



# Intraday information efficiency on the Chinese equity market<sup>☆</sup>

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## ABSTRACT

Bid-ask spread is a direct measure of information asymmetry. As such, it can be used to evaluate information efficiency. In this paper, we show that both the quoted and effective spreads on the Shanghai Stock Exchange are extremely high at the open, decrease over the trading day, and experience a small rebound at the close. The spread decreases with share volume, daily trades, and market capitalization, but increases with average trade size. We further examine the beta using the unbiasedness regression from Biais et al. [Biais, B., Hillion, P., Spatt, C. (1999). Price discovery and learning during the pre-opening period in the Paris Bourse. *Journal of Political Economy*, 107, 1218–1248] and find that intraday prices are efficient and unbiased for more liquid stocks. This suggests that liquidity prompts information-motivated trading, which, in turn, improves information dissemination. Moreover, our findings indicate that small and medium trades are more likely to facilitate the formation of efficient prices at the open and close of the market, while large trades play a more important role during the other trading periods.

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## 1. Introduction

Looking at trading mechanisms within different market structures provides insight into the ways financial markets operate. There is a growing literature examining a variety of structural aspects of trading mechanisms across different markets. Market efficiency, price discovery, trading costs, and the behavior of informed and liquidity traders are among the most widely researched and discussed topics. Central to any such research is the relative informational efficiency of market prices.

The opening of the Shanghai Stock Exchange in 1990 marked the beginning of an electronic quotation and surveillance system for equity trading in China. Electronic trading allows market participants to observe and track share prices, volume, and trades of any stock on the exchange. Even though the Chinese market has operated for nearly two decades, there have been a relatively limited number of articles studying the behavior of share prices on that market. The Chinese market is well-known for its lack of qualified security analysts, low transparency, uniform tick size, price limits, short-selling restrictions, and dominance of unsophisticated individual investors. These factors contribute to the difficulty in conducting research on the Chinese market. Earlier work that has attempted to explore the efficiency and accuracy of stock markets employs low frequency data which are based on daily, weekly, or monthly trades. In this paper, we use a tick-by-tick dataset to assess the efficiency and price discovery process for share prices on an intraday level.

With the dramatic growth in market capitalization over the past decade, the Chinese market has received increased attention from foreign institutional investors. For these investors, the degree of intraday information efficiency has a direct impact on the fair external environment for trading, which, in turn, is beneficial to their investments. This study utilizes a unique dataset which consists of quotes and trades for the 180 component stocks included on the Shanghai Stock Exchange from June 1, 2004 until May

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31, 2005. We use this dataset to evaluate the information efficiency of transaction prices, a key dimension of market quality. Analysis of the Chinese data provides an important first step towards understanding the dynamic behavior of share prices in this emerging market. Specifically, we try to answer the question of how price discovery evolves over the trading day.

In general, stock prices in a market with greater liquidity, lower trading costs, and fewer restrictions are more likely to move closer to their fundamental values. The Chinese market, with its low transparency, high trading costs, and many restrictions, tends to play a less important role in price discovery. However, our evidence indicates that information efficiency on the Chinese stock market is comparable to other markets, even on an intraday level. As more informative prices facilitate better informed investing and financing decisions,<sup>1</sup> our results have significant implications for the real economy.

Several studies have discussed information efficiency and price discovery in mature markets. *Stoll and Whaley (1990)* and *Madhavan and Panchapagesan (2000)* examine the importance of the specialist to price discovery on the New York Stock Exchange; *Biais, Hillion, and Spatt (1999)* probe the interaction between price discovery and the learning process before the opening of the Paris Bourse; *Flood, Huisman, Koedijk, and Mahieu (1999)* show the role that transparency plays in opening spreads and price discovery within an experimental framework; *Cao, Ghysels, and Hatheway (2000)*, and *Ciccotello and Hatheway (2000)* discuss the impact of pre-opening nonbinding quotes submitted by market makers on Nasdaq; *Domowitz and Madhavan (2001)* survey price discovery through nonbinding quotes when there is no trading; *Davies (2003)* examines price discovery by registered traders on the Toronto Stock Exchange; *Barclay and Hendershott (2003)* analyze the relationship between price discovery and trading; *Ellul, Shin, and Tonks (2005)* assess the performance of call markets at the open and close of the London Stock Exchange; *Comerton-Forde and Rydge (2006)* investigate the effect of a call auction design on price efficiency on the Australian Stock Exchange; and *Barclay and Hendershott (2008)* find that prices discovered through non-trading mechanisms on Nasdaq reveal less information than those discovered through trading mechanisms.

This article makes three contributions to the literature. First, due to the presence of controls on capital accounts, the Chinese market is more or less insulated from other mature markets. The ability to look at it in isolation allows us to generalize our findings to other markets and therefore complement similar studies that have already been conducted on those markets. Second, we provide some insight into how the Chinese market is able to produce efficient prices despite loose regulations and trading constraints. This is of interest both academically and practically. Finally, there have been few studies of order-driven and emerging markets such as the Chinese Stock Exchange, as opposed to quote-driven and developed markets.

The rest of the paper is arranged as follows. In *Section 2*, we describe the sample data and provide descriptive statistics. *Section 3* compares trading costs on an intraday level. In *Section 4*, we present the empirical findings. *Section 5* concludes the paper.

## 2. Data and descriptive statistics

### 2.1. Market structure

The Chinese market is a fully automated order-driven electronic trading system. Its operation is similar to that of the Paris Bourse and the Tokyo Stock Exchange. The exchange is open five days a week, from 9:30 am to 15:00 pm, with a lunch break from 11:30 am until 13:00 pm. There is a 10-minute call auction from 9:15 am to 9:25 am, to determine the opening price before the morning session. There is no such procedure before the afternoon session. During the call auction, only market orders and limit orders can be submitted, both of which remain valid for one day. After investors place a buy (sell) limit order specifying the bid (ask) price and the number of shares to be purchased (sold) with a broker, the orders are sent to the order book and await execution through the matching priority scheme of the computerized trading system. The Chinese market continuously publishes details of the five most recent orders, including their bid/ask prices and the number of shares to be traded.

Unlike the US market, the Chinese market does not have market makers to maintain stable stock prices by trading on their own accounts. As a result, dealer profit is absent from the spread decomposition on the Chinese market. Individual investors trading A-shares are required to trade via a broker. Consequently, a broker on the Chinese market plays the role of buyer or seller for his clients during trading.

A special aspect of the Chinese market, which affects the bid-ask spread, is the presence of illiquid shares. About two-thirds of outstanding Chinese stocks are state-owned shares and legal-person shares, neither of which is transferrable or tradable on the market. This further aggravates the problem of information asymmetry. Owners of illiquid shares exert a great deal of influence on corporate governance. They tend to dominate the board of directors and control inside information. Common traders, on the other hand, receive very little information. These mechanisms affect transparency and information dissemination on the Chinese market.

### 2.2. Dataset

The dataset used for this study consists of the 180 component stocks of the Shanghai 180 composite index during the period from June 1, 2004 to May 31, 2005. Available data includes all intraday tick data for code, date, time, price, volume, spread, bid and ask quotes, and bid and ask volume. The high frequency data are obtained directly from the China Stock Trade and Quote Research Database (CSTQRD). The CSTQRD provides data on trades and quotes on the Chinese Stock Exchange, time-stamped to the nearest second. Information on market capitalization, which we use as a classification indicator, is obtained from the China Stock Market

<sup>1</sup> *Subrahmanyam and Titman (2001)* examine the interaction between price and cash flow. *Wurgler (2000)* reports a strong association between markets and real investment in countries whose stock markets reflect more firm-specific information.

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