Short-term market efficiency in the futures markets: TOPIX futures and 10-year JGB futures

Joel Rentzler [a], Kishore Tandon [b],*, Susana Yu [c]

[a] *Department of Economics and Finance, City University of New York-Baruch College, USA*
[b] *Department of Economics and Finance, City University of New York-Baruch College, USA*
[c] *Department of Finance, Business Economics and Legal Studies, Iona College, USA*

Abstract

This paper examines the effect of the past price information on the two major futures contracts traded on the Tokyo Stock Exchange: the TOPIX futures and the 10-year JGB futures. The unique 90-min lunch break on the exchange creates two mini-sessions in each calendar-trading day. This paper compares these contracts between the morning and afternoon sessions. In addition, percentage-returns and tick-size-returns are used to measure the intraday price movements following past price performance. These futures contracts present evidence of short-term market inefficiency over the period 1994 to 2003.
© 2006 Elsevier Inc. All rights reserved.

1. Introduction

As high-frequency trading data has become more accessible and computing technology more affordable, researchers can now test the random hypothesis on a daily or intraday basis. In addition, with the availability of intraday data, market imperfections such as bid–ask spreads, commissions, and market impact, can be handled with more accuracy when testing for market inefficiencies. The objective of this paper is to examine the short-term

---

* Corresponding author. Zicklin School of Business, Box B10-225, Baruch College City University of New York, One Bernard Baruch Way, New York, NY 10010, USA. Tel.: +1 646 312 3468.
E-mail address: Kishore_Tandon@baruch.cuny.edu (K. Tandon).

efficiency in the two futures contracts traded on the Tokyo Stock Exchange (TSE). Persistent price movements, either continuance or reversal, following past price information is construed as proof of a lack of short-term efficiency on the TSE.

There is a growing interest in testing the short-term efficiency of futures markets. Tse (1999) examines the Japanese government bond (JGB) futures, listed on both the London and the Tokyo futures exchanges, and concludes that both markets are equally efficient. Lee, Gleason, and Mathur (2000) examine the French futures exchange and validate the random walk hypothesis. Fung, Mok, and Lam (2000) provide strong support for the intraday overreaction theory in the Hong Kong futures market but only minor support in the U. S. futures market. In addition, Fung and Lam (2004) show the existence of intraday overreaction during intraday trading and market closing on Hang Seng Index futures contracts. They suggest that pricing error of the index futures relative to its fair value can be used to identify investors' overreaction in index futures markets. Grant, Wolf, and Yu (2005) test the short-term efficiency of the U.S. equity index futures market examining 15 years of intraday data and conclude that the market may be inefficient for very short horizons. However, bid–ask spreads and market impact may seriously dampen the potential profit of a strategy designed to exploit this short-term inefficiency. Researching seven major currency futures contracts traded on the Chicago Mercantile Exchange, Rentzler, Tandon, and Yu (in press) conclude that large daily or opening price moves can be used to predict immediate intraday price movement patterns.

This paper differs from others in several ways. First, the TSE has a morning session and an afternoon session separated by a 90-min lunch break, which creates a gap in the information flow and generates two pairs of opening and closing prices within a calendar-trading day. Second, this study uses an adaptive filter rule to alleviate the bias caused by choosing an arbitrary filter, which may commit a fallacy of prophecy. Third, this study adopts two measures of price movements, percentage movements and tick-size movements, to evaluate results from trading futures contracts. Although the first measure is widely recognized, the second measure allows for a clearer interpretation and is also more suitable for futures trading where there is an investment base problem. Finally, this study examines the robustness of pricing errors across two sub-periods to check if these short-term inefficiencies persist.

The remainder of this paper is organized as follows. Section 2 describes the TSE, the TOPIX and 10-year JGB futures contracts, data characteristics, and two measures of past price performances in each session. Section 3 presents the methodology, which includes regression analysis, the adaptive filter rule and day-of-the-week analysis. The fourth section reports the empirical results of the four filters (measures) over the 1994 to 2003 period. Section 5 concludes the findings of the paper.

2. Data

The Tokyo Stock Price Index (TOPIX) is a market-value-weighted composite index of all common stocks listed on the First Section of the Tokyo Stock Exchange (TSE).[1] The

---

[1] The TSE domestic stock market is divided into two sections – the First and Second Sections. The First Section is the market place for stocks of larger companies, and the Second Section is for those of smaller and newly listed companies.