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STRUCTURAL CHANGE IN FARMING AND ITS RELATIONSHIP  
TO RURAL COMMUNITIES

By .

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## STRUCTURAL CHANGE IN FARMING AND ITS RELATIONSHIP TO RURAL COMMUNITIES

by Thomas A. Carlin and William E. Saupe <sup>1/</sup>

This chapter continues the theme of the preceding section on "the causes of structural change in agriculture", but also pertains to the topic of this final set of chapters, on "the impacts of structural change". That is because there is a two-way relationship between communities and farms. The structure of farming and changes in structure affect development in the communities in their midst, but communities also affect the structure of the farms that surround them.

We have witnessed a major transformation of rural America away from farming as the dominant industry. Over the last 40 years, the contribution of farming to the personal income of rural people has declined substantially. In 1950, at the beginning of the rapid decline in farm numbers, over 2,000 nonmetropolitan counties in the 48 contiguous states were "farming dependent", i.e. at least 20 percent of total earnings came from farming. By the early 1980's, only 505 nonmetropolitan counties could be so designated (see figure 1). Manufacturing, government, recreation, and retirement are among the industries now dominating most rural economies (4).

This change in rural America's economic base reflects the major transformation that has occurred in the structure of the U.S. farming sector. Since 1950, the number of farms has declined over 60 percent and average farm size has more than doubled. The farm resident population declined from over 23 million persons in 1950 to less than 5 million today.

The synergistic nature of the relationships between farm structure and rural communities is emphasized in this chapter. It is often tempting to treat farm structure and community development as if they were mutually exclusive topics when in reality they are highly related. We discuss how farm structure affects the communities in which the farms are located, and how in turn community attributes affect the organization of farming. The relationship has a two-way effect.

### Regional Development and Economic Concepts

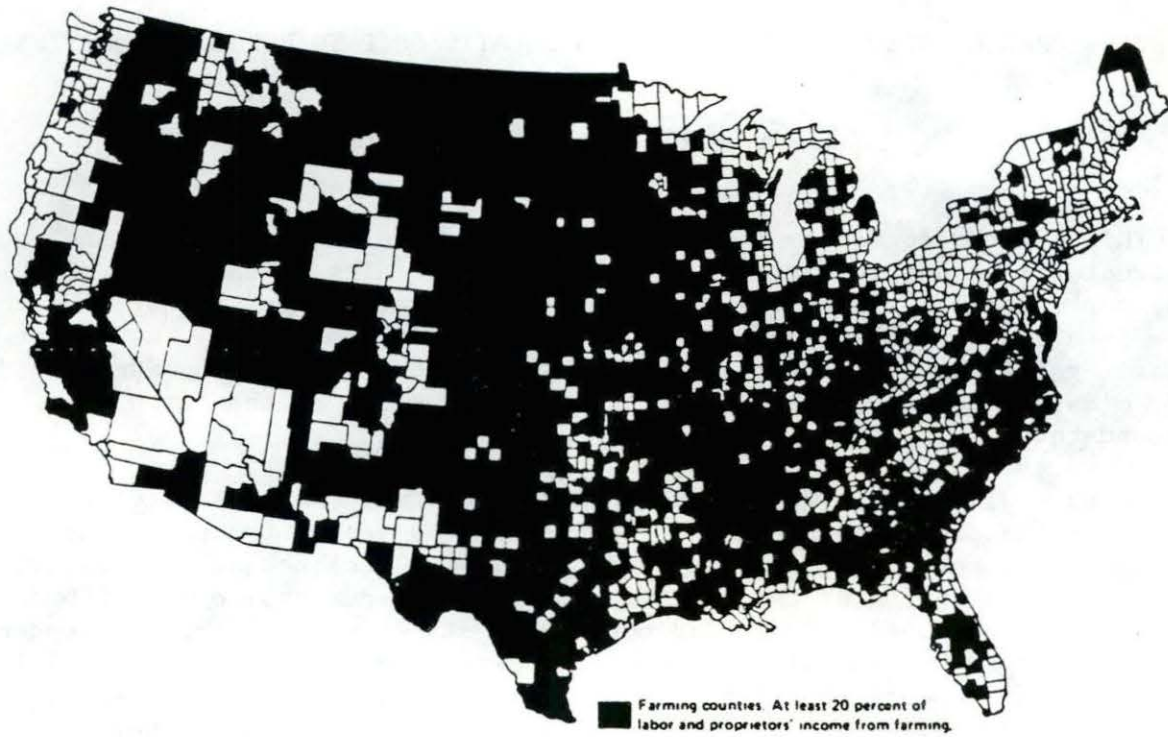
As used here, "community" involves a geographic area, business and social linkages or interactions among persons, and a commonality of mutual interests. We often think of communities as villages, towns, counties or other political jurisdictions. "Community growth" is an increase in the economic activity in a community. Growth might contribute to "community development", which involves the enhancement of human well-being, improved quality of life, and

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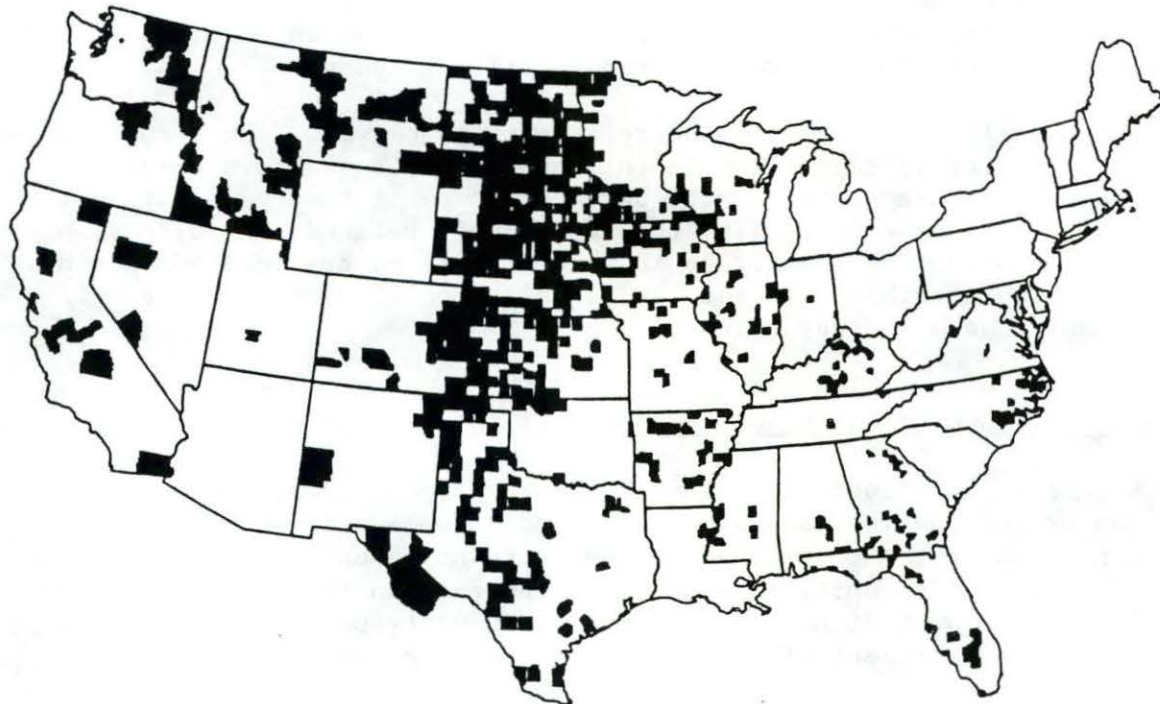
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**Farming-Dependent Counties, 1950**



**Farming-Dependent Counties, 1980-84\***



\* Twenty percent or more of total earnings in the county for the period 1980-84 were from farming.

**Figure 1.**



increased equity of opportunity (31). Development is a more subjective concept than growth, but it is more relevant as we consider the synergistic relationships between the farming sector and rural communities.

The theoretical and conceptual base for our discussion draws from various aspects of regional economics paradigms and economic theory (30). Supply-oriented community development theories focus on the importance of labor, capital, technology, land, and other natural resources to increase community output and income. Economists apply production function analysis to the community as the unit of interest, rather than (say) to a farm firm. But the same familiar assumptions, marginal conditions, equilibrium conditions, etc. apply in the analysis. The limited availability of private, public, and human capital inputs constrain community development. Community development policies that follow from this paradigm often focus on the need to increase productivity, usually through increased capital investment.

Resource endowment theory, a supply-orientated theory, focuses on the stock of natural resources, saying that they are the basis for producing externally desired goods and services. The ability of a community to develop depends on its ability to utilize these natural resources by combining other inputs (backward linkages) with the natural resources to produce an output that is processed (forward linkages) into the desired good or service. If suppliers of inputs and processors of output can be provided within the community, the community can expand its total output (or value added) and income.

Farming serves as an example, making use of land and climate as natural resources. Farmers purchase fertilizer, machinery, and other inputs and combine them with natural resources to produce food and fiber. Food and fiber products are further processed into consumer products. But farming provides a development dilemma as it is an unstable contributor to community economic development. This is because of its vulnerability over time due to the narrowness of the product line, the income inelasticity of demand for the product, and potential changes in the derived demand for the resource because of changes in technology or consumer preferences. Investments in farming to improve efficiency have resulted in a substantial reduction in the need for farm labor. Those communities that have not captured the forward linked value added agricultural industries or that have not diversified their economies face increasing levels of unemployment and population outmigration. This situation characterizes much of the western Corn Belt and Northern Plains.

Demand oriented development theories focus on the external demand for a community's goods and services, and the community's comparative advantage in producing them. The most explicit of these is "export base theory". It suggests that the economic vitality of a community depends on the production of goods and services that can be exported to an external market. Generally there is a basic industry that produces products or services for export. This industry essentially "drives" the local economy. There are secondary industries present that support either the basic industry or provide goods and services to people residing in the community. Agriculture, mining, forestry and manufacturing were initially put forth as examples of export based



industries, but more recently any activity that brings money into the community is considered an export activity. These include such diverse activities as tourism and the receipt of social security benefits and other transfers.

In the case of farming communities, the local economy is developed around activities associated with producing, transporting, processing and marketing farm products. Sometimes only a limited number of these activities are performed in the local rural community. The food processing industry, for example, is predominately an urban industry with two-thirds of the establishments and three-fourths of the employment located in metropolitan areas (10).

If the export industry is experiencing employment declines (e.g. farming) and there are limited employment opportunities in other local industries, then population outmigration likely occurs, threatening the viability of consumer based services. This in turn can lead to a decline in the community's business district. If the process proceeds long enough, it becomes difficult for the community to maintain adequate public services; soon the community can no longer maintain itself as a viable entity. In this way the role of various communities in the region change as economic activity adjusts itself spatially to accommodate the new economic and social environment.

By its very nature, community development deals with spatial location of economic activity, what we sometimes refer to as economic geography. "Location theory" deals with the attributes of space as it relates to markets, transportation, resources, and production. In location decisions, a firm probably first considers the location of the market for its product, and then to the minimization of transportation and labor costs and the possibility of capturing economies of scale in the industry. More recently, the location's desirable attributes from the point of view of the employees have become more important, e.g. educational facilities, climate, recreation. Location theory can probably be extended from determining the most desirable location for a firm as the unit of interest, to the optimal locations of communities.

"Central place theory" provides tools to understand where retail and service functions are clustered in the region. Community trade and service activities depend on the distance people will travel to purchase goods and services, the costs of providing goods and services, and the size of market needed to earn minimum profits. Some trade and service activities depend more on the volume of the export commodity produced (e.g. some farm inputs) whereas others depend on population size (e.g. retail trade).

Finally, "welfare theory" draws attention to the distributional impacts of changes in the national economy, the farming economy, and the regional economy. For example, development and adoption of cost reducing and output increasing farm technology can lead to increased agricultural production, lower farm prices and incomes, accelerated farm exit, reduced trade and income in some sectors of the local rural economy, but lower cost food for consumers. Public intervention in this process is a political decision, but social scientists can articulate the alternatives and their differential impacts.



### The Synergistic Relationship

The study of farm structure usually focuses on how land, labor, and capital are organized into farming units to produce food and fiber and the distribution of income and wealth that results from that activity. Discussions about the structure of U.S. farming typically feature national level statistics about the number and distribution of farms by various variables such as sales, tenure, operator age, etc. Yet, the structure of agriculture at the national level is the summation of a diverse set of regional and local farming sectors all of which are influenced by their local economic environment. For example, farming in the vast, sparsely settled western Corn Belt and Northern Plains is different from farming undertaken at the urban fringe or in the Appalachian region (1). As a result, the small farm component of U.S. farming is dominated by farms in the South whereas the large farm component is dominated by farms in the western Corn Belt and Plains states (see figure 2).

Utilizing a conceptual approach developed by Babb, we postulate that the structure of a local farm sector is influenced by international and national policies and events (38), as well as the attributes of the local area (3) (7). Sommer and Hines, for example, identified U.S. counties most affected by the swings in farm exports (34). Unraveling the complex relationships between national and international policies and the local community's farm structure is outside the bounds of this chapter. We are instead concerned with the local community or region's interaction with local farming structure.

### The Structure of the Local Farming Sector

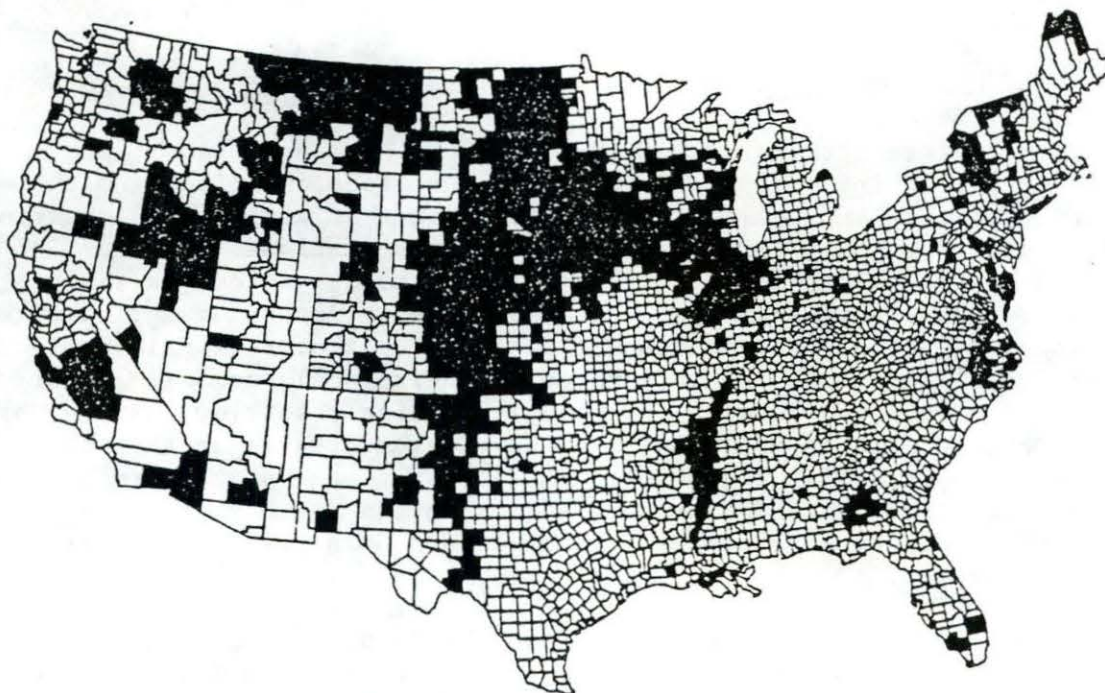
Formulating structural relationships in a way that emphasizes their great diversity around the nation opens the door to a much broader discussion of factors affecting local farm structure and the relationship of farm structure to the local economy. Prominent on most lists would be factors directly related to farming. These include potential enterprise combinations suitable for the area, availability of water, level of technology adopted by local producers, land characteristics, level of capital investment in the local farming plant, etc. These factors are distributed differently across the United States, and they influence the way the local farming sector evolves over time.

A local community's nonfarm economic activities affect local farm structure because they provide alternative uses of labor, land, and capital. As such, they establish the opportunity cost for farm resources. Included here are situations where farm resources are underemployed, and thus nonfarm economic activities are in fact complementary to local farming.

A wide variety of other variables including population size and settlement patterns, human capital, and public services influence local farm structure. Human capital, which encompasses formal and informal education, health, and aesthetic and recreational experiences, affects the productivity of labor both on and off the farm. Population size and public sector relate to the patterns of demand for land and the level of private and public

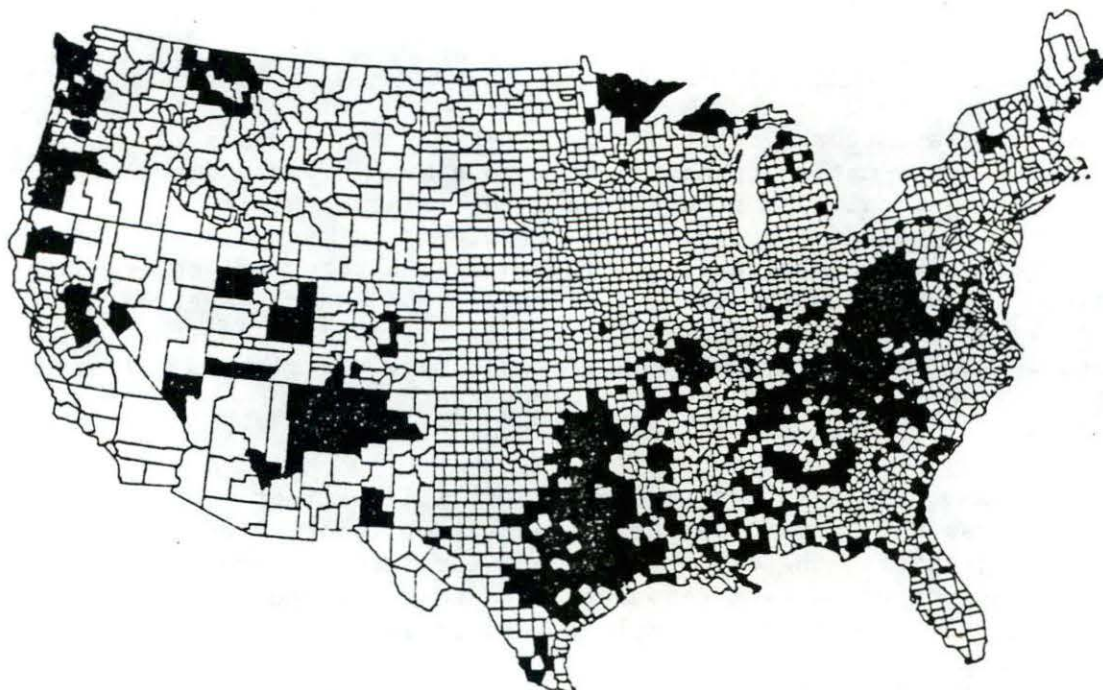


U.S. Large Farm Counties, 1982\*



\* Less than 59.3% of farms with 1982 gross farm sales of less than \$40,000.

U.S. Small Farm Counties, 1982\*



\* 88% or more of farms with 1982 gross farm sales of less than \$40,000.

Figure 2.



services a community can maintain. These variables, in concert, influence the structure of the local and consequently the national farming sector.

Likewise, rural community characteristics are but one of several factors affecting farming structure. The physical and social geography of the area including soil type and topography, precipitation level and seasonal distribution, length of growing season, access to water, demographics of the farm operator population, Federal farm commodity programs, public and private investment in research and development of technology, and Federal and state farm credit and tax policies can all influence the structure of farming.

#### How Farm Structure Affects Communities

There is a rich body of literature on the effect of farm structure on the local rural community. Some studies have focused on a single community, others have attempted to look at several communities or regions. A common characteristic of these studies is that they assume a particular farm structure as "given" and then examine how that structure affects the local community. However, we would first note that structural change in farming is only one of several factors that determines the nature of rural communities. Proximity to larger urban centers, the adequacy of transportation and communication systems, the presence of mineral or forest resources, the recreational attributes of the area, a restructuring of the retail sector, government initiatives for community economic development, and the original settlement patterns and cultural beliefs (33) can all contribute to rural community characteristics and change.

#### Goldschmidt and Critiques

Goldschmidt's classic study of the effects of farm scale on community life was part of a series on how business enterprises affected the social, cultural, and economic environment. Published in 1946, it focused on two similar California towns, Arvin and Dinuba, and is generally considered the genesis of this area of research (13).

The towns selected were in the Central Valley of California, of similar size, and with similar total value of agricultural production by the surrounding farms. He considered their major difference to be in the size of farm, with farms near Arvin averaging 497 acres compared with 57 acres near Dinuba. However, in the latter community, three-fourths of the farms were fully owned by their operators, versus about one-third near Arvin.

The central theme from this work was that community vitality was enhanced in the area dominated by owner-operated family farms. Goldschmidt found that occupational grouping was the greatest contrast between the two communities, as 65 percent of Arvins' employed work force were farm laborers and 11 percent were farm operators, compared with 29 and 34 percent respectively in Dinuba. By his measures Dinuba also enjoyed a higher standard of living, the public service needs of the people were better answered, the schools were better, and



the citizens had a higher level of participation in community institutions than in Arvin. Retail sales were about twice as great in Dinuba as in Arvin.

Goldschmidt concluded that because the large farms near Arvin were dependent on migrant wage labor, they fostered a skewed and segregated class structure. As a result, the working class in Arvin was poorer, less educated, and more alienated than the middle class small farmers from Dinuba (28).

Gilles and Dilecki note that at least 17 studies have examined the relationship between agriculture and socioeconomic well-being since 1972, most supporting Goldschmidt's thesis, but some with contradictory findings (12). They fault the Goldschmidt analysis for not making distinctions between structure of farming, farm size, land tenure, and farm labor systems, and for drawing conclusions about change from cross-sectional analysis.

Hayes and Olmstead examined Goldschmidt's data and method and concluded that because of methodological flaws his study offered little support for his conclusions (14). Goldschmidt had used four criteria to compare the two communities to establish that they were closely matched regions and differed importantly only in the size of farms that surrounded them. In examining the data, Hayes and Olmstead found instead that Arvin had experienced a one-third increase in population during a four year period shortly before the study, Dinuba had been platted and promoted by the railroad as a development scheme while Arvin had emerged as a community more than 15 years later, Arvin was near the center of a substantial oil-bearing region while Dinuba had no known petroleum deposits, and that the farm costs of irrigation were twice as high in Arvin. The authors concluded that too many differences other than farm size were present to accept the Goldschmidt interpretation.

Several other studies including those by Heffernan and Lasley (16) and Markousek (24) also examine the effect of different farming structures on the nonfarm sectors, including the public sector. They all examine in some way the tradeoffs between farmers and the nonfarm sector under alternative farm structures. With some exceptions and regional differences, they in general suggest that the nonfarm sector of rural communities fare better under a farm economy dominated by small and medium sized farms.

#### Modeling Structural Impacts

Heady and Sonka examined the effect of alternative farm structures on several economic variables including the secondary income effects on nonfarm sectors. They hypothesized that the atomistic nature of the farming sector implied that reductions in net revenue and farm income would have resulted from the structural change in American agriculture since the 1920s. To prevent inequities between farmers and consumers, Federal policy intervened with extensive farm programs, but little attention was given to other rural groups adversely affected. They concluded that the nonfarm sector in rural areas (the communities) bore the major costs of structural change in farming (15).



Heady and Sonka addressed the interrelationships between such communities and the number and size of farms using the Iowa State University national linear programming model with some 150 production areas and 31 consuming regions. The impacts of an agriculture composed of different sizes of farms on farm prices, location of production, farm income, number of farms, farm labor, consumer food costs, and the income generated in the rural nonfarm and agribusiness sectors were evaluated.

Four different farm size structures were used, one of which reflected the current farm size distribution, and served as the control. The other three represented a national agriculture composed of small, medium, or large farms. Differences in farm output among the farm size systems were carried forward in the model through the impacts on farm income, income from activity in the agribusiness sector, and income from sales of consumer goods. Compared with the control, a farm structure dominated by smaller farms resulted in 16.5 percent greater income generation in nonfarm businesses in rural communities (but with some regional differences), and also the greatest total net farm income. However, because of the large number of farms in this alternative, per farm net income was less than half that of the control. Under the small farm system, food costs were about four percent higher for consumers than in the control.

Their results emphasized the tradeoffs among producers, consumers, and rural communities among the alternative farm size structures. The large farm system, for example, would result in per farm income one-third higher than the control, four percent lower food costs for consumers, but 16 percent less nonfarm income generated in the rural communities.

Henry, Somwaru, Schluter, and Edmonson examined some effects of an agriculture composed of fewer medium-sized and thus more large farms on the nonfarm economy, adding another dimension to the Heady and Sonka analysis (20). Their analysis controlled for the total level of sales to users of farm products while the size distribution of farms was varied. To do this they merged a farm income and production expense account into the national input-output model and examined the direct and indirect changes in input use resulting from changes in the farm size distribution.

They concluded that within the nonfarm sectors, the locally oriented service and trade sectors would be required to produce more output and thus would benefit from a farm structure dominated by medium sized farms instead of larger farms. While this would be a cost to society, it would be a benefit to the rural communities where the additional demand for local goods and services would reside.

### Community Analyses

Henderson, Tweeten, and Schriener, in a study based on central place theory, examined how community retail businesses change as a result of changes in farm structure (19), and found that the effects on retail businesses vary by community size. In their study area, the farming dependent Oklahoma Panhandle, the smallest communities lost the most market share, caused by a



shift in farm induced demand for goods and services, as the number of farms and crop acreage declined, and in spite of an increase in per farm income.

There was a smaller decline in the market share of mid-sized communities and the largest communities actually increased market share. The number of retail businesses in the smallest communities declined. There was also a shift in the regional employment structure with employment declines in building materials, grocery, gasoline, and miscellaneous retail businesses. On the other hand, employment increased in apparel, furniture, and restaurant businesses. The authors conclude that community hierarchies are not static and adjust to changes in farm structure. In general, farm structural change that features reduced farm numbers, etc, results in the growth of larger communities at the expense of nearby small communities.

Additional information about both the positive and negative effects of the farm sector on rural communities is contained in a report by Stone. He noted that the adoption in the past of machine and chemical technology by farmers had contributed to the trend toward fewer but larger farms, which in turn had resulted in gradually declining retail sales for some rural communities. That trend had been accelerated by the development of regional shopping centers, improvement in highways, and fuel efficient vehicles. The farm financial circumstances of the 1980's accelerated the rural to urban shopping trend. However, this was in fact a reversal of a 1970s trend in Iowa, in which small town resurgence was driven by increased retail sales of farm equipment, automobiles, building materials, and by other farm oriented businesses (36).

Rural lay persons' views of farm-community linkages may also be of interest. The perceptions and opinions of members of the county government, community officials, and farmers in a southern county regarding how farmers affect communities were reported by Moxley and Liles (25). Among the positive responses were that farmers are retail customers, they operate an (export base) industry that brings outside money into the community, and they are a major property taxpayer. Taff also mentions the property tax, noting that it is the most important source of revenue for most local jurisdictions and is a major link between the farming sector and the local community (37).

#### How Communities Affect Farm Structure

The U.S. rural economic transformation that occurred during the last score years has resulted in the decline in farming as a source of rural employment and income. By the early 1980's, farming accounted for less than 10 percent of total earnings in almost 60 percent of all nonmetro counties in the contiguous United States (2). As the economic influence of farming wanes in most rural areas, future structural changes in farming will have less effect on rural communities. When rural communities grow as a result of nonfarm influences, the local farming sector may be altered by the new economic and social environment. In these cases, the research question might be posed differently. How do changes in the community affect the local farm sector? Obviously, the answers differ depending where the community is located.



### Community Case Studies

There were a number of case studies conducted from the late 1950's through the 1970's which examined the effect of rural nonfarm employment growth on the local farm sector. Bertrand and Osbone (1959) studied the effect of a wood products plant locating in a rural community in southeastern Louisiana. Agriculture in that area was characterized by small marginal farms, indicating the existence of underemployed farm labor resources (5). The researchers found that farm operators who were employed in the plant made little change in their farming operations.

Fuller (1960) studied the effect on farming in a five county area of a manufacturing plant locating in north central Pennsylvania (11). Fuller found that few of the sample farm families actually took jobs at the plant and, for those that did, there were negligible changes in their farming operations. Maitland and Friend (1961) reviewed the results of five studies of rural industrialization in Iowa, Utah, Mississippi, and Louisiana (23). All the areas were characterized as small, low income farming areas. In general, industrial employment was associated with a decline in the farm operator's contribution of farm labor and subsequent substitution of unpaid family labor.

Scott and Chen (1973) modeled the effects of industrialization (new steel rolling plant) on the farm sector in Putnam County, Illinois (29). Using a three-stage linear programming model involving six representative farm sizes, the authors concluded that small farmers could benefit because of their underemployed labor resources. They could decrease labor-intensive livestock enterprises, continue with crop production and take off-farm jobs. (The authors assumed that the prevailing nonfarm wage rate, opportunity cost of farm labor, would increase.) Faced with higher labor costs, large farmers could also substitute less labor intensive enterprises. The net result would be higher and more evenly distributed income in the local farm sector and general economic stimulus in the community.

In general, the literature suggests that increased nonfarm employment opportunities in a rural community is related to positive increases in total family income for small farmers and is also associated with a change towards less intensive farming operations.

The perceptions and opinions of persons in the local county government, community officials, and farmers regarding how communities affect farmers may be of use. Moxley and Liles reported such views from a southern county (25). Among the positive responses were that the community provided retail services, off-farm job opportunities, seasonal hired labor for farmers, credit institutions, agricultural Extension Service, local grocery stores, local recreation services, local health services, good roads, rural water system, seed and fertilizer retailers, farm product buyers and processors, and feed mills. The community also provided the leadership in developing a Federal grant request for a livestock processing plant and in pursuing improvement in highways. Negative responses referred to competition for hired labor, and property taxes assessed by local governments.



### National Studies

Brooks, Reimund and Peterson, using an analysis of variance procedure with county data, found that the rate of change in farm structure variables over the decade of the 70s differed by the rate of total population growth in the region and the degree of urbanization in the county (6). They found that increases in the number of farms could not be attributed to regional increases in the total population, while decreases in land in farms was associated with urbanization of the county. Farmers in metro and adjacent counties shifted to less labor intensive types of farming compatible with off-farm employment. High population growth rates in the region were associated with increased likelihood that farms were operated by full-owners, perhaps because they were the smaller, part-time farms of urban workers.

Carlin and Green, in a national study of local farm structure and community ties, calculated the proportion of farms in each county with gross sales of less than \$40,000. They arrayed counties from lowest to highest using the proportion of farms in a county with gross farm sales of less than \$40,000 and divided the array into quartiles (7). Mapping these counties reveals significant geographic groupings across the United States with large-farm counties concentrated in the Midwest and small-farm counties concentrated in the South.

Relative to small-farm counties, large-farm counties have a relatively small population and employment base and farming is a larger component of the local economy. They are also characterized by population decline or slow population growth. Large-farm counties are less likely to be in or adjacent to a major metropolitan area, making commuting to work more difficult. A high proportion of the land area is in farming, testifying, in part, to the favorable physical geography of the region.

The results suggest that the structure of the local farming sector is influenced not only by conditions within that sector but also by conditions in the local nonfarm sector. Conscious decisions on the part of local community leaders to attract nonfarm employment to their communities are likely to alter the structure of the local farming sector.

Henderson and Brooks, in a follow up study to Carlin and Green, suggest that the farmers in large-farm counties use a different farm management strategy than those in small farm counties (18). Farm operator households allocate their resources among alternative farm and non-farm activities in order to maximize family welfare. The physical and locational environment of large-farm counties correlates with management strategies that take advantage of economies of farm size, extensive crop production, part-ownership, and full-time farm employment. This reflects, in part, a lack of nearby nonfarm employment opportunities, thus expanding the farm business is the most practical way to increase family income. The physical and locational environment of small-farm counties favors strategies of diverting farm labor to full-time, off-farm employment and smaller less capital intensive fully owned farms. These alternative management strategies collectively are reflected in the structure of the local farming sector.



Edwards' et al. farm structure analysis using the longitudinal Census of Agriculture file in a Markov Chain model yielded very useful information that has altered some of our farm structure paradigms (9). For example, changes in farm size display a great deal of symmetry; for every farm that was likely to increase in size, there is one that is likely to decrease in size between census years. Previous research used synthetic models that usually specified that farms either grew or exited the system. While this research contributed significantly to our understanding of farm structural change, conventional analysis that uses a stable transition matrix to project future farm structure is troublesome because it is doubtful that the relations observed in the transition matrix constructed for a specific time period remain constant over time.

Smith explored ways to accommodate this concern in a study to predict the size distribution of dairy farms (32). Following the lead of Stavins and Stanton (35) in their analysis of New York dairy farms, Smith used multinomial logit functions to develop nonstationary transition probabilities for the U.S. Markov Chain model based on the 1974-78 transition matrix. Exogenous variables that he included in his analysis were age of the existing operator population, extent of off-farm work by the existing operator population, change in farm product prices, change in farm asset prices, and change in nonfarm incomes.

While the independent variables considered had little or no explanatory power for many of the cells in the matrix, for mid-sized commercial farms, the proportion of operators age 65 and older in 1974 was positively associated with the probability of exit by 1978. Where statistically significant, nonfarm income growth was positively related to the probability of declines in farm sales and negatively related to farm growth. The proportion of operators working off the farm 200 days or more was positively related to the probabilities of both exit and growth for small commercial farms. That is, the combination of full-time off-farm work and a farm of this size is not sustainable; operators tend either to leave farming completely or increase their farm size to improve total income. Smith demonstrated that including these variables in the model resulted in better projections of farm structure.

Peterson, in a follow up study to Smith, notes that the structural change in the size distribution of farms in the U.S. is related to a variety of economic-demographic forces which have impact on strength and survival of agricultural operations (27). His methodological study also involves the development of a technique that deals with the variability in Markov Chain matrices over time, allowing the measurement of changes in selected structural measures. His empirical results for change in U.S. agriculture during the mid-1970s indicated the importance of demographic variables in changes among size classes of farms. The percentages of farm operators over age 65 and under age 35 and the percentage working off-farm 200 days or more were the most important variables.

Ahearn, Bentley, and Carlin examined the relationship between individual farm financial stress and the extent to which farming dominates the local economy (2). They attached "farming dependent" or "farming important" county codes and individual "farming stress" codes to each of 12,428 farmer



observations from the Farm Costs and Returns Surveys. Their results point to important relationships between the well-being of farm operator households and the characteristics of the counties in which they live. These relationships can be observed both through the farm household income statement and the farm balance sheet.

They hypothesized that off-farm incomes are important for sustaining many farm households. The larger and more diverse the nonfarm sector in the local economy, the more likely that farm household members will be able to obtain nonfarm employment to help maintain household income and the farm business. The more dependent a county's economy is on farming the larger the average size farm and the less likely the operator is to work off-farm. Also, there are fewer alternative opportunities for the use of farmer's labor in such farming counties, thus there are incentives for farmers to expand their farms to achieve fuller employment and higher income.

Even though there are differences in the observed allocation of farm household labor among the county types, there were no major differences in total economic risk among the counties. That is, a farm household is as likely to report economic risk in a farming dependent county as in a nonfarming dependent county.

There is, however, substantial differences in the type of economic risk observed among the county types. In general, the more a county depends on farming, the more likely a farm operator household is to be in a financially risky position (i.e. have a relatively high debt-to-asset ratio) as opposed to low income position. This suggests that community characteristics can affect a farm household's well-being through the balance sheet. Land values are affected by expectations about the ability of the land to generate income. Thus, in counties dominated by farming activities, land values will be sensitive to expectations about farm income. In counties dominated by nonfarm industries, competition from alternative users of farmland will ameliorate declines or actually increase farmland values thus strengthening the equity position of farmers. Even though farmers, as a group, reduced their total debt burden during the 1980's, debt reduction could not keep pace with falling land prices, thus the sector's equity position deteriorated. It appears that farmland owners in farming dependent communities bore the brunt of asset value declines.

The lower incidence of low income in farming dependent counties was a bit puzzling. One explanation might lie in Government payments. Farms in farming dependent counties specialize in producing those crops included in Federal farm commodity programs. Sixteen percent of the farms and 23 percent of agricultural sales were in farming dependent areas, but they received one-third of direct Government payments in 1986. Government payments played a role in ameliorating economic stress in farming dependent areas; without direct Government payments economic stress would have surely been higher in farming dependent counties during the mid 1980's.

Deaton and Weber indicate that among the issues that emerge from the interrelationships between the agricultural economy and the community is the effect of expanding nonfarm employment opportunities on the farmer's



perception of risk, with implications for the selection of farm product mix, the technology used in production, and the capital intensity in farming (8). Risk analysis has often been from the view of the farmer as an entrepreneur whose major focus is on markets, prices, credit, and technology. Risk analysis, however, should also recognize the allocation of farm household labor between farm and nonfarm employment. They suggest that risk averse farmers may be more likely to participate in nonfarm employment. Similarly, risk adverse farmers may be more likely to turn to off-farm activities once size economies in farming have been exploited. In regions where geography does not favor farming, the risk adverse farmers may prefer full-time off-farm employment to farm expansion.

### Conclusions

In this chapter we have discussed the synergistic, two-way relationship between farm structure and the local community. The linkages between farm structure and community characteristics operate in both directions. The more a local area depends on farming the more likely that changes in the fortunes of the farm sector will be felt in the local community. Farming communities are in essence a special case of the "one company town". The number of farming communities has declined substantially during the past 40 years. Most of the remaining farming communities are concentrated in the Plains states and the Western Corn Belt. This is the same area where farming is relatively large scale and where the production of commodities covered by Federal price and income support programs predominate. Often characterized as America's empty quarter, this region is sparsely settled and nonfarm employment opportunities are limited. Overall population and employment growth has been stagnate during the 1980's and most counties have actually lost jobs and people. Future farm structural change that features continued farm consolidation suggests that state and local government officials in this region will continue to struggle with managing overall community decline.

In most rural areas, farming has been a declining source of both employment and income and the chances of it becoming a major driving force for future rural economic growth are low at best. Farm employment has been declining even in relatively "good times" for farmers. While there are farm input and processing industries in local communities that "depend" on the well-being of the farm sector, much of the farm input and processing employment is metropolitan based. Those who advocate keeping the farm sector strong to "preserve rural America" should note that this argument applies to fewer and fewer places as the decades pass on.

As communities diversify and grow, it becomes more likely that changes in the community will affect the structure of the local farming sector. We have noted the effect that nonfarm job opportunities have on the farm sector. But there are other issues proffered by basically nonfarm constituents that will continue to shape American agriculture. Both nationally and in local communities there is a pervasive environmental awareness that leads to several agricultural concerns. Whether valid or not, there are concerns about pesticide residue in food, animal stress in confinement livestock operations, and farmland protection and conservation (17). Half of all U.S. counties are



reported to have potential for groundwater contamination from farm fertilizers and pesticides (26). While there are effective methods for detecting small quantities of contaminants, there is a lack of data on their effect on humans, leading to circumstances "full of suspicion but short on verification" (22). Demands for state and Federal legislation to prevent contamination and addressing public concerns follow (21). New rural residents, living close by and observing current farming practices, are among the most vocal. Historically, adoption and use of farm technology has been voluntary but, regulation of farming technology in the future could influence farming structure substantially. Analysis of how community characteristics affect farm household well-being and farm structure will be a useful approach for students of farm structure as they attempt to understand where the farm sector is heading.



Literature Cited

1. Ahearn, Mary, and David Banker, "Urban Farming Has Financial Advantages," Rural Development Perspectives, Econ. Res. Serv., U.S.D.A., Vol. 5, No. 1, Oct. 1988, p. 19.
2. Ahearn, Mary, Susan Bentley, and Thomas Carlin, Farming-Dependent Counties and the Financial Well-Being of Farm Operator Households, Econ. Res. Serv., U.S.D.A., AIB 544, August 1988.
3. Babb, E.M., "Consequences of Structural Change in U.S. Agriculture", Structural Issues of American Agriculture, Econ. Res. Serv., U.S.D.A., AER No. 438, Nov. 1979.
4. Bender, Lloyd D., et al., The Diverse Social and Economic Structure of Nonmetropolitan America, Econ. Res. Serv., U.S.D.A., RDRR No. 49, Sept. 1985.
5. Bertrand, A.L., and H.W. Osborne, "Impact of Industrialization on a Rural Community," Journal of Farm Economics, Dec. 1959, pp. 1127-1134.
6. Brooks, Nora, Donn Reimund, and R. Neal Peterson. Effects of Population Growth and County Type on Farm Structure, 1970-80, Staff Report No. AGES 89-37, Economic Research Service, U.S. Department of Agriculture. August 1989.
7. Carlin, Thomas A., and Bernal L. Green, Local Farm Structure and Community Ties, Econ. Res. Serv., U.S.D.A., RDRR No. 68, March 1988.
8. Deaton, Brady J. and Bruce A. Weber, "The Economics of Rural Areas," Chapter 14 in R.J. Hildreth, et al. editor, Agriculture and Rural Areas Approaching the Twenty-first Century: Challenges for Agricultural Economics, Iowa State University Press. 1988.  
pp.403-4439.
9. Edwards, Clark, Matthew G. Smith, and R. Neal Peterson, "The Changing Distribution of Farms by Size: A Markov Analysis", Agricultural Economics Research, Vol. 37, No. 4, Econ. Res. Serv., U.S.D.A., Fall 1985.
10. Francis, Wyn., and Mindy Petrulis, "Food Processing and Beverage Industries: Moving Toward Concentration", National Food Review, Econ. Res. Serv., U.S.D.A., Vol. 11, Issue 4, Oct.-Dec. 1988, pp. 23-27.
11. Fuller, T.E., Description and Analysis of a Rural Area in North Central Pennsylvania Prior to the Establishment of an Industrial Plant, Agricultural Economics and Rural Sociology Report 26, Penn. Ag. Exp. Stat., Penn. State Univ., 1960.
12. Gilles, Jere Lee and Michael Dalecki, "Rural Well-being and Agricultural Change in Two Farming Regions," Rural Sociology, Vol. 53, No. 1. Spring 1988. pp. 40-55.



13. Goldschmidt, Walter R., "Small Business and the Community, A Study in Central Valley of California on Effects of Scale of Farm Operations," Report of the Special Committee to Study Problems of American Small Business, U.S. Senate, Wash., D.C., 1946.
14. Hayes, Michael N. and Alan L. Olmstead. "Farm Size and Community Quality: Arvin and Dinuba Revisited," American Journal of Agricultural Economics, Vol. 66, No. 4, November 1984. pp.430-436.
15. Heady, Earl O. and Steven T. Sonka. "Farm Size, Rural Community Income, and Consumer Welfare," American Journal of Agricultural Economics, Vol. 56, No. 3, August 1974. pp. 534-542.
16. Heffernan, William D., and Paul Lasley, "Agricultural Structure and Interaction in the Local Community: A Case Study," Rural Sociology, Fall 1978. pp 348-361.
17. Heimlich, Ralph E., "Metropolitan Agriculture-Farming in the City's Shadow," APA Journal, Autumn 1989. pp. 457-466.
18. Henderson, David A., and Nora L. Brooks, Bimodal Distribution In Agriculture: A Geographical Perspective, Econ. Res. Serv., U.S.D.A., RDRR, Forthcoming.
19. Henderson, David, Luther Tweeten, and Dean Schreiner, "Community Ties to the Farm," Rural Development Perspectives, Vol. 5, No. 3, June 1989, pp. 31-35.
20. Henry, Mark S., Agapi Somwaru, Gerald Schluter, and William Edmonson, "Some Effects of Farm Size on the Nonfarm Economy," North Central Journal of Agricultural Economics , Vol. 9, No.1, January 1987. pp.1-11.
21. Holmes, Thomas, Elizabeth Nielsen and Linda Lee, "Managing Groundwater Contamination in Rural Areas," Rural Development Perspectives, Vol. 5, Issue 1, October 1988. pp. 35-40.
22. Kennedy, Donald, "Humans in the Chemical Decision Chain," Choices, Third Quarter 1989. pp. 4-7.
23. Maitland, Sheridan T., and Reed E. Friend, Rural Industrialization, A Summary of Five Studies, AIB No. 252, Econ. Res. Serv., U.S.D.A., 1961.
24. Markousek, Gerald, "Farm Size and Rural Communities: Some Economic Relationships," Southern Journal of Agricultural Economics, Vol. 11, Dec. 1979.
25. Moxley, Robert L. and James Liles. "Agriculture and Locality Interrelationships: Perspectives of Local Officials and Farmers," Unpublished paper presented at the annual meetings of The Rural Sociological Society in Madison, WI (August 1987). North Carolina Agricultural Research Service Project NC13741, 1987.



26. Nielsen, Elizabeth G. and Linda K. Lee, "The Magnitude and Cost of Groundwater Contamination From Agricultural Chemicals: A National Perspective", Econ. Res. Serv., U.S.D.A., AER No. 576, October 1987.
27. Peterson, R. Neal. "A Single Equation Approach to Estimating Nonstationary Markov Chain Matrices: The Case of U.S. Agriculture 1974-78," Unpublished report, ERS, USDA, November 1989.
28. Salant, Priscilla, and Robert D. Munoz, Rural Industrialization and Its Impact on the Agricultural Community: A Review of the Literature, Econ. and Stat. Serv., U.S.D.A., Staff Rpt. No. AGESS810316, April 1981.
29. Scott, John T., Jr., and C.T. Chen, Impact of Rural Industrialization on Farm Organization Within the Area Where Industry Locates, Working Paper Series RID 72.9, Cent. of App. Soc., Dept. of Rur. Soc., Univ. Soc., Dept. of Rur. Soc., WI, 1973.
30. Shaffer, Ron, Priscilla Salant, and William Saupe, "Understanding the Synergistic Links Between Rural Communities and Farming," in New Dimensions in Rural Policy: Building Upon Our Heritage, Joint Committee Print, Joint Economic Committee, Congress of the United States, 99th Congress, 2nd Session. June 5, 1986. pp. 308-321.
31. Shaffer, Ron. Community Economics: Economic Structure and Change in Smaller Communities, Iowa State University Press. 1989.
32. Smith, Matthew G., A Conditional Approach to Projecting Farm Structure, Econ. Res. Serv., U.S.D.A., Staff Rpt. No. AGES880208, April 1988.
33. Solomon, Sonya. "What Makes Rural Communities Tick?," Rural Development Perspectives, Vol. 5, No. 2, June 1989, pp. 19-24.
34. Sommer, Judith E., and Fred K. Hines, The U.S. Farm Sector: How Agricultural Exports Are Shaping Rural Economies in the 1980's, Econ. Res. Serv., U.S.D.A., AIB 541, Sept. 1988.
35. Stavins, R.N., and B. F. Stanton, Using Markov Models to Predict the Size Distribution of Dairy Farms, New York State, 1968-1985. A.E. Res. 80-20, Ithaca, N.Y., Cornell Univ., Ag. Expt. Sta., 1980.
36. Stone, Kenneth E. "Impact of the Farm Financial Crisis on the Retail and Service Sectors of Rural Communities," Unpublished paper, Department of Economics, Iowa State University. 1987.
37. Taff, Steven J. "Farming, Farm Programs, and Local Economies," Minnesota Agricultural Economist, No. 659, October 1989. pp.4-5.
38. U. S. Department of Agriculture, Econ. Res. Serv., Agricultural Finance: Outlook and Situation Report, AFO-26, March 1986.



Additional References

Farm structure-community interrelationships have been investigated by social scientists since at least the 1940s. A sizeable body of literature has emerged. Besides articles and reports, there are entire volumes that are relevant to the issues as well as annotated bibliographies. To facilitate a search by others we have referenced a selection of such sources here.

Leistritz, F. Larry and Brenda L. Ekstrom. Interdependencies of Agriculture and Rural Communities, Garland Reference Library of Social Science, Vol. 383, Garland Publishing, Inc., New York and London. 1986.

Congressional Research Service, Library of Congress, "Agricultural Communities: The Interrelationship of Agriculture, Business, Industry and Government in the Rural Economy," Committee Print, 98th Congress, 1st Session. U.S. Government Printing Office. October 1983.

Joint Economic Committee, Congress of the United States "New Dimensions in Rural Policy: Building Upon Our Heritage," Joint Committee Print, 99th Congress, 2d Session. U.S. Government Printing Office. June 1986.

Guither, Harold and Harold G. Halcrow. The American Farm Crisis. An Annotated Bibliography With Analytical Introductions, Pierian Press, Ann Arbor, Michigan. 1988. Chapters 1 and 5.