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Agricultural Outlook Forum 2000 Presented: Thursday February 24, 2000

# STRUCTURAL CHANGE: FARM AND FINANCIAL DIMENSIONS

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Structure of the farm sector is again a topic of vital interest to farm households and agricultural policy makers, as it was in the mid 1960's and late 1970's -- two previous periods of rapid change. The rapid growth of contract hog production to nearly 40 percent of production in 1998 is the most notable structural concern -- perhaps paralleling the growth of contracting in broilers in the 1950's (6). And, concentration of production among larger farms, loss of small farms, and the uncertain impacts of the 1996 Farm Act on farm profitability continue to fuel speculation that the farm sector may be evolving in directions that some deem undesirable. A later concurrent session of this forum concerns Concentration and Structural Change in Agriculture, focusing primarily on agribusiness organization, anti-trust, and policy issues. This presentation focuses on the farm sector itself because the methods and findings of the industrial organization view may not present the whole picture for farms and farm households.

Inquiries into the structure of the farm sector have frequently generated more heat than light. Indeed, distinguished economists, policy analysts, and commentators on agriculture have come to widely disparate conclusions about the causes and consequences of structural change (3). We will show you a little about why there are wide differences of opinion by first contrasting several different ways of looking at structural change, then discussing some factors that affect changes in structure, and finally drawing some conclusions about the impacts on farm sector organization and finance.

## What Is Farm Structural Change?

### Traditional View

Over the years, several different views of structural change have emerged. In the 1960's and 70's interest was focused on describing changes in the number and size distributions of farms (figure 1). This traditional view led to conclusions that the farm sector was undergoing rapid increases in concentration of production, concerns about the loss of mid-sized family farms, and the concern that the sector was developing into a bimodal distribution of farms -- many small farms, a growing number of large farms and few in between. People reasoned that if then current trends continued, there would be only a relative handful of farms in a few years. The limitations of this traditional view are that it showed only size trends and provided little information on farm sector organization and performance, and no information on what farmers could do in the face of changing economic opportunities they faced.

### Organizational View

Beginning in the 1980's and continuing to the present, interest in farm structural change has centered on describing sector organizational arrangements -- an organizational view -- employing such terms as *industrialization, consolidation, concentration,* and *coordination*.

**Industrialization** is a general term taken to mean a shift to large scale farms managed as profit generating business units. Industrialization has produced a dualistic structure of the farm sector, with large industrialized farms producing the majority of food and fiber, and small to medium, usually part time, farms accounting for the bulk of farm numbers. This structural feature of the farm sector affects input industries that serve agriculture, such as the financial sector. Capital and credit needs of farms, and who serves them depend more and more on where the farm is located in this dual structure.

**Consolidation** is the growth of farms by purchasing the land and assets of other farms. It is the mechanism underlying the changes in farm numbers and sizes in the traditional view of farm structure. With a limited total or local land base, growth of farms can only take place by acquiring the land and assets of other farms. However, it is hard to argue that consolidation should be controlled because it is a necessary adjustment to changing technology. Most technological change is labor-saving, so farms of older, smaller sizes will not fully employ their operators. In other words, farms need to grow to at least a certain size to remain efficient and competitive. Controlling the consolidation of farms would be seen by many as a severe abridgement of the rights of farmers to grow and manage their businesses.

Similarly, consolidation has taken place in the rural financial sector with changes in regulations, technology, and closer integration into national credit markets. With increased farm size comes the ability to secure debt and equity capital at lower costs. Because of lower information costs -- costs to the borrower of searching for and evaluating terms of loans and costs to the lender for gathering and evaluating information on potential borrowers -- larger farms are better able to shop regional, national and international markets for their financial needs, and larger financial institutions are better able to serve these needs. By contrast, small farms have high information costs because they seek financing less often, and are more likely to be reliant on diverse off-farm income sources, requiring more intensive evaluation by the lender. The credit needs and credit worthiness of these smaller farms are largely based on consumer lending standards and are more likely to be locally supplied.

**Concentration,** or the proportion of total supply controlled by the largest firms, differs by commodity (figure 2) The most concentrated commodity groups are the more industrialized sectors, such as eggs, vegetables, cattle feeding, fruits, nursery & greenhouse, while the traditional program commodities, feed grains, food grains and cotton are among the least concentrated commodities. Cow-calf, hogs, dairy, and poultry fall in the mid range of concentration.

But concentration is more properly a product market issue -- the concern that a few firms will dominate an industry and lead to higher prices paid by consumers or lower prices received by producers. But for this to happen, there must be significant barriers to entry; and it has to be profitable for the dominant firms to restrict their own supplies in order to increase prices. In agricultural products, only when most of the market is split between three or four firms would it be profitable for any firm to unilaterally restrict its own production to try to raise prices. Hence, firm numbers would have to be in the handfuls, not the thousands producing farm commodities. Concentration in the agribusinesses that farms contract with exists in some sectors; but there is only negligible concentration in farm production itself.

**Coordination** is a sector organization issue reflecting the concern that decisions on what, how, and how much to produce are being made in agribusiness boardrooms instead of independent farms. The emergence of vertically coordinated "supply chains' or "value chains" is a growing phenomenon of recent years. These value chains may control the growing, processing, and distribution of a product, sometimes all the way from the genetics of the agricultural commodity to the supermarket shelf. Again, from an economic perspective, it is hard

to argue that coordination should be controlled or restricted. Consumers are demanding greater variety, quality control, and accountability in food and fiber products. Agribusiness firms and food manufacturers have responded with greater contractual control over the vertical stages of the food and fiber system from farm input supply, production, and processing to distributing in order to control costs and capture production efficiencies, control risks, and respond to consumer demands. Farmers, in turn, may benefit from participation in coordinated supply chains. They may be better able to control their own costs, increase quality or quantity of their production, and shed some production and price risks. However, these changes come at the costs of loss of independence in decision-making, increased "relationship risk"-- uncertainty over continuation of their contracts -- and perhaps loss of bargaining power in dealing with the supply chain.

The growing use of production contracts is altering the farm financing system as well. Contractual arrangements frequently shift price or production risks from producers to others in the supply chain, thus making producer cash flows more predictable. In general this increases the farm's access to capital at a lower costs. In addition, contracting agribusiness firms frequently provide equity investments in the farm, direct credit financing, or arrange credit lines for contractees.

In short, vertical coordination by contractual relationships has both positive and negative consequences, depending to some extent on contract terms. Some of the positive aspects are:

- Consumers obtain greater variety, quality, and accountability in products
- Agribusiness firms secure market identity for their products
- Farms join a stronger team, are better able to withstand adverse market trends or fluctuations
- Farms reduce production and market risks
- Farms have improved access to new technology
- Farms have improved access to capital
- Farmer rewards are more closely tied to performance
- Farmers can diversify their portfolios and commodity mixes.

Offsetting these are some negative aspects of vertical coordination;

- Periodic over-supply conditions and depressed prices in commodity markets (7)
- Traditional market channels and production areas may be displaced (7)
- Traditional market channels may become downwardly volatile "salvage markets"
- Producers may lack bargaining power
- Producers face "relationship risk"
- Producer performance and rewards are partially in the hands of the integrator
- Possible monopsony (a single buyer or contractor) in local production areas
- Possible monopoly or concentration in product markets.

**An Alternative View: Strategic Differentiation**

Both the size distribution view and the organizational view of farm structural change fall short of focusing on what adjustments farms and farm households can (and do) make to the changing economic opportunities they face. The traditional view of farm structure was based on an implicit model of "one farm-one household-one market channel" -- the classic model box in figure 3. To be sure, the farms' use of rented land and borrowed capital were considered, but other activities of the operator household and activities of other firms and households participating in the production process were largely ignored. The Economic Research Service, through its annual Agricultural Resource Management Study (ARMS) and predecessor surveys, set out to gather and analyze data on the range of activities engaged in by farms and farm families, such as off-farm work,

contract production, interests in other businesses, etc. -- the balance of the information items in figure 3.

This alternative view of how farmers organize their resources we call "strategic differentiation." It includes aspects of industrialization, consolidation, and coordination, but focuses on the boundaries and linkages among firms and households to reveal a diversity of arrangements. To capitalize on their opportunities, farms strategically differentiate themselves from other farms by their choices of off farm employment activities, their business ownership activities, and their choices of markets and contracting activities. Farms tend to cluster in eight groups differentiated by the extent of theirs links with other businesses, other households, and other markets as shown in figure 4. Descriptive names and numbers of farms for each of the clusters are included in figure 4. Characteristics of these eight clusters will be discussed under factors affecting structural change.

## Factors Affecting Structural Change

Factors affecting structural change in the farm sector fall roughly into four categories: economic opportunity factors, institutional factors, technology factors, and policy factors. We will summarize each in turn.

### Economic Opportunity Factors

Kislev and Peterson (5) have maintained that one of the strongest forces for structural change in the farm sector has been the growth of non-farm economic opportunities attracting the exit of human resources from farming and allowing the remaining farms to consolidate the assets of the exiting farms. Later authors (3) have recognized that farming is not an all or nothing income choice; farming can be and to a great extent is, combined with other economic pursuits. One of the least known and most striking characteristics of farms is the extent and persistence of their reliance on off-farm income sources (figure 5). Net farm income accounts for only about one eighth of the income of farm households -- a figure that has not changed appreciably for decades. While dependence on off-farm income sources declines with increasing size of farm, it remains strong throughout the size distribution, progressively switching from wages and salaries to off-farm business income, interest and dividends. Thus, the well-being of farm households is determined as much or more by their non-farm activities than by their farming activities.

Enterprise combinations are important determinants of farm opportunities. Strikingly, 55 percent of farms produce only one commodity, 75 percent produce only one or two commodities, and only 11 percent produce four or more commodities. Not surprisingly, the farm clusters with the fewest commodities are the small operator landlords and the households with diversified portfolios. For both of these clusters their farming operations are less important to their well-being than their non-farm activities.

Farms also differentiate themselves through how they combine household and business activities (figure 6). Operators reporting that they are full-time farmers are most prevalent on multi-market farms (cluster 3, 4, and 6). Though these three clusters represent the stereotypical view of a farm, together they account for only slightly over one-third of all farms Off-farm work is reported by nearly 80 percent of 503,000 farms clustered as general farms with off-farm focus. Also striking is the result that virtually all of the 167,000 farms in the diversified household portfolio cluster report receiving income from operation of another farm. All of these data indicate that farms must be viewed though a wider lens than the stereotypical view of a farm.

### Institutional Factors

Farm rewards tend to reflect the degree of management control and the risks borne; hence farm families may assess the trade-offs differently in plotting their economic courses. As mentioned earlier, the changing roles of market coordination versus contractual coordination entail some changes in the degree of management control by farm operators; but offsetting these are changes in the type and degree of exposure to risks.

Institutional factors contributing to structural change are the emergence of new alternatives to independent, market coordinated production, such as production contracts, marketing contracts, and hedging activities. Market choices show considerable diversity among clusters (figure 7). The important conclusions are that single equity, multi-market farms (younger, more business-oriented operators) use the widest array of marketing channels -- crop cash, crop contracts, livestock cash, livestock contracts, and futures market hedges in over 50 percent of survey responses. Multi-equity, multi-market farms use fewer marketing channels, perhaps reflecting that the senior operators tend to be older and more traditionally oriented marketers. Livestock production contracts are most prevalent on multiple market farms and diversified household portfolio farms. Smaller and less business-oriented clusters tend to use cash markets primarily.

**Technological Factors**

Technological advances have been linked to farm structural change for more than a generation. Willard Cochrane (1,2) described a "technological treadmill" in which a technological advance is adopted by a few farms who, because they have lower cost structures, increase their production to gain more profits. The increased production causes market prices to fall, forcing other farms to adopt the technology just to stay competitive. These later adopters do not profit from the technological advance; they merely hang on to the profits they had before. In this manner, the benefits of technological advances quickly accrue to consumers, not producers. In addition, the early adopters, because of their temporarily increased profits are able to acquire the assets of non-adopters forced out of business by the lower prices. In addition, because most technological advances tend to be labor-saving, farms that adopt the new technology but do not expand, find they no longer fully employ their operators; hence, they no longer provide a full employment income to the operator family. Finally, many technological advances require a certain minimum size of farm to be utilized efficiently. Farms smaller than this threshold find themselves at an economic disadvantage and tend to exit the sector.

This mechanism continues to be at work in the farm sector. Furthermore, continued advances in production technology are now being supplemented by advances in information technology, market coordination arrangements, and even new designer products, such as neutraceuticals -- commodities that have special nutritional or health characteristics.

**Policy Factors**

Agricultural policies such as price and income support policies, credit policies, and governmental research policies, have contributed to structural change, as have macroeconomic policies. Several observers of farm structural change including D. Gale Johnson, Willard Cochrane, and Lyle Schertz, have described a 'risk-leverage' mechanism by which agricultural policies encourage farm growth by swallowing up less well-positioned neighbors (2,4,8). Pre-1996 agricultural policies were aimed at stabilizing and supplementing net farm incomes through supply management and direct payments based on volume of production. These policies favored the larger farms by taking on a large measure of the uncertainty in farm income, and distributing more risk reduction benefits and larger direct payments to larger farms than to smaller farms. Even with payment limitations, larger producers received much larger shares of total subsidies than did small producers. The result, not surprisingly, was that larger farms could safely take on more debt and financially leverage the acquisition of the assets of smaller farms. This accelerated the growth of larger farms and the exit of smaller farms (2, 3).

Current agricultural policies under the 1996 Act, even though decoupled from farmers' current planting decisions, still retain some of the structural change implications of previous policies. AMTA payments are still disbursed on the basis of historical bases and program yields. Supplemental aid is also disbursed the same way as AMTA payments. Lastly, commodity prices below the Loan Deficiency Payment thresholds have brought USDA back into making direct payments that are tied to current levels of commodity production.

Macroeconomic policies, primarily inflation and interest rates, have also contributed to structural change incentives. Farm commodity prices have historically tended to lag behind inflation, while farmland values have tended to equal or exceed inflation rates. Thus, higher rates of inflation had the effect of altering the net returns streams to farms so that current net cash incomes were reduced, but deferred capital gains incomes were increased. Higher rates of inflation thus reduced the amount of financial leverage a farm could handle because of the restricted current net cash incomes, but increased the rewards for owning land. The combination of these two forces strengthened the hands of both farms with large proportions of off-farm incomes and non-operator land owners who saw ways of sheltering some of their incomes from taxation. Farms with little off-farm income were placed at a disadvantage and tended to exit if they got into cash flow difficulties as farm commodity prices failed to keep up with inflation. Macro policies which resulted in interest rates that lagged behind inflation rates, as occurred for many agricultural borrowers in the 1970's further intensified the above effects.

Credit and financial policies continue to influence structural change. Credit markets in the past could be characterized as fragmented and uncompetitive, particularly for the small, independent, family-based operations that once dominated the food and fiber system. Federal intervention in credit markets has long been rationalized by the perception that lenders were not adequately, efficiently, or fairly supplying credit to smaller or family-sized farms. Financing capital acquisitions to help operators attain sufficient size to be economically viable has been and continues to be a primary objective of federal credit policy. Today, over one-third of farm credit is supplied through the federal government and government agents, such as the Farm Credit System (FCS), and the Federal Agricultural Mortgage Corporation (Farmer Mac).

Federal credit programs provide varying degrees of subsidies to the farm sector and are targeted differently. USDA loan programs of the Farm Service Agency (FSA) provide the largest subsidies per dollar loaned, and are targeted to family-sized farms and those perceived to be under-served in credit markets, such as beginning farmers, women, and minorities. The FCS and Farmer Mac have less specific targeting mandates than do the FSA loan programs. They ensure that a sufficient pool of low cost capital is available to all farmers who have a basis for credit.

## What Does the Future Hold?

While the future pace and specific changes in the food production system are somewhat unpredictable, current trends will prevail in the near term. Industrialization of production will continue to produce structural changes, including consolidation of ownership of farm assets, greater coordination across the production and distribution systems, and some geographic relocation of production. To summarize this presentation, we'd like address three structural change questions:

- What are the gains and losses from structural change in the farm sector?
- Are we facing a revolution or an evolution of farming?
- Are we witnessing the end of family farming?

### Gains and Losses from Structural Change

The primary gains from structural change in the farm sector that have been put forward are:

- It may be needed to maintain or improve global competitiveness
- It may increase productivity
- It may lower consumer prices, and
- It may be needed to respond to consumer demands for quality, variety, and accountability in food supplies

Several potential losses from structural change have also been put forward:

- Traditional market channels and production areas may dry up
- Price discovery may become problematic due to thin or non-existent markets
- Producers may lose bargaining power relative to the supply chains, and
- If concentrated, the supply chains may make predatory use of market power to lower producer returns and/or increase consumer prices

**Revolution or Evolution?**

Structural change has historically been more evolutionary than revolutionary. We expect the future to continue the march toward fewer and larger farms. Farm sizes will continue to grow in response to technological change. Farm numbers will decline correspondingly because limited land supplies and limited markets will be divided among progressively larger units. Rapid, perhaps revolutionary, change is possible in farming arrangements because of the emergence of new coordinating arrangements and supply chains. In broiler production, contracting and integrating totally transformed production methods in a little over a decade. Pork production now seems to be experiencing a similar transformation, albeit at a somewhat slower pace.

The emergence of highly differentiated products -- for example high oleic soybeans and potentially, designer products such as neutraceuticals -- are increasing the need for identity preservation along the marketing chain. This may lead to "de-commodification" -- the progressive loss of bulk commodity markets in favor of contracts between the producers and the chains they are supplying. If the trends outlined above continue they will take us from our present "Market Agriculture" organization, dominated by homogeneous bulk commodities traded on cash or spot markets -- to "Post-Market Agriculture" where quality differentiated products traded by contracts will dominate. The crucial question for post-market agriculture is "Will bulk commodity markets continue to exist?" Such markets provide stable crop or livestock production alternatives for farmers. Bulk commodity markets provide broad, demand-elastic markets that stabilize producer revenues in the face of fluctuating supplies. The potential loss of bulk commodity markets could have widespread effects in the farm sector, because large markets with relatively elastic demands would be replaced by many contractual markets with highly inelastic demands. In markets with inelastic demands, producer revenues decline with increases in production, in elastic markets increased production increases producer revenues. The loss of broad, elastic markets would mean greater volatility of prices and shifting of bargaining power from farmers to others in the supply chains.

**The End of Family Farming?**

Do these changes spell the end of family farming? Our answer is probably not -- because family farms will continue to strategically differentiate themselves, combining multiple enterprises and diverse sources of income, and organizing to capture shares of returns in supply chains. Family control of farming has been an exceedingly durable and flexible institution. We expect it to continue to be; although the family farms of the future may be far different from the family farms of yesterday, or even those of today**.** However, new policy issues may arise if there is loss of the broad, bulk commodity markets that provide stable production alternatives, and thus a floor under farm returns. The new policy question is: "Can the farm sector obtain a fair reward for participating in value chains?" Farmers' shares of the returns to value chains are determined by the chain's potential suppliers, the farmers' alternatives, and the organization and bargaining power of farms. If problems arise, institutional arrangements that strengthen the farmers bargaining positions will likely evolve in the private sector or with the assistance of government.

## Further Reading


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7. Reimund, Donn A., J. Rod Martin, and Charles V. Moore. 1981 *Structural Change in Agriculture; The Experience of Broilers, Fed Cattle, and Processing Vegetables*. Technical Bulletin 1648. Washington, D.C. U.S. Department of Agriculture, Economics and Statistics Service, April.

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Figure 1
Traditional View of Farm Structure:
Numbers and Size Distributions

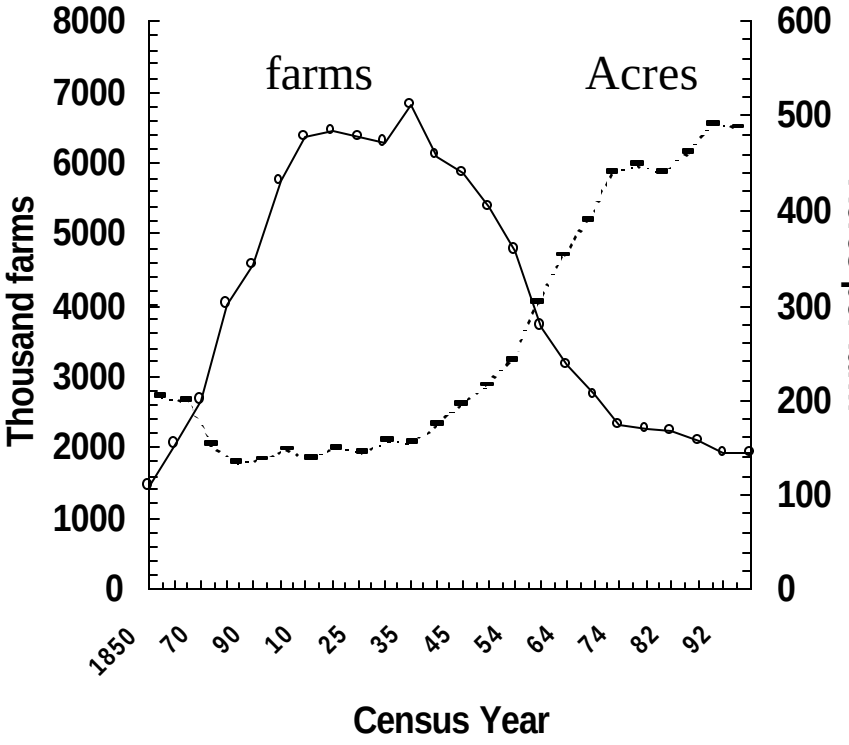
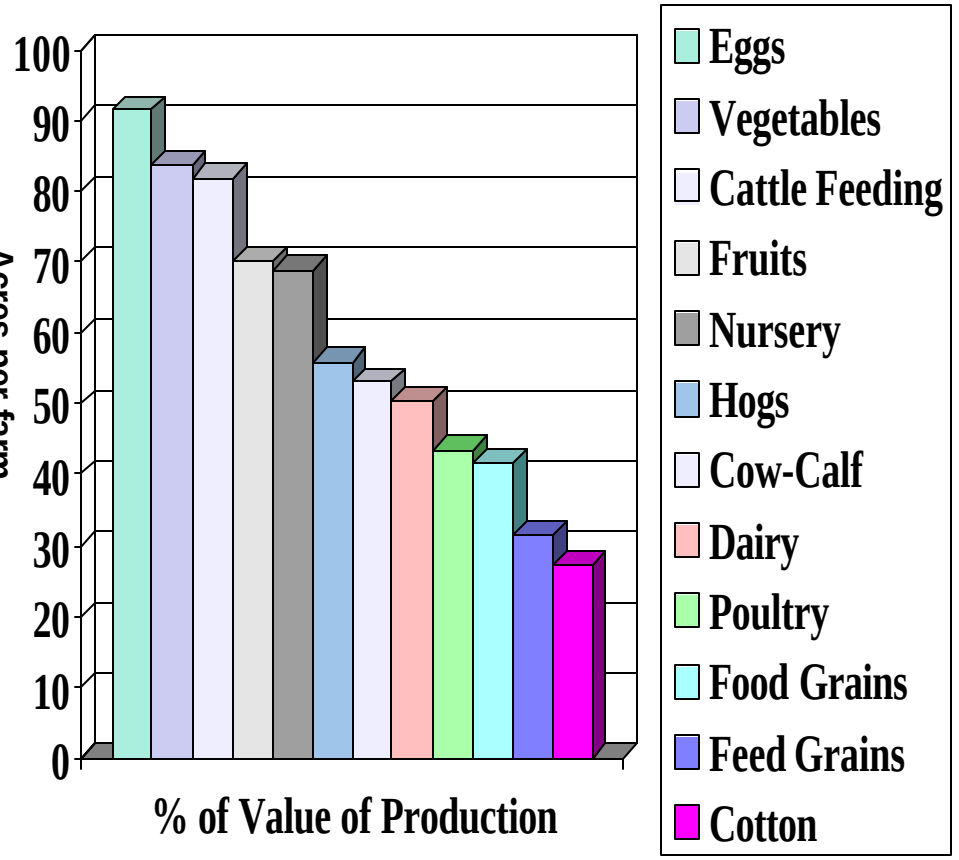
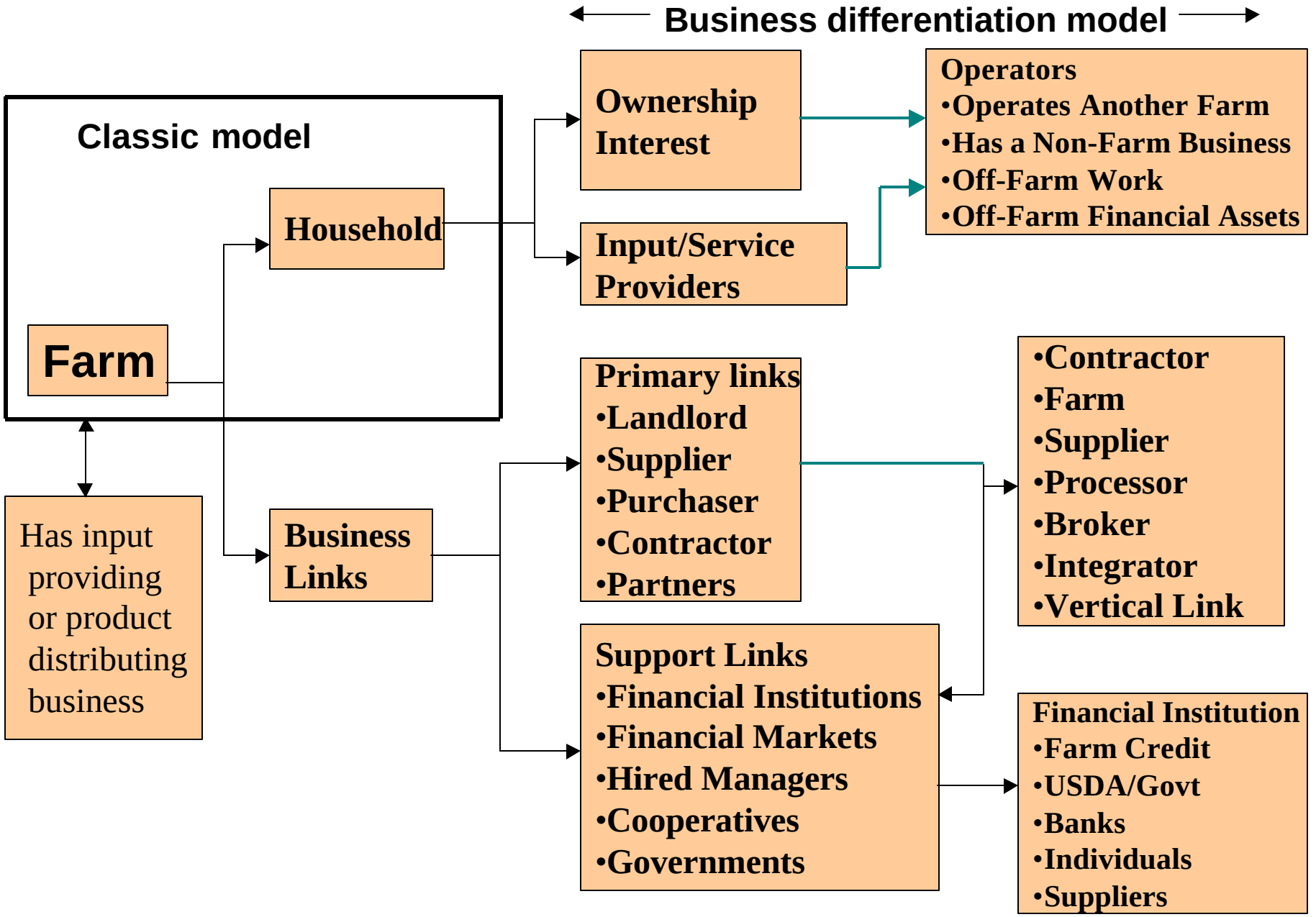


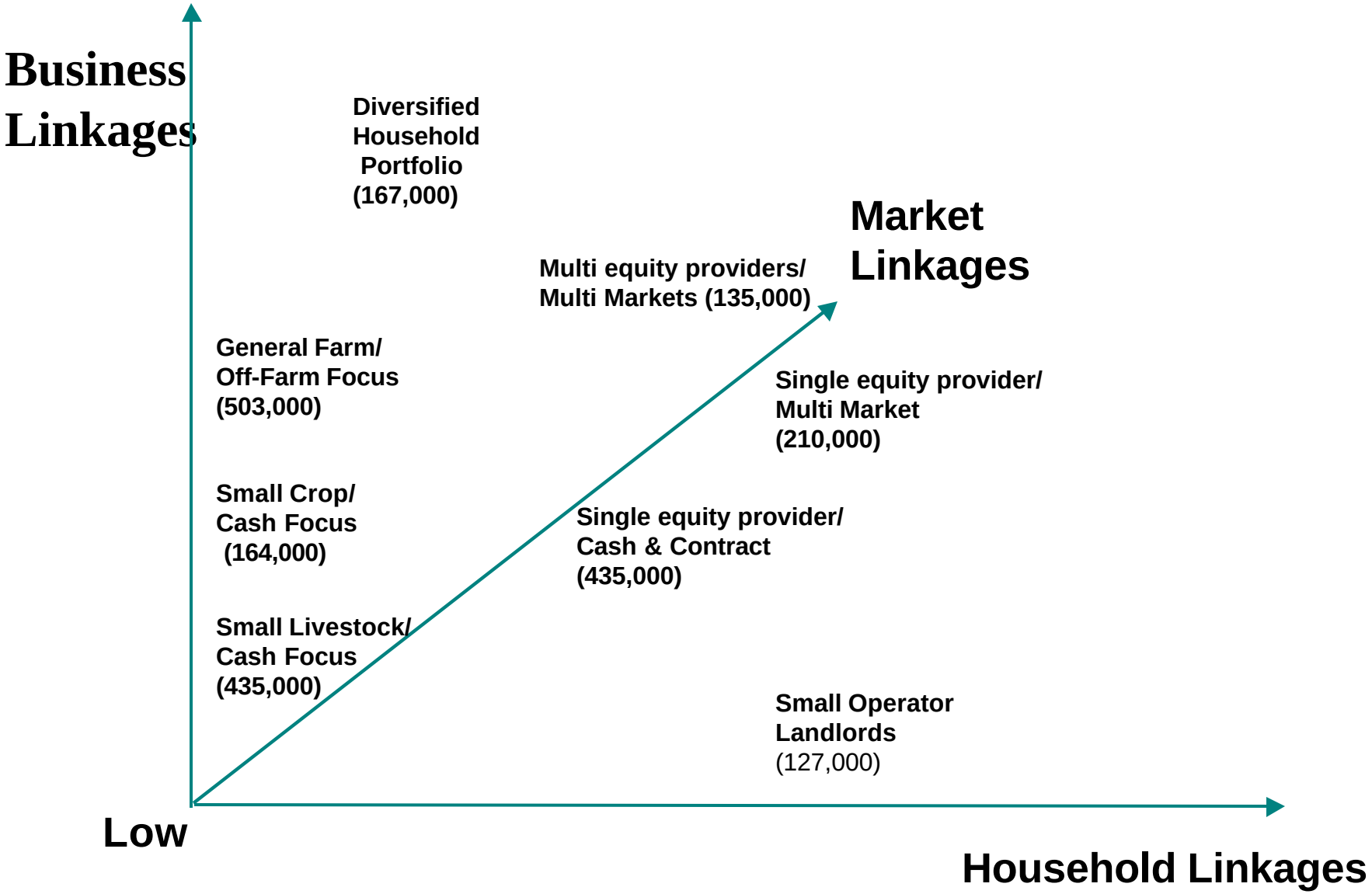

Figure 2: Concentration:
Proportion of Production
by Largest 5 Percent of Farms



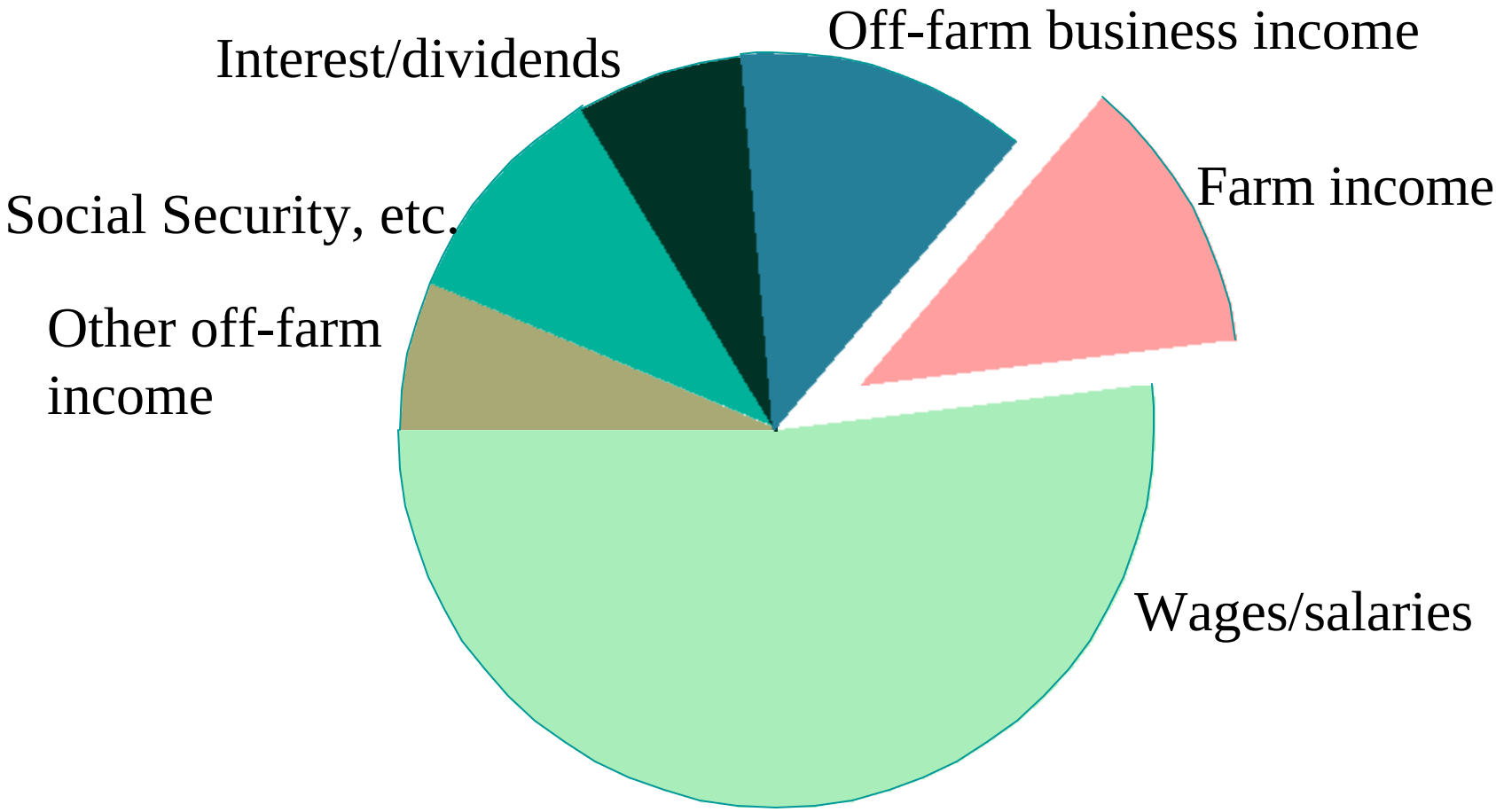
# Figure 3:Farm Business Linkages



# Figure 4:Dimensions of Strategic Differentiation



# Figure 5: Farm households receive income from a variety of sources




Source: 1997 Agricultural Resource Management Study

Figure 6: Farms Differentiate Through Household and Business Structures

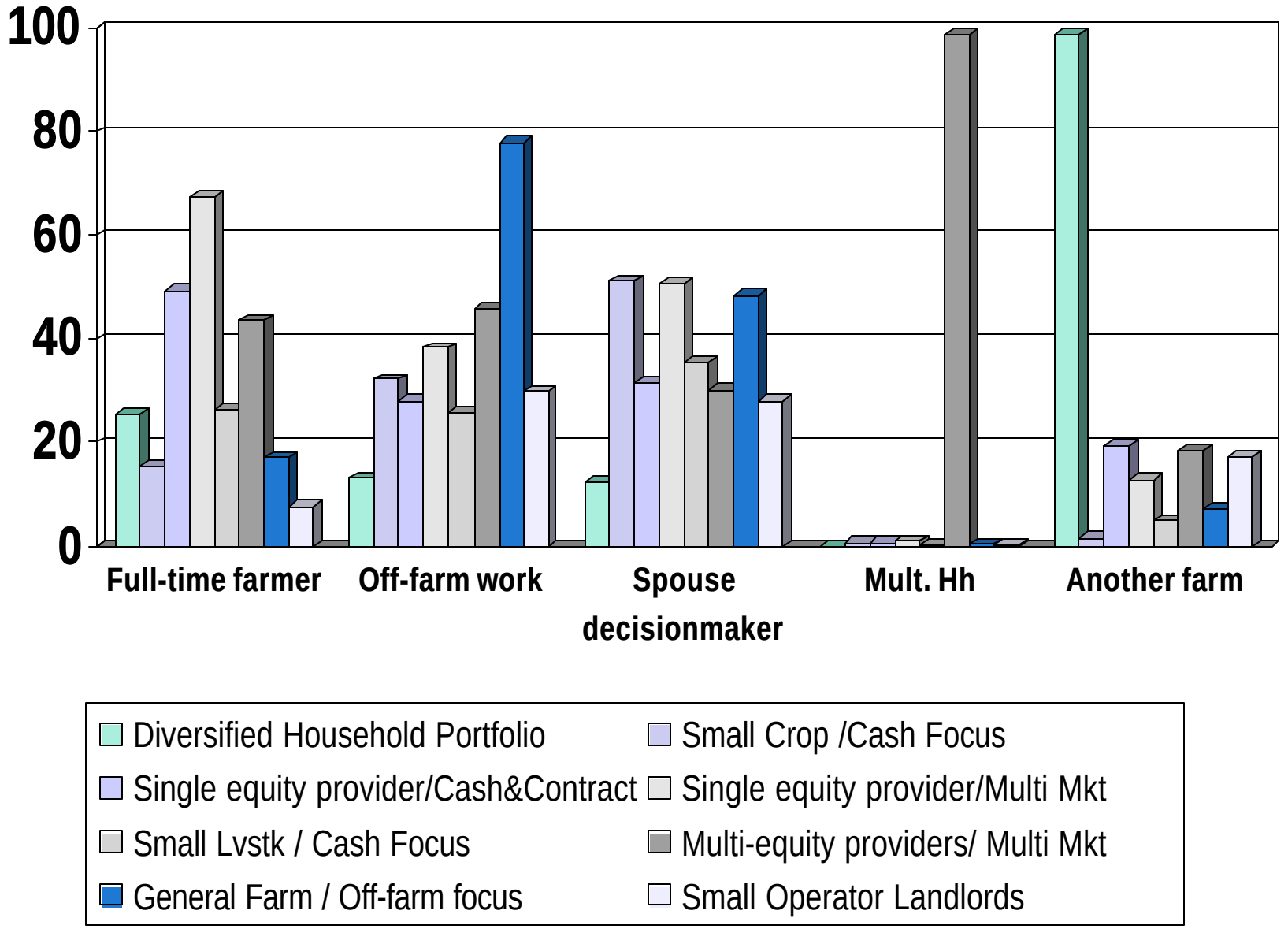


Figure 7: Farms Differentiate Through Market Choices