



Early unwinding of options-futures arbitrage with bid/ask quotations and transaction prices

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Abstract

By early unwinding of initial arbitrage positions simulated from bid/ask quotes and transaction prices, options-futures arbitrageurs can capture extra profits. Profits peak when arbitrageurs apply the dynamic early-unwinding strategy to the bid/ask quotes. Profits are at their lowest when arbitrageurs use the static hold-to-expiration strategy based on transaction prices. However, due to stale quotes, executing trades at prevailing bid/ask quotes can overstate both the size and frequency of arbitrage profits compared to transaction data for either the early-unwinding or the hold-to-expiration strategy. © 2003 Elsevier Science Inc. All rights reserved.

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1. Introduction

This study extends the early-unwinding strategy to bid/ask quotes supplied by market makers. The size and frequency of actual arbitrage opportunities are compared with those derived by simulating hold-to-expiration strategy based on transaction data.

Many studies have examined potential arbitrage profitability and its implication on options-futures efficiency (e.g., Lee & Nayar, 1993). In efficient markets, investors should quickly take advantage of pure arbitrage opportunity—when and if such an opportunity arises. Investors could exploit the price disparity, if any, among the options and futures and

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secure arbitrage profits. Research also shows that early unwinding the initial arbitrage positions based on transaction prices provides additional profits over and above the profits generated by the static hold-to-expiration strategy (Fung, Cheng, & Chan, 1997; Merrick, 1989).

Fung and Chan (1994) and Lee and Nayar (1993) use the hold-to-expiration strategy to examine the arbitrage efficiency between the S&P 500 Index options and futures contracts. Fung et al. (1997) and Fung and Fung (1997) use transaction data to examine the profitability and efficiency of the Hong Kong Hang Seng Index (HSI) options and futures contracts. Draper and Fung (2002) use the parity condition to examine the arbitrage efficiency between the FTSE-100 Index futures and index options. Hemler and Miller (1997) study the efficiency of the options market by using the bid and ask prices of the S&P 500 Index options. Although they find mispricings, they caution that because of stale prices, some quotes might not have been executed. Thus, the apparent arbitrage profits could be illusory.

Fung and Mok (2001) reexamine the HSI options-futures parity condition, using bid/ask quotes and transaction data. They find that under the hold-to-expiration strategy, executing the trades at prevailing bid/ask quotes overstates the mispricings that are signaled by transaction data.¹ Moreover, due to stale prices and execution delay, the apparent arbitrage profits could be deceptive.

Following another line of research, Cheng, Fung, and Pang (1998) and Draper and Fung (2002) simulate the options-futures early-unwinding strategy (Brennan & Schwartz, 1990; Finnerty & Park, 1988) using transaction data of the HSI and FTSE-100 Index derivatives, respectively. They show that by capturing the reversals in pricing errors, a dynamic strategy based on early unwinding provides an incremental profit over and above the static hold-to-expiration strategy.

This study extends these two lines of research by simulating the early-unwinding strategy on 20 months of bid/ask quotes and transaction data (from April 1994 to August 1995) obtained from the Hong Kong Futures Exchange. Note that the data are unique, since the exchange stopped providing concurrent bid/ask quote data after the release of this data set.

Options and futures are usually traded at ask or bid instead of somewhere in between, as in index portfolio (Harris, Sofianos, & Shapiro, 1994). When only the transaction data are available, the conventional approach tries to alleviate the problem of misidentification by adding or subtracting a spread from the traded price to impute the bid and ask prices. However, this results in underestimation or overestimation of the prospective arbitrage profits. Using bid/ask quote data alleviates the problem of misidentifying arbitrage opportunities in transaction data. Alleviating this misidentification problem is particularly important when a trader adopts the early-unwinding strategy, because it requires identifying the pricing errors at both the initial and the closing of the portfolios.

¹ This result is different from Bae, Chan, and Cheung (1998) and the difference is explained in Fung and Mok (2001). Suffice it to say here that Bae et al. adopted a 10-minute time interval as their matching criterion for the options-futures trios that could introduce significant legging risk and biases.

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