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ALTERNATIVE MODELS OF STRUCTURE CHANGE IN AGRICULTURE AND RELATED INDUSTRIES

by

Michael Boehlje

DEPARTMENT OF AGRICULTURAL AND APPLIED ECONOMICS

University of Minnestota

Institute of Agriculture, Forestry and Home Economics

St. Paul, Minnesota 55108

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Michael Boehlje

Department of Agricultural and Applied Economics
University of Minnesota
St. Paul, Minnesota

The structure of an industry or a sector includes many dimensions: (1) the size distribution of firms, (2) the technology and production characteristics of those firms including type of activity and level of specialization, (3) the characterization of the workforce (both managers/ entrepreneurs and employees) including age, education, experience, skill level, part-time verses full-time status, etc., (4) the resource ownership and financing pattern including tenancy, leasing and debt/equity sources and relationships, (5) the inter- and intra-sector linkages including contract production and vertical and horizontal integration.

The focus of this discussion will be on the key forces that shape the structure of the agricultural sector. The discussion will focus on five "models" of structural change--the technology model, the human capital model, the financial model, the institutional model, and the sociological (family farm) model. These "models" are all partial models at best (and they are overlapping and not mutually exclusive), but together they provide a relatively complete explanation of the factors that influence structural change and the interrelationships among these factors.

The Technology Model

The "technology model" is rooted in the concepts of economies of scale and size and the adaption of technology. Hallam and Young et al. have summarized much of the literature on size economies, and Ruttan, Peterson, and Rodgers have written extensively on technology and structure. Only a brief synopsis of these arguments will be presented here.

The economies of size literature has focused fundamentally on the long run cost curve in agricultural production and the determinants that shape and shift that curve. Key determinants that have been identified include the underlying production relationships and technology involved; government policy including taxation and farm programs; risk dimensions including risk preferences and the risks of the potential production, marketing, and financing activities of the firm; and so-called pecuniary economies in the input or product markets (so-called because they frequently arise from technical economies of size of input suppliers or product purchasers that allow them to sell inputs at lower prices or buy products at higher prices because of the economies of increased volume in marketing and distribution). Numerous procedures have been used in estimation of economies of size including cost, production and profit functions, growth and survivorship analyses, and economic engineering and budgeting concepts.

In spite of the substantial work of the past, a number of issues still remain concerning size economies. Three that I find interesting include:

(1) As environmental and similar costs that have been "externalized" by many firms become higher and are internalized (oftentimes by regulation or taxation), what will happen to the magnitude and shape of the cost curves?

(2) How should resource contributions and costs be allocated in multiproduct firms where there are fixed factors of production? Specifically, should the costs of machinery, equipment and other capital items be allocated to production assuming there is an active rental market for excess capacity or that costs of any excess capacity must be absorbed by the production enterprises of the firm? And what about operator labor and management; should it be valued and allocated assuming excess quantities can be absorbed by the nonfarm labor markets, or is it a "fixed" factor whose full cost must be borne by the agricultural production activities?

(3) What is the shape of the "right hand side" of the cost curve (i.e., What happens to costs at higher levels of output?); and, specifically, what economic or other factors will constrain the movement to large scale farming if the cost curve continues to be relatively constant with increasing size? It has been argued that costs of coordination and span of control may limit size, but recent institutional innovations in the swine industry that involve contract production by large integrators in geographically dispersed facilities operated by family farmers (in essence combining corporate and family farming) suggest that higher coordination costs with increased size may be offset by other size advantages.

The second concept central to the technology model is that of the adoption and diffusion of new technology. Hayami and Ruttan, and Peterson and Kisler, have documented that the direction of technical change is significantly a function of relative factor prices which fundamentally reflect resource endowments in the sector or the economy. According to this argument, the growth in farm size in the U.S. in recent times has been primarily a function of the relative prices of labor and capital. Higher labor incomes in the nonfarm sector have resulted in a high opportunity cost for farm labor. High priced labor relative to capital has "induced" the development of technology that substitutes machinery and equipment for labor. This physical capital has enabled the remaining labor to produce at a larger scale with a fixed labor supply. According to this model, farm size growth that embodies the substitution of capital for labor would not be expected to be as dominant in the future as in the past since wage rates have stabilized between the agricultural and nonagricultural sector and capital costs have increased relative to labor costs. Thus, there is expected to be less induced technical change that substitutes capital for labor. The technology of the future appears to be biotechnology and information technology. It has been

argued that biotechnology will be more scale neutral than the capital technologies of the past. However, this may not be the case for information technology because of the financial and human capital investment involved.

Rodgers has expanded the technology and structure arguments in important dimensions. His analytical results indicate that a neutral change in production technology (a costless proportional increase in the productivity of all resources), assuming output demand is price inelastic so that revenues fall with increased output, results in a decrease in the number of farmers and increased farm size because farmers with marginal managerial talents will leave the industry (Rodgers, p. 126). Furthermore, he argues that if new technology is increasingly more difficult or costly to adopt, marginal farmers who don't have the managerial skills to cost effectively use these technologies will eventually leave the industry, again resulting in fewer and larger firms. Finally, his work identifies two important determinants of specialization in agriculture. First, firms may have comparative advantage in the production of various intermediate and final products and increased specialization will occur as the transactions costs between these firms are reduced, thus allowing them to exploit their comparative advantage. And, secondly, given a fixed managerial input, increasingly complex technology will result in higher technology costs and incentives to specialize to lower those costs and more effectively use the fixed managerial input (Rodgers, p. 227).

The issue of the continued existence of alternative farm sizes and structures (i.e., a relatively heterogeneous rather than homogeneous size and structure over time) is also partially explained by the technology model.

According to this argument, technical change results in new production practices that could be adopted by producers. But farm firms exhibit differential rates of adoption of this new technology for various reasons including different salvage values of the current technology, different costs of technology adoption, different financial capacities to acquire the new technology and different human capital skills in assessing the risks and rewards of new technology. Thus, this argument suggests that heterogeneity in farm size and structure will persist over time irrespective of the technical economies of size.

The Human Capital Model

The "human capital" model of farm structure draws from three interrelated concepts: (1) human capital investments and managerial capacity, (2) household economics and time allocation, and (3) relative labor incomes in agriculture versus nonagricultural jobs.

Rodgers has made a seminal contribution to the farm structure literature in his development of the role of the human capital/managerial input as a determinant of structure and formal integration of this input into the technology model. The fundamental elements of the argument are that the managerial input is critical to the underlying cost and production relationships of any firm. If managerial capacity is a fixed factor, then costs will eventually rise with increased size since higher levels of output are receiving less and less managerial input which is essential for efficient production. In essence, the efficient size of firm would be limited by the "span of control" of the manager according to this argument, and so would the other elements of structure including type of activity,

level of specialization, and complexity of financing and inter-sector linkages. Managerial input is heterogeneous across firms because of differences in the experience, education, skill level, etc., of the manager. Managerial capacity can be impacted by investments in human capital; such investments can increase the ability to process information and to evaluate and implement new technology. Furthermore, some managerial inputs can be purchased in the form of consulting and advisory services. Generally there have been increased investments in human capital in agriculture over time which increases the span of control and allows farmers, in general, to more cost effectively manage larger scale specialized units and adopt cost-reducing/ output-increasing technology. But because managerial input and human capital investments are heterogeneous across farms, different sizes and structures of farms will persist over time because of these differences and the disequilibrium that occurs as firms adjust at different rates to technical, market, regulatory, and other changes.

Concepts of household economics combined with relative labor incomes in farming compared to other employment opportunities may provide partial explanations for the size of farms as well as the development of part-time farms. Traditionally the farmer, his spouse, and the children have allocated their time to a combination of farm and household production activities. In recent years a number of changes have occurred in the family structure and environment that impact the time allocation of farm families. First, spouses (primarily female) have developed the skills and are more strongly motivated to develop careers beyond their traditional role in farm and household production. Similarly, children frequently aspire to nonfarm employment and desire to obtain job

experience beyond farming. Second, with new technology in some areas of household production such as food preparation and home maintenance, the value and amount of time in that activity has been reduced, making more time available for other activities which have a higher value.

Third, more nonfarm employment opportunities have become available in some rural areas (in some cases because rural residents are willing to commute further distances for employment); employment opportunities that have higher incomes including benefits such as retirement programs, medical insurance, and other health programs compared to farm or household production activities. Fourth, nonfarm employment may be more desirable with respect to income and spendable cash flow and, thus, provide a more reliable risk-reducing diversification strategy than allocating all of the family time to expanded farm and household production activities. The result of all of these changes is increased employment of farmers and members of the farm family in nonfarm jobs, increased part-time farming, smaller scale farms for those who allocate their time in the fashion noted above, and the choice of farming enterprises and technology that best fit a part-time farming structure, including more specialized production and more purchased inputs (Rodgers).

The Financial Model

The financial model of growth and structural change has been most thoroughly developed by Vickers with extensions and applications to agriculture by Lowenberg-DeBoer and Lowenberg-DeBoer and Boehlje. This model combines concepts of production theory and financial theory into an integrated

model of firm behavior. In essence, the entrepreneur is assumed to maximize wealth which is a function of annual income (or loss) and capital gain (or loss). Inputs are defined as durables (for example land and improvements) and nondurables (for example, seed, fertilizer or chemicals). Durable inputs influence wealth in two ways--first through their contribution in the production of products and, consequently, generation of income and, second, through appreciation (or depreciation) which directly increases (decreases) wealth. Nondurable inputs contribute to wealth only through the production process. The optimal quantity of durable and nondurable inputs used in the production process and, thus, the technological structure of the firm is, consequently, a function not only of relative factor prices but also of relative capital gains or losses.

The value of the firm is maximized subject to financing and survival constraints. The financial constraint indicates that the acquisition of durable and nondurable inputs requires differential amounts of financial capital, and that a limit on input purchases is imposed by the availability of debt and equity capital. The survival constraint reflects the cash flow requirements that the firm must meet to continue in business. Production inputs and capital assets typically contribute cash earnings; while others, such as stored grain awaiting sale, commonly contribute cash through liquidation. However, durable and nondurable inputs can be liquidated with different levels of liquidation loss to meet cash needs, even though such sales are expected to impair the long run income generating capacity of the firm.

The implications of this integrated production-finance model for optimal input use and product mix are significant. Lowenberg-DeBoer indicates that the

optimal mix of durable and nondurable inputs is not only a function of the relative prices of these inputs, but also the finance charge coefficients as well as the capital gains parameters. Relative finance charges reflect the interest payments on funds borrowed to buy the inputs as well as the implicit or explicit collateral constraints imposed by lenders as reflected in specific lending limits that restrict the use of credit in acquiring various inputs. Because these lender imposed collateral and funding constraints are more a function of cash flow and liquidity characteristics of various inputs rather than relative prices, it is typically the case that the relative finance charges will not be equal to relative input prices.

Furthermore, assuming that capital gains on nondurables are zero and that capital gains on durables are positive, the capital gains will tend to off-set part of the cost of acquiring the durable inputs, thus resulting in the substitution of durable for nondurable inputs. Capital losses would have the opposite affect; they would tend to increase the cost of durable inputs and result in substituting nondurable for durable inputs. In similar fashion, capital gains and losses and finance charges will have an impact on the choice of outputs. For example, if the production of one product has a higher marginal product of durable inputs than other products, the output and use of durables in the production of the first product will be increased. With larger capital gains on durable inputs, the input cost ratio changes and the product which lends itself to production with durable assets assumes a larger share of the output mix.

Since real estate is the most important durable input used in most farming operations, the farm size implications of this model are significant. In essence,

the larger the capital gain on durable inputs (for example, the land price increase) or the smaller the finance charges, all other parameters constant, the greater the optimal use of durable inputs (farmland) per farm relative to nondurable inputs. Use of nondurable inputs is reduced with increases in capital gains on durable inputs. Capital losses and higher finance charges have the opposite effect; they tend to increase the cost of durables (land), reducing the factor or input cost ratio and, hence, reducing the use of durables (land) in the optimal solution while increasing use of nondurable inputs.

Lowenberg-DeBoer shows that recognition of capital gains (or losses) in the objective function also influences the optimal use of debt; debt use increases with higher levels of capital gains and decreases with higher levels of capital losses. Based on the arguements of this model, part of the structural changes in production agriculture during the three decades prior to the 1980s, including growth in per farm use of durable inputs and farm size as well as additional use of leverage, may be a result of the almost continuous capital gains that occurred during this time.

Finally, a more complete financial model would recognize the different types of debt that can be used to acquire assets, including the alternative of using financial leases. This model would also include the unique opportunities to use highly leveraged alternatives such as junk bonds and leveraged buyout strategies to finance merger and acquisition activity. These alternatives have a direct bearing on the financial structure of the firm.

The Institutional Model*

By "institutional model," I am referring to the structure-conduct-performance paradigm of industrial organization and its variants. Numerous discussions of this paradigm and its usefulness in economic analysis are available (Henderson, Bain, Marion, Caves); my purpose here is to provide a brief synopsis of the model and its applications in agriculture.

Henderson has described the structure-conduct-performance paradigm in the following fashion (Henderson, p. 96):

> The paradigm holds that these elements are functionally related; essentially that performance is a function of structure and conduct, conduct is a function of structure, and structure is a function of conduct and other things which I refer to as environmental factors. These environmental factors include the impacts of technological determinism. Technological determinism is an outcome of the process of industrialization itself, that is, the process of differentiating economic production into increasingly finite segments, i.e., specialization. Specialization begets interdependence which begets organization. As new technology results in the further specialization of individual work roles (of both labor and capital), new industries are formed to coordinate and conduct the specialized but now distinct operations.

The key dimension of this paradigm is the competitive nature of the market (competitive versus monopolistic or monopsonistic) and the implications for economic behavior and performance. In essence, the competitive market is assumed to be both efficient and equitable and other market structures are evaluated against this norm. Structural characteristics that are of primary interest

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* The latter part of this discussion of the institutional model draws heavily from Lazarus, Boehlje, and Dahl, Minnesota Agricultural Economist, No. 660, February 1990.

are buyer and seller concentration, conditions of entry and exit, and vertical integration; conduct refers primarily to product differentiation and pricing policies; and performance is measured by profits, prices, and innovation.

Applications of this model to the agricultural sector have been numerous, focused primarily on food manufacturing and distribution with only limited work on the input supply industries and the production processes. Probably the most significant findings of these studies for the production sector are the conclusions concerning concentration and pricing. For example, Marion has concluded that a 10 percent increase in the four firm concentration ratio for the cattle slaughtering industry results in a 10-23 cents per hundredweight decline in live cattle prices. These results are consistent with other studies of industry concentration and pricing. Thus, Henderson concludes that “industrial organization analysis lends support to the hypothesis that returns to farm operations are an inverse function of buyer concentration in their product markets” (Henderson, p. 109).

The structure-conduct-performance paradigm has not been directly applied to the issues of farm structure, but a variation of this model was used by Reimund et al. to analyze structural changes taking place in the broiler, fed cattle, and processing vegetable industries. They argue that change generally begins outside the industry itself, with the imposition of new or changed external conditions. The ensuing structural change is a process of adjustment initially to exploit or accommodate new conditions, but later to better manage newly emerging risks. In all three of these industries, after innovators (including input suppliers, processors, and distributors, as well as farmers) adopted new technology, the second stage in the process was a shift in production of the

commodity to new areas more amenable to changed methods than traditional ones. The third stage in the process is a rapid rise in output using newly gained efficiencies, followed by a fourth stage when new institutions emerge and relationships within the industry change to better manage new risks.

One characteristic of all three of the industries studied by Reimund et al. prior to their structural change was that their production stages were closely tied to the production of other commodities. Broilers were produced from the male chicks of heavy layer chicken breeds. Cattle were fed on grain farms, primarily to utilize off-season labor and as a means of marketing feed grains. Processing vegetables were largely off-grade and surplus fresh vegetables that were diverted to the processing market. These ties to other commodities were major causes of price variability. After the structural change, the use of production contracts in the case of broilers and vegetables, and development of close working relationships between large cattle feedlots and packers have reduced market price risks of producers by transferring these risks to the processing stage.

More recently, significant concern is being expressed about structural changes occurring in the swine industry similar to those in fed cattle. These changes are of two types--first, horizontal concentration into fewer, larger firms at each stage of production and, second, increased use of ownership and contract integration to coordinate the stages. These changes raise questions about who has control over strategic decisions in the industry ‘and what are the effects on performance of the industry. Performance criteria include: (1) how well supply matches demand, (2) technical and operational efficiency, (3) equitable sharing of rights, risks, and returns, (4) market access and ease of entry, and (5) stability.

Contractual vertical coordination is of particular interest in swine. Ronald Mighell and Lawrence Jones in their classic analysis, Vertical Coordination in Agriculture, identify three contract types: (1) market-specification contracts (where the producer transfers a modest degree of production risk and management to a contractor who is interested in product and supply uniformity), (2) production management contracts (which call for more direct participation by the contractor in farm production), and (3) resource providing contracts (where the contractor participates in the vertical stages of production/marketing activity by supplying important inputs). Resource providing contracts appear to be of most interest in the hog industry. They can assume various subforms that vary in amounts of costs and risks shared by contractors and producers. They can be profit-sharing arrangements, not unlike joint ventures. Joint ventures need not be undertaken only by parties with equal bargaining power. The farmer may find this type of arrangement attractive because it provides him with expensive inputs, utilizes his facilities and technical skills, and assures him a reasonable return.

Various forces appear to be behind the increased interest in vertical coordination in hogs. Uncertainty about quality of pork obtained in the spot market is likely an important driving force behind packers' integration and contracting activities. Another force behind swine contracting may be the difference in risk-bearing attitudes and abilities of contractors and other producers as it relates to the adoption of new technology. Returns to pork producers have been quite variable since the mid-1970s. A contractor may be willing to put up with a highly variable cash flow in return for potentially higher returns over the long-term, and have the capital reserves to do so. Producers in a

more precarious financial situation may find that the increased stability of cash flows under a fee-based contract arrangement offsets the loss of some upside income potential, especially if the increased stability makes financing more available for upgrading facilities and improving efficiency. The reduced risk with contract production may be a major advantage when the producer is negotiating with a lender to borrow funds for expansion or new facilities.

Interest in contracting has raised concerns about concentration and competition in the product markets. But a change in vertical coordination methods away from spot market pricing and toward contracting or vertical integration does not necessarily imply increased concentration if a relatively large number of contractors or integrated firms remain. Also, a policy of restricting integration and contracting may not necessarily reduce concentration. Studies in North Carolina indicate that where a number of contractors are actively competing for producers or where markets for independent production are more available, contractors are likely to offer more favorable contract terms than where fewer contractors and markets exist.

The Sociological Model

The "sociological model" has its roots in the behavior of individuals in a family context and the decisions that are made to develop and maintain a family and extended family (more than one generation) farming operation.

The fundamental motivation of individuals for a family farm structure is sometimes unclear. From a societal perspective, it is frequently argued that maintenance of family-based agriculture is important to efficient production,

community viability, and adequate food supply at reasonable costs in the long run. From an individual perspective, the motivations for family farming appear to be primarily related to the independent lifestyle, family bonding and relationships, and the opportunities to develop and strengthen individual attributes such as initiative, motivation, risk-taking and the work ethic in a supportive family environment. In some cases, an implicit (but rarely explicit) objective of family farming is to exploit family members (both spouse and children) as a low cost labor supply. In multigenerational family farming operations, the objective is frequently identified as providing an opportunity for a future generation (a child or grandchild) to farm. An unstated objective in some cases may be the unwillingness to recognize mortality and an attempt by a hard working, independent, decision maker to become immortal by leaving a permanent legacy of a successful farming operation continued beyond death by the heirs.

The sociological (family farm) model is described by the family firm life cycle. The first stage is the entry or establishment stage. In this stage, the prospective farmer evaluates the opportunities in farming compared to other occupational alternatives and determines whether or not to enter the industry. An individual who decides to accept the challenge of starting a farm business must then acquire the “critical mass” of capital resources and managerial ability which is necessary to establish a viable economic unit--a farm business that will generate a competitive income and have the capacity to grow.

Historically, a substantial number of new entrants moved into agriculture via the “agricultural ladder”--first as a hired laborer and then as a renter, next a part-owner and, finally, with full ownership of land as well as livestock and

machinery. But with the substitution of capital for labor, the rapid price increase in durable resources (particularly land and machinery), and the expanding capital requirements of the economically viable farm firm, the “agricultural ladder” may no longer be a viable source of new entrants.

Substitutes for the “agricultural ladder” as a source of new entrants have not been well identified. Research indicates that most new entrants during the 1960s and 1970s used family help to establish their business. One approach is for an established farmer to take the new entrant (historically, a son, son-in-law, brother, or brother-in-law) into the business as a partner and expand the operation to an economic size for both families. A second approach is for the established farmer to provide the financial backing either through a loan or a guarantee (co-signature) of the new entrant’s credit line to purchase a farm and equip it. A third approach is for the new entrant to be employed as a “working farm manager” to gain experience. The entrant can rent or buy land when it becomes available in the neighborhood and farm it using some or all of the established farmer’s machinery. As the new entrant accumulates capital, the individual can “buy into” the current operation or move to a farm of his or her Own.

The second stage in the family-firm life cycle can be identified as a stage of growth and survival. During this stage, the farmer-entrepreneur attempts to expand the resource base by acquiring the services of additional inputs through purchase or lease. New techniques of production are evaluated as to their efficiency and profitability as well as their ability to increase the volume of production through intensification with livestock or extensive expansion through

acquiring a larger land base are also evaluated and implemented. The capital as well as labor requirements of the typical farm firm expand rapidly during this stage in the life cycle, resulting in continued utilization of debt as well as equity sources of funds. Thus, analysis of alternative sources of credit and evaluation of repayment ability are important issues to be faced during the growth and survival stage. In addition, a major consideration during this stage is maintaining a debt-equity structure that will guarantee survival during years of low income due to weather, disease, or low product prices. This consideration may require the maintenance of credit reserves; the acquisition of various types of production, income protection, and liability insurance policies; and the use of diversification strategies in production. In the later years of the growth and survival stage, emphasis may shift from expansion to consolidation of gains, reduction of costs, and stabilization of income.

The third stage in the family-firm life cycle is the exit or disinvestment stage. Two major processes are involved in this stage: the process of retirement and the intergeneration transfer of property. During retirement, the farmer attempts to reduce his/her management responsibilities while maintaining sufficient control of farm assets to generate adequate retirement income. Simultaneously, estate plans that implement lifetime or death transfers of farm property and the managerial responsibility associated with that property to the next generation are developed.

Substantial economic losses can occur if the proper strategy is not used to transfer a large estate from a retiring farmer to his/her heirs. These potential losses are attributable to estate, inheritance and gift taxes; liquidation losses and

reduction in size economies; and legal and management fees incurred in the process of transferring property between generations. In addition, inadequate planning may result in family arguments and other noneconomic problems.

One of the major issues that exists in agriculture, as well as any industry dominated by the sole proprietorship organization structure is that of the efficiency of the firm over the family-firm life cycle. A related issue is the opportunity for new entrants to enter the industry. Although the family farm may be highly efficient during the prime of the farmer-entrepreneur's life, inefficiencies may exist during the entry and exit stages. At the entry stage, the limited size of many farm firms makes it difficult, if not impossible, for the farmer to take advantage of the economies of size that may be available with larger units. During the exit stage, many farmers are attempting to reduce their commitment to farming and income maximization is a lower priority goal for them. In addition, at the death of the farmer and the transfer of property to the heirs, a significant reduction in efficiency can occur because the new entrant frequently does not have the managerial experience to operate the new unit in the most efficient manner. Thus, increased efficiency can be obtained in the long run by coordinating the entry and exit processes. This coordination can be obtained within the family farm structure through the use of multi-owner business organizations, such as the corporation and partnership, through family arrangements that facilitate the son or son-in-law entering the farming business before the father has passed on, or through well-conceived and executed intergeneration transfer plans. This attention to coordination of the entry and exit processes in agriculture may not only provide opportunities for young farmers to enter the

agricultural sector, but also generate a higher level of long run efficiency than can be achieved by nonfarm businesses entering the industry.

As has been noted earlier, family-based agriculture is revered and is endowed with almost mystical qualities. The debate about the attributes of the family farm is very emotional and sometimes hindered by a misunderstanding of some basic concepts. Two aspects of the family farm structure are often confused. The first aspect concerns the relationship of the owner of production assets (particularly land) to the user of those assets (the operator or farmer). One way this relationship can be structured is for the owner to be the operator. Here, the operator of the farm owns the land as well as the machinery, equipment, and working capital. A second way this relationship can be structured is for the owner to act as a landlord renting out the land to a tenant. Some farmers use a mixed strategy for control of the land resource; they own and farm a portion of the land while renting and farming land owned by someone else.

A second aspect of the family farm structure of agriculture concerns the type of ownership, the economic control of the farm. Who owns or operates it? A family or an extended family may be the locus of control; a situation in which the linkages between the individuals involved are dominated by personal ties rather than economic considerations. Alternatively, a nonfamily or “corporate” structure may control the farm. Here, the linkages between the individuals are primarily economic with only limited personal ties. The differences between these two ways of controlling a farm are numerous, but one of the more obvious ones centers on the degree of interpersonal commitment; within the family structure there is typically (but not always) more commitment to the relationship

than there is in the corporate structure. Often in the corporate structure, the primary bonding is economic; interpersonal commitments are much less permanent or important.

Delineation of these two dimensions--the structure and control of farm ownership--is useful in evaluating the attributes of family farms. The distinction assists us in assessing the actual attributes of owner-operator versus tenant agriculture as well as of family versus nonfamily control. These two dimensions are frequently intertwined in discussions of the family farm, but family-controlled agriculture does not necessarily imply owner-operator agriculture.

The structural dimensions of size and financing method are not insignificant to discussions of the family farm. Some commentators imply that family farms are small and use primarily internal sources of financing (i.e., equity rather than debt or leased assets). This is not necessarily the case as evidenced by large farm and nonfarm businesses owned by the same family (for example, the Cargill family and the Bass brothers own substantial farm as well as nonfarm business enterprises) as well as the substantial use of debt and even external sources of equity by owner-operator, family-controlled farms. Clouding the family farm issue with issues of size and financing again makes the debate confusing.

One final comment on the sociological (family farm) model concerns the attributes of family farming. I have identified and discussed elsewhere nine attributes that might be used to evaluate “family” as compared to “corporate” and “owner-operator” versus “tenant-landlord” ways of organizing agriculture (Boehlje). These attributes included (1) economic efficiency, (2) financial stability and risk bearing, (3) standard of living, (4) resource conservation, (5) employment,

(6) entrepreneurial prerogatives, (7) adoption of new technology, (8) community contributions, and (9) independence. My conclusion is that family farming has a clear preference on only one of these attributes--independence and control of one's future. With respect to the remaining criteria, there seems to be no clear-cut advantage for the "family" over the "corporate" approach to decision making or the "owner-operator" verses "tenant-landlord" method of controlling and allocating resources.

Conclusion

I have attempted to review the basic elements of five models of structural change and develop implications for the determinants of change in agriculture and related industries. My review leads me to the conclusion that the factors and forces behind structural change are more complex than the traditional technology and/or institutional (structure-conduct-performance) models that have dominated most economic studies of structure in the past. Significant insights into the determinants of structural change can be obtained from the financial, sociological, and human capital models as well. Although one might argue that these models should be integrated to provide a more comprehensive framework for analyzing structural changes, they individually provide useful information on the key determinants of the structure of the agricultural sector.

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