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**CORNELL**  
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**FARM STRUCTURE:  
CONCEPT AND DEFINITION**

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## FARM STRUCTURE: CONCEPT and DEFINITION\*

Farm structure, like a number of terms which are widely used by the general public, has no single, widely accepted definition. The word, structure, suggests a framework around which a more complete entity or whole is constructed. Perhaps framework is the ideal word or concept to have in mind as we examine alternative ways in which "farm structure" has been defined and used. The basic objective of studying farm structure is to understand more fully how and why the sector that produces agricultural products is changing in the United States and what such change may mean in the future. Farm structure has become one of the central concerns of those interested in agricultural policy in the second half of the twentieth century. The meaning of this concept and reasons for interest in it are central to this book.

This chapter is designed to help the reader grasp the concept of farm structure and more fully appreciate the discussion surrounding this concept. In the first section, the concept or definition of structure is explored and developed. Since the measurement of farm size is a critical component of structure, the second section describes the different methods of classifying farms by size along with the problems, caveats, and pitfalls of each method.

### Definitions of Farm Structure

One way to understand how the term, farm structure, is used and understood is to examine a few definitions and statements that have been published by recognized authorities in the field. These quotations provide additional insight into the problems and concerns that are commonly addressed under the heading, farm structure. The first citation is an excerpt from a standard dictionary. This is followed in turn by direct quotes from three relatively recent and important sources.

"Structure....The arrangement or interrelation of all the parts of a whole; manner of organization or construction: as they studied the structure of the atom, the structure of society..." -- Webster's New World Dictionary of the American Language

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\*This manuscript was prepared as a contribution to a book to be published by Iowa State University Press, Determinants of Size and Structure in American Agriculture. It is a part of the output from Regional Research Project NC-181.

"The structure of agriculture refers to the number and size of farms; ownership and control of resources; and the managerial, technological and capital requirements of farming. The issues of the structure of agriculture are illustrated by such questions as:

- Will the family farm survive?
- Do farm programs help or injure the chances of family farm survival?
- Who controls production and marketing decisions at the farm level?
- What is the balance of market power among input suppliers, farmers, and marketing firms?
- Will U.S. agriculture eventually become industrialized and controlled by large agribusiness corporations?
- What type of agriculture is wanted in America?"

from Knutson, Penn and Boehm, Agricultural and Food Policy, 2nd edition, Prentice Hall, 1990, Chapter 11, p. 270.

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"Structure is not an easy concept to define. It involves the following components:

- Organization of resources into farming units.
- Size, management, and operation of these units.
- Form of business organization, whether a sole proprietor or several individuals in a partnership or corporation.
- The degree of freedom to make business decisions, and the degree of risks borne by the operator.
- Manner in which the firm procures its inputs and markets its products.
- Extent of ownership and control of the resources that comprise the farming unit.
- Ease of entry into farming as an occupation.
- Manner of asset transfer to succeeding generations.
- Restrictions on land use; immediate 'sovereignty' versus stewardship for future generations."

"The term family farm structure, although loosely and imprecisely used, often means a relatively large number of modest-sized farms, each operated by a family unit, perhaps employing some nonfamily labor, but with the husbandry and management decisions by the operator and family and the inputs purchased from and products sold in open, easily accessible, competitive markets. Obviously, a wide range of structural configurations would fit within this definition," -- Penn, J. B., "The

Structure of Agriculture: An Overview of the Issue,"  
Structural Issues of American Agriculture, ESCS, USDA,  
 Agr. Econ. Rpt. 438, November 1979, p. 5.

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"....Farm Structure refers to farm size and numbers, tenure patterns, legal organization (sole proprietorship, partnership or corporation), the market arrangements under which farmers buy and sell, and the institutional arrangements (including, of course, the public sector) influencing the farming industry," page 1.

"....The four components of the definition of the family farm given in the introduction provide a framework to examine the prospective future structure of farming, which is moving toward:

- (1) fewer farms and less production under family sole proprietorships and more under nonfamily-type corporations, partnerships and conglomerate firms. Vertical coordination in the form of production contracts and vertical integration is on the rise and extending to additional commodities such as swine. Farm operators increasingly must share control of their decisions with the government, landlords, banks and others;
- (2) more farms and production under arrangements whereby the operator furnishes less than one-half the labor;
- (3) more part-time operations in which the operator and family receive more income from off-farm than from farm sources;
- (4) an industry in which farms of all types have gradually if erratically improved their rate of returns on resources and incomes to parity with those in the nonfarm sector in normal years..."  
 page 54.

from Tweeten, Luther, Causes and Consequences of Structural Change in the Farming Industry, NPA Food and Agriculture Committee, FPA Rpt. 207, 1984.

### Common Elements in These Definitions

These quotations have a number of elements in common which are fundamental to an understanding of structural issues in a policy context. It is important to recognize first that all farm structure issues are concerned simultaneously with: (1) farms and farm businesses, (2) farm households, and (3) agricultural resources. There are some important reasons for examining each of these aspects of farm structure separately because the forces of change touch each of them somewhat differently.

- (1) Farm Businesses -- At the center of any study or discussion of farm structure are a set of business entities with balance sheets, profit and loss statements, commonly referred to as farm businesses. These operations combine the services of land, labor, capital, and management in production and sustain profits and losses like any other business. They are somewhat unusual in the sense that land is commonly such an important component in the mix of resources used in production. Yet even here there is wide variation among them from intensive greenhouse operations at one extreme to cow/calf operations making use of large areas of open range and pasture for every animal unit. The business as a productive enterprise contributing value-added to the national economy is basic to this concept.
- (2) Farm Households -- It is important to recognize and differentiate decisions and actions taken by the farm household from decisions and actions taken by the farm business. Increasingly, such decisions are separate, even though interrelated. In terms of priority, it is the welfare of the members of the household that usually takes precedence in decision-making if there is a conflict between the household and the business. Following the same logic, decisions about off-farm and on-farm employment by family members is taken in the context of what is best for the farm household in total, not necessarily what is best for the farm business. Understanding the nature of change in farm structure requires conscious recognition of the role of the household in actions of family members, especially as more and more members of farm households hold off-farm jobs.
- (3) Agricultural Resources -- Fundamental to the organization of agricultural businesses is the resource base associated with farming in all its many dimensions. For most farms, land is a necessary and key component. For livestock rearing enterprises, it may encompass large areas of land with substantial amounts of capital

invested per worker in the business. On crop farms, whether they produce extensive crops like hay and grain, or intensive crops like vegetables and fruit, the quality of the land resource and the associated climate and location with respect to markets has much to do with production alternatives and the way farming is organized. Land, labor, capital, and management collectively are the fundamentals around which farm structure is constructed and the basic mechanisms through which structural change occurs is carried out. Thus, the quality and quantity of these resources available in each region are one of the key determinants of farm structure as it evolves, as well as to the alternatives open to farm businesses and farm households.

### Major Issues and Concerns About Farm Structure

The quotations cited concerning farm structure all dealt with farm businesses, farm households, and agricultural resources. The reasons for constructing the definitions were a set of concerns and issues about past and future changes in structure and the reasons for them. These issues revolve around: (1) changing distributions within the sector; (2) production decisions and who makes them; and (3) ownership of resources and control over their use.

- (1) Changing Distributions in an Industry Context -- Nearly all discussions of farm structure include an examination of changes in numbers and sizes of farms. It is changes in cropland per farm or capital investment per farm or gross sales per business unit that are used in describing structural change or in addressing major concerns about structure. It is from aggregate distributions that one can learn what proportion of industry sales is provided by the 10,000 largest farms or what has happened to the numbers of small, or mid-sized farms however these are defined. No single frequency distribution is adequate to describe farm structure. Hence, distributions of farms by sales class, land area, labor force, acres of key crops or numbers of livestock are all used in examining structure and change through time. What happens to these distributions remains a focus of public interest and debate.
- (2) Production Decisions and Organization -- Associated with the industrialization of agriculture has come market demands for consistent supplies of uniform products in relatively large quantities. Input suppliers on one side of farm producers and processors and marketing firms on the other side have become fewer in



number with the power to impose substantial requirements on the production and marketing decisions of producers. Complete independence for the producer in deciding what to plant or produce and when and how much to sell has become less and less possible for an increasing number of relatively perishable products.

The organization of production on the farm must increasingly fit into an industry context. The more perishable the product, the more important that it move to market in an efficient and well established manner. For those farmers who wish to control both production and marketing decisions, they must establish a special marketing niche in localized markets, utilize roadside markets or pick-your-own operations, or some other retailing relationship. Alternatively, they will contract or build a relationship with an integrated production and marketing system or become the integrator. The more storable the product, in general, the less pressure to be directly tied to some formal arrangements for buying inputs and selling products. Increasingly, farm businesses examine such options or participate in cooperative or corporate systems that allow efficiency in buying, selling or obtaining services.

- (3) Resource Ownership and Control -- Capital requirements per worker in commercial agriculture are high by comparison with nearly any other modern industry. Real estate requirements explain an important part of this; capital for livestock and machinery are another major component. Historically, individual proprietorships have been the dominant form of business organization in farming. Thus, access to resources for farm production and control over them has been a major concern in the evolution of farm structure in nearly all industrialized societies.

Historically, control over the use of land and tenancy issues have been major concerns of people in both developed and less developed societies. In the United States, tenancy and share cropping were major policy issues in the 1920s and 1930s. By the 1950s, most farmers in the United States owned at least part of the land they farmed and rented some land in addition. In the later years of this century, part owners (as contrasted with full owners) have become the dominant group in commercial agriculture. The Jeffersonian notion of a nation of independent freeholders operating their homesteads with family labor does not describe any segment of American agriculture today even though this myth lives on in the minds of many Americans.

As less and less land and the associated capital is owned by the farmers who operate it, the way in which returns to these resources is distributed will be of increasing interest to owners, operators and society at large. The potential for concentration of power in the hands of a few key decision makers continues to undergird the discussion of farm structure issues. In individual communities, there are the beginnings of such control or positions of power, even though at regional or national levels, such concentration is small compared to that in most other industries. The broiler industry, fed cattle, and some processed vegetables provide examples of situations where public concerns are already evident (Reimund, Martin and Moore).

### Study and Analysis of Farm Structure Issues

The selected definitions of farm structure and the preceding paragraphs were intended to call attention to common elements and issues associated with discussion about farm structure. They are intended to provide a frame of reference for succeeding chapters in this book. Questions about structure and size distributions, including methods of analyzing them, revolve around farms, households and agricultural resources. Increasingly, the focus of attention is on public policy issues. The effects of government programs on the size distribution of farms; the ability of farms operated primarily with family labor to compete with larger farms; the degree of control by major processors over all phases of production in some sectors of agriculture -- these are the kinds of issues which generate interest in understanding more fully what is happening to farm structure and the forces which bring about change. No single size distribution or method of analysis can effectively characterize the complexity of farm structure. A sense of the larger context in which structural change will continue to occur is essential.

The word, size, is used throughout the discussion of farm structure. In fact, size is such an important part of the structure discussion that the phrase "size and structure" is used widely instead of just the word, structure. Even though size does have this important role, there is not a universally accepted procedure for measuring size. In the next section, alternative methods of measuring size are presented and discussed.

## EFFORTS TO CLASSIFY FARMS and MEASURE FARM SIZE

Substantial efforts have been made by various units of government, both in the United States and other developed countries in the world to develop systematic ways to classify farms into meaningful groups to aid in discussing public policy issues and to describe more accurately changes as they occur in the structure of agriculture. Most of these efforts use multiple criteria to classify farms into meaningful groups. An internationally accepted classification system has not emerged. The major descriptive measures center on: (1) economic size in terms of output, and (2) amount of labor used in production, and (3) the share of household income provided by the farming enterprise. Measures using physical quantities, such as acreage of numbers of animals, have not been used widely because of the problems of aggregation across different types of farming.

### Census Classification into Economic Classes

Under the leadership of Ray Hurley at the Bureau of the Census and with the encouragement of the Bureau of Agricultural Economics, USDA as well as his Census Advisory Committee, an Economic Classification of Farms was developed for the 1950 Census of Agriculture. All farms were first divided into two groups: "commercial" and "other" (Table 1). The commercial farms were further divided into six classes on the basis of the value of farm products sold. The other farms were subdivided into three groups with the general titles of "part-time," "residential," and "abnormal." The major criteria used in classification were value of farm products sold, days of work off-farm by the operator, and income of family members from off-farm sources.

In many respects, this system divided farms into three major categories: full-time, part-time and residential. The subdivision for economic Class VI differs from part-time only on the reported number of days of work off the farm and income from off-farm sources. If one were to assume that most of the 717,201 farms in economic Class VI were, in fact, individuals who necessarily were getting more than half their net income from off-farm sources, they could well be counted with the part-time units. Thus, 56 percent of the total, just under three million, could be considered full-time farms; 25 percent were part-time or close to that designation; and 19 percent were residential.

Table 1.

DISTRIBUTION OF FARMS BY ECONOMIC CLASS  
Census of Agriculture, United States, 1950

Class	Criteria used:		Number of farms
	Value of farm products sold	Other	
<u>Commercial:</u>			
I	\$25,000 and over	None	103,231
II	10,000 - 24,999	None	381,151
III	5,000 - 9,999	None	721,211
IV	2,500 - 4,999	None	882,302
V	1,200 - 2,499	None	901,316
VI	250 - 1,199	Less than 100 days of work off farm by operator; income of family members from off-farm sources less than value of farm products sold.	<u>717,201</u> 3,706,412
<u>Other:</u>			
Part-time	\$250 - 1,199	100 days or more of off-farm work by operator; income of family members from off-farm sources greater than value of farm products sold	639,230
Residential	Less than \$250	None	1,029,392
Abnormal	Not a criterion	Institutional farms, experi- mental farms, grazing assoc- iations, etc.	<u>4,215</u> 1,672,838
Total number			5,379,250

Source: U.S. Census of Agriculture, Volume II, 1950, pp. 1109-10.

Hurley continued to experiment with Economic Classes during the next two decades, adjusting the six commercial categories to reflect both changes in prices and technology (Table 2). Most of the sales class intervals doubled between 1950 and 1969 even though the Producer Price Index for farm products and processed foods and feeds had only increased from 93.9 to 108.0 over those 20 years. The "other" categories now included part-time and part retirement with the use of an age criterion as well as days of work off the farm.

Table 2.

DISTRIBUTION OF FARMS BY ECONOMIC CLASS  
Census of Agriculture, United States, 1969

Class	Criteria used:		Number of farms
	Value of farm products sold	Other	
<u>Commercial:</u>			
1	\$40,000 and over	None	221,690
2	20,000 - 39,999	None	330,992
3	10,000 - 19,999	None	395,472
4	5,000 - 9,999	None	390,425
5	2,500 - 4,999	Less than \$2,500 sales if normally would have had sales in excess of \$2,500 (crop failure, new farms, large inventories).	395,104
6	50 - 2,499	Operator under 65 years of age and did not work off-farm more than 100 days.	192,564
Part-time	50 - 2,499	Operator under 65 years, worked off-farm more than 100 days.	574,546
Part retirement	50 - 2,499	Operator who is over 65 years of age.	227,346
Abnormal	Not a criterion	Institutional, experimental and research farms, and Indian reservations.	<u>2,111</u>
Total number			2,730,250

Source: U.S. Census of Agriculture, 1969, Volume II, Chapter 7, p. 7.

In 1974, the economic classes were dropped and have not reappeared in subsequent Census publications. No doubt the tremendous changes in prices and technology for agriculture between 1969 and 1974 were part of the reason. While there were obvious problems in establishing meaningful criteria in which to group farms by size, the lack of such classes has left interpretation of these distributions to each reader, often unskilled in thinking about the many different forces which shifted farms from one sales class to another. One consequence of dropping the official economic classes is the conclusion by some that the great restructuring of American agriculture, which occurred between 1950 and 1969, is continuing at the same rates in the 1970s, 1980s and 1990s even though the evidence provided by the Census suggests quite strongly to the contrary.

### The European Community

Given the number of problems just demonstrated in using value of farm products sold to define farm size when making comparisons over time, some other alternatives have been developed around the world. The European Community now uses a system of economic size classes denominated in European Size Units (ESU). There are nine size classes; the smallest is Class I with less than 2 ESU; the largest includes farms with 100 ESU or more.

A European Size Unit is defined in terms of the European Currency Unit (ECU). One ESU is equal to 1000 ECU's of Standard Gross Margin. Gross Margin is the difference between gross receipts and variable costs per unit of production, usually land area or animal unit. Standardized Gross Margin (SGM) is calculated in each of the 12 countries of the EC for every productive agricultural enterprise annually. These values are standardized using ECU's for the 1980 reference period. Thus, if one hectare of wheat has an average gross margin of 120 ECU's in France in 1988 and the index of prices is 150 on the 1980 base, the SGM will be 80 ECU's per hectare using the 1980 reference period. Put another way, if prices increased 50 percent between 1980 and 1988, one ESU = 1500 ECU in 1988 prices.

The ESU and the nine economic size classes have worked well for the Europeans. Both the Farm Accountancy Data Network used throughout the EC and the Community Surveys of Agricultural Holdings, similar to our Census, use these classifications. Standard Gross Margin (SGM) has the additional advantage of being an approximation of Value Added which makes comparisons of size across enterprises much more appropriate than gross sales. All that is needed to calculate ESU for a farm is the number of hectares of each crop and the number of animal units. SGM is provided for each enterprise by individual national governments, usually the Ministry of Agriculture based on local farm accounting data.

### Japanese Classification of Farms

Japanese statistics on agriculture and farming are well established with a long history of rather complete national and local records by prefecture dating back to the nineteenth century (Arayama). A standard economic classification of farms has been in place since the 1950s. The definition of a farm is based on a minimum level of sales of agricultural products; in 1965, it was ¥30,000 and in 1985 it was ¥100,000 or the rough equivalent of U.S. \$750 (MAFF, Japan).

Farms are divided into three major categories:

- (1) Full-time -- At least one person who works 250 days or more on the farm; family income comes primarily from farming; accounted for 14 percent of farms in 1984-85.
- (2) Part-time, Type I -- Farm income is larger than off-farm income; farm operations require less than 250 days per year; accounted for 18 percent of farms in 1984-85.
- (3) Part-time, Type II -- Farm income is less than off-farm income; farm operations account for less than 250 days per year; accounted for 68 percent of farms in 1984-85.

Two other economic classifications have been developed as well. The first is core farm; it includes all farms with males aged 16-59 years old who are engaged in farming for more than 150 days a year. This classification accounted for 20 percent of the farms and 46 percent of the arable land in 1984-85. The second is designated as viable farm. These farms have an average agricultural income per full-time worker that at least matches the average income of non-farm employees in neighboring urban areas.

#### A Labor-Based Classification

Much of the technology applied in agricultural production has sought to increase labor productivity. Labor is a key input around which production is organized. It can be a common denominator across all types of production and is an input which can be measured in physical units on a consistent basis over time. Thus, it has many of the key elements which might be used in an economic classification system for U.S. farming. A labor-based classification system might include the following general categories:

1. Full-time, Large. Establishment where agricultural production and marketing is the primary occupation of the operator (manager), and where 60 months or more of operator, family, regular hired or day labor are employed.
2. Full-time, Family. Establishment where agricultural production and marketing is the primary occupation of the operator (manager), and where from 10 to 60 months of operator, family, regular hired or day labor are employed.

3. Part-time. Establishment where agricultural production is an important contributor to family income and where from 2 to 10 months of operator, family or day labor in total is required in business operations.
4. Residential. Establishment where agricultural production occurs but is not an important contributor to family income; less than 2 months of total labor are required under average conditions to carry out agricultural operations.

This classification system uses some of the original descriptive terms from Hurley's economic classification system for the 1950 Census. It provides four major categories within which size groups based on value of production or value added could be constructed as well. If the basic classes were used regularly, it would help to identify more clearly the major groups of farms within agriculture and help to reduce confusion about the number of farms affected by different types of public policy. Such a system would require that more information be obtained systematically by the Census and NASS about labor provided by family members in agricultural operations. Essentially, no other new information is required.

An alternative approach for a labor-based classification system is to use standardized labor requirements for each of the productive enterprises on a farm and determine size of operations in this manner after determining acres of crops and numbers of livestock. Activities of direct marketing, farm processing and similar activities would then have to be counted in days of labor used in the business. Estimates of labor requirements by enterprise have not been updated in most of the United States for many years. Advances in technology have been substantial so that any such effort would also require indicators of the technology used for each enterprise.

One of the reasons for examining different ways to classify farms into logical economic categories is to improve the public's ability to understand changes in farm structure over time. Substantial difficulties arise when comparing farm numbers by sales classes over a span of years because inflation and technology can affect the results so strongly (Young, et. al.). Building a consistent series based on physical characteristics and primary sources of family income could reduce misunderstanding of how many farmers there are by category and what is happening to them.



Concluding Comment

Farm structure results from the interplay of many economic, social and political forces. We can be sure that this structure will continue to change through time as individual households take action in their own best interests. The adoption of new technology and opportunities for employment outside agriculture were major forces in cutting farm numbers in the United States in half between 1950 and 1970. Such an absolute loss in numbers cannot occur again. Yet, the potential for striking change in individual sectors of production agriculture remains. Public interest in this process is likely to continue as 10,000 to 15,000 of our largest farms provide successively larger and larger shares of national agricultural output in the years ahead.

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