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# Stock market closure and intraday stock index futures market volatility: “contagion”, bid–ask bias or both?

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## Abstract

Chang et al. [Journal of Business 68 (1) (1995) 61] examine the impact of the closure of the New York Stock Exchange (NYSE) on S&P500 stock index futures traded on the Chicago Mercantile Exchange. They document a decline in futures market volatility immediately after the close of the NYSE, and an increase 15 minutes later when the futures market closes. They attribute this to contagion—i.e. a decline in information transfer from equities to futures markets following the closure of the underlying market. This paper examines the impact of the extension of trading hours in Hang Seng Index futures traded on the Hong Kong Futures Exchange on the 20 November, 1998 to 15 minutes after the close of the underlying market (the Stock Exchange of Hong Kong). Using the unique natural experiment provided by this change, a pattern similar to US markets is documented for the Hang Seng Index Futures following the change in trading hours. This provides strong evidence that the intraday pattern in volatility is caused by market closure. Unlike US futures exchanges, price reporters on the floor of the Hong Kong Futures Exchange collect quote data in addition to trade data. This data facilitates a test of another plausible microstructure explanation for the observed behaviour—bid–ask bounce associated with trading activity. This paper provides evidence that bid–ask bounce also explains part of the observed intraday behaviour in price volatility. © 2001 Elsevier Science B.V. All rights reserved.

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## 1. Introduction

Chang et al. (1995) examine the behaviour of stock index futures markets when underlying markets close. They argue that such research provides evidence on the impact of underlying market closure for institutional or regulatory reasons, such as 24-hour trading of derivatives and trading halts in stock markets. In motivating their research they note the relative dearth of literature examining the impact of underlying market closure on futures market behaviour [p. 66]:

Most of the extant research on volatility presents results of analyses while both the underlying asset market and the futures market are open, but essentially no evidence seems to exist on the effect of closing of the underlying asset market on the futures market.

Apart from the research by Chang et al. (1995), this motivation is still relevant today. This study aims to provide further evidence on this issue by examining the intraday trading behaviour of the Hang Seng Index futures contract traded on the Hong Kong Futures Exchange (HKFE).

Chang et al. (1995) examine price volatility around the last 15 minutes of trading in S&P500 futures, which trade for 15 minutes longer than the New York Stock Exchange. On 20 November, 1998 the HKFE extended the trading hours of Hang Seng Index futures to commence trading 15 minutes prior to the opening, and continue for 15 minutes after the close of the underlying market (the Stock Exchange of Hong Kong). This change provides a natural laboratory experiment for extending the analysis of Chang et al. (1995). The change in HKFE trading hours also provides an opportunity to examine trading behaviour in stock index futures contracts when the underlying market *opens*.

Chang et al. (1995) use two theoretical models to develop predictions on the behaviour of futures markets when the underlying market closes. The contagion model developed by King and Wadhvani (1990) implies that traders in one market draw information from observed price movements in another, hence price movements in one market affect price behaviour in other related markets. The model predicts a decline in futures market volatility when the underlying market closes. The strategic trading models developed by Admati and Pfleiderer (1988) and Foster and Viswanathan (1990) imply that informed traders seek to transact during periods when liquidity (uninformed) traders trade in order to minimise execution costs, such as when a market opens or closes. Consistent with these models, Chang et al. (1995) demonstrate that price volatility in S&P500 index futures drops immediately when the underlying market closes, and subsequently increases in the closing minutes of trading. The theories relied on by Chang et al. (1995) imply that a similar mini U-shaped pattern in price volatility is expected at the close, as well as the open of trading on the HKFE following the change in trading hours. However, no such pattern is expected *prior* to the change in trading hours. This provides a natural control for testing the impact of cash market closure on futures price volatility.

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