Is pre-market information disclosure valid information or noise to investors?

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ABSTRACT

On June 29, 2015, Taiwan Stock Exchange implemented the "Best Five Bid and Ask Quotes Disclosure System before Opening", disclosing simulated transaction price 30 minutes before the market opening. If any simulated transaction price varies from the previous transaction price by more than 3.5%, individual stocks will be postponed 2 min for opening, which helps to increase market efficiency and connect with international stock markets. In order to converge the opening and closing prices, this system offers investors the opportunity to adjust the bid and ask quotes, which can increase transaction volume. This study explores whether pre-market information disclosure has an impact on transaction quality via the implementation of new system.

Through the establishment of new system in Taiwan's stock market, it will provide a reference for research and regulation when formulating policy in the future. This new trading system will not affect investors because of the large volume of trading information or lock limits but will increase market transparency and allow investors to choose their own preferred timing to buy and sell. Even though this new system affects the spread, market value, trading volume, and trading value, due to the disclosure of the best five bid and ask quotes before opening, it also provides investors with more market information.

Key words: Market quality, stock price volatility, best five quotes disclosures.

INTRODUCTION

Price discovery has an important function in the securities market of helping market information quickly and efficiently be reflected in asset prices (Schreiber and Schwartz, 1986). Price discovery theory is derived from the efficient market hypothesis proposed by Fama in 1970, with Fama believing that financial market information is transparent and that the price of commodities in the market should be able to fully and immediately reflect all commodity-related information, and that different asset structures and transaction characteristics will result in different price discovery capabilities. The process of integrating new information into equilibrium prices in the financial market is the main function of price discovery in the stock exchange (Hasbrouck, 1995). The methods applied to disclose opening and closing information in international markets can be broken down into the following:

A. Disclosure of reference price and quantity:

1. The reference price and quantity are disclosed during the period before market opening and closing (Singapore, Germany, South Korea, Australia and Tokyo)
2. Call auction price is disclosed for opening and continuous trading price is disclosed for closing, with the reference price and quantity also disclosed during the period before opening (Hong Kong and Shanghai)
3. Only the reference price is disclosed, with the reference volume remaining undisclosed (London and Malaysia).

B. Disclosure of unsettled order information:

1. Publicly disclose the order information so investors can get all the order information of price and quantity (Australia and Malaysia).
2. Disclose the best three and four bid and ask quotes (South Korea and Tokyo).
3. Disclose the unsettled outstanding quantity (Shanghai, Shenzhen and Germany).
In order to avoid the manipulation of stock prices, supporting measures such as the orders shall not be cancelled or changed for a period of time before the match (Singapore, Hong Kong, Shanghai and Shenzhen) or with random match during opening and closing (London, Germany, South Korea and Australia) being adopted. Relevant empirical research on information disclosure before market opening or closing includes: fund managers deliberately raise the closing price (Carhart et al., 2002; Bernhardt and Davies, 2004), future contract holders deliberately manipulate the closing price (Kumer and Seppe, 1992), Aggarwal and Wu (2006) found that stocks with poor liquidity are more likely to be manipulated, with their closing price volatility showing a significant increase after manipulation (Mei et al., 2004). However, whether the disclosure of relevant information before opening can lead investors to price discovery or just bring noise still lacks empirical evidence. Due to the low cost of changing orders in matching system, price before market opening and closing are most likely to be manipulated by interested parties who make mistakes on purpose and take advantage of confused investors. For example, those who place orders with limit-up price (and cancel later) may create illusion of excess demand and then take advantage by dumping shares while investors bidding up prices.

Orders with limit-down price may create illusion of excess supply and then achieve the purpose of depressing share price. In such case, the purpose of placing limit orders is not to make a deal but to distort matching price to influence the opening and closing prices. This behavior mostly occurs during the opening and closing trading hours, such as placing manipulated price orders that affect the number of orders in the market to distort the price limit information, as well as attempting to affect matching price with active placing (or canceling) behavior when close to market opening and closing. In empirical research, manipulators usually try to buy at lower prices and sell at a higher price within minutes to create short-term order imbalances, often resulting in temporary losses. In order to reduce the possibility of manipulating the closing price, many exchanges (Tokyo, Australia, South Korea, and Singapore) use collective bidding to determine the closing price. Studies have found that collective bidding can reduce price volatility and improve the price discovery ability (Cao et al., 2000; Pagano and Schwartz, 2003), and reduce price manipulation (Chang et al., 2008). This article mainly examines whether pre-market information disclosure will bring investor information or just noise. During the pre-market period, new orders, modified orders, or cancelled orders can still be carried out; in addition, the simulated matching price, volume, and the best five bid and ask quotes are still disclosed to investors for modification or cancellation decisions. In this research, we find the new system will provide investors good information. The information disclosed before opening benefits investors with reference and stay away from share price manipulation. The new system will improve market transparency and offer more detailed trading information to investors, rather than the imbalanced noise created by manipulators.

INSTITUTIONAL BACKGROUND

Taiwan Stock Exchange (TWSE) is an order-driven market without market makers. Only the public limit orders, which are matched in price and time priority, are permitted in TWSE. Quotation in TWSE adopts multiple tick-size rule, with a total of six ticks and tick size increases with stock price. Minimum trading unit is 1,000 shares and the daily range of price movement is between limit-up 10% and limit-down 10%. TWSE uses a call-auction trading mechanism where orders are accumulated and are cleared approximately every 5 sec and at a price that maximizes the trading volume. Information of the best five bid and ask quotes are disclosed on the electronic real-time transaction system and disclosed to public through computer terminals. For the pre-opening information disclosure, TWSE accepts trading orders from 8:30 in the morning, with matching starting at 9:00. The opening price will be matched at 9:00 based on the price and time priority method. Before June 29, 2015, all orders were accumulated in an order book during the pre-opening session (08:30 to 09:00), and both the relative five bid and ask quotes and quoting volumes were not disclosed before 09:00. Beginning June 29, 2015, to increase the pre-opening information disclosure, the TWSE launched an order-matching simulation mechanism for thirty minutes during the periods from 08:30 to 09:00. All securities are subject to information disclosure before market opening starting from 8:30 and continually in accordance with the intervals of the intraday call auction matching. Over the pre-opening periods, traders have the opportunity to modify and/or cancel existing orders so as to reflect the most current state of information without (in most cases) any cost or obligation, if the change is made before the order is executed at the opening.

DATA AND METHODOLOGY

Data

The main variables applied in this study include the best bid and ask quotes and its relative trading volume, the highest and lowest trading price, the trading volume, and

1The tick size for the study period was (1) NT$ (New Taiwan Dollar) 0.01 for a trading price (TP) <NT$10; (2) NT$0.05 for NT$10≤TP<NT$50; (3) NT$0.1 for NT$50≤TP<NT$100; (4) NT$0.5 for NT$100≤TP<NT$500; (5) NT$1.0 for NT$500≤TP<NT$1000; and (6) NT$5.0 for NT$1000≤TP.
market value of each trading day. Research data is retrieved from the Taiwan Economic Journal (TEJ) database. Research period is the pre-period from 2015/04/01 to 2015/06/28 and the post-period from 2015/07/01 to 2015/09/30. After removing observations of delisted stocks and those with a daily trading volume of less than 10 (Van and Warr, 2001), all the listed companies are included in this study.

Research model

The market quality variables applied in this research mainly include spread, depth, the trading volume of the first 30 min compared with the trading volume of the entire day (REL) and the variance ratio (VR), which are defined as follows:

\[ \text{Spread}_{i,t} = \frac{(\text{Ask}_{i,t} - \text{Bid}_{i,t})}{(\text{Ask}_{i,t} + \text{Bid}_{i,t})} \times 100 \]  

\[ \text{Depth}_{i,t} = Q_{\text{bid},i,t} + Q_{\text{ask},i,t} \]  

\[ \text{REL}_{i,t} = \frac{V_{t}}{V_{i}} \]  

\[ \text{VR}(K) = \frac{\text{Var}[R_{t}]}{[\text{Var}[R_{t}]]} \]  

We apply the variance ratio developed by Cochrane (1988), Lo and MacKinlay, (1988) to test the market price efficiency, where \( \text{Bid}_{i,t} \) (\( \text{Ask}_{i,t} \)) is the best bid (ask) quote of the opening price of \( i \) company on \( t \)th day; \( Q_{\text{bid},i,t} \) (\( Q_{\text{ask},i,t} \)) is the best first-level bid (ask) quote of \( i \) company's opening price on day \( t \); \( \text{REL}_{i,t} \) is the volume in the first 30 min compared to the full day volume of \( i \) company; \( V_{t} \) is the trading volume 30 min before opening; \( V_{i} \) is the trading volume for the whole day; \( R_{t} \) represents the return within 30 min of opening on \( t \)th day (log value of the last price in this period divided by the opening price), \( K = 9 \) (represents nine 30 min intervals in a trading day from 9:00 to 13:30). When market efficiency is high, the value of Variance ratio (VR(K)) will approach 1; if the market reacts excessively, the variance ratio will be less than 1; if the market responds insufficiently, the variance ratio will be greater than 1. Therefore, if the market becomes more efficient after restructuring, the variance ratio will approach 1.

EMPIRICAL RESULTS

Descriptive statistics

This study is implemented in accordance with the regulatory updates and the data is divided into two intervals: pre-period started from 2015/04/01 to 2015/06/28 and post-period started from 2015/07/01 to 2015/09/30. We examine the impact of information disclosure on market quality during the study period and compares results from both periods. Table 1 exhibits the descriptive statistics for all variables in this study. The average market value, transaction value, and trading volume in the pre-period are 36,914.82, 121,111.46,
and 3,125.50, respectively; the average market value, transaction value, and trading volume in the post-period are 35,232.62, 105,303.62, and 2,790.48, respectively. In comparison, the mean values above are higher in the pre-period than those in the post-period. It is clear that in the long-term disclosure of pre-market information can provide investors with some good information, allowing investors to clearly understand information in a transaction. In Table 1, although the lower average turnover rates in the post-period imply higher liquidity, the mean and median standard deviation of returns are higher in the post-period. Higher returns indicate increased profits for investors and also highlighting that the disclosure of pre-market information is effective. The mean value of Spread (0.2295) is higher in post-period than that (0.1768) in pre-period.

Based on the calculation of Spread in function (1), a larger value in the numerator or smaller value in the denominator will yield larger value in Spread. The results indicate that (1) the spread is larger or (2) the value of the bid and ask prices is smaller during the pre-opening session in the post-period, implying that the increased information disclosure before opening increases investors’ information and helps investors to place orders with lower bid price or higher ask price. Table 1 demonstrates the summary statistics of relevant variables in the pre-period (the first row) and post-periods (in parentheses at the second row) under the implementation of new regulation. Variables include spread (Spread), standard deviation (\(\sigma_p\)), market value (MV), transaction volume (Tvol), transaction value (Tval), turnover rate (Turnover) and standard deviation of return (\(\sigma_R\)), and their description statistics have average (Mean), 25th quartile (25\textsuperscript{th}), median (Me), 75th quartile (75\textsuperscript{th}), maximum (Max), minimum (Min), skewness (Skew), kurtosis (Kurt) and standard deviation (\(\sigma\)).

**Comparison between pre- and post-period**

Table 2 presents the mean and median for Spread, Depth, and trading volume of the first 30 min relative to the daily trading volume (REL), and the variance ratio between pre- and post-period (VR). For each period, we divide the daily trading hours (from the 9:00 opening to 13:30 closing) into nine 30 min intervals and present the value of Spread.

<table>
<thead>
<tr>
<th>Table 2: Comparison between pre- and post-period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A : Pre-period (104/04/01～104/06/28)</strong></td>
</tr>
<tr>
<td><strong>Variable(\backslash)Intervals</strong></td>
</tr>
<tr>
<td>Spread</td>
</tr>
<tr>
<td>(0.1725)</td>
</tr>
<tr>
<td>Depth</td>
</tr>
<tr>
<td>REL</td>
</tr>
<tr>
<td>(0.0305)</td>
</tr>
<tr>
<td>VR</td>
</tr>
<tr>
<td>(46.9550)</td>
</tr>
<tr>
<td><strong>Panel B : Post-period (104/07/01～104/09/30)</strong></td>
</tr>
<tr>
<td><strong>Variable(\backslash)Intervals</strong></td>
</tr>
<tr>
<td>Spread</td>
</tr>
<tr>
<td>(0.1745)</td>
</tr>
<tr>
<td>Depth</td>
</tr>
<tr>
<td>REL</td>
</tr>
<tr>
<td>(0.0343)</td>
</tr>
<tr>
<td>VR</td>
</tr>
</tbody>
</table>

Note: *, ** and *** are significant at 10%, 5% and 1%, respectively.
Depth, REL, and VR for each interval to examine market quality. We also provide the Interval 9-1 which represents data in the 9th interval (13:00~13:30) minus data in the 1st interval (9:00~9:30). Due to the disclosure of pre-market trading quotes, the decline of Spread between pre and post-period has slowly recovered, with the depth also increasing significantly as well. The variance ratio (VR) has slightly decreased but the pre-period REL and post-period REL have gradually increased. REL dropped sharply in the later trading hours, especially during the post-period. There are two possible reasons. Firstly, some of the major investors started suppressing prices when trading hours approaching the end of the period, which resulted in a decline. Secondly, some of the major investors were in the process of washing the market, confusing investors whether they should buy or sell at that time. However, no matter what the reason is, they did not rush to buy or sell in the later trading hours because the lower price could still appear on the next trading day. Table 2 shows the spread (Spread), the depth (Depth), trading volume of the first 30 min relative to the daily trading volume (REL) and the variance ratio (VR) in each of the nine 30 min intervals (from the 9:00 opening to 13:30 closing) to examine market quality. Interval (9-1) represents the 9th interval (13:00~13:30) minus the 1st interval (9:00~9:30).

**Comparison of differences between pre- and post-periods**

If the difference between pre- and post-periods reaches a statistically significant level, a significant difference in the range of changes in market quality will exist. Thus, empirical results in this study can support that pre-market information disclosure provides good information to investors, and that any noise will not affect investors. In Table 3, we analyze the difference between pre- and post-period on Spread, Depth, and trading volume of the first 30 min relative to the daily trading volume (REL), and the variance ratio between pre- and post-period (VR). The depth represents the sum of trading volume of the best (highest) bid quote and (lowest) ask quote at the opening price. We find that the differences in spread, depth, and variation ratio occur in an increasing number of cases, despite the difference in REL decreasing or even negative. These results exhibit that the implementation of new system "disclosure of the best five bid and ask quotes before opening" increases the liquidity of the market and also provides investors with more information, which protects investors from noise of large bid or ask quotes. This is also the results expected by TWSE. The market quality variables used in this research mainly include: spread (Spread), depth (Depth), trading volume of the first 30 min relative to the daily trading volume (REL) and the ratio of variance (VR). In Table 3 we calculate the differences between pre- and post-period by subtracting the pre-period data from post-period data in each of the nine 30 min intervals (from the 9:00 opening to 13:30 closing). Interval (9-1) represents the 9th interval (13:00~13:30) minus the 1st interval (9:00~9:30).

**Table 3: Differences between pre- and post-period**

<table>
<thead>
<tr>
<th>Interval</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>(9-1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spread</td>
<td>-0.2486</td>
<td>-0.6583</td>
<td>-2.1493</td>
<td>-1.5479</td>
<td>-1.5294</td>
<td>-1.1974</td>
<td>-1.2218</td>
<td>-1.2697</td>
<td>-1.1842</td>
<td>-0.9356</td>
</tr>
<tr>
<td>Depth</td>
<td>-27.5328</td>
<td>-38.5505</td>
<td>-44.8696</td>
<td>-44.7179</td>
<td>-46.8589</td>
<td>-46.8649</td>
<td>-47.0254</td>
<td>-43.9754</td>
<td>-36.8451</td>
<td>-9.3123</td>
</tr>
<tr>
<td>REL</td>
<td>0.0134</td>
<td>0.0178</td>
<td>0.0193</td>
<td>0.0189</td>
<td>0.0167</td>
<td>0.0233</td>
<td>0.0196</td>
<td>0.0209</td>
<td>-0.0100</td>
<td>-0.0234</td>
</tr>
<tr>
<td>VR</td>
<td>2.7515</td>
<td>2.1370</td>
<td>1.8864</td>
<td>2.2763</td>
<td>2.4629</td>
<td>2.6106</td>
<td>2.6460</td>
<td>2.6308</td>
<td>3.0663</td>
<td>0.3148</td>
</tr>
</tbody>
</table>

**CONCLUSION**

In this study we examine the impact of the "Best Five Bid and Ask Quotes Disclosure System before Opening" on market quality. Two research periods are 2015/04/01 to 2015/06/28 for the pre-period and 2015/07/01 to 2015/09/30 for the post-period. With a dataset of publicly listed firms in Taiwan, we examine whether the implementation of this new system will provide good information to investors. The empirical results indicate that the impact of this new system on market quality is mainly exhibited in market spreads but also indirectly exhibited in market value, trading volume, and trading value. This phenomenon is due to the best five bid and ask quotes being revealed 30 min before opening, allowing investors to have more information to use as a reference to choose the right time to buy and sell, which affects investors' willingness to place orders. This research concludes that this new system offers good information to investors and that the information will not affect investors' final decision due to large trading volumes or locked limit-up or limit-down prices, and does not become noise interfering with investors' decisions. This new system aims to make the market more transparent so that investors can choose to buy or sell at a price and time that they preferred.

**REFERENCES**


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