



# An empirical investigation of trading volume and return volatility of the Taiwan Stock Market

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## Abstract

This study examines the Mixed Distribution Hypothesis (MDH) using 5-min interval stock returns of the Taiwan Stock Index (TSI). Startlingly enough, the persistence of stock volatility remains dominant after the stochastic mixing variable was included in the variance equation. It implies that the MDH cannot explain away the ARCH phenomenon. We have found that the composition of participants (approximately 92% of participants are individual investors) in TSI is a major contributing factor to the persistent volatility. In addition, the existence of limits on price changes, to some extent, accounts for the persistence phenomenon. Similar results are also found for individual stocks in the sample. Interestingly enough, the explanatory power of trading volume exhibits a U-shaped pattern in explaining return volatility in Taiwan Stock Market. © 2001 Elsevier Science Inc. All rights reserved.

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## 1. Introduction

Taiwan, the orphan of Asia, has had more than her share of political vicissitude throughout her 400-year-old history. Prior to the war of 1895 in which Taiwan was seceded to Japan, the staple of export had been deer hides and camphor products under the rule of Dutch and Manchu

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regimes. During Japanese occupation, the lion's share of export hinges on sugar industry. It was not until early 1960s that Taiwan develops her sound export-oriented trade policy under the nationalist government. Since then, the bubbling economy of Taiwan is considered an example of successful economic development especially for Asian emerging economies. The fact that the Taiwan Stock Index (TSI) is included in Morgan–Stanley Emerging Market Free Index, World Free Index, and Fareast (except Japan) Free Index is testimonial to an ever increasing financial role Taiwan plays in the Asian market. Prior to the announcement (April 3, 1996), the Taipei market had gained 95 points with the closing index of 5127.49 valued at US\$30.86 billion. On April 6, TSI rocketed to 5377.19 (valued at US\$76.97 billion) with a sizable gain of 201.44 points in just 2 h. Because Morgan–Stanley index is one of the major guiding principles for portfolio managers, the inclusion of TSI makes the Taiwan market an attractive choice in international financial market. However, in an attempt to prevent the first popular presidential election (March 23, 1996) in Taiwan, mainland China launched a series of missile exercises around the island. As a consequence, TSI took a plunge to about 4700 points, but bounced back to approximate 5500 points as more positive information arrived. Since then, other economic upheavals and political jitters have caused TSI to be very sensitive to newly arrived information. Recent stock turmoils in Hong Kong, Taiwan, and other Asian emerging economies inevitably transmitted its volatility to the record 554-point plunge and 337-point, next-day rebound of the Dow Jones industrial average in October 1997. Hence, a careful examination of the variance equation of TSI can be of critical importance in understanding the nature of volatility in an emerging market. As pointed out by Huang (1995), only 5% of participants in TSI were institutional investors, with a great majority of 95%, individual investors.<sup>2</sup> Such an unusual composition creates an environment, which is conducive to the formation of “irrational exuberance” in which individual investors focus primarily on short-term profit. As such, the great majority of TSI investors appears very jittery to the arrival of new information, while the fundamental aspects of firms play only a secondary role.

No sooner had TSI (77 individual stocks) been included in the Morgan–Stanley Emerging Market Free Index and the Dow Jones World Index than the bubbling Taiwan market became a financial safari for foreign investment companies. A conservative estimate of new international investment on TSI is US\$30 billion in the first 2 years. The flip side is that an emerging market in general does not have a well-structured financial system and lacks maturity in terms of market scales and regulations. Needless to say, the bottom line for many investors is the profitability (abnormal profit) of the Taiwan market, which inevitably begs to the question of the weak form efficient market hypothesis. Majority of studies of the efficient market hypothesis on TSI (e.g., Huang 1995; Huang & Yang 1995) cannot find a serious deviation from the random walk hypothesis.<sup>3</sup> Their conclusion, based on the variance ratio (VR) test and rescaled range (R/S) test, does not necessarily suggest an efficient market for TSI. The discrepancy between statistical results and the widely-held view about the Taiwan market may

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<sup>2</sup> According to 1995 data released by Taiwan Stock Exchange, the ratio is 8% and 92%, respectively.

<sup>3</sup> Huang and Yang (1995), using the modified R/S technique (Lo, 1991), fail to reject the null hypothesis with daily, and monthly stock returns. Similarly, Huang (1995) fails to reject the null hypothesis, using the heteroscedasticity-consistent VR statistic.

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