



Intraday technical analysis of individual stocks on the Tokyo Stock Exchange

Ryuichi Yamamoto*

Department of International Business, National Chengchi University, 64 Sec. 2, Chih-Nan Rd., Taipei 11605, Taiwan

ARTICLE INFO

Article history:

Received 17 February 2012

Accepted 3 July 2012

Available online 10 July 2012

JEL classification:

G12

G17

G14

Keywords:

Technical analysis

Order-flow imbalance

Order-book imbalance

Intraday trading

Data snooping

Japanese stock market

ABSTRACT

This paper conducts an intraday technical analysis of individual stocks listed on the Nikkei 225. In addition to the price-based technical rules popularly examined in the literature, we uniquely propose and statistically investigate technical rules that utilize information regarding (1) the order-flow imbalance and (2) the order-book imbalance. Technical analysis using the imbalance-based trading rules is motivated by the evidence presented first in this paper that short-term returns can be predicted from the information regarding the order-flow and order-book imbalances for more than half of Nikkei 225-listed stocks. However, we demonstrate that no strategies, including limit order trading where trading signals are derived from the order-book imbalance, beat the buy-and-hold strategy within our sample. The results imply that past prices and demand/supply imbalances do not contribute to profiting in intraday trading and that non-execution and picking-off risks are too large for limit order trading to be profitable in our sample.

© 2012 Elsevier B.V. All rights reserved.

1. Introduction

Technical analysis involves the use of historical market data, such as price, volume, and other observables, to predict future returns in financial assets. This technique has been widely used by financial market professionals and much investigated by academic researchers. For example, the studies of survey data conducted by Lui and Mole (1998), Menkhoff and Taylor (2007), and Menkhoff (2010) demonstrate that financial market professionals rely heavily upon technical trading strategies to form their own trading plans.¹ Numerous empirical studies of technical analysis have also been carried out, particularly since the 1960s.² Thus far, real market professionals and academic researchers have paid particular attention to past price data in order to evaluate the profitability of technical trading rules. However, in addition to price and volume data, other market data such as order flows and order-book information,

have recently been made available to the public in real time.³ Since order flows and the state of the order book provide information about likely price movements, technical trading strategies that are formulated based upon such information would be expected to yield profits. This paper thus aims to investigate the profitability of the trading strategies based upon the order flows and order-book information as well as past prices by utilizing data from the limit order book and transactions in individual stocks on the Tokyo Stock Exchange.

In addition to linking past prices to technical trading strategies, as has been typically carried out by previous studies, the present paper makes a unique contribution to the body of knowledge on this topic by relating (1) the *order-flow imbalance* and (2) the *order-book imbalance* to the profitability of intraday technical trading rules. As indicated by Handa and Schwartz (1996, p. 1835), investigating the profitability of trading strategies based upon order-book information provides the rationale not only for limit order trading, which is important to stock traders, but also for the viability of an order-driven market. In addition, technical traders in real-

* Tel.: +886 2 2939 3091; fax: +886 2 2938 7699.

E-mail address: ryuichi@nccu.edu.tw

¹ In the study conducted by Lui and Mole (1998), more than 50% of market participants emphasize the use of technical trading strategies, while Menkhoff (2010) demonstrates that 87% of the sampled fund managers place a degree of importance on technical analysis. Further, Menkhoff and Taylor's (2007) review of the empirical studies of technical analysis finds the widespread use of technical analysis by market participants.

² See, for example, the survey study conducted by Park and Irwin (2007).

³ Certain stock exchanges, such as the Australian Stock Exchange, the London Stock Exchange, the NASDAQ, NYSE OpenBook, and the Tokyo Stock Exchange, show all limit orders on both sides of the order book and order volumes at those prices before trading. In some stock exchanges, such as Euronext Paris, Hong Kong Exchanges and Clearing, and the Toronto Stock Exchange, only the best five bid and ask quotes can be observed prior to trading with the depth available at these limit prices. See, for example, Comerton-Forde and Rydger (2006) regarding the level of pre-trade transparency in Asia-Pacific exchanges.

ity would have more trading options if we were able to provide profitable technical rules based on order-flow information.

This paper is also motivated by the several previous research studies that demonstrate that order-flow and order-book imbalances have a predictive ability with respect to short-horizon returns. For example, selected papers, such as those of Chordia et al. (2005), Su et al. (2010), and Visaltanachoti and Yang (2010), empirically demonstrate that short-horizon returns are predictable from the order-flow imbalance, which is typically defined as the number of seller-initiated trades subtracted from the number of buyers (or the dollars received by sellers subtracted from the dollars paid by buyers). When the order-flow imbalance is positive, meaning that the pressure to buy dominates the market, the price tends to go up, and vice versa. Furthermore, Chordia and Subrahmanyam (2004) and Su et al. (2010) find that trading profits are generated from the order-flow imbalance. These empirical works confirm the significant relation among the order-flow imbalance, the return predictability, and the trading profitability in the short horizon, and imply that intraday technical trading rules, when combined with the order-flow imbalance, can be profitable.

Second, previous studies demonstrate significant relations among the current order imbalance, namely the difference between the current market depths of the buy side and the sell side, investors' trading decisions, and stock price dynamics. For example, Handa et al. (2003) indicate that stock investors tend to place more aggressive orders, such as market orders, as the order-book depth on the same side of the order becomes thicker compared with that on the other side, and less aggressive orders, such as limit orders outside the spread, as it grows thinner.⁴

The results of Handa et al. (2003) resemble the findings of several empirical studies such as Biais et al. (1995), Griffiths et al. (2000), and Ranaldo (2004) that explain as follows. Real stock investors face a trade-off between an advantageous price and the risk of non-execution. When investors submit a market order rather than a limit order, they can certainly execute the order, but they give up obtaining a superior execution price. Meanwhile, investors who place a limit order obtain a favorable execution price, but at a higher risk of non-execution and of failing to earn any profits. Such a risk of non-execution increases as the depth on the same side of the order becomes thicker compared with that on the other side. When an agent recognizes a thicker order book, the agent places more aggressive orders. When the book is thinner, investors tend to assume that more aggressive orders are coming from the opposite side, and thus a limit order is more likely to be executed, yielding more favorable prices for investors at a reduced risk of non-execution as a result of placing less aggressive orders. This trading strategy indicates that when the bid side becomes thicker than the ask side, for example, market buy orders are more likely to be observed, pushing up future prices and making return predictable from the order-book imbalance.⁵ In addition, Osler (2003) demonstrates that the limit order book is a key source for predicting short-term future returns,⁶ while Harris and Panchapagesan (2005) show that traders who trade ahead of the heavy side of the book are capable of making a positive profit. Thus, previous stud-

⁴ In the literature, the most aggressive order is the market order, while limit orders within the spread are more aggressive than limit orders outside the spread but less aggressive than market orders.

⁵ Yamamoto (2011) demonstrates that this imbalance-based strategy is crucial to explaining the persistent behavior of several financial time series, such as volume, volatility, and order signs.

⁶ Osler (2003) investigates the return series in ultra-high-frequency data from the foreign exchange market. She demonstrates that order clustering in the order book is able to explain two popular predictions from technical trading analyses, namely that trends tend to reverse around round numbers and that they tend to intensify once the rate penetrates round numbers.

ies imply certain profitable opportunities from intraday technical rules in which we derive trading signals from the imbalance of the limit order book.

This paper evaluates the intraday trading performances of our technical rules in individual stocks on the Tokyo Stock Exchange. We conduct this evaluation by using an order book and transaction data on individual stocks listed on the Nikkei 225 from September 1, 2006 to August 31, 2007, distributed by Nikkei Media Marketing, Inc., an information vendor in the Nikkei Group. We apply both the Reality Check bootstrap procedure proposed by White (2000) and the Superior Predictive Ability (SPA) test created by Hansen (2005) in order to evaluate the profitability of our trading strategies as well as to reduce the data-snooping problem, which may occur if profitable rules are found by pure chance.⁷

We first provide evidence that order-flow and order-book imbalances can, in fact, predict short-horizon returns on the Japanese stock market during our sample period. We carry out this procedure before the technical analysis, as little empirical evidence exists in the literature regarding the predictability of the short-horizon returns of individual stocks on the Japanese stock market. However, in contrast to the presented evidence, we demonstrate that none of the technical trading strategies formulated based on past prices, the order-flow imbalance, and information on the demand/supply imbalance in the limit order book generate higher profits compared with a buy-and-hold strategy once the effect of data snooping has been accounted for. At the end of the paper, we confirm the robustness of our results with a sample of different periods that have a higher Nikkei 225 index return volatility, in which extra risk may be added to dynamic strategies, implying a higher risk premium and therefore greater predictability.

We emphasize the following two points regarding our results. First, as implied from the results of the predictability of the short-horizon returns, the best technical rules based on order-flow and order-book imbalances as well as past price information actually generate positive trading profits in our sample. However, the profits are too small and not sufficiently larger than those derived from a buy-and-hold strategy. Second, the unprofitable technical rules include limit order trading, in which trading signals are derived from the order-book imbalance.⁸ Thus, the results of this paper also suggest that non-execution risk and picking-off risk are too large for limit order trading to be profitable during our sample periods.⁹

Although our most significant contribution is that we propose and statistically investigate unexamined technical rules that are formulated based on order-flow and order-book imbalances, while also taking into account the effect of data snooping, this paper contains four other contributions. First, we demonstrate the predictability of the short-horizon returns of individual stocks from order-flow and order-book imbalances on the Japanese stock market during our sample period.

Second, rather than using stock indices as is typical in the literature, we utilize individual stocks in our analyses. Such an approach has the following two advantages. First in reality, certain

⁷ Although Chordia and Subrahmanyam (2004) and Su et al. (2010) investigate the performance of trading strategies based on the order-flow imbalance, they do not account for the data-snooping bias.

⁸ Our limit order traders observe a buy (sell) signal when the buy side of the book becomes thinner (thicker) than the sell side. The limit order trader, upon observing a buy signal, places a limit order in order to buy at the prevailing best bid price, waiting to be hit by a market sell order in the future. He/she places a limit sell order at the best ask and this waits to be executed with a market buy order that will be placed in the future. We define our limit order trading in further detail in Section 3.1.2.

⁹ In addition to the non-execution risk mentioned above, the use of limit orders involves picking-off risk, meaning that if the market price moves through the limit price set by our limit order traders and the order is not cancelled, an individual can "pick off" his or her order and make money. In such a case, limit order traders lose money.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات