

Modeling Choice Behavior of Marketing Channel Members for the Services Provided by Financial Derivatives Exchanges

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ABSTRACT

This article models the choice process of managers belonging to the same marketing channel, with regard to the hedging services provided by financial derivatives exchanges. Insight is gained into the risk-spreading process in the channel, the use of price risk management instruments and its effect on the channel structure. The model has been empirically tested on a set of data gathered in a stratified sample of 467 producers, 50 traders and 18 managers in the processing industry. The data were obtained through computer-assisted personal interviews with the producers which lasted about 45 minutes and a survey among traders and managers in the processing industry. Logistic regression models are used to test the relationships in our model. Implications for financial derivatives exchanges offering price risk management instruments in terms of service design (that is security design) and service delivery are discussed, and directions for future research are indicated.

KEYWORDS: Risk management, Channel members

INTRODUCTION

Modeling managerial decision-making behavior concerning the use of price risk management instruments (PRMIs) in companies is still virgin territory. In financial literature much attention has been paid to valuation models for financial derivatives and optimal security design. The efficient functioning of financial institutions has also received considerable attention. In marketing literature, attention has been directed towards developing methods and techniques to detect consumer needs and wishes. Both approaches yield information valuable to financial institutions.

However, in order to give a financial institution clues as to how it can improve its financial product, insight is required into the factors that entrepreneurs weigh in their decision for or against using the financial products which the financial institution offers. In the financial literature, many optimal portfolio models have been developed. These models are normative: they indicate how an entrepreneur should compose his or her portfolio, that is, which derivatives are to be used and how many of them.

Nevertheless, recent studies show that these models are unable to describe the behavior of entrepreneurs towards financial derivatives. Furthermore, those portfolio models fail to take into account price risk shifting in the marketing channel which the entrepreneur enters. Therefore, these models do not provide insight into how financial

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services offered by financial derivatives exchanges can be improved in order to generate more volume on these markets. This article looks at the financial service provided by the exchange, from the perspective of an entrepreneur trying to reduce the risk he or she perceives within his market channel. Moreover, the article investigates how a financial institution can improve its financial products.

This article attempts to provide an insight into the factors which determine the of the entrepreneurs in a marketing channel to use financial derivatives for the same underlying commodity and to determine the way in which these companies differ in their decision making behavior. Moreover, we will analyse the effect of the behavior of entrepreneurs concerning PRMIs on the channel structure and draw conclusions from it about service design and service delivery of exchange-listed PRMIs.

First, a framework is developed consisting of three channel members: producers, traders and the processing industry. It shows the different relationships between the channel members, in particular relationships dealing with price risk management. The decision making behavior of each of these channel members with regard to PRMIs is then modeled. These models describe actual behavior towards the use of futures contracts and the intention to use options, the latter instrument was not yet available to the respondents in our empirical study. The models developed are able to explain how and why managers and entrepreneurs make choices with respect to PRMIs. The models contain the characteristics of both company and the entrepreneur/manager. Thereafter, a comparison is made of the models which have been determined by the different channel members. Having gained insight into the channel members' decisions with respect to PRMIs and into the differences between the channel members in this respect, the implications for price risk management policy in the channel are derived. Next, the managerial implications for the service design and service delivery of securities are indicated.

CONCEPTUAL FRAMEWORK

Developing Choice Models for Managers, Who Participate in a Marketing Channel, for the Hedging Services Provided by Financial Derivatives Markets

In financial literature it is frequently argued that the success of a PRMI is heavily dependent on both its design and the characteristics of the underlying asset's cash market (Black, 1986). Gray (1987) identifies the importance of contract design. He argues that a PRMI must reflect the commercial movement of the asset both closely and broadly enough to avoid price distortions resulting from specifications in the PRMI. An empirical study by Silber (1981) concludes that PRMIs whose specifications closely reflect the needs of hedgers seem more likely to succeed. Tashjian and McConnell (1989) show that hedging effectiveness is a very important determinant in explaining the success of PRMIs. In accordance with these recent findings, particular attention has been paid to the hedging effectiveness of futures as an example of a PRMI widely traded on financial derivatives exchanges. Authors who have proposed measures of this effectiveness include, Ederington (1979), Hsin, Kuo and Lee (1994) and Pennings and Meulenberg (1997). Common to all these measures is that they try to indicate the extent to which hedgers are able to reduce cash price risk by using a particular PRMI. It has been argued that the motivation for hedging by offsetting PRMIs is not to reduce the *cash price risk* of single assets but to reduce the *residual risk* of the firm (Anderson and Danthine, 1980; Anderson and Danthine, 1981; Rolfo, 1980; Zilcha and Broll, 1992). Therefore, we will investigate risk

management behavior towards both inputs and outputs. To do so we will look at the price risk management behavior of enterprises that are within the same marketing channel.

The conceptual model consists of three channel members: 1) the producer of raw material (in this stage raw material is the output), 2) the trader in raw material (in this stage raw material is both input and output) and 3) the processor of raw material (in this stage raw material is the input).

Actors in marketing channels take decisions about PRMIs individually. Interdependency may occur between the decisions of individual actors. For instance, the use of PRMIs by a producer of raw materials may depend upon the PRMI-decisions with respect to that raw material by the wholesaler or the processor he or she is supplying. In that case the use of PRMIs has truly become an issue of marketing channel. Characteristics of individual actors that influence decision making with respect to PRMIs include: price variance, the degree of risk seeking/aversion, and the costs of hedging. As a result of differences in these variables the willingness to use PRMIs can differ between actors in the marketing channel. Another channel-aspect of decision making with respect to PRMIs is that it can be a sequential process. The most risk averse actor might decide first to use a PRMI and other channel-actors may follow suit, while taking into account the decisions made by the first user. Also, the type of PRMI used by an actor in the channel can depend on his or her channel power. For instance, when the user of a raw material has strong channel power, he or she might enforce upon a supplier a forward contract at a suitable price instead of executing a hedge in the futures market. Whether a channel actor is using PRMIs to get rid of risks also depends on his or her relationships with other actors in the marketing system and with actors supportive to his or her business. Cases in point are banks and shareholders.

In this article we will not analyze all the factors that influence decision making with respect to PRMIs in marketing channels. Rather, we focus on a number of characteristics related to the PRMI decision making of individual channel actors and on related aspects of dependency between PRMI decisions in the marketing channel.

Our model presupposes the presence of a futures contract for the raw material concerned. Futures contracts are standardized legal agreements to make or take delivery of a specific commodity at a designated place sometime in the future. Futures contracts are traded on futures exchanges and make it possible for those who want to manage price risk hedgers, to transfer risk (hedging service of the exchange) to those who are willing to accept it speculators (speculation service of the exchange). It is, therefore, interesting to study the channel members' behavior towards this price risk management instrument and its meaning for the risk-spreading process in the channel and for the channel structure (as a whole). Furthermore, this study investigates the channel members' position towards a new PRMI, as yet unavailable to our respondents, the option.

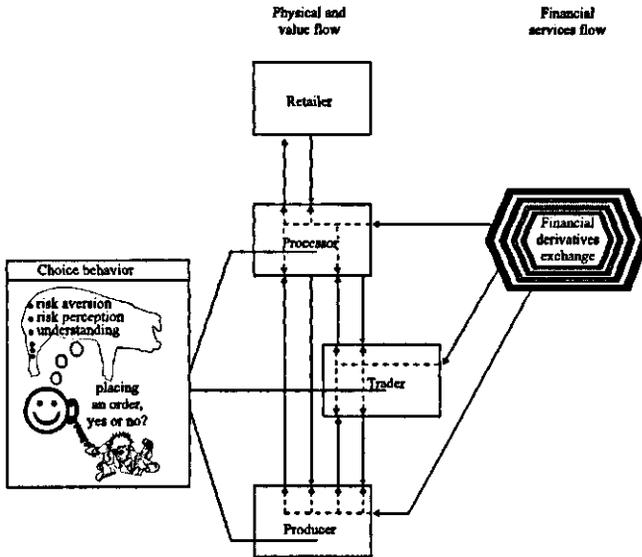


Figure 1. Price risk management in the marketing channel.

Figure 1 provides a schematic representation of our conceptual model. It discerns the physical and value flow from the financial service flow. The value flow, in our model is directly deducted from the price of raw materials and is volatile and introduces risk. Whether or not channel members will make use of financial services depends on several factors that do not necessarily have to be the same for each channel member. By making use of the services that a financial derivatives exchange has to offer, this risk can be eliminated. The use of these services can, in turn, have an effect on the different channel members' choice of channel and hence on the entire channel structure.

We want to test some hypotheses about the use of PRMIs which are related to the individual actors and the channel structure. On the basis of in-depth interviews (i.e. organized group discussions with entrepreneurs) and desk research the following hypotheses can be formulated.

Hypotheses related to the individual actor

If entrepreneurs have a higher awareness of price fluctuations in the cash market and hence are aware of the risks they face in the cash market (assuming the price is difficult to predict) and if entrepreneurs are risk-averse, they will be more inclined to use PRMIs.

Hypothesis 1. Risk aversion in the case of risk perception will have a positive relation with the use of price risk management instruments.

The legal form of a company will influence the manager's price risk management strategy. In general, the manager of a limited liability company will have to generate a continuous return on the invested assets. This makes risk management, and consequently the use of PRMIs, important in risk-bearing surroundings/settings. Entrepreneurs running

a one-man business without the obligation of realizing returns for stock holders will therefore feel no pressing commitment to risk management.

Hypothesis 2. The degree to which a manager is focused on shareholder interests will have a positive influence on the use of price risk management instruments.

By using PRMIs, for instance futures contracts, a company can fix the price of a raw material in advance. This is a very drastic form of risk management, all risk being eliminated. Implicitly this means that all price dynamics, also those advantageous to the company, will no longer have any influence on the result. For a company with a downward-risk goal (return on investment should be at least x percent, anything above it is welcome) options probably are a better alternative. After all, the use of options allows for a bottom or ceiling market price thereby allowing the company to take advantage of favorable price developments.

Hypothesis 3. A downward-risk goal is positively related to the intention to use options

Hypothesis related to the channel structure

Many firms have multiple inputs and outputs, and it is not reasonable to assume that the firm is interested in the isolated price-risk management of a single input or output. A more plausible goal for a firm's risk management activities would be to protect the firm's overall financial performance. Covering only one input or one output may even introduce additional risks. Therefore, a company will sooner cover the price of raw material, when the other variable means of production can be covered as well.

Hypothesis 4. When a firm has the possibility of covering the risk of its entire production complex, it will sooner use a price risk management instrument than it would have without this possibility.

METHOD OF RESEARCH

Research Context

Our study uses for its subjects Dutch entrepreneurs and managers of medium-sized and large hog farms, hog traders and managers of slaughterhouses. In the Netherlands, the hog industry is one of the most important industries in agriculture and faces heavy price fluctuations. The Netherlands has 18 slaughterhouses processing hogs into meat components and sell these components to wholesalers and retailers. Moreover, these meat packers export a large proportion of pork components. The traders serve as intermediaries between the hog farmer on the one hand and the slaughterhouses and exporters of live hogs on the other. The slaughterhouses are run by managers, whereas the hog farms and hog trading firms are often family firms.

In the Netherlands, there is a futures market for hogs, in which entrepreneurs can fix the price of their live slaughter hogs in advance. This implies that research into the use of futures contracts allows us to study actual behavior: do people use futures contracts or not? In the case of options, we can (only) measure the intention to use options, should they become available.

Research Design

Prior to the quantitative study, in-depth interviews were held with 40 farmers, 10 hog traders and 5 managers of slaughterhouses to provide insight into decision-making structure. Both the in-depth interviews and desk research formed the basis for the operationalization of the models. The goal of the depth interviews was to gain insight into the decision-making process involved in using PRMIs. More specifically, we wanted to gain insight into the criteria managers use when deciding either to use or futures contracts or not. Care was taken to select some managers who had been involved in futures trading before and other managers who had not been involved in futures trading at all. The depth interviews took place in an informal atmosphere and each session lasted for about two and a half hours. For the producers, we developed a personal computer-assisted interview. The sample frame for this interview was stratified according to the variables 'region' and 'size of enterprise'. The interview had several sections. After having posed some background questions (for example, on size of enterprise, previous behavior regarding price risk management), the respondents were subjected to two experiments which measured risk attitude by means of the certainty equivalence technique and strength of preference by means of the rating technique. This was followed by a measurement of the relative intention to use futures contracts and options. The interview then continued with items that measured the entrepreneurs' characteristics. All the interviewers had prior interviewing experience, and had gone through an extensive 'training program for the assessment procedures. Moreover the training program ensured that the interviewers understood the questions posed to the entrepreneurs. In 1996, a total of 467 producers were interviewed. A similar survey was conducted among managers of slaughterhouses and hog traders.

In 1997 questionnaires were sent to all slaughterhouses and hog traders, a total of 150 in all. Before the questionnaires were sent, telephone contact had been made with the managers concerned to make sure the questionnaires were addressed to the right person and to inform those concerned that a query was coming their way. Sixty-five questionnaires were returned, which means our sample covered over 43 % of the total population.

Measures

Most characteristics of the company and the entrepreneur, such as legal form, can be measured objectively. The constructs characterizing managers and entrepreneurs were measured by scales such as those developed in marketing, psychology, and management.

Analysis

The data obtained from the 550 respondents constitutes the input for the quantitative part of the research. The relations between managers' characteristics and company characteristics and the use of price risk management instruments, as well as the relations between the channel members will be tested using logistic regression. This provides the possibility of being able to test our hypothesis empirically.

The models describing the actual use of futures contracts are choice models where the choice is binary and refers to revealed preferences, that is past behavior. Since in these models choice is a binary variable, we model the probability of choosing one of the alternatives by logistic regression (Hosmer and Lemeshow, 1989). Logistic regression analysis estimates the coefficients of the predictors, such that the likelihood of the data fed into the model is maximized. As a measure of model fit, we provide the improvement of

the - 2 log likelihood as compared to the - 2 log likelihood of the null model which consist only an intercept. The higher the chi-square value of this model, the better it describes the binary choice model.

RESULTS¹

During the interview, the respondent was asked to indicate on a scale from 1 (not risky at all) to 9 (very risky) the extent to which he or she felt the hog market was risky. An average score of 7.5, 7.3, 7.4 and a standard deviation of 2.1, 1.8, 1.7 for the producers, traders and processors suggest that the hog market is perceived as risky.

Producers

Using logistic regression, risk attitude and the extent to which producers are able to fix both input and output prices appeared to be strongly positively related to the use of futures contracts. The model significantly improves the fit compared to the null model with only an intercept ($p < 0.001$), thereby supporting Hypotheses 1 and 4. Since the producers in our sample are mainly one-man businesses, no relation was found between the legal form and the use of futures contracts.

In order to gain more insight into the producers' choice of marketing channel and their risk attitude, we split the producers into two groups. The first group sells slaughter hogs on the free market (i.e. directly to the slaughterhouse or the trader), the second group sells slaughter hogs to a cooperative. The split shows the entrepreneur's preference for either a price risk-bearing market channel or a risk-reducing market channel. As expected, a significant difference in risk attitude was found between entrepreneurs who sell directly onto the free market and entrepreneurs who supply cooperatives, the latter being less risk-seeking ($p < 0.025$). This result is in line with Hypothesis 1. Logistic regression enables us to gain insight into the decision-making behavior of producers regarding the use of options. In their decision for or against using options the following variables are of importance: the decision unit's opinion of options ($\beta = 1.14$, $p = 0.005$), risk attitude ($\beta = 0.381$, $p = 0.017$), interaction between risk perception and risk attitude ($\beta = 0.05$, $p = 0.07$), and understanding of options ($\beta = 0.630$, $p = 0.000$). The model significantly improves the fit compared to the null model with only an intercept ($p < 0.001$).

Processors

Because 18 interviews are available to the processors, the hypotheses are tested by using correlation coefficients between variables. The interviews show that risk aversion is positively correlated to the extent to which a slaughterhouse makes use of futures contracts ($r = 0.65$, $p = 0.03$), thereby supporting Hypothesis 1². No relation was found between the

¹ Lack of space prevents the authors from reporting all the statistics of the logistic regressions. Readers who are interested in these statistics are welcome to contact the authors.

² Since we conduct a correlation analysis, we did not use actual market behavior -using or not using futures contracts- for a variable here (this is, after all, a binary choice). Instead we use the variable which indicates the extent to which the company uses futures contracts.

extent to which futures markets are used and the legal form, thereby rejecting Hypothesis 2. Note that the sample contained little variation as to legal form. A clear relation was found between the processor's downward-risk goal and the intention to use options ($r = 0.54$, $p = 0.05$), thereby supporting Hypothesis 3. The extent to which futures markets were used depended strongly on the processors' opportunity to hedge both input and output ($r = 0.71$, $p = 0.02$), thereby supporting Hypothesis 4.

Traders

Using logistic regression, it appeared that risk attitude and legal form are strongly positively related to the use of futures contracts. The model significantly improves the fit compared to the null model with only an intercept ($p < 0.001$), thereby supporting hypothesis 1 and 2. The extent to which traders are able to fix both input and output prices was not significant in logistic regression, thereby rejecting hypothesis 4. The intention to use options and a downward-risk goal were significantly related ($r = 0.47$, $p = 0.05$), thereby supporting hypothesis 3.

These results indicate out that differences exist between the market channel members as far as their relationship to price risk management is concerned. For all channel members knowledge about financial derivatives appeared to be an important determinant in choosing for or against hedging. The risk with regard to raw materials is largely borne by the producers. They appeared to be the least risk-averse of all channel members.

In our empirical study, the producers are mainly family companies, where the entrepreneur has no obligation to other parties to realize a return on his or her capital (there being no shareholders). The possibility of using options to fix a bottom or ceiling price in the market is greeted with enthusiasm among the channel members. Risk attitude concerning the company's performance is an important determinant in the decision to either use or shun price risk management instruments. The channel members who hold power in the channel, in our case the retailers, actually use their power to shift the risk to other channel members, thus avoiding having to use the services of financial markets.

The producers' choice of channel also depends on their risk attitude. Producers evaluate channels using several criteria including the risk they introduce. Based on their own risk attitude they then choose a relatively safe or relatively risky channel. Therefore, the choice of market channel is also a part of entrepreneurs risk management strategy.

DISCUSSION

Strategic Implications for Financial Derivatives Markets from a Service Marketing Perspective

Services marketing has only recently emerged as a discipline in the field of marketing (Fisk, Brown & Bitner, 1993; Swartz, Bowen & Brown, 1992). As they constitute an immensely diverse number of industries, it is difficult to define exactly and unambiguously the nature of services (Grönroos, 1990). Consequently, authors have focused their attention on finding features which distinguish services from goods (Bowen & Schneider, 1988; Zeithaml, Parasuraman & Berry, 1985). Intangibility presents a challenge to new service development, as it requires management of the financial derivatives exchange to cooperate closely with customers and to stress the use of tangible cues to make the service more physical. Tangible cues in the financial derivatives industry are the trading floor, the information provided by the trading system and the clearing

system. Furthermore, intangibility may diminish the period of time needed to complete the new product development process for services. As a result, the financial derivatives industry may be able to respond more quickly and adequately to customers' needs. However, as services can be easily imitated ("me-too" products), this had lead to an increased proliferation of similar services in the financial derivatives industry (de Brentani, 1991; Easingwood, 1986; Pennings, 1998; Shostack 1984; Storey & Easingwood, 1996).

Level of understanding, risk attitude and legal form are related to the use of futures contracts, confirming our Hypotheses 1 and 2. In order to increase the understanding of the services provided by financial derivatives exchanges, the exchange might develop training programs for managers. These programs may be seen as a tangible cue to make the hedging service as a whole more tangible. It seems interesting to the exchange to direct its attention towards companies that particularly focus on shareholder value interests.

In the decision to use the services provided by options, the determinants that are decisive are different to operative in determining the use of futures. This implies that the marketing of financial derivatives is service specific. The objective concerning profit fluctuations, for example having a downward risk goal or not appearing to bear a clear relation with the intention to use options (Hypothesis 3). In our study, this implies that it would be interesting for the Amsterdam Exchanges to conduct further research into the feasibility of options on slaughter hogs. Our results show that the motivation for reducing risk by offsetting PRMIs is not to reduce the *cash price risk* of single commodities but to reduce the *residual risk* of the firm, that is all inputs and outputs (Hypothesis 4). The Warenterminbörse in Hannover (Germany) starts trading futures contracts in 1998. This exchange is going to list several related futures complexes, such as the hog futures complex which will include piglet futures, feed futures and hog futures. Gathering information on the production structures particular to different industries seems to be of great importance to financial institutions. Computer technology and advancements in telecommunications will make this increasingly easier in the future which will, in turn, lead to improvements in the structure of financial institutions (Merton 1995). It is important to gain further insight into the risk management alternatives of entrepreneurs. The risk management services offered by the exchange may serve as a substitute for vertical integration and will influence the channel choice (risky versus safe). Our study, for example, showed that the choice of market channel is used by producers as a risk management tool. Moreover investigating the interdependency between the channel members regarding their risk management behavior would be an interesting avenue to explore in future.

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