ELSEVIER

Journal of Economic Psychology 23 (2002) 263–278

JOURNAL OF Economic Psychology

www.elsevier.com/locate/joep

Pulling the trigger or not: Factors affecting behavior of initiating a position in derivatives markets

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Received 16 July 1999; received in revised form 10 May 2001; accepted 9 October 2001

Abstract

The behavior of managers in initiating a derivatives market position brings to the surface an interesting phenomenon: sometimes managers initiate a position in derivatives markets (i.e., futures and options markets) and sometimes they do not, even though the price volatility of the underlying asset has not changed. The current (hedging) models might explain the phenomenon of derivatives position-initiating behavior by assuming changes in the manager's risk attitude and in the volatility of the underlying asset. However, this explanation is not in line with the literature that suggests that risk attitude in a particular domain does not show strong changes within a short time frame. In this paper we try to solve this puzzle by providing a conceptual model that is able to explain the manager's futures contract initiation behavior. The psychological reference price and the futures market price level at the manager's decision moment play a key role in this model. The model is able to explain futures initiation behavior without assuming changing risk attitudes or changing price volatility. Using data from experiments obtained from personal computer-guided interviews conducted with 450 managers, the proposed model is tested with logistic regression on choice probabilities. The manager's risk attitude, the ratio of the futures price level to the manager's psychological reference price and the interaction between them, appear to explain the manager's behavior in initiating a futures position.

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0167-4870/02/$ - see front matter
PII: S0167-4870(02)00067-3

PsycINFO classification: 2229; 2340; 3920

JEL classification: C51; D21; G29

Keywords: Choice behavior; Risk attitudes; Psychological reference prices; Financial markets

1. Introduction

Recently, growing attention has been paid to the factors that explain why firms use derivatives as risk reduction instruments. Carter and Sinkey (1998), Géczy, Minton, and Schrand (1997), Howton and Perfect (1998), Koski and Pontiff (1999), Lee and Hoyt (1997), Mian (1996), Nance, Smith, and Smithson (1993), Pennings and Leuthold (2000), Schrand and Unal (1998), Smith and Stulz (1985), Tufano (1996) and Visvanathan (1998) among others have analyzed the determinants of corporate derivative use. [1] These studies provide valuable insight into the characteristics of corporations that are associated with the decision to use derivatives. Several factors, such as the firm's risk exposure, its growth opportunity, the level of wealth, managerial risk aversion, financial distress costs, and the accessibility to financing appear to influence the decision of a corporation to adapt derivatives to their risk management toolbox. However, gaining insight into why firms use derivatives as risk management tools does not explain the manager's decision whether or not to enter the derivatives market in a *concrete choice situation*. [2] In this paper, we focus on futures as an example of a derivative used as a hedging tool. [3] We will focus our attention on the situation in which managers are deciding whether or not to initiate a position in the futures market. In such a concrete choice situation, the manager has two options: to initiate a futures position or not to initiate a position (the latter could mean delaying the initiation of the futures position). The behavior of a manager in such a concrete choice situation will be referred to as "the manager's behavior in initiating a futures position".

[1] In business today there is no doubt managers have recognized the usefulness of derivatives as risk management tools. In 1998, 2.2 billion contracts both futures and options were traded throughout the world (Futures Industry Association, 1999) presenting an underlying value of 800 billion US Dollars. The derivatives industry is composed of exchanges, banks and brokerage houses offering and facilitating over-the-counter trading.

[2] Notable research conducted by Antonides and van der Sar (1990) and Guth, Krahnen, and Rieck (1997), focussed on the investment decisions. In this study, we exclusively focus on the use of derivatives as risk reduction instruments.

[3] Hedging is the practice of offsetting the price risk inherent in any spot market position by taking an equal but opposite position in the futures market. The futures contract serve, as it were, as the medium through which the hedging service is provided. The exchanges 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, i.e., speculators (speculation service of the exchange) (Stoll & Whaley, 1993). Futures contracts are standardized with respect to characteristics of the product covered by the contract, time and place of delivery of the product and they are traded under the rules of an organized exchange.

The phenomenon of managers sometimes deciding to initiate a position in the futures market and sometimes deciding not to (e.g., whether or not the manager "pulls the trigger"), without a change in the volatility of the risky asset or commodity, is often assumed to be attributed to a change in the manager's risk attitude. Several articles concerning portfolio selection use this explanation (Mehra & Prescott, 1985; Hagiwara & Herce, 1997). Yet, in the literature it has been argued that risk attitude in a particular domain does not change in a short time frame (March & Shapira, 1992; Schoenmaker, 1993; Smidts, 1997; Weber & Milliman, 1997). [4] The phenomenon of managers sometimes deciding to initiate a futures position and sometimes deciding not to, often occurs in a relatively short time span of, let us say, several minutes. As the effects of the fundamental factors that influence risk attitude (such as age) span a much longer period of time, we might expect risk attitude to be constant. If this is the case, then why do managers either initiate futures positions or do not initiate them, while volatility, and hence their risk exposure, remains unchanged? Obviously the decision to initiate a futures position depends on the riskiness of the underlying commodity that the manager wishes to hedge. The manager's response to the risk exposure depends on his or her risk attitude. The decision to initiate a futures position also depends on the futures price level. So, on the one hand risk attitude will play a role in a concrete choice situation, as risk aversion is the primary motivation for risk reduction behavior (hereafter referred to as hedging behavior), and on the other hand the futures price will play a role too. What, then, is a "good" futures price? Or, put differently, what is a price that will generate the desired financial performance and hence a price at which the producer wishes to initiate a futures position? It has been shown that decision-makers use psychological reference prices to evaluate price levels (March, 1988; Payne, Laughhunn, & Grum, 1980; Puto, 1987; Qualls & Puto, 1989; Siegel, 1957). In this research, the manager's psychological reference price is defined as a price (or price scale) in the manager's memory that serves as a basis for judging or comparing prices (Grewal, Monroe, & Krishnan, 1998). So, it seems that in a concrete choice situation in which the manager has to decide whether or not to initiate a futures position, risk attitude on the one hand and the manager's reference price compared to the actual futures price on the other hand play a role. In this paper, we try to gain insight into the managers' behavior in initiating a futures position by examining the relationships among risk attitudes, futures price levels and reference prices.

The remainder of the paper is structured as follows. First, in Section 2, we introduce a conceptual model that links risk attitude, the manager's reference price, and the price level in the futures market to the manager's behavior in initiating a futures position. After the presentation of the research method and the operationalization of the model in Section 3, the model is tested in Section 4. Data obtained from 450

[4] Others have argued that risk attitude might show slow change over time. Morin and Suarez (1983) found that the investor's life cycle plays a significant role in portfolio selection behavior, risk aversion increasing uniformly with age.

owner-managers of agricultural enterprises by means of computer-assisted personal interviews constitute the input for this part of the research. We conclude with an evaluation of the study and make some suggestions for further research in Section 5.

2. A futures position initiation model

A manager who is deciding whether or not to initiate a futures position takes the consequences of such action into account. Initiating a futures position has two important consequences. First, by fixing the price in advance (s)he has reduced his or her spot market risk. Secondly, fixing the price in advance at a certain price level is inherent to taking a futures position. From decision literature it is well known that decision-makers use anchor points to evaluate a stimulus, in our case futures prices (Fershtman, 1996; Payne et al., 1980). The anchor points chosen differ across domains and decision frames. Managers compare the futures price level to their reference price (where the reference price is defined as the manager's internal price that (s)he uses as an anchor to judge other prices). The further the futures price exceeds the manager's reference price, the more attractive it becomes for him/her to take a futures position (note that throughout the paper we will focus on a manager who is deciding whether or not to initiate a sell (short) position in the futures market. The analysis is analogous for a manager deciding whether or not to initiate a buy (long) position). And, conversely, the further the reference price exceeds the futures price, the less attractive it will become to take a futures position. Puto (1987) found that the reference price varies widely for each individual, depending on such factors as judgement capacity and aspiration level. In the context of a producer deciding whether or not to initiate a futures position (which is the context of our empirical study) the reference price may be closely related to the production costs of the underlying commodity.

In our model, we hypothesize that managers use the futures price level and the reference price when deciding whether or not to initiate a futures position. An interesting subject is the functioning of the mechanism for comparing these prices. The nature of the comparison process along different prices may vary. Anderson (1981) showed that decision-makers use operations such as addition (subtraction) or multiplication (division) to arrive at judgments or decisions. Comparison by ratio is very common in decision-making analysis. A decision-maker may think, "this price is twice as good". Monroe and Chapman (1987) found that decision-makers derive perceived value from perceived benefits and perceived sacrifice. They suggested that perceived value = perceived benefits/perceived sacrifice, which is similar to comparison by ratio. Moreover, in a study involving judgements of similarity and dissimilarity, Ramsay (1980) found that comparison by ratio described the data well. In this study, therefore, the manager is assumed to compare the futures price and the reference price by ratio.

We hypothesize that the extent of risk aversion is positively related to the incidence of initiating a futures position (Pennings & Smidts, 2000). Furthermore, we hypothesize the ratio of the futures price level to the reference price to be positively

related to the incidence of initiating a futures position. Moreover, we expect an interaction between risk attitude and the ratio of the futures price level to the manager's reference price. That is, the willingness of a risk-averse decision-maker to take a futures position, will be more prominent if the price for which the decision-maker is going to take a position in the futures market is larger than his or her reference price. Thus, risk attitude is weighted by the ratio of the futures price level to the reference price. In a linear framework our model can be written as

$$B = \beta_1 \mathrm{RA} + \beta_2(\mathrm{FP}/\mathrm{REFP}) + \beta_3 \mathrm{RA}(\mathrm{FP}/\mathrm{REFP}) \quad (1)$$

where B is the manager's behavior in initiating a futures position, RA is the manager's risk attitude, FP the futures price level in the concrete choice situation and REFP the manager's reference price.

We will empirically test this relationship after having explained our research method.

3. Research method

In this section, we discuss the decision context of the managers in our sample, the sample employed, the design of the experiments and the measures employed to measure risk attitude and the manager's reference price.

3.1. Decision context

The model outlined in the previous section implicitly assumes the availability of only one price risk management instrument to the manager. Sometimes, more alternatives are available to a manager in a concrete choice situation. In order to deal with this multi-alternative situation, taking price levels from alternative price risk management instruments into account could expand the simple model in (1). Therefore, the model as outlined before is a more general framework that allows for context-specific modifications. As this paper intends to focus purely on the underlying decision process regarding the manager's behavior in initiating a futures position, the assumption of a multi-alternative scenario would only introduce intervening variables that would distract from the objectives of this research. In order to test the general model as outlined in the previous section, a single-alternative empirical domain had to be found. The Dutch hog industry appears to be a perfect fit: only one price risk management instrument is available to the participants, the hog futures contract traded on Euronext. Moreover, this market is characterized by high price fluctuations that are unpredictable according to the participants in the spot market and the availability of futures contracts which closely reflect the commercial movement of spot market hog trade (Pennings & Meulenberg, 1997). Using the Ederington (1979) measure, the hedging effectiveness was 0.92, based on transactions-specific data during 1990–1996, indicating that the futures contract is able to reduce spot price risk substantially, and hence is a valuable risk reduction tool for

the Dutch hog industry (Pennings & Leuthold, 2001). [5] The subjects of the study are managers of medium-sized and large hog farms in the Netherlands. Its production process is rather simple: the manager buys piglets and feed and raises the piglets to slaughter hogs. A hog farm is a specialized company where hog farming accounts for 85% or more of the manager's total income. The Dutch hog industry is among the largest exporters of slaughter hogs in the European Union and accounts for an important part of the country's export. Contrary to practices associated with other agricultural products, the market for slaughter hogs in the European Union knows no government intervention. Therefore, slaughter hog prices fluctuate widely, and the coefficient of variation (CV) is 0.19, based on daily observations over the period 1990–1997. This is relatively high even when compared to US soybeans (CV is 0.14), which is generally known as a very risky food raw material. Because of large price fluctuations, the managers face price risks and consequently futures contracts might be an attractive price risk management instrument. The characteristics of the Dutch hog industry, selling in volatile markets and the availability of risk management instruments (e.g., futures and options), can be found in many industries. That is, our empirical study can easily be generalized to other industries that are involved in selling or buying raw materials (e.g., commodities) or products, such as the food processing industry.

3.2. Data collection

A questionnaire was developed on the basis of literature, and 40 test interviews were conducted to ensure correct interpretation of the questions. The survey consisted of personal computer-guided interviews. Care was taken to build a user-friendly interface. To ensure that the interface was well understood and perceived as "very user-friendly", 15 test interviews were conducted. The interviews took on appointment, at the manager's enterprise. All the interviewers had prior interviewing experience and had followed an extensive training program for the assessment procedures. A total of 450 managers participated.

3.3. Experiments

In line with DeBondt and Thaler (1995) and Daniel, Hirshleifer, and Subrahmanyam (1998), we believe that a good finance theory is to be grounded on evidence about how people actually behave. The main sources of bias are due to the fact that the experiment does not match the real decision situation of the subjects under consideration. For these reasons we measured the manager's behavior in initiating a futures position using a scenario framework which closely matched the real economic business situation of our respondents. The validity of scenarios has been well docu-

[5] The Ederington measure ranges from 0 to 1 and indicates the reduction in the variance of the return (Ederington, 1979).

mented (Bem, 1967). The scenario method is advocated by many researchers and has been applied in several research domains (see e.g., Suprenant & Solomon, 1987). It is particularly successful as a research tool when subjects are required to "play themselves" rather than unfamiliar roles. In this study, the managers "played" themselves. During the measurement the managers were instructed to "read the following situation carefully" and that "it is important to imagine yourself in the situation described". They were given a choice between selling their hogs forward through initiating a futures position or selling their hogs on the spot market, i.e., without taking a futures position.

Whenever they chose to initiate a futures position, they would therewith fix their hog price in advance at the price level assigned to them, eliminating spot market risk. Whenever they decided not to initiate a futures price, the managers would be exposed to spot market risk. Five different futures price levels were randomly assigned to the managers. The price levels chosen were based on price levels from previous years on the futures market and reflected the price distribution function. The managers perceived the scenario as very realistic, as it is quite similar to the kind of choices they make in daily life. In the first experiment the managers were asked to indicate their relative intention towards initiating a futures position by distributing 100 points across two alternatives: to either initiate a futures position or not to initiate a futures position (hence, indicating the probability of initiating a futures position). [6] In the second experiment the manager had to choose between actually taking or not taking a futures market position. [7] The interview continued by measuring the manager's reference price level.

3.4. Measures

In this study, the probability of initiating a futures position, the first experiment, was measured by asking the manager to distribute 100 points across initiating a futures position or not initiating a futures position given the random assigned futures price (van den Putte et al., 1996). This experimental design was a deliberate choice: by making the manager distribute 100 points across the two alternatives, (s)he is simultaneously considering both options when expressing his/her probability of initiating a futures position, a situation very similar to the manager's daily decision process. In the second experiment, the manager had to choose between actually initiating a futures position or not.

The elicitation of the reference price was based on the notable work of Puto (1987). Managers were asked to respond to the open-ended question: "If you sell your hogs you will receive different prices for them, depending on the market situation.

[6] van den Putte, 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.

[7] Our research design is such that we are able to relate the measurements to actual choice behavior (in contrast to the often-used University setting), as proposed by Warneryd (1996).

Some prices will make you feel that you have made a loss and some prices will make you feel that you have made a gain. Supposing you sold your hogs today, from which price level onwards would you perceive the sale as a gain?'' Immediately after declaring the initial reference price, the manager was confronted with the following sentence ''so, if I understand you correctly, then a price below... Dutch guilders is perceived as a loss'' the manager could answer this question with ''yes'' or ''no''. When the manager answers the last question with ''no'', the first question was repeated, in order to give the manager the opportunity to change the initial reference price. Whenever the manager answered the latter question with a ''yes'', the assessment of the reference price had been accomplished (Puto, 1987). The ratio of the futures price level to the reference price was calculated by dividing the price level of the futures contract by the manager's reference price. The nomological validity of the elicited reference price may be tested by investigating how that reference price relates to the variables to which it is theoretically associated, such as production costs (Campbell & Fiske, 1959; Churchill, 1979; Cook & Campbell, 1979). Therefore we correlated the manager's reference price to the manager's cost of raising hogs, and as expected, both measures correlated significantly positive ($\rho = 0.86$, $p = 0.00$) indicating the nomological validity of the measurement procedure to obtain the manager's reference price and the fact that the subjective reference price has an economic basis.

Several researchers have developed risk attitude measures (Childers, 1986; Harnett & Cummings, 1980; Jaworski & Kohli, 1993; Miller, Kets de Vries, & Toulouse, 1982). As the literature contained no risk attitude measures for the domain of financial risks faced by managers of small and medium-sized enterprises, we developed a new risk attitude measure. We propose to measure the manager's risk attitude by a set of observable indicators (items) that are subjected to confirmatory factor analysis to assess their psychometric properties and unidimensionality. In developing this scale, we adhered to the iterative procedure recommended by Churchill (1979). First, based on the literature, a large pool of items was generated. Care was taken to tap the domain of the risk attitude construct as closely as possible. Next, the items were tested for clarity and appropriateness in personally administered pre-tests with 40 managers. The managers were asked to complete a questionnaire and indicate any ambiguity or other difficulty they experienced in responding to the items, as well as for any suggestions they deemed appropriate. Based on the feedback received from the managers, some of the original items were eliminated, others were modified, and additional items were developed.

In order to test the risk attitude measure on its psychometric properties, we conducted structural equation modeling (SEM) as SEM permits the explicit modeling and estimation of errors in measurement (Bollen, 1996; Churchill, 1979; Gerbing & Anderson, 1988; Jöreskog & Sörbom, 1993; Nunnally, 1978; Reise, Widaman, & Pugh, 1993; Steenkamp & van Trijp, 1991). The final scale contained four items which appeared to be unidimensional, all factor loadings were significant (minimum t-value was 4.60, $p < 0.001$) and exceeded 0.5. These findings support the convergent validity of the scale (Gerbing & Anderson, 1988). The composite reliability was 0.70, which indicates reliable construct measurement (Hair, Anderson, Tatham, & Black, 1995). The risk attitude scale resembles the items used by Jaworski and Kohli (1993)

and Pennings and Smidts (2000). In Appendix A, the items in the final scale and their psychometric properties are given. Averaging the items formed a composite risk attitude scale. This composite will be used in our model.

4. Results

The data obtained from the 450 managers served as input for the validation of our hypotheses. To investigate the relationship between the probability of initiating a futures position on the one hand and risk attitude, futures price level and reference price level on the other hand (e.g., the first experiment) a multiple regression model was developed which includes an interaction between the ratio of the futures price to the manager's reference price and risk attitude (e.g., Eq. (1)).

Table 1 shows the regression results for the probability of initiating a futures position. Risk attitude (e.g., risk aversion) shows a significant positive relationship with the probability of initiating a futures position, thereby confirming our hypothesis that the more risk-averse (risk-seeking), the greater (smaller) the probability of initiating a futures position. The futures price as a proportion of the manager's reference price shows a significant positive relationship with the probability of initiating a futures position, thereby confirming our hypothesis that managers evaluate the futures price against their reference price. If the futures price is larger than the reference price, managers are more inclined to initiate a futures position than in the case that the reference price is larger than the futures price when selling. Furthermore, the interaction between risk attitude and the ratio of the futures price to the manager's reference price was positive significantly related to the probability of initiating a futures position, thereby confirming our hypothesis that willingness of a risk-averse decision-maker to take a futures position, will be more prominent if the futures price is larger than the reference price. The positive significant sign of the interaction term can be interpreted clearly. Generally, a risk-averse manager will

Table 1
Results of the regression in which risk attitude (RA) and the ratio of the futures price level (FP) to the manager's reference price (REFP) and the interaction between them predict the manager's probability of initiating a futures position

Probability of initiating a futures position	β	t-value	p-value
RA	0.752	3.06	0.002
FP/REFP	0.563	6.70	0.000
Interaction (RA $*$ (FP/REFP))	0.621	2.62	0.009
$R^2 = 0.462$			
Adjusted $R^2 = 0.458$			
$F(3, 447) = 132.58$			
Probability of $F(3, 447) = 0.000$			

Note: The variables risk attitude and the ratio of the futures price level to the manager's reference price were centered prior to forming the multiplicative term (Cronbach, 1986; Jaccard, Turrisi, & Wan, 1990). Note that the risk attitude and the ratio of the futures price level to the manager's reference price did not correlate ($\rho = 0.031$, $p = 0.782$), thereby further substantiating our results.

initiate a futures position relatively more often, in order to reduce his/her spot price risk. When the price level in the futures market is higher than his/her reference price, this behavior will be more prominent. Thus, for a risk-averse manager, an attractive futures price level (compared to his/her reference price) will lead to an increase in the probability of initiating a futures position. Generally, a risk-seeking manager will not initiate a futures position in order to reduce his/her spot price risk. His/her probability of initiating a futures position is <0.5. When the price level in the futures market is lower than his/her reference price, the risk seeker's behavior in initiating a futures position (in this case the probability of *not* initiating a futures position) will be more prominent.

We now turn to the results of the second experiment in which the manager was asked to make a choice between taking a futures market position or selling at the spot market. Because our dependent variable (whether or not to initiate a futures position) is a binary response variable, we adopted maximum likelihood logistic regression, utilizing the logistic cumulative distribution. The composite risk attitude measure, the reference price and the futures price level were used as the predictors of the managers' choice behavior in the logistic regression. This means that the probability of initiating a futures position p, is modeled as

$$p = \frac{1}{1 + \exp(-[\beta_1 \mathrm{RA} + \beta_2(\mathrm{FP}/\mathrm{REFP}) + \beta_3 \mathrm{RA}(\mathrm{FP}/\mathrm{REFP})])}. \tag{2}$$

The logistic regression estimates the parameters β_1, β_2, and β_3 in the model, such that the likelihood of the choice data given the model is maximized. The parameters can be interpreted as the change in the log odds associated with one unit change of the independent parameter. In our case, the odds are defined as the ratio between the probability that a manager initiates a futures position (i.e., pulling the trigger) and the probability that (s)he does not initiate a futures position.

The model produces the likelihood ratio statistics and Wald statistics (the square of the parameter estimate divided by the standard error), both of which closely follow a chi-square (χ^2) distribution under the null hypothesis that the parameter being tested is zero. 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 (consisting of only an intercept). The higher the χ^2 value of the model, the better it describes the binary model. For the optimal model we also consider two goodness-of-fit statistics to examine the substantive significance of the variables in the model. We will consider Nagelkerke's R^2, which is similar to the R^2 in linear regression (Hair et al., 1995), and the proportional reduction of prediction error (PRPE) (cf. Sharma, 1996). The latter statistic indicates the improvement in predictive power compared to a null model that does not include the predictor variables. The PRPE statistic is closer to one, the more the model improves the null model in terms of predictive power (Hosmer & Lemeshow, 1989).

The model's chi-square (χ^2) values resulting from logistic regression are displayed in Table 2. The model significantly improves the fit when compared to the null model, which includes only an intercept ($p < 0.001$). Furthermore, as is not shown in the table, none of the models can be rejected when compared to a saturated model

Table 2
Results of the logistic regression in which risk attitude (RA) and the ratio of the futures price level (FP) to the manager's reference price (REFP) and the interaction between them predict the probability of initiating a futures position

	Risk attitude	FP/REFP	Interaction
To hedge or not (pulling the trigger or not)			
B	2.299	1.067	2.418
Wald statistic	5.805	20.37	8.874
Significance	0.016	0.000	0.003
χ^2-improvement	523.556		
Significance	0.0000		
Nagelkerke's R^2	0.43		
Correctly classified	89%		
PRPE	0.93		
(Huberty's test: $p < 0.1$)			

that perfectly describes the data ($p \approx 1.0$). This indicates that the models considered describe the data sufficiently well. Moreover, the proportion of correctly classified choices supports the validity of the models: 89%. That is, the model is able to predict whether or not a managers' initiate a futures position with good accuracy, based on the managers' risk attitude and the ratio of the futures price level to the manager's reference price. This proportion significantly exceeds the proportion of choices correctly classified by chance (Huberty's test: $p < 0.1$) further substantiating that the model was able to contribute to explaining the choice data. These statistical results show that manager's risk attitude and his/her reference price, and the futures price are crucial variables in understanding whether or not the manager will pull the trigger (i.e., initiate a futures position). The signs of the estimated parameters confirm that risk aversion and the ratio of the futures price level to the manager's reference price is positively related to the incidence of initiating a futures position. Furthermore, the positive sign of the interaction between risk attitude and the ratio of the futures price level to the manager's reference price show that the incidence of initiating a futures position by a risk-averse manager increases when the futures price exceeds the manager's reference price.

5. Conclusions and discussion

Recently, the literature has paid attention to the use of derivatives in a business of conduct context. Géczy et al. (1997), Howton and Perfect (1998), Koski and Pontiff (1999), Lee and Hoyt (1997), Mian (1996), Nance et al. (1993), Schrand and Unal (1998) and Tufano (1996) provide insight into the corporate characteristics associated with the decision to add derivatives to the corporation's risk management tools. This paper investigates how a manager decides to initiate a futures position in a concrete choice situation (e.g. whether or not the manager "pulls the trigger"). Such behavior might, for example, be explained using the mean–variance models (Robinson &

Barry, 1987) which assumes a change in risk attitude and volatility, something that is unlikely to occur in a short time span. Our results show that the managers' futures position initiation behavior can be explained by the level of risk attitude (treated as a variable that does not change within a short time frame) and the ratio of the futures price level to the manager's reference price. Risk aversion combined with a ratio larger than one increases the probability of a manager initiating a futures position and vice versa. Moreover, these two key components interact. That is, a risk-averse hedger will be more inclined to take a futures position than a less risk-averse decision-maker (or a risk-seeking decision-maker). This behavior, the willingness to take a futures position, will be more prominent when the ratio of the futures price level to the manager's reference price is larger than one. [8]

Our results show how the manager's reference price and futures price level may be incorporated in models that focus on concrete hedging choice behavior (as opposed to models that focus on how futures become part of the corporate business of conduct). The interaction between the ratio of the futures price level to the manager's reference price on the one hand and risk attitude on the other may be interpreted in an interesting way. One may view this interaction as risk attitude, the primary force behind hedging, being weighted by the ratio of the futures price level to the manager's reference price.

If we investigate futures initiation behavior without considering the ratio of the futures price level to the reference price, it will lead us to conclude that risk attitude changes are the driving force behind this type of behavior, but it is unlikely for risk attitude to change over a short span of time. Thus, failure to account for the reference price will mask the actual role of risk attitude. For further research of this type it seems valuable to combine accounting data with experimental data. Through experiments the decision behavior of managers in concrete choice situations may be based on evidence about how managers actually behave, something not always present in accounting data.

Our findings suggest several directions for further research. First, our study may be replicated within other financial services, such as speculation services, and may be replicated for other derivatives. Secondly, it would seem interesting to include the concepts proposed in this paper in other domains of finance where the manager's reference price might play a role. An example of such a domain is the research dealing with the equity puzzle, where the equity risk premium in a representative agent setting cannot be explained satisfactorily without introducing implausibly heightened levels of risk aversion (Cecchetti, Lam, & Mark, 1993; Kandel & Stambaugh,

[8] Note that our findings are consistent with rational maximizing behavior. If there is any optimality in the manager's compensation (i.e., if compensation is a convex function of performance), the manager may rationally choose not to initiate a futures position when futures prices are low compared to his/her reference price and will initiate a futures position when futures prices are high compared to his/her reference price. When futures prices are relative low, initiating a futures position may lock in a loss and foreclose the manager's option to profit from favorable price changes. Conversely, when futures prices are relative high, the manager's compensation may be a nearly linear function of firm performance.

1990; Mehra & Prescott, 1985). Including the concept of price levels and reference prices in this stream of research would be an interesting avenue to explore.

Acknowledgements

We are very grateful for the generous participation of the 450 managers in the personal computer-assisted interviews. Financial support provided by the Algemene Stichting Termijnhandel (AST), Amsterdam Exchanges (AEX), Chicago Mercantile Exchange, the Foundation for Research in Derivatives and the Niels Stensen Foundation is gratefully acknowledged. We would like to thank J.A. Bijkerk for building a user-friendly interface for the computer-assisted personal interviews. We benefited from the comments of participants at several research meetings at the University of California at Berkeley, the Wageningen University and Research Center, the Chicago Mercantile Exchange and the University of Illinois at Urbana-Champaign. The authors express special thanks to M. Altman, R.M. Leuthold, M.T.G. Meulenberg and A. Smidts who provided helpful comments on the research project and preliminary versions of this manuscript.

Appendix A. Confirmatory factor analysis results of risk attitude measure

The managers were asked to indicate their agreement with each item on a nine-point scale ranging from "strongly disagree" to "strongly agree".

Construct reliability = 0.70	Loading	*t*-value
(1) I like to "play it safe"	0.967	14.336
(2) With respect to the conduct of business I am risk averse	0.691	14.236
(3) With respect to the conduct of business I like to take the sure thing instead of the uncertain thing	0.736	15.098
(4) When I am selling hogs I like to take risks	0.541	4.586
$\chi^2 = 2.0$ (df $= 2, p = 0.37$); RMSEA = 0.0; GFI = 0.99		

RMSEA is the root mean square error of approximation and GFI the goodness-of fit index (Jöreskog & Sörbom, 1993). The likelihood-ratio chi-square statistic (χ^2) tests whether the observed and estimated matrices differ. Statistical significance levels indicate the probability that these differences are due solely to sampling variations. Low χ^2 per degree of freedom (value lower than 2.5) indicates that the actual and predicted input matrixes are not statistically different. The likelihood-ratio χ^2 statistic is heavily (negatively) influenced by sample size ($N > 200$) (Bentler, 1990). Because of this problem, other fit indices have been developed, such as the GFI which resents the overall degree of fit, that is the squared residuals from prediction compared with the actual data. The measure ranges from 0 (poor fit) to 1.0 (perfect fit). RMSEA estimates how well the fitted model approximates the population co variance matrix per degree of freedom (Steiger, 1990). Browne and Cudeck (1986) suggested that a value below 0.08 indicates a close fit (see Baumgartner & Homburg (1996), Bentler (1990), and Hair et al. (1995) for a detailed explanation of the fit indices).

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