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Long-Term Channel Relationship with Asset Specificity

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Recent marketing channels are characterized by cooperative relationships, in which players regard the other channel members as partners and tie themselves to each other with higher asset specificity. Previous channel research on this topic dealt with the cooperative relationship by developing interdisciplinary models in which some social psychological constructs are compounded with transaction cost analysis (TCA). However, this approach seems to have the problem that there exist different behavioral assumptions between transaction cost analysis and the social psychological approach. In this paper, we develop a relational contracting model which is compatible with the asset specificity hypothesis and long-term successive relationships. We derive a causal model from game theory, and test the model empirically with primary datasets from manufacturers in long-term channel organizations. The results suggest that continuity of cooperative relationships is influenced negatively by opportunism as TCA claimed, and positively by long-term orientation of channel members as game theory claimed. The results also suggest that asset specificity has an indirect impact on continuity of cooperative relationships via long-term orientation.

Key words: marketing channel, cooperative relationship, transaction cost, asset specificity, hold-up, relational contracting, incomplete contract, discount parameter, long-term orientation, repeated game, opportunism, structural equation modeling

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LONG -TERM CHANNEL RELATIONSHIP WITH SPECIFIC ASSET

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Abstract

Recent marketing channels are characterized by cooperative relationships, in which players regard the other channel members as partners and tie themselves to each other with higher asset specificity. Previous channel research on this topic dealt with the cooperative relationship by developing interdisciplinary models in which some social psychological constructs are compounded with transaction cost analysis (TCA). However, this approach seems to have the problem that there exist different behavioral assumptions between transaction cost analysis and the social psychological approach. In this paper, we develop a relational contracting model which is compatible with the asset specificity hypothesis and long-term successive relationships. We derive a causal model from game theory, and test the model empirically with primary datasets from manufacturers in long-term channel organizations. The results suggest that continuity of cooperative relationships is influenced negatively by opportunism as TCA claimed, and positively by long-term orientation of channel members as game theory claimed. The results also suggest that asset specificity has an indirect impact on continuity of cooperative relationships via long-term orientation.

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1. INTRODUCTION

Manufacturers and distributors in modern marketing channels often establish cooperative relationships with bilateral high asset specificity. They establish these relationships to acquire high quality, customized distribution services, which are not easily available through from arm's length transactions. For example, Japanese

automobile manufacturers provide many services regarding sales activities to their customers through dealers which tie long-term close relationship with the manufacturers (Asanuma 1994). Also, Japanese convenience stores receive customized distribution functions (e.g. short cycle and small lot logistics, and production of private brands) from suppliers by establishing long-term transaction relationships (Maruyama 2000). Because high asset specificity often results in competitive advantage, cooperative relationships with channel members are considered an important resource available from the outside of the firm (Ghosh and John 1999).

The purpose of this study is to clarify the mechanism of evolution and maintenance in the inter-firm cooperative relationship in the marketing channel, especially to theoretically and empirically uncover the relationship between asset specificity and cooperative relationships. Although asset specificity and cooperative relationships are associated with each other, they have been discussed separately by two different theories. First, asset specificity has been treated by transaction cost analysis (TCA) (Williamson 1985). This theory originally focused on the dichotomy of the arm's length transaction and the internal hierarchical transaction. And, it regarded the cooperative relationship as a hybrid form of transaction. However, the explanation of cooperative relationship as a hybrid form has been criticized (Baker, Gibbons, and Murphy 2002). In order to resolve the problem, marketing scholars have attempted to explain cooperative relationships by introducing social psychological constructs to TCA (Heide and John 1992).

Second, the cooperative relationship has been analyzed by the repeated game theory (Axelrod 1984). For example, in a one shot prisoner's dilemma, defect strategy results in a higher payoff than do any strategies involving the other prisoner, and, therefore, defect always occurs. In contrast, cooperative relationships would arise between players if they play the game on a long-term basis. Marketing scholars have paid attention to the repeated game theory because it may vitally contribute to an explanation of long-term successive transaction among channel members (Heide and Miner 1992; Rokkan, Heide, and Wathne 2003).

Marketing scholars have developed their own framework for relationship marketing in order to handle asset specificity and cooperative relationship simultaneously. As discussed below, however, the studies of relationship marketing have typically

proposed research hypotheses without deductive theory to test them empirically, and, therefore, proposed hypotheses often contradict the assumption of the implied theoretical framework. Thus, while there are many previous researches that attempt to explain cooperative relationships with asset specificity, it should be said that the attempts have failed.

In this paper, to develop a model of cooperative relationships with asset specificity, we focus on the current studies of relational contracting based on game theory (Baker *et al*. 2002; Dixit 2004). Relational contracting is contracting which is not enforced by a codified contract or legal system, but by "the entire relation as it had developed to the time of the change in question" (Macneil 1978, p.890), and, therefore, this concept is closely related to cooperative relationships. Some marketing scholars have already employed the concept and published papers regarding relational contracting among channel members (Dwyer, Schurr, and Oh 1987). However, due to the social psychological approach, they have a problem in theoretical consistency. With the game theory approach, we could clearly explain conflict and cooperation in marketing channels with theoretical consistency. Relational contracting or cooperative relationship in the actual marketing channel contains cooperation as well as conflict due to firms' self-interest seeking. This approach would clearly explain the phenomenon.

This paper is organized as follow: first, we review the area of cooperative relationship and reveal its issues. Second, we propose a theoretical model of relational contracting with asset specificity and derive causal hypotheses. Third, we test the proposed model by estimating the causal relationship with the structural equation modeling using 144 samples of Japanese manufacturers. Finally, we discuss our conclusions and provide suggestions for future research.

2. REVIEW OF COOPERATIVE RELATIONSHIP

In last two decades marketing channel scholars had called attention to the cooperative relationship. In a transaction among channel members, cooperative relationship refers to a situation in which members cooperate with each other even if they have chances to increase payoff by defecting. Actually, in traditional marketing channel

literature, channel members have been described as completely egoistic players, who negotiate with the other players and use their powers to bend other members for their own profits (Stern and Reve 1980). In this section, we examine the study of cooperative relationship among egoistic channel members.

2.1. TCA and Hold-up Problem

Cooperative relationships in marketing channel might be catching researchers' attention partly because TCA has been developed and employed. Traditionally, TCA focused on transaction costs which manufacturers should pay when buying distribution services from distributors (Anderson 1996). TCA has been, therefore, employed as a framework for explaining the make or buy of distribution functions (Anderson and Schmittlein 1984; Palay 1984; Anderson 1985; Maltz 1993) and also for explaining a firm's boundaries (Klein 1989; Klein, Frazier, and Roth 1990; Erramilli and Rao 1993). Currently, TCA can also be applied to analyze cooperative relationships (Langlois and Robertson 1995, Buvik and John 2000, Rokkan *et al*. 2003). In the latter research field, the previous TCA studies point out that if a manufacturer encourages distributors to make relation-specific investments and increase asset specificity, then the manufacturer could hold them up.

Asset specificity inevitably creates hold-up problem (Klein, Crawford, and Alchian 1978). The causal relationship can be explained by using a situation of transactions between a manufacturer and a distributor as follows: Suppose a manufacturer would request a distributor for investment on a logistics center only for the manufacturer in order to distribute his products more efficiently. And it is assumed that the logistic center is a relation-specific and specified asset because it cannot be switched to the transaction with the other manufacturers. Moreover, this transaction is an incomplete contract because they cannot establish a complete contract ex ante, and the performance of the logistics center would be unclear until they start operating the facility.

Various conflicts (e.g. how to determine the price, how can unexpected problems be solved) could occur in this transaction. One of the solutions for the possible conflicts would be to establish a codified contract ex ante. But it is realistically impossible to predict all possible contingencies ex ante and write a complete contract with perfect

binding effects. And if the complete contract could be made, firms might disappear because all transactions could be governed by the market (Coase 1937; Williamson 1975; Grossman and Hart 1986).

In our example, the distributor who develops a logistics center only for a particular manufacturer and enhances asset specificity for the manufacturer would no longer be able to exit the transaction without sunk cost. The manufacturer understanding the lock-in situation could conduct renegotiations ex post, reduce prices, and exploit appropriable quasi-rent from the distributor. This creates a hold-up problem. However, a distributor who predicts the hold-up problem may not invest specified facilities from the beginning stage and, therefore, asset specificity would become less than the first best: with higher asset specificity, the joint profits of manufacturer and distributor would increase. This silly phenomenon is the ending of the story of the hold-up problem. Thus, many assert that in order to avoid the problem and enjoy the competitive advantage from higher asset specificity, firms should vertically integrate so that one united firm can own the property rights of physical assets (Grossman and Hart 1986).

TCA has a major problem due to its simplicity. Although TCA implies that arm's length transactions might be replaced by vertical integration because asset specificity creates hold-up problem, it is not so in the real world. As mentioned at the beginning of the paper, we can find the other type of transaction in the automobile channel and supply chain of the convenience stores in Japan; both of these long-term successive transactions with asset specificity.

Certainly, Williamson (1985) takes a step forward from his own original paper regarding two types of governance mechanism, arm's length transactions and hierarchy (Williamson 1975), and admits the presence of bilateral governance based on relational contracting. Williamson insists that the bilateral governance would be maintained if players in the transaction provide hostages, such as specific assets and reputations, for each other. However, there exists a problem in explaining the long-term successive relationship by the hostage model. Even though players exchanged hostages, it is quite possible that termination of the transaction or defection would be still happened. Actually, current marketing channels successfully maintain the long-term successive cooperative relationships to obtain customized distribution function and enjoy a competitive advantage, while avoiding hold-up problem. Bridging this gap between

TCA and reality has become a main topic for the following studies which include a sequence of studies of relationship marketing, introducing social psychological constructs to solve Williamson's problem.

2.2. Relationship Marketing

Some studies of relationship marketing have attempted to solve the paradoxical problems of TCA by introducing a social psychological construct. In this section, we examine the TCA related studies of relationship marketing.

Ardnt's domesticated market model is the first important study in relationship marketing. This model insists that a leader firm leads transactions to establish long-term relationships so that various benefits which are not available in the arm's length transaction can be generated. According to this assertion, the relationship is maintained by the leader's authority, not by members' voluntary incentives. Thus, this model misses the micro-foundation and regards transaction as internal organization.

Ardnt (1979) compared arm's length transactions, which are based on the classical contract law that all potential contingents are codified on a contract, with hierarchy, which is based on the neo-classical contract law that says leaders' authorities enforce the contract. After Ardnt's comparative study of the two poles between arm's length transaction and hierarchy, Dwyer *et al*. (1987) considered cooperative relationship as the relational exchange because it is a hybrid transaction between arm's length transaction and hierarchy, while they regarded arm's length transaction as the discrete transaction, because each transaction never affects the next one. These studies discard comparative institution analysis views of TCA, and lead marketing scholars to focus on the social psychological mechanism of maintaining cooperative relationship. It could be said that these studies established the direction of the study of how a relationship, which is neither market nor organization, enhances asset specificity as well as maintains a cooperative relationship.

As a pioneer of that direction, the study by Heide and John (1988) insisted when it is assumed that only one player makes relation-specific investment for the other player and increases asset specificity, the hold-up problem would occur and, therefore, a cooperative relationship is not sustainable as claimed by classical TCA. In contrast,

when it is assumed that *both* players make relation-specific and offspring investment for each other, and the possibility of switching partners decreases simultaneously, the hold-up problem would not occur and the relationship would be locked in for higher benefits. Anderson and Weitz (1992) also adopted the bilateral relation-specific investment. They attempted to explain the commitment of each member to the relationship, and concluded that the players' commitment to cooperative relationship would not be influenced by the ex ante contract, but by the ex post idiosyncratic investment. Heide and John (1990) claim that supplier's relation-specific investment increases expectation of continuity [of relationship] and, in turn, joint action [between supplier and buyer]. That claim is similar to Anderson and Weitz's work in that relation-specific investment reinforces the cooperative relationship.

Simultaneously, other studies introduced social psychological constructs into the field of relationship marketing. Heide and John (1992), who took notice that asset specificity generates opportunistic behaviors in arm's length transaction, introduced a social psychological construct, norm, as a restrainer of opportunistic behavior. The interaction effect of norm and relation-specific investment has a positive effect on the control of buyer behavior (see also Berthon, Pitt, Ewing, and Bakkeland 2003). Furthermore, Morgan and Hunt (1994) indicated that commitment and trust are imperative for building relationships among firms, and trust enhances commitment. These studies, which introduced social psychological constructs, seem to be interested in causal relationships explaining cooperative relationships rather than comparative institutional issues.

Two major problems would be revealed by surveying the above-mentioned studies. First, these previous studies do not give enough explanation of long-term cooperative relationships. This problem is expected to be solved by dynamic modeling. The cooperative relationship itself is fragile because negotiation over profit distribution among channel members is inevitable. Therefore, asset specificity is an important analytical concept in marketing channel literature. It is necessary to make a dynamic model in order to describe the cooperative relationship with asset specificity. Second, previous studies lack theoretical consistency. Social psychological constructs, such as norm, trust and commitment, are the key concepts of relationship marketing. These constructs are not integrated within a theoretical model, but are just used in empirical

hypotheses without any theoretical models supporting them. For example, "intentional trust" (Andaleeb 1992) means that players believe that other players may not defect even though they have the competence to defect. Because such a construct is inconsistent with TCA, in which behavioral assumptions are bounded rationality and opportunism, hypotheses that contain it could not be derived from the theoretical system of TCA.

2.3. Game Theory of Cooperative Relationship

Cooperative relationship in marketing channels can be treated by game theory. Game theory is expected to solve the problem that TCA cannot explain maintenance of successive transaction. Moreover, game theory is consistent with the behavioral assumptions of TCA and both of them deal with cooperative relationships among selfish players. Some marketing scholars have been already attracted by the game theory approach (e.g. Heide and Miner 1992; Rokkan *et al*. 2003).

In game theory, vertical transactions in marketing channel could be formulated as the prisoner's dilemma (Heide and Miner 1992). Actually, because transactions between channel members are regarded as deprived actions of profits between members, payoff would be increased if the seller/buyer defects the buyer/seller and draws better deals. However, cooperation between seller and buyer could enhance total payoff. First, if the transaction is terminated by defections, firms need to search for other players for the next transaction incurring searching costs. Second, the tough negotiation caused by defections requires sunk costs. Thus, formulation of transaction between manufacturer and distributor as prisoner's dilemma would be consistent with reality.

If the opponents of the game were changed in every transaction and players were not charged with any behaviors in past transaction, it is inevitable that intense defections would occur between both parties in order to obtain short-term payoffs. Discontinuous transaction causes the defecting situation. Some marketing scholars called this discrete transaction (Dwyer *et al*. 1987; Heide 1994). This model suitably explains that intense defections occur in some actual marketing transactions in which sellers and buyers are changed frequently and negotiations regarding price and trading conditions are conducted every time. Cooperative relationship might not occur in such a situation even if transactions are repeated over and over again.

While we can find many prisoner's dilemma-like situations, persons in the real world often behave cooperatively unlike the prisoners in the game model. These behaviors can be explained by a repeated game. It is known that infinite repeats of the prisoner's dilemma might result in cooperative relationship as long as the players regard future payoffs as important (Axelrod 1984).

A major contribution of the repeated games might be to describe successfully such situations in which players voluntarily choose cooperation causing a cooperative relationship to develop among them. Firms in the games do not deceive each other in terms of short-term profits, but cooperate in terms of long-term profits, because the future payoffs are important. These firms are different from the firms in Ardnt's domesticated market model (1979) and Williamson's hierarchy (1975), for the latter firms cooperate compulsorily when the authority of a manager enforces the contract. Cooperative relationships in the modern marketing channel are related to the former firms. While TCA and relationship marketing have failed to explain long-term cooperative relationships, the repeated game approach is successful in doing so.

Heide and Miner (1992) provided evidence that extendedness of relationship, which was introduced to analysis by Axelrod's hypothesis on discount parameter empirically, has a positive effect on the level of cooperation. Also, Weiss and Kurland (1997) extended the previous studies of Heide and Miner (1992), which dealt with the discount parameter, and Heide and John (1988), which dealt with offspring investment, and claimed that the likelihood of the player's terminating the relationship is influenced negatively from the interaction effect of length of prior relationship and relation-specific investment, and positively from the interaction effect of length of prior relationship and offspring investment. They did not develop their own channel models to replace Axelrod's previous model, and it should be seen that they made only limited contributions with some original constructs and the causal relationship among them.

Although the repeated games are notable for the main contribution discussed above, it is difficult to simply apply game theory for more complex situation of the modern distribution channels. It is noted that the modern channel is characterized by asset specificity. Firms in the real world often fix their relationship and specify their assets to each other to some extent to use each other's specific asset effectively in order to achieve a stronger competitive advantage than ever: the advantage has never yet been achieved

with neither internalization nor arm's length transaction. There still exists room for improving the repeated games, which have not taken the asset specificity into account.

2.4. Relational Contracting

Higher asset specificity enables the marketing channel to carry out more advanced functions. Not only general distribution resources, but also customized distribution resources are needed, in order to build a postponed marketing system and make the throughput turn over speedily with a shorter cycle and a smaller lot size (Bucklin 1965). One question here is why the relationship among channel members is successively maintained without vertical integration if their assets are specified only for the transaction among them. We focus on the studies of relational contracting to answer that question (Macneil 1978).

As related research, Heide (1994) is valuable for examining attributes of relational contracting. Heide classified governance structures of transactions into three types, market governance, hierarchical governance, and bilateral governance, and, as discussed below, the last type is related to the relational contracting in question. He suggested that these governance structures are different from each other in terms of enforcement mechanism (see Table 1).

First of all, governance structures of transactions can be divided into two governance styles, market governance and nonmarket governance, in terms of whether the transaction is governed by market mechanisms or not (Coase 1937). On the one hand, market governance refers to discrete transactions (Heide 1994). With a complete contract, channel members would perfectly identify the quality and quantity of goods in transaction. And, because of the nature of complete contracts, it is possible that the

Table 1
Three Kinds of Governance Structures

	Market governance	Nonmarket governance	
		Hierarchical governance	Bilateral governance
Means of enforcement	Legal system (external to the relationship)	Authority (internal to the relationship)	Mutuality of interest (internal to the relationship)

Source: Heide (1994), p.75. Revised by the authors.

legal system, an external system to the relationship, enforces the contract.

On the other hand, without a complete contract, nonmarket governance would occur (Grossman and Hart 1986). Nonmarket governance can be divided into hierarchical governance and bilateral governance (Heide 1994; Lamoreaux, Raff, and Temin 2003). Hierarchical governance refers to internal transactions. This governance model has been proposed referring to the Domesticated market model, developed by Ardnt (1979). Under hierarchical governance, the authority of the manager, an internal element within the relationship, enforces the contract. Finally, bilateral governance refers to relational contracting.

As Heide mentioned, mutuality of interests among channel members enforce~~s~~ the contract under this governance. While he did not go into detail, some governance researchers have clearly mentioned that a set of behaviors which are maintained as if there were a codified contract (like market governance) or authority of manager (like hierarchical governance) should be regarded as a kind of contracting, and called it relational contracting (Macneil 1978; Baker *et al*. 2002; Dixit 2004).

As claimed in the TCA literature, asset specificity results in the hold-up problem when the transactions are made under incomplete contracts due to bounded rationality. In the ideal world where complete contract can be codified and verifiable at the low court, relation-specific investment might be feasible for all members of any marketing channels. However, in the real world, complete contracts are rarely available and, therefore, relation-specific investment is not verifiable to the third party (e.g. the court). As a result, firms could decide on hierarchical governance rather than market governance. In fact, vertical integration has been assumed in discussing high asset specificity in a one-shot transaction (Grossman and Hart 1986).

However, it could be assumed that players' relation-specific investments and actions are observable for each other, though they are not able to be verified at the court. With the assumption, relational contracting could occur in long-term transaction behavior. Long-term profits of transaction enforce the contract in the relational contracting situation. The contract is enforced without both codified contracts and vertical integration, because players could punish each other if someone violates the contract (Antia and Frazier 2001). Cooperative relationships could be initiated and maintained if players evaluate that choosing such a relationship results in higher profits than defect strategy (Baker *et al*.

2002; Lamoreaux *et al*. 2003). The point here is that the players *choose* the cooperative relationship for themselves. Because it is obviously Nash equilibrium, once the equilibrium is achieved, no players have incentive to defect, and therefore, the contract becomes self-enforced (Buvik and John 2000).

3. MODELING

In this section, we provide a model on relational contracting between manufacturer and distributor to examine effects of asset specificity and opportunism on cooperative relationship. Relational contracting is discussed in comparison with spot transaction. While the relational contracting means long-term cooperative relationship based on informal arrangement, not on formal contract, the spot transaction means discrete transaction with formal, codified contract. Comparing with the spot transaction, conditions for maintaining relational contracting and the impacts of asset specificity and opportunistic behavior of distributor are discussed.

3.1. Setting

In our model, we assume two players, manufacturer and distributor. The distributor owns physical assets such as logistics centers and sales information systems. And the manufacturer purchases a customized distribution service from the distributor. The distribution service has high value for the manufacturer in question, but it does not for other manufacturers. The transaction between the players can be conducted infinitely, and they have same discount parameter, δ ($0 \leq \delta \leq 1$).

Procedure of a transaction at each term is assumed to behave as following: First, manufacturer and distributor close a contract on quality and price of the distribution service which is dealt in the term. Second, the distributor makes human investment, e, into the production of the distribution service using the physical assets. Now, the human investment, e, affects the production cost. We define $c(e)$ as the production cost and assume $c'(e) > 0$. On the other hand, e also affects the value of the distribution service. We define $V(e)$ as the value for manufacturer and assume $V'(e) < 0$. It is

assumed that the distribution service is valued $W(e)$ by the other manufacturer and $W'(e) < 0$. W is lower than the value perceived by the manufacturer in question ($V(e) > W(e)$) for all e. $V - W$ presents the asset specificity. Third, the manufacturer purchases the distribution service at a price, which determines how the payoff is divided into manufacturer's payoff, π_M, and distributor's payoff, π_D.

Because the total surplus of the marketing channel is the remainder between value, V, and cost, c, it can be presented as follow:

$$S = V(e) - c(e) \tag{3.1}$$

It is noted that S does not include products produced by the manufacturer, but a distribution service provided by the distributor, because we consider the transaction in which a manufacturer buys a distribution service from a distributor, not the transaction in which a distributor buys products from a manufacturer (Anderson 1996).

In the ideal world with a complete contract, the optimum total surplus, S^*, with the optimum amount of human investment, e^*, can be represented as follows:

$$S^* = V(e^*) - c(e^*) \tag{3.2}$$

Now, it is assumed that human investment, e, is unobservable to anyone but the distributor and, therefore, is not verifiable by a third party. It is also assumed that value, V, can be observed by the players, but, also cannot be verifiable for a third party. As a result, contracts based on neither e nor V would be enforced by a third party. That would cause a problem in spot transactions, as discussed below in 3.2. In contrast, if we allow the players in the model to have a long-term cooperative relationship (relational contracting) with the informal arrangement based on V, which is possible because V can be observed by both manufacturer and distributor, the situation would be changed as discussed in 3.3 and the following subsections.

3.2. Benchmark: Spot Transaction

Analysis of a spot transaction can be a good benchmark of the relational contracting analysis discussed below. Based on Grossman and Hart (1986), payoffs and human investments with an incomplete contract are compared to those with a complete contract.

Complete contract: First best

Suppose that the players predict all possible contingencies ex ante and write a complete contract with perfect binding effect. If both players' bargaining powers are equal, the bargaining price based on the Nash Bargaining Solution (NBC), p', can be represented as follow:

$$p' = \frac{1}{2}\{V(e) + c(e)\} \tag{3.3}$$

Total surplus of the marketing channel is;

$$S = V(e) - c(e) \tag{3.4}$$

Payoff of the manufacturer is;

$$\pi_M = V(e) - p' \tag{3.5}$$

Payoff of the distributor is;

$$\pi_D = p' - c(e) = \frac{1}{2}\{V(e) + c(e)\} - c(e) = \frac{1}{2}\{V(e) - c(e)\} \tag{3.6}$$

Because manufacturer and distributor have equal bargaining powers, the total surplus is shared between them. The optimum amount of human investment, e^*, which indicates the optimum behavior of the distributor, is given when we solve the following equation for e:

$$\pi'_D = V'(e) - c'(e) = 0 \tag{3.7}$$

Thus, the total surplus of the channel is maximized with e^*.

Incomplete contract: Second best

In a more realistic situation, one without a complete contract, the manufacturer could renegotiate after the human investment, e, has been made by the distributor and the amount of value, V, has been realized. After realizing, renegotiation would occur. In the renegotiation, the re-bargaining price based on the NBS, p'', can be represented as follow:

$$p'' = \frac{1}{2}\{V(e) - W(e)\} + W(e) = \frac{1}{2}\{V(e) + W(e)\} \tag{3.8}$$

It is noted that $c(e)$ is not included in p'' because it has been sunk. Instead W, which is value of the distribution service for the other manufacturer, is added.

In this situation, payoff of the distributor is;

$$\pi_D = p'' - c(e) = \frac{1}{2}V(e) + \frac{1}{2}W(e) - c(e) \tag{3.9}$$

Payoff of the manufacturer is;

$$\pi_M = V(e) - p'' \tag{3.10}$$

The optimum amount of human investment, e^s, which indicates the optimum behavior of the distributor, is obtained when we solve the following equation for e by backward induction;

$$\pi'_D = \frac{1}{2}\{V'(e) + W'(e)\} - c'(e) = 0 \tag{3.11}$$

Substituting e^S for Equation (3.9), we get the distributor's surplus in spot transaction, D^S;

$$\pi_D = p'' - c(e^S) = \frac{1}{2}V(e^S) + \frac{1}{2}W(e^S) - c(e^S) = D^S \tag{3.12}$$

Substituting e^S for Equation (3.10), we get the manufacturer's surplus in spot transaction, M^S;

$$\pi_M = V(e^S) - p'' = M^S \tag{3.13}$$

From $V(e) > W(e)$, we get $\frac{1}{2}V'(e) > \frac{1}{2}W'(e)$. Therefore, $V'(e) > \left\{\frac{1}{2}V'(e) + \frac{1}{2}W'(e)\right\}$ for all e. Hence, $e^* > e^S$. We obtain;

$$V(e^*) > V(e^S) \tag{3.14}$$

Finally, in the incomplete contract situation, the distributor makes an underinvestment in order to avoid a hold-up and, therefore, the high quality, customized distribution service is not available for the manufacturer.

3.3. Relational Contracting and Discount Parameter

After examining a spot transaction in the previous section, we go to an analysis of relational contracting. Based on Baker *et al*. (2002), payoffs and human investments in a relational contracting situation are compared to those in a spot transaction situation with an incomplete contract.

In a relational contracting situation, it is assumed that a manufacturer and a distributor make a relational compensation contract $\{s, b\}$, where s is a fixed amount of salary which the manufacturer pays for the distribution service at the beginning of every term in the transactions, and b is an unfixed amount of bonus which amount is determined by value, V, and the manufacturer pays after the distribution service are provided and V is realized. Although b can be varied with V and any formal contracts cannot be codified, the distributor could look forward to receive b for V and, therefore, make a human investment, e, with no fear of hold-up. Thus, given relational contracting, players cooperate with each other and higher V is achieved: that is self-enforcing.

With relational contracting, each of players has a choice of defection. The manufacturer could defect by refusing to pay bonus, b, and obtaining value, V, at the spot price. A situation where b is higher than the spot price, $\frac{1}{2}\{V(e^R)+W(e^R)\}$, is the manufacturer's incentive to defect, e^R means distributor's human investment in relational contracting. In contrast, the distributor could defect by refusing to provide the distribution service after obtaining salary, s, and reselling it to another manufacturer at the spot price. These situations are assumed as opportunistic behaviors. This can lead to the implementation of trigger strategy equilibrium, in which a player permanently punishes the defecting opponent. Using trigger strategy, the player dissolves the relational contracting to shift spot transactions if the opponent defects. Once the relational contracting is replaced with spot transactions, the distributor's human investment falls into underinvestment and, therefore, the higher quality, customized distribution service becomes unavailable.

Equilibrium condition for relational contracting

Payoff function of distributor is;

$$\pi_D = s + b - c(e) = D^R \tag{3.15}$$

maximizing (3.15) for e, we obtain e^R. Therefore, payoff function of manufacturer is;

$$\pi_M = V(e^R) - s - b = M^R \tag{3.16}$$

where M^R and D^R are manufacturer's and distributor's surplus, respectively. Total surplus, S^R, is;

$$S^R = M^R + D^R \tag{3.17}$$

The manufacturer would keep from defecting because the discounted present value of the payoffs, which are obtained if it honors the relational contracting, is higher than the discounted present value of the payoffs which are obtained if it defects the relational contracting. Hence,

$$\{V(e^R) - b\} + \frac{\delta}{1-\delta} M^R \geq [V(e^R) - \frac{1}{2}\{V(e^R) + W(e^R)\}] + \frac{\delta}{1-\delta} M^S \tag{3.18}$$

The left side of the Inequality represents the discounted present value of the manufacturer if the rational contracting is honored, while right side represents the value if the relational contracting is reneged. In the left side, the first term represents the cooperate payoff which the manufacturer will obtain at the current term if the rational contracting is honored. It does not include s because s has been already paid and sunk. Defining R_M as the cooperate payoff at each term in the future (M^R in (3.16)), we denote the first term s + R_M. The second term represents the discounted present values of the cooperate payoffs which the manufacturer will obtain at the following terms if the relational contracting is continuously honored. Using above notation, we denote it by $\frac{\delta}{1-\delta} R_M$. In the right side of the Inequality, the first term represents the defect payoff which the manufacturer will obtain at the current term if the relational contract is reneged at that term. We denote it by T_M. The second term represents the discounted present values of the defect payoff which the manufacturer will obtain each term in the future if the relational contracting is reneged at the current term. We denote it by $\frac{\delta}{1-\delta} P_M$. Using the above notations, we obtain;

$$s + R_M + \frac{\delta}{1-\delta} R_M \geq T_M + \frac{\delta}{1-\delta} P_M \tag{3.19}$$

Table 2
Manufacturer's Payoff Stream Assuming Distributor's Trigger Strategy

term	1	2	3	···
cooperation	$s+R_M$	R_M	R_M	···
defect at term 1	T_M	P_M	P_M	···

Assuming that the distributor follows the trigger strategy, we can describe the manufacturer's payoff stream Table 2, which suggests the same payoff stream as the repeated prisoner's dilemma. Now, solving Inequality (3.19) for δ, we obtain;

$$\delta > \frac{T_M - R_M - s}{T_M - P_M - s} = \delta'_M \tag{3.20}$$

The Inequality implies that the manufacturer would decide to be cooperative and honor the relational contracting if the discount parameter, δ, is more than the right side value. That is, the critical value of discount parameter, δ'_M, means that if the discount parameter of manufacturer is larger than δ'_M, manufacturer will choose cooperation. Similar to an implication of the classical repeated prisoner's dilemma game discussed in the previous section, Inequality (3.20) suggests that the manufacturer is more likely to choice cooperation rather than defection if the discount parameter is higher than δ'_M and the future payoff is more important for the manufacturer.

The distributor would face the similar condition as the manufacturer. That is, the distributor's cooperation condition is that the discount present value of payoffs which the distributor will obtain if the relational contracting is permanently honored are superior to the discount present value of payoffs which the distributor will obtain if the relational contracting is reneged at any term. Hence,

$$b + \frac{\delta}{1-\delta} D^R \geq \frac{1}{2}\{V(e^S) + W(e^S)\} + \frac{\delta}{1-\delta} D^S \tag{3.21}$$

The left side of the Inequality represents the discounted present value of the distributor if the rational contracting is honored, while right side represents the value if the relational contracting is reneged. It is noted that salary, s, and cost, c, are not included in the first term of the left side because they have been sunk. From Equation (3.16) $b = D^R - s + c(e)$. Substituting it for Inequality (3.21), we obtain;

$$D^R + \frac{\delta}{1-\delta} D^R + c(e^R) - s \geq \frac{1}{2}\{V(e^S) + W(e^S)\} + \frac{\delta}{1-\delta} D^S \tag{3.22}$$

In the left side of Inequality (3.22), the first term represents the cooperate payoff which the distributor will obtains at the current term if the rational contracting is honored. We denote it by R_D. The second term represents the cooperate payoff which the distributor will obtains at the following terms if the rational contracting is continuously honored.

We denote it by $\frac{\delta}{1-\delta}R_D$. The third term represents the cost which the distributor paid at the current term. In the right side of the Inequality, the first term of the right side represents the defect payoff which the distributor will obtain at the current term if the relational contract is reneged at that term. We denote it by T_D. The second term represents the discounted present values of the defect payoffs which the distributor will obtain at the following terms if the relational contracting is reneged at the current term. We redenote it by $\frac{\delta}{1-\delta}P_D$. Using the above notations, we obtain;

$$\frac{1}{1-\delta}R_D + c(e^R) - s \geq T_D + \frac{\delta}{1-\delta}P_D \tag{3.23}$$

Solving Inequality (3.23) for δ, we obtain;

$$\delta > \frac{T_D - R_D - c(e^R) + s}{T_D - P_D - c(e^R) + s} = \delta'_D \tag{3.24}$$

Similar to δ'_M in Inequality (3.20), δ'_D is the critical value of discount parameter for the distributor's choice of cooperation. Inequality (3.24) suggests that the distributor is more likely to choice cooperation rather than defection if the discount parameter is higher than δ'_D and the future payoff is more important for the distributor.

3.4. Asset Specificity and Opportunistic Behavior

Now, we focus on the manufacturer's decision making on using a cooperative relationship, and examine the effects of two factors on the critical value of discount parameter; distributor's asset specificity and opportunism, which are two important factors treated by marketing scholars (Brown, Dev, and Lee 2000, Rokkan *et al*. 2003).

First, the degree to which the distributor specifies its physical assets for a particular manufacturer would affect the critical value of discount parameter for the manufacturer's choice of cooperation. In the game in the previous subsections, it was assumed that the distributor owns property rights of physical assets, and the degree of the specificity of the physical assets is fixed. Now, we loosen the assumption to regard asset specificity as a shift parameter which has an impact on the critical value of discount parameter.

Asset specificity as a shift parameter is represented as $V - W$, that is the remainder of the value for the manufacturer in question and the value for the other manufacturers. In the manufacturer's cooperation condition (3.20), cooperate payoff at each term, R_M, and defection payoff at each term, P_M, are changed when asset specificity is changed. On the one hand, if asset specificity, $V - W$, increases, then value, V, increases and, in turn, bonus, b, increases. Given the amount of payment, $b + s$, is low compared with V, R_M (= $V - b - s$) increases. On the other hand, if $V - W$ increases, then V increases, while human investment made by the distributor, e^s, is not varied. Therefore, P_M $(=\frac{1}{2}\{V(e^s) - W(e^s)\})$ does not increase so much. Thus, if (1) the amount of payment for the distributor is not high and (2) the payoff from spot transaction is not high, asset specificity would decrease the critical value of discount parameter, δ'_M, to δ'_{MAS}.

$$\delta'_M > \delta'_{MAS} \tag{3.25}$$

High quality, customized distribution service would contribute to the manufacturer's competitive advantage. Because the distributor made investment for physical assets highly specified for the manufacturer, the manufacturer can enjoy future payoff from cooperation, even though its discount parameter is not high. Therefore, if the highly specified assets results in higher V than compared with additional payment of bonus, b, the manufacturer would cooperate without a higher discount parameter. The condition for the manufacturer's choice of cooperation is;

$$\begin{cases} \delta > \delta'_M > \delta'_{MAS} \Rightarrow cooperate \\ \delta'_M > \delta > \delta'_{MAS} \Rightarrow cooperate \\ \delta'_M > \delta'_{MAS} > \delta \Rightarrow defect \end{cases} \tag{3.26}$$

That condition implies that the specificity of physical assets owned by the distributor would affect the critical value of discount parameter of the manufacturer, which would affect the cooperative relationship in turn.

Second, the degree to which the distributor behaves opportunistically would also affect the critical value of discount parameter for the distributor's choice of cooperation. In the relational contracting model, opportunism means that a player reneges on the informal contract in order to seek its own interests. Now, we narrowly define the concept as the distributor's use of its physical assets specified for the manufacturer in order to increase its bargaining power. In relational contracting, the distributor is

expected to make $V(e^R)$ by the manufacturer. However, as discussed in Section 3.1, the distributor is able to obtain higher bargaining power by increasing W, the value of the distribution service for an alternative manufacturer, instead of V, that for the manufacturer in transactions, because W raises the Nash bargaining price. As a result, the distributor can increase W rather than V to increase its own interests. That is the opportunistic behavior. Similar to the asset specificity discussed above, we regard opportunism as a shift parameter which has an impact on the critical value of discount parameter in order to examine the effects of the degree of opportunism on cooperative relationships.

In the distributor's cooperation condition (3.24), P_D, in the denominator, would be influenced by opportunism. P_D is the payoff which the distributor obtains if the relational contracting is reneged and $P_D = \frac{1}{2}\{V(e^s) + W(e^s)\} - c(e^s)$ as denote in the previous subsection. If W increases with high opportunism, P_D increases because the distributor's bargaining power in spot transactions increases. That would increase the critical value of discount parameter, δ'_D, to δ'_{DO}.

$$\delta'_{DO} > \delta'_D \tag{3.27}$$

Therefore, cooperation would be more difficult in the situation in which the distributor behaves more opportunistically. The condition for the distributor's choice of cooperation is;

$$\begin{cases} \delta > \delta'_{DO} > \delta'_D \Rightarrow cooperate \\ \delta'_{DO} > \delta > \delta'_D \Rightarrow defect \\ \delta'_{DO} > \delta'_D > \delta \Rightarrow defect \end{cases} \tag{3.28}$$

That condition implies that the distributor's opportunistic behavior would affect the cooperative relationship by the way of the critical value of discount parameter of the distributor, δ'_D.

3.5. Hypotheses

From the model discussed above, we derive three hypotheses which describe a causal relationship among the core concepts of the model, asset specificity, long-term orientation, and continuity of relationship. First of all, because asset specificity

increases payoff of a cooperative firm and decreases payoff of a defecting firm, it might have an impact on the critical value of discount parameter. While Axelrod (1984) treated discount parameter as constant, we treat it as variable to describe this causal hypothesis. To do so, we adopt the construct of Long-term orientation, which is a variation of discount parameter. This construct is expressed as $\delta - \delta'$ using the notation above. While the discount parameter, δ, is still constant, the critical value of discount parameter, δ', can be varied: the higher asset specificity, the lower the critical value of discount parameter. Hence, the long-term orientation, $\delta - \delta'$, can be treated as a variable, and it increases as Asset specificity increases.

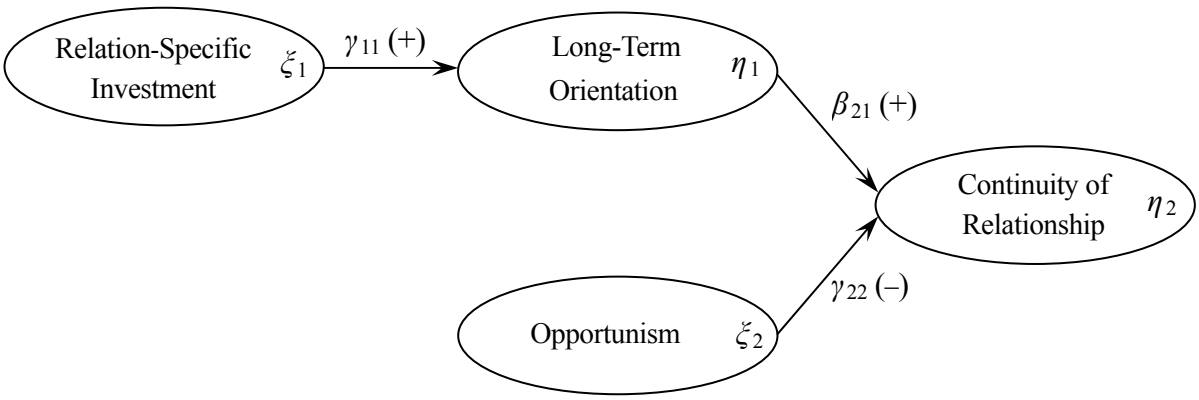
Hypothesis 1: Asset specificity positively influences Long-term orientation.

Second, Long-term orientation, $\delta - \delta'$, in turn, might have an impact on the cooperative relationship. As implied by simple repeated game theory, firms are more likely to choose cooperation rather than defect if they regard future payoffs as more important, and, therefore, $\delta > \delta'$. This condition is, of course, more likely to be satisfied as Long-term orientation is higher. Thus, firms' intentions to cooperate might be positively associated with Long-term orientation. Now, in order to introduce a dependent variable which indicates firms' intentions to cooperate, we employ Continuity of relationship, defined by Heide and Miner (1992) as the following: "the degree to which the parties [firms] anticipate that it [relationship] will continue into the future with an indeterminate end point" (pp.268-269). Thus,

Hypothesis 2: Long-term orientation positively influences Continuity of relationship.

Third, the concept of defection in game theory is equivalent to opportunistic behavior in TCA. Like Brown *et al*. (2000), we regard opportunism as a variable, while Williamson regarded it as a behavioral assumption. Firms could be more likely to alert the defection of other firms when firms perceive the other firms to behave opportunistically. As a result, a cooperative relationship among them will be difficult to maintain. Thus, Opportunism might have a negative impact on Continuity of relationship. The critical value of discount parameter of the distributor is hardly

Figure1
Proposed Structural Model



Notes: Observable indicators, factor loadings, and measurement and latent errors are not included for simplicity of depiction.

observed by the manufacturer, while the opportunistic behavior of the distributor can be observed by the manufacturer. Therefore, we do not use the former as a moderator variable, and simply hypothesized as following;

Hypothesis 3: Opportunism negatively influences Continuity of relationship.

Finally, the three hypotheses derived from the model are summarized into the path diagram of Figure 1. According to notes added in Figure 1, we treated the set of hypotheses as a structural model to test our relational contracting model in the following sections.

4. METHOD

4.1. Data Collection and Measurement

The structural model in Figure 1 was tested using primary data. We collected qualitative data from divisional managers of Japanese manufacturers from particular industries, including food, fiber, paper, chemical, medicine, rubber, machinery, appliances, precision instruments, and automobile and other vehicles, which are well

known by their distinctive cooperative relationship with their domestic marketing channel members. We used a Japanese database, *Diamond Soshikizu Keitouzu Binran 2004* (*Diamond Survey Data Book of Organizational Structures within Japanese Firms 2004*) to obtain mailing address of randomly sampled 1540 divisions of Japanese manufacturers. Before mailing the questionnaires, we checked each firm's marketing channels, and eliminated firms which use only direct marketing channel to end users or consumers. We mailed questionnaires to 1540 divisions: 208 questionnaires were returned (a 13.5% respondent rate), and 144 questionnaires were useable for the analysis (a 9.3% valid respondent rate).

The questionnaire was designed for the structural equation modeling (SEM). In this research, the SEM fit the psychological process of division managers. Because the SEM needs multiple scaling, we prepared two measurements for each construct. See Table 3 for measurements and Cronbach's alphas. As implied in Table 3, confirmatory factor analysis was used to examine convergent validity. All the factor loadings and measurement errors are in acceptable ranges and significant at 1% level. Discriminant validity among the constructs was examined stringently using the procedure recommended by Fornell and Larcker (1981). Every pair of constructs passed this test.

Table 3
Conceptual and Operational Definitions, Factor Loadings, Cronbach's Alpha

ξ_1: Relation-specific investment	α = .765	
(Degree to which the distributor specifies its property for distributing products of a particular manufacturer.)		
X_1: Are physical distribution facilities of the buyer prepared only for transactions with you?		(.707)
X_2: Is Sales information system of the buyer prepared only for transactions with you?		(.707)
η_1: Long-term orientation	α = .811	
(Degree to which future profit is important for the manufacturer.)		
X_3: Are you regarding profit in the future as important rather than profit at present?		(.707)
X_4: Are you making decision on transaction with a point of long term view?		(.707)
ξ_2: Opportunism	α = .769	
(Degree to which the manufacturer perceives the distributor behaves in a dishonest manor.)		
X_5: Are you thinking the buyer can tell a lie for you due to the profit orientation?		(.707)
X_6: Are you thinking the buyer can get the length of your foot in transaction?		(.707)
η_2: Continuity of relationship	α = .635	
(Degree to which the manufacturer hope for relationship with the distributor.)		
X_7: Are you willing to maintain the relationship with the buyer?		(.595)
X_8: Are you satisfied with the relationship with the buyer?		(.588)
X_9: Do you want to deal with the buyer in future?		(.548)

4.2. Model Estimation Results

The structural model in Figure 1 is estimated using maximum-likelihood of the CALIS Procedure in SAS/Stat 9.1. The solution was optimal, and the results are summarized in Table 4. The overall chi-square for the model is 38.64 ($p > .03$), and the model has 24 degrees of freedom. Although the high significant probability suggests the overall validity of the measurement model, the degrees of freedom is quite low due to fewer observations and measurements. The goodness of fit index (GFI) and GFI adjusted by the degrees of freedom (AGFI) for the measurement model are .95 and .91, respectively. They are larger than the recommended level of not less than .9 (e.g. Bagozzi and Yi 1988). In this case, a useful index is the root mean square error of approximation (RMSEA), a parsimony measure that accounts for potential artificial inflation due to the estimation of many parameters. Values of .08 and below are indicative of a satisfactory fit of the model (Steiger 1980; Jap 1999). The RMSEA is .06, which indicates a close fit of the data to the model. All parameter estimates of structural and measurement equations have signs which we hypothesized and are at a satisfactory significant level of 1%.

We checked the validity of the constraints on the structural model by estimating another model in which each of the parameters in the structural model was estimated freely one at a time. If the chi-square difference between the models is significant, the parameter is not equal across the two groups and should be estimated freely. There are no significant chi-square differences. We also tried another alternative model in which the effect of the relation-specific investment on discount parameter is replaced by the direct effect of the investment on continuity of relationship. This alternative model

Table 4
Model Estimation Results

H_1: Relation-specific investment => Long-term orientation [$\gamma_{11}(+)$]	.412	(t = 3.24)*
H_2: Long-term orientation => Continuity of relationship [$\beta_{21}(+)$]	.530	(t = 5.50)*
H_3: Opportunism => Continuity of relationship [$\gamma_{21}(-)$]	–.712	(t = –5.59)*

Notes: *: significant in 1% level. χ^2 = 38.64 (24 degree of freedom), $p > .03$; Goodness of fit index = .949; Goodness of fit index adjusted by the degree of freedom = .905; Root mean square error of approximation = .063.

shows no significant effect there, which empirically supports previous researchers' claims that asset specificity works as a commitment and consequently prompts cooperative relationship (Dwyer *et al*. 1987; Morgan and Hunt 1994).

4.3. Discussion

Asset specificity has a significant positive effect on Long-term orientation (γ_{11} = .412, t = 3.24, p < .01). The result supports Hypothesis 1 that a manufacturer's long-term orientation in the transaction with the current distributor increases if the distributor's asset specificity increases. Although the manufacturer's discount parameter δ is constant, the critical value of the manufacturer's discount parameter is variable and decreases with the distributor's asset specificity ($\delta'_M > \delta'_{MAS}$). An important finding shows that Asset specificity has positive effect on Long-term orientation. Unlike traditional TCA which asserts that asset specificity leads a firm to behave short-term oriented (e.g. hold-up), our results indicate that asset specificity in marketing channel leads a firm to behave long-term oriented.

Long-term orientation has a significant positive effect on Continuity of relationship (β_{21} = .530, t = 5.50, p < .01). The result supports Hypothesis 2 that a manufacturer's intention to continuously maintain the transactions with the current distributor increases when the manufacturer's long-term orientation increases. Like an assertion of a simple repeated game, our results indicate that cooperative relationships in marketing channels occur when channel members pursue long-term rather than short-term payoffs (Axelrod 1984; Heide and Miner 1992). An important finding shows that Asset specificity has an indirect effect on Continuity of relationship through Long-term orientation, and does not directly affect Continuity of relationship. Cooperative relationship would not be endorsed, even with high asset specificity, if the manufacturer has low degree of long-term orientation.

In contrast, Opportunism has a significant negative effect on Continuity of relationship (γ_{21} = –.712, t = –5.59, p < .01). The result supports Hypothesis 3 that a manufacturer's intention to continuously maintain the transactions with the current distributor decreases when the distributor behaves opportunistically. Unlike an assertion of traditional TCA, our results indicate that opportunism is variable, and

cooperative relationship in marketing channel would be disturbed if the distributor has high degree of opportunism.

In a marketing channel, a manufacturer wants to obtain high quality, customized distribution services in order to establish competitive advantage. TCA literatures indicate that customization of distribution services results in asset specificity and, therefore, underinvestment because the distributor who customizes the service for a particular manufacturer perceives the risk of hold-up (Klein *et al.* 1978; Grossman and Hart 1986). However, the higher distributor's asset specificity, the higher the manufacturer's losses from defecting the manufacturer and, therefore, the higher degree of long-term orientation the manufacturer has. Long-term orientation is a key factor for avoiding conflicts and establishing cooperative relationships among channel members and establishing cooperative relationships between them. In addition, cooperative relationships might be disturbed by increasing distributors' opportunistic behaviors. Relational contracting maintained by informal trust relationships is easily destroyed by distributors' opportunistic behaviors.

5. CONCLUSION

While previous channel researchers have adopted social psychological constructs (e.g. trust), inter-firm cooperation in the real world is never created solely by altruism. There are many selfish firms whose behaviors result in conflicts and termination of their relationships with the other channel members. Firms seek their own interests and, therefore, they try to maintain the cooperative relationship with their channel members as long as the relationship contributes to their interests. Social psychological hypotheses proposed by recent studies are inconsistent with the TCA, which assumes opportunistic firm behavior. Therefore, it is necessary to explain why cooperation coexists with conflict. In this paper, we develop a relational contracting model which enables us to understand the long-term cooperative relationship among selfish channel members.

Key results of our analysis are related to the findings that increased prospects of future payoff rather than present payoff would result in more cooperative relationship in vertical transactions. The results suggest that asset specificity, which presents the

channel members' commitment to the transaction, has a limited, indirect effect on the intention of maintaining a cooperative relationship. In contrast, opportunistic behavior, such as defection and hard negotiation, has a negative, strong effect on the continuity of the relationship.

There are a few limitations to consider with regard to our model. First, our model does not explain the phenomenon called "relationship trap"; long-term successive relationship becomes a firms' incentive to shirk. Second, there are many kinds of different distribution services in marketing channels (e.g. logistics, ware houses, selling, settlement, credit management), while our model treated a distribution service in general.

There are several important research directions that could follow from this work. For instance, this research did not include technological changes and advancements. In related research, Lamoreaux *et al*. (2003) analyzed the US history of distribution from the view point of informal relational contracting, and concluded that it is impossible to maintain coordination by long-term relationship in the business environment in which technology rapidly changes. Another research direction might involve recent increase of horizontal division of labor with modular systems. In some cases of e-commerce, the horizontal division of labor prompts unbundling of distribution functions, such as settlement, physical distribution, and credit management (Langlois 2003). In the future, we could expand our model by considering the impacts of these technological changes and modularization on cooperative relationships.

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