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## Abstract

The traditional list of resources used in production agriculture is redefined by replacing entrepreneurial ability with information and risk-bearing capacity. Equity diversification is identified as a means for farmers to improve risk-bearing capacity. By bearing (rather than shifting) risk, farm owners become entitled to accrue profits.

## Profits and Risk: Fitting an Old Framework to a New Agriculture

By Cheryl J. Wachenheim and David Saxowsky

### Introduction

Structural and other changes continue to redefine the agricultural sector. This evolution has been well documented and includes, for example, increasing farm size and specialization, decreasing farm numbers, increasing use of production contracts, and evolving markets for specialty products and products with otherwise unique characteristics (e.g., organic). The causes, nature, extent, and results of these changes have been, and continue to be, widely discussed and debated throughout both the popular and academic literature. In general, the changes suggest that the pendulum is swinging from the long-held characterization of production agriculture as a near perfectly competitive industry to one increasingly characterized by imperfect competition.



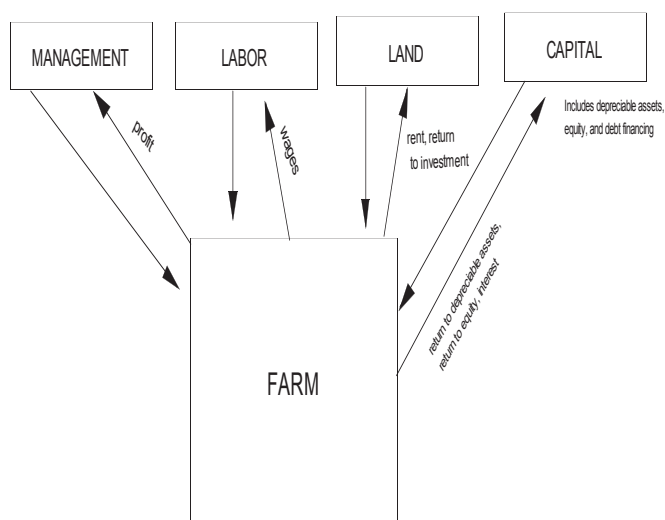
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Textbooks in agricultural economics characterize the resources used in production agriculture into four categories: land, capital, labor, and entrepreneurial ability (management) (Figure 1). Land defines the soil and the environment within which it is contained. Capital includes resources that are tangible and depreciable such as farm machinery, buildings, and brood cows, as well as equity. Labor is considered strictly the physical act of performing a task, while management defines the process of controlling the other resources. Decision making, innovation, gaining access to and use of information, and risk management have all traditionally been considered functions of the management resource. Although managers are motivated by a variety of influencers (e.g., profit, quality of life, risk aversion), within the narrow confines of textbook neoclassic economics, they seek only to maximize profit.

When considered a perfectly competitive market, the assumptions defining production agriculture are strict. In this market, there exist a large number of buyers and sellers, none of whom individually influence price, homogeneous products, free entry and exit, and information that is readily available for and accessible by all market participants (Rhodus, Baldwin, and Henderson). The assumption of free entry and exit defines all resources as instantaneously and freely mobile.<sup>1</sup> Free entry and exit, perfect information, and the notion that the behavior of rational market participants striving to maximize profits can be predicted with certainty, result in a risk-free environment.

*Figure 1: Inputs to production agriculture: traditional framework.*



Within this environment, our textbooks identify fair return to the use of the resources of land, capital, labor, and management to be rent, interest, wages, and profit. In *Agricultural Economics and Agribusiness*, Cramer, Jensen and Southgate (1997, p.79) state “This grouping accords with the view of resource earnings held by firm operators, with the payment to land called 'rent', the earnings of labor its 'wage', the earnings of capital its 'interest', and rewards to management being 'profit'.”

We suggest it is time to revisit the traditional classification of resources used in production agriculture. Doing so will facilitate identification of the source(s) of profits in the sector and definition of alternatives for its profit-seeking participants. This is the purpose of this paper. Specifically, we will argue that the characterization of resources be respecified to combine labor and management into a single resource category and to add two resource categories: information and risk bearing capacity. We begin with brief discussion supporting reclassifying the management resource as labor and the specification of a resource called information. In doing so we re-emphasize a fundamental economic principal: economic profits are not generated if resources earn only the value of their contribution to an economic activity. We then argue for risk bearing capacity as an additional resource category. We contend that a capacity to bear risk can be a source of economic profits. In making this argument, we discuss the wide array of risk management tools available to farmers and their effectiveness in shifting risk. We emphasize that the cost of using these tools can negate economic profits. Thereafter, we explain how bearing risk can generate profits. An alternative that can increase the risk *bearing* ability of farmers, and thus allow them to earn economic profits, is then presented. We conclude by discussing the impact of policies that prohibit or restrict the use of this alternative: diversification of equity investment.

### Redefining the Resources of Production Agriculture

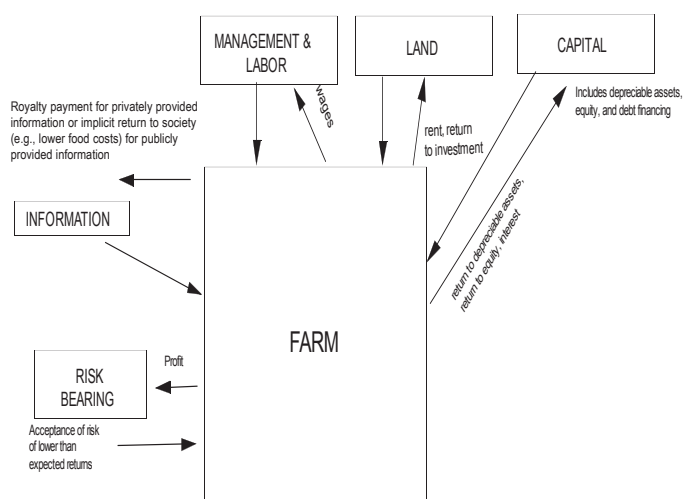
Changes in production agriculture warrant a reconsideration of the economic framework used to describe the forces shaping it. Specifically, economists should re-evaluate how well our models explain and predict decisions made by, and the varying levels of success of, its participants. Our traditional economic

framework does not explain satisfactorily what we observe. Why do some farms earn a profit while other farms with comparable resources do not? Why do some sectors of the agricultural marketing channel earn profits while others do not?

Throughout the academic literature and the popular press, we find hypotheses and associated empirical support for a variety of economic models that attempt to explain these phenomenon. For example, differential market power between participants within the marketing channel is proposed to explain differences in profitability. It is argued that profits accrue to those participants comprising the concentrated industries selling inputs to, and buying products from, the farms that comprise a less concentrated sector. Economies of size are used to explain why some farms are profitable and others are not. Production and market efficiencies, it is argued, allow larger farms to earn greater returns than their smaller counterparts.

While sometimes compelling evidence is presented, we lack a theory that explains and predicts which participants in the agricultural sector will earn economic profits. Our point of departure in the search for a more valid and reliable model is to respecify the resources of production agriculture. First, we argue that management is not a profit generating resource, but rather is a specialized type of labor earning a wage associated with the value it provides. Therefore, the traditionally separated labor and management resources can be considered a single

*Figure 2: Inputs to production agriculture: revised framework.*



resource. We then argue for the explicit inclusion of two additional resource categories, information and risk bearing capacity. Each of the proposed alterations to the more traditional model is discussed in some detail in the following sections. Figure 2 shows the resulting proposed framework defining the resources of production agriculture.

### Management and Labor

We have noted that our traditional model identifies fair return to the use of the resources of land, capital, labor, and management as rent, interest, wages, and profit. It shows that the existence of, or potential to, generate economic profits can be attributed to the innovation, decision-making, or other skills “owned” by the management resource. As the industry evolves and profit margins continue to tighten, the level of skill with which its productive enterprises must be managed increases. The skills required to, for example, identify and develop niche markets and produce products appropriate for them are different than those necessary to produce and market an agricultural commodity. Although management tasks have changed, our consideration of such within the traditional economic framework has not. The abilities of management to direct farm resources to their best value use have continued to be identified as the source of profits. That is, we continue to conclude that good managers should earn a profit.

Alternatively, it is our contention that management should be more simply viewed as a specialized type of labor. We concur with the traditional model, in that, to successfully bid for their use in a particular enterprise, resources, including management, must be paid a return equivalent to their value in generating net income. When resources are mobile, this is the return offered from their next best alternative use. Within a perfectly competitive framework, if a resource can earn more elsewhere, its price is bid up by profit seeking producers to a level at which it earns no economic profits. We emphasize that this holds true for the management resource. Innovativeness, decision making, a willingness to bear risk, and other psychological characteristics and skills defining management simply make it more valuable and, accordingly, it demands a higher wage. This is demonstrated in the marketplace by differences in wages paid to managers at various levels within a

firm, or to managers in equivalent positions at different firms. Under the assumptions of perfect competition, particularly that of resource mobility, management does not earn economic profit.<sup>2</sup> Whether “labor” or “management”, individuals in production agriculture receive a return equivalent to their contribution to the farm. Labor and management do not therefore warrant consideration as unique resource categories.

## Information

Information warrants identification as a unique resource used in production agriculture, with its fair return defined as a royalty payment. Accurate, timely, detailed information is important for good decision making, just as an appropriate soil type is important for crop growth. Fortunately, there is an extensive array of detailed information available about various agricultural enterprises and the production practices appropriate for use within them, and about agricultural and other markets important to farmers (e.g., financial markets). Historically, much of the information used by farmers and other participants in the agricultural sector has been provided by public institutions and is therefore publicly available (Schroeder, et al.). The primary public sources of agricultural production and market information are the Agricultural Statistics Service and other agencies of the U.S. Department of Agriculture (USDA) and land grant universities through their Agricultural Experiment Stations and Cooperative Extension Services.<sup>3</sup>

There are also private sources for information about historic, current, and expected conditions in agricultural markets (e.g., Cattle-Fax). These sources demand a royalty payment as fair return for the use of their information. However, there are compelling arguments for the public collection and dissemination of information. Therein exist economies of size. Furthermore, market information is likely to be under-collected privately. Its value is not known until it is used, and it is difficult to limit use of the information by others once disseminated.

Regardless of its source, information is and will continue to be a distinct resource used by farm operators for decision-making. While we have noted that public information is available to producers and, to some extent, public agents who interpret this

information in a manner meaningful to individual producers, it is likely this task will increasingly be provided by private entities. As such, the cost of obtaining this resource will shift from society to farmers. The extent and nature of the market for private information will depend on the willingness of farmers and other market participants to provide a fair return to those who provide this resource. If information continues to be a public good, managers who are more skilled at obtaining, analyzing and using it will demand a higher wage than those less skilled.

## Risk Bearing Capacity

Similarly warranting explicit consideration as a resource used in production agriculture is the ability to bear risk. Although risk has always been part of production agriculture, farmers are no different than others in that they are, in general and in most circumstances, risk adverse. That is, they accept risk because doing so increases expected profits (or provides other, sometimes intangible, benefits).

Alternatively, for a fair return, farm owners can hire external agents to bear risk. Providing a fair return means that farmers do not lay claim to economic profits when risks are borne by others. Just as a farm manager must decide whether to use equity financed land in the expectation a fair return will accrue to the equity investment, or whether to pay others to provide this resource (e.g., cash rent), (s)he must decide whether the farm owner will bear risks or will rather pay others to do so (e.g., an insurance company). Those ultimately bearing the risks inherent in production agriculture do so with the expectation of a fair return.

Many of our traditional measures of risk (e.g., stand deviation) represent “upside” as well as “downside” risk. However, unless owners are concerned about the potential for tax liability, the relevant risk is “downside” risk, for example that of less-than or less-timely-than-expected cash flow or net income.<sup>4</sup> Managing this risk involves anticipating the potential for undesired events or circumstances and, when cost effective, taking measures to avoid them or their consequences. Managing risk can be considered a manager's responsibility. Bearing risk is not. The distinction is important and we will later argue that risk-bearing

capacity can be a source of profits while managing risk is not. In the following section, the tools available for risk management and the cost of their use are discussed to support our argument that risk management does not earn economic profit. Our characterization of the risk bearing resource as a source of profits is then presented. An alternative strategy by which farm owners can provide this resource, diversification of equity investment, is then discussed, as are actions that will facilitate its adoption.

### Risk Management

Risks in production agriculture include those associated with production, marketing and financing. Risk management tools available to farmers today by and large help them manage but not bear risk. Nearly all available risk management strategies, with perhaps the exception of those offered to producers by society<sup>5</sup>, have an explicit (e.g., payment of an insurance premium) and/or implicit (e.g., foregone revenues) cost

associated with their use. These costs tend to negate expected economic profits. A brief review of the tools available to manage production, market, and financial risks in production agriculture and the cost of their use is provided in Table 1 and discussed here.

There are various means by which farm owners can reduce production risk. However, employing strategies to reduce the likelihood of an undesirable production event have associated costs. For example, increasing the likelihood that fieldwork will be timely by carrying excess machinery capacity has an implicit cost, the otherwise expected earnings from the invested capital. Applying chemicals to reduce or eliminate potential weeds and insects and thereby reduce the risk of lower than expected crop yields has an explicit cost, that of purchasing and applying the chemicals. Diversification of the farm operation can reduce production risk by reducing the consequences of an undesired event. A farm can be diversified by increasing the number of enterprises (e.g., crop and livestock enterprises on a

Table 1. Tools for risk management in production agriculture.

| Type of Risk | Tool for Risk Management  | Potential or Expected Costs  |   |
|--------------|---|--|---|
|              |   | Explicit   | Implicit  |
| Production   | Investment in lower risk enterprises  |  | Foregone revenues   |
|              | Diversification of enterprises (e.g., production practices, enterprise type, geographic location) | Increased production cost  | Foregone revenues   |
| Marketing    | Market information  | Cost of obtaining, analyzing, using  | Time/management   |
|              | Participation in government programs  | Increased production, administrative costs (e.g., record keeping, application) | Foregone revenues associated with maintaining eligibility           |
|              | Spreading sales; use of forward contracts or other marketing arrangements                         |  | Foregone revenues, time/management                                  |
|              | Hedging   | Brokerage fee  | Foregone revenues   |
|              | Options   | Premium, brokerage fee   |   |
| Financial    | Insurance*  | Premium  |   |
|              | Maintaining reserves (inventory, financial)   | Increased overhead cost  | Foregone revenues   |
|              | Deferring or reducing capital investments   | Lease or rental expense  | Reduced efficiency (increased production cost or foregone revenues) |

\* Crop and revenue assurance insurance also can be considered tools to reduce production and/or marketing risk.



single farm) or including in the farm operation geographically separated enterprises, or those that use a diversity of resources, or production practices (e.g., growing several different varieties of corn). Managing risk through diversification may also provide other advantages such as facilitating the use of labor and other resources (e.g., the time at which resources are required varies between enterprises) and improving yield (e.g., the benefits of crop rotation). In spite of its advantages, because diversification reduces the size of individual enterprises, a cost is generally associated with its use as a risk reduction strategy. This cost may be explicit (e.g., increased production cost) or implicit (e.g., reduced revenues). The cost of another production risk management tool, subsidized crop insurance, is borne as an explicit cost, in part by the farmer through premiums, and in part by the taxpayer.

There are also costs associated with managing market and financial risk. The cost of strategies to manage market risk may be explicit (e.g., the premium on an option contract) or implicit. The strategies of spreading sales, forward contracting, or hedging, for example, have an implicit cost, i.e., foregone revenue. That of qualifying or maintaining eligibility for government programs may include administrative and other explicit costs, but may also include foregone revenues. Financial risks are similarly reduced by strategies that pose an explicit cost (e.g., the premium for insurance carried, the interest cost associated with maintaining borrowed financial reserves) or an implicit cost (e.g., foregone revenue or increased cost because capital expenditures to increase production or efficiency were postponed or not made).

### Diversification of Equity Investment as a Risk Bearing Strategy

Risk cannot be engineered out of production agriculture.<sup>6</sup> Government programs have thus far dictated that society take on some of the risk. Public monies fund, for example, commodity programs, subsidized crop insurance, and disaster payments. We have noted that other risks have been efficiently spread or transferred away from the farm operation. In effect, this increases the participation by economic agents outside of agriculture who provide the risk bearing resource (Johnson). The remaining risk must either be managed internally or borne by the farm owner.

The extent to which the public will be willing to continue accepting risks inherent in production agriculture is uncertain. Internal resources (e.g., owner equity) or external agencies assuming the remaining risk will continue to demand payment for doing so, thus eroding or negating economic profits in production agriculture. Alternatively, in other sectors of the economy, business owners can acquire profits without bearing substantial risk. A well designed business structure can support diversification of equity investment among multiple owners. Because particular organizational structures facilitate diversification of an equity portfolio, they allow business owners to bear risk, that is, to manage risk without sacrificing economic profits.

The reason is well understood. As demonstrated by Modigliani and Miller, an asset (e.g., a farm enterprise) held as part of a portfolio (e.g., of farms or farm enterprises) is usually less risky than this same asset held in isolation. The expected return from a portfolio of assets is the weighted expected return from each asset. The expected riskiness of an investment, however, is its contribution to the riskiness of the portfolio of assets held. The more diversified the returns are from assets held in the portfolio, the greater the risk reduction from holding the assets in a portfolio of assets, rather than individually. The advent of mutual funds and other investment alternatives has facilitated the ability of equity investors to diversify risk. In the same way, equity diversification through investment in various assets (e.g., machinery, buildings) or business entities (e.g., farms) would allow farmers to bear risk. By bearing (rather than shifting) risk, farm owners thus become entitled to accrue profits. However, this basic tool is underutilized in production agriculture, particularly among farms organized as sole proprietorships or partnerships.

The independent nature of farmers, and communication difficulties between them, and a lack of producer education regarding the benefits of, and alternatives for, equity diversification likely contribute to the lack of the use of this alternative among farmers. Furthermore, policies limiting the organization of farm ownership can greatly impede the adoption of this strategy, one which has the potential to reduce risk without eroding economic profits. Restrictions on the source of equity investment in production agriculture reduce the ability of farm owners to bear risk. (So-called anti-corporate farming

laws negate or severely limit equity diversification among farm owners. The nature and rationale of such are discussed in more detail in Wachenheim and Saxowsky.) Alternatively, agribusiness firms and those in other economic sectors widely use the strategy of diversification of equity investment to allow owners to bear risk, that is to manage risk without sacrificing expected profits.

Opponents to reducing impediments to shared equity investments as a means to improve the risk-bearing capacity of farm owners might argue that the cooperative structure already allows producers to share equity. However, the one member/one vote rule of cooperative organization denies producers the ability to share in decision making in proportion to their equity contribution, and the amount of risk they hold as a result. Opponents might further argue that value added, so called “new generation” cooperatives, provide producers with a vehicle for diversification. However, membership in such generally requires additional equity rather than diversifies investment of existing equity.

In spite of laws and attitudes that impede its adoption, there is good reason to consider the potential of diversified equity investment as a risk bearing strategy for farmers. Economies of size reduce the number of enterprises in which one farm family can invest. In fact, it is increasingly the case that, to grow or maintain a viable size operation, producers must resort to debt financing, in effect receiving the financier as the outside investor. The difficulty arises in the nature of debt payment, which is designed to be of a specific amount payable at a specific time, versus equity payment, which is by nature responsive to production and market risk. In effect, by using debt financing to reduce production and market risk through diversification or other means, the producer increases financial risk.

### **Equity Diversification Alternatives**

The potential scope of equity diversification by farmers is large. Producers could diversify, for example, by investing in operations of different types (e.g., a livestock producer investing in one or more crop enterprises), operating within different geographic locations, or producing for different

markets (e.g., grain targeted for a commodity market versus a certified organic operation aimed at a growing niche market). Diversification can also be achieved through a combination of these strategies such as owning an equity position in a Southern dairy farm, a Midwest orchard, a Great Plains grain operation, and a ranch in the Western mountains. Equity sharing of productive assets or enterprises among agricultural producers may not only reduce risk but production costs as well. Coordinated machinery sharing by producers in regions where machinery is needed at different times will reduce capital investment cost. If the pool of sharing producers is well-selected, planned machinery and equipment needs would not overlap. Custom combiners have long capitalized on this notion.

Facilitating entities could serve to help identify potential equity sharing partners, evaluate and compare risk and returns from perspective operations within which to invest, and evaluate the impact of these investments on an individual’s portfolio (i.e., expected return and risk). Dramatic advances in communication during recent years (i.e., the Internet) greatly reduce the cost of identifying suitable partners. Because some equity sharing arrangements, if successful, might promote reduced capital expenditures by farmers, those agribusinesses likely to be affected might gain by proactively internalizing the benefits. For example, developing a program wherein assets are leased by period of use rather than annually may allow dealers to reduce the cost to participating producers and increase their own revenues.

Options by which the risk borne by farm owners can be reduced through equity diversification are limited only by the imagination, and in nine states, laws that restrict or prohibit it. Thus, there exists a compelling reason to reexamine how our policies are, first, hindering movement towards the natural risk management mechanism of diversification (one that is of no or low cost to society) and, second, how we are facilitating it. The first step is simply to make it possible by eliminating or rewriting existing legislation.

The most obvious policy to revisit is ironically that which was initially designed and subsequently defended as a means to enhance the ability of small, family farms to survive. We have



demonstrated that an important source of profits in production agriculture comes from the risk bearing ability of its participants (i.e., farm owners). However, progress in increasing the risk bearing ability of farmers through equity diversification is not likely without the repeal or amendment of state laws restricting or prohibiting equity investment in farms by non-family members.<sup>7</sup> Doing so would allow producers to be *free, but not compelled*, to improve their risk-bearing capacity through diversification of their equity investment. Outside equity will not flow into production agriculture to share risk unless producers allow it and economics encourages it.

## Conclusion

The present framework within which the resources of production agriculture are considered benefits from the redefinition of management as a specialized type of labor, one in which equilibrium demands a return equivalent to the value it provides. Furthermore, consideration of information and the ability to bear risk have become important to understanding the forces and interactions in production agriculture. Explicit consideration of them as resource categories is thus warranted.

Production agriculture has changed. Profit margins are tightening and farmers face increasingly concentrated markets both for purchasing inputs and selling outputs. Our nation continues to lose farms. However, by evaluating the industry within our existing framework, we continue to expect that those operating under good management will survive and continue to prosper. Those managers skilled in obtaining and using information and managing risk will continue to generate profits.

Alternatively, we contend and have argued that, no matter how skilled, when managers are rewarded for the value they provide to the farm, no economic profits are earned by the farm owner. Alternative profit sources need to be identified. That, considered in detail within this paper, is increasing the ability of the farm owner to bear risk, specifically through diversification of their equity investment. Advances in communication and other technologies have greatly reduced transactions costs, and will facilitate the ability of producers to communicate, evaluate and compare risk and returns from their perspective operations, and, where allowed, reduce their risk through diversification by

investing equity in one another's operations or sharing equity owned assets (e.g., machinery).

Our challenge in facilitating producer efforts to increase profitability by increasing risk-bearing ability is two-fold. First, producers must be educated regarding the advantages of diversifying their equity investment. This process will be facilitated by explicitly specifying the ability to bear risk as a resource in production agriculture, and research examining the impact on risk and return of investing in a diversified set of farm businesses. Second, laws must be changed to allow producers to fully diversify their equity investment. Policy makers and others involved in, or influencing production agriculture, should consider how those in related business sectors have diversified risk and identify those mechanisms most likely to benefit agricultural producers. Policy makers should carefully and more explicitly consider how adopting new or revising existing (e.g., anti-corporate farming) legislation will affect the ability of farmers to provide the resource of risk-bearing to the farm operation.

## Endnotes

- <sup>1</sup> Resource mobility is not defined literally but rather by use. For example, although it can be altered by capital improvements, the land resource is fixed in its locale. It is mobile in that it can be used in other alternative productive activities.
- <sup>2</sup> Only when management is immobile, and paid a wage less than its value to the firm, is economic profit earned. We concede that the management resource for a family farm operation may be relatively immobile in the short run. However, so too is the labor resource the farmer provides. These resources are only immobile over the longer run if the farm's owner is not motivated solely by profit.
- <sup>3</sup> The Agricultural Statistics Service provides state yield and price information (Patrick). Cooperative Extension Services provide a wide array of information about resource use, production practices, and the economic

viability of various agricultural enterprises as well as situation and outlook information. The most comprehensive source of price and other market information is the USDA Agricultural Marketing Service (AMS). In fact, most other publicly available information about agricultural markets simply summarizes or otherwise revises that provided by AMS.

- 4 If the risk of less than or less timely than expected cash flow or net income can be absorbed by the operation because excess equity is available, the owners would expect a higher return on their equity investment in return for bearing this risk.
- 5 Those for which society is bearing the risk without extracting due profits, e.g., subsidization of crop insurance.
- 6 There is also substantial risk in the agribusiness sector. Agribusiness and others, for example, take on the risk associated with developing technologies in both the input and output markets.

<sup>7</sup> In most states in the U.S., the corporate structure for, and outside ownership of, the resources used in production agriculture (e.g., land, facilities, livestock) are allowed. However, nine states (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Wisconsin) legislatively limit the corporate structure or outside investment. The strictest law is that found in North Dakota. The fact that all states with so called anti-corporate farming legislation exempt the family farm indicates policy makers recognize that the corporate form of organization is not itself a threat.

There are sometimes compelling arguments for the existence of such laws. However, we argue that the benefits now attributed to legislatively mandated farm structure (i.e., saving the family farm; protecting rural communities and the environment) can be maintained without anti-corporate farming laws. Reasonable alternatives to addressing societal concerns about the impact of farm structure on the community and the environment exist and in many cases are already in place.

Furthermore, allowing farmers to share equity, including accepting outside equity investment, may increase the chances a so considered “community and environmentally friendly” family farm will survive. Undesired impacts of changes in the equity financing of local farms on society (e.g., reduced local purchasing and community involvement by farmers) can be avoided by amending statutes to allow for outside equity to flow into production agriculture while preserving local control.

Concerns about the impact of farm structure on the environment are unnecessary when there exists a system of well-written laws regarding the production practices of farms and their environmental impacts. In fact, allowing outside or shared investment may encourage adoption of farming practices which minimize environmental impact, improve worker safety and so on. Producers may be both more willing (e.g., as the details of the operation are more carefully scrutinized) and, because of outside investment, more able, to adopt such practices. It is not a giant leap of reason, for example, to expect a producer soliciting a potential investor to be well prepared with up-to-date, well-organized manure management records that otherwise may not be kept.

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