Changing Agricultural Marketing Channel Structures: Interdependences & Risk Preferences

Jason R.V. Franken*
Department of Agricultural and Consumer Economics
University of Illinois at Urbana-Champaign

Joost M.E. Pennings
Department of Agricultural and Consumer Economics
University of Illinois at Urbana-Champaign
Department of Social Sciences
Wageningen University, The Netherlands

* Contact information: jrfranke@uiuc.edu; Tel.: +1-217-244-1284; Fax +1-217-333-5538; Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, 326 Mumford Hall, MC-710, 1301 West Gregory Drive, Urbana, Illinois 61801, USA.

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50 Word Summary

We propose a conceptual model that integrates transaction cost and risk behavior theories in an interdependence framework. An empirical research design is proposed to test the conceptual model within the context of the broiler and grain industries using structural equation modeling.

Abstract

We propose a conceptual model that integrates transaction cost and risk behavior theories in an interdependence framework. Hypotheses are offered that relate the concepts that are central to the proposed model to the three dimensions of channel structures: the allocations of uncertainty, decision rights, and gains. An empirical research design is proposed to test the validity of the conceptual model within the context of the broiler and grain industries. The conceptual model will be validated in a structural equation modeling framework.

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Rapid changes in the structure and organization of marketing channels draw attention from policymakers, economists, and industry stakeholders. Agricultural marketing channels provide a fertile research context, as such changes differ within and across agricultural and food sectors, e.g., commodity vs. branded products, grains vs. hogs (Lajili, et al., 1997). Transaction cost theory (Coase, 1937; Williamson, 1975) has identified several factors that influence the extent of vertical coordination (Hobbs, 1997; Lajili, et al., 1997), and has influenced the theory of channel member interdependence (Stern and Reve, 1980, and Achrol, Reve, and Stern, 1983). Yet, the transaction cost model's low predictive power for classifying firms by channel choices suggests that the model may be incomplete (Klein, Frazier, and Roth, 1990). Pennings and Wansink (2004) show that suppliers' and buyers' contractual relationships can be partly explained by the interaction of risk attitudes and risk perceptions (IRAP) of channel members and the perceived power relationships amongst channel members.

We examine the factors that drive marketing channel structures and the relations between these factors. These factors may be helpful in explaining the different marketing channel structures that exist in agriculture and in understanding how agricultural marketing channels change over time. Following Cheung (1983), we conjecture that the nature of contractual relations determine the channel structure. Three dimensions of contractual relationships, i.e., the allocation of uncertainty, the allocation of decision rights, and the allocation of gains from trade, indicate the extent of vertical coordination (Sykuta and Cook, 2001). These three interrelated dimensions are the dependent variables

of the proposed model, which integrates key variables from transaction cost theory with risk behavior theory in an interdependence framework.

Agricultural economics research has examined individuals' attributes and perceived transaction costs to explain producers' choices of outlets (Hobbs, 1997) and contracts (Lajili, et al., 1997). We focus on channel structure formation. While the previous literature incorporates elements of perceived risk, the interaction of risk attitudes and perceptions are not explicitly modeled. Nor are the interdependences between channel members. We include the interaction between channel members' risk attitudes and risk perceptions (Pennings and Wansink, 2004) and the interdependences between channel members (Stern and Reve, 1980, and Achrol, Reve, and Stern, 1983) as explanatory variables in a model of market channel formation. The conceptual model will be evaluated for two differently structured marketing channels: the highly coordinated broiler industry and the generally less coordinated grain industry.[1] This research design may help ascertain the applicability of the proposed conceptual model and enables testing the robustness of the conceptual model.

This paper is organized as follows. First we review the relevant literature from the (agricultural) economics and marketing fields. We then present the conceptual model in which we integrate the transaction costs, risk behavior, and interdependence theories and formulate hypotheses that relate the concepts from these theoretical frameworks to the three dimensions of channel structures: the allocation of uncertainty, decision rights and gains. Subsequently, we describe the decision context for which we wish to validate the conceptual model, discuss the research design, and offer suggestions for future research.

[1] Stern and Reve (1980) call for systematic comparisons of marketing channels across or within industries.

1. Marketing Channel Literature

Marketing channel literature, which remains fragmented into economic and behavioral approaches, has long neglected the maintenance, adaptation, and evolution of marketing channels, and has offered little empirical evidence that validates the proposed theories (Stern and Reve, 1980). As marketing channels are sets of interdependent organizations that make a product or service for use or consumption (Stern, El-Ansary, and Coughlan, 1996), the interdependence of channel members has been emphasized in marketing literature (Geyskens, et. al., 1996). Interdependence theory has drawn on transaction cost theory. The conventional focus of both transaction cost and interdependence theories has been on transactions.[2] These similar, but operationally different, approaches can be further complemented with concepts from the risk behavior literature, such as Pennings and Wansink's (2004) interaction of risk aversion and risk perception (IRAP) concept.

Below we review three theoretical frameworks that have been used to understand channel marketing structures. We begin by discussing transaction cost theory, followed by interdependence and risk behavior theories. The first two have been used extensively in marketing and agricultural economics literature. The latter has only scarcely been used to understand marketing channel structures.

1.1. *Transaction Cost Theory*

While several definitions have been offered, transaction costs are simply (and tautologically) the costs incurred when organizing economic exchange (i.e., transacting).[3]

[2] The transaction is the unit of analysis in transaction cost theory (Williamson, 1975), while the marketing literature concentrates on the relationship between two trade parties (Achrol, Reve, and Stern, 1983).
[3] Transaction costs encompass the costs of running economic and social systems (Furubotn and Richter, 2000). The costs of contracting are ex-ante transaction costs, e.g., search and information costs; drafting,

Human factors, like bounded rationality and opportunism, coupled with environmental factors, such as uncertainty, complexity, and the concentration (i.e., small numbers bargaining) of input and output markets are the sources of these costs (Williamson, 1975; Mahoney, 1992). Opportunistic behavior (i.e., self-interest seeking with guile) is more likely to prevail when information is asymmetric (i.e., unequally possessed). If positive transaction costs exist, property rights and the organization of exchange (ranging from pure market governance to complete vertical ownership with hierarchical governance) matter for achieving efficient economic outcomes (Mahoney, 2005). Thus, the organizational form realized economizes on these costs. Transaction costs are often dimensionalized in terms of asset specificity and uncertainty (Mahoney, 1992).[4]

1.1.1 *Asset Specificity*

Asset specificity is an asset's degree of specialization (Lajili, et. al., 1997). Higher levels of asset specificity suggest greater threats of opportunistic behavior and encourage increased vertical integration (Mahoney, 1992). Williamson (1985) notes that specific assets may be physical (e.g., specialized tools and equipment), human (e.g., firm-specific knowledge), or locational (e.g., co-location of an electric plant and a coal mine). Investment in specific assets offers ex-ante screening benefits, as well as ex-post bonding benefits that render agreements self-enforcing. Willingness to invest in a specific asset, which may have low salvage value outside of the relationship, is a signal of a desirable

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bargaining, and decision costs; and costs of safeguarding an agreement, and ex-post transaction costs, e.g., monitoring and enforcement costs; adaptation and haggling costs; bonding costs; and maladaptation costs (Mahoney, 1992).

[4] A positive relationship between frequency of transactions and vertical integration has been hypothesized (Anderson and Schmittlein, 1984). Mahoney (1992) suggests that frequency influences the extent of vertical integration only at intermediate levels of asset specificity. Thus, we do not account for frequency.

trade partner. Though many alternative trade partners may exist at the onset of an exchange relationship, bonding effects transform contractual renegotiations into small numbers bargaining situations.[5] Hence, potential trade partners should grant mutual hostages (i.e., each should make relationship-specific investments) to insure against future vulnerability to opportunistic behavior by the other party (Williamson, 1983).

1.1.2 *Uncertainty*

Mahoney's (1992) review of empirical transaction cost studies reveals that uncertainty about input supply, output demand, and volume (e.g., sales growth volatility) encourage vertical coordination, which is a means of transferring risk (Mahoney, 1992).[6] These uncertainties directly impact the level and volatility of (net) cash flows of channel members. Mahoney (1992, p. 562) states, "Firms integrate to ensure a supply of input for their 'high probability' demand and continue to purchase their 'low probability' demand." While uncertainties due to fluctuations in up- or down-stream firms' selling and purchasing behavior can be limited by tighter coordination, uncertainties from aggregate market demand fluctuations can only be transferred.

1.2. *Interdependence Theory*

According to Pfeffer and Salancik (1978, p.40), "Interdependence exists whenever one actor does not entirely control all of the conditions necessary for the achievement of an

[5] The potential partner to a trade relationship that has fewer alternative trade partners to choose from is more vulnerable to opportunism by its chosen partner. Asset specificity implies small numbers bargaining, but the reverse is not necessarily true (Mahoney, 2005).

[6] Balakrishnan and Wernerfelt (1986) find that uncertainty regarding the rate of technological change is negatively associated with vertical integration. We assume that agricultural producers primarily face cash flow uncertainties due to fluctuations in production and demand, and do not account for this effect.

action or for obtaining the outcome desired from the action." Buchanan (1992) suggests that interdependence is two or more organizations having to take each other into account to accomplish their goals. From a transaction cost perspective, Dwyer and Oh (1988) suggest that interdependence refers to parties that are not bound in the classical contractual sense, but by informal and tacit agreements; each sharing expectations for continued beneficial exchange due to knowledge of the other's preferences and capabilities.

Stern and Reve's (1980) proposed political economy framework and Achrol, Reve, and Stern's (1983) dyadic approach have become ingrained in interdependence theory.[7] The former allows sociopolitical and economic forces to be analyzed in consort, while the latter allows meaningful linkages between paired channel members and sources of uncertainty in their environment. Trade relationships are described in terms of (1) their place on the continuum between market and hierarchical transactions (economic structure); (2) what decision-making mechanisms are used to establish the terms of trade (economic process); (3) whether a power-dependence relationship is minimal, balanced, imbalanced, or centralized (political structure); and (4) what type of sentiments and behaviors (cooperative or conflictive) typify their interactions (political process). The interdependence structure of a dyadic relationship comprises each party's dependence, the magnitude of their total interdependence, and the extent of interdependence asymmetry between them (Kumar, Scheer, and Steenkamp, 1995).

[7] A marketing channel's internal economic and political structures and processes is its internal political economy (Stern and Reve, 1980). The prevailing and prospective economic environment and the sociopolitical system in which a channel operates is its external political economy. Internal and external political economies influence each other via adaptation and interaction processes. Etgar's (1977) empirical results suggest that internal, rather than external, political economies largely explain channel operation.

1.2.1 *Dependence*

Dependence is a firm's need to maintain a trade relationship to achieve desired goals (Gundlach and Cadotte, 1994), and is indicated by the replaceability of a firm's existing partner (Kumar, Scheer, and Steenkamp, 1995 p. 349).[8] The irreplaceability of a trade partner is ever-apparent when few potential trade partners exist, i.e., an oligopoly/oligopsony, and, in the extreme, a monopoly/monopsony (Buchanan, 1992). Patterns of channel power-dependence relations are associated with channel members' dominant sentiments and behaviors, which are dimensionalized as cooperation and conflict (Stern and Reve, 1980).

1.2.2. *Interdependence Magnitude and Asymmetry*

The magnitude of total interdependence, reflecting the amount of attention that trade partners give to their relationship, is the sum of both party's dependence, whereas relative interdependence asymmetry, the comparative level of dependence between trade partners, is their difference (Gundlach and Cadotte, 1994). Higher magnitudes of interdependence, reflecting either greater complementarities between partners' resources, fewer alternative suppliers of resources, higher levels of asset specificity, or greater uncertainties, are associated with increased cooperation and vertical coordination.

Citing Williamson (1985), Buchanan (1992) confers that credible commitments (e.g., specific investments of low salvage value) increase trade partners' magnitude of interdependence. Her description of potential trade partners weighing the marginal

[8] Dependence and power are two sides of the same coin (Gundlach and Cadotte, 1994). While the abuse of market power is cause for concern (and may be overcome by vertically integrating the consecutive links along the value-added chain), economists attach no negative connotation to market power itself, as the downward slope of a demand curve reflects its existence (Frank and Bernanke, 2001).

benefits from the existing resources and specific investments of the other partner versus their own costs of investing in the relationship is reminiscent of Teece's (1986) resource-based distinction between complementary and co-specialized (i.e., specific) assets. If potential partners possess complementary assets, coordinating their use enhances value generation, suggesting a high magnitude of interdependence. The relative scarcity of access to such resources for each party (i.e., large vs. small numbers bargaining), affects who values the relationship more (Williamson, 1975, and Mahoney, 1992). The party that values the relationship more is relatively dependent on the other, and may make specific investments that increase the potential partner's valuation, but also increase its own dependence on that partner (Buchanan, 1992). Also, a channel member facing substantial environmental uncertainties may highly value a relationship with a partner that is better suited to cope with the uncertainty (Achrol, Reve, and Stern, 1983).

1.2.3. *Interdependence and Vertical Coordination*

Vertical coordination requires cooperation, regardless of whether cooperation is achieved by coercive or noncoercive means (Gundlach and Cadotte, 1994). As relationships with low magnitudes of interdependence warrant neither the time, effort, nor opportunity cost of extensive interaction, further coordination is often foregone (Gundlach and Cadotte, 1994). In general, closer vertical linkages are associated with higher magnitudes of interdependence which facilitate cooperation (Stern and Reve, 1980). Yet, cooperation in high magnitude relationships can be complicated by asymmetry. From the *benevolent perspective*, the exercise of power via noncoercive means is thought to aid in coordination, adaptation, and goal attainment, encouraging cooperation and mitigating

opportunistic tendencies (Gundlach and Cadotte, 1994). However, Korpi (1974) claims that slight power imbalances may yield conflict, while Williamson (1975) maintains that centralized power may induce cooperation.[9] These claims support the *opportunistic perspective* that a power advantage manifests exploitative tendencies (Gundlach and Cadotte, 1994), and that coercion may serve to institutionalize and legitimize power (Pfeffer and Salancik, 1978). Though cooperation in such cases is likely different from that found in balanced power relationships, centralized planning has emerged via cooperative efforts in symmetric relationships (Stern and Reve, 1980).

The literature reviewed above suggests that vertical coordination is less likely for low, rather than high, magnitude relationships. Furthermore, equitable sharing of gains from coordination and evenhanded distribution of decision rights bearing on the exchange appear more likely when interdependence is of a high magnitude and symmetric, rather than asymmetric. The distribution of uncertainty in vertically coordinated relationships will depend on the partners' relative perception of and attitude toward the risk.

1.3 Risk Behavior Theory

The uncertainties associated with sales volumes, supply of inputs, demand for outputs, and (by extension) with cash flows are an important component of the transaction cost theory (Williamson, 1975). Supply and demand uncertainties are considered environmental factors in interdependence theory (Achrol, Reve, and Stern, 1983). Neither

[9] "A relative power advantage within a channel is often used to program channel activities and in such situations, decision making with respect to at least certain functions (e.g., promotion, physical distribution) tend to be centralized" (Stern and Reve, 1980, p. 59). For instance, a channel member that is more capable of coping with or absorbing uncertainty will initiate vertical coordination with a relatively less capable, and hence, more dependent partner (Achrol, Reve, and Stern, 1983).

transaction cost theory nor interdependence theory explicitly address channel members' awareness (i.e., perception) of and attitude toward risk.[10]

A channel member must first perceive or identify risk in order to respond to it. Risk perception reflects the channel member's interpretation of the likelihood of exposure to the content of the risk (e.g., price fluctuations) and is defined as a channel member's assessment of the risk inherent in a particular situation (Pennings, Wansink, and Meulenberg, 2002). The perceived risk may differ across channel members. How channel members cope with perceived risk will depend on their risk attitude (i.e., their general or consistent predisposition toward risk). It is important to emphasize that risk perception and risk attitude are two different concepts. Risk perception deals with the channel member's interpretation of the likelihood of being exposed to the content of a particular risk, whereas risk attitude deals with the channel member's interpretation of the content of the risk and how much he or she dislikes risk.

The notable work of Arrow (1971) and Pratt (1964) provides insight into the relationships between risk perceptions and risk attitudes, and risk behavior. In Pratt and Arrow's work, risk management, reflected in the risk premium, is a function of risk aversion and the variance in additional wealth. Pennings, Wansink and Meulenberg (2002) showed that the Pratt and Arrow framework implies that the interaction between risk attitude and risk perception (the latter reflected in the variance of additional wealth) drives the risk premium and hence, risk behavior.

The interaction between the two concepts become apparent if one realizes that, regardless of a channel member's risk attitude, a channel member will not change his or

[10] Here, we do not make Knight's (1921) distinction between risk (randomness with knowable probabilities) and uncertainty (randomness with unknowable probabilities), since within our channel context it is often unknown whether the probabilities are known or not.

her behavior if no risk is perceived in a given situation. When risk-averse channel members perceive risk, they will exhibit behavior that decreases their risk exposure. The interaction between risk attitude and risk perception, hereafter referred to as IRAP, represents how the channel member intends to cope with risks perceived in the channel, along with the risks his or her own actions generate. Following Pennings and Wansink (2004) we define IRAP as positive when channel members perceive risk and are risk averse. We define it as negative when channel members perceive risk and are risk seeking. We define it as zero when channel members either do not perceive any risk or when they are risk neutral. A channel member's IRAP profile reveals how he or she is going to react to the uncertainty. It also reflects channel members' predispositions to dealing with the risks inherent to the stimuli they receive and the risks their actions generate. In this paper, we integrate the IRAP concept with the uncertainty concepts in transaction costs and interdependence theories to explain how channel members allocate uncertainty.

2. Conceptual Model

Much of the economic and marketing literature on marketing channels concerns the extent of vertical integration (i.e., the boundaries of the firm). We concur with Cheung's (1983) reasoning that the nature of contractual relations, rather than what constitutes a firm (i.e., where the firm begins and ends), is the matter of importance. Sykuta and Cook (2001) list three economic components of every transaction relationship; the allocation of uncertainty, the allocation of property rights to decisions bearing on the relationship, and the allocation of gains from trade. These three interrelated dimensions indicate the extent

of vertical coordination, and are explained by integrating concepts from interdependence, transaction costs, and risk behavior theories (Figure 1).

2.1. *Integrating Transaction Cost, Interdependence, and Risk Behavior Theories*

As noted earlier, transaction cost theory's main explanatory variables are asset specificity and uncertainty (Mahoney, 1992). Both have been identified as influencing the magnitude and symmetry of interdependence between dyad members, the central concepts of interdependence theory (Buchanan, 1992). While the level of relationship-specific investments (i.e., asset specificity) is clearly part of the dyad's internal structure, uncertainty is considered an environmental factor, and thus external to the dyad.

The more uncertain the dyad's environment, the higher the magnitude of interdependence is. The greater the disparity between the levels of uncertainty faced by channel members (and between their relative ability to manage that uncertainty), the greater the asymmetry of interdependence between them. Similarly, greater levels of relationship-specific investment and disparity in the level of such investment by each dyad member are associated, respectively, with higher magnitude and asymmetry of interdependence, through interactive feedback relationships. While transaction cost and interdependence theories identify the importance of uncertainty, both neglect that channel members' decisions on how to manage the uncertainty that they "face" is related is to the interaction of their risk perceptions and risk attitudes (IRAP). That is, the way that channel members respond to uncertainty depends on the channel members' IRAP profiles, which thus, influence the allocation of uncertainty within the channel.

The integration of the theories is displayed in Figure 1, which shows how the concepts of the three theories influence each other and how they drive the dimensions of channel structure. IRAP influences the allocation of uncertainty directly and the allocations of decision rights and gains from trade indirectly through its affects on interdependence magnitude and asymmetry. Transaction cost theory holds that asset specificity engenders vertical integration, as a means of mitigating exposure to opportunism (Mahoney, 1992). Actually, asset specificity is one of the factors influencing interdependence magnitude and asymmetry and thus, contributing to the power-dependence relationships that enable one channel member to take advantage of another. Hence, asset specificity indirectly affects the allocations of decision rights and gains from trade through its impact on the interdependence structure of the dyad.

2.2 *Development of Hypotheses*

Following Stern and Reve (1980) and Achrol, Reve, and Stern (1983) we evaluate the interdependence structure of a channel dyad in terms of its internal and external political economies from a producer perspective. This allows modeling of the interactions of the dyadic relationship within the uncertain channel environment.

The interdependence magnitude and symmetry of a dyad reflect the importance of the relationship to both parties to the dyad (Kumar, Scheer, and Steenkamp, 1995). If both parties desperately need the relationship to achieve their goals, then interdependence magnitude is high. A party's valuation of the relationship depends on (1) how well the other's existing resources complement its own, (2) the availability of alternative sources of those and similar resources, and (3) the potential benefits from mitigating or

transferring uncertainty within the relationship (Buchanan, 1992). As lower uncertainties regarding the supply of inputs to the channel dyad and the demand for its outputs provide fewer incentives for cooperation and suggest a lower magnitude of interdependence (Achrol, Reve, and Stern, 1983), we hypothesize that

H1a Higher (lower) perceived levels of environmental (e.g., supply and demand, and thus, cash flow) uncertainties are positively related to higher (lower) magnitudes of interdependence, *ceteris paribus*.

The above hypothesized relationship is expected, assuming that both of the dyad parties are not simultaneously risk-seeking and disregarding asset specificity and the complementarities between each party's resources. Furthermore, under these conditions, higher perceived uncertainty by either party to the dyad tends to increase interdependence asymmetry. According to Achrol, Reve, and Stern (1983, p. 63), "The higher the uncertainty in the input or output sectors of the task environment of marketing channel dyads, the greater the efforts towards increasing the level of vertical coordination within the dyad." Vertical coordination is initiated by the channel member that is more capable of coping with or absorbing the uncertainty. High uncertainty in the input (output) sector induces backward (forward) vertical coordination, which is initiated by the less dependent partner who is better suited to cope with the uncertainty. We hypothesize that

H2a Higher relative uncertainty on either the supply or the demand side of the dyad engenders higher interdependence asymmetry, *ceteris paribus*. Disregarding risk attitudes, the party facing the relatively higher perceived level of uncertainty is the relatively dependent party.

Pennings and Wansink (2004) explain risk behavior using the interaction of risk attitude and risk perception (IRAP), defined as positive when a channel member perceives risk and is risk averse; negative when a channel member perceives risk and is risk seeking; and zero when a channel member either does not perceive any risk or is risk neutral. Given this definition and assuming either risk-neutrality or -aversion for one dyad member, we can redefine H1a and H2a, respectively, in terms of the other's (in our research context, the producer's) IRAP value as[11]

H1b The magnitude of interdependence is likely greater for larger, positive IRAP values, *ceteris paribus*.

H2b Interdependence asymmetry is likely greater for larger, positive IRAP values, *ceteris paribus*.

[11] As producers' exchange partners are often companies, interviewing employees of each to determine an IRAP score seems impractical. We assume that these companies are likely risk-seeking, or at least risk-neutral, but not risk-averse.

Furthermore, as relative power may be partially due to a greater ability to handle uncertainty, the allocation of uncertainty depends on the dyad members' relative perceptions and attitudes toward risk (i.e., their IRAP values).[12] We hypothesize that

H3 Perceived uncertainties will likely be allocated to dyad members with relatively smaller (i.e., less positive or more negative) IRAP values, *ceteris paribus*.

While we discuss uncertainty using transaction cost, interdependence, and risk behavior theories, asset specificity can only be considered in terms of the first two theories. Kumar, Scheer, and Steenkamp (1995) show that greater interdependence lowers conflict and induces higher trust and stronger commitment, including parties' willingness to invest in the relationship. Credible commitments (e.g., specific investments) are associated with higher interdependence (Buchanan, 1992) and serve to strengthen ties between trade partners (Williamson, 1985, and Kumar, Scheer, and Steenkamp, 1995). Furthermore, higher asset specificity is related to increased vertical coordination (Mahoney, 1992). Hence, we offer the following hypothesis

H4a High (low) magnitudes of interdependence engender high (low) levels of asset specificity, and vice-versa, *ceteris paribus*.

[12] Though we recognize that risk attitude and ability to manage risk are not the same concept, we expect that a channel member with low ability to manage risk will be unlikely to be risk-seeking.

Similarly, from Gundlach and Cadotte (1994) we can infer that the relatively dependent party will invest more heavily in assets specific to the relationship, enhancing total interdependence and the disparity in relative interdependence. Thus, we hypothesize

H4b Greater (lower) interdependence asymmetry induces higher (lower) relationship-specific investment by the relatively dependent party and vice-versa, *ceteris paribus*.

The integration of transaction cost, interdependence, and risk behavior theories provides no clear expectation regarding how equitably decision rights and gains from trade are allocated among members of channels exhibiting little vertical coordination. Low magnitudes of interdependence are associated with less vertical integration than higher magnitudes of interdependence. At high magnitudes of interdependence, the allocations of decision rights and of gains from trade may differ with the extent of interdependence symmetry or asymmetry. When interdependence is of high magnitude and is also symmetric, cooperation is in the best interest of both parties to exchange and the relative bargaining power between them is equal, suggesting equitable allocations of decision rights and of gains from trade. Hence, we hypothesize that

H5a High interdependence magnitude and symmetry induce equitable allocations of decision rights, *ceteris paribus*.

H5b High interdependence magnitude and symmetry induce equitable allocations of gains from trade, *ceteris paribus*.

Conversely, when interdependence is of high magnitude and is also asymmetric, the potential for conflict is higher (Gundlach and Cadotte, 1994). The relatively powerful party may coordinate exchange activities, using coercion to gain compliance (i.e., cooperation) from the dependent party. In other words, the allocation of property rights to decisions bearing on the relationship will be one-sided. Similarly, the gains from trade may be allocated less equitably when interdependence is of high magnitude and is also asymmetric. Hence, we hypothesize that

H6a High interdependence magnitude and asymmetry induce inequitable allocations of decision rights, *ceteris paribus*.

H6b High interdependence magnitude and asymmetry induce inequitable allocations of gains from trade, *ceteris paribus*.

3. Research Context

We plan to test the validity of the proposed conceptual model within the context of the highly coordinated poultry industry and less coordinated grain industry, and identify the hog industry as another promising research context for future study. Nearly all poultry, turkey, and eggs in the U.S. are produced under contract or vertical integration (Ménard and Klein, 2004). While egg production is highly vertically integrated, poultry and turkey production primarily rely on production contracts. U.S. hog production was predominantly characterized by market transactions prior to the competitive pressures from vertically integrated systems introduced by former tobacco producers from North

Carolina, which induced vertical coordination of production in Iowa (Cozzarin and Westgren, 2000).[13] Approximately 72% of U.S. hog production was sold through marketing contracts in 2001 (Ménard and Klein, 2004). Production and transformation processes in these industries are increasingly mechanized and subject to quality standards that require specialized equipment. The transaction cost literature identifies that such specialized investments yield potential "hold-ups" that may be mitigated via contract or vertical integration.

The tighter coordination of egg, poultry, and turkey production may be due to the extent of physical asset specificity that stems from perishability, site, and temporal specificity (Ménard and Klein, 2004). In contrast, marketing contracts appear to effectively mitigate opportunism in the pork industry, where site and temporal specificities are lower (i.e., hogs may be transported further with less degradation and slaughter age is of less importance).

While contract production and vertical integration is common in U.S. livestock, broilers, turkeys, fruits, vegetables and dairy industries, such coordination is sparse, though increasing, in grain production (Lajili, et. al., 1997).[14] According to Stern and Reve (1980), "Typically, competitive, price-mediated mechanisms are dominant in those market transactions where information is relatively complete and products are undifferentiated, as in soybean trading" (p. 55). However, some new contracting alternatives require producers to invest in specialized equipment, influencing vertical

[13] Stern and Reve (1980) note that the initiative for innovations in channel design may come from outsiders, who are at odds with existing norms. Thus, innovations result, in part, because of functional conflicts within existing channels.

[14] The decoupling of price protection and production, as reflected in the 1996 farm bill, and increasing processor interest in input characteristics drive the increasing vertical coordination of grain production (Lajili, et. al., 1997).

coordination decisions (Lajili, et. al., 1997). Channel members consider the risk-return trade-offs of potential contracts. Hence, "Farmers' choices may also depend on their risk attitudes and financial positions" (Lajili, et. al., 1997, p. 264).

4. Proposed Empirical Design

4.1 Data Collection and Measures

Much of the empirical work in past research used a survey instrument, experiments, or both to collect primary data from channel members. We plan to conduct a personal computer guided interview with 50 producers in both poultry and grain marketing channels to measure the constructs of the proposed model. The computer-guided interviews will consist of survey questions that measure channel members' dependence (to calculate interdependence magnitude and asymmetry), asset specificity, cash flow uncertainty, the allocation of uncertainty, and the underlying constructs for the allocation of decision rights by asking producers about their risk management practices. In addition, the computer-guided interview will contain two experiments to measure the producers' risk attitudes and risk perceptions. Furthermore we plan to collect secondary industry data and government based data. Below we describe in detail how we measure each construct. Sample items of operational measures are given in Table 1.

Cash Flow Uncertainty. Adopting Anderson and Schmittlein's (1984) measure of volume uncertainty, we proxy cash flow uncertainty by asking producers how much (in percentage terms) they think sales could vary from their expected amount. In addition, following Levy (1985), we use the variance in the error term from the regression of the log of sales on time to measure cash flow uncertainty.

IRAP. The IRAP is measured indirectly; first we have to measure the channel member's risk attitude and risk perception. The interval technique is used to elicit risk perceptions by revealing producers' cumulative probability distributions regarding output and input prices. Channel members' utility functions are assessed by the certainty equivalence method using experiments in which channel members make choices that reflect their real business decisions, reducing response bias (Pennings and Garcia 2001).

Interdependence magnitude. The total magnitude of interdependence is the sum of a producer's and his/her trade partner's irreplaceability from the producer's perspective (Gundlach and Cadotte, 1994).

Interdependence asymmetry. Interdependence asymmetry is calculated as the difference between the producer's and his/her trade partner's irreplaceability from the producer's perspective (Gundlach and Cadotte, 1994).

Asset Specificity. Following Caves and Bradburd (1988), we ask producers to indicate the potentially sunk investments that they have made into the relationship with their primary trade partner to measure physical, human, and locational asset specificity.

Allocation of uncertainty. The allocation of uncertainty will be measured by asking producers to report the extent to which the (contractual) relationship with their primary trade partner transfers risk from the producer to its partner.

Allocation of decision rights. Dwyer and Oh's (1988) concepts of centralization, formalization, and participation are adopted to measure the allocation of decision rights.

Allocation of gains from trade. We measure the allocation of gains as the ratio of producer's return on equity, to the industry return on equity for the processor. The producer's return on equity will be obtained from farm records if the producer is part of

the Illinois farm panel data set, or will be based on self reported data (i.e., will be asked in the survey). The industry return on equity will be obtained from secondary industry and governmental sources.

With the exception of variables calculated directly from accounting data, the variables in our analysis are latent, meaning that these constructs can only be measured indirectly with error by indicators (i.e., observable variables). The indicators will be examined for clarity and appropriateness in personally administered pre-tests with producers. Producers will be asked to complete a questionnaire and indicate any ambiguity or other difficulty experienced in responding to questions (i.e., indicators) and to make any suggestions they deem appropriate. Some indicators may be eliminated or modified, and new indicators may be developed, based on producer feedback. The resulting set of indicators will be administered in the large-scale producer interview. Using structural equation modeling, the (psychometric) measurement quality of our constructs will be assessed by confirmatory factor analysis (Hair, et al.).

4.2 Empirical Model: Structural Equation Modeling

Using a linear regression framework to estimate the relationships between and among our variables may result in biased regression coefficients, since many of these variables are latent constructs, and hence measured with error. Covariance structure models (often referred to as structural equation models) permit explicit modeling and estimation of errors in measurement (Bollen, 1989, 1996). Covariance structure models provide a method for estimating structural relationships among latent constructs and for assessing

the validity with which those constructs have been measured. Following Pennings and Leuthold (2000), the covariance structure model can be expressed as

$$\eta = B\eta + \Gamma\xi + \varsigma \tag{1}$$

$$y = \Lambda^{y}\eta + \varepsilon \tag{2}$$

$$x = \Lambda^{x}\xi = \delta\,. \tag{3}$$

Equation (1) is the latent variable or structural model that expresses the hypothetical relationships among the constructs. The $m\times 1$ vector η contains the latent endogenous constructs. Nearly all of the latent variables are endogenous in our framework (Figure 2). The only latent exogenous construct, exposure to cash flow risk (uncertainty), is represented by the $n\times 1$ vector ξ. The coefficient matrix B denotes the effects of endogenous constructs on each other, while the coefficient matrix Γ denotes the effects of exogenous on endogenous constructs. The vector of disturbances ς represents errors in equations. Equations (2) and (3) are factor-analytic measurement models that tie the constructs to observable indicators (Figures 2 and 3). The $p\times 1$ vector $\boldsymbol{y}$ contains measures of endogenous constructs. The $q\times 1$ vector $\boldsymbol{x}$ contains measures of endogenous constructs. The coefficient matrices Λ^{y} and Λ^{x} relate $\boldsymbol{y}$ to η and $\boldsymbol{x}$ to ξ, respectively, with measurement errors represented by the vectors of disturbances ε and δ. The measurement model for our dependent variables is depicted in Figure 3, while Figure 2 contains the structural model, including the measurements for explanatory, but not dependent, latent variables. Table 1 identifies the operational measures of latent variables employed in our analysis.

4.2 Estimation Procedure

Estimation of the covariance structure model involves finding values for the parameter matrices that produce an estimate of the covariance matrix that is as close as possible to the sample matrix (e.g., the covariance matrix of the raw data). The covariance structure can be estimated by one of the full information methods: unweighted least squares, generalized least squares, and maximum likelihood. We will employ a maximum likelihood procedure, because of its attractive statistical qualities (Bollen, 1989).

5. Conclusions and Discussion

Transaction cost, interdependence, and risk behavior theories have contributed to our understanding of marketing channel formation, each from its own perspective. The differences and similarities in the concepts employed by each provide the basis for integrating the theories to formulate a more comprehensive model of market channel formation. For instance, a key concept in transaction cost and interdependence theories is uncertainty, which can easily be related to Pennings and Wansink's (2004) interaction of risk attitudes and risk perceptions (IRAP) concept. Transaction cost and interdependency theories identify that uncertainty may be important in channel formation. Yet, these theories do not explain how channel members' perceptions and attitudes toward uncertainty impact their actions, and in turn, the channel structure. The IRAP concept bridges this gap by providing insight into how channel members respond to uncertainty.

We hypothesize that the proposed conceptual model, by integrating the drivers of market channel structure from each theory, is able to explain the heterogeneity in the structure of trade relationships. Furthermore, we hypothesize that the conceptual model

may be helpful in understanding how channel structures change over time within the specific context of the highly coordinated broiler industry and the generally less coordinated grain industry.

We plan to validate the conceptual model, using primary data collected via personal computer-guided interviews with poultry and grain producers, and secondary data on producer and industry return on equity from industry and government sources, as well as a panel dataset on Illinois grain producers. We plan to use data from only one side (i.e., the producer) of the dyadic trade relationship, but recognize that similar information from the other trade partner (i.e., the processor) would be insightful (Geyskens, et. al., 1996). Collecting data from decision-makers in the companies that producers trade with is often problematic. In addition, the interpretation of IRAP values elicited from companies' employees can be difficult (Pennings and Garcia, 2004).

Although we focus on poultry and grain industries for the purpose of exposition, we expect the proposed model to have validity in other industries, including those outside of agriculture. However, differences in government policies and regulations and the observed heterogeneity in market channel structures across agricultural industries make them particularly interesting research contexts. The proposed model, when taking the political environment into account, may help to explain how changes in these policies and regulations have impacted the evolution of marketing channels.

Lajili, et. al., (1997) expect increasing processor interest in input characteristics and the decoupling of price protection and production, as reflected in the 1996 farm bill, to increase the vertical coordination of grain production. Within the context of the proposed model, less price protection exposes producers to higher uncertainty or risk,

which may make them more dependent on processors that can absorb risk. Processors that require specific input characteristics become increasingly dependent on producers that are willing to invest in specific assets (e.g., grain with specific traits), that have low salvage value. As the total magnitude of interdependence between them increases, higher vertical coordination is expected. The distribution of decision rights and gains from trade depends on the direction of interdependence asymmetry (i.e., the relative dependence of the producer and processor). Further, the actual effect of increased uncertainty on producers' risk behavior depends on their IRAP values.

The rich and diverse literature on marketing channels and the important changes occurring in marketing channel structures suggests the opportunity and need for further research in this area. While we attempt to integrate transaction cost, interdependence, and risk behavior theories to explain market channel structure, empirical validation of the proposed model is still needed. As the proposed model only accounts for the political and social environment (e.g., the impacts of legislation and social welfare groups on agricultural channels) indirectly, future research that directly examines the influence of these environmental factors and their interaction with the key constructs in the model is worthwhile . Second in the proposed model we assume that each channel member's risk attitude is constant, and hence, does not change across the outcome (e.g., price) domain. Pennings and Smidts (2003), applying Tversky and Kahneman's (1979) prospect theory, showed that a particular segment of producers have S-shaped utility functions, implying that these producers have a reference point that causes their risk attitude to change over the outcome range (in their study price). Future research may add insight regarding how producers respond to uncertainties in the domains of gains and losses by accounting for

reference points when measuring producers' IRAP values. Mahoney (1992) showed how transaction cost and agency theories may be integrated to explain vertical integration. Hence, incorporating agency theory concepts within the proposed conceptual model may be another avenue for future research.

References:

Achrol, R.S., T. Reve, and L.W. Stern. "The Environment of Marketing Channel Dyads: A Framework for Comparative Analysis." *Journal of Marketing* 47(1983): 55-67.

Anderson, E. and D. Schmittlein. "Integration of the Sales Force: An Empirical Examination." *The RAND Journal of Economics* 15(1984): 385-395.

Arrow, K.J. *Essays in the Theory of Risk Bearing*. Chicago: Markham Publishing Company, 1971.

Balakrishnan, S. and B. Wernerfelt. "Technical Change, Competition and Vertical Integration." *Strategic Management Journal* 7(1986): 347-359.

Bollen, K.A. *Structural Equations with Latent Variables*, New York; John Wiley, 1989.

Bollen, K.A. "An Alternative Two Stage Least Squares Estimator for Latent Variables Equations." *Pshychometrica* 61(1996): 109-121.

Buchanan, L. "Vertical Trade Relationships: The Role of Dependence and Symmetry in Attaining Organizational Goals." *Journal of Marketing Research* 29(1992): 65-75.

Caves, R.E. and R.M. Bradburd. "The Empirical Determinants of Vertical Integration." *Journal of Economic Behavior and Organization* 9(1988): 265-279.

Coase, R.H. "The Nature of the Firm." *Economica* 4(1937): 386–405.

Cheung, S. "The Contractual Nature of the Firm." *Journal of Law & Economics* *26*(1983): 1-21.

Cozzarin, B.P. and R.E. Westgren. “Rent Sharing in Multi-Site Hog Production.” *American Journal of Agricultural Economics* 82(2000): 25-37.

Dwyer, F.R. and S. Oh. “A Transaction Cost Perspective on Vertical Contractual Structure and Interchannel Competitive Strategies.” *Journal of Marketing* 52(1988): 21-34.

Etgar, M. “Channel Environment and Channel Leadership.” *Journal of Marketing Research* 15(1977): 69-76.

Frank, R.H., and B.S. Bernanke. *Principles of Economics*. Boston, MA: McGraw-Hill/Irwin, 2001.

Furubotn, E.G. and R. Richter. *Institutions and Economic Theory*. Ann Arbor, MI: University of Michigan Press (reprint edition), 2000.

Geyskens, I., J-B.E.M. Steenkamp, L.K. Scheer, and N. Kumar. “The Effects of Trust and Interdependence on Relationship commitment: A Trans-Atlantic Study.” *International Journal of Research Marketing* 13(1996): 303-317.

Gundlach, G. T. and E. R. Cadotte. “Exchange Interdependence and Interfirm Interaction: Research in a Simulated Channel Setting.” *Journal of Marketing Research* 31(1994): 516-532.

Hair, J.F., R.E. Anderson, R.L. Tanham, and W.C. Black. *Multivariate Data Analysis*, Englewood Cliffs, NJ: Prentice Hall, Inc., 1995.

Hobbs, J. “Measuring the Importance of Transaction Costs in Cattle Marketing.” *American Journal of Agricultural Economic*, 79(1997): 1083-1095.

Klein, S., G.L. Frazier, and V.J Roth. "A Transaction Cost Analysis Model of Channel Integration in International Markets." *Journal of Marketing Research* 27 (1990): 196-208.

Knight, F H. 1921. *Risk, Uncertainty, and Profit*. Boston, MA: Hart, Schaffner & Marx; Houghton Mifflin Company, 1921.

Korpi, W. "Conflict and the Balance of Power." *Acta Sociologica*. 17(1974): 99-114.

Kumar, N., L.K. Scheer, and J-B.E.M. Steenkamp. "The Effects of Perceived Interdependence on Dealer Attitudes." *Journal of Marketing Research* 32 (1995): 348-356.

Lajili, K., P.J. Barry, S.T. Sonka, and J.T. Mahoney. "Farmers' Preferences for Crop Contracts." *Journal of Agricultural and Resource Economics* 22(1997): 264-280.

Levy, D.T. "The Transaction Cost Approach to Vertical Integration: An Empirical Investigation." *Review of Economics and Statistics*, 67 (1985): 438-445.

Mahoney, J.T. "The Choice of Organizational Form: Vertical Financial Ownership versus Other Methods of Vertical Integration." *Strategic Management Journal* 13(1992): 559-584.

Mahoney, Joseph T. *Economic Foundations of Strategy*. Thousand Oaks, CA: Sage Publications, 2005.

Ménard, C. and P.G. Klein. "Organizational Issues in the Agrifood Sector: Toward a Comparative Approach." *American Journal of Agricultural Economics* 86(2004): 750-755.

Pennings, J.M.E. and P. Garcia. "Measuring Producers' Risk Preferences: A Global Risk Attitude Construct." *American Journal of Agricultural Economics* 83(2001): 993-1009.

Pennings, J.M.E. and P. Garcia. "Hedging Behavior in Small and Medium-sized Enterprises: The Role of Unobserved Heterogeneity." *Journal of Banking & Finance* 28(2004): 951-978.

Pennings, J.M.E. and R.M. Leuthold. "The Role of Farmers' Behavioral Attitudes and Heterogeneity in Futures Contracts Usage." *American Journal of Agricultural Economics* 82(2000): 908-919.

Pennings, J.M.E. and A. Smidts. "The Shape of Utility Functions and Organizational Behavior." *Management Science* 49(2003): 1251-1263.

Pennings, J.M.E, B. Wansink, and M.T.G. Meulenberg. "A Note on Modeling Consumer Reactions to a Crisis: The Case of the Madcow Disease." *International Journal of Research in Marketing.* 19(2002): 91-100.

Pennings, J.M.E. and B. Wansink. "Channel Contract Behavior: The Role of Risk Attitudes, Risk Perceptions, and Channel Members' Market Structures." *Journal of Business* 77(2004): 1-27.

Pfeffer, J. and G. Salancik. *The External Control of Organizations: A Resource-Dependence Perspective*. New York: Harper & Row Publishers Inc., 1978.

Pratt, J.W. "Risk Aversion in the Small and in the Large." *Econometrica* 32 (1964): 122-136.

Stern, L. W. and T. Reve. "Distribution Channels as Political Economies: A Framework for Comparative Analysis." *Journal of Marketing* 44(1980): 52-64.

Stern, L.W., A.I. El-Ansary, and A.T. Coughlan. *Marketing Channels*. Upper Saddle River, NJ: Prentice Hall, fifth edition, 1996.

Sykuta, M.E. and M.L. Cook. "A New Institutional Economics Approach to Contracts and Cooperatives." *American Journal of Agricultural Economics* 83(2001): 1273-1279.

Teece, D.J. "Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy." *Research Policy*. 15(1986): 285-305.

Tversky, A., and D. Kahneman. "Prospect Theory An Analysis of Decision under Risk." *Econometrica* 47 2 (March 1979): 263-292.

Williamson, O.E. *Markets and Hierarchies: Analysis and Antitrust Implications.* New York: The Free Press, 1975.

Williamson, O.E. "Credible Commitments: "Using Hostages to Support Exchange." *The American Economic Review* 73(1983): 519-540.

Williamson, O.E. *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. New York: The Free Press, 1985.

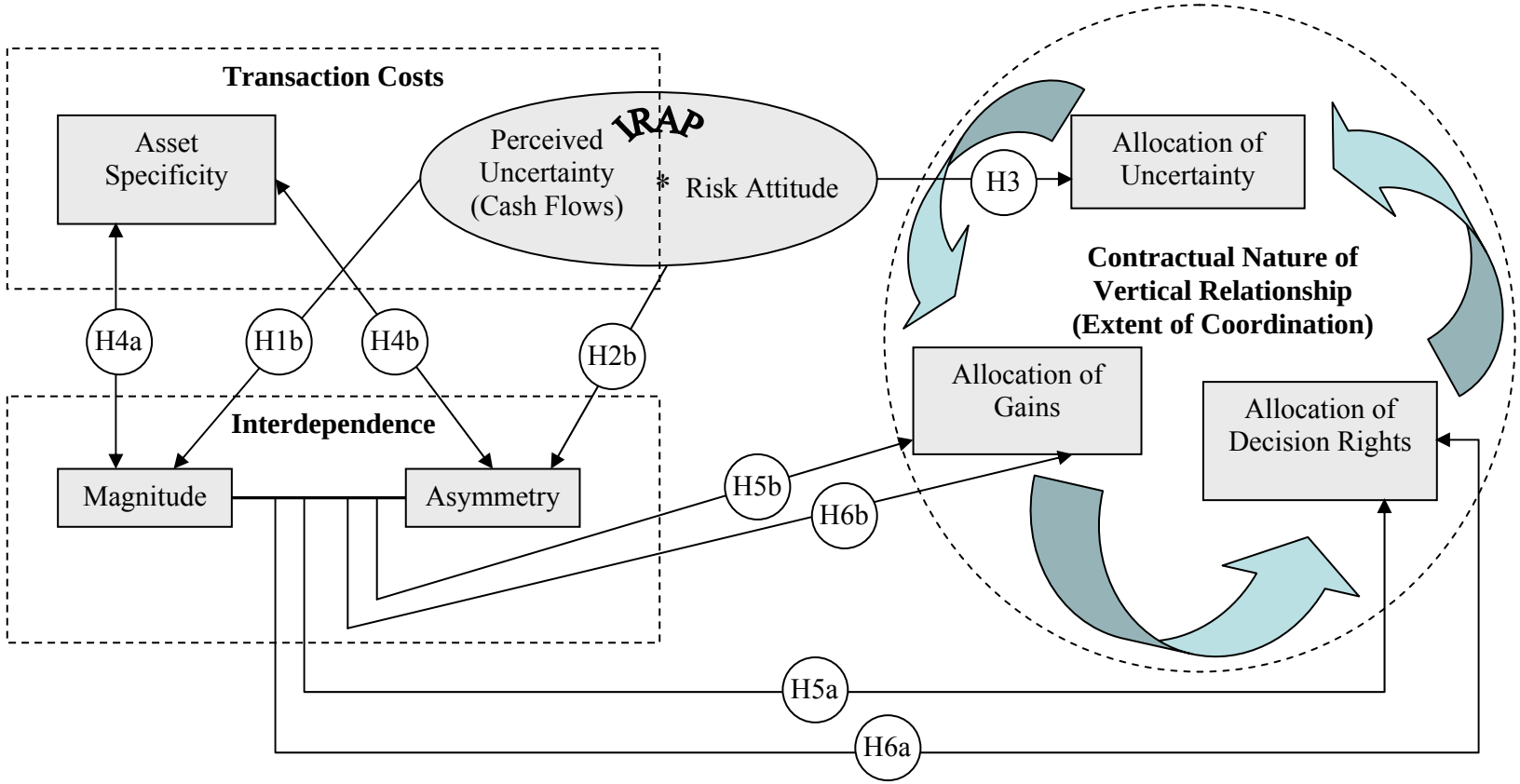

Figure 1. The Conceptual Model.

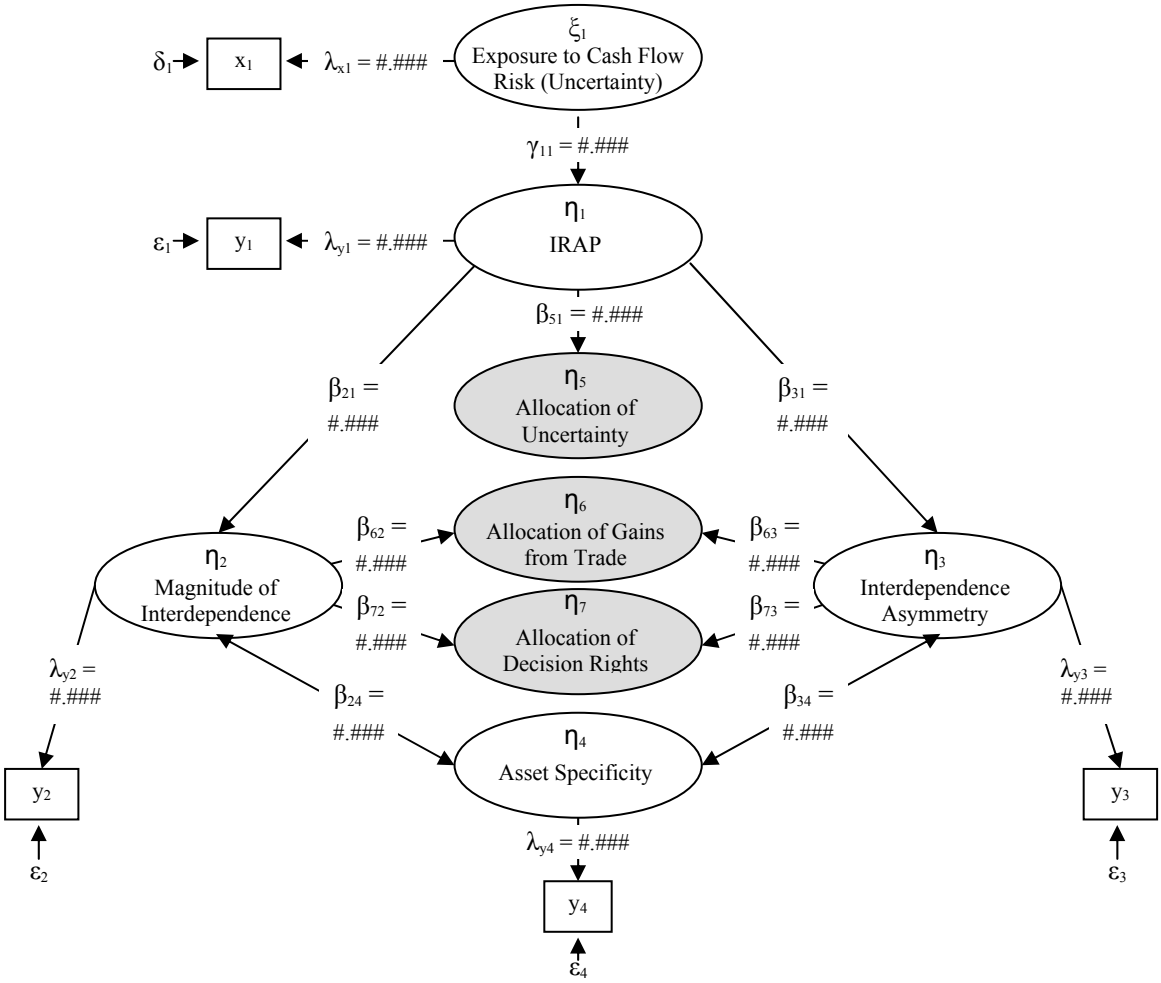

Figure 2. The Structural Model.

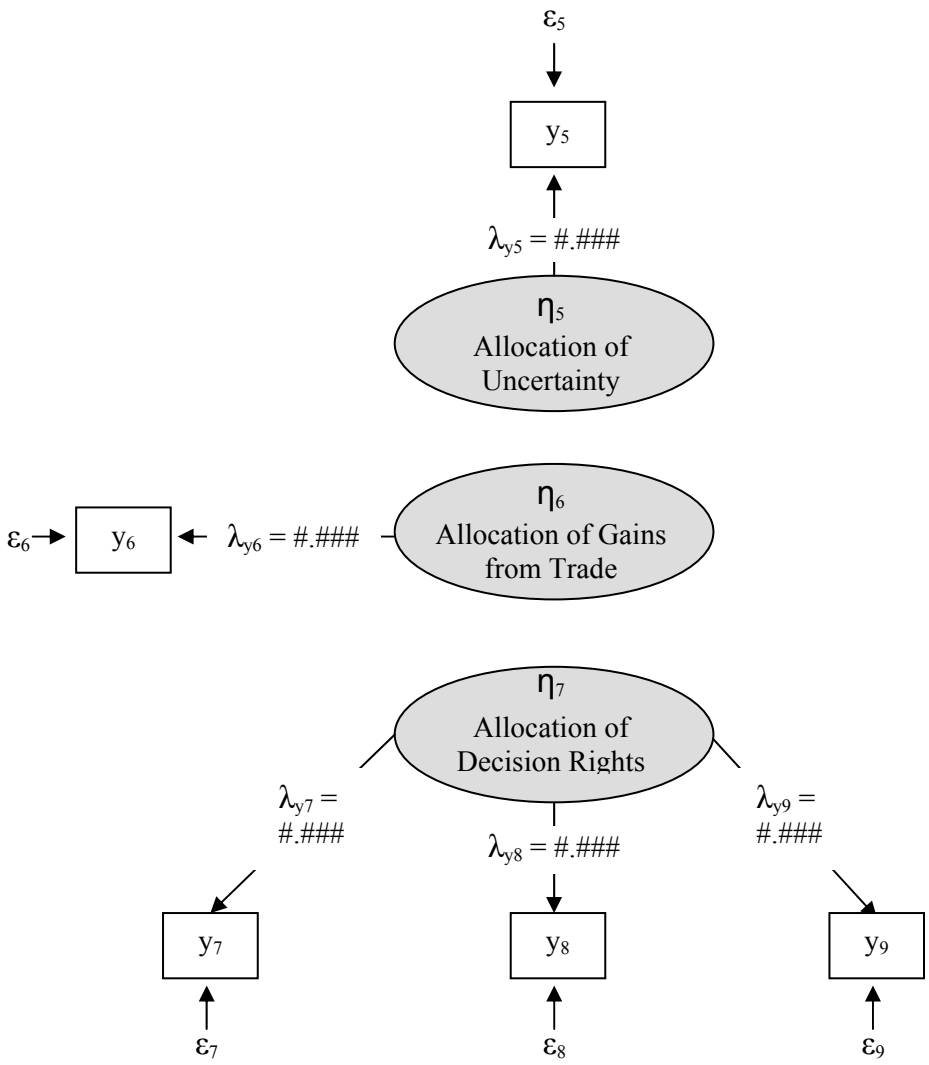

Figure 3. The Measurement Model for the Dependent Variables.

Table 1. Summary of measures.

Construct	Operational Measure*
Cash Flow Risk Exposure $= \xi_1$	x_1 = Unexpected variance in sales (a proxy).
	Accounting data: The variance in the error term from the regression of the log of sales on time.
	Scale: By how much (in percentage terms) do you think sales (cash flows) could vary from your expected amount.
IRAP $= \eta_1$	y_1 = (risk attitude × risk perception). Elicit risk attitudes and risk perceptions with certainty equivalent and interval techniques, respectively.
Interdependence Magnitude $= \eta_2$	y_2 = The sum of producer's and processor's irreplaceability taken from the producer's perspective.
Interdependence Asymmetry $= \eta_3$	y_3 = The difference between producer's and processor's irreplaceability taken from the producer's perspective.
Producer's irreplaceability	Scale: There are other producers who could provide your trade partners with comparable products.
Trade partner's irreplaceability	Scale: There are alternative buyers to whom you could deliver in your area.
Asset Specificity $= \eta_4$	y_4 = Potentially sunk investments.
Physical	Scale: The extent to which you have invested in equipment that would not be as valuable in a relationship with another trade partner.
Human	Scale: Your primary trade partner considers your understanding of its input needs and/or operating/trade procedures key to the relationship.
Locational	Scale: Your primary trade partner values the close location of your production operations for its timely delivery of inputs.
	Scale: The distance you must travel to deliver your product plays a role in your choice of a primary trade partner
Allocation of Uncertainty $= \eta_5$	y_5 = Contract characteristic or type.
	Scale: The contract with my primary trade partner limits my exposure to risk.
	Scale: The contract with my primary trade partner transfers risk that I would otherwise face to my partner.
	Scale: The type of contract I enter into is most closely categorized as spot transactions, forward-price, fixed price, etc….
Allocation of Gains from Trade $= \eta_6$	y_6 = Calculated as the ratio of producer's profit (in terms of return on equity) to the industry return on equity for the processor.
Producer's return on equity	Accounting data: Illinois farm panel-dataset and asked during computer-guided interviews.
Processor's return on equity	Accounting data: Datasets from industry and governmental sources.
Allocation of Decision Rights $= \eta_7$	y_7 = Centralization, y_8 = Participation, y_9 = Formalization.
Centralization	Scale: My primary trade partner specifies many aspects of my end of the production process.
	Scale: I have control over the decisions that affect my level of production.
Participation	Scale: My trade partner welcomes and considers my ideas for my production procedures.
	Scale: My trade partner welcomes and considers my ideas for coordinating our exchange relationship.
Formalization	Scale: The relationship with my primary trade partner is governed by written contract.

* With the exception of the underlying constructs for the allocation of decision rights variable, in which we follow Dwyer and Oh (1988) using 5-point scales, and the third item for the allocation of uncertainty variable, which is categorical, all scales are 7-point Likert with end-poles strongly disagree (1) and strongly agree (7).