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Determinants of Farm Size and Structure

Proceedings of the program sponsored by the NC-181 Committee on Determinants of Farm Size and Structure in North Central Areas of the United States, held January 16, 18, and 19, 1988, in San Antonio, Texas.

Robison/Introduction and Overview

Johnson/Farm Managerial Inquiry: Past and Present Status and Implications for the Future

Batte/Question and Answer Session Following Glenn Johnson's Presentation

Sonka/Factors We Observe on Successful Midwest Farms Today

Ruttan/Scale, Size, Technology and Structure: A Personal Perspective

Batte/Discussion Following Vernon Ruttan's Presentation

Hallam/Economies of Size: Theory, Measurement, and Related Issues

Henderson/Application of the Structure, Conduct, and Performance Paradigm to Research on the Structure of Agriculture

Young, May, and Shetewi/Farm Size Classifications and Economies of Size: Some Empirical Issues

DeFraín and Stinnett/Strong Families and Strong Farming Organizations: Is There A Connection?

Richardson, Smith, and Knutson/Who Benefits From Farm Programs: Size and Structure Issues?

Headley/The Effect of Government Policy on Farm Size and Structure

Tweeten/World Trade, Exchange Rates, and Comparative Advantage: Farm Size and Structure Implications

Carlin/Strong Communities - Strong Farms: What is the Connection?

Baker/Financial Stress in Agriculture: Likely Impact for Farm Structure

**DETERMINANTS OF FARM
SIZE AND STRUCTURE**

Edited By

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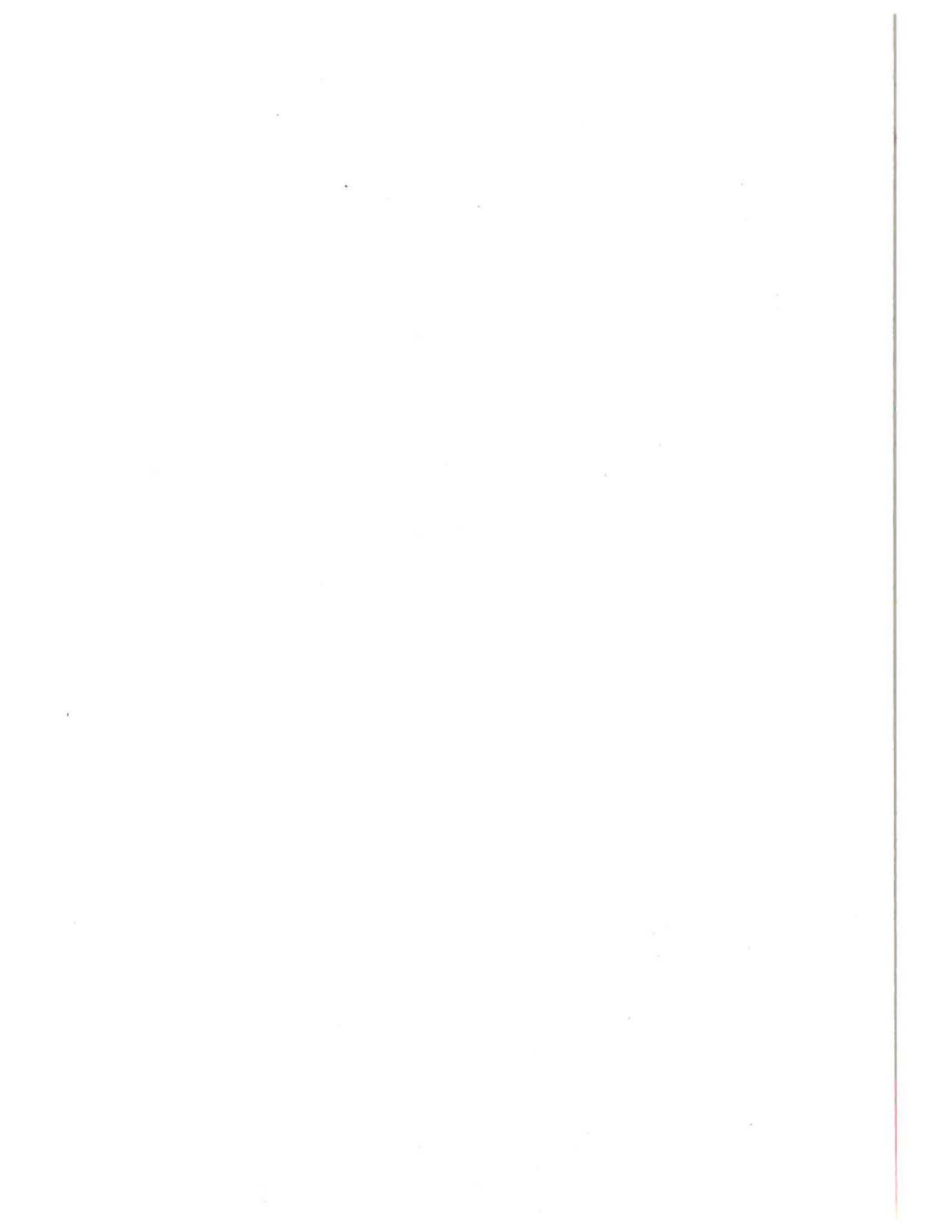
PREFACE

This publication contains papers presented at the 1988 meeting of the North Central Regional Research Project NC-181. The program is listed in the Appendix. This is the first set of proceedings papers arising from the NC-181 project. It is expected that proceedings papers will be produced for the meetings held in the future. The objectives of NC-181 and a brief introduction are contained in this report's first article.

Cooperating agencies in the NC-181 project are the Agricultural Experiment Stations of Arkansas, Cornell, Illinois, Iowa State, Kansas State, Kentucky, Michigan State, Minnesota, Missouri, Nebraska, North Dakota, Ohio State, South Dakota, and Wisconsin, and the Economic Research Service of the U.S. Department of Agriculture. The project's administrative advisor is Robert Jolly, Iowa State University. James Nielson serves as the CSRS representative to the committee. The program committee for the 1988 meeting consisted of Arne Hallam, Robert Hornbaker, and Lindon Robison, Chairman.

Special thanks are due the Farm Foundation under the direction of R.J. Hildreth and Walter J. Armbruster for providing financial support for one of the papers presented by an invited guest. We also thank Marvin Batte for tireless effort that led to the organization of NC-181. Finally, Jeanette Barbour, at Michigan State University, should receive a bouquet of roses for pioneering a desk-top published proceedings. This involved long hours untangling papers in diverse word processing packages and reproducing them in a consistent manner.

Lindon J. Robison



INTRODUCTION AND OVERVIEW*

Lindon J. Robison**

The NC-181 Committee was organized to study the determinants of farm size and structure in north central areas of the United States. This report is the committee's first collective response to meeting the objectives that include:

- (1) To evaluate existing concepts and delineate improved techniques for measurement, economic evaluation, and prediction of farm size and structural change.
- (2) To identify and quantify factors contributing to changes in the size and structure of American farms.
- (3) To develop new regional or national databases useful to evaluate size and structural changes using the concepts and techniques of objective (1).
- (4) To identify implications of future changes in farm size and structure on the economic performance of farm firms and on the infrastructure of rural areas and industries serving the farming sector.

It is always a good idea to begin a report like this with a statement nearly all can agree on. The closest I can come to such a statement is the following: the size and structure of American agriculture is changing. Moreover, it is different today than it was 5, 10, or 20 years ago. Beyond these statements, our unanimity dissipates as we attempt to introduce definitions, measure the change, and deduce the implication and causes of the change, and the likely direction of changes in size and structure of American agriculture in the future. So having told you what not to expect, we can begin in earnest our topic and the introduction to the papers contained in this proceedings.

First, what do we mean by farm size and structure? It obviously depends on who wants to know and who is in charge of answering the question. Animal scientists may use number of animals as a measure. Crop scientists may refer to the number of acres in various crops in the farm unit. Economists answering the question tend to focus on the fixed costs of the business. Bankers might measure it by the value of the farm business assets. Organizational engineers might measure it by the number of people employed. Historians, on the other hand, may want to integrate intertemporal dimensions, such as longevity of the business or business owners into the measures. Finally, management scientists may find of most interest the stability of the business.

I introduce the diversity of views to underscore the need for a diversity of approaches to the study of farm size and structure. This report has papers that reflect some of the different views one might take in a study of farm size and structure.

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One approach for measuring farm size is USDA's sales class definitions. Rural residences have sales of farm products of less than \$5,000. Small farms have sales between \$5,000 and \$39,999. Medium farms have sales of farm products between \$40,000 and \$199,999. Finally, large farms have sales over \$200,000.

For others, farm size is measured in acres, aggregate input, output, and value added. Since dollars is the only homogeneous measure (one dollar is like another but one acre of land may not be like another acre of land), it seems quite appropriate to use dollars as the measure. The difficulty, of course, is that dollars are homogeneous measures only if being compared in the same time period (a 1950 dollar doesn't buy the same goods as a dollar in 1988). Thus dollars may be useful for cross-sectional comparisons but not intertemporal comparisons. For intertemporal comparisons, acres or cows or bushels of product produced may be more useful.

The definition of farm structure does not, of course, mean the same thing as farm size. NC-181, in its project outline, referred to Rasmussen's definition of farm structure. His definition is that farm structure is the control and organization of resources needed for farm production. Structural studies of farms could, according to Rasmussen, be organized by the number and sizes of farms by commodities and by regions, the degree of specialization in production and the technology employed, the ownership and control of productive resources, barriers to entry and exit in farming, and the social, economic, and political situation of farmers.

One might ask for a definition with some more precise boundaries. But such a request is not likely to be satisfied. For example, Tweeten defines farm structure as: farm size and numbers, tenure patterns, legal organization, the market arrangements under which farmers buy and sell, and the institutional arrangements influencing the farming industry. It appears that a complex study requires a broad definition.

Still within the broad definition of farm size and structure, the activities of NC-181 members and the papers of this proceedings reflect a particular concern. The interest appears to focus on what factors determine who owns the agricultural resources used to produce food and fibre, and what sizes (measured in both physical and economic units) characterize the units of productive agriculture.

Management and Families

The factors that are most frequently recognized as influencing the size and structure of agriculture can be divided into endogenous and exogenous. Endogenous factors include the managerial talents of the farm operators. Glenn Johnson and Steven Sonka both address the problem of managerial influences on determining which farms survive and are profitable. Johnson points out that our attention to the science of management has likely been inadequate. Moreover, in part, our inattention may be due to the multidisciplinary approach needed to study management.

Sonka points out the important fact that management matters. Even on farms of nearly equal resources, managerial practices account for important differences in the success of the farm business. Sonka's paper is particularly useful because it provides one of the few recent efforts to account for managerial influence in the success of the farm business.

It may also be important to note here John DeFrain and Nick Stinnett's interesting paper. They report on their work that has received national and international attention. It is on the identification of factors associated with strong families. For some time society has expressed

preference for the family farm. Many important agricultural policies have been directed toward preserving it as an institution. But without families that successfully work and play together, this family farm survival goal will not be achieved. DeFrain and Stinnett describe factors associated with successful families.

Technology and Farm Size and Structure

Ruttan's paper on technology deserves particular attention. Should technology be described as an exogenous or endogenous factor influencing farm size and structure? His well-recognized work with Hayami suggests that often technologies are responses to other forces. For example, Ruttan refers to work by Peterson and Kiev that suggests most labor and capital substitutions are attributable to changing relative prices. Moreover, productivity gains per agricultural worker in the United States have often come as mechanical power has been substituted for man-hours.

In this regard, Ruttan sounds a note of caution. He sees nothing in the evidence presented in recent technological studies that leads him to anticipate productivity gains over the next several decades comparable to the gains achieved since 1940. Thus Ruttan sees little opportunity for adjustments in farm size and farm structure to contribute to either efficiency in agricultural production or to inter-sector equity in income distribution in the United States. Moreover, he cautions that recent advances in crop yields may plateau out.

Government Policies and Farm Size and Structure

James W. Richardson and co-authors, widely recognized for their simulation of the effects of farm programs, discuss the more frequently asked question regarding our government's farm policy. The question is: who benefits the most? If benefits are measured by farm survival probabilities, Richardson et al. conclude that middle-size farms benefit the most. Moreover, it is also this same group most likely to be the most severely stressed if programs are eliminated or reduced.

J.C. Headley is less sure than Richardson et al. of the effects of our government's farm programs. He concludes that there are no easy answers. Nonfinancial motivations, reaction to risk, technology, tax policy, monetary-fiscal policy, and credit have all played a role in determining farm size and structure. Headley asks: is there any evidence that our farm programs, particularly price and income programs, have ever been significant in shaping the size, number, and control of American farms? Headley doesn't believe we can answer the question with our available data. He does suggest we examine the issue more carefully.

The Significance of International Trade

Perhaps, with agriculture's significance as an export industry, world trade, exchange rates, and comparative advantage are the critical factors that can explain farm size and structure. Luther Tweeten explores this issue. He concludes that exposure to international markets has enhanced technology, productivity, the opportunity cost of farm labor, and economies of size. But the instability generated by exposure to international markets has motivated many farmers to turn to part-time farming to stabilize their earnings. The result has been the dual structure of a few large farms that account for most of the output but many small part-time farms that account for most of the farm numbers.

The Farm and the Community

Every program dealing with farm size and structure should invite Tom Carlin to speak. At least, they should ask him to send a representative. What we sometimes forget is that farms do not exist independent of their communities. Carlin tells how they are related. Communities dominated by farmers are in essence a special case of the "one company town" according to Carlin. But those communities falling into this classification are decreasing as the farm population as a percentage of the total population decreases. On the other hand, as rural communities outgrow their farmer dependence, they will definitely alter farm size and structure. The nature of this linkage is what Tom Carlin suggests deserves research attention.

Farms, Finances, and Farm Size and Structure

The final paper in these proceedings was not presented at our meetings, but at an earlier NC-181 meeting held in St. Louis, Missouri, October 29, 1986. Several members of the NC-181 Committee suggested that C.B. Baker's paper be included because the topic remained crucial and Baker's paper provided needed insights into the area of how financial stress in agriculture will likely change farm structure.

Baker observes that there appears to be a concentration of debt both by size and by region. Moreover, this concentration of debt appears to indicate the areas most stressed financially. For example, financial stress is highly focused in the Midwest and Great Plains where reliance on export demand for corn, wheat, and soybeans is high.

Theoretical Concerns and Measures of Farm Size and Structure

The committee benefitted from two tutorials presented at the meeting. Dennis Henderson presented the first one on the structure, conduct, and performance paradigm. He claims it is a useful framework for addressing farm size and structure issues in agriculture. His paper was convincing, and we agree. It does appear to be useful in explaining agriculture's relationship to its input supplies and the purchases of its products. We expect some of this committee's effort will follow on Henderson's challenge to apply the structure, conduct, and performance paradigm to meeting our committee's objectives.

Arne Hallam's paper performs a valuable service for this committee. It is an exhaustive review of the theory and measurement issues of economies of size, scale, and scope. I would advise students interested in size and structure issues in agriculture to begin with his paper.

Hallam suggests three areas beg for further empirical research. They are: (1) the study of multiproduct farms using cross-section data and positive methods; (2) studies that explain the growth and contraction of individual firms over time; and (3) studies that estimate frontier functions that help us understand the effects of efficiency on an industry.

It remained, however, for Young, May, and Shetewi to remind us that the "emperor wore no clothes." They point out that the gross value of sales (GVS) criteria typically used to divide farms into economic size classes in Agricultural Census and USDA reports is inconsistent with "scale of plant" measures employed in economic theory. Fortunately, GVS and the "scale of plant" measures provide highly correlated classifications. At least, they did so in the empirical study of

Pacific Northwest dryland grain farms. This paper does leave with us, however, the challenge: do we need new measures of farm size?

Comments and Conclusions

I have tried to provide in this introduction a summary of the findings contained in the papers presented at the NC-181 meeting held in January 1988 in San Antonio, Texas. Marvin Batte deserves special thanks for recording and editing comments following papers by Johnson and Ruttan. The conclusion I arrive at after reviewing these papers is that there is much left to learn about factors influencing farm size and structure.