以真實股價機率分佈為基礎之選擇權評價及避險研究

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摘要

選擇權的起源來自於 17 世紀荷蘭人購買鬱金香避險的工具，由於台灣金融市場的股價具有漲跌幅限制的特性，因此選擇權的訂價若未考慮漲跌幅特性可能會有錯估之情形，使得避險策略上有套利之情形發生。Black and Scholes(1973)假設股價報酬率符合常態分配，並推導 Black-Scholes 選擇權評價模型(B-S)，不過在金融市場中，股價報酬率不符合常態分配，以及會被限制在漲跌幅 7%的情況，因此本文藉由擁擠距離提出一個真實股價機率分佈之選擇權評價。研究方法為將股價報酬率排序後，算出擁擠距離值(CD)，藉由前緣(Frontier)的挑選方式，推算股價報酬率的真實股價機率分佈，稱為 FCD 分配(Frontier Crowding Distance)，不過會有高估機率的可能，因此再藉由區塊密度的方式，算出區塊的機率，機率分佈稱為 DCD 分配(Density Crowding Distance)，藉由兩種機率分配，推導新的歐式選擇權評價，稱為 FCD-BS 模型與 DCD-BS 模型。本研究藉由 Vähämaa (2003)的避險研究方法做避險組合，並且在到期日作結算，了解新選擇權是否比 B-S 的避險誤差小，以便於評價模型的優劣。研究資料以台指選擇權做實證。實證結果顯示出 FCD-BS 的避險表現極不穩定，但透過 DCD-BS 可以明顯改善 FCD-BS 會高估機率的情形，並且有較穩定的避險績效。因此，藉由模擬股價機率分佈的真實性可以有效求得選擇權評價，進而得到有效的避險。

關鍵詞： Black-Scholes 選擇權評價模型、擁擠距離、FCD-BS 模型、DCD-BS 模型、避險誤差

A study of Option Pricing and Hedging Capability based on real stock probability distribution

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Abstract

The origin of option began with hedging tool of buying Dutch's tulip in the 17th century. Due to the characteristics of price limits in Taiwan financial markets, if we do not take the characteristics of price limits into consideration, it may cause the arbitrage in the Hedging Strategy. Black and Scholes (1973) supposed that stock return follow normal distribution, based on that suppose, they derived the Black-Scholes option model. However, actual stock return didn't follow normal distribution , and the extension of the changes of the stock price will be limited at 7% in financial market in Taiwan. Based on probability distribution be produced by crowding distance, this paper derives Black-Scholes model with Crowding Distance. This paper constructs hedge portfolio by Vähämaa (2003) , and the sample chosen from the TAIEX during January 3, 2010-December 31, 2010. The empirical tests shows that FCD-BS Model's hedging error not well, but DCD-BS Model can increase hedging capability. Thus, we could obtain the option pricing of efficient by simulating probability distribution.

Keywords： Black-Scholes Model、Crowding Distance、FCD-BS Model、DCD-BS Model、Hedging Error

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