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*International Food and Agribusiness Management Review*
*Volume 15, Issue 2, 2012*

# An Institutional Approach to the Examination of Food Safety

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## Abstract

Food safety is an inherently complex agribusiness problem. Food safety is a result of the collective efforts of various members of the food supply chain in which each member's production, handling, processing and retailing practices jointly determine the safety of the consumed product. Although agency explanations have been offered as one potential solution to this research challenge, food safety also operates within a greater institutional setting. A theoretical framework that draws on an institutional approach is developed in which two sets of propositions are offered to explain the coordination and economic organization of food safety. Such a framework offers four contributions / implications to organizational economic and food safety research.

**Keywords:** food safety, institutions, separating equilibrium.

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## Introduction

Food safety is an inherently complex agribusiness problem (e.g. Berg et al. 2005; Loader and Hobbs 1999; Ménard and Valceschini 2005). Food safety is a result of the collective efforts of various members of the food supply chain in which each member's production, handling, processing and retailing practices jointly determine the safety of the consumed product (Weiss 1995). Yet, despite its importance to society, there is no definitive system of food safety that food supply chain members can agree on. This is because firms seek their own food safety technologies and standards as a means to differentiate from others. Specifically, while firms have a public responsibility to provide safe food to the consumer, they have a private incentive to profit from such responsibilities by investing in specialized assets that differentiate them from others (Loader and Hobbs 1999; Ménard and Valceschini 2005; Sporleder and Goldsmith 2001). For instance, as the largest food service supplier in the U.S., Sysco Inc. has differentiated its services through investments in its food quality assurance programs that are specialized to this firm's food safety needs. This specialization provides a source of competitive differentiation because it "signals" to potential customers as well as to competitors its commitment to food safety. Many other firms are also involved in such competitive differentiation, such as Walmart's efforts to implement and coordinate a Global Food Safety Initiative (GFSI). Yet, since food safety is the result of the collective efforts of many, the research problem is: how does management coordinate the specialized and thus divergent interests of firms in a food system in a way that not only satisfies their private interests for competitive differentiation, but also organized to meeting the needs for public safety?

Agency explanations have been offered as one potential solution to this research problem (e.g. Fearne and Hornibrook 2001; King, Backus, and Van der Gaag 2007: Resende-Filho and Buhr 2008; Starbird 2005; Starbird, Amanor-Boadu, and Roberts 2008; Weiss 1995). The goal of agency theory is to demonstrate how divergent interests can be coordinated by organizing economic exchanges through a contractual arrangement. By "getting incentives right", an optimal contract coordinates the divergent interests of a principal-agent relationship in which incentives modify an agent's actions towards the interests of its principal (Eisenhardt 1989; Hill and Jones, 1992; Jensen and Meckling 1976). In a food safety context, a principal firm that has made investments in food safety assets, such as Sysco, may design a contract to pay its supplier or agent (i.e. food processor) a premium to produce food products that meet a specific pathogen reduction goal. Such incentive inducements have been manifested in various forms. For instance, Starbird (2005) conceived that changes to sampling conduct in inspection could lead to analogous results to incentives in the structuring of principal-agent relationships (see also Starbird et al., 2008). Furthermore, King et al. (2007) demonstrate that payment mechanisms based on safety routines can align the safety interests of the agent with those of its principal.

Yet, despite its general appeal, agency theory rests on an assumption that incentive contracts are governed by efficient markets (Barney and Ouchi 1986; Fama 1980; Fama and Jensen 1983; Hill and Jones 1992; Jensen 1983). With efficient markets, the principal and agent have the freedom to enter and exit contractual relationships (Hill and Jones 1992). In the long run, such free entry / exit yields a competitive market situation in which an agent can voluntarily enter into those contractual arrangements that are mutually compatible with the interests of its principal. And if such contractual arrangements are not agreeable, competitive market conditions ensure that agents or

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principles "can always seek better alternatives" (Hill and Jones1992, 135). Contracts – as a means of economic organization- are thereby inherently efficient because in the long run, competitive market forces will not only select out the most inefficient forms, but will reveal contracts that mutually coordinate the divergent interests of the agent to its principal (Hill and Jones, 1992).

However, institutional theorists argue markets do not always subscribe to the efficient premises of agency theory (e.g. Coase, 1937, 1960; Hayek, 1960; Hill and Jones, 1992; Ménard and Valceschini, 2005). A long tradition in industrial organizational economics contend that markets are subject to barriers to entry / exit that contribute to concentrated market conditions (e.g. Caves and Porter, 1977; Carleton and Perloff, 2005; Porter, 1980). Market concentration introduces market power influences that limit an agent / principals' ability to voluntarily enter / exit a contractual arrangement (Hill and Jones, 1992). For instance, as U.S. and European food markets have transitioned towards increasing concentration (e.g. Boehlje, 1995, 1996; 1999; Cook and Chaddad, 2000; Loader and Hobbs, 1999; Ng, 2008), concentration yields market power influences in which "chain captains" (Boehlje, 1996) can pressure supply chain members to conform to a food safety standard (Ménard and Valceschini, 2005). This market power undermines agency explanations because market power precludes an agent the freedom to voluntarily enter or exit mutually beneficial contractual exchanges.

In addition, agency theory lacks consideration for the role of specialized assets in coordinating the divergent interests of the market (Lajili and Mahoney, 2006). This is because due to its assumptions of free entry / exit, agency theory assumes that firms in the long run will eventually possess similar assets (Carlton and Perloff, 2005). Yet, various institutional economists contend that asset specificity is important to coordinating less than efficient markets because specialized assets can "signal" the quality / safety of the product (e.g. Allen, 1984; Kirmani and Rao, 2000; Landon and Smith, 1998; Shapiro, 1983). Institutional theorists argue that specialized assets can yield a "small numbers" situation in which contracts can no longer benefit from the "large number" efficiencies of a competitive market (e.g. Lajili and Mahoney, 2006; Williamson, 1975). This is because agents not only face fewer contractual alternatives in coordinating their food safety activities, but these remaining alternatives face a greater potential for hold up.

Although not directly examined in agency theory, the efficient premise of agency theory is also predicated on a well-defined set of property rights (e.g. Asher, Mahoney and Mahoney, 2005; Coase, 1960; Hayek, 1960; Kim and Mahoney, 2005; Rothbard, 1982). This is because property rights enable parties to coordinate mutually beneficial exchanges by profiting from the ownership / use of specialized assets (e.g. Asher et al., 2005; Hayek, 1960; Rothbard, 1982). Yet, the assignment of property rights, in terms of food safety liability, is often difficult to determine (e.g. Brewster and Goldsmith, 2007; Loader and Hobbs, 1999). When property rights cannot be fully defined, contracts are incomplete and the parties to an exchange become vulnerable to the liable actions of their connected partners (Brewster and Goldsmith, 2007). When contracts are incomplete, contracts are thereby not likely to be sufficient in coordinating food safety because in the absence of punitive action, contractual members can shirk on their food safety commitments.

Lastly, as the efficient market processes play a primary role in coordinating economic exchanges, an agency theory does not account for the role of institutional norms in coordinating private-

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collective interests. In that, while competitive markets can yield an efficient contract that coordinates food safety, this coordination cannot be attributed to financial incentives alone. It may also depend on a firm's social or normative obligations to the consuming public. For instance, studies have shown that consumers do not have the objective nor scientific expertise to assess the safe handling practices of food firms (Berg et al., 2005). Thus, in the absence of such expertise, food firms have a normative obligation or duty that they can be counted on or trusted in producing food that is safe (Berg et al., 2005; Sapp et al., 2009). Hence unlike the efficient premises of agency theory, the coordination of food safety cannot be attributed to financial incentives alone, but may also depend on a firm's social or normative obligations to their consuming public.

As a result, although agency theory offers a potential means to explain the coordination and economic organization of food safety, the efficient premises of agency theory operates within competitive market setting that cannot account for these various institutional considerations. That is, agency theory is principally concerned with the alignment of divergent interests, but such an alignment operates within a greater institutional context that is not accounted for in the efficiency tenets of agency theory. As a result of this "gap" in agency explanations of food safety, the objective is to draw on an institutional approach to addressing this study's aforementioned research problem. Namely, how does management coordinate the specialized and thus divergent interests of firms in a food system in a way that not only satisfies their private interests for competitive differentiation, but also organized to meeting the needs for public safety?

To address this research problem, this study argues that as food safety fundamentally involves the coordination of public and private interests, an institutional approach offers a framework that serves to coordinate an individual's self-interests towards a pattern of economic organization that advances the interests of a social collective (Coase, 1937, 1960; Hill and Jones, 1992; Nelson and Sampat, 2001; Pfeffer and Salancik, 1978). While undoubtedly there are variety of possible institutional factors to consider, a conceptual framework is developed that focuses on five factors that influence the coordination and economic organization of food safety activities: 1) market concentration (e.g. Boehlje, 1999), 2) specialized assets (e.g. Ménard and Valceschini, 2005), 3) small numbers situation (e.g. Ménard and Valceschini, 2005), 4) property rights (e.g. Ménard and Valceschini, 2005) and 5) trust (e.g. Berg et al., 2005; Freudenburg, 1993; Loader and Hobbs, 1999; Sapp et al., 2009). By accounting for these institutional factors, this framework not only underscores departures from the efficient premises of agency theory, but it extends agency's focus on contracts to consider other forms of economic organization that include vertical integration and social networks (e.g. Boehlje, 1995; Loader and Hobbs, 1999; Sporleder, 1992).

To organize the development of this institutional framework, the concept of an agribusiness institution is first outlined. The five institutional factors surrounding this concept of an agribusiness institution are then examined by drawing on insights from institutional research that include industrial organization economics (Carleton and Perloff, 2005; Caves and Porter, 1977; Porter, 1980), Signaling theory (Shapiro, 1983; Sporleder and Goldsmith, 2001), Transaction cost economics (Williamson, 1975), Property rights (Coase, 1960), and Trust (Berg et al., 2005; Freudenburg, 1993; Granovetter, 1983; Sapp et al., 2009). Insights from these five institutional areas are then integrated to yield propositions that explain the coordination and economic organization of food safety. This study then concludes with its contributions to institutional economics and draws implications to food safety research.

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## Conceptual Development

*Defining the Concept of an Agribusiness Institution*

Although there are varied meanings of institutions, one primary function of an institution is to coordinate human exchanges towards a pattern of economic organization (e.g. Coase, 1960; Hayek, 1960; Nelson and Sampat, 2001; Scott, 1995). For instance, Nelson and Sampat (2001) describe that a common focus of institutions is "achieving agreement in contexts where there is a collective interest in channeling and controlling self-interested behaviors and achieving a pattern of action that is in the collective interest" (p. 38). However, as such coordination tends to be influenced by the context in which it is studied (Nelson and Sampat, 2001); this study argues the institutional context surrounding the coordination of food safety is particularly influenced by: market concentration, asset specificity, small number situations, property rights and trust. Furthermore, as institutions coordinate activities towards a pattern of economic organization, various agribusiness researchers contend that exchange relationships are organized not only through contracts, as ascribed by agency theory, but also through vertical integration and social networks (Boehlje, 1995; Loader and Hobbs, 1999; Sporleder, 1992). This study thereby defines an agribusiness institution by a pattern of economic organization – contracts, vertical integration, social networks- in which an agribusiness firm is subject to institutional factors – market power, asset specificity, property rights and trust- that influence the coordination of its food safety activities. While such a definition may appear to be similar to "mainstream" definitions of agribusiness, mainstream definitions of agribusiness however tend to focus on the interdependencies among connected supply chain members but do not explain the institutional factors impacting such interdependence (e.g. Boehlje, 1999; Cook and Chaddad, 2000; King et al., 2010; Sporleder, 1992). Hence, this study's definition differs from mainstream treatments in its attention on those institutional factors that impact the coordination and economic organization of food safety in the agribusiness supply chain[1]. The institutional factors shaping this coordination are explained as follows:

*Institutional Factors of Coordination*

***Concentration:*** As U.S. and European agricultural markets have evolved towards increasing concentration (Boehlje, 1996, 1999, Cook and Chaddad, 2000; Ménard and Valceschini, 2005; Ng, 2008), such changes in market structure are increasingly characterized by a small number of large and specialized agribusiness operations (e.g. Hardesty and Kusunose, 2009). While there are numerous factors influencing concentration, economies of scale is an important factor because they form a barrier to entry that limits the number of firms that can enter the market (e.g. Carleton and Perloff, 2005; Porter, 1980). Specifically, as economies of scale are based upon an investment of fixed and often specialized assets, reductions in average costs stem from spreading these specialized assets over increasing quantities. This yields barriers to entry because such scale economies favor a minimum efficient scale that can only support a small number of larger players in the market (Porter, 1980). For instance, the U.S. pork production industry is strongly characterized by such concentrated market structures in which the minimum efficient scale has

[1] Hence, this definition limits the scope of those inter-dependencies between members of a given supply chain and not members across different supply chains. Although cross industry / supply chain externalities are important, it is beyond the scope of this study. Future research is thus called upon to examine such interdependencies.

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increased tremendously such that small scale operations have been virtually replaced by specialized large scale feeding and feeder-pig operations (Babcock, 2005; Babcock and Clemens, 2005). This push for an increasing scale of operations has led to an industry wide concentration in which a small number of large scaled pork producers and packers control 80% of the U.S. markets (Babcock, 2005; Babcock and Clemens, 2005).

Although such a characterization of market concentration need not reflect all agricultural industries, there is nevertheless a general recognition that modern agricultural industries- in both the U.S. and European markets- favor "structural changes" towards a small number of large and specialized agribusinesses (e.g. Banterle and Stranieri, 2008; Boehlje, 1999; Codron, Giraud-Heraud and Soler, 2005). This type of market concentration yields two implications to food safety. First, a consequence of concentration is it yields a form of "market power" (Hill and Jones, 1992; Pfeffer and Salancik, 1978; Scott, 1995) in which large firms are placed in a position of influence that can directly shape the coordination of food safety standards (e.g. Ménard and Valceschini, 2005). This is because by virtue of their success and their overall role in society, larger firms have greater "legitimacy" to members of society to which yields them normative or institutional powers to enforce standards and practices that protect their self-interests (Hill and Jones, 1992; Pfeffer and Salancik, 1978; Porter, 1980; Scott, 1995). This is consistent with Porter's 5 (1980) forces framework in which he argues increases in concentration at one stage of a supply chain can yield a "threat of buyer / supplier power" over other stages of the supply chain (see also Hill and Jones, 1992). Such a threat of buyer / supplier power however involves more than the market price abuses described in industrial organizational economics (Carleton and Perloff, 2005), but includes the enforcement of standards that support those who are in power (Hill and Jones, 1992; Porter, 1980).

For instance, Wal-Mart had adopted a Global Food Safety Initiative Standard (GFSI) for its private label products. Under such a food safety standard, all producers of Wal-Mart and Sam's Club private label food products must be audited and be fully certified in accordance with Wal-Mart's food safety requirements (A.N.S.I., 2008). Due to the overall increasing concentration of the food retailing sector (Anders, 2008; Loader and Hobbs, 1999; Ménard and Valceschini, 2005), food producers and processors face little choice but to accept this food safety standard. While such food safety initiatives have originated from the downstream segments of the food supply chain, food safety initiatives can also be influenced by the supplier power of upstream members. For instance, the Leafy Greens Marketing Agreement has been a successful government-private partnership program that originated from the food safety initiatives of California produce farmers. The success of this food safety initiative has led to its adoption throughout the downstream stages of the fresh produce supply chain and has been a model for other states.

As a second consequence, industrial organizational economists argue concentrated markets can also yield larger than average market returns (e.g. Anders, 2008; Carleton and Perloff, 2005; G.A.O, 1999). These above normal returns are important to supporting investments in food safety related assets because they tend to involve specialized investments that are costly to reverse (e.g. Ménard and Valceschini, 2005; Sporleder and Goldsmith, 2001). For instance, as the largest food service supplier in the U.S. market, Sysco Corporation has differentiated its services through specialized investments in its food quality assurance programs. Such investments in a firm's food safety reputation and other supporting assets requires a long term commitment that is

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costly to reverse because such investments tend to be highly specialized to a firm's food safety needs (e.g. Sporleder and Goldsmith, 2001).

More generally speaking, since concentration is influenced by underlying scale economies, studies have shown that large firms are better able to absorb the fixed cost of such specialized investments over that of smaller firms (Codron et al., 2005; Hardesty and Kusunose, 2009). While smaller firms in competitive industries have sought to differentiate themselves through marketing safe products that involve claims such as "local", "organic, "rBst- Free", such monopolistic competitive market conditions are not likely to generate a level of sustainable returns that will support the level of investment in specialized assets made by larger firms. Hence, with concentrated market conditions, scale economies yield above normal returns that provide the financial means to invest in costly to reverse specialized assets that would not be possible in the limited return settings of a monopolistic competitive market.

***Specialized Assets:*** As concentration promotes an investment of specialized assets (e.g. Hill and Jones, 1992; Montgomery, 1994), it is important to thereby outline the nature of such specialized assets. In the context of food safety research, specialized food safety assets include investments in a firm's food safety reputation and those assets that support a firm's reputation (e.g. Banterle and Stranieri, 2008; Sporleder and Goldsmith, 2001). With respect to a firm's brand reputation, a food companies branding efforts include food traceability traits (Banterle and Stranieri, 2008; Pouliot and Sumner, 2008). For instance, due to the *E.coli* outbreak in the U.K, regulation 1760/2000 in the EU of the meat supply chain obligates members of the beef supply chain to be able to include in their labels the country of origin of the animal, a traceability code linking the meat to the animal, and the country and registration number of the slaughterhouse and culling of the traced animal (Banterle and Stranieri, 2008). Such EU regulations also permit voluntary labeling in which beef supply chain members can include additional information beyond these mandatory requirements, such as a system of cattle breeding, cattle feeding, breed, date of slaughtering, name of slaughter house (Banterle and Stranieri, 2008). Such branding efforts are specialized because it create a "national" identity that distinguishes the safety of meat from other regions (i.e. meat originating from non-U.K. origins) (Banterle and Stranieri, 2008). Such branding efforts also require other specialized investments that involve the costs of planning the system, consulting and training the personal, and the design of the data management and control system that support the traceability requirements of the food label (Banterle and Stranieri, 2008). As another example, California leafy greens producers have also made similar investments in such specialized assets. Due to the 2006 *E.coli* outbreak in U.S. spinach, California leafy green producers undertook specialized investments in the production; marketing and handling of leafy greens (Hardesty and Kusunose, 2009). In the spring of 2007, a group of California handlers established the Leafy Greens Product Handlers marketing Agreement (LGMA). Through government certification, this agreement required that handlers source from growers who are in compliance to the food safety practices of this agreement. Growers who are in compliance are distinguished by a "service mark" brand label which was carried on sales documents throughout the produce supply chain. As such branding efforts are specialized to the good agricultural practices (GAPs) described in the LGMA, other specialized investments were also required in implementing this food safety standard. In particular, Hardesty and Kusunose (2009) study found that in order to support the best practices of the "service market label", specialized investments involving additional training in field monitoring, procedures documentation, water testing and overall

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personnel training were needed. Food safety specialists were also identified as another required investment to which the total cost for compliance to LGMA was estimated at $84.36/ acre. There are also other specialized investments involving "one time modification costs" such as additional fencing at $17.2/ acre, modification of compost storage area at $0.8 / acre) and other modifications including air cannon to scare off wild life at $5.4 /acre[2].

In explaining the incentives to invest in such specialized assets, food safety researchers have drawn on the price signaling literature that argues firms make such investments because there is a basic market failure (i.e. inefficient markets) in "signaling" the safety attributes of a firm's products (Ménard and Valceschini, 2005; Sporleder and Goldsmith, 2001). This market failure stems from the "experience good characteristics" of food safety whereby food hazards are either difficult to detect or are detectable only after its consumption[3] (Loader and Hobbs, 1999). With this experience good characteristic, markets fail to coordinate the production of high quality / safe products. This is because in the presence of such market failure, producing firms have an incentive to sell unsafe food products as safe to which buyers respond by paying lower prices. This reduces incentives for firms to produce high quality / safe products (Loader and Hobbs, 1999) and thus low quality / unsafe food products will drive out the production of high quality/ safe products (e.g. Akerlof, 1970; Sporleder and Goldsmith, 2001).

More generally speaking, to overcome this market failure problem, signaling research finds that firms have an incentive to invest in specialized assets because they yield a "separating equilibrium" outcome that differentiates the quality of their products from others. A "separating equilibrium" refers to an outcome where high quality / safe firms have in their economic self-interest to signal the quality of their products, while lower quality / unsafe firms do better by not signaling (Kirmani and Rao, 2000; Sporleder and Goldsmith, 2001). That is in the context of food safety, because the production of safe quality products requires a greater investment of specialized assets, a separating equilibrium involves two types of food firms: large and small food businesses. In such a separating equilibrium, large food companies have in their self-interest to engage in a "separating equilibrium" in which their investments in specialized food assets serve to signal the safety of their product offerings from that of smaller food companies.

Large companies engage in such a separating equilibrium because the specialization of food safety assets exhibit scale advantages in food safety and they provide a means of competitive differentiation. With such scale economies, larger firms are in a better position to signal the safety of their products than smaller growers because small producers cannot absorb the higher cost that is associated with the investment of specialized assets. For instance, in the case of LGMA, large firms face greater economies of scale than smaller producers whereby the cost of LGMA compliance for growers with sales over $10 million was estimated at $8.29 /acre, while for growers with revenue between $1 and $10 million, LGMA compliance costs was estimated at $18.05 / acre (Hardesty and Kusunose, 2009). Furthermore, due to such scale economies, large firms have an incentive to "signal" their food safety because it provides a source of competitive differentia-

[2] In the U.S. beef supply chain, food safety assets in meat packing such as Frigoscandia's beef steam pasteurization system used in Excel's plant in Fort Morgan, Colorado is also highly specialized asset. Because food safety protocols, such as HACCP, involve a strong systems orientation, the integration of food safety prevention assets need to be integrated within the processing conditions and constraints of the plant (see Golan et al.(2004))

[3] Readers are noted, this definition does not exclude consideration that food safety can also include credence attributes.

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tion. For instance, Codron et al.'s study (2005) found that large agribusinesses, such as Carrefour, have made specialized investments that meet the strict quality standards of their premium private label, "Filière Qualité Carrefour" (see also Label Rouge Program[4]). This specialization exceeded publicly mandated food safety standards and thus yielded a source of competitive differentiation in which Carrefour commanded a price premium of 10 to 20%. While, as smaller firms lack the specialization of assets that is associated with a large firm's scale economies, small firms thereby lack the competitive differentiation of large producers. Hence, in a separating equilibrium, smaller firms are better off with not signaling the quality of their products by remaining "anonymous" (e.g. Cordon et al., 2005; Hardesty and Kusunose, 2009).

***Small Number Exchanges***: However, the challenge facing this "separating equilibrium" outcome is that such "signaling" efforts are often cast between a single seller and buyer and thus do not speak to the coordination that is required in the multiple agent settings of an agribusiness institution. Yet, since concentrated markets consist of large firms that have market power, such market power can institutionalize the investment of specialized assets in their upstream or downstream partners (e.g. Hill and Jones, 1992). This investment of specialized assets can subsequently create a sequence of "bilateral monopolies or small number situations" (Williamson, 1975) in the agribusiness supply chain. In particular, through such asset specific investments, each large firm member of this small number exchange "signals" to their adjacent buyer their quality differentiating efforts. This not only yields a "separating equilibrium" amongst the various members of the supply chain, but such a "separating equilibrium" rewards each member a higher price premium for their investments made in food safety (see also Pouliot and Sumner, 2008). As a result, through market concentration, a large firm with market power can institutionalize or enforce upstream and downstream members to invest in specialized food safety assets that serve the firm's food safety goals. This yields a separating equilibrium in which there is a sequence of small numbers exchange relationships in which large food companies align and coordinate the interests of the various members of the agribusiness food system.

For instance, in following the U.K. BSE crisis, the giant retailer Carrefour, second largest worldwide, created its own label for beef (Filière Qualité Carrefour) that involved tight quality control requirements on cattle farmers and slaughterhouses (Ménard and Valceschini, 2005) involving complete traceability and organoleptic quality of the meat (Codron et al., 2005). As each value chain member conformed to the food safety standards and investment requirements of their "chain captain", such pressures for conformance coordinated the collective activities of the beef supply chain. Such coordination in turn differentiated the food safety attributes of this supply chain. This coordination is supported by the arguments of a "separating equilibrium" whereby higher price premiums are commanded by the quality investments and standards made by the small number exchange members of this beef supply chain. The following is thus proposed:

*1a. Market concentration positively affects a firm's incentives to making specialized investments in their firm's food safety assets*
*1b. Specialized investments in a firm's food safety assets positively influences a "separating equilibrium" amongst small number exchange members of a food supply chain system.*

[4] Westgren's (1999) discussion of the Label Rouge Poultry system exhibits similar parallels.

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***Property Rights:*** A consequence of this "separating equilibrium" is that investments in specialized assets yield property right considerations that can also influence the coordination of food safety activities in an agribusiness institution. Institutional researchers have long recognized the importance of property rights in coordinating exchange activities (e.g. Coase, 1960; Hayek, 1960; Ménard and Valceschini, 2005; Rothbard, 1982). Property rights involve a right of exclusivity in which owners can exclude exchange partners from the benefits of asset ownership (Asher et al., 2005; Coase, 1960; Hayek, 1960; Rothbard, 1982). Acts such as violations of patents or the appropriation of returns on another's property reflect infringements to such rights (Asher et al., 2005). The right of exclusion and the assignment of liability are thereby two sides of the same coin (Coase, 1960). This is because the right to exclude non-owners from the benefits of ownership implies a right to impose liabilities on those who violate such rights.

In the context of food safety, rights of exclusivity and liability are important to coordinating the food safety activities of an agribusiness institution for two reasons. First, property rights over the ownership of specialized assets are central to the coordinating advantages of a separating equilibrium. For instance, consider a situation in which there is an absence of property rights. Under such a situation, a firm will not have an incentive to invest in their food safety assets because they will be unable to exclude small number exchange members from "free riding" on the signaling benefits of these assets. This inability to exclude others from appropriating the signaling benefits of a firm's assets introduces a "markets for lemons problem" (Akerlof, 1970) in which low quality / unsafe food products will be sold at premium prices. Hence, in the absence of a right of exclusion, a separating equilibrium is unsustainable because the market will not support price premiums that would sustain a firm's investment in specialized food safety assets.

Second, although the Coase theorem (1960) has not been examined in the context of price signaling research, a clear assignment of liability is important to the onset of a separating equilibrium. In situations where individuals do not fully bear the social costs of their actions, the Coase theorem argues that regardless of the initial assignment of liability, as long as property rights can be well defined with no transactions costs, societal resources will be allocated to their most efficient use. To illustrate, Coase uses an example in which a rancher's straying cattle creates crop damage to a neighboring farm. Coase argues that as long as property rights can be fully specified whereby liability can be assigned to the damaging party (i.e. rancher) with minimal or zero transaction costs, the liable party (rancher) can negotiate with the damaged party (farmer) to accept payments for damages (i.e. farmer has the right of exclusion) created by its straying cattle. Coase further argues that the initial assignment of liability does not affect the efficient allocation of societal resources. Coase argues if the rancher cannot be held liable (i.e. the rancher has the right of exclusion), in which liability now resides with the farmer, the farmer can provide payments to the rancher for reducing the size of its herd. In either situation, the initial assignment of liabilities does not affect the final social outcome. This is because in both situations the bargaining process introduces additional social costs that were not previously considered by the other party. Such a bargaining process, irrespective of the assignment of initial liability, leads to a greater internalization of social costs and thus promoting the coordination and efficient allocation of social resources.

In drawing from the Coase theorem, a clear assignment of food safety liability – irrespective of initial assignment- can promote the onset of a separating equilibrium. Because investments in specialized assets create a small numbers situation (Lajili and Mahoney, 2006; Williamson,

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1975), each partner is vulnerable to the liable actions of their connected partner. For instance, since the detection of food pathogens is costly (Loader and Hobbs, 1999), small number exchange members can "shirk" on their commitments to food safety and thus impose social costs in the form of food safety liability to their adjacent partners. In the absence of a clear assignment of liability, there will be no incentive for a firm to invest in specialized assets because the damaging party will not internalize the social cost of their liable actions.

As a result, since a separating equilibrium is contingent on investments in food safety assets, the lack of a clear assignment of liability will undermine the onset of a separating equilibrium. This suggests that a separating equilibrium role is not only dependent on a right to exclude "small members" from appropriating excessive returns from a firm's ownership of specialized assets, but according to Coase (1960) depends on an assignment of liability that protects each member's specialized assets from the liable actions of their connected partners. For instance, the 1990 Food Safety Act in the U.K. holds each party in the value chain accountable for due diligence over the safety of the supplies that it uses (Loader and Hobbs, 1999). By creating a widely shared liability, the Act motivated the private sector to a high level of coordination and control in food safety enhancements (Holleran, Bredahl and Zaibet, 1999; Loader and Hobbs, 1999). Every contemporary analysis of the drivers of supply chain coordination in the U.K. notes the role of the legal liability system in establishing shared responsibility, and it is widely agreed that this assignment of rights spurred the coordination for safer food standards (e.g. Loader and Hobbs, 1999). The following is thus proposed:

*1c. Property rights promote the coordination of food safety activities by protecting a firm's right to appropriate the returns from its specialized investments and from the liable actions of its connected parties.*

Yet, although property rights are important to protecting a firm's investments in specialized assets, property rights themselves are necessary but not a sufficient condition to providing the level of food safety that is predicted by a separating equilibrium. Specifically, given the assignment of private property rights, private-public partnerships for food traceability can also facilitate the onset of a separating equilibrium outcome. Such private-public partnerships can involve the development of voluntary food safety standards that exceed minimum public standards. For instance, in the case of the EU meat supply chain, EU regulation 1760/2000 permits voluntary labeling in which beef supply chain members can include additional information beyond that of government mandated requirements (Codron et al., 2005). This private-public partnership promotes a greater transparency about the food safety practices of supply chain members. This transparency not only facilitates the detection and thus subsequent assignment of liability to infracting parties, but it can also promote the realization of a separating equilibrium outcome.

To explain within this private-public partnership, large firms have an interest to signal their food safety by engaging in voluntary standards that exceed a publicly mandated standard. This is because by virtue of their larger size, lapses in food safety by these large members can incur significant liabilities to its financial position. For instance, in the case of *E. coli* contamination in hamburger patties, court costs and lost sales to Jack in the Box restaurant have been estimated of up to $100 million (Martin, 1998). Hence, large firms have an incentive to signal a higher level of food safety that exceeds government mandated standards because it minimizes their exposure to

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such financial liabilities and risks. In contrast, a small producer's signaling strategy is to choose a publicly mandated requirement because they do not have the financial resources to cover the financial liabilities in failing to conform to the higher food safety requirements of a voluntary standard. Furthermore, as smaller food firms do not possess specialized assets in food safety, they lack the expertise that is required to meeting the additional food safety requirements of a voluntary system. As a result, through this private-public partnership, a separating equilibrium can arise in which large firms have in their self-interest to signal a commitment to a "voluntary standard", while the self-interests of the small firm is to signal a commitment to a publicly mandated standard. The following is thus proposed:

*1d.Given well defined property rights, private-public partnerships involving voluntary and mandatory food safety standards positively influence the onset of a separating equilibrium.*

***Trust:*** Yet, while such private-public partnership are helpful in realizing a separating equilibrium outcome, institutional researchers contend that "trust" in food producers and regulatory bodies is also important to the provision of food safety (Berg et al., 2005; Sapp et al., 2009). According to a theory of recreance, an increasing specialization of tasks yields a highly interdependent society which renders the public increasingly vulnerable to the risks posed by each specialized member. As Sapp et al. (2009) note, a theory of recreance,

"recognizes that risk is socially constructed, wherein contemporary citizens are "dependent not just on the technologies [of a modern society], but also on the social relations that bring them into being, involving whole army of specialists, most of whom have areas of expertise that we may not be competent to judge, and many of whom we will never even meet, let alone have the ability to control" (Alario and Freudenberg, 2003: 2000). Institutional actors must therefore be perceived as both competent and reasonably responsive to citizens" (pg. 529).

In particular, since food safety risks cannot be fully understood by the concerns of the consuming public, theoretical and empirical studies have found that there are normative expectations on food companies that they are increasingly "counted on" by the public "to follow through on a duty or trust" in producing goods that are safe (Freudenburg, 1993, pg. 916; Sapp et al., 2009). For instance, Sapp et al.'s (2009) study found that consumers' trust in the U.S. food system is based on a normative expectation that agribusiness food companies are expected to demonstrate "competency" in their handling of safe food and that the production of food is conducted in a "fiduciary responsible" manner. Food companies have an obligation to fulfill such normative expectations because when food companies fail to behave in accordance to such expectations, they are deemed "miscreants" (Freudenberg, 1993, p 917) and will fail to receive the "trust" and support from the public. Such trust places normative obligations on firms to produce food that is safe even when their risks cannot be fully identified.

To elaborate, while the stochastic and complex nature of food safety risk renders it difficult to fully detect safety infractions (Brewster and Goldsmith, 2007), trust can yield a "separating equilibrium" in which large firms face a greater normative obligation to producing safe food over that of smaller firms. Consumers are more likely to place greater trust in large firms because their investment in specialized food safety assets may give them the appearance of competence. Furthermore, because of their size, they are socially more visible and thus may appear to uphold

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a greater fiduciary responsibility to the public. In contrast, as smaller firms lack an investment of specialized assets, they do not possess equal "competence" of their larger counterparts and thus command less trust from the consuming public. Furthermore, small firms may prefer a signaling strategy of "anonymity" because they cannot be held liable for any food safety infractions. Such anonymity lacks accountability and thus reducing a small firm's fiduciary responsibilities to society. As a result, despite the complex and stochastic nature of food safety risks, large firms have an incentive to provide safe food even when such risks are costly to detect. This is because larger firms face a greater normative obligation to develop trust with their consumer public to which such trust serves to yield a separating equilibrium that "signals" their commitment to food safety over that of smaller firms. The following is thus proposed:

*1e. Increases in the complexity or interdependency of food safety risks positively influences a separating equilibrium outcome.*

*Economic Organization*

Since the purpose of an institution is to coordinate individual interests towards a pattern of economic organization (Nelson and Sampat, 2001), the institutional factors ascribed by this study are not only used to explain the coordination of food safety activities in a separating equilibrium outcome context, but these factors are also used to explain the economic organization of this outcome. Agribusiness researchers contend that the activities of the agribusiness system can be organized through contracts, vertical integration and social networks (e.g. Boehlje, 1995; Sporleder, 1992; Ng, 2008) to which their choice can be explained by a transaction cost minimizing logic (Williamson, 1975). While a transaction cost economics approach is well established in agribusiness research, the institutional factors surrounding the economic organization of food safety is not. As result, in drawing on the institutional factors of this study, a transaction cost minimizing logic approach is extended to explain within a separating equilibrium context the economic organization of food safety activities. This extension is explained as follows:

***Contracts:*** Given concentrated markets, a clear delineation of property rights coupled with asset specificity and a small numbers situation is argued to favor a contractual mode of organizing the food safety activities of a separating equilibrium. This is because when property rights on food safety assets are well defined, exclusivity and the assignment of food safety liability reduces the transaction costs in the enforcement and monitoring of food safety transactions. Exclusivity minimizes opportunistic problems of hold up and thus prevents small number members from having the rents of their food safety assets being appropriated by their adjacent partners. Furthermore, the assignment of liability reduces efforts by small number members to shirk on their food safety activities. This assignment of liability mitigates problems of moral hazard which reduce the transaction costs of monitoring the food safety practices of small number partners. As a result, given concentrated markets, a well-defined system of property rights coupled with asset specificity and a small number exchange situation will reduce the transaction costs of market exchange. This would favor a contractual mode of economic organization in which food safety activities of a separating equilibrium are coordinated by a contractual arrangement that rewards small number members –consisting of large food producers- a price premium for their specialized investments in food safety assets. The economic organization of this separating equilibrium is proposed as follows:

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*2a. A well-defined system of property rights coupled with asset specificity and a small number situation positively influences contractual forms of economic organization.*

***Vertical Integration***: Yet, when it is difficult to fully assign food safety liability, the assignment of property rights not only becomes costly, but it renders vertical integration – as opposed to contracts- a more viable form of economic organization.

For instance, Brewster and Goldsmith (2007) argue that courts tend to avoid imposing harsh liability to infracting firms on the basis of a type I error avoidance, an avoidance to punish the innocent. The U.S. constitutional setting protects individual rights at its core and thus individuals are deemed innocent until proven guilty. Yet, although Type I error protects individual rights, Brewster and Goldsmith (2007) argue that "proving cause, effect, and responsibility becomes difficult for regulators within a system that is most concerned about not committing a type I error" (p. 29) and "…hinders the ability of the legal system to correctly signal and enforce consequences associated with safety risks" (p. 30). The implication to the economic organization of food safety is that the inability to assign food safety liability not only renders that property rights are ill-defined, but as result introduces a transaction costs in the assignment of such rights. Specifically, consistent with Coase (1960), when there are transaction costs in the assignment of property rights or the property rights are not well defined, asset specificity and small number situations increases the transaction costs of a contractual exchange. This is because when liability cannot be fully defined –due to an avoidance of Type I errors-, ill- defined property rights opens up opportunities for small number members to shirk on their commitment to food safety without financial recourse. Furthermore, small number members cannot be excluded from appropriating or holding up the returns made by their partner's investment in specialized food safety assets. This inability to fully define property rights thereby raises the transaction costs in writing more complete contracts that mitigate such opportunistic behaviors.

Vertical integration has been argued as an alternative to this contractual mode of economic organization (Williamson, 1975). Vertical integration is distinguished by its power of authority (Coase, 1937, Williamson, 1975). Authority replaces the arms-length transactions of contracts with a single employer-employee relationship (Coase, 1937). An employer-employee relationship reduces the need for an agribusiness firm to write a complete contract, and relinquish the need to monitor and enforce the food safety practices of its contractual partners because an employee who is conducting the same food safety activity in question can be directly monitored by the employer. Such authority not only reduces the transactions costs associated with the monitoring and enforcement of food safety practices, but authority also reduces problems associated with shirking and holdup (e.g. Coase, 1937; Williamson, 1975). This is because with the power of authority, employers can instruct their employees to act in ways that reflect the safety goals of their business and thus protect the firm's specialization of food safety assets from problems of hold up and shirking. Hence, due to the transaction cost minimizing properties of authority, the logic of transaction cost economics would suggest that when property rights cannot be fully defined, conditions of asset specificity and small numbers situation would favor organizing the food safety activities of a separating equilibrium through vertical integration. Hence, to emphasize the significance of property rights to the vertical integration of food safety activities, the corollary to proposition 2a is stated as follows:

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*2b. Given asset specificity and small numbers situation, the absence of property rights positively influences the vertical integration of food safety activities.*

In spite of the transaction cost minimizing benefits of authority, Coase (1937) however recognizes that a firm cannot vertically integrate all activities of a market. Coase argues that with increasing vertical integration, managers face an increasingly bureaucratic administrative structure that limits a firm's ability to grow. For instance, since food safety risks are complex and interdependent, efforts to increasingly vertically integrate specialized food safety assets increasingly exposes the firm to the risks of each integrated and specialized unit. This follows Durkheim's notion of "organic solidarity"[5] in which "increasingly complex social systems may increase the probability that some key portions of the system…cannot be safety counted on. Paradoxically the very division of labor [specialization] that permits many of the achievements of advanced industrial societies may also have the potential to become one of the most serious sources of risk and vulnerability." (Freudenberg, 1993, p, 914). This suggests that while the absence of well-defined property right favors organizing a separating equilibrium through vertical integration, an increasing integration of specialized food safety assets limits a firm's growth. This is because as this vertical integration increases a firm's internal complexity, it exposes the firm to various sources of specialized and interdependent risks and thus limits a firm's ability to provide safe food.

***Strong tie networks:*** To deal with such limits, social networks involving strong ties offer another form of economic organization (e.g. Chiles and McMackin, 1996; Granovetter, 1983). Distinct from contracts and vertically integrated forms of economic organization, strong ties are defined by interactions that involve a high frequency of close and reciprocal social relationships amongst similar individuals (Granovetter, 1973, 1983; Hansen, 1999; Ng, Unterschultz, and Laate, 2006; Rowley, Behrens and Krackhardt, 2000). Due to the focus on close and reciprocal relationships, strong ties have been found to: 1) promote the exchange of detailed and / or difficult to codify knowledge (Dyer and Nobeoka, 2000; Granovetter, 1983; Kraatz, 1998; Uzzi, 1997), 2) facilitates joint problem-solving activities, and 3) provide the mutual identification of parties that enhance trust-based governance (Dyer and Nobeoka, 2000; Granovetter, 1983; Kraatz, 1998; Rowley et al., 2000; Uzzi, 1997).

In drawing on a recreance theory of trust, strong ties offer an alternative means of organizing a separating equilibrium. In this separating equilibrium, a recreance theory would suggest that even when food safety risks have become increasingly complex and interdependent, small number members with strong network ties will nevertheless face a normative obligation to produce safe food. Namely, as strong ties have been found to promote a conformance to institutionally prescribed norms (e.g. Burt, 1992; Coleman, 1988; Granovetter, 1983), strong ties increase a small number members' competence and fiduciary responsibilities to their consuming public.

To elaborate, in terms of competence, the close and reciprocal exchanges of strong ties increase members' ability to jointly solve a common set of problems (Hansen, 1999; Ng et al., 2006; Uzzi, 1997). This is because strong ties promote an in depth understanding of each small number member's food safety practices to which each member develops a unique or specialized understanding of their potential food safety hazards. For example, such detailed or specialized knowledge promotes joint solutions in identifying the Critical Control Points (CCPs) of a

[5] Readers should note that the theory of recreance is based on Durkheim's notion of organic solidarity

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HACCP program. By promoting such greater joint problem solving, strong ties thereby increase small number members' competence in their handling of food safety events.

Moreover, in accordance to the normative pressures ascribed by recreance theory, strong ties create a greater social obligation to produce food in a fiduciary responsible manner. This is because as strong ties involve frequent and detailed interactions, strong ties have been found to promote a greater monitoring and governance of partner practices (see Dyer and Nobeoka, 2000; Dyer and Singh, 1998).With this greater monitoring of partner behaviors, strong ties create a greater social obligation by small number members to become accountable for their food safety actions. In that, due to their close and frequent exchanges, strong ties will render that small number members are more likely to devote resources to reducing food safety contaminants than focusing their attention to cost control efforts. Hence, in accordance to the normative obligations ascribed by a recreance theory of trust, strong ties increase trust in the small number member's food safety practices because these ties promote fiduciary responsible actions to the public.

Hence, although vertical integration offers a means to organize food safety activities, strong ties can thus become an increasingly relevant alternative when limits to such vertical integration have been reached. Specifically, strong ties not only offer an alternative means to organizing a separating equilibrium, but strong ties develop small number members' trust with its consuming public. Amongst small number members that consist of large food firms, strong ties reinforce their joint specialization of tasks to which increases their competence in their handling of food safety activities. These strong ties also increase their accountability and thus fiduciary responsibilities to the consuming public because their actions are closely monitored by their small number partners. As result, these strong ties yield a greater trust by the consuming public to which places a normative obligation on these small number members to be increasingly "counted on" in producing food that is safe (Sapp et al., 2009). As a result, while the economic organization of a separating equilibrium can be influenced by financial incentives and transaction cost reducing motivations, strong ties reflect an alternative mode of economic organization in which small number members - consisting of large firms- differentiate their food safety on institutional or normative grounds. Given that there are limits in even a large firm's ability to integrate specialized food safety assets, the normative or institutional aspects of this separating equilibrium are captured in the following proposition:

*2c. Increasing vertical integration- beyond a size threshold- positively influences a strong tie mode of economic organization in which small number members – consisting of large firms- face a normative obligation to produce food that is safe.*

## Conclusions

As food safety has become an increasingly important attribute in consumer choice, firms differentiate their competitive position by making investments in food safety related assets (Berg et al., 2005; Loader and Hobbs, 1999; Ménard and Valceschini, 2005). Yet, the challenge facing agribusinesses is that the benefits from such investments rest on a firm's ability to coordinate and organize the diverse interests of its exchange partners. Although principal-agent explanations have been a useful approach to addressing this research problem, agency explanations rest on an implicit assumption that contracts are devised under highly efficient market settings (Barney and

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Ouchi, 1986; Hill and Jones, 1992). While markets in the long run tend to exhibit the properties of an efficient market, institutional researchers contend that markets in the short run are less than efficient (e.g. Coase, 1937, 1960; Hayek, 1960; Hill and Jones, 1992; Rothbard, 1982). Such inefficiencies can stem from a variety of institutional factors that include but are not limited to market concentration, asset specificity, small numbers exchange, property rights and trust (e.g. Coase, 1960; Chiles and McMackin, 1996; Freudenburg, 1993; Hill and Jones, 1992; Ménard and Valceschini, 2005; Sporleder and Goldsmith, 2001; Williamson, 1975). Yet, in spite of a recent growth in interest about institutions (e.g. Sykuta and James, 2004), there remains a limited understanding of how these various institutional factors influence the coordination and economic organization of food safety activities in an agribusiness institution. As a result, by drawing on these varied institutional factors, this study developed an institutional approach to addressing this gap in food safety research. This institutional approach offers four contributions / implications to organizational economics and food safety research.

First, as agency theory is predicated on an efficient market premise (e.g. Fama, 1980; Fama and Jensen, 1983; Jensen, 1983), an agency perspective understates the complexities involved in the coordination and economic organization of food safety. This underscores a criticism made by Eisenhardt's (1989) review of agency theory in which she notes,

"Agency theory presents a partial view of the world that, although it is valid, also ignores a good bit of the complexity of organizations" (p.71)

This study complexifies agency explanations by recognizing that the coordination and economic organization of food safety depends on institutional considerations that have received limited treatment by the efficient premises of agency theory. Specifically as the design of an efficient contract depends on a highly competitive market outcome, this study argues and shows that food safety does not operate under such conditions. Food safety operates in concentrated markets in which the alignment of divergent interests is not just about "getting incentives right", but such an alignment is also influenced by those in power. That is, although high powered monetary incentives are crucial to the alignment of divergent interests, such an alignment need not be driven by monetary incentives alone but is also driven by the institutional demands of those in power (e.g. Hill and Jones, 1992; Pfeffer and Salancik, 1978). As a result, this study introduces a concept of power that is absent in the competitive market outcomes of agency theory (see also Hill and Jones, 1992).

Second, departures from such an efficient market premise introduce other institutional considerations that are not considered in agency theory. Concentrated markets promote an investment in specialized assets that have been largely ignored in agency theory explanations of contract design (Hill and Jones, 1992; Lajili and Mahoney, 2006). In the context of food safety, specialized investments in a firm's food safety assets addresses a basic failure of the market in valuing the experience good characteristics of food safety. A firm's investment in specialized assets not only resolves such a market failure problem, but it indicates that "getting incentives" right also requires that agents "signal" the quality of their food products. Investment in specialized assets signals a firm commitment to food safety which in turn supports price incentives that will sustain such an investment. As a result, by introducing the role of specialized assets, it underscores that

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the use "ex-ante bonding costs" in agency theory (Hill and Jones, 1992) should also consider these asset characteristics of such bonding costs.

Third, as this study's institutional approach complexifies agency explanations, it yields a broader understanding of organizational economic research. Transaction cost economics argues that under conditions of asset specificity and a small numbers situation, the transaction cost minimizing properties of a firm's authority are favored over that of contracts (e.g. Williamson, 1975). In the context of food safety, this transaction cost argument is however dependent on the extent to which property rights are defined. That is, in contrast to transaction cost economics, this study argues that if property rights can be fully specified, asset specificity and small number situations will favor a contractual rather than a vertically integrated form of economic organization. This suggests that the importance of "property rights" needs to be more fully considered in transaction cost economics applications of food safety research. Furthermore, as food safety involves a complex system of partnerships, this study extends the markets and hierarchies distinctions (Williamson, 1975) of transaction cost economics to include the role of strong tie networks. Grounded in a recreance theory of trust, this study argues that strong ties differ from contractual and vertically integrated modes of economic organization because firms face normative obligations that lead them to produce food that is safe. Such normative obligations are not only absent in the incentive design explanations of agency theory but they are also not typically considered in the opportunistic premise of transaction cost economics (see also Granovetter, 1983).

Lastly, by drawing on these varied institutional considerations, this study also extends "signaling" research in two distinct ways. First, while an investment in specialized assets is widely recognized as important to realizing a separating equilibrium outcome (Kirmani and Rao, 2000), this study shows that such investments are contingent on the varied institutional factors raised by this study. Second, this study also argues that these institutional factors impact not only the coordination of food safety activities of a separating equilibrium but also that of its economic organization. Given that signaling research is a response to problems of market failure, such institutional considerations to our knowledge, have not been a subject of examination in signaling research (see Kirmani and Rao, 2000; Loader and Hobbs, 1999). Accounting for such institutional considerations are important to food safety research because institutions are widely recognized to address private-collective action problems (Nelson and Sampat, 2001).

In light of these contributions, there are nevertheless notable limitations in this study. The objective of this study was to develop an institutional theory that explains the coordination and economic organization of food safety activities in an agribusiness institution. Such theory development speaks little about its empirical aspects. As a result, future research is called upon to empirically examine the propositions proposed by this study. In particular, with the recent approval in the U.S. Congress of the FDA Food Safety Modernization Act, this legislation places greater responsibilities on farmers and food companies to prevent food contamination. This legislation also changes food safety oversight for U.S. imports. As food safety concerns over fresh produce (i.e. *E.coli.* spinach outbreak in 2006) have become an increasing public concern and given that a significant portion of produce is imported into U.S., the U.S. produce industry will be one setting to empirically examine this study's propositions.

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To conduct such a study, future research should develop empirical measures that capture the varied institutional elements described in this study. Concentration can be measured through standard measures used in Industrial organization research, such as CR4 ratios and / or the Herfindahl Index (Carleton and Perloff, 2005). Asset specificity can be measured by variables used in Montgomery's (1994) study. As small number exchanges involve a bilateral monopoly exchange relationship, a small number exchange relationship can be measured by "exclusive" marketing or producing agreements amongst large firms. With regards to property rights, especially in regards to the assignment of food safety liability, property rights can be measured through contract provisions that stipulate penalties associated with food safety infractions. Lastly, as trust arises from strong tie networks, strong ties can be measured by the frequency and proximity of social exchange relationships (see Bian, 1997; Fischer, 1982; Friedkin, 1982). Survey methods that elicit the degree of friendship and frequency of exchanges can be used to elicit such a construct (e.g. Fischer, 1982). Furthermore, as these institutional factors favor the onset of a separating equilibrium outcome, such an outcome can be measured by differences in food safety recall between that of small and large food companies. Measures of food safety recall can be obtained by Food Safety Inspection Service (F.S.I.S) of the U.S.D.A. and FDA, to assess differences in food safety recall of small and large producers. Joy (2010) study offers one such approach. Through these proposed measures, this study offers an initial basis to advancing an institutional approach to food safety and offers a future research agenda for researchers in food safety.

## Acknowledgements

Support for this research under Cooperative Agreement number 58-4000-9-0058 with the Economic Research Service, U.S. Department of Agriculture is gratefully acknowledged. An earlier version has been presented at the 2009 International Food and Agribusiness Management annual meetings. The authors would like to acknowledge the helpful suggestions offered by participants at this meeting. Furthermore, the authors would also like to thank the reviewers of IFAMR for their input to this manuscript.

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