14 Contracting and Organization in Food and Agriculture

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14.1 Introduction

The food and agriculture sector offers many opportunities to apply concepts from the new institutional economics (NIE). Indeed, some of the earliest modern studies on economic organization focussed on agricultural contracting such as cropsharing (Stiglitz 1974), land tenancy arrangements (Roumasset and Uy 1980; Alston and Higgs 1982; Alston, Datta, and Nugent 1984; Datta, O’Hara, and Nugent 1986), marketing cooperatives (Hendrikse and Bijman 2002), and markets for commodities like honey (Cheung 1973) and fresh fish (Wilson 1980; Acheson 1985). Food and agriculture contracting are particularly interesting because of their unique characteristics. First, agricultural commodities are produced according to biological production functions, meaning that their production schedules are often “fixed” by nature. Combined with the seasonal nature of production, this typically leads to high levels of uncertainty and physical, site, and temporal asset specificity. Second, because agricultural commodities are often highly perishable, monopolistic and monopsonistic market structures are common. Third, agriculture operates in a unique political and regulatory environment, with substantial effect on ownership patterns and economic incentives. Agriculture is often viewed by policy makers as a “special” sector, not only because food is a basic human need but also because the independent farmer – often in a highly romanticized caricature – is usually viewed as an essential element of a nation’s character.

Operating in this unique institutional environment, food and agricultural producers have adopted a number of specialized institutional arrangements to increase productivity, improve quality and variety, and protect relationship-specific investments, among other objectives. Hybrid governance structures such as cooperatives and other forms of network organizations are common (Ménard 1996). Unlike virtually every other mature industry, commodity production remains dominated
by small, family-owned farms (Allen and Lueck 2002). Informal contracts are common.

This chapter describes recent changes to the food and agriculture sector, and shows how concepts from NIE help to shed light on these developments. Until recently, economists approached the food and agriculture sector with the tools of neoclassical industrial organization. Market power in agricultural markets (typically monopsonistic, not monopolistic) was assessed by use of concentration ratios and Herfindahl indices, with the usual remedies proposed to increase competition (in the case of buyer power, this meant increasing, not reducing, commodity prices). Vertical integration was viewed with suspicion because it was typically seen as an attempt by monopsonistic processors to leverage market power. Unfortunately, these approaches left economists unable to explain the variety and richness of contractual arrangements observed in the food chain.

Beginning with a brief review of economic research on the food system, we turn to a discussion of vertical contractual relationships, followed by an examination of network organizations. The organizational forms dominating the governance of exchange in the food system are rapidly changing. Consolidation at every level – from input supply (seeds, plant food, plant protection, animal health products) to food retail – has been caused by technological advances, globalization, domestic and trade policy changes, and tighter vertical coordination across sectors and markets. Throughout the discussion, we show how concepts from NIE, transaction cost economics (TCE) and agency theory, provide valuable insights into the nature and evolution of the main organizational arrangements in agriculture as they adapt to these exogeneous forces. Because of the vastness of the topic, we limit our discussion to several specific organizational arrangements.

14.2 Research on the economic organization of food: a brief history

Food system organization has been a topic of analytical interest since the seminal work by Bakken and Schaars (1937), but not until the 1950s did it gain its current academic stature.1 Figure 14.1 describes the evolution of agricultural and organizational economists’ thinking about the system. Davis and Goldberg (1957) introduced the concept of inter-firm coordination by referring to the post-World War II phenomenon of increasing “unified functions” and “interdependency” between the agricultural production sector and the complementary input production and food processing systems. Subsequently, coordination studies evolved
along two loosely parallel levels of analysis: the study of coordination between vertical and horizontal participants within the food chain (inter-firm coordination) and the micro-analytic study of decision making within alternative food chain governance structures (intra-firm coordination).

Starting with an input–output model emphasizing dependence among sectors, Davis and Goldberg (1957) found that value-adding economic activities at the input production and processing levels were increasing while decreasing at the farm production level. Interest immediately arose as to how and why inter-firm coordination arrangements took the form that emerged within individual commodity systems. The first node in Figure 14.1 denotes this “Get commodity systems right” approach which focussed analysis on exchange coordination and harmony, particularly in vertical relationships among firms. Proponents of this approach argued that tightly coordinated systems would lower per-unit costs, increase system and participant profits, increase responsiveness to market demand, and, in many cases, increase output.

Shortly thereafter, a more theoretical yet complementary approach to agrifood system coordination emerged rooted in applied micro-economics and the workings of agricultural marketing researchers. Utilizing the industrial organization model, agricultural economists concentrated their analysis on two major issues: a market structure–performance
approach to the agrifood system and analysis of the agricultural industrialization process. Evolving simultaneously, the French “filière” concept and the American “subsector” approach incorporated a more dynamic paradigm than the static, horizontally oriented, structure–conduct–performance approach of traditional industrial organization. “Getting market performance right” was the policy objective of researchers applying the filière and subsector approaches. Correcting for vertical market constraints, market failures, and coordination frictions motivated these schools to expand industrial organization models toward more integrative analysis of supply-and-demand conditions, price management relationships, and government–market interfaces. These schools of research emphasized a more dynamic research process and broadened the set of dependent variables to encompass not only efficiency but also social and equity measures (Shaffer 1983). More recent work (albeit efficiency oriented) extends these approaches to diagnostic research methodologies (convention theory) in the study of inter-firm coordination (Sauvé 1998; Boomgard et al. 1991).

As exchange in the global food system became more vertically coordinated, new frameworks for understanding vertical contractual relations emerged. Initially, researchers turned their attention to TCE. This “get governance structures right” approach to vertical systems introduced a set of concepts and tools for addressing the increasing importance of relationship-specific investments in inter-firm relations. As the food system became increasingly industrialized and regulated, more transactions were carried out in non-market, non-hierarchical arrangements. Consequently, hybrid governance structures became more important and contracts more complex. With the onset of more complicated contract design, contractual incompleteness became increasingly important. And in the absence of credible and enforceable contractual arrangements, the opportunity for a transacting party to extract appropriable quasi-rents accruing to a relationship-specific investment led to the standard underinvestment problem.

Accompanying TCE, another contractual approach to understanding the inter-firm coordination process emerged. To address the role of contract design in tightly coordinated and owner-manager separated agrifood systems, agricultural economists began turning to principal–agent models. Applied studies of moral hazard and adverse selection represented by Lajili et al. (1997), Hayami (1998), and Knoeber (2000) demonstrate the breadth of applicability of this “getting contracts right” approach to the issue of inter-firm coordination.

By the 1990s, supply chain management (SCM) surfaced as an alternative paradigm. First put forth by logistics scientists as a method to
improve technical efficiency in procurement and inventory control management processes, SCM soon developed a following among food system economists. Defined as an integrative philosophy to manage the total flow of a distribution channel from supplier to ultimate user, SCM has expanded into a more comprehensive coordination analysis approach. The unit of analysis is the coordinated chain, not the firm. Beers, Beulens, and van Dalen (1998) summarize the origins and conceptual background of the “getting agri-chain performance right” approach. But logistical inter-firm coordination analysis in the form of SCM was not the only academic methodology informing the understanding of the global food system. Exogenous forces such as increased liberalization of market policies, privatization initiatives, and globalization during the 1990s also had important effects on the organization of food production. Simultaneously, the adaptation of information technology and biogenetic technologies affected quality screening, animal safety, traceability, community development, and other sensitive social, environmental, and behavioral objectives (Van Hoek 1999). To analyze these more complex environments and the consequent challenges for coordination, new frameworks such as networking models, system simulation, ecological footprinting, and reverse logistics received increasing attention.

14.3 Contracts and vertical integration

As the above discussion makes clear, many of the important changes in the food-system organization involve the relationships between input suppliers, producers, processors, and distributors. Of course, as food
product attributes become more measurable and less like the generic commodities caricatured in perfectly competitive general equilibrium models, horizontal relationships among rivals become important as well. To date, however, much of the theoretical and empirical work in the economic organization of food and agriculture emphasizes the vertical dimension.2

As briefly explained earlier, the vertical structure of the agricultural production process has changed dramatically in recent decades. One of the most salient features is a rapid increase in contract farming. In the USA, for example, contracts now govern 36% of the value of all agricultural production, up from 12% in 1969 (MacDonald et al. 2004). The adoption of contracting has not proceeded evenly across commodities, however. Between 1991 and 2001 the value of rice production under contract increased from 20% to 39%. For cotton the increase was from 31% to 52%; for hogs, 30% to 61%; and for tobacco, less than 1% to 48%. For livestock commodities such as milk, hogs, and broilers, and for crops such as sugar beets, fruit, and tomatoes, contracts are the primary means of handling production and sales. In France more than 80% of the growers in the poultry industry operated under contracts in 1994, though the contracts varied widely in form (Ménard 1996).

Moreover, data on contracts tell only part of the story. For instance, Grimes, Plain, and Meyer (2004) report that the percent of hogs sold on the US negotiated cash market fell from 62% in 1994 to 12% in 2004, suggesting an increase in vertical integration to accompany the increase in contracting for hogs. Vertical integration is also common in the production of poultry, turkey, and, particularly, eggs. Similar trends are observed in Europe and other parts of the developed world.

14.3.1 Why contract?

What explains this increase in vertical coordination? Contracts allow parties to share risks and provide incentives for effort, quality control, and investment. Contracts may also reduce the costs of quality measurement and effort monitoring. And, as emphasized by TCE, contracts can mitigate the hold-up problem associated with relationship-specific investments. These are all important in agriculture, but the precise roles of risk, transaction costs, asset specificity, and other factors in determining the use and structure of contracts is subject to considerable controversy.

Risk. Much of the early literature on agricultural contracting, such as the work of Stiglitz (1974) on share cropping, focussed on the trade-off between risk sharing and incentives. Share contracts shift yield and price
risks from farmers to commodity buyers, who ameliorate this risk by investing in diversified portfolios. More recent work, in particular a series of papers by Allen and Lueck (summarized in Allen and Lueck 2002), question the role of risk in explaining the particular features of agricultural contracting. They show, for example, that riskier crops are more likely to be associated with fixed-rent contracts, rather than share contracts, contrary to the predictions of standard agency models. Moreover, individuals often act simultaneously as principal in one transaction and agent in another, making it unlikely that contracting arises in response to differences in individuals’ tolerances for risk. Allen and Lueck (2002) suggest instead that contracts serve primarily to reduce measurement costs and mitigate moral hazard problems arising from the unique characteristics of land.

Asset specificity and uncertainty. Many studies use a TCE framework to explain the time-series and cross-sectional variety of observed contractual arrangements, focussing on the roles of asset specificity and uncertainty (Frank and Henderson 1992; Martínez 1999, 2002; Masten 2001; Ménard and Klein 2004). Egg production is highly vertically integrated while poultry and turkey production rely more on production contracts. All these production and transformation processes are increasingly mechanized and subject to quality standards that require highly specialized equipment. Egg, poultry, and turkey production is characterized by high degrees of physical asset specificity, and, because of perishability, site- and temporal-specificity. Because hogs can be transported greater distances without losing value, and may be slaughtered at different ages, site and temporal specificities are less important in the pork industry where (less tightly coordinated) marketing contracts appear sufficient to mitigate opportunism.

Quality control. Tight vertical control can also improve quality control, which is increasingly important as consumers increase their demands for quality, safety, and traceability. In the EU, new regulations making large retailers liable for the quality and identity preservation of the food they sell impose a new set of problems that vertical coordination may alleviate. Similarly, new quality certification and grading systems for protecting consumers that have emerged in Europe over the last ten years require tighter coordination. Recent studies on agricultural contracting in France and in the EU (Mazé 2002; Raynaud, Sauvé, and Valceschini 2002) show that contracts involve an increasing number of detailed clauses concerning quality and the control and monitoring processes which render inputs traceable, all of which require increasingly tight control of the supply chain. On the other hand, the need for flexibility – for instance, matching producers’ livestock to the ever-changing quality
needs of packers—sometimes leads to an increase in informal, relational contracting, rather than explicit agreements.

14.3.2 Small-numbers bargaining

Another reason for the complexity of vertical relationships in food production is the growing consolidation of food production, processing, and distribution. In 1920 the USA had about six and a half million farms with an average of 149 acres per farm. In 1997 there were fewer than two million farms, averaging 487 acres per farm. It is estimated that less than 350,000 farmers generate 80% of the agricultural cash flows in the USA. The European situation is similar. In France, the EU’s leading agricultural producer with 21% of total production in 2000, there were 660,000 farms that year compared with over two million in 1958. The average French farm in 2000 had 104 acres compared to half that area forty years earlier. The processing and distribution sectors are also becoming more concentrated. The twenty largest US grocers had a combined market share of 48.2% in 1998; up from 37% in 1992. The thirty largest European grocers held 68.5% of the market in 2001, up from 51.5% in 1992 (French and German companies dominate the top ten with 41% of the market).

At the same time, farming—unlike virtually every other mature industry—has remained largely a family-owned business. In the USA in 1997, “other than family-held,” corporate farms owned only 1.3% of total farm acreage and generated only 5.6% of total sales receipts. In France, 75% of farms are family-owned with no employees. Allen and Lueck (2002) argue that this ownership pattern results from agriculture’s unique combination of seasonality and random variation, which makes it difficult to design and enforce effective incentive contracts which minimize moral hazard. Instead, sole proprietorships, with the farmer or farm family as residual claimant, outperform joint ownership arrangements such as corporations.

The combination of dispersed family ownership and highly concentrated processing and distribution sectors poses unique challenges for vertical coordination and quality control over the supply chain. Contracts are rarely negotiated among “equals” in size and market influence, but between parties with very different characteristics. In the USA, marketing cooperatives were formed in the early twentieth century for this exact reason—to help small producers negotiate with large processors. Today, in many sectors in both Europe and the USA, formal negotiating bodies and hybrid organizational forms and networks have been established to handle contractual arrangements between diverse
producers and an increasingly concentrated processing and distribution sector.

14.4 Network organizations

Collaborative or network organizations, such as joint ventures, cooperatives, and other hybrids have always been important in US and European agriculture. As the term “hybrid” implies, network organizations represent a blend, or compromise, between the benefits of centralized coordination and control and the incentive and informational advantages of decentralized decision making. Although network members pool significant resources, they often rely on relational contracts rather than formal written agreements, though they do establish some formal mechanism for coordinating.

Two complementary factors may explain the emergence of network organizations in the food and agriculture sectors. First, agricultural policy in most industrialized agricultural countries over the last half-century was designed to achieve restructuring while retaining family ownership. Coinciding with the major concentration in input distribution and food manufacturing, this dispersed ownership puts the coordination problem at the center of organizational issues. Second, consumers have increased dramatically their demands for quality certification. In Europe the certification movement began in France in the early 1960s, with a small group of poultry producers, and increased dramatically during the late 1970s. For instance, the high-quality segment of the poultry industry (the “red-label” system) represented over 30% of the French poultry market in 1994; up from 2% in the late 1970s (Ménard 1996). This system, made up of tightly coordinated groups of producers who agree to meet certain quality specifications in exchange for the right to display a special label, spread quickly to the pork and beef sectors and diffused to other European countries (in particular Italy and, to a lesser extent, the Netherlands and Spain). This evolution was formally endorsed by the adoption in 1992 of a certification system by the EU (Regulation 2081/92). In other European countries, quality certification has also become more important but is handled by private firms (brand-name certification) or quasi-governmental organizations such as the British “Meat and Livestock Commission.”

As was the case with vertical coordination, we observe substantial variety in how these networks are organized. Three stylized types are identifiable. First, some networks are organized around a leading firm. The leader is often a large processor coordinating and monitoring a vast network of suppliers, eventually spread over different countries with
different regulations and institutions. To manage these contracts while guaranteeing consistency and quality of supply and maintaining adequate incentives for producers, leading firms tend to rely on a stable network of producers. We see this model both in the USA (Knoeber 1989) and the EU (Sauvée 2000). A second, more “egalitarian,” form of network organizes a large number of participants with similar rights and duties. The firms that developed the red-label system in France are a good illustration. To guarantee quality, reduce contractual hazards, and prevent freeloaders among legally independent partners, mechanisms must be designed to monitor the partners. Coordinating structures tend to emerge with significant authority on the parties (Ménard 1996), such as Loué in the European poultry industry or Savéol in the market for high-quality tomatoes.

The agricultural organization most analyzed from a new institutional economics approach is the network referred to as a cooperative. Traditionally organized cooperatives, characterized by open membership, redeemable yet non-transferable ownership shares, and a residual claims based on patronage suffer from what Cook and Iliopoulos (2000) call “ill-defined property rights.” These ill-defined property rights result in various conflicts of interest among members. Multiple mixes of selective incentives, degrees of decentralization, and coercion have been designed to ameliorate the internal conflicts inherent in these latent formal groups. Given the aforementioned globalization and industrialization forces, a rapid increase in producer heterogeneity follows, and consequently producer-owned and controlled organizations demand a dynamic and flexible design mechanism. Numerous hybrid cooperative organizational forms addressing these incomplete contract and property rights constraints have emerged recently (Cook and Chaddad 2004). One of these hybrids is the “new generation” cooperative whose structure is being adopted in Oceania, North America, and Europe. New generation cooperatives attempt to solve these ill-defined property rights by restricting membership, allowing transferability of equity shares, and making ownership rights unredeemable. Alternatively, rearranging certain ownership rights within the traditional cooperative structure may help to improve members’ investment incentives (Hendrikse and Bijman 2002).

Because of their importance in the agricultural sector, cooperatives have been the focus of extensive study, but only recently from an NIE approach. Both TCE incomplete contract theory and agency theory studies attempt to explain the ownership rights, control rights, and incentives of these mutually owned and controlled governance structures.

*Transaction cost economics.* Organization economists have applied TCE concepts to examine two related questions: (1) What type of governance
structure is the cooperative firm? (2) Under what conditions is the cooperative the least costly way to govern a transaction? Like all hybrids and networks, cooperatives combine elements of market and hierarchy. Members own the cooperative but remain independent, as the cooperative firm does not control its farmer members. And because of this ownership relation, transactions between the cooperative and its farmer-members are not pure market transactions. The relationship can best be described as contingency contracting since the value of the contract is contingent on the performance of the cooperative. In other words, coordination within a cooperative is similar to market coordination, with the added potential of member patrons influencing the cooperative’s behavior and performance by ceasing to use it (“exit,” in Hirschmann’s [1970] terminology) or influencing its decisions through an elected board of directors (voice).4

In the first comprehensive organizational economics summary of cooperative issues, Staatz (1989) uses TCE to examine the conditions under which farmers benefit from forming a cooperative. The combination of small numbers in the product market, increasing asset specificity, and uncertainties associated with rapidly changing consumer demands, production technologies, and regulatory conditions puts farmers at a considerable risk in their dealings with their trading partners. Farmers may attempt to counteract opportunism by forming an association or lobbying the government to enforce particular contractual terms with input suppliers or processors. However, contract enforcement is costly in many situations, and internalizing the transaction by forming a vertically integrated cooperative may be beneficial. “Because farmer cooperatives combine elements of both vertical integration and contingency contracting, they may offer more ways of dealing with uncertainty than either investor-owned firms (IOFs) or bargaining associations,” (Staatz 1987, p. 94). This is so because cooperatives’ flexibility in pricing renders unnecessary costly contract renegotiation. In addition, the pooling form of payment in marketing cooperatives provides an income insurance function that reduces risk to individual farmers.

More recently Hendrikse and Veeman (2001a) utilize TCE to study the relationships between investment constraints and control constraints within an agricultural marketing cooperative. Employing a TCE framework, these authors develop a logical sequencing for members in deciding on the optimal form of governance structure subject to financial constraints. Analyzing temporal and physical site asset specificity hold-ups, TCE analysis informs the solution to the temporal hold-up and narrows the options to the solution of the second.
Agency theory. Agency models view the cooperative firm as a “nexus of contracts” between agents (managers) and principals (members, boards of directors). The key contracts are those that specify the nature of the residual claims and the allocation of decision control among the organization’s stakeholders. Cooperative residual claims have unique attributes, not found in IOFs, which distinguish these claims from those found in other types of economic organization. Residual claims in cooperatives are restricted to patrons (i.e. cooperative members) and thus remain in force only in as much as the agents (members) holding them patronise the cooperative. Also, residual claims of traditionally organized cooperatives are not alienable, nor are they separable from any other agent roles in the organization. They are thus not marketable.

Cooperatives are generally complex organizations in which decision management and residual risk-bearing are separated, primarily because the main group in the organization consists of the customers or patrons for the organization’s produced goods or services, who do not typically have the decision skills necessary to manage a complex organization. Agency problems arise in cooperatives because management and risk-bearing are separated and performed by specialized agent groups. And because the residual claims of cooperative organizations are not marketable and only incompletely redeemable, members lack the market information that would enable them to exercise more effective decision control.

Another agency problem in cooperatives is that the boards of directors consist, almost exclusively, of members who are not professional managers and who often lack the necessary information to practice decision control effectively. However, cooperative boards often excel at short-term decision making because they have direct knowledge of the near-term impact of management’s decisions. This may not be true, nevertheless, with respect to long-term decisions.

Additional mechanisms for aligning cooperative directors’ interests with those of member patrons include reputation – directors are often active in their local communities – and the threat of takeover from another cooperative or IOF. Specialized cooperative banks may also be in a position to limit cooperative managers’ discretion. These farmer-owned lending institutions specialize in providing capital to cooperatives. Their experts can monitor lending agreements with cooperatives more effectively than can non-cooperative banks which have specialized knowledge of the cooperative form and the unique attributes of the agency relationships within cooperatives.

When analyzing the plethora of network forms in the food sector, an interesting question appears – who is the principal and who is the agent?
Eilers and Hanf (1999) use a principal–agent model combined with detailed fieldwork-generated knowledge to address the opportunistic behavior, conflicts of interest, asymmetric information, and stochastic conditions which emanate from detailed exploration of this issue. This work, heavily influenced by NIE, generates questions seldom raised and never analyzed in the context of agricultural marketing organizations. The approach offers insights and solutions where the manager, acting as principal or agent, offers a contract to a farmer and where the farmer, acting as agent or principal, offers a contract to the cooperative.

### 14.5 Conclusion

The global food system is in the process of radical transformation. This process, often called agro-industrialization, has two major characteristics: (1) production agriculture is becoming more specialized and dependent on outsourcing inputs and services; and (2) food-system participants are using tighter vertical coordination and networking between participants. NIE sheds light on several aspects of this transition, such as the replacement of spot-market exchange for increasingly complex contractual arrangements, and the emergence of new transaction-cost-minimizing structures, replacing spot markets, and exchanges organized by means of transaction-cost-minimizing governance structures. By endogenizing “institutions,” organizational economists are beginning to crack open the institutionally rich sector of agriculture.

Several observations may be extracted from the review of agricultural contracts and network literature. The first is the rapid advance in the application of NIE approaches to the understanding of food and agricultural sector inter-firm coordination. Second, since the mid-1980s analytical approaches we recognize an increase in the number of more institutionally friendly theoretical developments, namely TCE, incomplete contracts, and agency approaches. Third, we notice an increasing emphasis on governance structure analysis – particularly emanating from the contract and network literature and analytical insights gained. Fourth, we observe that the analysis of the role of the agent and the role of the principal in inter-firm coordination decision making is increasing. This work is laying the groundwork for more sophisticated risk and influence cost research. The final observation – a plea is emerging from the authors and readers of this literature – in a field so rich in institutional organizational arrangements and complex institutional environments, the need for detailed, painstakingly thorough fieldwork becomes increasingly important in advancing the organizational economist’s theoretical and empirical work in agricultural contracts and organization.


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