the net value added by manufacturing establishments of companies classified as primarily nonmanufacturing. It is believed that for manufacturing as a whole the net effect increases income originating. Many of the items that must be deducted from "value added" to arrive at an income originating figure can be reported on an establishment basis only with considerable difficulty, if at all.

Another distinction between the Census value added and O.B.E. income originating statistics arises from the treatment of net changes in inventories of work-in-process and finished goods. The Census figure is based on shipments, and hence does not reflect net changes in these inventories during the year. The O.B.E. estimate makes allowance for inventory changes.

Capital expenditure

In Census, manufacturers were asked to report expenditures made during the year for permanent additions and major alterations to their plants, as well as for machinery and equipment purchases, that were chargeable to fixed-asset accounts of manufacturing establishments and were of a type for which depreciation accounts are ordinarily maintained. Capital expenditure consists of the following: additions completed during the year, plus construction in progress at the end of the year, minus

construction in progress at the beginning of the year. Expenditures for machinery and equipment were to include those made for replacement purposes, as well as for additions to plant capacity. Excluded from such expenditure totals are costs of maintenance and repairs charged as current operating expenses. Also excluded are expenditures for land and expenditures made by owners of plants and equipment leased to manufacturers.

The concepts and definitions developed in this chapter will be used in later chapters. In the next chapter we will formulate the statistical models for estimating production functions for different S.I.C. industries.

CHAPTER IV. THE MODEL

In this chapter we will discuss the production functions and their estimation procedure from available data. The production functions will relate to various S.I.C. groups of industries. The production functions will also reflect year to year variation and firm size variation. We will present the economic theory, mathematical model and statistical analysis as needed in the later chapters. The production functions estimates of the various industries will be used for analyzing impacts on rural industrialization.

Theory of Production Functions

Neoclassical theory of production functions

The essential features of the neoclassical production model are the assumptions of continuous, twice differentiable linearly homogeneous production functions and of a single homogeneous capital good and a single homogeneous labor.

The basic neoclassical model in its simplest detail can be stated mathematically as:

$$Q = F(K,L) \tag{4.1}$$

where the function is homogeneous of degree one in capital K and labor L. Both capital and labor are assumed to be single homogeneous goods. Since F is homogeneous of degree one we can write (4.1) as

$$\frac{Q}{L} = F(\frac{K}{L}, \frac{L}{L}) \tag{4.2}$$

or

$$y = f(k) \tag{4.3}$$

where y is the average product of labor and k is the capital-labor ratio.

Controversies over the neoclassical theory

The famous 'Cambridge Criticism' of simple neoclassical theory started with Joan Robinson's article "The Production Function and the Theory of Capital" (45) written in 1953. In that article she made a number of specific complaints about the state of economic theory and the state of some economic theorists, namely, the latter-day neoclassicals, whose headquarters is now Cambridge, Massachusetts. The response was many articles, a number of books and several new strands of economic analysis. Some of the exchanges can be found in the articles (44, 46, 47, 48).

Mrs. Robinson's main target of criticism is the custom of regarding output as a function of inputs of labor and capital. She complains specifically about the fuzzy nature of the capital, the concept of which, she argued, was used by the neoclassicals to explain the distribution of income between profit-earners and wage-earners in capitalist economies, taking as given the stocks of labor and capital and the knowledge of how one could be substituted for the other, so that their marginal productivities were known. She tells us that the student is told that output is a kind of index number, labor is a quantity of homogeneous man-hours, and then he is hurried away before he has a chance to ask in what units "capital" is measured. "Capital" to Mrs. Robinson is not a single homogeneous good but heterogeneous, and one should find first an index number 'capital-in-general' before putting as an input in the production function.

Solow (52) in his article "Production Function and Theory of Capital" tried to deal with the concept of 'capital-in-general'. His ideas can be summarized as follows:

Suppose we have a production function $Q = F(L, C_1, C_2)$ where Q is a single output, L an input of a single grade of labor, and C_1 and C_2 are inputs of the services of two distinct kinds of capital equipment (there could be more types of capital involved, but the argument would be the same). The question is: when can we write, identically?

$$\begin{aligned} Q &= F(L, C_1, C_2) \equiv H(L, K) \\ K &\equiv \phi(C_1, C_2) \end{aligned} \tag{4.4}$$

That is to say, when can we collapse the production function from one having three variables to one having only two? If this can be done, we would seem to have right to call K an index of the quantity of capital. The necessary and sufficient condition that the production function can be so collapsed is that the marginal rate of substitution of one kind of capital good for another must be independent of the amount of labor in use.

There is a whole class of situations in which the condition may be expected to hold and this possibility throws a new light on the meaning of the condition itself. It could be that the process of production described by F should have two stages such that first something called K is literally manufactured out of C_1 and C_2 alone, and then this substance K is combined with labor to manufacture the final output Q. In this case the index function ϕ is actually a production function itself. Obviously

the inputs of C_1 and C_2 play no special role themselves; only their yield of K matters ultimately.

In summarizing, we can say that the Cambridge Criticism is a valid one. If all production processes are characterized by fixed proportions and heterogeneous capital goods, one cannot legitimately postulate a priori a unique relation between capital intensity and the factor-price ratio, either within a sector or in the aggregate. Thus the simple neoclassical results concerning the relation between production and input and output markets may not hold. This does not necessarily involve reswitching; but if there is reswitching of techniques, it may further be impossible to give a precise meaning to 'factor intensity'.

The question that confronts us is not whether the Cambridge Criticism is theoretically valid. It is. Rather, the question is an empirical or an econometric one; Is there sufficient substitutability within the system to establish the neoclassical results?

Production function in value terms

In our study of production functions, output and capital are both taken in value terms, i.e., in their dollar values, Q and K being value added and capital expenditure in thousand dollars. This solves in a way the problem of heterogeneous capital goods and their aggregation, but then (4.1) is not really a production function in the technical sense. The relation in this case will be an aggregate relationship between value added, capital expenditure and man-hours of labor. We still prefer to call it a production function, but in value terms.

Statistical Models and Their Estimation Procedures

Since the production functions for different S.I.C. industries in this study are of Cobb-Douglas type, it is relevant to explain its form and properties.

Cobb-Douglas production functions with two inputs

The production function in this category is expressed in the form:

$$y = ax_1^{b_1} x_2^{b_2} \tag{4.5}$$

where y is output, x_1 and x_2 are inputs, a is a constant and b_1 and b_2 are production elasticities of the two resources.

If $b_1 + b_2 = 1$, we have constant returns to scale.

If $b_1 + b_2 > 1$, we have increasing returns to scale.

If $b_1 + b_2 < 1$, we have decreasing returns to scale.

The isoquants of this production function can be obtained from the equation:

$$x_1 = \left(\frac{y}{ax_2^{b_2}}\right)^{\frac{1}{b_1}} \tag{4.6}$$

The marginal rate of substitution between the two resources x_1 and x_2 is given by the equation:

$$\frac{\partial x_1}{\partial x_2} = \frac{\frac{\partial y}{\partial x_2}}{\frac{\partial y}{\partial x_1}} = -\frac{b_2 x_1}{b_1 x_2} \tag{4.7}$$

The isocline equation is obtained by putting the marginal rate of substitution equal to some constant -k.

$$\text{marginal rate of substitution} = \frac{-b_2 x_1}{b_1 x_2} = -k \tag{4.8}$$

or

$$x_1 = b_1 b_2^{-1} k\, x_2 \tag{4.9}$$

The isoclines are straight lines as can be seen from (4.9). Since the isoclines are straight lines passing through the origin, they also are scale lines, indicating a fixed proportion or mix of the two inputs used at different levels. Because of these characteristics, the Cobb-Douglas function denotes that the ratio in which the two resources are combined should remain the same regardless of the level of output. The optimum magnitude of input and output changes as the price of the product changes relative to the price of inputs, but the optimum input ratio does not change if the factor price ratio remains constant. The optimum ratio of factors does change, however, as the factor price ratio changes.

Estimation of Cobb-Douglas function with regression analysis

The Cobb-Douglas function with two inputs in logarithmic form can be expressed in regression model as

$$\log y_i = \log a + b_1 \log x_{1i} + b_2 \log x_{2i} + U_i \qquad i = 1, \ldots n \tag{4.10}$$

where $\log a$, b_1, b_2 are the unknown parameters to be estimated and U_i's are the random disturbances. More compactly (4.10) can be expressed in matrix form as:

$$Y = X\beta + U \tag{4.11}$$

where

$$Y = \begin{bmatrix} \log y_1 \\ \log y_2 \\ \vdots \\ \log y_n \end{bmatrix} \quad X = \begin{bmatrix} 1 & \log x_{11} & \log x_{21} \\ 1 & \vdots & \vdots \\ \vdots & \vdots & \vdots \\ 1 & \log x_{1n} & \log x_{2n} \end{bmatrix} \quad U = \begin{bmatrix} U_1 \\ \vdots \\ U_n \end{bmatrix} \quad \beta = \begin{bmatrix} \log a \\ b_1 \\ b_2 \end{bmatrix}$$

To make any progress with the estimation of the vector of coefficients β, we must make some further assumptions. These assumptions are crucial for the estimation process. The simplest set of crucial assumptions is

$$E(U) = 0 \tag{4.12}$$

$$E(UU') = \sigma^2 I_n \tag{4.13}$$

X is a set of fixed numbers (4.14)

X has rank $3 < n$ (4.15)

Least-squares estimates

Let $\hat{\beta} = \begin{pmatrix} \widehat{\log a} \\ \hat{b}_1 \\ \hat{b}_2 \end{pmatrix}$ denote a column vector of estimates of β.

Then we may write

$$Y = X\hat{\beta} + e \tag{4.16}$$

where e denotes the column vector of n residuals $Y - X\hat{\beta}$. From (4.16) the sum of squared residuals is:

$$e'e = (Y-X\hat{\beta})'(Y-X\hat{\beta})$$

$$= Y'Y - 2\hat{\beta}' X'Y + \hat{\beta}' X'X\hat{\beta} \qquad (4.17)$$

To find the value of $\hat{\beta}$ which minimizes the sum of squared residuals, we differentiate (4.17) when we get the normal equations to solve for $\hat{\beta}$. The normal equation is:

$$\hat{\beta} = (X'X)^{-1} X'Y \qquad (4.18)$$

Note that if X has rank 3, then $(X'X)$ has rank 3 and the inverse $(X'X)^{-1}$ exists.

$$\text{Rank } (X) = \text{Rank } (X') = \text{Rank } (X'X) = 3 \qquad (4.19)$$

If $(X'X)^{-1}$ exists, we can solve uniquely for $\hat{\beta}$ from (4.18).

If $(X'X)$ has rank less than 3, then we have to take generalized inverse of $(X'X)$ and $\hat{\beta}$ has many solutions. The estimates which form the components of $\hat{\beta}$ are best linear unbiased.

Statistical Tests on Estimates

t-test

To derive the tests we shall add one more assumption:

$$U_i \text{ has a normal distribution} \quad i = 1, \ldots n \qquad (4.20)$$

With the above assumption we can easily see that

$$\hat{\beta} \text{ is } N[\beta, \sigma^2 (X'X)^{-1}] \qquad (4.21)$$

To test the hypothesis that $b_i = 0$, that is, that x_i has no linear influence on Y, we compute the following 't' statistic.

$$t = \frac{\hat{b}_i}{\sqrt{\Sigma e_i^2/n-k}\ \sqrt{a_{ii}}} \qquad (4.22)$$

where $e_i^2 = (Y-X\hat{\beta})'(Y-X\hat{\beta})$ and a_{ii} is the ith diagonal element in $(X'X)^{-1}$.

F-test

The joint hypothesis that $b_1 = b_2 = 0$ can be tested by the F statistic

$$F = \frac{R^2/2}{(1-R^2)/n-3} \tag{4.23}$$

where the multiple correlation R is given by

$$R^2 = \frac{\hat{\beta}X'Y - (\frac{1}{n})(\Sigma Y)^2}{Y'Y - (\frac{1}{n})(\Sigma Y)^2} \tag{4.24}$$

Durbin-Watson test

Let e_t's denote the residuals from a fitted least-squares regression. The Durbin-Watson statistic 'd' for autocorrelation is given by:

$$d = \frac{\sum_{2}^{n}(e_t - e_{t-1})^2}{\sum_{1}^{n} e_t^2} \tag{4.25}$$

Regression Analysis with Dummy Variables

Econometric research in recent years provides many examples of the use of dummy variables in regression analysis. They are used to represent temporal effects such as shifts in relations between wartime and peacetime years, between different seasons, or between different political regimes. They are also used to represent qualitative variables such as sex, marital condition, and occupational or social status, and they are

sometimes used to represent quantitative variables such as age.

As an illustration suppose both intercept and marginal propensity to consume changes in the consumption function from wartime period to peacetime period. Then we can take a model like

$$C = \gamma_1 + \gamma_2 X_2 + \beta_1 Y + \beta_2 Z \tag{4.26}$$

where $Z = X_2 Y$

and

$$X_2 = \begin{cases} 0 \text{ in each wartime year} \\ 1 \text{ in each peacetime year} \end{cases}$$

This gives the wartime function as

$$C = \gamma_1 + \beta_1 Y \tag{4.27}$$

and the peacetime function as

$$C = (\gamma_1 + \gamma_2) + (\beta_1 + \beta_2) Y \tag{4.28}$$

(4.26) can be easily estimated by least-squares from the total number of observations.

Production functions with dummy variables

In Chapter IX we will estimate two kinds of production functions, one incorporating year-to-year shift and the other incorporating firm size shift. The models used are explained here.

The production functions for each S.I.C. group of industry is based on 28 observations of value added per employee and capital expenditure per employee. The observations come from four years 1954, 1958, 1963 and 1967 and seven firm sizes A, B, C, D, E, F and G. The production function for each S.I.C. group with year-to-year shift, assuming no firm size variations will look like:

$$\log y = \alpha + \beta \log x + \beta_2 x_2 \log x + \beta_3 x_3 \log x + \beta_4 x_4 \log x + \gamma_2 x_2 + \gamma_3 x_3 + \gamma_4 x_4 \quad (4.29)$$

where y = value added/employee in thousand dollars

x = capital expenditure/employee in thousand dollars

and x_2 = 1 if the year is 1958

= 0 if the year is 1954, 1963 and 1967

x_3 = 1 if the year is 1963

= 0 if the year is 1954, 1958 and 1967

x_4 = 1 if the year is 1967

= 0 if the year is 1954, 1958 and 1963

x_2, x_3 and x_4 are dummy variables.

The individual production function for each year will appear as:

1954 $\log y = \alpha + \beta \log x$ (4.30)

1958 $\log y = (\alpha + \gamma_2) + (\beta + \beta_2) \log x$ (4.31)

1963 $\log y = (\alpha + \gamma_3) + (\beta + \beta_3) \log x$ (4.32)

1967 $\log y = (\alpha + \gamma_4) + (\beta + \beta_4) \log x$ (4.33)

The production function (4.29) can be estimated by least-squares.

The production functions for each S.I.C. group with firm size shift and assuming no year-to-year variations will be:

$$\log y = \alpha + \beta \log x + \beta_2 x_2 \log x + \beta_3 x_3 \log x + \beta_4 x_4 \log x + \beta_5 x_5 \log x + \beta_6 x_6 \log x + \beta_7 x_7 \log x + \gamma_2 x_2 + \gamma_3 x_3 + \gamma_4 x_4 + \gamma_5 x_5 + \gamma_6 x_6 + \gamma_7 x_7 \quad (4.34)$$

where

x_2 = 1 if it is of firm size B

= 0 otherwise

x_3 = 1 if it is of firm size C

= 0 otherwise

x_4 = 1 if it is of firm size D

= 0 otherwise

x_5 = 1 if it is of firm size E

= 0 otherwise

x_6 = 1 if it is of firm size F

= 0 otherwise

x_7 = 1 if it is of firm size G

= 0 otherwise

Note that x_2, x_3, x_4, x_5, x_6 and x_7 are dummy variables. The individual production function for each firm size will look like

A $$\log y = \alpha + \beta \log x \tag{4.35}$$

B $$\log y = (\alpha + \gamma_2) + (\beta + \beta_2)\log x \tag{4.36}$$

C $$\log y = (\alpha + \gamma_3) + (\beta + \beta_3)\log x \tag{4.37}$$

D $$\log y = (\alpha + \gamma_4) + (\beta + \beta_4)\log x \tag{4.38}$$

E $$\log y = (\alpha + \gamma_5) + (\beta + \beta_5)\log x \tag{4.39}$$

F $$\log y = (\alpha + \gamma_6) + (\beta + \beta_6)\log x \tag{4.40}$$

G $$\log y = (\alpha + \gamma_7) + (\beta + \beta_7)\log x \tag{4.41}$$

The models for production functions and their estimations procedure are presented in this chapter. We have adopted Cobb-Douglas type as our production functions. Year-to-year shift and firm size shift in the production functions are tackled with introducing dummy variables.

Estimation of the production functions will be presented in Chapter IX. Next chapter will deal with the population distribution in Iowa and its analysis.

CHAPTER V. POPULATION TRENDS IN IOWA

Iowa has experienced rapid shifts in its population distribution. The technological progress in agriculture has reduced the number of farms and the farm population. While population has been rapidly declining in the predominantly rural areas, a trend toward urbanization and the creation of large metropolitan areas has continued. These shifts in population distribution have had a significant impact on Iowa's communities.

In this chapter we will show the population trends in counties, SPB areas, rural and metropolitan regions. This will guide us in adopting policy measures of industrialization for specific counties or geographical areas. The source of data in this chapter mainly came from the population studies by Chang (4), Tait and Johnson (54).

Population Trends in Counties

Population trends in all counties

In Table 5.1, the population and migration trends for each county in Iowa between the years 1950 and 1970 are presented. Net migration is calculated by the following formula:

$$P_t = P_{t-1} + B_t - D_t + N_t \qquad (5.1)$$

where

P_t = population at time t

B_t = number of births between t-1 and t

D_t = number of deaths between t-1 and t

N_t = net migration between t-1 and t

TABLE 5.1. Population and migration in Iowa's counties, 1950-1970

County	Population[a]			Migration[a]				Population Change	
	1950	1960	1970	Net migration 50/60	% Net migration 50/60	Net migration 60/70	% Net migration 60/70	% Change in population 50/60	% Change in population 60/70
Adair	12,292	10,893	9,487	-2,474	-20.1	-1,641	-15.1	-11.4	-12.9
Adams	8,753	7,468	6,322	-2,105	-24.1	-1,204	-16.1	-14.7	-15.3
Allamakee	16,531	15,982	14,968	-2,561	-15.7	-2,142	-13.4	- 2.3	- 6.3
Appanoose	19,683	16,015	15,007	-4,270	-21.7	- 841	- 5.3	-18.6	- 6.3
Audubon	11,579	10,919	9,595	-2,253	-19.5	-1,873	-17.2	- 5.7	-12.1
Benton	22,656	23,422	22,885	-2,101	- 9.3	-2,137	- 9.1	3.4	- 2.3
Boone	28,139	28,037	26,470	-2,456	- 8.7	-2,371	- 8.5	- 0.4	- 5.6
Bremer	18,884	21,108	22,737	- 468	- 2.5	- 403	- 1.9	11.8	7.7
Buchanan	21,927	22,293	21,746	-2,698	-12.3	-2,848	-12.8	1.7	- 2.5
Buena Vista	21,113	21,189	20,693	-2,868	-13.6	-1,652	- 7.8	0.4	- 2.3
Butler	17,394	17,467	16,953	-1,986	-11.4	-1,516	- 8.7	0.4	- 2.9
Calhoun	16,925	15,923	14,287	-2,929	-17.3	-2,215	43.9	- 5.9	-10.3
Carroll	23,065	23,431	22,912	-4,038	-17.5	-3,374	-14.4	1.6	- 2.2
Cass	18,532	17,919	17,007	-2,562	-13.8	-1,778	- 9.9	- 3.3	- 5.1
Cedar	16,910	17,791	17,655	-1,012	- 6.0	-1,129	- 6.3	5.2	- 0.8
Cherokee	19,052	18,598	17,269	-3,028	-15.9	-2,698	-14.5	- 2.4	- 7.1
Chickasaw	15,228	15,034	14,969	-2,267	-14.9	-1,539	-10.2	- 1.3	- 0.4
Clarke	9,369	8,222	7,582	-1,687	-18.0	- 634	- 7.7	-12.2	- 7.8

Clay	18,103	18,504	18,464	-2,440	-13.5	-1,352	- 7.3	2.2	- 0.2
Clayton	22,522	21,962	20,606	-3,180	-14.1	-2,580	-11.7	- 2.5	- 6.2
Crawford	19,741	18,569	18,780	-3,733	-18.9	-1,376	- 7.4	- 5.9	2.9
Dallas	23,661	24,123	26,085	-1,836	-77.8	613	2.5	2.0	8.1
Davis	9,959	9,199	8,207	-1,480	-14.9	-1,164	-12.7	- 7.6	-10.8
Decatur	12,601	10,539	9,737	-2,712	-21.5	- 650	- 6.2	-16.4	- 7.6
Delaware	17,734	18,483	18,770	-2,322	-13.1	-1,880	-10.2	4.2	1.6
Dickinson	12,756	12,574	12,565	-1,864	-14.6	- 613	- 4.8	- 1.4	- 0.1
Emmet	14,102	14,871	14,009	-1,686	-12.0	-1,987	-13.4	5.5	- 5.8
Fayette	28,294	28,581	26,898	-3,288	-11.6	-3,760	-13.2	1.0	- 5.9
Floyd	21,505	21,102	19,860	-3,086	-14.4	-2,856	-13.5	- 1.9	- 5.9
Franklin	16,268	15,472	13,255	-2,718	-16.7	-2,959	-19.1	- 4.9	-14.3
Fremont	12,323	10,282	9,282	-2,742	-22.3	-1,150	-11.2	-16.6	- 9.7
Greene	15,544	14,379	12,716	-2,847	-18.3	-2,347	-16.3	- 7.5	-11.6
Grundy	13,722	14,132	14,119	-1,321	- 9.6	- 969	- 6.9	3.0	- 0.1
Guthrie	15,197	13,607	12,243	-2,683	-17.7	-1,679	-12.3	-10.5	-10.0
Hamilton	19,660	20,032	18,383	-2,134	-10.9	-2,749	-13.7	1.9	- 8.2
Hancock	15,077	14,604	13,227	-2,778	-18.4	-2,381	-16.5	- 3.1	- 8.7
Hardin	22,218	22,533	22,248	-1,990	- 9.0	-1,156	- 5.1	1.4	- 1.3
Harrison	19,560	17,600	16,240	-3,837	-19.6	-1,946	-11.1	-10.0	- 7.7
Henry	18,708	18,187	18,114	-2,157	-11.5	- 719	- 4.0	- 2.8	- 0.4
Howard	13,105	12,734	11,442	-1,936	-14.8	-1,932	-15.2	- 2.8	-10.1
Humboldt	13,117	13,156	12,519	-1,859	-14.2	-1,463	-11.1	0.3	- 4.8
Ida	10,697	10,269	9,190	-1,791	-16.7	-1,402	-13.7	- 4.0	-10.5

[a]Source: Chang (4).

TABLE 5.1. Continued

County	Population[a]			Migration[a]				Population Change	
	1950	1960	1970	Net migration 50/60	% Net migration 50/60	Net migration 60/70	% Net migration 60/70	% Change in population 50/60	% Change in population 60/70
Iowa	15,835	16,396	15,419	-1,379	- 8.7	-2,039	-12.4	3.5	- 6.0
Jackson	18,622	20,754	20,839	- 825	- 4.4	-2,277	-11.0	11.4	0.4
Jasper	32,305	35,282	35,425	-2,084	- 6.5	-2,459	- 7.0	9.2	0.4
Jefferson	15,696	15,818	15,774	-1,442	- 9.2	-1,128	- 7.1	0.8	- 0.3
Jones	19,401	20,693	19,868	-1,478	- 7.6	-2,540	-12.3	6.7	- 4.0
Keokuk	16,797	15,492	13,943	-2,674	-15.9	-1,898	-12.3	- 7.8	-10.0
Kossuth	26,241	25,314	22,937	-5,404	-20.6	-4,813	-19.0	- 3.5	- 9.4
Lee	43,102	44,207	42,996	-3,961	- 9.2	-3,899	- 8.8	2.6	- 2.7
Louisa	11,101	10,290	10,682	-1,720	-15.5	- 111	- 1.1	- 7.3	3.8
Lucas	12,069	10,923	10,163	-1,653	-13.7	- 624	- 5.7	- 9.5	- 7.0
Lyon	14,697	14,468	13,340	-2,782	-18.9	-2,409	-16.7	- 1.6	- 7.8
Madison	13,131	12,295	11,558	-1,802	-13.7	- 965	- 7.8	- 6.4	- 6.0
Mahaska	24,672	23,602	22,177	-3,380	-13.7	-2,196	- 9.3	- 4.3	- 6.0
Marion	25,930	25,886	26,352	-2,632	-10.2	-1,057	- 4.1	- 0.2	1.8
Mills	14,064	13,050	11,606	-2,144	-15.2	-1,960	-15.0	- 7.2	- 9.3
Mitchell	13,945	14,043	13,108	-2,013	-14.4	-1,928	-13.7	0.7	- 6.7
Monona	16,303	13,916	12,069	-4,170	-25.6	-2,244	-16.1	-14.6	-13.3
Monroe	11,814	10,463	9,357	-2,081	-17.6	-1,154	-11.0	-11.4	-10.6

Montgomery	15,685	14,467	12,781	-2,662	-17.0	-1,728	-11.9	- 7.8	-11.7
Muscatine	32,148	33,840	37,181	-2,236	- 7.0	251	0.7	5.3	9.9
O'Brien	18,970	18,840	17,522	-2,965	-15.6	-2,626	-13.9	- 0.7	- 7.0
Osceola	10,181	10,064	8,555	-1,992	-19.6	-2,379	-23.6	- 1.1	-15.0
Page	23,921	21,032	18,507	-4,608	-19.3	-2,827	-13.4	-12.1	-12.0
Palo Alto	15,891	14,736	13,289	-3,821	-24.0	-2,473	-16.8	- 7.3	- 9.8
Plymouth	23,252	23,906	24,312	-3,115	-13.4	-1,743	- 7.3	2.8	1.7
Pocahontas	15,496	14,234	12,729	-3,540	-22.8	-2,390	-16.8	- 8.1	-10.6
Poweshiek	19,344	19,300	18,803	-2,340	-12.1	-1,682	- 8.7	- 0.2	- 2.6
Ringgold	9,528	7,910	6,373	-2,121	-22.3	-1,437	-18.2	-17.0	-19.4
Sac	17,518	17,007	15,573	-2,972	-17.0	-2,212	-13.0	- 2.9	- 8.4
Shelby	15,942	15,825	15,528	-2,789	-17.5	-1,720	-10.9	- 0.7	- 1.9
Sioux	26,381	26,375	27,996	-4,893	-18.5	-1,181	- 4.5	- 0.02	6.1
Tama	21,688	21,413	20,147	-2,634	-12.1	-2,254	-10.5	- 1.3	- 5.9
Taylor	12,420	10,288	8,790	-2,673	-21.5	-1,204	-11.7	-17.2	-14.6
Union	15,651	13,712	13,557	-2,906	-18.6	- 388	- 2.8	-12.4	- 1.1
Van Buren	11,007	9,778	8,643	-1,852	-16.8	-1,220	-12.5	-11.2	-11.6
Warren	17,758	20,829	27,432	601	3.4	3,947	18.9	17.3	31.7
Washington	19,557	19,406	18,967	-2,405	-12.5	-1,655	- 8.5	- 0.8	- 2.3
Wayne	11,737	9,800	8,405	-2,356	-20.1	-1,105	-11.3	-16.5	-14.2
Winnebago	13,450	13,099	12,990	-2,017	-15.0	- 767	- 5.9	- 2.6	- 0.8
Winneshiek	21,639	21,651	21,758	-2,970	-13.7	-1,717	- 7.9	0.1	0.5
Worth	11,068	10,259	8,968	-1,876	-16.9	-1,550	-15.1	- 7.3	-12.6
Wright	19,652	19,447	17,294	-2,849	-14.5	-3,008	-15.5	- 1.0	-11.1
Story	44,294	49,327	62,783	-3,355	- 7.6	5,919	12.0	11.4	27.3

TABLE 5.1. Continued

County	Population[a]			Migration[a]				Population Change	
	1950	1960	1970	Net migration 50/60	% Net migration 50/60	Net migration 60/70	% Net migration 60/70	% Change in population 50/60	% Change in population 60/70
Des Moines	42,056	44,605	46,982	-2,634	- 6.3	-1,626	- 3.6	6.1	5.3
Black Hawk	100,448	122,482	132,916	752	0.8	-7,166	- 5.9	21.9	8.5
Linn	104,274	136,899	163,213	13,253	12.7	4,469	3.3	31.3	19.2
Clinton	44,664	55,060	56,749	-1,239	- 2.5	-3,358	- 6.1	10.9	3.1
Pottawattamie	69,682	83,102	86,991	1,479	2.1	-6,471	- 7.8	19.3	4.7
Scott	100,698	119,067	142,687	1,006	17.2	6,499	5.5	18.2	19.8
Polk	226,010	266,315	286,101	2,111	0.9	-11,364	- 4.3	17.8	7.4
Dubuque	71,337	80,048	90,609	-5,144	- 7.2	-2,230	- 2.8	12.2	13.2
Webster	44,241	47,801	48,391	-3,979	- 9.0	-4,149	- 8.7	8.1	1.2
Johnson	45,756	53,663	72,127	-2,449	- 5.4	7,694	14.3	17.3	34.4
Marshall	35,611	37,984	41,076	-2,156	- 6.1	- 226	- 0.6	6.7	8.1
Cerro Gordo	46,053	49,894	49,335	-3,417	- 7.4	-4,161	- 8.3	8.3	- 1.1
Wapello	47,397	46,126	42,149	-7,385	-15.6	-6,299	-13.7	- 2.7	- 8.6
Woodbury	103,917	107,849	103,052	-13,315	-12.8	-15,015	-13.9	3.8	- 4.4

Percent net migration is calculated as:

$$\text{Percent net migration} = \frac{N_t}{P_{t-1}} \times 100 \qquad (5.2)$$

Of the 99 counties only 6 had in-migration between 1950 and 1960 and 7 had in-migration between 1960 and 1970. Significant changes have occurred in population trends of counties during the past two decades. During 1950-60, 41 counties increased in population, while 58 declined. From 1960 to 1970 only 25 counties increased in population while 74 had a population decrease. Figures 5.1 and 5.2 show the migration in counties of Iowa in 1950-60 and 1960-70. Figures 5.3 and 5.4 show the population trends in counties of Iowa in 1950-60 and 1960-70.

TABLE 5.2. Population trends of Iowa counties, 1950-1970

Percent change	1950-1960 Number of counties[a]	1960-1970 Number of counties[a]
Over 10% increase	12	6
0-10% increase	29	19
0-10% decrease	43	53
Over 10% decrease	15	21
TOTAL	99	99

[a]Calculated from Table 5.1.

Table 5.2 is interesting by itself. The percentage changes in population of counties for 1960-1970 ranged from an increase of 34.4 percent in Johnson County to a decline of 19.4 percent in Ringgold County.

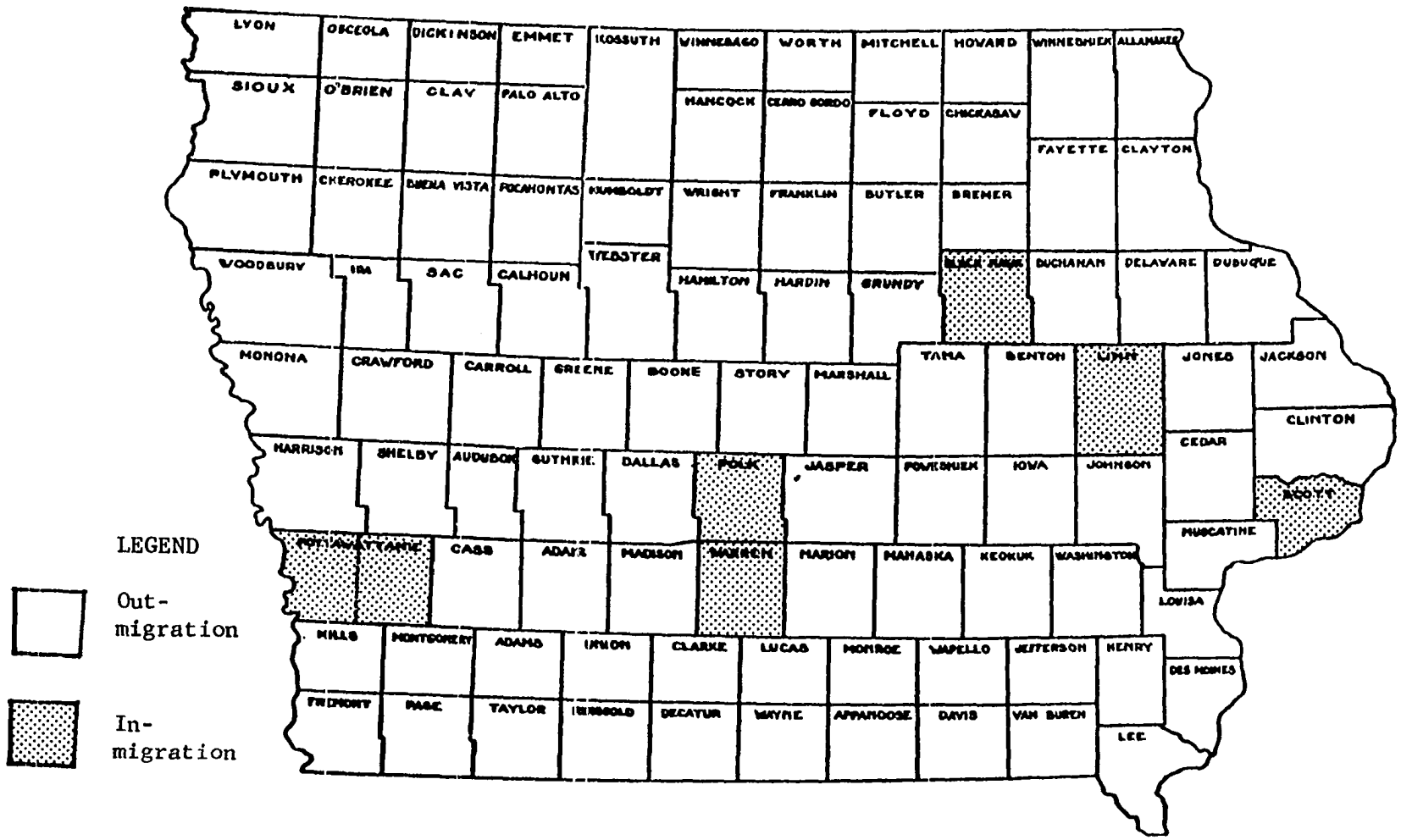

Figure 5.1. Migration in counties of Iowa, 1950-60

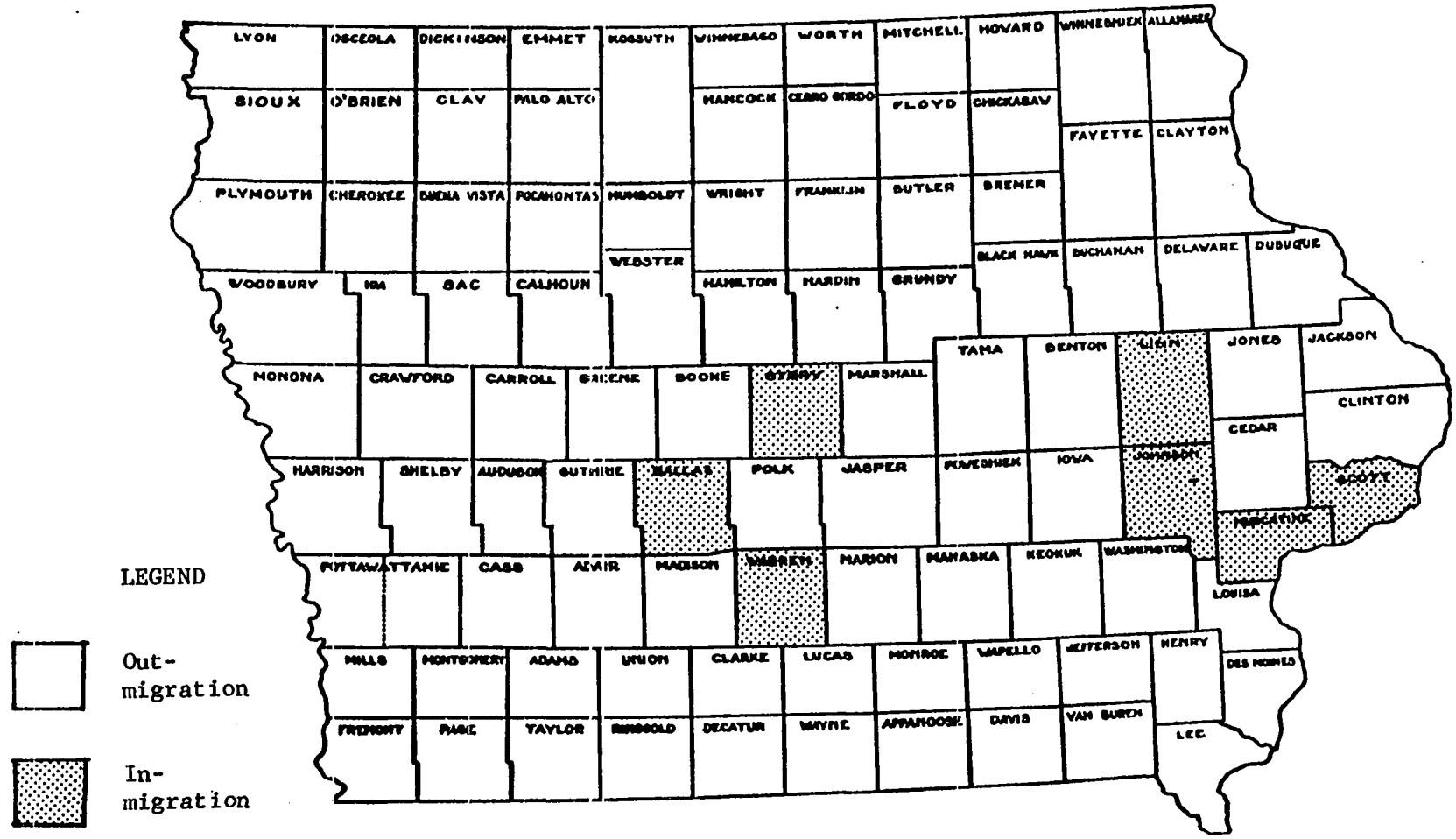

Figure 5.2. Migration in counties of Iowa, 1960-70

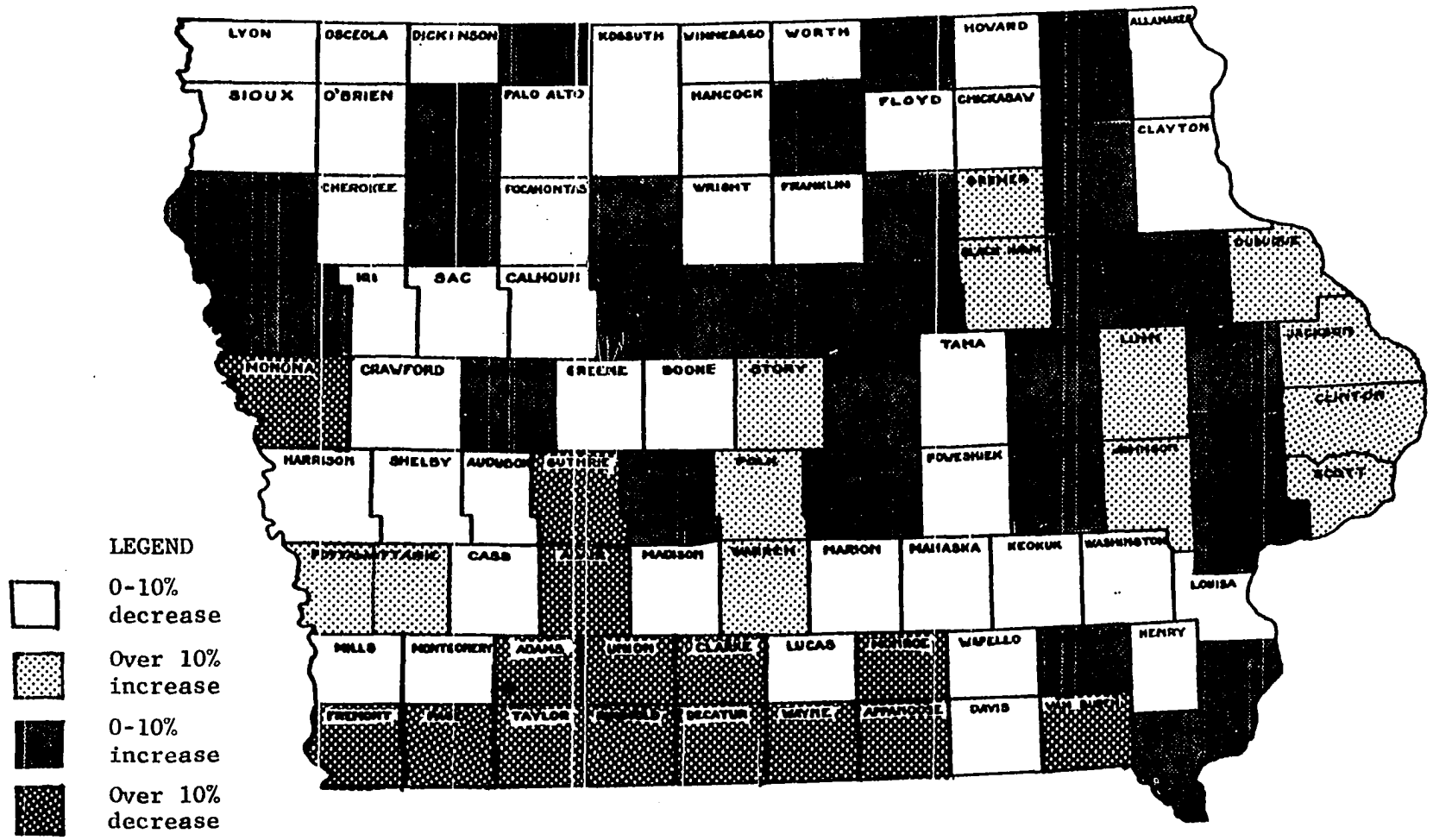

Figure 5.3. Population trends in counties of Iowa, 1950-60

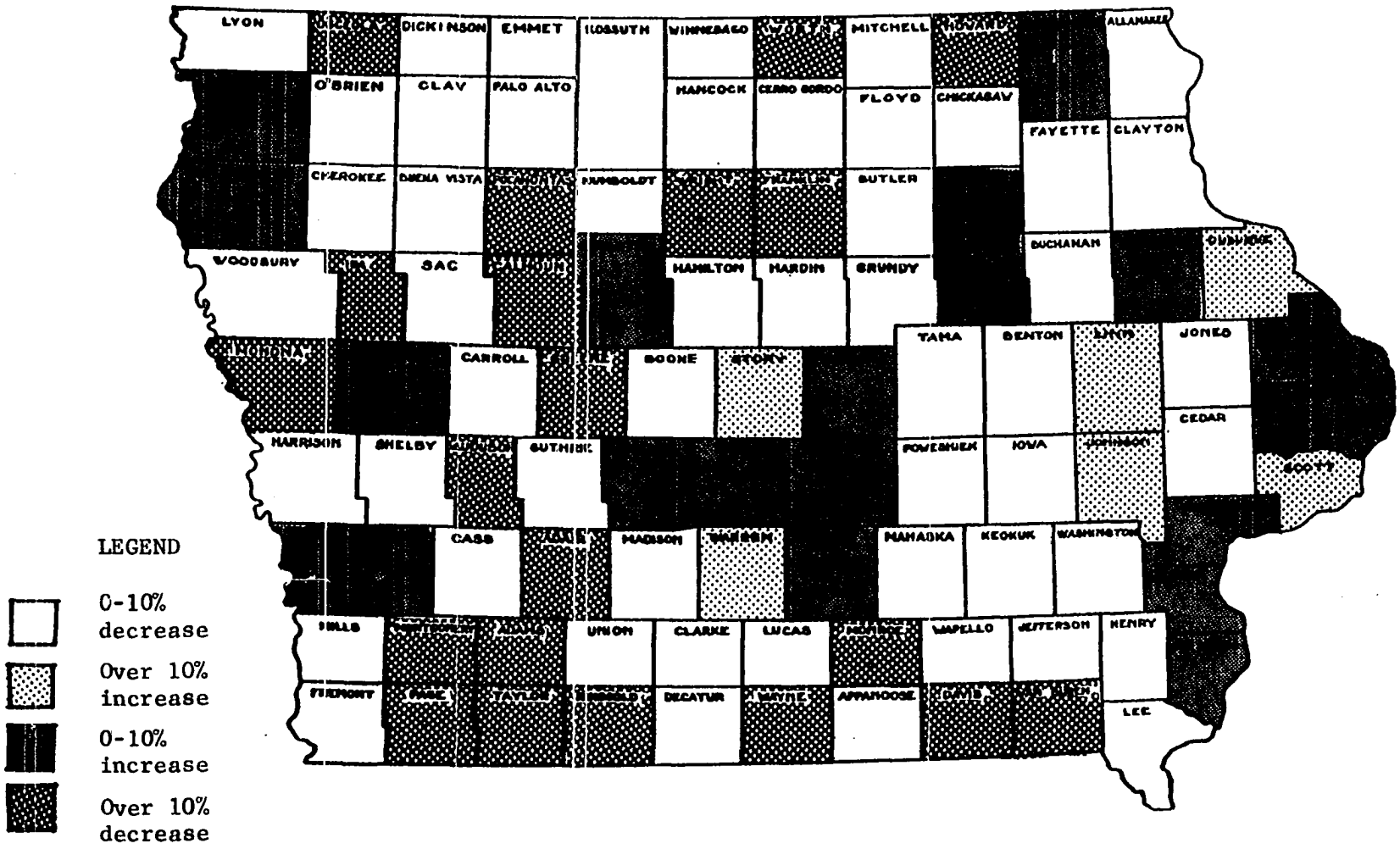

Figure 5.4. Population trends in counties of Iowa, 1960-70

Counties showing the greatest population increase during 1960-1970 were located in eastern and central Iowa. In eastern Iowa, Johnson, Scott, Linn and Dubuque counties increased more than 10 percent in population. With the exception of Johnson County in which the growth of the University of Iowa influenced the population increase, the growth of the urban centers of Davenport, Cedar Rapids and Dubuque influenced the population increases in these counties.

In central Iowa, Warren and Story counties experienced increases of more than 10 percent in population. A major factor affecting Story County's increase has been the growth of Iowa State University, while the proximity of Warren County to the Des Moines metropolitan area has influenced its growth rate. Polk County, containing Iowa's largest city, had a population growth rate of 7.4 percent during the past decade.

Most counties experiencing population growth had a population center greater than 25,000, or were located adjacent to counties with large urban centers. One rural county, Sioux, had a growth rate of 6.1 percent. The growth in manufacturing employment during the past decade in Sioux County contributed to its population growth.

Approximately 75 percent of Iowa's counties declined in population during the past decade. Ringgold County experienced the sharpest decline, 19.4 percent, followed by Adams, 15.3 percent; Osceola, 15.0 percent; Taylor, 14.6 percent; Franklin, 14.3 percent; and Wayne, 14.2 percent. Generally, the rural counties in southern, western, and northern Iowa declined in population during the past 10 years. The two southernmost tiers of counties experienced the sharpest declines in population. The

decline in agricultural employment in rural counties without a sufficient increase in employment in other sectors to offset the agricultural employment decline has resulted in out-migration from rural counties. Figures 5.3 and 5.4 present the county population trends for 1950-60 and 1960-70.

Population trends in metropolitan and nonmetropolitan counties

Table 5.3 presents the population trends in metropolitan and nonmetropolitan counties, 1950-70. For the purposes of comparison, counties which had one or more population centers of 25,000 or more were classified as metropolitan, while the remaining counties are classified as nonmetropolitan.

TABLE 5.3. Population trends in metropolitan and nonmetropolitan counties, 1950-1970

Types of Counties	Year		
	1950[a]	1960[a]	1970[a]
Metropolitan			
Number	14	14	14
Population	1,095,827	1,262,247	1,384,085
% of State total	41.81	45.77	49.00
% change		15.19	9.65
Nonmetropolitan			
Number	85	85	85
Population	1,525,246	1,495,290	1,440,292
% of State total	58.19	54.23	51.00
% change		-1.96	-3.68
State			
Number	99	99	99
Population	2,621,073	2,757,537	2,824,377
% change		5.21	2.42

[a]Calculated from Table 5.1.

The population living in metropolitan counties has increased between 1950 and 1970. In 1950, 41 percent of Iowa's population lived in 14 metropolitan counties, whereas in 1970 49 percent of Iowa's population lived in metropolitan counties.

In contrast, the nonmetropolitan counties or rurally oriented counties have continued to decline in both total population and the proportion of the state total. In 1950, nearly 58 percent of Iowa's population lived in nonmetropolitan counties, while only 51 percent of Iowa's population resided in 85 nonmetropolitan counties in 1970. This reflects a continued trend toward urbanization in Iowa.

Population Trends in SPB Areas

Table 5.4 shows the population and net migration trends for each of the SPB area between 1950-1970. The net migration for any area is calculated in the following way.

Let there be n counties in a particular area.

Let

P_t^i = population in the county i in the area at time t

B_t^i = number of births in the county i within the area between t-1 and t

D_t^i = number of deaths in the county i within the area between t-1 and t

$$i = 1, \ldots, n$$

Then net migration N_t in the area between t-1 and t is given by

$$N_t = (P_t^1 + P_t^2 + -- + P_t^n) - (P_{t-1}^1 + -- + P_{t-1}^n) - (B_t^1 + -- + B_t^n) + (D_t^1 + -- + D_t^n) \quad (5.3)$$

TABLE 5.4. Population and migration in SPB areas of Iowa, 1950-1970

Area	Population[a]			Migration[a]				Population Change	
	1950	1960	1970	Net migration 50/60	% Net migration 50/60	Net migration 60/70	% Net migration 60/70	% Change in population 50/60	% Change in population 60/70
1	101,911	100,910	95,672	-13,935	-13.67	-12,131	-12.02	- 0.9	- 5.1
2	163,607	163,787	153,680	-23,309	-14.24	-21,415	-13.07	0.1	- 6.1
3	125,813	125,246	118,437	-20,418	-16.22	-15,491	-12.36	- 0.4	- 5.4
4	199,602	200,913	193,888	-30,312	-15.18	-24,283	-12.08	0.6	- 3.4
5	129,091	130,602	123,603	-17,290	-13.39	-15,974	-12.23	1.1	- 5.3
6	98,861	101,230	102,274	- 9,120	- 9.22	- 5,318	- 5.25	2.3	1.0
7	187,603	212,516	223,440	- 7,988	- 4.25	-14,441	- 6.79	13.2	5.1
8	107,693	119,285	130,218	- 8,291	- 7.69	- 6,387	- 5.35	10.7	9.1
9	182,510	207,967	236,617	- 2,469	- 1.35	3,392	1.63	13.9	13.7
10	244,389	288,270	330,134	2,384	0.97	2,663	0.92	17.9	14.5
11	411,228	462,094	502,206	-11,453	- 2.78	- 7,737	- 1.67	12.3	8.6
12	102,644	97,912	91,819	-18,526	-18.04	-12,861	-13.13	- 4.6	- 6.2
13	189,709	193,268	187,942	-19,865	-10.47	-19,580	-10.13	1.8	- 2.7
14	80,614	69,032	61,847	-16,678	-20.68	- 7,158	-10.36	-14.3	-10.4
15	180,830	167,216	153,825	-28,573	-15.80	-17,629	-10.54	- 7.5	- 8.0
16	114,967	117,289	118,774	-10,472	- 9.10	- 6,355	- 5.41	2.0	1.2

[a]Calculated from Table 5.1 by aggregation over the counties.

Of the 16 SPB areas only one had in-migration between 1950-60 and two had in-migration between 1960-70. Area 10 which is the Cedar Rapids area had net in-migration in both the decades. The growth of industry in that area accounts for the in-migration. Area 9 which is the Davenport area had in-migration between 1960-70, because of the industrial development in the last decade. The areas where the out-migration was considerably high are 1, 2, 3, 4, 5, 12, 14, and 15. These are the areas which were predominantly rural and lack of sufficient industries forced the people to out-migrate. One important thing that can be pointed out is that there is reduction in out-migration between 1960-70 compared to 1950-60 in most of the areas. Rural industrialization might be the cause of out-migration slowing down.

Between 1950-1960 5 areas had declines in their population, whereas during 1960-1970, 9 areas had decline in their population. The declines in the population between 1960-1970 occurred mostly in northern and southern areas. Sharpest declines in population between 1960-1970 occurred in Creston area followed by Ottumwa area, Carroll area, Spencer area and Fort Dodge area. The areas which had most declines in their population were mainly rural areas.

The areas which were heavily urbanized and metropolitan in nature increased their population in the last two decades. Sharpest increase in population occurred in the Cedar Rapids area, followed by the Davenport area, Dubuque area and Des Moines area. These were the areas which were very much urbanized and metropolitan.

Rural-urban trends of SPB areas

Another interesting table 5.5 presents the rural-urban population trends of SPB areas of Iowa. In 14 areas, the trend toward urbanization continued during the past 10 years, while the percentage of the people living in rural areas continued to decline. In the Dubuque area (8), the percentage of the population classified as living in rural and urban areas during the past decade remained constant. In one area, Burlington (16), the percentage of the population classified as living in rural areas increased. The population of the major urban centers (Burlington, Fort Madison, and Keokuk) within the burlington area declined during the past decade.

More than 50 percent of the population lived in urban communities of 2500 or more in half of the 16 areas. These areas were Sioux City (4), Waterloo (7), Dubuque (8), Davenport (9), Cedar Rapids (10), Des Moines (11), Council Bluffs (13), and Burlington (16). The Davenport area with 80.5 percent had the highest percentage living in urban communities.

In eight areas, 50 percent or more of the population lived in rural communities. The areas were Decorah (1), Mason City (2), Spencer (3), Fort Dodge (5), Marshalltown (6), Carroll (12), Creston (14), and Ottumwa (15). The Decorah and Creston areas, with 77.8 percent and 77.5 percent respectively had the highest percentage of its population living in towns of less than 2500 and the open country.

TABLE 5.5. SPB rural-urban population trends, 1950-1970[a]

Area	Population Totals											
	1950				1960				1970			
	Rural	%	Urban	%	Rural	%	Urban	%	Rural	%	Urban	%
1	60,761	82.5	12,856	17.5	58,446	80.8	13,883	19.2	53,506	77.8	15,268	22.2
2	104,292	63.8	59,315	36.2	100,137	61.1	63,650	38.9	89,530	58.2	64,253	41.8
3	79,677	71.7	31,439	28.3	72,584	65.5	38,194	34.5	63,672	60.5	41,425	39.5
4	107,996	66.8	106,303	33.2	99,693	46.3	115,688	53.7	89,043	43.0	118,185	57.0
5	85,820	66.5	43,271	33.5	79,533	60.9	51,069	39.1	71,726	58.0	51,877	42.0
6	61,275	62.0	37,586	38.0	56,777	56.1	44,453	43.9	54,976	53.8	47,298	46.2
7	110,341	51.1	105,556	48.9	112,126	46.5	128,971	53.5	107,650	43.0	142,688	57.0
8	49,728	46.2	57,965	53.8	48,791	40.9	70,494	59.1	53,321	40.9	76,897	59.1
9	48,609	26.6	133,901	73.4	49,139	23.6	158,828	76.4	46,081	19.5	190,536	80.5
10	116,269	47.6	128,120	52.4	122,707	42.6	165,563	57.4	117,381	35.6	212,753	64.4
11	133,805	32.5	277,423	67.5	128,778	27.9	333,316	72.1	127,998	25.5	374,208	74.5
12	81,555	79.5	21,089	20.5	74,448	76.0	23,464	24.0	66,311	72.0	25,844	28.0
13	105,413	55.6	84,296	44.4	95,240	49.3	98,028	50.7	85,428	45.4	102,740	54.6
14	68,875	85.4	11,739	14.6	58,015	84.0	11,017	16.0	47,949	77.5	13,898	22.5
15	108,306	60.0	72,525	40.0	95,214	56.9	72,002	43.1	85,867	55.8	67,958	44.2
16	47,413	41.2	67,554	58.8	43,397	37.0	73,892	63.0	47,635	40.1	71,139	59.9
	1,370,135	52.3	1,250,938	47.7	1,295,025	47.0	1,462,512	53.0	1,208,074	42.8	1,616,967	57.2

[a]Source: Tait and Johnson (54).

Population Trends in Different Communities

In Table 5.6, population trends of incorporated communities according to size are presented. The growth of Iowa's incorporated communities reflect the general movement of Iowa toward a more urbanized state. Generally, the larger urban and suburban communities have experienced a greater growth rate than Iowa's smaller communities. The only category of incorporated places which remained relatively constant in population were the incorporated communities with less than 1000 population. The trend in Iowa has been toward a greater concentration of population in urban communities.

What is the picture we get from population trends in Iowa? Most of the counties, especially the nonmetropolitan ones faced population decrease and out-migration, both between 1950-60 and 1960-70. Similarly most of the SPB areas had out-migration between 1950-60 and 1960-70. In particular, northern and southern areas suffered most due to out-migration. Within an area again rural part had more population decrease and out-migration than urban part. An important factor affecting population changes within Iowa has been the continuing advances in agricultural technology. With the replacement of labor by capital, the number of farm families has continued to decline. The significant decline in agricultural employment without a sufficient increase in employment in other economic sectors to offset agricultural employment decline has resulted in out-migration and depopulation in many rural areas. There is a redeeming feature though. Compared to 1950-60 out-migration has declined in 1960-70 in almost all the counties and SPB

TABLE 5.6. Population of communities, 1950-1970[a]

Size of Community	1950 Total Population	1950 % Change 1940-1950	1960 Total Population	1960 % Change 1950-1960	1970 Total Population	1970 % Change 1960-1970
50,000 & over	473,999	12.3	663,159	39.9	693,813	4.6
25,000-49,999	270,030	37.7	219,377	-18.8	300,620	37.0
10,000-24,999	152,512	-0.4	169,543	11.2	171,650	1.2
5,000- 9,999	180,738	20.9	227,074	25.6	254,816	12.2
2,500- 4,999	152,154	-6.9	161,370	6.1	168,611	4.5
1,000- 2,499	195,260	2.0	201,427	3.2	213,529	6.0
Under 1,000	273,268	-2.2	267,295	-2.2	267,408	0.1

[a]Source: Tait and Johnson (54).

areas. This has happened probably due to increase in rural industrialization providing more jobs and incomes for the rural people.

In the next chapter we will deal with another aspect of the necessity of rural industrialization. Employment trends will be analyzed in the three basic sectors, agriculture, manufacturing and services.

CHAPTER VI. EMPLOYMENT TRENDS AND INCOME DISTRIBUTION

With the improvement of farm technology, agriculture has become more capital intensive and a large proportion of people who were previously dependent on agriculture had to leave agricultural employment to seek employment elsewhere. The forces of technological improvement has made the farm size larger. The big commercial farms which have come into existence in recent years use capital more heavily than before. The number of farms, especially smaller farms was greatly reduced. Though overall we have now less number of farms than before, the agricultural output has increased substantially over the years. In this chapter we will support the above thesis with empirical evidence over the years.

Agricultural Farm Trends in Iowa

Trends in Iowa

Table 6.1 presents the number of farms of different acreage between 1945 and 1969. The first thing to be noticed is that the total number of farms in the state has steadily declined over the last two decades. The number of farms of large acreage particularly in the 500-999 acres and 1,000 or more acres categories have steadily increased over the last two decades. This corroborates the fact that the farms have become larger than before. While there were only a negligible number of farms in 2,000 or more acres category in 1945, 1950 and 1954, there is now a substantial number of farms in that category.

TABLE 6.1. Trends of agricultural farms in Iowa, 1945-1969[a]

Acreage Size	YEAR					
	1969	1964	1959	1954	1950	1945
All farms	140,354	154,165	174,685	192,933	203,155	208,934
1-9 acres	5,637	4,324	5,469	9,138	9,585	10,664
10-49 acres	9,586	11,156	13,710	14,402	16,515	17,174
50-69 acres	3,116	3,465	3,907	4,338	4,780	4,744
70-99 acres	10,680	11,886	14,642	18,244	21,114	23,336
100-139 acres	12,563	15,113	19,586	24,923	28,720	30,323
140-179 acres	21,897	27,837	37,408	45,564	48,846	50,019
180-219 acres	12,818	16,067	20,105	22,152	22,457	21,982
220-259 acres	14,582	17,873	20,699	20,657	19,896	20,335
260-499 acres	38,598	38,850	34,337	29,960	28,114	27,483
500-999 acres	9,865	6,999	4,477	3,284	2,845	2,655
1000 or more acres	1,012	592	345	271	253	219

[a]Source: U.S. Census of Agriculture (60, 61, 62, 63, 64, 65).

Between 1945 and 1969 number of farms increased by 40.44 percent, 271.56 percent and 362.10 percent in 260-499 acres, 500-999 acres and 1,000 or more acres.

In the smaller size categories the trend is just the opposite of larger size categories. Here we had a decline in the number of farms over the last two decades. Between 1945 and 1969 number of farms decreased by 47.14 percent, 44.18 percent, 34.32 percent, 54.23 percent,

58.57 percent, 56.22 percent, 41.69 percent and 28.29 percent in 1-9 acres, 10-49 acres, 50-69 acres, 70-99 acres, 100-139 acres, 140-179 acres, 180-219 acres and 220-259 acres.

Farm trends in SPB areas

Tables 6.2, 6.3 and 6.4 present the trends of farms in SPB areas of Iowa between 1959 and 1969. Here also we notice the same type of trends exhibited in state figures. In all the sixteen areas, total number of farms reduced both between 1959-1964 and 1964-1969. In the larger categories such as 260-499 acres, 500-999 acres, 1,000-1,999 acres and 2,000 or more acres the number of farms have mostly increased both between 1959-1964 and 1964-1969. Between 1959 and 1964, 16, 16, 16 and 10 areas increased the number of farms in 260-499 acres, 500-999 acres, 1,000-1,999 acres and 2,000 or more acres. Between 1964 and 1969, 9, 16, 16 and 7 areas increased the number of farms in 260-499 acres, 500-999 acres, 1,000-1,999 acres and 2,000 or more acres.

In the smaller categories the number of farms declined mostly both between 1959-1964 and 1964-1969. Thus 15, 16, 13, 16, 16, 16, 16 and 16 areas declined in their number of farms in 1-9 acres, 10-49 acres, 50-69 acres, 70-99 acres, 100-139 acres, 140-179 acres, 180-219 acres and 220-259 acres between 1959 and 1964. Also 16, 14, 16, 16, 16, 16 and 16 areas declined in their number of farms in 10-49 acres, 50-69 acres, 70-99 acres, 100-139 acres, 140-179 acres, 180-219 acres and 220-259 acres between 1964 and 1969.

TABLE 6.2. Number of agricultural farms of different sizes in SPB areas in Iowa, 1959[a]

Acreage Size	AREA							
	1	2	3	4	5	6	7	8
1-9	192	444	375	389	304	299	322	106
10-49	716	904	532	737	577	621	848	330
50-69	263	214	105	143	108	156	241	140
70-99	999	1,013	772	826	709	604	1,229	443
100-139	1,683	1,395	742	1,089	903	870	1,711	892
140-179	2,359	3,860	3,686	3,043	2,596	1,880	2,783	1,337
180-219	1,479	1,606	1,123	1,218	1,245	960	1,442	905
220-259	1,210	1,828	1,748	1,601	1,471	1,062	1,234	644
260-499	1,747	2,761	2,787	2,750	2,414	1,484	1,457	923
500-999	178	265	243	390	216	132	133	91
1000-1999	6	17	12	35	12	7	4	1
2000 or more	1	0	2	4	0	0	1	1
Total	10,833	14,307	12,127	12,225	10,555	8,075	11,405	5,803

[a]Entries in the table are calculated by aggregating the data on counties from U.S. Census of Agriculture, 1959 (63).

AREA								
9	10	11	12	13	14	15	16	Total
219	450	649	308	473	249	440	238	5,457
626	1,257	1,884	612	1,160	724	1,597	602	13,727
166	391	483	140	270	226	628	238	3,912
560	1,400	1,448	780	993	844	1,484	553	14,647
751	1,973	1,646	1,187	1,276	931	1,868	674	19,590
1,263	2,878	2,474	2,547	2,240	1,478	2,124	856	37,404
670	1,754	1,675	1,307	1,502	973	1,655	609	20,123
546	1,597	1,582	1,426	1,681	1,125	1,391	539	20,685
779	2,310	2,985	2,190	3,232	2,354	3,149	1,020	34,342
80	299	419	236	585	478	556	174	4,475
5	27	28	14	44	39	35	20	306
0	7	2	3	6	6	4	2	39
5,665	14,343	15,275	10,750	13,461	9,427	14,931	5,525	174,707

TABLE 6.3. Number of agricultural farms of different sizes in SPB areas in Iowa, 1964[a]

Acreage Size	AREA							
	1	2	3	4	5	6	7	8
1-9	191	441	265	287	238	191	291	109
10-49	578	690	391	511	471	511	757	301
50-69	239	170	91	143	84	125	231	121
70-99	853	788	568	673	470	454	1,052	399
100-139	1,398	1,044	504	825	592	643	1,391	762
140-179	1,864	2,807	2,609	2,254	1,759	1,356	2,241	1,176
180-219	1,269	1,295	818	1,058	892	702	1,200	830
220-259	1,086	1,663	1,522	1,437	1,258	937	1,172	595
260-499	2,042	3,226	3,281	2,976	2,863	1,768	1,824	1,021
500-999	282	451	4451	563	427	267	225	124
1000-1999	20	31	19	55	16	12	14	7
2000 or more	3	5	-	5	4	1	-	2
Total	9,825	12,611	10,513	10,787	9,074	6,967	10,398	5,447

[a]Entries in the table are calculated by aggregating the data on counties from U.S. Census of Agriculture, 1964 (64).

AREA								
9	10	11	12	13	14	15	16	Total
154	340	473	253	380	186	315	210	4,324
471	1,072	1,553	536	905	565	1,309	535	11,156
137	337	444	145	262	244	482	210	3,465
448	1,114	1,207	605	833	667	1,300	455	11,886
579	1,577	1,257	838	975	705	1,493	530	15,113
997	2,248	1,670	1,880	1,655	1,065	1,603	653	27,837
589	1,498	1,237	1,070	1,099	736	1,261	513	16,067
492	1,393	1,305	1,231	1,298	847	1,187	450	17,873
955	2,691	3,300	2,575	3,518	2,467	3,266	1,077	38,850
126	456	666	385	831	683	818	250	6,999
6	38	49	35	80	65	57	28	532
-	6	7	3	6	8	7	3	60
4,954	12,770	13,168	9,556	11,842	8,238	13,098	4,914	154,162

TABLE 6.4. Number of agricultural farms of different sizes in SPB areas in Iowa, 1969[a]

Acreage Size	AREA							
	1	2	3	4	5	6	7	8
1-9	262	433	376	462	333	275	356	171
10-49	487	628	389	496	418	464	712	278
50-69	184	140	113	118	109	117	219	112
70-99	730	610	493	652	426	407	955	365
100-139	1,117	760	399	671	492	518	1,148	669
140-179	1,520	2,029	1,997	1,675	1,290	1,054	1,730	1,065
180-219	1,101	982	582	856	694	558	955	708
220-259	975	1,294	1,141	1,212	928	763	987	555
260-499	2,032	3,314	3,356	3,044	2,939	1,835	1,929	1,075
500-999	421	753	712	763	636	407	365	164
1000-1999	33	88	53	85	42	27	25	15
2000 or more	6	7	3	11	1	1	-	1
Total	8,868	11,038	9,614	10,045	8,308	6,426	9,381	5,178

[a]Entries in the table are calculated by aggregating the data on counties from U.S. Census of Agriculture, 1969 (65).

AREA								
9	10	11	12	13	14	15	16	Total
195	452	608	356	516	292	384	166	5,637
431	960	1,344	427	733	429	984	406	9,586
119	303	438	113	241	175	426	189	3,116
415	1,058	1,187	518	762	617	1,075	410	10,680
482	1,296	1,113	700	855	565	1,287	491	12,563
752	1,778	1,378	1,500	1,360	876	1,375	518	21,897
485	1,213	947	805	865	583	1,059	425	12,818
414	1,168	1,052	1,027	1,053	674	977	362	14,582
1,003	2,756	3,125	2,569	3,400	2,224	2,959	1,038	38,598
192	655	908	587	1,055	871	1,048	328	9,865
13	53	91	54	108	122	87	32	928
-	1	7	10	12	8	8	3	79
4,501	11,697	12,203	8,667	10,960	7,436	11,669	4,368	140,359

The reduction in the number of farms coupled with unavailability of nonagricultural jobs caused migration especially from northern to southern areas. Thus we see sharp declines in population in Creston area, Ottumwa area, Carroll area, Spencer area and Fort Dodge area.

The areas which are heavily urbanized and metropolitan in nature like Cedar Rapids area, Davenport area, Dubuque area and Des Moines area increased their population in the last decade. Though the numbers of agricultural farms have reduced in these areas, yet due to sufficient industrialization these areas could offer more nonagricultural jobs to people released from agriculture.

In all the counties the number of farms declined between 1959 and 1969. The average reduction in the counties was approximately 20 percent. Polk county containing Des Moines had the highest reduction, 28.66 percent. The reduction was uniform over the rural and metropolitan counties. This shows that the impact of improvement of farm technology had the same kind of effect over the whole state.

Output and Capital Intensity in Agriculture

Total output in agriculture has gone up in the last two decades because of the increase in productivity. The rise in productivity was due to improvement of farm technology and use of more capital intensive techniques. The agricultural output showed increase, even though the number of farms and total acreage under cultivation declined. The average per farm value of agricultural products sold increased from 13,075 dollars in 1959 to 26,044 dollars in 1969. The productivity in agriculture showed substantial increase due to the fact that output increased and less people

were needed to stay in agriculture. The increase in capital intensity in agriculture in Iowa can be judged from the figures of some of the capital items between the years 1959 and 1969. The number of automobiles, motortrucks and tractors in use per farm increased from 1.24, 1.08 and 2.1 to 1.35, 1.17 and 2.5 from 1959 to 1969. Consumption of commercial fertilizer increased from 6.7 tons per farm to about 10 tons per farm between 1959 and 1969. Consumption of gasoline and other fuels which is a good indicator of machinery used and hence of capital rose from 569 dollars per farm to 879 dollars per farm between 1959 and 1969.

Employment Trends in Different Sectors

Over the last decade employment in agriculture has steadily reduced. This is mainly due to the improvement in farm technology, and agriculture becoming more capital intensive. As a result of capital replacing more and more labor, people steadily left agriculture to join non-agricultural jobs.

In Table 6.5 employment figures are given for 16 SPB areas for three broad categories:

(1) Agriculture, forestry and fisheries

(2) Manufacturing

(3) Others

In the manufacturing sector, all S.I.C. industries are included. In category (3), we have included the following:

(3) Others:

Railroad and railway express service

Trucking service and warehousing

TABLE 6.5. Employment trends in Iowa, 1960-1970[a]

Area	Agriculture, Forestry & Fisheries 1960	Agriculture, Forestry & Fisheries 1970	Manufacturing 1960	Manufacturing 1970	Others 1960	Others 1970	Total 1960	Total 1970
1	14,605	9,871	3,101	4,573	19,037	20,132	36,743	34,576
2	17,907	11,215	7,991	9,901	33,574	36,215	59,472	57,331
3	14,635	9,812	3,979	5,461	24,761	27,662	43,375	42,935
4	14,731	10,836	10,463	10,278	46,332	50,820	71,526	71,934
5	12,084	8,012	7,418	7,197	27,098	30,603	46,600	45,812
6	9,825	6,839	5,856	8,405	21,131	24,556	36,812	39,800
7	14,153	9,364	20,064	20,992	42,543	52,408	76,760	82,764
8	7,985	5,952	10,880	13,555	24,163	28,174	43,028	47,681
9	6,958	4,776	24,978	28,181	46,466	58,969	78,402	91,926
10	17,779	12,423	26,773	31,643	68,422	89,025	112,974	133,091
11	16,680	11,882	34,034	37,112	128,706	159,274	179,420	208,268
12	13,030	9,466	2,452	3,302	18,463	20,825	33,945	33,593
13	16,183	12,084	8,218	9,534	46,503	50,517	70,904	72,135
14	9,671	7,277	1,257	1,984	13,943	14,507	24,871	23,768
15	14,902	9,160	10,735	11,509	34,695	35,396	60,332	56,065
16	5,572	3,504	11,461	14,977	26,785	28,120	43,818	46,601
Total	206,700	142,473	189,660	218,604	622,622	727,203	1,018,982	1,088,280

[a]Source: U.S. Census of Population (66, 67).

Communications

Utilities and sanitary service

Wholesale and retail trade

Finance, insurance and real estate

Education and medical service

Public administration

Category (3) is mainly the service sector.

Table 6.5 presents employment trends of three sectors in SPB areas between 1960 and 1970. In agricultural sector employment in all the 16 areas have declined. Sharpest decline was in Ottumwa area (15) followed by Burlington area (16), Mason City area (2) and Spencer area. Northern and southern areas being more agricultural than other areas lost more in agricultural employment. Council Bluffs area (13), Carroll area (12), Dubuque area (8), Des Moines area (11) and Sioux City area (4) had relatively less declines in agricultural employment.

In the manufacturing sector we notice the opposite trend of what we saw in agricultural employment. In manufacturing sector except Sioux City area (4) and Fort Dodge area (5) employment in all other areas increased between 1960 and 1970. Sharpest increases in manufacturing employment occurred in Creston area (14) followed by Decorah area (1), Marshalltown area (6), Spencer area (3) and Carroll area. We might say that the areas which were predominantly rural had more increase in manufacturing employment.

In the service sector employment in all the sixteen areas increased between 1960 and 1970.

The picture that we get from the employment trends was that whereas agricultural employment have reduced, employment in other sectors have increased. A very important and pertinent question will be whether the increases in employment in manufacturing and service sector were sufficient to offset the reduction in employment in agriculture and increase population. The required offset did not happen in some areas where there were out-migration of people.

Income Distribution Model

Poverty in the rural sector of United States is a result of unequal distribution. Excessive obsession with the growth of GNP overlooking its distributional aspects led the country to its present state of deterioration of rural sector. Income in the rural sector during the last decades fell significantly behind urban and metropolitan sector. In this section we present a simple statistical model to analyze some aspects of income distribution.

Let us consider two sectors, rural and urban. We adopt the following symbols.

R = Rural income

$E(R)$ = Expected rural income

$V(R)$ = Variance of rural income

f_1 = Density function of rural income

P_R = Rural population

U = Urban income

$E(U)$ = Expected urban income

$V(U)$ = Variance of urban income

f_2 = Density function of urban income

P_U = Urban population

Variance of income is taken as a measure of income distribution. The two distributions are pooled to find the distribution of income of overall population.

Let

T = Income of overall population

$E(T)$ = Expected income of overall population

$V(T)$ = Variance of income of overall population

f = Density function of income of overall population

$P(T) = P_U + P_R$ = Population in both the sectors

From above we see that

$$f = \frac{P_R}{P_R + P_U} f_1 + \frac{P_U}{P_R + P_U} f_2 \tag{6.1}$$

$$E(T) = \frac{P_R\, E(R) + P_U\, E(U)}{P_R + P_U} \tag{6.2}$$

$V(T)$ is determined by the following formula

$$V(T) = E(T^2) = [E(T)]^2$$

$$= \int x^2 \left[\frac{P_R}{P_R+P_U} f_1(x) + \frac{P_U}{P_R+P_U} f_2(x) \right] dx - \left[\frac{P_R E(R) + P_U E(U)}{P_R+P_U} \right]^2 \tag{6.3}$$

After simplification we get

$$V(T) = \frac{P_R}{P_U+P_R} V(R) + \frac{P_U}{P_U+P_R} V(U) + \frac{P_R P_U}{(P_U+P_R)^2} [E(R) - E(U)]^2 \tag{6.4}$$

From (6.4) we see that income distribution of the total population as given by variance V(T) depends on P_R, P_U, V(R), V(U), E(R) and E(U). Higher is the V(T), the wider is the difference between people's incomes. From the point of view of rural welfare V(T) should be reduced.

Suppose $\frac{P_R}{P_U+P_R}$, $\frac{P_U}{P_U+P_R}$, V(R) and V(U) are fixed. Then V(T) diminishes with reduction in E(V) - E(R) . The less is the deviation between the mean incomes of rural and urban population, the less is V(T).

$$\frac{dV(T)}{d[E(U)-E(R)]} = \frac{2P_RP_U}{(P_U+P_R)^2}\,[E(U)-E(R)] \qquad (6.5)$$

Let us take the case of Iowa. According to 1970 census there were 249,189 and 468,587 families in the metropolitan sectors. The mean incomes per family in the two sectors were given as \$10,295 and \$8,368. So we have

$$P_R = 468,587 \qquad E(R) = \$8,368$$

$$P_U = 249,189 \qquad E(U) = \$10,295$$

and

$$\frac{dV(T)}{d[E(U)-E(R)]} = \$874.$$

Over the last decades the number of agricultural farms steadily increased in the larger acreage, whereas the numbers of farms in the smaller acreages generally declined. This phenomenon was observed both for the whole of Iowa and SPB areas. The number of farms including all sizes declined in all the SPB areas. The decline in the number of farms, especially the small family farms and the increase in capital intensive in large commercial farms coupled with the unavailability of

nonagricultural jobs resulted in out-migration, especially from northern and southern areas. Whereas employment in agriculture has declined, employment in manufacturing and service sector increased in most of the SPB areas. More nonagricultural jobs were created to offset somewhat the reduction in employment in agriculture.

In the next chapter we will analyze Iowa's rural industrial experience over the last decade. This analysis will give us a picture of the characteristics and transition of rural industrialization in Iowa.

CHAPTER VII. IOWA'S RURAL INDUSTRIALIZATION EXPERIENCE

The welfare of rural people has many dimensions. Obviously, jobs and incomes are the means for achieving some of the important goals of rural people. For some policymakers, the creation of new jobs and the improvement of rural incomes are the beginning and end of rural development. While this is too narrow a viewpoint, rural development without adequate attention to jobs and income is likely to be unsatisfactory for most rural people. In other words, we might say that rural industrialization program for creating new jobs and raising income is important, perhaps most important variable entering into the welfare function of the rural people.

Rural industrialization is a big hope for those communities which have the resources and characteristics favoring it. There are many examples where the initiation of a new plant by an outside firm brought the rural community to the path of prosperity. It would be fine if all rural communities faced with economic decline, and who want it, could have industrialization to serve these needs. There are many communities whose endowments and interests mesh with the interests of firms, and in those cases industrialization is the right program to adopt. But there are also many communities which lack the resources to entice the firms to set up new plants. Rural community is not an homogeneous entity.

There are some aspects of rural industrialization to which we must pay attention. A stratification of communities by their objectives in rural development is also necessary for aid and help. It is not known with certainty that all rural communities desire industrialization. Many

communities do not want just any industry, especially large plants which they think will bring more pollution and deteriorate the quality of life. Rural communities are far from a homogeneous lot. Their needs, interests and objectives are varied and often conflicting. Objectives of rural communities may also vary according to the age distribution of the population living in the community. A community where a larger proportion of the population are old and retired, may not be as much interested in the jobs and income as the quality of life itself. Before making any program for help and aid to the community, we should try to know the welfare objectives of that community. Even if industrialization is sought by the community as a high priority, we should be careful in our suggestion about the type and size of industry sought after. Needless to say that research is lacking in this area.

There has been a conscious effort in the 1960's both by federal and state government to eradicate rural poverty. Programs were undertaken to create more jobs and raise income, and develop backward areas. Community development service (RCDS), low income housing programs (FHA) and other such programs were adopted to alleviate poverty of rural people. In the light of these we will examine in this chapter the trends in rural industrialization in Iowa in the 1960's. To be consistent with earlier chapters we will mainly concentrate on 16 SPB areas.

The Diffusion of Firms in Iowa

Distribution by firm size and SPB area

Between the years 1960-61 and 1971-72, the number of manufacturing firms in operation in Iowa increased by about 8 percent (from about 3,675 to 3,977). The firms located in places of less than 25,000 population (according to the 1960 census) increased in number over the same time period by about 16.2 percent (2,399 to 2,787) but the number of firms located in places of over 25,000 population declined by about 6.8 percent (1,276 to 1,189). For the state as a whole, the distribution of firms, when classed by the number of employees, remained relatively unchanged by the additions, which means that proportionally as many small firms were added as large firms (see Tables 7.1 and 7.2). Firms of all sizes were added in places of under 25,000 population, but proportionally more larger firms were added. Thus the distribution of firms in places of under 25,000 tended to flatten somewhat over the decade. By contrast, the places with over 25,000 population lost firms in all size classes but one (the class with between 251 and 500 employees) and lost proportionally more of the smaller firms than the larger firms. The result is that the distribution of firms of various sizes, the relative share of firms in places under 25,000 grew for all sizes of firms. The majority of larger firms (firms with over 250 employees) were still to be found in the places with more than 25,000 persons but with a rising share of these firms being found in the smaller places. Indeed, the majority of firms employing between 51 and 100, and 501 and 1,000 persons were found in places of

TABLE 7.1. Distribution of industries in Iowa by firm size and SPB area, 1960-61[a]

SPB Area	Region[b]	Firm Size A No.	A %	B No.	B %	C No.	C %
	Nonmetro	131	82.91	17	10.76	7	4.43
1	Metro						
	Nonmetro	157	86.74	11	6.08	7	3.87
2	Metro	40	59.70	16	23.88	4	5.97
	Nonmetro	170	84.16	17	8.42	8	3.96
3	Metro						
	Nonmetro	135	83.33	16	9.88	8	4.94
4	Metro	73	51.05	35	24.48	15	10.49
	Nonmetro	120	80.00	15	10.00	10	6.67
5	Metro	19	40.43	5	10.64	11	23.40
	Nonmetro	114	74.03	17	11.04	9	5.84
6	Metro						
	Nonmetro	136	77.71	27	15.43	5	2.96
7	Metro	74	54.01	31	22.63	14	10.22
	Nonmetro	59	80.82	8	10.96	4	5.48
8	Metro	47	54.02	18	20.69	8	9.20
	Nonmetro	80	60.15	26	19.55	11	8.27
9	Metro	71	48.97	28	19.31	17	11.72
	Nonmetro	161	83.85	18	9.38	9	4.69
10	Metro	93	53.14	35	20.00	12	6.86
	Nonmetro	166	73.45	32	14.16	17	7.52
11	Metro	161	52.27	71	23.05	39	12.66
	Nonmetro	106	78.52	18	13.33	3	2.22
12	Metro						
	Nonmetro	109	77.86	18	12.86	6	4.29
13	Metro	35	60.34	11	18.97	3	5.17
	Nonmetro	36	80.00	6	13.33	1	2.22
14	Metro						
	Nonmetro	115	68.86	31	18.56	10	5.99
15	Metro	23	53.49	11	25.58	4	9.30
	Nonmetro	70	66.04	17	16.04	5	4.72
16	Metro	25	37.88	16	24.24	10	15.15
	Nonmetro	1,865	77.74	294	12.26	120	5.00
Iowa	Metro	661	51.80	277	21.71	137	10.74
Iowa	All firms	2,526	68.60	571	15.60	257	7.00

[a]Source: Directory of Iowa Manufacturers (20).

[b]Nonmetro = Nonmetropolitan region.
Metro = Metropolitan region.

Firm Size									
D		E		F		G		All Firms	
No.	%	No.	%	No.	%	No.	%	No.	%
3	1.90							158	100.00
4	2.21	1	.55			1	.55	181	100.00
4	5.97	2	2.99			1	1.49	67	100.00
5	2.48	2	.99					202	100.00
3	1.85							162	100.00
11	7.69	5	3.50	3	2.10	1	.70	143	100.00
4	2.67	1	.67					150	100.00
9	19.15	2	4.26			1	2.13	47	100.00
11	7.14	1	.65	1	.65	1	.65	154	100.00
5	2.86	2	1.14					175	100.00
10	7.30	5	3.65	1	.73	2	1.46	137	100.00
1	1.37					1	1.37	73	100.00
9	10.34	1	1.15	1	1.15	3	3.45	87	100.00
10	7.52	4	3.01	1	.75	1	.75	133	100.00
15	10.34	8	5.52	2	1.38	4	2.76	145	100.00
3	1.56	1	.52					192	100.00
18	10.29	6	3.43	8	4.57	3	1.71	175	100.00
7	3.10	1	.44	2	.88	1	.44	226	100.00
26	8.44	4	1.30	1	.32	6	1.95	308	100.00
7	5.19	1	.74					135	100.00
5	3.57	2	1.43					140	100.00
8	13.79	1	1.72					58	100.00
2	4.44							45	100.00
8	4.79	3	1.80					167	100.00
3	6.98					2	4.65	43	100.00
8	7.55	1	.94	4	3.77	1	.94	106	100.00
9	13.64	3	4.55	2	3.03	1	1.52	66	100.00
86	3.58	20	.83	8	.33	6	.25	2,399	100.00
122	9.56	37	2.90	18	1.41	24	1.88	1,276	100.00
208	5.80	57	1.60	26	0.70	30	0.80	3,675	100.00

TABLE 7.2. Distribution of industries in Iowa by firm size and SPB area, 1971-72[a]

SPB Area	Region[b]	Firm Size					
		A		B		C	
		No.	%	No.	%	No.	%
	Nonmetro	128	82.05	13	8.33	9	5.77
1	Metro						
	Nonmetro	153	80.10	20	10.47	8	4.19
2	Metro	21	43.75	14	29.17	6	12.50
	Nonmetro	176	80.00	22	10.00	9	4.09
3	Metro						
	Nonmetro	136	76.40	21	11.80	14	7.87
4	Metro	59	49.58	27	22.69	13	10.92
	Nonmetro	146	77.66	27	14.36	8	4.26
5	Metro	15	35.71	9	21.43	5	11.90
	Nonmetro	131	70.05	27	14.44	17	9.09
6	Metro						
	Nonmetro	138	77.09	26	14.53	6	3.35
7	Metro	74	56.49	30	22.90	7	5.34
	Nonmetro	57	80.28	8	11.27	4	5.63
8	Metro	47	47.47	28	28.28	9	9.09
	Nonmetro	80	56.34	25	17.61	16	11.27
9	Metro	67	48.20	27	19.42	14	10.07
	Nonmetro	213	82.56	25	9.69	11	4.26
10	Metro	84	52.17	30	18.63	13	8.07
	Nonmetro	224	72.26	49	15.81	20	6.45
11	Metro	180	58.25	56	18.12	33	10.68
	Nonmetro	127	79.38	19	11.88	7	4.38
12	Metro						
	Nonmetro	121	79.08	23	15.03	1	.65
13	Metro	30	63.83	8	17.02	3	6.38
	Nonmetro	49	72.06	9	13.24	5	7.35
14	Metro						
	Nonmetro	145	75.13	19	9.84	13	6.74
15	Metro	18	48.65	9	24.32	5	13.51
	Nonmetro	94	70.15	8	5.97	8	5.97
16	Metro	22	38.60	14	24.56	7	12.28
	Nonmetro	2,118	75.97	341	12.23	156	5.60
Iowa	Metro	617	51.89	252	21.19	115	9.67
Iowa	All firms	2,735	68.80	593	14.90	271	6.80

[a]Source: Directory of Iowa Manufacturers (24).

[b]Nonmetro = Nonmetropolitan region.
Metro = Metropolitan region.

Firm Size									
D		E		F		G		All Firms	
No.	%	No.	%	No.	%	No.	%	No.	%
6	3.85							156	100.00
6	3.14	2	1.05			2	1.05	191	100.00
4	8.33	2	4.17			1	2.08	48	100.00
9	4.09	2	.91	2	.91			220	100.00
3	1.69	2	1.12	2	1.12			178	100.00
13	10.92	6	5.04			1	.84	119	100.00
5	2.66	1	.53			1	.53	188	100.00
9	21.43	3	7.14	1	2.38			42	100.00
7	3.74	2	1.07	1	.53	2	1.07	187	100.00
7	3.91	1	.56	1	.56			179	100.00
11	8.40	4	3.05	3	2.29	2	1.53	131	100.00
		2	2.82					71	100.00
9	9.09	2	2.02	2	2.02	2	2.02	99	100.00
9	6.34	3	2.11	5	3.52	4	2.82	142	100.00
16	11.51	10	7.19	2	1.44	3	2.16	139	100.00
6	2.33	2	.78			1	.39	258	100.00
15	9.32	11	6.83	4	2.48	4	2.48	161	100.00
10	3.23	3	.97	3	.97	1	.32	310	100.00
21	6.80	8	2.59	5	1.62	6	1.94	309	100.00
6	3.75	1	.63					160	100.00
5	3.27	3	1.96					153	100.00
4	8.51	2	4.26					47	100.00
5	7.35							68	100.00
11	5.70	4	2.07	1	.52			193	100.00
3	8.11					2	5.41	37	100.00
14	10.45	6	4.48	3	2.24	1	.75	134	100.00
8	14.04	4	7.02			2	3.51	57	100.00
109	3.91	34	1.22	18	.65	12	.43	2,788	100.00
113	9.50	52	4.37	17	1.43	23	1.93	1,189	100.00
222	5.60	86	2.20	35	0.90	35	0.90	3,977	100.00

under 25,000 in 1971-72, which contrasts with the majority of these firms being in places of over 25,000 in 1960-61.

Within the state, firm numbers have risen for the majority of regions (see Tables 7.1 and 7.2). Only four of the sixteen regions have actually lost firms (areas 1, 2, 4 and 7), and these losses amount to only 3 percent of the 1960-61 number of firms. The biggest single loss appears to be in area 2, and in the "metropolitan" part of area 2, Mason City. But the gains in firms have not been uniformly distributed. Comparing the distributions of firms in 1971-72 with that in 1960-61 shows that areas 5 and 6, 10 and 11, 15 and 16 have gained relatively more firms than have other areas.

With the exception of area 1 which lost firms in the nonmetropolitan segment (there is no metropolitan segment in area 1), and area 8 which gained firms overall but lost firms in the nonmetropolitan segment, and gained firms in the metropolitan segment, all regions in the state appeared to follow the state's tendency and lost firms in their metropolitan areas (places with over 25,000) and gained firms in places of under 25,000 population (see Tables 7.1 and 7.2).

Considering the various regions in the state and their degree to which their individual experiences parallel the overall state experience, in terms of the size classes of firms that were added or lost over the decade, Tables 7.1 and 7.2 show that only 4 of the 16 regions had completely contradictory experience vis-a-vis the state. In areas 5, 7, 8, and 9, metropolitan segments gained firms of the sizes that the state as a whole lost, or lost firms in the nonmetropolitan segments of the sizes that the state as a whole gained. Other small contradictions exist in

other regions, but these are relatively few and would not negate the generality of the tendency in the region.

The generalization that the firms in all size classes have become relatively more important in numbers in the nonmetropolitan sectors of the state appears to be applicable to all areas of the state as well. The exception would be area 8, where only firms of 251 to 500 employees in nonmetropolitan segments increased their numbers relative to the numbers in the metropolitan segments. Each area has one or two size classes of firms for which the state tendency in relative importance of firms in the nonmetropolitan segment would not describe the trend in the area, but these are not of sufficient magnitudes to negate the generalization. In at least six instances, the disagreement with the state-wide tendency exists because the number of firms of the size class in the nonmetropolitan segment rose sufficiently to become the majority of firms, whereas the growth at the state level was not sufficient to do this.

Lastly, the generalization that the relative importance of small firms in the state is declining, so that the distribution of firms by size class is flattening in both nonmetropolitan and metropolitan segments is generally true for each area within the state. Nine of the sixteen areas show this tendency for both segments, four additional areas show the state-wide tendency for nonmetropolitan segments (but not metropolitan segments), and three areas (areas 12, 13, and 16) show tendencies that are contradictory to the state tendencies in both segments.

For the state and most of the regions within the state, therefore, industry has tended to spread more into the rural areas, the places with fewer than 25,000 people. Firms of all sizes (measured by number of

employees) have appeared in these segments but relatively more firms employing in excess of twenty persons have appeared. Firm numbers in metropolitan places, with populations of over 25,000 have decreased throughout the state, again with relatively more of the surviving firms employing more than twenty persons each. In terms of numbers of firms, therefore, there appears to have been progress in industrializing rural Iowa.

Distribution by town size and SPB area

Whereas the number of manufacturing firms in Iowa between 1960-61 and 1971-72 increased in places under 25,000 population (from 2,399 to 2,788), the number of firms in places over 25,000 population decreased in the same period (from 1,276 to 1,189). This trend is not only visible in absolute figures but also in relative percentages. The percentage of the number of firms in places under 25,000 changed from 65.28 to 70.10 between 1960-61 and 1971-72. At the same time the percentage of the number of firms in metropolitan areas decreased from 34.72 to 29.90 (see Tables 7.3 and 7.4).

It is interesting to observe how the gains in the number of firms in rural areas, i.e., places under 25,000 population are distributed in towns of different sizes. Except in towns of size 6 (15,000 to 25,000 population), towns of all sizes under 25,000 population added more industries. In general, the percentages of additions of industries in towns of sizes 1 to 5 are roughly of the same order (see Tables 7.3 and 7.4). We can conclude from these observations that indeed more industries moved to rural areas, but industries didn't show any preference for sizes

TABLE 7.3. Distribution of industries in Iowa by town size and SPB area, 1960-61[a]

SPB Area		Town Size 1	2	3	4
1	No.	54	46	31	27
	%	34.18, 8.01	29.11, 7.49	19.62, 8.09	17.09, 6.40
2	No.	59	51	32	29
	%	22.52, 8.75	19.47, 8.31	12.21, 8.38	11.07, 6.87
3	No.	58	52	36	56
	%	28.71, 8.61	25.74, 8.47	17.82, 9.40	27.72, 13.27
4	No.	39	64	17	42
	%	12.79, 5.79	20.98, 10.42	5.57, 4.44	13.77, 9.95
5	No.	41	41	38	30
	%	20.81, 6.08	20.81, 6.68	19.29, 9.92	15.23, 7.11
6	No.	38	26	16	25
	%	24.68, 5.64	16.88, 4.28	10.39, 4.18	16.23, 5.92
7	No.	48	59	7	35
	%	15.38, 7.12	18.91, 9.61	2.24, 1.83	11.22, 8.29
8	No.	38	6	22	7
	%	23.75, 5.64	3.75, .98	13,75, 5.74	4.38, 1.66
9	No.	21	24	8	
	%	7.55, 3.12	8.63, 3.91	2.88, 2.09	
10	No.	70	50	49	13
	%	19.07, 10.39	13.62, 8.14	13.35, 12.79	3.54, 3.08
11	No.	67	32	31	44
	%	12.55, 9.94	5.99, 5.21	5.81, 8.09	8.24, 10.43
12	No.	46	40	41	8
	%	34.07, 6.82	29.63, 6.51	30.37, 10.70	5.93, 1.90
13	No.	31	40	23	46
	%	15.66, 4.60	20.20, 6.51	11.62, 6.01	23.23, 10.90
14	No.	12	14	4	15
	%	26.67, 1.78	31.11, 2.28	8.89, 1.04	33.33, 3.55
15	No.	32	56	21	26
	%	15.24, 4.75	26.67, 9.12	10.00, 5.48	12.38, 6.16
16	No.	20	13	7	9
	%	11.63, 2.97	7.56, 2.12	4.07, 1.83	5.23, 2.13
Iowa	No.	674	614	383	422
	%	18.34, 100.00	16.71, 100.00	10.42, 100.00	11.48, 100.00

[a]Source: Directory of Iowa Manufacturers (20).

[b]Nonmetro = Nonmetropolitan region.
Metro = Metropolitan region.

Town Size				
5	6	7	Nonmetro[b]	Nonmetro + Metro[b]
			158	158
			100.00, 6.59	100.00, 4.30
		67	181	262
		25.57, 5.25	69.08, 7.54	100.00, 7.13
			202	202
			100.00, 8.42	100.00, 5.50
		143	162	305
		46.89, 11.21	53.11, 6.75	100.00, 8.30
		47	150	197
		23.86, 3.68	76.14, 6.25	100.00, 5.36
	49		154	154
	31.82, 23.90		100.00, 6.42	100.00, 4.19
	26	137	175	312
	8.33, 12.68	43.91, 10.74	56.09, 7.29	100.00, 8.49
		87	73	160
		54.38, 6.82	45.63, 3.04	100.00, 4.35
25	55	145	133	278
8.99, 24.75	19.78, 26.83	52.16, 11.36	47.84, 5.54	100.00, 7.56
10		175	192	367
2.72, 9.90		47.68, 13.71	52.32, 8.00	100.00, 9.99
34	18	308	226	534
6.37, 33.66	3.37, 8.78	57.68, 24.14	42.32, 9.42	100.00, 14.53
			135	135
			100.00, 5.63	100.00, 3.67
		58	140	198
		29.29, 4.55	70.71, 5.84	100.00, 5.39
			45	45
			100.00, 1.88	100.00, 1.22
32		43	167	210
15.24, 31.68		20.48, 3.37	79.52, 6.96	100.00, 5.71
	57	66	106	172
	33.14, 27.80	38.37, 5.17	21.63, 4.42	100.00, 4.68
101	205	1,276	2,399	3,675
2.75, 100.00	5.58, 100.00	34.72, 100.00	65.28, 100.00	100.00,100.00

TABLE 7.4. Distribution of industries in Iowa by town size and SPB area, 1971-72[a]

SPB Area		Town Size 1	2	3	4
	No.	57	46	26	27
1	%	36.54, 6.80	29.49, 6.61	16.67, 5.86	17.31, 5.39
	No.	67	50	37	38
2	%	28.03, 8.00	20.92, 7.18	15.48, 8.33	15.90, 7.58
	No.	67	37	50	66
3	%	30.45, 8.00	16.82, 5.32	22.73, 11.26	30.00, 13.17
	No.	54	68	26	30
4	%	18.18, 6.44	22.90, 9.77	8.75, 5.86	10.10, 5.99
	No.	64	54	40	30
5	%	27.83, 7.64	23.48, 7.76	17.39, 8.01	13.04, 5.99
	No.	45	42	19	34
6	%	24.06, 5.37	22.46, 6.03	10.16, 4.28	18.18, 6.79
	No.	54	54	9	38
7	%	17.42, 6.44	17.42, 7.76	2.90, 2.08	12.26, 7.58
	No.	28	8	22	13
8	%	16.47, 3.34	4.71, 1.15	12.91, 4.95	7.65, 2.59
	No.	35	27	11	
9	%	12.46, 4.18	9.61, 3.88	3.91, 2.48	
	No.	82	77	58	23
10	%	19.57, 9.79	18.38, 11.06	13.84, 13.06	5.49, 4.59
	No.	86	51	38	61
11	%	13.89, 10.26	8.24, 7.30	6.14, 8.56	9.85, 12.18
	No.	60	45	46	9
12	%	37.50, 7.16	28.13, 6.47	28.75, 10.36	5.63, 1.80
	No.	39	44	20	50
13	%	19.50, 4.65	22.00, 6.32	10.00, 4.50	25.00, 9.98
	No.	13	37	6	12
14	%	19.12, 1.55	54.41, 5.32	8.82, 1.35	17.65, 2.40
	No.	51	36	12	54
15	%	22.17, 6.09	15.65, 5.17	10.00, 5.18	23.48, 10.78
	No.	36	19	13	16
16	%	18.85, 4.30	9.95, 2.73	6.81, 2.93	8.38, 3.19
	No.	838	696	444	501
Iowa	%	21.07, 100.00	17.50, 100.00	11.16, 100.00	12.60, 100.00

[a]Source: Directory of Iowa Manufacturers (24).

[b]Nonmetro = Nonmetropolitan region.
Metro = Metropolitan region.

Town Size				
5	6	7	Nonmetro[b]	Nonmetro + Metro[b]
			156	156
			100.00, 5.60	100.00, 3.92
		48	191	239
		20.08, 4.04	79.92, 6.85	100.00, 6.01
			220	220
			100.00, 7.89	100.00, 5.53
		119	178	297
		40.07, 10.01	59.93, 6.38	100.00, 7.47
		42	188	230
		18.26, 3.53	81.74, 6.74	100.00, 5.78
	47		187	187
	25.13, 24.48		100.00, 6.71	100.00, 4.70
	24	131	179	310
	7.74, 12.50	42.26, 11.02	57.74, 6.42	100.00, 7.79
		99	71	170
		58.24, 8.33	41.76, 2.55	100.00, 4.27
19	50	139	142	281
6.76, 15.97	17.79, 26.04	49.47, 11.69	50.53, 5.09	100.00, 7.07
18		161	258	419
4.30, 15.13		38.42, 13.54	61.58, 9.25	100.00, 10.54
53	21	309	310	619
8.56, 44.54	3.39, 10.94	49.92, 25.99	50.08, 11.12	100.00, 15.56
			160	160
			100.00, 5.74	100.00, 4.02
		47	153	200
		23.50, 3.95	76.50, 5.49	100.00, 5.03
			68	68
			100.00, 2.44	100.00, 1.71
29		37	193	230
12.61, 24.37		16.09, 3.11	83.91, 6.92	100.00, 5.78
	50	57	134	191
	26.18, 26.04	29.84, 4.79	70.16, 4.81	100.00, 4.80
119	192	1,189	2,788	3,977
2.99, 100.00	4.83, 100.00	29.90, 100.00	70.10, 100.00	100.00,100.00

of towns between size 1 to size 5 (i.e., under 15,000 population). From the point of view of state's past policy it is heartening that rural industrialization had progressed and communities of different sizes in the rural areas had approximately the same amount of dosage of industrialization.

Moving to the regions within the state, we find the same general pattern as the whole of Iowa. Except areas 1 and 8, all the areas in the state gained firms in their rural areas. In the areas where the firm numbers have decreased in their rural areas, the loss is negligible (less than 3 percent). Areas 5 and 6, 10 and 11 and 14 and 16 had substantial increases in the numbers of firms in their rural areas. In rural places of areas where the numbers of firms have increased, no preferences among towns of different sizes can be seen.

The above analysis tells us that rural industrialization is going on almost all over Iowa except one or two regions. In choosing the towns in rural areas industries did not show any preference.

The Diffusion of Enterprises in Iowa

But the picture of industrialization in Iowa given by an analysis of the changing numbers of firms or establishments, does not present a full picture of change in Iowa's industrial structure. Firms are not uniform in the extent to which they employ local resources relative to resources "imported" to the location of operation. An identical change in firm numbers in two different places, therefore, could signal a qualitatively different kind of "development" depending on the enterprises that were embodied in the firms. In addition, the kind of "development"

resulting from the same numbers of firms with the same enterprises locating in different places would be different by virtue of a difference in resources and characteristics in the recipient locations.

For the state as a whole, the number of enterprises[1] increased by about 15 percent between 1960-61 and 1971-72, with the overall increase accounted for by a 23 percent increase in enterprises within firms located in nonmetropolitan areas. This increase exceeds the increase in numbers of firms which indicates growing pattern of multi-product manufacturing in the state.

Comparing the distribution of enterprises by two-digit S.I.C. number shows a declining absolute importance in six enterprises and an increasing absolute importance in thirteen enterprises. Also a declining and increasing relative importance has been shown by eleven and nine enterprises. Of the twenty enterprises, six S.I.C. enterprises are relatively important than others in Iowa. These enterprises accounted for about 78 percent of all enterprises in 1960-61 and 1971-72 (see Tables 7.5 and 7.6). The six important enterprises for Iowa are food and kindred products (S.I.C. 20), printing, publishing and related enterprises (S.I.C. 27), stone, clay, glass and concrete products (S.I.C. 32), nonelectrical machinery fabrication (S.I.C. 35), fabricated metals (S.I.C. 34) and chemicals and allied products (S.I.C. 28). Comparing the distribution of these six important enterprises (see Tables 7.5 and 7.6) shows a

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[1]An enterprise in this context is a set of activities described by a two-digit Standard Industrial Classification (S.I.C.) number. There are more enterprises than firms because firms may be multi-product in nature.

TABLE 7.5. Distribution of enterprises by firm size and S.I.C. in Iowa, 1960-61[a]

S.I.C.	Region[b]	Firm Size A	B	C	D	E	F	G	Total	Total (NM+M)[b]
	NM	2							2	
19	M	1						1	2	4
	NM	776	176	64	29	13	2	1	1,061	
20	M	150	103	66	52	13	7	14	405	1,466
	NM									
21	M									
	NM	1		1	1				3	
22	M	4	1						5	8
	NM	20	21	6	2	3			52	
23	M	42	14	6	12	12			76	128
	NM	86	13	5	1	1	1		107	
24	M	28	12	9	1		2	1	53	160
	NM	65	11	2	3				81	
25	M	49	11	6	12	6	4	3	91	172
	NM	3	4	1	2		1		11	
26	M	5	12	3	7	2			29	40
	NM	829	72	12	2		2		917	
27	M	186	66	27	15	2		3	299	1,216
	NM	70	15	7	3	3		1	99	
28	M	77	18	13	5	2	3	7	125	224
	NM	7	3		4				14	
29	M	4	6	4					14	28
	NM	24	8	2	1		2	1	38	
30	M	18	6	5	3	2		2	36	74

	NM	4	2	2	2				11	
31	M	7	2	3		2			14	25
	NM	282	53	16	7	2			360	
32	M	58	34	16	12	4	1		125	485
	NM	22	18	8	7	3	4		62	
33	M	15	6	7	10	6		1	45	107
	NM	184	31	13	25	2	2	1	258	
34	M	131	56	16	41	10	4		258	516
	NM	283	55	29	27	7	2	4	407	
35	M	104	78	32	41	15	8	8	286	693
	NM	10	7	4	15	2	2	1	41	
36	M	17	10	2	12	4	7	4	56	97
	NM	69	13	17	11	1			111	
37	M	16	20	7	11	2		2	58	169
	NM	18	1		1	1		1	12	
38	M	8	3	2	1		1	2	17	29
	NM	85	18	11	11		2		127	
39	M	77	20	14	7	2			120	247
	NM	2,833	521	200	154	38	20	10	3,776	
Total	M	997	478	238	242	74	37	48	2,114	
Total	(NM+M)	3,830	999	438	396	112	57	58		5,890

[a]Source: Directory of Iowa Manufacturers (20).

[b]NM = Nonmetropolitan region.
M = Metropolitan region.

TABLE 7.6. Distribution of enterprises by firm size and S.I.C. in Iowa, 1971-72[a]

S.I.C.	Region[b]	Firm Size A	B	C	D	E	F	G	Total	Total (NM+M)[b]
	NM	1							1	
19	M						1	1	2	3
	NM	552	189	57	39	9	7		853	
20	M	115	87	37	37	18	3	14	311	1,164
	NM									
21	M									
	NM	3			1				4	
22	M	1	1	2					4	8
	NM	32	14	16	5		3		70	
23	M	35	16	12	7	3	2		75	145
	NM	192	25	4	2		1		224	
24	M	34	17	5	6		1		63	287
	NM	71	6	10	4	1	2		94	
25	M	40	8	1	8	1	1		59	153
	NM	6	3	2	6				17	
26	M	8	8	6	11	2	2		37	54
	NM	970	105	12	3	2			1,092	
27	M	298	57	47	20	7	2	8	439	1,531
	NM	370	20	6	14	4	4	1	419	
28	M	78	15	4	10	3		3	113	532
	NM	11	2	1					14	
29	M	6	5	1					12	26
	NM	42	11	9	2		1	3	68	
30	M	10	18	3	4	4		2	41	109

	NM	10	3	2	1				16	
31	M	3	4	2	1				10	26
	NM	358	44	10	4	1	1		418	
32	M	58	30	14	8	5			115	533
	NM	21	7	10	9	8	3	2	60	
33	M	11	5	6	12	2	2		38	98
	NM	242	58	38	32	2	3	4	379	
34	M	136	65	28	33	10	6		278	657
	NM	302	107	76	30	11	6	6	538	
35	M	133	59	40	37	24	10	9	312	850
	NM	26	17	10	10	3	3	6	75	
36	M	24	13	3	4	7	7	4	62	137
	NM	85	22	13	12	2	1	1	136	
37	M	23	12	9	8	3	1	1	57	193
	NM	12		1	1		1	1	16	
38	M	10	2	3	4		2	4	25	41
	NM	106	19	9	4	3	2		143	
39	M	51	18	9	4	1	1		84	227
	NM	3,412	652	286	179	46	38	24	4,637	
Total	M	1,074	440	232	214	90	41	46	2,137	
Total	(NM+M)	4,486	1,092	518	393	136	79	70		6,774

[a]Source: Directory of Iowa Manufacturers (24).

[b]NM = Nonmetropolitan region.
M = Metropolitan region.

declining absolute and relative importance of food and kindred products (S.I.C. 20) and a declining absolute importance of stone, clay, glass and concrete products (S.I.C. 32). By contrast there has been a marked rise in the absolute and relative importance of printing, publishing and related enterprises (S.I.C. 27), nonelectrical machinery fabrication (S.I.C. 35), fabricated metals (S.I.C. 34) and chemicals and allied products (S.I.C. 28). What is important to note is that food and kindred products which is the biggest enterprise of all has gone down in relative importance. This indicates that Iowa's industrial structure is changing from primary related production to more diversified industries. Besides the above six big enterprises, three other minor important enterprises gained in absolute and relative importance. These are lumber and wood products (S.I.C. 24), electrical machinery, equipment and supplies (S.I.C. 36) and transportation equipment (S.I.C. 37).

But equally significant as the change in numbers of enterprises as an indication of the character of Iowa's industry, is the change in numbers of enterprises in firms of different employee classes. This is evident when we consider that it would take 10 firms of between 1 and 20 employees to employ as many persons as one firm with 101 to 250 employees.

In 1960-61, food and kindred products (S.I.C. 20) enterprises accounted for at least 20 percent of the enterprises in firms of all employment classes (see Tables 7.5 and 7.6). Indeed, with the exceptions of printing and publishing enterprises (S.I.C. 27) with 27 percent of the enterprises in firms with under 20 employees, and nonelectrical machinery manufactured (S.I.C. 35) with between 500 and 1,000 employees, food and kindred products enterprises were in a plurality position in all firm

sizes. By 1971-72, however, food and kindred products enterprises lost relative importance in firms of all size classes, and lost their plurality among firms of 1000 or more employees, of 251 to 500 employees, and of 51 to 100 employees (with numbers of nonelectrical machinery enterprises, S.I.C. 35, growing in each of these classes). Thus, as shown in Tables 7.5 and 7.6, by 1971-72, Iowa's industrial sector had become more fully dominated by printing and publishing enterprises in small firms (S.I.C. 27 in firms with 1 to 20 employees), remained dominated by food and kindred products enterprises in firms of 21 to 50, and 101 to 250 employees, and had become more fully dominated by nonelectrical machinery enterprises (S.I.C. 35) in firms of 51 to 100, and over 250 employees (although there are only about 1.5 percent more nonelectrical machinery enterprises than food and kindred products enterprises in firms of over 1000 employees).

As in the case of firms, enterprises in the state tend to be located more in places of under 25,000 persons ("nonmetropolitan" places). Table 7.7 shows for each S.I.C. and class of firm by numbers of employees, the ratios of enterprises in nonmetropolitan areas to those in metropolitan areas. A ratio in excess of 1.0 in a cell shows that more enterprises of this type in firms of this size are found in nonmetropolitan places. Further, an increase in the ratio, say, from 1.3 to 1.7, or 0.7 to 0.9, in comparable cells between 1960-61 and 1971-72, signals a rising proportion of enterprises of the specified type in firms of the specified size. A relative growth in enterprises in nonmetropolitan areas (or decline, as the case might be) would be signalled even if numbers of enterprises declined (as they sometimes do). This tendency is evident for enterprises of all types, in firms of all employee classes. Even if

TABLE 7.7. Ratios of nonmetropolitan enterprises to metropolitan enterprises, 1960-61 and 1971-72, by S.I.C. code and size class of firm[a]

1960-61								
	Firm Size[b]							
S.I.C.	A	B	C	D	E	F	G	Total
20	5.2	1.7	1.0	0.6	1.0	0.3	0.1	2.6
27	4.0	1.1	0.4	0.1	M	NM	M	2.9
28	0.9	0.8	0.5	0.6	1.5	M	0.1	0.8
32	4.9	1.6	1.0	0.6	0.5	M	0	2.9
34	1.4	0.6	0.8	0.6	0.2	0.5	NM	1.0
35	2.7	0.7	0.9	0.7	0.5	0.3	0.5	1.4
24	3.1	1.1	0.5	1.0	NM	0.5	M	2.0
36	0.6	0.7	2.0	1.2	0.5	0.3	0.2	0.7
37	4.3	0.6	2.4	1.0	0.5	0	M	1.9
State Total	2.8	1.1	0.8	0.6	0.5	0.5	0.2	1.8

[a]Calculated from Tables 7.5 and 7.6.

[b]NM = All enterprises in nonmetropolitan firms.
M = All enterprises in metropolitan firms.

1971-72								
	Firm Size[b]							
S.I.C.	A	B	C	D	E	F	G	Total
20	4.8	2.2	1.5	1.1	0.5	2.3	M	2.7
27	3.3	1.8	0.3	0.2	0.3	M	M	2.5
28	4.7	1.3	1.5	1.4	1.3	NM	0.3	3.7
32	6.2	1.5	0.8	0.5	0.2	NM	0	3.7
34	1.8	0.9	1.4	1.0	0.2	0.5	NM	1.4
35	2.3	1.8	1.9	0.8	0.5	0.6	0.7	1.7
24	5.6	1.5	0.8	0.3	0	1.0	0	3.5
36	1.1	1.3	3.3	2.5	0.4	0.4	1.5	1.2
37	3.7	1.8	1.4	1.5	0.6	1.0	1.0	2.4
State Total	3.2	1.5	1.2	0.8	0.5	0.9	0.5	2.2

the majority of enterprises in four of the classes of firms were found in metropolitan areas in 1971-72, the tendency between 1960-61 and 1971-72 was to increase the relative importance of enterprises in nonmetropolitan areas (even if the increase in relative importance was the result of a slower rate of decline in numbers, as indicated in Table 7.7). Among the six most significant enterprise classes (S.I.C.s 20, 27, 28, 32, 34, 35) in terms of their numerical dominance, all but S.I.C. 27 enterprises showed a rising proportion of enterprise in firms locating in the non-metropolitan places between 1960-61 and 1971-72, either because of differential rates of growth or decline in enterprise numbers, and a majority of enterprises in nonmetropolitan places in 1971-72. With few exceptions, the tendency of enterprises in nonmetropolitan places to grow in relative importance between 1960-61 and 1971-72 is evident, again either because of differential rates of decline or growth in enterprise numbers, and regardless of whether the majority of enterprises was still found in metropolitan places in 1971-72. The exceptions to this tendency are found mainly in stone, clay, concrete and glass enterprises (S.I.C. 32) and in printing and publishing enterprises (S.I.C. 27) although it is interesting to note that food and kindred products enterprises and non-electrical machinery enterprises in firms of 1 to 20 tended to concentrate in metropolitan places.

It might be interesting to see how the gains in the numbers of enterprises in different S.I.C.s in nonmetropolitan areas are distributed in towns of different sizes under 25,000 population. In nonmetropolitan areas except towns of size 6 (15,000-25,000 population) towns of all

TABLE 7.8. Distribution of enterprises by town size and S.I.C., 1960-61[a]

S.I.C.	Town Size								
	1	2	3	4	5	6	7	Non-Metro[b]	Nonmetro + Metro[b]
19		1	1				2	2	4
20	360	249	163	191	34	69	405	1,066	1,471
21									
22	1		1			1	5	3	8
23	2	9	6	22	8	6	77	53	130
24	36	29	19	15	4	4	53	107	160
25	16	23	12	13	5	10	91	79	170
26		2	3		1	5	29	11	40
27	285	284	138	145	16	41	319	909	1,228
28	14	26	19	20	5	16	125	100	225
29	2	4		4	2	1	14	13	27
30	1	15	5	4	3	8	36	36	72
31	1	2	2	7		1	14	13	27
32	104	98	67	53	17	14	125	353	478
33	4	5	3	16	11	23	45	62	107
34	41	55	45	62	14	37	258	254	512
35	92	81	55	90	32	58	286	408	694
36	5	12	6	10	1	6	56	40	96
37	36	26	14	21	3	12	58	111	169
38		3	1	5	1	3	17	13	30
39	19	27	26	19	10	27	121	128	249
Iowa	1,019	951	586	697	167	342	2,136	3,761	5,897

[a]Source: Directory of Iowa Manufacturers (20).

[b]Nonmetro = Nonmetropolitan region.
Metro = Metropolitan region.

TABLE 7.9. Distribution of enterprises by town size and S.I.C. in Iowa, 1971-72[a]

	Town Size								
S.I.C.	1	2	3	4	5	6	7	Non-Metro[b]	Nonmetro + Metro[b]
19			1				2	1	3
20	311	175	119	142	17	35	311	799	1,110
21									
22	2		3	1			4	6	10
23	6	11	15	27	4	5	75	68	143
24	81	62	37	33	8	6	63	227	290
25	21	34	14	14	3	9	59	95	154
26			4	1	4	8	37	17	54
27	274	399	168	176	23	47	439	1,087	1,526
28	178	95	52	53	14	30	113	422	535
29	5	4		2	1	2	12	14	26
30	12	19	11	12	2	13	41	69	110
31	3	2	3	8	1	1	10	18	28
32	94	123	90	72	23	17	113	419	532
33	7	7	8	18	8	18	45	66	111
34	81	82	74	70	29	33	278	369	647
35	129	118	86	105	45	69	312	552	864
36	7	14	10	25	11	9	62	76	138
37	40	37	30	16	7	5	57	135	192
38	1	5	1	6	2	2	25	17	42
39	25	24	26	33	8	23	84	139	223
Iowa	1,277	1,211	752	814	210	332	2,142	4,59[illegible]	6,738

[a]Source: Directory of Iowa Manufacturers (24).

[b]Nonmetro = Nonmetropolitan region.
Metro = Metropolitan region.

sizes (1, 2, 3, 4 and 5) gained enterprises both in absolute and relative terms. The increases in relative importance in town sizes 1, 2, 3, 4 and 5 are roughly of the same order, and no preference was shown among them.

Moving to the S.I.C.s we fail to see any set pattern for enterprises to choose any particular town size in nonmetropolitan areas. Enterprises in different S.I.C.s are moving in or moving out in towns of different sizes without any particular pattern.

Tendencies in Iowa's Industrial Experience

Over the decade of the 1960's, there has been a net increase in the number of firms located in the state. Further, manufacturing has been diffused throughout the state, with some net additions being made to all regions of the state, and to the nonmetropolitan areas of the state. Additionally, the manufacturers that have spread into the rural areas have been of different sizes in terms of their proposed work forces and neither large or small firms have concentrated in selected areas. Also in moving to the nonmetropolitan areas, the firms large or small in general did not show any preference for any particular town size.

The structure of Iowa manufacturing has changed modestly as new firms have located or sprung up in the state. An analysis of enterprises by two-digit S.I.C. number shows that the six most numerous types of enterprises in 1960-61 were still the most numerous in 1971-72. The biggest enterprise, food and kindred products has gone down in both absolute and relative importance. Iowa's industrial structure has moved away, though not drastically, from primary related production to more diversification as other industries like printing and publishing,

non-electrical machinery fabrication, chemicals and allied products, lumber and wood products, transportation equipment, electrical machinery and equipment and fabricated metals have become absolutely and relatively important. As a result of public policy Iowa has found in its resource structure comparative advantages in some industries. Apparently, there has not been a concentration of enterprises of a particular nature in the nonmetropolitan areas of the state; rather all types of enterprises have been diffused into the rural areas. Also, no evidence could be seen regarding the preferences of town sizes by S.I.C. enterprises.

CHAPTER VIII. DIRECT DEVELOPMENTAL-RELATED CHARACTERISTICS OF IOWA'S RURAL INDUSTRY

"Trickle-Down", "Trickle-Up", "Trickle-In" and "Trickle-Out"

Considering the possibility that the environs of the community that attract an industry will be beneficiaries of the location, even to a larger degree than the actual town selected when costs are netted out, it is important to have an understanding of the likely ways in which positive and negative impacts might result from the appearance of the firm. A considerable number of case studies of the impacts of plant locations in communities have been done and some general expectations can be derived from these. While the actual and final distribution of benefits and costs resulting from a plant's locating in a rural community will be largely determined by the specific character of the community, its environs, and the characteristics of the firm itself, nonetheless, general expectations can be drawn.

When the new plant locates in the rural town, it interrupts a system that was in dynamic equilibrium; that is, the income and employment flows were a result of the many independent decisions made by persons involved under the constraints that community and economic interaction imposes on completely free choice. The arrival of the new plant or firm disrupts the equilibrium and sets up the conditions for various magnitudes to "trickle-down", "trickle-up", "trickle-in" and "trickle-out". The commonly held view, and the view that spurs the interest of local business men in attracting industry to their own town is that the benefits of new

plant location trickle-down to them in the form of greater population and/or income base for the support of their concerns. But as can be seen, this view incorrectly presumes that the town in which the firm is located can always bottle-up the benefits by retaining the income, providing the labor, and using currently available services to meet the needs of the new plant.

Generally, however, what trickles down to the community in which the industry locates is the cost involved in improving water, sewer, access and site. This is a rapidly moving impact since under present institutional arrangements, it is easy to fix the responsibility for these improvements on the municipality. To be sure, income accrues to the municipality in the form of local taxes, utility rates (if these sources of income were not devalued in the process of bidding for the plant to locate in this specific community).

To the extent that the firm employs females, income will trickle down through the community in which the plant is located, since females (particularly those who are married) tend not to commute as widely as males. This income will find its way into local banks and other forms of savings, to providers of luxury items and items and services substituting for the work of the wife in the home (convenience foods, homemaker services, restaurants, better clothing, better automobiles and so on). The volume of income generated would be lower than that generated by an equal amount of male labor because of the tendency to pay females lower wages. On the other hand, by employing females the plant does not encourage population growth in the community so that growing demand for

more housing, public services, and so on is minimized. Against these flows trickling down, is a flow of mobile labor trickling up. As the new plant bids labor away from other employers in the community and dries up underemployment, pressure is placed on inefficient small business who tends to go out of business and on farm businesses that feel growing shortages of labor at critical times and mechanize instead, leading to an increase in the proportion of younger persons in the labor force (even if these are in part-time jobs). Thus, the existence of a plant employing a large number of females will give the community added income and will force some restructuring of community business. But whether or not this exceeds the community costs depends on the terms required to attract the plant in the first place.

In contrast with this situation, if the plant hires a predominantly male labor force, the first round of employment and income distribution will tend to be spread over the entire feasible commuting radius from the plant itself, while the costs and income resulting from the utilities sector will still fall to the local community thus, initially, wages and income will trickle out of the community selected for location.

Over time, however, and if a variety of factors are in harmony, given that the employment is stable (that is the firm is not subject to strikes, layoffs, and other disruptions) and is safe and career-oriented, males who formerly commuted may decide to migrate to the town in which the plant is located. Families and population may trickle in. They will only do this however, if the benefits of the job net of commuting costs are not valued by higher housing costs (taxes, rent or acquisition costs) or by other financial and psychic costs of living within the

community with the plant. Eventually, the town will have to face the costs of servicing new housing and similar costs associated with growing numbers of families and establish tax rates in line with the costs of these services. To be sure, greater numbers of persons may mean that some scale economies are realized in the delivery of the public services. The plant would have to have this potential to employ these however, and any short fall would mean that hoped for scale economies could not be realized. But assuming the best, the town will also benefit to the extent that income is repatriated for local service-oriented businesses.

These are longer term prospects and subject to the vagaries of national policy, the decisions of business, and a host of private decisions. They are not prospects that all can imagine for their own communities.

In summary, therefore, the openness of the single community economy with respect to labor supply (under upward and inward mobility) and the retention of income, combines with the reasonable possibility that the costs associated with the plant's location will be high relative to the income generated even if there are small economies in delivering the larger volume of community services, makes single-community industrialization appear to have rather limited net benefits for the town which is "lucky" enough to get some.

Developmental Impacts of Industries

The theory of functional economic areas, and the experience of areas that have undergone industrialization in the past suggests that the distribution of benefits resulting from the location of manufacturing in rural communities depends on the employment characteristics of the enterprises involved. It is said in the beginning of this chapter that the degree of benefit for the town of location varied directly with the propensity of the firm to employ female labor and that from the longer term development and growth viewpoint stable, secure, safe jobs would be required.

Although data specific to the firms locating in Iowa was not available at the time of this writing, recent data for enterprises on the national scale is suggestive of differences that may exist between firms with respect to stability, security, and local employment impacts. Some possible indicators of employment quality and characteristics that are relevant for considering the different developmental impacts of industry are considered here. Injury frequency rate, severity of injury rate and days of disability per injury are presumed to be negatively related to employment safety. The percent of workers involved in work stoppages due to strikes indicates the likelihood of a worker's being involved in a stoppage of more than one day for a variety of grievances and would be an indicator of employment stability. Percent of workers in unions would also be an indicator of job stability and security to the extent that workers have the usual job protection offered by unions but the same statistic would be an indicator of job uncertainty in the extent to which

decisions are made in remote settings and for reasons that may be remote to the employee that the employee cannot readily control. Differences in income per employee indicates the differences in expected incomes between firms with enterprises of the types specified, and value added indicates the relative productivity of workers. The ratio of value added to income indicates the degree to which returns to other factors of production are available (returns to community utilities, taxes, returns to capital, profits, depreciation, and so on).

The percent female composition of the work-force is an indicator of the relative tendencies of the firms containing the enterprises mentioned to draw labor from a more limited geographic space in relation to the place in which the firm is located. The rate of job leaving is the aggregate rate of employee separation, employee quitting, and layoffs. The first of these shows the tendency for the job to be unstable because of predominantly employer actions, while the quit rate shows the tendency for the employee to leave motivated by his dissatisfaction with the work itself or because of the availability of other opportunities to which the employment left may have contributed.

The national data for the types of enterprises numerically dominant in Iowa over the past decade, indicates that four of the eight have worse records in terms of injury frequency, accident severity, and average days lost through disability than the rates for manufacturing as a whole. But all have better records than, say, the construction industry in this regard. None, however, have as good an injury rate as the wholesale trade, or government employment (except S.I.C. 36, electrical equipment manufacturing). Five of the eight dominant industry types located in

Iowa have a larger percentage of employees typically involved in work stoppages than manufacturing as a whole, but considerably lower percentages than the construction trades (and higher than the wholesale-retail trades). Similarly, in terms of union membership, five of the eight dominant manufacturing types located in Iowa have greater percentages of unionized employees than for manufacturing as a whole, but lower percentages than the construction trades. Two of the eight industrial types tend to employ a greater proportion of females than manufacturing as a whole and only three of the eight have lower rates of job leaving than the manufacturing as a whole. Most types of manufacturing that locate in Iowa has greater value added per employee than manufacturing as a whole, and provide incomes that exceed the average of all manufacturing in 5 of 8 cases. In most cases, the ratio of value added to incomes per employee are above or approximately equal to the average for all manufacturing.

What evaluative conclusion can be drawn concerning the emerging and future character of Iowa manufacturing, therefore, based on the qualities exhibited by the eight dominant types of enterprise pursued in the state? If the average score in each of the categories for all manufacturing is taken as a benchmark, a score for an industrial type that is greater when the quality being measured is negative, or a score that is smaller than the benchmark when the quality is a positive could be considered a negative point for the industrial type. Also, a score that was less than the benchmark when the quality was a negative quality, or a score greater than the benchmark when the quality is positive could be considered a positive point. By assuming that all of the qualities described are

negative except income per employee, value added per employee, and that percent of workers unionized, percent of employees that are female and the ratio of value added to income per employee are more relevant for the location than the job itself, manufacturing types appear to rank as follows:

TABLE 8.1. Developmental-related characteristics of different industries in Iowa

S.I.C.		Negative Points	Positive Points	Percent Female Relative to all Manufacturing
20.	Food and kindred products	4	3	Lower
27.	Printing and publishing	1	6	Higher
28.	Chemicals and allied products	1	6	Lower
32.	Stone, clay and glass products	6	1	Lower
34.	Fabricated metal products	6	1	Lower
35.	Machinery except electrical	1	6	Lower
33.	Primary metals	3	4	Lower
36.	Electrical equipment and supplies	3	4	Higher

Now, recalling from earlier chapter that over the 1960's enterprises in S.I.C. 27, 28, 35, and 36 (the enterprises with most positive points with respect to employment characteristics) increased in absolute number and as a proportion of all enterprises, while enterprises in S.I.C. 20

and 33 declined in both absolute and relative number (enterprises with the most negative points), it is apparent that the industrialization experience has been satisfactory both in terms of the existence of the jobs themselves (as described in Chapter VII) and in the qualities of jobs made available. And to the extent that the tendencies of the 1960's continue, the employment picture in Iowa should continue to be promising for industrialization that is of acceptable character. On the other hand, the firms that are apparently growing in absolute and relative numbers tend also to employ a greater percentage of males than for manufacturing in general. This means that from the state's point of view, industrial development is tending to provide a solid base upon which families, communities, incomes, infrastructure, and even population can grow. From the viewpoint of the aggregate, the past experience would be consistent with developmental goals.

Similar claims could reasonably be made at the area-wide or regional level. Given the type and quality of the employment created, the benefits of any enterprise's locating in an area would spread over the area (to the extent of the commuting pattern around the point of location).

But from the viewpoint of individual community, the industrialization experience would be of varying usefulness to their own perceived development. First, the character of the firms locating or growing up is that they tend not to provide the proportion of jobs for females that would suggest that the benefits of the location would be highly localized. Instead, the tendency for firms that are growing in importance to employ proportionally more males than manufacturing as a whole suggests that employment benefits will trickle away from the location of the plant in

the shorter run. In the longer run, however, given that the jobs offered in the enterprises that are growing in importance are potential career jobs, the prospects for community development appear favorable, since after a period of satisfactory commuting some workers and their families will relocate in the town of employment. If this occurs at a gradual enough pace to permit the planned expansion of community services, and the avoidance of bottle-necks, the experience could be a good one if it is really what the community wanted.

To be sure, tot all communities have the desire to grow and expand their populations, even though they desire the location of a manufacturing firm within their borders. The expression of the desired characteristics of the firm locating found by Kaldor and Dahlke (30) that it be

> odor-free, non-polluting industries, several small firms rather than one large firm, and businesses offering employment to women.

indicated that it is not growth but stability that is uppermost in the minds of many (or "development without growth" as Scott (49) calls it). Indeed, it might equally well be that the expression is signalling a desire for orderly decline, and decline at a slower pace that is likely under agricultural adjustment. But the types of enterprises that tend to locate in Iowa do not generally meet these specifications (at least as a source of employment for women).

Thus, what appears to be satisfactory and encouraging at the state level, and satisfactory at the area and regional level, is a potential frustration at the community level. Some communities get industries, but the ones they are most likely to get will not be consistent with the short run goals the community has for itself (either growth or stability).

Rather, the community will bear whatever burden the locating firm places on services, labor force, and so on, without immediate compensating benefits.

CHAPTER IX. ESTIMATION OF THE MODEL

Production functions estimates for different S.I.C. industries are important from the point of view of their impacts on employment in rural industrialization in Iowa. From the estimates of production functions we will be able to say whether a S.I.C. is capital intensive or labor intensive, the benchmark being the production function for manufacturing as a whole. Also in Chapter VII we have seen which are the dominant industries for industrialization in nonmetropolitan areas in Iowa. Matching these two sets of information we will then be able to say whether industrialization in rural Iowa has been employment generating or not. Also the yearly and firm size effects on capital intensities and productivities of different industries will be examined.

The production functions estimates for each S.I.C. industry are based on 28 observations of value added per employee in thousand dollars and capital expenditure per employee in thousand dollars for the U.S. data. The reasons why U.S. data are chosen are that data for Iowa are not complete. We also assume that firms of various sizes in different industries in Iowa operate in the same way as in the whole of U.S. with respect to resources used and products manufactured. This is not a very unrealistic assumption considering the resources being mobile and technical information is freely available within a country.

Estimation of Production Functions

Production functions without firm size and yearly effects

The production functions fitted by least-squares without taking account of firm size and yearly effects are of the form

$$\log y = a + b \log x \tag{9.1}$$

where

y = value added per employee (in thousand dollars)

x = capital expenditure per employee (in thousand dollars).

Results of the estimates of production functions (9.1) for nine dominant industries for Iowa (S.I.C.s 20, 27, 28, 32, 34, 35, 24, 36 and 37) are summarized in Table 9.1.

Looking at the table we find that food and kindred products (S.I.C. 20), printing and publishing (S.I.C. 27), chemicals and allied products (S.I.C. 28), stone, clay and glass products (S.I.C. 32), machinery except electrical (S.I.C. 35), lumber and wood products (S.I.C. 24), electrical machinery, equipment and supplies (S.I.C. 36) and transportation equipment (S.I.C. 37) are less capital intensive[1] than manufacturing as a whole, which we have taken as the benchmark. Only fabricated metal products (S.I.C. 34) is more capital intensive than manufacturing as a whole. Capital intensities for food and kindred products and printing and publishing are very nearly the same as that of manufacturing as a whole.

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[1]For Cobb-Douglas production function with constant returns to scale and two inputs capital and labor (vide equation 9.1), a production function will be more capital intensive than another if it has a higher value of b. We compared the estimates of b for different industries with the estimate of b for manufacturing as a whole.

TABLE 9.1. Production functions estimated for different S.I.C. industries based on U.S. data[a]

S.I.C.	Estimates of coefficients[b]				
	Intercept (a)	Regression Coefficient (b)	F-Statistics	Durbin-Watson Statistics	Multiple Correlation R^2
20. Food and kindred products	(40.1887)	0.5367 (4.1945)	17.5949	0.4508	0.8036
27. Printing and publishing	2.7112 (40.8894)	0.5119 (6.5016)	42.2714	0.6535	0.8191
28. Chemicals and allied products	2.6112 (34.7959)	0.4712 (5.3689)	28.8252	0.8465	0.7257
32. Stone, clay and glass products	2.4054 (60.3200)	0.4223 (4.6256)	21.3963	0.8116	0.7514
34. Fabricated metal products	2.6919 (49.3169)	0.6296 (8.2366)	67.8419	1.5066	0.7229
35. Machinery except electrical	2.6314 (43.0362)	0.4863 (5.4297)	29.4825	1.3405	0.9313
24. Lumber and wood products	2.1695 (35.5889)	0.4349 (5.1310)	26.3278	0.9133	0.8031
36. Electrical machinery, equipment and supplies	2.4841 (39.1886)	0.3491 (4.4274)	19.6026	0.9476	0.7298
37. Transportation equipment	2.3880 (36.2949)	0.2338 (2.7716)	7.6821	1.0795	0.7280
All industries	2.4898 (63.5727)	0.5376 (8.0026)	64.0418	0.8703	0.7112

[a]Source: U.S. Census of Manufacturers (56, 57, 58, 59).

[b]The t values are given in the parentheses.

What are the implications of these results? We have already seen in Chapter VII that over the 1960's enterprises in S.I.C.s 27, 28, 32, 34, 35, 24, 36 and 37 have increased absolutely in rural Iowa. These are the industries which are important for rural industrialization of Iowa. Since these industries except fabricated metal products are also relatively more labor intensive than manufacturing as a whole, we can infer that rural industrialization has been satisfactory from the point of view of creating more jobs. Except lumber and wood products (S.I.C. 24), the average value added per employee, i.e., productivity of all the nine important industries are higher than manufacturing as a whole. The average productivity of chemicals and allied products (S.I.C. 28) is significantly higher and the average productivity of lumber and wood products (S.I.C. 24) is significantly lower than manufacturing as a whole.

Several reasons might be suggested why the labor intensive industries have moved in rural areas. A rural area has in general more unskilled than skilled labor. Capital intensive industries which usually require more skilled labor might be reluctant to move in rural areas where there is a shortage of skilled labor. Another reason might be that the rural communities prefer to see more labor intensive industries in their areas, because these industries generate more employment. To bring labor intensive industries, the rural communities often offer subsidies, low-valued lands and other industrial concessions as an incentive. Capital intensive industries tend to use more energy which might lead to more detrimental effects on the environment. This might be a reason why the rural communities prefer more labor intensive industries. Still another reason might

be that the wages are low in rural areas. Cheaper cost of living and the availability of more female labor who are usually paid lower wages than males for the same type of jobs, might be the reasons why the wages are low and why the labor intensive industries moved in rural areas.

Production functions with yearly effect

Production functions of S.I.C. industries with yearly effects are estimated to see whether the capital intensity and productivity are changing over the years. As explained in Chapter IV the estimates are obtained by least-squares with dummy variables for the yearly effects. Table 9.2 summarizes the results of the estimates of production functions for nine important industries with yearly effects and without firm size effects (vide equation 4.29).

We notice from the Table 9.2 that in general the estimates[1] of β_2, β_3, and β_4 are small and statistically insignificant (according to "t" values) for the nine important industries for Iowa. This means that yearly effects on capital intensity are absent for these nine industries. This is consistent with the view of some economists who think that manufacturing industries maintained their capital intensity more or less at the same level over the last ten years. Since the yearly effects on capital intensity are insignificant we do not have to worry about its impacts on rural industrialization in terms of employment generation. However, the

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[1] β_2, β_3 and β_4 are the coefficients of the dummy variables for the years 1958, 1963, and 1967. These coefficients represent the change in capital intensity from its value in 1954.

TABLE 9.2. Production functions estimates with yearly effect for S.I.C. industries based on U.S. data[a]

S.I.C.		Estimates of coefficients[b]			
		α	β	β_2	β_3
20.	Food and kindred products	1.8488 (5.0822)	-0.3109 (-0.6381)	-0.5943 (-0.9323)	-0.0452 (-0.0860)
27.	Printing and publishing	1.4936 (1.9586)	-0.4450 (-0.7233)	0.3504 (0.5439)	0.5154 (0.5477)
28.	Chemicals and allied products	2.4515 (31.7629)	0.3345 (1.4181)	0.3737 (1.0113)	-0.5550 (-1.5446)
32.	Stone, clay and glass products	2.1540 (14.1163)	0.2849 (1.0581)	-0.2773 (-0.8985)	-0.4452 (-1.4763)
34.	Fabricated metal products	2.1562 (17.7105)	0.1776 (1.3478)	-0.3041 (-1.2631)	0.0881 (0.4347)
35.	Machinery except electrical	2.0624 (23.7636)	-0.0093 (-0.0911)	-0.0348 (-0.2664)	0.0157 (0.0784)
24.	Lumber and wood products	1.9867 (9.4390)	0.2980 (1.5011)	-0.6039 (-2.0059)	-0.2486 (-0.8989)
36.	Electrical machinery, equipment and supplies	1.8805 (12.7091)	-0.0951 (-0.6406)	0.0789 (0.3955)	0.0498 (0.2656)
37	Transportation equipment	2.0332 (16.9691)	0.0720 (0.6126)	-0.2398 (-0.9414)	-0.2471 (-1.3967)

[a]Source: U.S. Census of Manufacturers (56, 57, 58, 59).

[b]The t values are given in the parentheses.

Estimates of coefficients				Multiple Correlation	F-Statistics
β_4	γ_2	γ_3	γ_4	R^2	
0.1389 (0.2093)	-0.0341 (-0.0785)	0.6351 (1.7098)	0.9289 (2.5170)	0.8344	14.3983
1.0178 (1.4666)	0.6418 (0.8226)	0.9896 (1.0959)	1.2746 (1.6574)	0.8023	11.5998
-0.3284 (-1.1840)	0.0424 (0.2648)	0.8211 (3.5099)	0.8278 (3.8319)	0.8031	11.6536
-0.2705 (-0.8513)	0.1287 (0.7821)	0.3447 (2.1671)	0.4825 (2.8853)	0.8561	17.0001
0.5512 (1.9146)	-0.0843 (-0.4030)	0.3963 (2.5026)	0.5811 (4.3989)	0.9344	40.7003
0.4530 (2.2779)	0.1065 (0.9835)	0.3951 (2.6594)	0.6365 (7.0361)	0.9571	63.8710
-0.0992 (-0.3236)	-0.4896 (-1.7494)	0.0496 (0.2189)	0.2737 (1.2347)	0.7875	10.5926
0.2028 (1.0612)	0.2575 (1.3288)	0.4156 (2.4056)	0.6484 (4.2297)	0.8811	21.1794
-0.0983 (-0.5387)	-0.0367 (-0.1525)	0.2449 (1.6946)	0.4856 (3.6655)	0.7606	9.0817

estimates of γ_2, γ_3 and γ_4[1] especially γ_3 and γ_4 are in general statistically significant for the nine industries. This means that over the years especially in the later years due to neutral technical progress the industries are becoming more productive.

Production functions with firm size effect

Production functions for seven sizes of firms (A, B, C, D, E, F and G) for nine important S.I.C. industries are estimated by least-squares using dummy variables to see if there are any firm size effect present. The results of the estimates of the production functions (vide equation 4.34) for nine industries (S.I.C.s 20, 27, 28, 32, 34, 35, 24, 36 and 37) are summarized in Table 9.3.

The estimates[2] of β_2, β_3, β_4, β_5, β_6 and β_7 for nine industries are in general statistically insignificant (according to "t" values). This means that firm size has no significant effect on capital intensity. From small to large firms capital intensity do not change significantly. The estimates[3] of γ_2, γ_3, γ_4, γ_5, γ_6 and γ_7 for nine industries are in general positive and statistically significant (according to "t" values). This means that with the increase in size a firm becomes more efficient

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[1] γ_2, γ_3 and γ_4, which are the coefficients of dummy variables, represent neutral technical progress over the years 1958, 1963 and 1967.

[2] β_2, β_3, β_4, β_5, β_6 and β_7 are the coefficients of the dummy variables for the firm sizes B, C, D, E, F and G in equation 4.34. These coefficients represent the change in capital intensity from its value for the firm size A.

[3] γ_2, γ_3, γ_4, γ_5, γ_6 and γ_7 are the coefficients of the dummy variables for the firm sizes B, C, D, E, F and G. These coefficients represent the change in productivity from its value for the firm size A.

TABLE 9.3. Production functions estimates with firm size effect for S.I.C. industries based on U.S. data[a]

S.I.C.	Estimates of coefficients[b]					
	α	β	β_2	β_3	β_4	β_5
20. Food and kindred products	2.2325 (33.2654)	0.6464 (4.0684)	0.4573 (1.4749)	0.1307 (0.4942)	0.0868 (0.3234)	0.0737 (0.2297)
27. Printing and publishing	2.4839 (21.7269)	0.5757 (3.2205)	0.0674 (0.2514)	-0.0237 (-0.0957)	-0.0398 (-0.1718)	0.0999 (0.3860)
28. Chemicals and allied products	2.3232 (18.8407)	0.3578 (4.0055)	0.4687 (1.8479)	0.3176 (1.4035)	0.2403 (0.7556)	0.4243 (1.6375)
32. Stone, clay and glass products	2.0627 (26.1910)	0.6435 (4.7581)	-0.0764 (-0.3663)	-0.0859 (-0.3813)	0.1274 (0.4626)	0.1441 (0.4019)
34. Fabricated metal products	2.6447 (19.1014)	0.8419 (3.6159)	-0.1026 (-0.3064)	-0.2307 (-0.7345)	-0.2258 (-0.7471)	-0.0838 (-0.2801)
35. Machinery except electrical	2.5145 (15.5553)	0.6207 (1.8513)	-0.0187 (-0.0423)	-0.1346 (-0.2722)	-0.0943 (-0.2209)	-0.0536 (-0.1303)
24. Lumber and wood products	1.9503 (15.0589)	0.6066 (2.4076)	0.1941 (0.4876)	-0.1888 (-0.5984)	-0.1397 (-0.4453)	0.0784 (0.2019)
36. Electrical equipment and supplies	2.2996 (29.2026)	0.5691 (3.2381)	0.0015 (0.0047)	-0.0483 (-0.1778)	-0.0586 (-0.2045)	-0.1309 (-0.4203)
37. Transportation equipment	2.1183 (24.3742)	0.3317 (2.4604)	0.1095 (0.4264)	0.0656 (0.2868)	0.0776 (0.2120)	0.1684 (0.6782)

[a]Source: U.S. Census of Manufacturers (56, 57, 58, 59).

[b]The t values are given in the parentheses.

TABLE 9.3. Continued

S.I.C.		Estimates of coefficients[b]					
		β_6	β_7	γ_2	γ_3	γ_4	γ_5
20.	Food and kindred products	-0.0408 (-0.1717)	0.1706 (0.6699)	0.5450 (3.6094)	0.5039 (3.8555)	0.5367 (4.0032)	0.5969 (3.9369)
27.	Printing and publishing	-0.0943 (-0.4433)	-0.0466 (-0.1897)	0.2784 (1.2603)	0.2280 (1.1968)	0.3253 (1.8348)	0.3992 (2.0924)
28.	Chemicals and allied products	0.1438 (0.7121)	0.5367 (1.8364)	0.0969 (0.5531)	0.1996 (1.1640)	0.1724 (0.6351)	0.2188 (0.8790)
32.	Stone, clay and glass products	-0.0112 (-0.0499)	-0.2552 (-0.9311)	0.2554 (2.4086)	0.2854 (2.5971)	0.4054 (3.8621)	0.4804 (4.3293)
34.	Fabricated metal products	-0.4728 (-1.4922)	0.0628 (0.2001)	0.1284 (0.5359)	0.1026 (0.4490)	0.0814 (0.3925)	0.2081 (1.0727)
35.	Machinery except electrical	-0.1164 (-0.2597)	0.1366 (0.3148)	0.1973 (0.7159)	0.1090 (0.3820)	0.2454 (0.9009)	0.2764 (1.0733)
24.	Lumber and wood products	-0.0258 (-0.0766)	-0.0723 (-0.2222)	0.4031 (2.0066)	0.2230 (1.4069)	0.3512 (1.6398)	0.5032 (1.9414)
36.	Electrical equipment and supplies	-0.0104 (-0.0336)	-0.0372 (-0.1397)	0.2683 (1.2198)	0.3984 (1.6893)	0.3227 (1.5438)	0.3028 (1.3416)
37.	Transportation equipment	-0.5296 (-2.1358)	0.2579 (0.9429)	0.3249 (1.7160)	0.3658 (2.0187)	0.4164 (1.4180)	0.5845 (2.6536)

TABLE 9.3. Continued

S.I.C.	Estimates of coefficients γ_6	Estimates of coefficients γ_7	Multiple Correlation R^2	F-Statistics
20. Food and kindred products	0.5824 (4.9005)	0.7363 (5.8149)	0.8995	9.6391
27. Printing and publishing	0.3253 (2.1235)	0.3535 (2.0389)	0.8885	8.5845
28. Chemicals and allied products	0.4648 (2.2966)	0.1569 (0.7276)	0.8802	7.9163
32. Stone, clay and glass products	0.5952 (4.6872)	0.4811 (3.8003)	0.8632	6.7967
34. Fabricated metal products	-0.1043 (-0.5641)	0.1714 (0.9384)	0.8623	6.7453
35. Machinery except electrical	0.1461 (0.6031)	0.1800 (0.8435)	0.6923	2.4234
24. Lumber and wood produc products	0.2780 (1.2796)	0.3835 (1.6636)	0.8018	4.3579
36. Electrical equipment and supplies	0.3820 (1.8527)	0.4606 (2.5624)	0.7731	3.6697
37. Transportation equipment	0.0842 (0.4845)	0.6586 (3.9313)	0.7522	3.2696

and productive (value added per employee increases). From small to large firm, value added per employee increases possibly due to reduction in costs and/or increase in output per capita.

The characteristics of the nine important industries for Iowa have been examined in this chapter with production functions estimates. The industries that are moving into nonmetropolitan Iowa are in general more labor intensive than manufacturing as a whole. This is satisfactory for industrialization as more jobs are created in rural areas. The industries that are moving into rural areas also have higher average value added per employee than manufacturing as a whole. This means that the incomes generated in the industries from the wages and profits will help to develop the rural areas rapidly. Over the years the industries are becoming more productive due to technical progress which means more incomes will be generated in future for rural development. For industries, a large firm is more efficient and productive (value added per employee increases) than a small firm. More incomes were generated in the decade of the 1960's as proportionally more larger firms were added in the nonmetropolitan areas.

CHAPTER X. GENERAL IMPLICATIONS AND SUMMARY

During the past three decades, the traditional rural community in Iowa has been subjected to strong adjustment pressures. In the countryside, forces associated with improvement in farm technology and national economic growth have depressed relative income opportunities on all but the best organized farms. These farms have escaped much of the impact as a result of internal adjustments and government price and income support programs. Partly because of the kind of improvements in farm technology and partly because of the growing number and attractiveness of nonfarm employment opportunities, the heaviest adjustment burden in agriculture has fallen on human resources. This is reflected in the fact that returns to human effort in farming have been lower in relation to long-run opportunity costs (i.e., returns to nonfarm labor) than that for either land or capital. Some of the improvements in farm technology have required a larger land base to make adoption profitable. As a result, there has been strong pressure to increase farm size. With the decline in the number of farms and the fact that the large commercial farms use capital heavily, a sizeable work force in agriculture has become redundant. Because of the niggardly absolute benefits on small farms with highly underemployed labor, the small operators could best gain through capital gains in land sold to more highly capitalized large operators in a position to realize scale economies. Without a sufficient increase in employment in other economic sectors to offset agricultural employment decline has resulted in out-migration and depopulation of many rural counties, communities and areas. The decisions of individuals

to migrate from rural areas have a significant impact on the people who remain and their community institutions. With out-migration from rural areas, there are fewer people to support the existing social, economic, political and cultural institutions. Net migration loss affects schools, churches, businesses, local government and other community services which meet peoples' needs. Whereas there has been out-migration from rural areas we find the opposite picture in metropolitan areas and cities. More and more people, especially young ones, have migrated to cities and metropolitan areas for job opportunities. With the influx of an unprecedented number of people, the cities have faced all kinds of urban problems like congestion, crime and pollution. Rural development is necessary to alleviate the problems of both cities and rural areas. A sound rural development program will make the rural areas attractive and bring back the people who are living marginally in big cities to rural areas. By redistributing the population, rural development will help to shape up two developed sectors, rural and urban, which is a sign of healthy economy.

Having recognized the need for rural development programs, the important question is how do we go about it. Development is a multidimensional concept and encompasses many facets of rural life. The most important contribution to development comes from rural industrialization. Any rural development plan without adequate attention to jobs and incomes will be futile. It is true that many other problems of rural areas and rural people will vanish if people have jobs and higher incomes. Perhaps

no other instrument is as effective as rural industrialization in improving and creating jobs and incomes. The research done here has examined many aspects of rural industrialization in Iowa.

Analysis of population trends and distribution show that most of the counties and SPB areas of Iowa had out-migration between 1950-70. Of the 99 counties only 6 had in-migration between 1950 and 1960 and 7 had in-migration between 1960 and 1970. The nonmetropolitan counties had more out-migration than metropolitan counties. Of the 85 nonmetropolitan counties 84 had out-migration in 1950-60 and 82 had out-migration in 1960-70. At the same time, out of 14 metropolitan counties 9 had out-migration between 1950-60 and 10 had out-migration between 1960-70. Of the 16 SPB areas (State Planning Board Areas, see Figure 3.1), only one had in-migration between 1950-60 and two had in-migration between 1960-70. Area 10 which is the Cedar Rapids area had in-migration in both the decades. In particular, in the northern and southern areas (areas 1, 2, 3, 14 and 15, see Figure 3.1) out-migration was considerably high. These are the areas which are predominantly nonmetropolitan in character. Compared to 1950-60, out-migration has diminished in most of the nonmetropolitan counties and SPB areas between 1960-70. The reduction in out-migration is due to the adoption of rural industrialization and development program on the part of federal, state and local governments and rural communities themselves. This is an encouraging feature.

Over the decades in Iowa whereas the numbers of small agricultural farms have declined, the numbers of large farms have increased. In the three largest acreage sizes the increases in the numbers of farms between

1945 and 1969 were quite substantial. In the acreage sizes, 260-499 acres, 500-999 acres and 1000 or more acres the increases were 40 percent, 271 percent and 362 percent respectively. Except these large sizes, numbers of farms decreased in all other acreage sizes. Thus in the acreage sizes 1-49 acres, 50-99 acres, 100-179 acres and 180-259 acres the numbers of farms decreased by 45 percent, 50 percent, 57 percent and 35 percent between 1945 and 1969. The emergence of giant commercial capital intensive farms and significant decrease in the numbers of small family farms together with the lack of employment opportunities in non-farm sectors have created a problem in the rural economy. Total output in agriculture has gone up in the last two decades because of the increase in productivity. The rise in productivity was due to improvement of farm technology, and use of more capital intensive techniques. The agricultural output increased even though the number of farms and total acreage under cultivation declined. The increase in capital intensity in agriculture in Iowa can be seen from the figures of some of the capital items between the years 1959 and 1969. The numbers of automobiles, motortrucks and tractors in use per farm increased from 1.24, 1.08 and 2.1 to 1.35, 1.17 and 2.5. Consumption of gasoline and other fuels which is a good indicator of machinery used and hence of capital rose from 569 dollars per farm to 879 dollars per farm between 1959 and 1969.

Analysis of employment in Iowa shows decrease in employment in agricultural sector and increase in employment in manufacturing and service sectors over the last decade. Between 1960 and 1970, employment in agriculture decreased by 31 percent and increased by 15 percent and 16

percent in manufacturing and service sectors in Iowa. Total employment in all the sectors increased only negligibly from 1960 to 1970. In all the SPB areas employment in agriculture decreased and in service sector increased. Except for areas 4 and 5 (Sioux City and Fort Dodge areas) employment in manufacturing has increased in all the SPB areas. Since the agricultural sector is mainly comprised of rural areas, the reduction in employment in agricultural sector has been reflected mostly in rural areas. True, rural areas gained some employment in manufacturing and service sectors, but the increase was not enough as evidenced in the continuing out-migrations from rural areas.

Over the decade of the 1960's rural industrialization has taken place in Iowa. The joint efforts of Iowa Development Commission and local community leaders was no less important for location of new plants in rural areas. The firms located in nonmetropolitan areas (i.e., places under 25,000 population) increased in number by about 16.2 percent but the number of firms located in metropolitan areas declined by about 6.8 percent. Firms of all sizes were added in nonmetropolitan areas, but proportionately more larger firms were added. Moving to the SPB areas within the state we find the same general pattern over the whole state. Most of the SPB areas lost firms in their metropolitan segments but gained firms in their nonmetropolitan segments. It is interesting to observe how the gains in the number of firms in nonmetropolitan areas were distributed in communities of different sizes. Except in the community of size 15,000-25,000 population, all other communities (under 1,000 population, 1,000-2,500 population, 2,500-5,000 population, 5,000-10,000 population and 10,000-15,000 population) added industries.

Moreover, the additions in the communities are such that the relative distribution of firms remained unchanged. From the above we conclude that firms of all sizes are moving into communities of different sizes in non-metropolitan areas of Iowa.

Let us now examine the change in Iowa's industrial structure in the decade of the 1960's, if any. Comparing the distribution of the enterprises shows a declining absolute importance in 6 industries and an increasing absolute importance in 13 industries. Of the twenty industries, six are important for Iowa. These six industries account for approximately 80 percent of the total number. The six important industries are food and kindred products (S.I.C. 20), printing, publishing and related enterprises (S.I.C. 27), stone, clay, glass and concrete products (S.I.C. 32), nonelectrical machinery fabrication (S.I.C. 35), fabricated metals (S.I.C. 34) and chemicals and allied products (S.I.C. 28). Comparing the distribution of these six important industries shows a declining absolute and relative importance of food and kindred products and a declining relative importance of stone, clay, glass and concrete products. By contrast there has been a marked rise in the absolute and relative importance of printing, publishing and related enterprises (S.I.C. 27), nonelectrical machinery fabrication (S.I.C. 35), fabricated metals (S.I.C. 34) and chemicals and allied products (S.I.C. 28). What is important to note is that food and kindred products which is the biggest industry of all is going down in relative importance. This indicates that Iowa's industrial structure is changing from primary related production to more diversified industries. Besides the above six big

industries, three other minor important industries gained in absolute and relative importance. These are lumber and wood products (S.I.C. 24), electrical machinery, equipment and supplies (S.I.C. 36) and transportation equipment (S.I.C. 37). In nonmetropolitan areas where industrialization was going on, we did not find any evidence of trends of concentration of any particular type of industry in any particular community size.

Production functions analysis based on value added per employee and capital expenditure per employee for different industries shows some interesting results. Five out of six big industries of Iowa, food and kindred products, printing and publishing, chemicals and allied products, stone, clay, glass and concrete products, machinery except electrical are more labor intensive than manufacturing as a whole. Only fabricated metal products (S.I.C. 34) is more capital intensive. The other three minor important industries for Iowa, lumber and wood products (S.I.C. 24), electrical machinery, equipment and supplies (S.I.C. 36) and transportation equipment (S.I.C. 37) are also labor intensive. The capital intensities of food and kindred products and printing and publishing are very nearly same as that of manufacturing as a whole. Analysis of production functions and trends of firms and industries tells us that in general labor intensive industries are moving into nonmetropolitan areas of Iowa. Why in particular labor intensive industries are moving into nonmetropolitan areas? Several reasons might be suggested why it is so. Capital intensive industries which require skilled labor might be reluctant to move in rural areas where this resource is more limited. Another reason might be that the rural communities prefer to see more labor intensive

industries in their areas, because these industries generate more employment. Capital intensive industries tend to use more energy which might lead to more detrimental effects on the environment. This might be a reason why the rural communities prefer more labor intensive industries. Still another reason might be that the wages are low in rural areas. Lower living costs and the availability of more female labor who usually are paid lower wages than male labor for the same type of job might be the reasons why the wages are low and why the labor intensive industries are moving in rural areas.

As our analysis of industries has shown, capital intensities do not change significantly from small to large firms. What changes, however, is the value added per employee. Value added per employee becomes larger with firm size. The reduced cost of production and or increase in output makes a firm more efficient and productive as it becomes larger. No significant yearly effects on capital intensities of industries have been observed. However, increases in value added per employee due to technical progress have been observed. The average value added per employee of all the six big industries for Iowa are higher compared to manufacturing as a whole. The average value added per employee for food and kindred products (S.I.C. 20) and chemicals and allied products (S.I.C. 28) are significantly higher than manufacturing as a whole. Of the three minor important industries except lumber and wood products (S.I.C. 24), the other two (S.I.C. 36 and 37) have higher average value added per employee. Transportation equipment (S.I.C. 37) has a substantially high average value added per employee.

Our conclusion on the basis of this study is that indeed rural industrialization in Iowa has taken place in the 1960's. Industries have moved into both large and small communities in the nonmetropolitan areas. The industrial structure of Iowa is becoming more diversified. In general, labor intensive industries are moving into nonmetropolitan areas. The out-migration from rural areas is slowing down. More people are coming back to rural areas to stay. There is a strong reason to believe that industrialization is the major reason for reversing the tide of out-migration from rural areas. In future, at least for some years, employment in agriculture will continue to decline, though the rate of decline will decrease. People will continue to leave small farms as long as there are higher income prospects in nonfarming. Rural industrialization will be needed to create more nonfarm jobs. We now pose two important questions. Is industrialization the answer for all rural communities? Is industrialization all that we need for rural development?

Not all rural communities will benefit by industrialization. Rural communities are not a homogeneous lot. They differ among themselves by their resource bases. They differ among themselves by their objectives of welfare. It is only those communities properly endowed with resource bases like location, good road connections, closeness to urban centers, local leadership to generate support and taxes for industrial parks, improved water and sewer facilities, transportation facilities and other utilities will gain by industrialization. These are the communities sought after by outside firms. In the last decade, possibly these type of communities were benefited most by industrialization. The communities

which have no hope to build a proper resource base in the near future should look for something else other than industrialization for their development. These type of communities are mainly agricultural. Income of their citizens will be increased more through a restructuring of farms into more efficient units and the training and transfer of workers for employment elsewhere. Their welfare also can be increased through reorganization of public administrative units and services to provide better products at lower cost, through publicly or privately initiated delivery systems which improve the quality of services and similar reorganization. Largely, their long-run answer is in restructuring of the community to a declining resource base, rather than restructuring to meet industrial growth. Their salvation is in intervention of outside governmental entities, as state or federal, rather than through intervention of a foreign firm which brings in capital and management to generate local employment. Possibly, these type of communities were bypassed by industrialization during the last decade. We can identify these communities by the growth of industries in them. These communities had negligible or nothing at all industrial growth. Out-migrations did not show any sign of slowing down in these communities. These type of communities are mostly located in northern and southern parts of Iowa.

The location of a plant in a rural community brings some costs and benefits to the community. While the costs to build the necessary infrastructures and providing subsidies to the firms is mostly borne by the community itself, benefits seldom stay wholly within the community. There are several sources of leakage for benefits. The major leakage is payroll

carried out of the community by nonresident commuting workers and spent in other towns and cities. As a result of this leakage, local businesses and services will suffer, local banks will not receive additional savings, local housing market will remain stagnant. In other words the local community will not see much prosperity and development. The smaller the region or economic area, the greater is the leakage. In these days of fast transport, there will be more and more commuters. This lends very strong support to form multicounty area or functional economic area (9, 10) to develop new economic activities when costs and benefits will be more uniformly distributed. Also, public utilities and services because of economies of scale will be cheaply and efficiently distributed over a wider area.

As said in the introduction in Chapter I rural development encompasses many facets of life in the rural communities. The welfare of rural people has many dimensions. Welfare is not just increasing income opportunities through industrialization, though it may be the major important objective. Welfare comprises better income opportunities, better housing, various education facilities, a good medicare system, good environment, recreational and other facilities available in large cities and a host of other variables. True, welfare cannot be achieved without improving jobs and incomes. Improvement of jobs and incomes will improve many other facets of rural life. Some additional policies on the part of federal, state and local governments and local leaders along with rural industrialization are necessary for rural development. Industrialization is not the only instrumental policy for rural development. For

example, a community where majority of persons are old and retired or a community which is purely agricultural and lacks the proper resource base will be better served by policies other than industrialization. Each rural community is different from another in respect of its characteristics of population and resource base. Before recommending any standard policy for that community we should do research to find out those characteristics. Research is also needed to know about the many variables which comprise welfare of the rural people. Welfare of the rural people should reflect their objectives and not what political leaders or state planners assume.

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APPENDIX. DATA SET

TABLE A.1. Distribution of industries in Iowa by firm size and SPB area, 1964-65[a]

SPB Area	Region[b]	Firm Size					
		A		B		C	
		No.	%	No.	%	No.	%
	Nonmetro	136	82.42	14	8.48	10	6.06
1	Metro						
	Nonmetro	161	84.74	11	5.79	11	5.79
2	Metro	24	51.06	11	23.40	6	12.77
	Nonmetro	198	85.34	17	7.33	9	3.88
3	Metro						
	Nonmetro	141	82.46	20	11.70	7	4.09
4	Metro	65	50.39	30	23.26	14	10.85
	Nonmetro	152	82.61	17	9.24	9	4.89
5	Metro	17	38.64	11	25.00	4	9.09
	Nonmetro	125	73.96	20	11.83	10	5.92
6	Metro						
	Nonmetro	162	81.41	25	12.56	5	2.51
7	Metro	86	60.14	26	18.18	12	8.39
	Nonmetro	67	77.91	13	15.12	3	3.49
8	Metro	51	53.68	23	24.21	9	9.47
	Nonmetro	94	67.63	22	15.83	12	8.63
9	Metro	80	51.61	25	16.13	15	9.68
	Nonmetro	197	85.28	21	9.09	5	2.16
10	Metro	72	46.45	36	23.23	15	9.68
	Nonmetro	183	75.62	32	13.22	13	5.37
11	Metro	213	61.03	63	18.05	38	10.89
	Nonmetro	123	80.92	17	11.18	7	4.61
12	Metro						
	Nonmetro	135	84.91	12	7.55	5	3.14
13	Metro	33	68.75	5	10.42	7	14.58
	Nonmetro	43	78.18	7	12.73	2	3.64
14	Metro						
	Nonmetro	125	73.96	23	13.61	9	5.33
15	Metro	28	62.22	9	20.00	4	8.99
	Nonmetro	79	67.52	12	10.26	7	5.98
16	Metro	30	46.15	18	27.69	6	9.23
	Nonmetro	2,121	79.74	283	10.64	124	4.66
Iowa	Metro	699	54.82	257	20.16	130	10.20
Iowa	All firms	2,820	71.66	540	13.72	254	6.45

[a]Source: Directory of Iowa Manufacturers (21).

[b]Nonmetro = Nonmetropolitan region.
Metro = Metropolitan region.

Firm Size									
D		E		F		G		All Firms	
No.	%	No.	%	No.	%	No.	%	No.	%
5	3.03							165	100.00
4	2.11	2	1.05			1	.53	190	100.00
3	6.38	2	4.26			1	2.13	47	100.00
3	1.29	5	2.16					232	100.00
1	.58	2	1.17					171	100.00
12	9.30	6	4.65	2	1.55			129	100.00
4	2.17	1	.54	1	.54			184	100.00
7	15.91	4	9.09	1	2.27			44	100.00
11	6.51	1	.59	1	.59	1	.59	169	100.00
5	2.51	2	1.01					199	100.00
11	7.69	4	2.80	2	1.40	2	1.40	143	100.00
2	2.33					1	1.16	86	100.00
7	7.37	2	2.11	1	1.05	2	2.11	95	100.00
4	2.88	3	2.16	2	1.44	2	1.44	139	100.00
21	13.55	8	5.16	2	1.29	4	2.58	155	100.00
5	2.16	2	.87	1	.43			231	100.00
16	10.32	7	4.52	5	3.23	4	2.58	155	100.00
9	3.72	2	.83	2	.83	1	.41	242	100.00
23	6.59	4	1.15	2	.57	6	1.72	349	100.00
2	1.32	3	1.97					152	100.00
4	2.52	3	1.89					159	100.00
2	4.17	1	2.08					48	100.00
3	5.45							55	100.00
10	5.92	2	1.18					169	100.00
2	4.44					2	4.44	45	100.00
12	10.26	2	1.71	3	2.56	2	1.71	117	100.00
6	9.23	2	3.08	1	1.54	2	3.08	65	100.00
84	3.16	30	1.13	10	.38	8	.30	2,660	100.00
110	8.63	40	3.14	16	1.25	23	1.80	1,275	100.00
194	4.93	70	1.78	26	.66	31	.79	3,935	100.00

TABLE A.2. Distribution of industries in Iowa by firm size and SPB area, 1967-68[a]

SPB Area	Region[b]	Firm Size					
		A		B		C	
		No.	%	No.	%	No.	%
	Nonmetro	133	80.61	12	7.27	11	6.67
1	Metro						
	Nonmetro	159	81.12	16	8.16	12	6.12
2	Metro	26	50.98	11	21.57	6	11.76
	Nonmetro	195	82.28	18	7.59	10	4.22
3	Metro						
	Nonmetro	141	79.66	25	14.12	7	3.95
4	Metro	69	53.08	26	20.00	14	10.77
	Nonmetro	152	79.17	22	11.46	10	5.21
5	Metro	14	32.56	9	20.93	5	11.63
	Nonmetro	141	69.80	29	14.36	10	4.95
6	Metro						
	Nonmetro	154	79.38	24	12.37	8	4.12
7	Metro	76	54.29	32	22.86	9	6.43
	Nonmetro	65	73.86	16	18.18	3	3.41
8	Metro	50	49.50	27	26.73	10	9.90
	Nonmetro	97	66.44	25	17.12	13	8.90
9	Metro	78	52.00	26	17.33	14	9.33
	Nonmetro	199	83.61	25	10.50	6	2.52
10	Metro	86	53.42	28	17.39	14	8.70
	Nonmetro	177	71.08	40	16.06	14	5.62
11	Metro	200	58.48	69	20.18	36	10.53
	Nonmetro	126	78.26	19	11.80	8	4.97
12	Metro						
	Nonmetro	134	83.23	13	8.07	5	3.11
13	Metro	33	68.75	5	10.42	6	12.50
	Nonmetro	49	73.13	8	11.94	4	5.97
14	Metro						
	Nonmetro	115	68.45	29	17.26	9	5.36
15	Metro	25	58.14	8	18.60	5	11.63
	Nonmetro	85	65.89	11	8.53	12	9.30
16	Metro	32	50.00	13	20.31	7	10.94
	Nonmetro	2,122	76.69	332	12.00	142	5.13
Iowa	Metro	689	54.12	254	19.95	126	9.90
Iowa	All Firms	2,811	69.58	586	14.50	268	6.63

[a]Source: Directory of Iowa Manufacturers (22).

[b]Nonmetro = Nonmetropolitan region.
Metro = Metropolitan region.

Firm Size									
D		E		F		G		All Firms	
No.	%	No.	%	No.	%	No.	%	No.	%
6	3.64							165	100.00
5	2.55	2	1.02	1	.51	1	.51	196	100.00
5	9.80	2	3.92			1	1.96	51	100.00
7	2.95	6	2.53	1	.42			237	100.00
1	.56	3	1.69					177	100.00
15	11.54	4	3.08	1	.77	1	.77	130	100.00
5	2.60	1	.52	2	1.04			192	100.00
11	25.58	2	4.65	1	2.33	1	2.33	43	100.00
16	7.92	2	.99	3	1.49	1	.50	202	100.00
6	3.09	1	.52	1	.52			194	100.00
14	10.00	5	3.57	2	1.43	2	1.43	140	100.00
2	2.27	1	1.14			1	1.14	88	100.00
9	8.91	2	1.98	1	.99	2	1.98	101	100.00
4	2.74	3	2.05	2	1.37	2	1.37	136	100.00
20	13.33	8	5.33	2	1.33	2	1.33	150	100.00
5	2.10	2	.84	1	.42			238	100.00
15	9.32	9	5.59	5	3.11	4	2.48	161	100.00
10	4.02	4	1.61	2	.80	2	.80	249	100.00
26	7.60	3	.88	2	.58	6	1.75	342	100.00
5	3.11	3	1.86					161	100.00
5	3.11	4	2.48					161	100.00
3	6.25	1	2.08					48	100.00
5	7.46			1	1.49			67	100.00
12	7.14	3	1.79					168	100.00
2	4.65			1	2.33	2	4.65	43	100.00
12	9.30	2	1.55	5	3.88	2	1.55	129	100.00
4	6.25	4	6.25	1	1.56	3	4.69	64	100.00
106	3.83	37	1.34	19	.69	9	.33	2,767	100.00
124	9.74	40	3.14	16	1.26	24	1.89	1,273	100.00
230	5.69	77	1.91	35	.87	33	.82	4,040	100.00

TABLE A.3. Distribution of industries in Iowa by firm size and SPB area, 1969-70[a]

SPB Area	Region[b]	Firm Size					
		A		B		C	
		No.	%	No.	%	No.	%
	Nonmetro	138	83.64	11	6.67	11	6.67
1	Metro						
	Nonmetro	158	81.87	12	6.22	10	5.18
2	Metro	21	42.86	16	32.65	4	8.16
	Nonmetro	194	81.86	14	5.91	12	5.06
3	Metro						
	Nonmetro	161	79.70	23	11.39	11	5.45
4	Metro	59	48.76	28	23.14	13	10.74
	Nonmetro	148	76.29	27	13.92	10	5.15
5	Metro	16	36.36	7	15.91	6	13.64
	Nonmetro	155	73.46	24	11.37	10	4.74
6	Metro						
	Nonmetro	154	78.17	27	13.71	8	4.06
7	Metro	72	52.94	34	25.00	6	4.41
	Nonmetro	74	75.51	17	17.35	2	2.04
8	Metro	47	48.96	28	29.17	8	8.33
	Nonmetro	106	68.83	22	14.29	12	7.79
9	Metro	75	51.72	27	18.62	13	8.97
	Nonmetro	212	84.46	25	9.96	5	1.99
10	Metro	91	55.83	29	17.79	13	7.98
	Nonmetro	188	71.21	38	14.39	20	7.58
11	Metro	198	60.74	49	15.03	39	11.96
	Nonmetro	136	75.56	24	13.33	10	5.56
12	Metro						
	Nonmetro	138	84.66	71	6.75	5	3.07
13	Metro	31	65.96	6	12.77	7	14.89
	Nonmetro	47	70.15	7	10.45	5	7.46
14	Metro						
	Nonmetro	108	68.35	25	15.82	10	6.33
15	Metro	18	48.65	9	24.32	5	13.51
	Nonmetro	81	64.80	17	13.60	7	5.60
16	Metro	27	43.55	17	27.42	6	9.68
	Nonmetro	2,198	76.88	324	11.33	148	5.18
Iowa	Metro	655	53.43	250	20.39	120	9.79
Iowa	All Firms	2,853	69.84	574	14.05	268	6.56

[a]Source: Directory of Iowa Manufacturers (23).

[b]Nonmetro = Nonmetropolitan region.
Metro = Metropolitan region.

Firm Size									
D		E		F		G		All Firms	
No.	%	No.	%	No.	%	No.	%	No.	%
5	3.03							165	100.00
9	4.66	2	1.04	1	.52	1	.52	193	100.00
5	10.20	2	4.08			1	2.04	49	100.00
10	4.22	5	2.11	2	.84			237	100.00
2	.99	5	2.48					202	100.00
10	8.26	8	6.61	2	1.65	1	.83	121	100.00
7	3.61			2	1.03			194	100.00
10	22.73	4	9.09	1	2.27			44	100.00
15	7.11	3	1.42	2	.95	2	.95	211	100.00
7	3.55			1	.51			197	100.00
15	11.03	3	2.21	4	2.94	2	1.47	136	100.00
2	2.04	2	2.04			1	1.02	98	100.00
7	7.29	2	2.08	2	2.08	2	2.08	96	100.00
5	3.25	2	1.30	5	3.25	2	1.30	154	100.00
14	9.66	12	8.28	1	.69	3	2.07	145	100.00
5	1.99	3	1.20			1	.40	251	100.00
13	7.98	8	4.91	4	2.45	5	3.07	163	100.00
9	3.41	3	1.14	4	1.52	2	.76	264	100.00
27	8.28	3	.92	4	1.23	6	1.84	326	100.00
7	3.89	2	1.11	1	.56			180	100.00
5	3.07	3	1.84	1	.61			163	100.00
2	4.26	1	2.13					47	100.00
7	10.45			1	1.49			67	100.00
10	6.33	4	2.53	1	.63			158	100.00
2	5.41			1	2.70	2	5.41	37	100.00
10	8.00	5	4.00	3	2.40	2	1.60	125	100.00
3	4.84	5	8.06	1	1.61	3	4.84	62	100.00
115	4.02	39	1.36	24	.84	11	.38	2,859	100.00
108	8.81	48	3.92	20	1.63	25	2.04	1,226	100.00
223	5.46	87	2.13	44	1.08	36	.88	4,085	100.00

TABLE A.4. Distribution of enterprises by firm size and S.I.C. in Iowa, 1964-65[a]

S.I.C.	Region[b]	Firm Size A	B	C	D	E	F	G	Total	Total[b] (NM+M)
	NM	2							2	
19	M						1	1	2	4
	NM	777	146	60	29	14	3		1,029	
20	M	162	107	43	38	14	15	14	383	1,412
	NM									
21	M									
	NM	1		1	1				3	
22	M	2							2	5
	NM	23	15	9	8	1			56	
23	M	42	13	12	11	3			81	137
	NM	169	9	9	5		1		193	
24	M	29	10	9	4	1	1		54	247
	NM	69	10	7	4	1	1		92	
25	M	54	8	3	6	3			74	166
	NM	4	4		6				14	
26	M	3	19	1	15	2			40	54
	NM	995	81	11	3	2			1,092	
27	M	305	59	44	14	8		8	438	1,530
	NM	215	27	3	5	3	1	1	255	
28	M	98	23	9	6			4	145	400
	NM	9	3						12	
29	M	7	6						13	25
	NM	27	4	2	2	1		2	38	
30	M	10	8	3	1	1		2	25	63
	NM	8	3	1	2				14	
31	M	6	2	2					10	24

	NM	331	48	14	4		1		398	
32	M	71	28	12	6	5			122	520
	NM	14	9	8	12	3	4	1	51	
33	M	15	6	4	11	2	2		40	91
	NM	197	45	27	26	2	2	1	300	
34	M	132	51	28	32	13	2		258	558
	NM	272	60	46	28	7	2	5	420	
35	M	111	63	29	53	12	6	10	284	704
	NM	28	6	6	14	4		2	60	
36	M	16	7	3	8	2	10	3	49	109
	NM	85	13	18	8	1			125	
37	M	26	8	13	12	1	1	1	62	187
	NM	16	1	1	1	1		1	21	
38	M	14	4	2	1	1	22	4	28	49
	NM	101	16	10	3	1		1	132	
39	M	71	11	12	4	6			104	236
	NM	3,343	500	233	161	41	15	14	4,307	
Total	M	1,174	438	229	222	74	30	47	2,214	
Total	(NM+M)	4,517	938	462	383	115	45	61		6,521

[a]Source: Directory of Iowa Manufacturers (21).

[b]NM = Nonmetropolitan region.
M = Metropolitan region.

TABLE A.5. Distribution of enterprises by firm size and S.I.C. in Iowa, 1967-68[a]

S.I.C.	Region[b]	Firm Size A	B	C	D	E	F	G	Total	Total (NM+M)[b]
	NM	1							1	
19	M						1	1	2	3
	NM	675	168	61	24	15	5		948	
20	M	159	97	47	38	12	4	14	371	1,319
	NM		2						2	
21	M									2
	NM	2			2				4	
22	M	3							3	7
	NM	24	12	13	8	1			58	
23	M	44	15	8	11	2			80	138
	NM	198	14	6	5		1		224	
24	M	30	16	6	6	1	1		60	284
	NM	74	11	6	2	3	1		97	
25	M	51	6	3	2	7			69	166
	NM	4	3	1	6				14	
26	M	9	12	3	14	2			40	54
	NM	1,018	99	10	5	2			1,134	
27	M	318	58	42	18	7		8	451	1,585
	NM	265	32	9	9	3	1	2	321	
28	M	102	32	7	8		2	1	152	473
	NM	11	3						14	
29	M	10	5						15	29
	NM	43	6	2	2	2	1	2	58	
30	M	8	13	1	4	1		2	29	87
	NM	11	1	2	2	1			17	
31	M	6	1	2					9	26

	NM	340	57	12	6	1	1		417	
32	M	67	30	13	9	4			123	540
	NM	21	9	7	8	8	5	1	59	
33	M	13	4	4	16	1	2		40	99
	NM	216	47	25	30	7	3	1	329	
34	M	123	61	27	39	9	3		262	591
	NM	314	78	48	34	12	5	3	494	
35	M	132	55	29	55	20	6	12	309	803
	NM	15	17	7	9	9	2	2	61	
36	M	18	6	3	9	3	15	2	56	117
	NM	78	20	14	9	3	1		125	
37	M	19	14	7	14	4	2		60	185
	NM	13	2	1	1	1		1	19	
38	M	12	3	5	1		5	1	27	46
	NM	107	18	10	4	3		1	143	
39	M	68	12	11	5	6			102	245
	NM	3,430	599	234	166	71	26	13	4,539	
Total	M	1,192	440	218	249	79	41	41	2,260	
Total	(NM+M)	4,622	1,039	452	415	150	67	54		6,799

[a]Source: Directory of Iowa Manufacturers (22).

[b]NM = Nonmetropolitan region

M = Metropolitan region.