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Finance Research Letters 2 (2005) 173–184

Finance Research
Letters

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Risk aversion and price limits in futures markets

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Received 28 September 2004; accepted 18 May 2005

Available online 14 July 2005

Abstract

Assuming that a representative trader is risk-neutral, Brennan [1986. *Journal of Financial Economics* 16, 213–233] shows that price limits, in conjunction with margins, may help reduce the default risk, lower the margin requirement, and decrease the total contract cost. We show that Brennan's result is true only when the trader's degree of risk aversion is low and the precision of additional information about the equilibrium futures price is also low. When the trader either is more risk-averse or can receive precise information, price limits become ineffective in either reducing the default probability, cutting down the margin requirement, or lowering the contract cost.

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JEL classification: G10; G13; G14; G18

Keywords: Futures market; Price limits; Margin requirement; Default risk

1. Introduction

The use of price limits in futures markets has generated a great deal of discussion since the global market crash in October 1987. Several researchers have tried to examine the

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impact and effectiveness of price limits, either empirically or theoretically. In essence, price limits are designed to reduce the total cost for market participants by serving as a price stabilization mechanism to assure the proper operation of futures markets. Their impact on the operation of markets, however, is still under debate.

Advocates and supporting evidence suggest that price limits prevent extreme price movements and provide a cooling-off period during events of overreaction (e.g., [Ma et al., 1989](#); [Greenwald and Stein, 1991](#); and [Arak and Cook, 1997](#)). Furthermore, since price limits constrain the price change in a trading period, they may serve to reduce the potential default risk in futures contracts ([Brennan, 1986](#)).

Opponents to price limits contend that the imposition of price limits, instead of stabilizing price changes, may actually impede the price discovery process by preventing the price from reaching its equilibrium level effectively. The view that price limits serve nothing, but merely slow down the price adjustment process, has also gathered many proponents and supporting evidence (e.g., [Telser, 1981](#); [Figlewski, 1984](#); [Miller et al., 1987](#); [Lehmann, 1989](#); [Fama, 1989](#); [Kim and Rhee, 1997](#)). It is also argued that price limits may impose additional risks on market participation, because they prohibit mutually beneficial trades at prices outside the limits (e.g., [Ackert and Hunter, 1994](#)). A final argument against price limits is that they may have a “magnet effect.” This is because traders, for fear of losing liquidity and being locked in a position, may rush to protect themselves through active trading. As a result, when the price is close to a limit, the trading volume will be heavy and the price limit rule will serve as a magnet that further pulls the price even closer to the limit (e.g., [Lee et al., 1994](#); [Subrahmanyam, 1994](#); and [Harris, 1997](#)).

Some researchers have tried to examine whether the use of price limits, in conjunction with margin requirements, can improve the efficiency of the futures markets. [Telser \(1981\)](#) and [Figlewski \(1984\)](#) point out that price limits cannot substitute for margins since they, though lengthening the time it takes to adjust to a new equilibrium, do not reduce the size of price change. On the other hand, [Ackert and Hunter \(1994\)](#) argue that price limits can decrease the margin that brokers and exchanges require since repressing prices reduces the probability of default resulting from unfavorable price movements and thus lowers the risks.²

Assuming that a representative trader is risk-neutral, [Brennan \(1986\)](#) shows that price limits, in conjunction with margins, may help reduce the default risk, lower the margin requirement, and decrease the total contract cost. Intuitively, price limits provide a mechanism that obscures the exact amount of the loss incurring to the trader when price limits are triggered. Being uncertain about the magnitude of the loss, a risk-neutral trader bases his decision on the expected loss, conditional on the information of a limit move. He will adhere to his position if the expected loss is less than the effective margin, and will renege otherwise. Thus, there exist conditions in which certain combinations of price limits and margin requirement may improve the operation of the market. However, Brennan also indicates that the effectiveness of price limits disappears when the trader can obtain precise information derived from other markets such as the spot market. He predicts that price

² In a different dimension, there is a rich amount of literature on margin setting (e.g., [Gay et al., 1986](#); [Edwards and Neftci, 1988](#)) and the impact of margin on trading activities (e.g., [Fishe et al., 1990](#); [Adrangi and Chatrath, 1999](#)).

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