

Hedging Revisited: Resolving Contractual Conflicts

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This paper develops an alternative view on the motivation to hedge. A conceptual model shows how hedging facilitates contract relationships between firms and can solve conflicts between firms. In this model, firms' contract preferences, level of power and conflicts in contractual relationships are driving usage of futures contracts. The model shows how using futures markets can provide a jointly preferred contracting arrangement, thereby enhancing relationships between firms. The robust nature of the conceptual model is empirically examined through a computer-guided study of various firms.

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INTRODUCTION

The current research on hedging in futures markets is characterized by a large number of excellent specialized papers. These papers typically focus on rather narrow topics, often assuming that the motivation to hedge is risk reduction, or finding an optimal balance between risk and return. These papers do not typically address the influence of the commercial environment on the firm's motivation to hedge. Powers (1994) recently stressed in this *Journal* the importance of addressing the fundamental question of why firms hedge and futures exchanges exist. This paper attempts to contribute to this question. It is argued here that one of the motivations to use futures contracts is contract relationship management. A conceptual framework is developed to show that futures exchanges provide facilitating services that can be used to establish a successful contract relationship among various parties despite differences in contract-type preferences between firms. It is argued that the service provided by futures exchanges complement the contract terms in a contract relationship such that it yields a communally preferred contracting relationship. This paper does not pretend to establish *the* hedging theory. Rather, it presents one explanation of why firms hedge, and as such it complements other theories. There are several motivations for decision makers to use futures contracts, and hence the rationale for having futures markets. The role of futures contracts as facilitating long-term contractual relationships is addressed here by taking the perspective of firms engaged in contract relationships. It is shown that futures exchanges provide services that help solve conflicts in the contract relationships between firms.

This paper proceeds as follows. First the theories on the motivation to use futures markets are reviewed. Then a framework is introduced in which the commercial environment, reflected by the firm's contract relationships with other firms, is the central focus of attention. The role of power in a contract relationship and the conflicts that might arise between firms within the contract relationship are examined. Subsequently, it is shown how the services of futures exchanges can be used to solve these conflicts. Based on this framework it is argued that one of the motivations underlying futures usage is conflicts that might arise from differences between firms regarding their preferred contracting relationship. A field study conducted in an agricultural marketing channel illustrates the proposed hedging concept. Finally, the proposed theory is compared with the ones reviewed and the commonalities and differences between them are discussed.

VIEWS ON HEDGING: A REVIEW

This paper exclusively focuses on hedging theories that are related to the motivation to use futures markets, hence, theories regarding futures price behavior or price information are not elaborated. Several authors, amongst others, Cootner (1960), Gray and Rutledge (1971), Goss and Yamey (1978), Kamara (1982), Williams (1986), Blank (1989), Malliaris (1997) and Carter (1999), have done an excellent job providing such reviews. The review presented here serves as a background to which the proposed hedging motivation model is evaluated.¹

¹ The paper does not aim to make a complete review of all hedging theories developed in the literature.

Price Insurance Theory

In the early days of research in futures markets, the view on the role of these markets was straightforward and simple. Hoffman stated “hedging is shifting risk” (1932, p.382) and Smith said “hedging enables hedgers to insure against the risk of price fluctuations” (1922, p.81). Previously, in 1919, Marshall disseminated this view by stating “the hedger does not speculate: he insures” (Marshall, 1919, p.260). Keynes (1930), Hicks (1939) and Kaldor (1939) discussed hedging in terms of risk avoidance and insurance. In this view any loss made by the hedger on the completed hedged transaction represents an insurance premium paid to the risk-assuming speculator. Until the 1940’s this price risk motivation argument was *the* theoretical explanation of why firms use futures exchanges, or as Blau (1944, p.1) stated “commodity futures exchanges are market organisations specially developed for facilitating the shifting of risks due to unknown future changes in commodity prices; i.e., risks which are of such a nature that they cannot be covered by means of ordinary insurance”. In the post-war era this view would be challenged by several researchers, the first being Working.

Earnings Returns Theory

Working (1953) challenged the idea of risk insurance by arguing that it is the pursuit of profit through the exploitation of (expected) changes in the basis, that is, the exploitation of opportunities for profit presented by the prospective movement of prices in the futures market relative to the movement in the cash market. In this view, hedging was primarily a sort of

arbitrage, to be engaged in only when the hedger perceived a promising opportunity for profit.²

In later work Working renounced his earlier position. In 1967 he asserted that (short) hedgers tend to lose money to speculators on their hedge transactions in the futures market and they do so even during periods in which futures prices in the market in question have fallen. The explanation was the “dips” or “bulges” that tend to occur when hedgers sell or buy futures contracts. Hence, Working’s hedgers had to pay a price to speculators, that is, they incur execution costs for the prompt carrying out of their sale or purchase transaction. This explanation links back to the price insurance theory: the reason for hedgers to have their orders executed expeditiously is to reduce the interval in which their inventories are left uncovered, exposed to the risk of price change.

The adoption of the portfolio theory approach in the 1960’s to decisions in futures markets rehabilitated the risk reduction notion in hedging theory.

Portfolio Theory

Using portfolio theory to explain the activity of participants in futures trading once again sets risk in the center of why one should hedge. This theory contributes by making explicit the risk-return trade off to be assessed by the hedger in each situation. Stein (1961) and Johnson (1960) used the foundation of the portfolio theory as grounded by Markowitz (1959) to explain hedging. In the portfolio approach a hedger is viewed as maximizing the expected utility derived from a

² In the view of Working (1953), hedging in futures consists of making a contract to buy or sell on standard terms, established and supervised by a commodity exchange, as a temporary substitute for an intended later contract to buy or sell on other terms. Working (1962) distinguished between several different categories of hedging: carrying charge hedging, operational hedging, selective hedging, anticipatory hedging and pure risk avoidance hedging. See Kamara (1982) for a detailed discussion.

portfolio of cash and futures. Several researchers have drawn on this framework (e.g. Danthine, 1978; Holthausen, 1979; Anderson and Danthine, 1983).

Williams (1986) challenged the portfolio theory by arguing that the riskiness in production, transport, and processing is the reason for firms to hold inventories and to use futures contracts. These risks in the availability of commodities are unlike the individual risks which are at the center of the portfolio theory, which assumes that individuals who diversify or transfer risk to others can eliminate most of the risk. Williams (1986) argued that the important risks (availability of commodities) are hard to diversify. Moreover, he argued that the portfolio theory of hedging always begins with the initial position of all inventory unhedged, and hence is extremely sensitive to what is taken as the predetermined position. Stein (1986) argued that the portfolio theory implies that investors hold risky assets in their portfolio in the same proportions as they are available in the market. Stein then argued that this assumption does not apply to futures because the open interest is equally divided between long and short traders. Furthermore, he argued that futures contracts are short-lived securities, whose quantities are determined by the volume of transactions in the cash and forward markets, whereas in the portfolio theory prices adjust to clear the market for fixed quantities of securities. Hartzmark (1987) and Peck and Nahmias (1989) found that actual positions in futures markets were unrelated to portfolio-recommended strategies. The absence of a relationship between actual hedges and the optimal hedge positions derived from strategies based on portfolio models are robust. In these studies modification of price expectations did not change the results.

In his review on issues in futures markets, Kamara (1982, p.263) stated that “the hedger’s futures position is motivated partially by the desire to stabilize income and partially by

the desire to increase the expected profits”, thereby showing that the price insurance theory, the earnings return theory, and the portfolio theory all contributed to the understanding why firms hedge. So far, the theories didn’t take alternative risk reduction instruments into account. Telser (1981) shifted the perspective by contrasting the characteristics of futures exchanges with forward markets.

Liquidity Theory

Telser (1981) argued that organized futures markets exist because they are superior to informal forward markets. An organized futures market has elaborate written rules, standing committees for adjudicating disputes, and a limited membership. In contrast to futures contracts, forward contracts rely on the good faith of individual parties. Also, in contrast to standardized futures contracts, a typical forward contract is tailored through substantial negotiations to the individual parties and the particular lot of the commodity. Therefore, they cannot be offset by identical contracts, and there is no scope for the advantages of clearinghouses and settlement by the payment difference. Through their rules and standardization futures provide liquidity and eliminate counter-party risk. Telser (1981, p. 1) stated that “an organized market *facilitates* trade among strangers”. Also in Telser’s view the motivation to use futures exchanges is risk reduction, but he recognizes that there are other instruments available to the firm which can reduce risk. Telser argues that even if one accepts the price insurance theory, it does not explain why an organized futures market is necessary in order to accommodate hedging. Telser argued that a merchant who wishes to avoid the price risks of holding inventories can do so without an organized futures market, namely by entering into forward transactions in the cash market. In

this view the motivation to use futures contracts is not primary driven by the firm's desire to reduce risk, but by the institutional characteristics of the futures exchange itself.

So far, the theories view hedging as a transaction in the futures markets. Williams (1986) focused not only on the hedging transaction itself, but also on the whole hedging operation, when he developed his loan markets theory.

Loan Markets Theory

Williams (1986) departs from the question of why firms hold inventories in order to understand why firms use futures exchanges.³ He argued that firms hold inventory as a response to the cost of producing, moving, and processing commodities quickly. To borrow a commodity implicitly through a hedging operation involving a futures contract is one method of obtaining accessibility for a stretch of time.⁴ Williams (1986) views hedging in the context of implicit loan markets. He showed that a short hedging operation, the spot purchase of a commodity and its simultaneous sale for future delivery, equals to borrowing a commodity over an interval of time while lending money. Likewise, he showed that a long hedging operation is an implicit forward loan of a commodity. Hence, he concluded that a futures market is primarily part of an implicit loans market.⁵ In his view a firm does not first buy its inventory on the spot market, and then, after

³ Working (1949) answered the question of holding inventories in his theory of the supply storage. In this theory dealers are willing to supply storage, which they are willing to do at times at negative return because of the convenience yield of holding inventories.

⁴ He argued that regardless of whether firms have nonlinearities in their utility functions (resulting in risk aversion or risk seeking behavior), the nonlinearities in production are important to futures markets. Even commodity dealers who are risk neutral, and are faced with consumers who pressure to move and process commodities quickly, have reasons to use futures markets. Interesting is that for Williams' research, risk attitude plays a role, although in this case it is a derived risk aversion (e.g., the risk aversion of consumers).

⁵ Williams showed the economic effect of a hedging operation in the context of a repurchase agreement. In a short hedging operation the hedger buys the commodity in the cash market for immediate delivery and sells

contemplating the riskiness of its position, hedges with a short sale of a futures contract as assumed in the portfolio theory of hedging. Rather, Williams's theory views the trades as if they were one. The contribution of futures markets is to be an organized part of an implicit loan market for commodities. A functioning loan market for commodities improves the allocation of reserves over time and among those holding stocks at any one moment of time. A loan market (read futures market) directs stocks to the firm whose need for them is most immediate. Such improvements in the allocation of reserves effectively lowers the price of holding stocks. In this view a spot commodity is a bundle of two characteristics: access to the good over some period of time and the right to future use beginning at the end of that period. The contribution of futures markets in this view is to accommodate these two separate markets, a market for accessibility, and one for the commodity's future use. With a futures market, the argument goes, a firm buying a good on the spot market can sell its right to that commodity in the future by contracting to deliver in the future. The firm is left with only what it really desires, namely accessibility over the first period. The theory of implicit loan markets predicts that commodities with inflexibility in production, transportation, and processing are most likely to develop active futures trading, the insurance view of futures markets would predict that those with the most volatile prices would have futures markets.⁶

Interesting in Williams' view is that he focussed not only on the futures transaction, but on the whole hedging operation, of which the transaction in the futures market is just a part. This

the commodity for future delivery on a futures exchange. The hedger is pledging to buy and then sell back, hence the hedger is enacting a repurchase agreement. Through this repurchase agreement the hedger borrows the commodity and lends the money.

⁶ Williams (1986) wrote in terms of commodities. Extensions of his theory into financials is beyond the nature and scope of this paper.

paper elaborates on this view, and focuses on the decision-making behavior of firms in the real markets, recognizing that a firm belongs to a marketing channel in which the firm interacts with various other firms. The focus of attention will be directed to contracts between firms, which result in deliveries and acceptance of commodities. That is, the paper focuses on the heart of any firm's operation: the firm's contract relationships (that generate the flow of commodities to the firm (e.g., inputs) and the flow of commodities from the firm (e.g., outputs)).

A NEW HEDGING FRAMEWORK

This paper takes a positive perspective on hedging rather than a normative one. It does not come up with optimal hedging strategies, instead it shows how contract-relationship management induces a motivation for using futures markets. The relationships of firms with other ones are "formalized" in contract relationships. Often, these contract relationships are long term. For example, the grain elevator selling grain to the same group of millers year after year.⁷ It is, as will be shown below, this chain of contracts between firm A and firm B that under special circumstances will be sustained if futures exchanges are available. The proposed theory starts by looking at the contract initiation process between firms when marketing their outputs and buying their inputs. More specifically, the paper first focuses on the different elements of a contract between two firms, after which it focuses on one particular contract term: the pricing scheme. Based on the pricing term the paper classifies contracts into those that determine the price when

⁷ There can be several reasons to trade with the same partners: location, trust, known quality of the product delivered (or requested), etc. Geyskens, Steenkamp and Kumar (1999) showed the importance for such relationship in manufacturing type of industries.

the contract is initiated as opposed to those where the price is established at the moment the contract is closed (the moment of delivery or acceptance of the commodity). In the case that firm A and B agree on all contract terms, including the pricing scheme, a contract relationship is established.⁸ However, in the case that the two firms disagree on the pricing scheme, even though they agree on all the other contract terms, a conflict in their relationship may occur. The paper then shows that the *power* balance regarding the price discovery process between the two trading partners is an important factor in determining the final outcome of the contract relationship (e.g., no contract, a forced cash contract relationship or a forced forward contract relationship). It will be shown how power influences the contracting relationship between firms. Next, the paper shows that one of the motivations underlying futures usage are “conflicts” that might arise from different contract preferences between firms.

Contractual Framework

The types of contracts that exist between firms characterize their relationships. A contract minimally defines the place of delivery, time of delivery, quantity and quality of the product or service and the pricing scheme (e.g., Crocker and Masten, 1991). The pricing scheme may result in two distinctive outcomes: the price is determined at the moment of transaction based on the spot market, a so-called *cash contract*, or it can be determined at the moment the contract is negotiated, a so-called *forward contract*. Hence, a cash contract specifies at time t all the

⁸ Most hedging theories focus on (commodity) dealers, who are buying and selling commodities to the lowest ask and highest bid respectively. This almost exclusive focus on dealers leads researchers away from the importance of long-term contract relationships, which are especially important in a manufacturing industry context.

elements of the contract, except for the price, which is determined at time $t+I$, the moment of actual acceptance or delivery, based on the (local) spot market. A forward contract specifies all the contract terms at time t for delivery or acceptance of the product at time $t+I$, including the price.⁹

Contract *relationships* can be classified on the basis of these two broad classes of contracts and can be defined as a long-term relationship between two or more firms that is reflected in a chain of (cash or forward) contracts between them. This phenomenon is common in many industries. Most firms operate in a marketing channel in which they buy their inputs from firms with whom they have traded for long periods and sell their products to firms with whom they have also a long history of trading. Cheung (1983), Heide and George (1990), Noordewier, George and Nevin (1990) and Rindfleisch and Heide (1997), amongst others, have shown that such relationships are rational because they induce low transaction costs, i.e., there are no search costs; costs to obtain information about the product offered by suppliers, product specification, or the needs of buyers.

The Role of Power in Contract Relationships

Power can be used to help achieve firms' preferred contract relationships. Previous research focused on the power of one party (Gaski and Nevin, 1985; Kale, 1986; Frazier, Gill and Kale, 1989). However, in the price discovery process, objective power counts less than the relative power perceived between firms (Anderson, Lodish and Weitz, 1987; Buchanan, 1992). In this

⁹ Please note the conceptual difference between (cash and forward) contracts and futures contracts: contracts (cash or forward) involve the interaction between at least two firms whereas the use of futures contracts involves the interaction between the firm and the futures exchange.

paper, power refers to the ability of firms to influence the price discovery process. Firms able to exert power over the price formation process can do so on two dimensions. First, they can influence prices themselves, trying to realize the highest (lowest) price level possible when selling (purchasing). Second, firms can try to enforce their contract preference on the other firm. Hence, in terms of the contract framework, power refers to the firms' ability to force either a cash contract or a forward contract relationship.

Use of power, in this context, may result in a tense relationship and may lead to conflicts. In line with Lusch (1976) and Gaski (1984), contract conflict is the situation in which one firm perceives another firm to be engaged in behavior that is preventing or impeding him or her from achieving his or her own goals. The final result of exchange between firms (i.e., the use of cash or forward contracts) depends on the contract relationship preferences of the firms *and* the extent of power each firm has. For example, firm A has relative power over firm B and prefers a cash contract, whereas firm B prefers a forward contract. In such a situation firm A might use power to force a cash contracting relationship, which will result in a problematic relationship, because firm B will be dissatisfied with this situation (Frazier, Gill and Kale, 1989). The above described situation may also result in no relationship at all, particularly when firm B has other alternatives.

In practice, however, a contract relationship is likely to take place even in cases in which firms disagree on the contract type relationship and there is a power imbalance. A well-known example is that of agribusiness marketing channels where concentration in the upstream channel has shifted power and contract preferences are very diverse (e.g., Messinger and Narasimhan, 1995).

In the next section, it is shown that the use of futures can complement the price term of a contract, such that an exchange can be made, despite disagreement on contract type and a possible power imbalance.

Resolving Contract Relationship Conflicts with Futures Contracts

Contracts between firms can be complemented by services offered by third parties in order to improve the outcome of a contract relationship between firms. For example, the quality of the product may be checked by a third party, which ensures the buyer receives the correct product, and the seller avoids a breach-of-contract suit. This paper exclusively focuses on the pricing element of contracts.

Suppose firm A is a wholesaler of a food raw material (such as meats and vegetables) and firm B is a processor of that food raw material. Assume further that the market for this raw material is very volatile and price fluctuations are large and unpredictable. The two firms know each other very well and know what to expect as seller and buyer. Moreover, both firms are located close to one another, so that delivery is simple for both firms. In this scenario, it would seem highly valuable for both firms to build a contract relationship, and hence exchange the raw material. This relationship might then be formalized by a contract that defines when, where, how much, and which quality the wholesaler will deliver to the processor.

However, there is one element of the contract that needs further definition: the pricing scheme. Should they use a cash contract or a forward contract? Suppose the wholesaler prefers a cash contract relationship, one that enables him/her to adapt to the price changes of the raw

material.¹⁰ However, the processor with whom the wholesaler is trading may, for example, find the larger fluctuation in cash flows due to a cash contract relationship with the wholesaler undesirable, as it might not fit his/her goal for generating shareholder value, and hence prefers a forward contract relationship.¹¹ The above situation might lead both firms away from an exchange and the establishment of a contract relationship, even though all the other elements of the exchange process (place, time, quantity and quality) are highly favorable. Or, it may lead to a forced cash contract relationship in the case that the wholesaler has relative power over the processor, or to a forced forward contract in the case the processor has relative power over the wholesaler. If in this case a contract relationship occurs, this relationship will not be satisfactory for one of the contract partners. Then, a conflict situation is likely to occur.

Futures Exchanges Facilitating Contract Relationships

The conflicts arising from different contract preferences of the firms may be solved by using the services provided by futures exchanges. These services can complement the pricing element of contracts such that contracting becomes interesting for both parties. The processor might, for example, use the hedging services offered by a futures exchange to complement the cash contracts preferred and enforced by the wholesaler. In this case the hedging service is a service through which the processor is offered the opportunity to buy products forward at a fixed price,

¹⁰ The reason why a firm prefers a cash contract relationship or a forward relationship is not discussed here because it only leads *indirectly* to whether or not the hedging service is used. One may argue that risk and the firm's risk attitude play an important role in the preference forming.

¹¹ Rappaport (1983), Christie and Vikram (1994), and Srivastava, Shervani and Fahey (1998) argued that reducing cash flow volatility contributes to shareholder value, as it results in lower costs of capital or discount rates, which results in higher net present values and hence higher shareholder value.

thereby not restricting him or her to have a cash contract relationship with the wholesaler.¹² In general terms the hedging service can be defined as: *a service through which a firm is offered the opportunity to buy or sell products forward at a fixed price, thereby not restricting the firm to engage in a cash contract relationship.*

So, in this example, the processor agrees not to set a forward contract, but a cash contract instead (according to the wholesaler's desires). The processor then buys at time t (the same time that (s)he initiates the cash contract with the wholesaler) the same product in the futures market for delivery at time $t+1$ for a price agreed upon at time t (that is, the processor uses the hedging service offered by the exchange). Thus, the processor succeeds in fixing the price in advance, without demanding it from the wholesaler in their cash contract.¹³ Hedging services come at a financial cost. These costs are assumed to be carried by the relatively less powerful firm: it is the price the less powerful firm has to pay to sustain the contract relationship.

The example illustrates that it is not necessary for firms to agree on all the terms of the contract in order to have a contract relationship. The following hypothesis can be stated:

H₁: If firm A is more powerful than firm B and firm A prefers cash contracts, whereas firm B prefers forward contracts, a cash contract relationship will occur and firm B buys hedging services to complement the price term of the cash contracts.¹⁴

¹² It can be shown that a cash contract combined with a futures contract yields a pay-off structure that is similar to a forward contract.

¹³ Small differences might occur between the price for which the processor locks in the price in the futures market and the result of engaging in the cash contract and offsetting the futures position due to basis risk. This will in no way affect our conclusions.

¹⁴ In the hypothesis the need for risk reduction may still play a role indirectly, as it may be the driving force why firm B prefers a forward contract relationship.

EMPIRICAL ILLUSTRATION

The conceptual findings are illustrated with data from a field study characterized by companies that differ in both power and the preferred contract relationship. The objective is to illustrate the theoretical framework presented above and hence the important role of futures contracts on firms' contracting relationships.

Research Design

The empirical research is based on a two-channel-member framework in the domain of the Dutch pork industry. The Dutch hog-marketing channel is a representative marketing channel for many manufacturing industries. It is a channel with minimal co-ordination, minimal integration, and multiple members at multiple channel levels in a competitive environment with a wide range of heterogeneity among the channel members. In the Dutch pork industry, wholesalers collect hogs from hog farms and then sell them to meat processors, which are slaughterhouses that prepare and pack the meat. The Dutch pork industry consists of 150 wholesalers and 65 processors. The relationship between wholesalers and processors is characterized by long-term contractual relationships. In order to investigate their contract preferences, their power, and whether or not they use futures, a sample was randomly drawn from directories kept by the Dutch Union of Livestock Wholesalers and the Dutch Pork Association. Before sending the request to participate in the computer-guided interview, the researchers checked whether the right person had been contacted. In the case of the

wholesalers this was either the managing director or the owner-manager, and in the case of the processing companies the person responsible for sales and purchasing was considered the right person. The interviews took place at the firm's enterprise in the beginning of 1998. Response rates were 62% among wholesalers (52 respondents) and 78% among processors (39 respondents). In this empirical domain the Amsterdam Exchanges and the Chicago Mercantile Exchange provide the relevant hedging services.

Measures

Contract Relationship: Cash versus Forward. The contract relationship was based on registering past behavior. In the interview, the terms “cash contract” or “forward contract” were not mentioned, because the respondents do not use these terms. Rather, the respondents indicated whether their main contract relationship was characterized by contracts that determined the price at the moment of delivery or acceptance (i.e., cash contracts) or at the moment the contracts were initiated (i.e., forward contracts).¹⁵

Use of Futures Contracts. The use of futures contracts was based on past behavior, registering whether or not firms used futures contracts. During the interview it was made clear to the respondent that the research focused on the use of futures driven by business economic reasons only, thereby excluding futures use for other reasons that are not related to the firm's management policy.

¹⁵ In the Netherlands, firms in the pork industry usually use one main contract partner through whom the larger part of their products are being sold or bought. Dual-contract relationships are rare. During the interview it was indicated that the questions regarding contracts were referring to their main contract partner.

Power. The power perceived by the firm was measured by asking the firm to indicate the extent to which (s)he thinks that (s)he has power regarding the price discovery process, compared to the other firm (e.g., main trading partner). This was done by having the respondent distribute 100 points across him/herself and the other firm, where more points indicate more power. Putte van de, Hoogstraten and Meertens (1996) showed that distributing 100 points across alternatives provides a more accurate measure, while it forces respondents to make a trade-off between alternatives, thereby not assuming a particular comparison mechanism.

Trading Partner. Because the contracting relationship depends on the contract partner as well as the firm interviewed, respondents were asked to state the name of the firm with whom they have a primary contract relationship.

Analysis and Results

The respondents are classified along the level of power, the preferred contract relationship, and the characteristics of their primary trading partner.¹⁶ A respondent was classified as having relatively low power when (s)he allocated less than 50 points to him/herself (and hence more than 50 points to the trading partner) and as having relatively high power when (s)he allocated more than 50 points to him/herself.

To test the theory effectively and H_1 in particular, a domain was needed in which the main trading partner prefers a cash contract relationship and the firms under consideration have different levels of power. Therefore, only firms who are in a contract relationship in which the trading partner prefers cash contracting are included in the empirical illustrations.¹⁷ From the 91 firms interviewed, 42 firms met this requirement. From the 42 firms, 33% used futures contracts. Table I shows the observed frequencies of firms having either cash contract relationships, forward contract relationships or cash contract relationships in combination with futures contracts.

¹⁶ The data set contained information about the trading partner. Hence, the data are in a closed system format, in the sense that the two firms, concluding contracts, were in the data set. Such a close system provides the opportunity to validate the contract relationship mentioned by both firms.

¹⁷ Our research design excludes firms that hedge for basis speculation reasons.

TABLE I
 Classification of Firms' Contract Relationships and Use of Futures Contracts when
 Firm A Prefers a Cash Contract Relationship

Contract relationship	Contract Preference and Power level of Firm B			
	Forward contract and high power	Forward contract and low power	Cash contract and low power	Cash contract and high power
Cash contracting	2	1	7*	9*
Forward contracting	6*	3	0	0
Cash contracting and hedging services	2	8*	2	2
Correctly classified	60%	67% ¹	78% ¹	82% ¹

An asterisk indicates the number of firms who have a contract relationship that is consistent with the proposed framework. ¹Indicates that the percentage of correctly classified firms, based on the observed contract relationship, is significant at $p < 0.05$, employing a one-sample multinomial test (e.g. Bain and Engelhardt, 1987).

As seen in Table I, the frequency of respondents that behave consistent with the theory is high, ranging from 60% to 82%, thereby, on face value, supporting the theory. The first data column in Table I reflects the situation of a firm who prefers a forward contract relationship and has relative power over the other firm who prefers a cash contract relationship. It is expected that in such a situation the firm exercises its power, and hence, will force a forward contract relationship with the other firm. Column two of Table I describes the situation as reflected in H₁: the firm prefers a forward contract relationship, however the other firm prefers a cash contract relationship and is able to force such a relationship because it is more powerful. As predicted by the theory, the firm accepts the cash contract relationships and complements it with the hedging services offered by futures exchanges such that the hedging service plus the cash forward

contract relationship yields the same pay-off structure as a forward contract relationship. In columns three and four of Table I both firms prefer a cash contract relationship. In these cases a cash contract relationships is being established, as predicted by the theory.

Using a one-sample multinomial test (e.g. Bain and Engelhardt, 1987), it was tested whether the correct classified contract relationships and futures usage employed by the firms according to the proposed theory are significant. There are c possible types of outcomes, A_1, A_2, \dots, A_c . In the empirical study $c = 3$ and $A_1 =$ cash contract relationship; $A_2 =$ forward contract relationship; and $A_3 =$ cash contract relationship in combination with futures usage, with a sample of size n (the sum of a column in Table I). Let o_1, \dots, o_c denote the frequency of observed outcomes for each situation (e.g., the columns in Table I). Assuming probabilities $P(A_j) = p_j, j = 1, \dots, c$, where $\sum_{j=1}^c p_j = 1$, the completely specified hypothesis $H_0: p_j = p_{j0}, j = 1, \dots, c$ is tested. Under H_0 the expected values for each type are given by $e_j = np_{j0}$. The chi-square statistic can then be written as:

$$\chi^2 = \sum_{j=1}^c (o_j - e_j)^2 / e_j.$$

The limiting distribution of this statistic is chi-squared with $c - 1$ degrees of freedom, so an approximate size α test is to reject H_0 if $\chi^2 > \chi_{1-\alpha}^2(c - 1)$.

For three cases (the columns in Table I), the H_0 is rejected at the 0.05 level of significance, supporting the proposed theory that futures contracts play a significant role in contract relationships among firms.¹⁸ In the case where the firm has high power and prefers

¹⁸ The number of observations in the cells are rather low, thereby weakening the chi-square test. It is therefore emphasized that the empirical results must be viewed as an illustration, not a formal test.

forward contracts and the other firm prefers cash contracts, H_0 is not rejected at the 0.05 level. The empirical results show, consistent with the proposed theoretical framework, that if firm A is more powerful than firm B and firm A prefers cash contracts, whereas firm B prefers forward contracts, a cash contract relationship will occur in which firm B buys hedging services to complement the price term of the cash contracts (column 3 in Table I). Also, if both firms prefer cash contracts, there is little use of hedging services. Likewise for firms preferring forward contracts with relatively high power.

DISCUSSION AND CONCLUSIONS

The theory presented is a positive one (how *do* decision-makers behave), whereas some of the theories reviewed in the beginning of the paper have a normative character (how *should* decision-makers behave). In line with DeBondt and Thaler (1995) and Daniel, Hirshleifer and Subrahmanyam (1998), it is believed that a good finance theory is to be grounded on evidence about how people actually behave.

While many firms physically operate independently, their behavior is influenced by the interaction and relationships among other firms with whom they do business. Although this has been generally accepted in economics and futures research (e.g., multi-product hedging models (Anderson and Danthine, 1980; Rolfo, 1980; Anderson and Danthine, 1981; Zilcha and Broll, 1992)), it is surprising that none of the theories on the motivation for using futures take the commercial environment into account.¹⁹ In this paper the firm's commercial environment is taken

¹⁹ Williams (1986) did view the hedging operation in a broader way, but he did not include the interaction among firms into his analysis.

into account by focussing on the relationships of the firm with other firms in the marketing channel. The commercial environment is reflected in the other firm's contractual relationship preference and the power balance in the relationship between the firms. In this framework it is argued that one of the reasons to hedge is the firm's contract relationship preference, its commercial environment, reflected in the contract preferences of the other firm and the power balance between the firms. In this case, the motivation for firm A to use futures contracts is not only driven by characteristics of firm A, but is also heavily influenced by the trading environment and the power balance between firms. In the earlier work on the motivation to use futures, risk insurance or the risk-return trade-off was the reason to hedge. Hence, these theories do not address the role of the interaction between other firms for futures usage. In the proposed framework the need for risk reduction still plays a role as it may reflect the firm's preferred contractual relationship, or the contract relationship preferred by the other firm. Hence, the proposed theory is a complement rather than an alternative theory to the existing ones. The proposed theory shows that futures markets affect the industrial organization of an industry; without the availability of hedging services some type of contract relationships may very well not exist. This finding is in line with Hirshleifer (1988) who argued that the presence or absence of a futures market affect how production is optimally organized.

Telser (1981, p. 1) stated that futures markets *facilitate* trade among strangers. In this paper it is argued that futures markets *facilitate* contractual relationships among contract parties. Telser (1981, p. 1) also stated that "even if we accept the price insurance theory, it does not explain why an organized futures market is necessary in order to accommodate hedging. A merchant who wishes to avoid the price risks of holding inventories can do so

without an organized futures market. He can do so by entering into forward transactions in the cash market". But is that true? Can a firm who wants a forward trade always make a forward trade? Power imbalances between trading partners may cause the relative powerfully trading partner to enforce a cash contract relationship on the other firm. Taking power into account seems to introduce a variable which is important when trying to understand firms' contract relationships and hence the firms' motivation to use futures.

In line with Williams (1986), this paper views the total trade as one, that is the interaction with the other firms and the transactions in the futures market. The hedging operation is extended, thereby including the net of contract relationships of a firm which makes up his/her business. In a sense a portfolio approach is taken, but now the portfolio not only consists of actuals and futures but also of contract relationships.

The perspective of the previous literature was primarily on commodity dealers, in which contract relationships were not at the center of focus. However, in an industrial marketing channel, contract relationships *are* the center of business. It is shown that the relatively powerful firm might enforce a contract relationship with the less powerful trading partner, which can result in a conflict situation that might lead to the termination of the contract relationship. It is shown that in this situation the services provided by futures exchanges can be used to solve the conflict. Hence, one of the firm's motivations for using futures is to facilitate contract relationships. The illustration of futures used in the Dutch pork industry supports the theory. The theory of contract relationship management motivation predicts that those commodities which are traded in a marketing channel where there are differences in power level and contract relationship preferences between firms may develop active futures trading.

BIBLIOGRAPHY

- Anderson, R.W. & Danthine, J.P. (1980). Hedging and joint production, theory and illustrations. *Journal of Finance*, 35, 487-489.
- Anderson, R.W. & Danthine, J.P. (1981). Cross hedging. *Journal of Political Economy*, 89, 1182-1196.
- Anderson, R.W. & Danthine, J.P. (1983). Time and pattern of hedging and the volatility of futures prices. *Review of Economic Studies*, 50, 249-266.
- Anderson, E., Lodish, L.M. & Weitz, B.A. (1987). Resource allocation behavior in conventional channels. *Journal of Marketing Research*, 24, 85-97.
- Bain, L. J. & Engelhardt, M. (1987). *Introduction to Probability and Mathematical Statistics*. Boston: Duxbury Press.
- Blank, S.C. (1989). Research on futures markets: issues, approaches, and empirical findings. *Western Journal of Agricultural Economics*, 14, 126-139.
- Blau, G. (1944). Some aspects of the theory of futures trading. *Review of Economic Studies*, 12, 1-30.
- Buchanan, L. (1992). Vertical trade relationships: the role of dependence and symmetry in attaining organizational goals. *Journal of Marketing Research*, 29, 65-75.
- Carter, C.A. (1999). Commodity futures markets: a survey. *The Australian Journal of Agricultural and Resource Economics*, 43, 209-247.
- Cheung, S.N. (1983). The contractual nature of the firm. *Journal of Law & Economics*, 26, 1-21.

- Christie, W.G. & Vikram, N. (1994). Free cash flows, shareholder value, and the undistributed tax of 1936-1937. *Journal of Finance*, 49, 1727-1754.
- Cootner, P.H. (1960). Returns to speculators: Telser versus Keynes. *Journal of Political Economy*, 62, 396-404.
- Crocker, K.J. & Masten, S.E. (1991). Pretia ex machina? Prices and process in long-term contracts. *Journal of Law & Economics*, 34, 69-99.
- Daniel, K., Hirshleifer, D. & Subrahmanyam, A. (1998). Investor psychology and security market under- and overreactions. *Journal of Finance*, 53, 1839-1885.
- DeBondt, W.F.M., & Thaler, R.H. (1995). Financial decision making in markets and firms: a behavioral perspective, in Jarrow, R.A., Maksimovic, V. & Ziemba, W.T. ed. *Finance, Handbooks in Operations Research and Management Science* 9, Amsterdam, North Holland, 385-410.
- Danthine, J.P. (1978). Information, futures prices, and stabilizing speculation. *Journal of Economic Theory*, 17, 79-98.
- Frazier, G. L., Gill, J.D. & Kale, S.H. (1989). Dealer dependence levels and reciprocal actions in a channel of distribution in a developing country. *Journal of Marketing*, 53, 50-69.
- Gaski, J. F. (1984). The theory of power and conflict in channels of distribution. *Journal of Marketing*, 48, 9-29.
- Gaski, J. F. & Nevin, J.R. (1985). The differential effects of exercised and unexercised power sources in a marketing channel. *Journal of Marketing Research*, 22, 130-142.
- Geyskens, I., Steenkamp, J.B.E.M. & Kumar, N. (1999). A meta-analysis of satisfaction in marketing channel relationships. *Journal of Marketing*, 36, 223-238.

- Goss, B.A. & Yamey, B.S. (1978). *The Economics of Futures Trading*. New York, John Wiley and Sons.
- Gray, R.W. & Rutledge, D.J.S. (1971). The economics of commodity futures markets: a survey. *Review of Marketing and Agricultural Economics*, 39, 57-108.
- Hartzmark, M.L. (1987). Returns to individual traders of futures: aggregate results. *Journal of Political Economy*, 95, 1292-1306.
- Heide, J.B. & George, J. (1990). Alliances in industrial purchasing: the determinants of joint action in buyer-supplier relationships. *Journal of Marketing Research*, 27, 24-36.
- Hicks, J.R. (1939). *Value and Capital*. London, Oxford University Press.
- Hirshleifer, D. (1988). Risk, futures pricing and the organization of production in commodity markets. *Journal of Political Economy*, 96, 1206-1220.
- Hoffman, G.W. (1932). *Futures Trading upon Organized Commodity Markets in the United States*. Philadelphia, University of Pennsylvania Press.
- Holthausen, D.M. (1979). Hedging and the competitive firm under price uncertainty. *American Economic Review*, 69, 989-995.
- Johnson, L. (1960). The theory of hedging and speculation in commodity futures. *Review of Economic Studies*, 27, 139-151.
- Kaldor, N. (1939). Contribution in 'A Symposium on the Theory of the Forward Market'. *Review of Economic Studies*, 7, 1-27.
- Kale, S. H. (1986). Manufacturer's power and influence strategies within distribution channels in a developing country. *Journal of Marketing Research*, 23, 387-393.

- Kamara, A. (1982). Issues in futures markets: a survey. *The Journal of Futures Markets*, 2, 261-294.
- Keynes, J.M. (1930). *A Treatise on Money*. London: Macmillan.
- Lusch, R. F. (1976). Sources of power: their impact on intrachannel conflict. *Journal of Marketing Research*, 13, 382-390.
- Malliaris, A.G. (ed.) (1997). *Futures Markets. Elgar Reference Collection International Library of Critical Writings in Financial Economics*, Cheltenham and Lyme, NH: Elgar.
- Markowitz, H.M. (1959). *Portfolio Selection: Efficient Diversification of Investments*. New York, John Wiley and Sons.
- Marshall, A. (1919). *Industry and Trade*. London: Macmillan.
- Messinger, P. R. & Narasimhan, C. (1995). Has power shifted in the grocery channel? *Marketing Science*, 14, 189-223.
- Noordewier, T.G., George, J. & Nevin, J.R. (1990). Performance outcomes of purchasing arrangements in industrial buyer-vendor relationships. *Journal of Marketing*, 54, 80-93.
- Peck, A.E. & Nahmias, A.M. (1989). Hedging your advice: do portfolio models explain hedging? *Food Research Institute Studies*, 21, 193-204.
- Powers, M. (1994). Editorial. *The Journal of Futures Markets*, 14.
- Putte van den, B., Hoogstraten, J. & Meertens, R. (1996). A comparison of behavioral alternative models in the context of the theory of reasoned action. *British Journal of Social Psychology*, 35, 257-266.
- Rappaport, A. (1983). *Creating Shareholder Value: The New Standard for Business Performance*. New York, Free Press.

- Rindfleisch, A. & Heide, J.B. (1997). Transaction cost analysis: past, present, and future applications. *Journal of Marketing*, 61, 30-54.
- Rolfo, J. (1980). Optimal hedging under price and quantity uncertainty: the case of a cocoa producer. *Journal of Political Economy*, 88, 100-116.
- Smith, J.G. (1922). *Organised Produce Markets*. London, Longmans & Green.
- Stein, J.L. (1961). The simultaneous determination of spot and futures prices. *American Economic Review*, 51, 1012-1025.
- Stein, J.L. (1986). *The Economics of Futures Markets*. Oxford, Basil Blackwell.
- Srivastava, R. K., Shervani, T.A. & Fahey, L. (1998). Market-based assets and shareholder value: a framework for analysis. *Journal of Marketing*, 62, 2-18.
- Telser, L. G. (1981). Why there are organized futures markets? *Journal of Law & Economics*, 24, 1-22.
- Williams, J. C. (1986). *The Economic Function of Futures Markets*. Cambridge, Cambridge University Press.
- Working, H. (1967). Tests of a theory concerning floor trading on commodity exchanges. *Food Research Institute Studies*, 7, 5-48.
- Working, H. (1962). New concepts concerning futures markets and prices. *American Economic Review*, 52, 431-459.
- Working, H. (1953). Hedging reconsidered. *Journal of Farm Economics*, 35, 544-561.
- Working, H. (1949). The theory of the price of storage. *American Economic Review*, 39, 150-166.

Zilcha, I. & Broll, U. (1992). Optimal hedging by firms with multiple sources of risky revenues.

Economic Letters, 39, 473-477.