



Clearing margin system in the futures markets—Applying the value-at-risk model to Taiwanese data

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Abstract

This article sets out to investigate if the TAIFEX has adequate clearing margin adjustment system via unconditional coverage, conditional coverage test and mean relative scaled bias to assess the performance of three value-at-risk (VaR) models (i.e., the TAIFEX, RiskMetrics and GARCH-t). For the same model, original and absolute returns are compared to explore which can accurately capture the true risk. For the same return, daily and tiered adjustment methods are examined to evaluate which corresponds to risk best. The results indicate that the clearing margin adjustment of the TAIFEX cannot reflect true risks. The adjustment rules, including the use of absolute return and tiered adjustment of the clearing margin, have distorted VaR-based margin requirements. Besides, the results suggest that the TAIFEX should use original return to compute VaR and daily adjustment system to set clearing margin. This approach would improve the funds operation efficiency and the liquidity of the futures markets.

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1. Introduction

Margins on futures contracts help protect the integrity and reputation of the futures exchange. If one party defaults, the exchange clearinghouse must fulfill the contract instead. Therefore, the exchange clearinghouse sets margin requirements for both parties to guarantee futures contracts performed. As the margins deposited can be regarded as transaction costs for participation in the futures market, the exchange clearinghouse must consider the tradeoff between numbers of failures and efficiency of funds used when setting the margin requirement level.

In Taiwan, the clearing and settlement processes are performed via the Clearing Department of the TAIFEX, which administers the collection of margins from clearing members and the transfer of funds among members to settle losses and gains on a daily basis. If the amount of margin is insufficient, the clearing member

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will receive a margin call issued by the Clearing Department and is required to deposit adequate margin into its trading account to supplement the deficit. The financial safeguard system operated by the TAIFEX thus relies on the integrity of the system established by the clearing members.

In the TAIFEX, the clearing margin is set using a value-at-risk (VaR) basis to calculate the risk coefficient based on stock price movements during certain periods to cover 99.7% single-day price volatility risk. The risk coefficient is reassessed periodically to reflect market conditions. Whenever the range of price variation exceeds 15%, the clearing margin will be adjusted. However, the measurement of the TAIFEX clearing margin might be distorted under this system. If the margin level is too low, losses might exceed it when market volatility increases, resulting in one party unpaid. The exchange is exposed to risk in this situation and the financial markets will be further damaged. If the exchange clearinghouse sets a high margin to remove the default risk, the ability of the exchange to control risk increases, while the leverage effect reduces and transaction costs increase. This condition will reduce trader desire and market liquidity [1]. Therefore, the optimal margin level represents a balance between trader willingness and the ability of the exchange to control risk. Now it is important to investigate the appropriateness of the manner in which the TAIFEX uses absolute returns to calculate VaR, and the time it adjusts the clearing margin requirement only when the calculated required clearing margin of the trading day exceeds that of the previous day by 15%.

Previous studies concerning the method of determining optimum margins focus primarily on how to set margin levels to reduce default risk [2–5] or to minimize contract costs [6]. However, now we would like to examine if the current clearing margin of the TAIFEX corresponds to the VaR spirit. Therefore, the main purpose of this article is to compare another VaR-based model (the RiskMetrics and GARCH-t models) with the TAIFEX VaR model to investigate the adequacy of the method to calculate and the time to adjust the TAIFEX clearing margin. Correspondingly, this article suggests that the TAIFEX should adopt more accurate methods to set optimal clearing margins without increasing risk levels.

In general, the results tend to suggest that to increase the fund use efficiency and the willingness of market participants, the TAIFEX should regulate the clearing margin requirements according to daily VaR based on original returns.

The remainder of this article is organized as follows. Section 2 explains the TAIFEX clearing margin system and presents the related literature on margin requirement followed by a description of the data and the empirical methodology adopted for this study. Section 4 presents the results of this study, and Section 5 summarizes the conclusions drawn from the results.

2. Clearing margin system and literature review

2.1. Clearing margin system of the TAIFEX

The Clearing Department of the TAIFEX in Taiwan deals with clearing members and guarantees the trades performed through the TAIFEX facilities. The TAIFEX also calculates the liabilities of clearing margin, variation margin and clearing fees for each clearing member after the market is closed.

The TAIFEX adopts absolute returns to calculate VaR by assuming that the risks shouldered by long and short positions of futures contracts closely resemble each other. However, if the probabilities of price rising and declining are different, the symmetric distribution assumptions of the clearing margin requirement may be unreasonable, and lead to risk overestimation or underestimation [7]. Furthermore, the TAIFEX computes the clearing margin required to cover 99.7% single-day price volatility risk, assuming the returns of the next trading day follow a normal distribution. Although the TAIFEX calculates VaR daily, the clearing margin is not adjusted on a daily marked-to-market basis; instead, it is adjusted to the adjustment standards. That is, when the required margin of the trading day exceeds that of the previous one by 15%, the newly required margin is round to the next nearest ten thousand dollars (valued at NTD). If the new required margin differs from the original one, the former is set as the clearing margin level for the next day. In a word, the TAIFEX adjusts the clearing margin in a tiered manner.

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