The Impact of Post-trade Transparency on Investors: Evidence from an Emerging Market

Cheng-Huei Chiao, Chiou-Fa Lin, and Bin Qiu

Abstract

This study examines the effects of a post-trade transparency event on the payoff to informed and uninformed traders of large and small size firms. The evidence indicates that the event leads to a significant decrease in the payoff only to informed traders of large firms, while there is little change in the payoff to other investors. The implications are two-fold, that the event is beneficial to market fairness for large firms although it has the drawback of discouraging informed traders from producing/sharing information; and secondly, the event has no universal and equivalent impact for different groups of investors.

Keywords: post-trade transparency, information asymmetry, realized spread, payoff

I. Introduction

In stock market trading, transparency refers to what and how much information market participants have access to during the trading process[1]. Transparency may be categorized as one of two types, pre- or post-trade transparency. Changes in transparency may influence the amount and depth of information available to market participants, which in turn affects their trading behavior and the payoff among traders. In this study, we examine the impact of the Taiwan Stock Exchange's (TSEC's) post-trade transparency event[2], on information asymmetry and the realized spreads, which are the payoffs for informed and uninformed traders, respectively.

Our study is related to the body of research that examines how post-trade transparency affects market participants' welfare and market quality. There are positive and negative viewpoints on these issues. On the positive side, it is argued that post-transparency will improve market quality , price information, price efficiency, market liquidity and market fairness is improved while volatility is reduced; see Adamati and Pfleiderer (1991), De Frutos and Manzano (2005), Baruch (2005), Bessembinder and Maxwell (2008), and Baruch and Glosten (2013). On the other hand, from the negative viewpoint, it is suggested that post-trade transparency provides little additional information, decreases liquidity and price efficiency, and is not necessary to improve welfare among traders; see Madhavan (1996), Glosten (1994),

Cheng-Huei Chiao (cchiao@missouriwestern.edu), corresponding author, Missouri Western State University; Chiou-Fa Lin (cflin@gs.nfu.edu.tw), National Formosa University, Taiwan; and Bin Qiu (bqiu@missouriwestern.edu), Missouri Western State University

[1] See O'Hara (1995).

[2] Before 2 January 2003, the reference information available to all traders on the TSEC included only the transaction price, transaction volume, the best one bid/ask and the corresponding orders. Beginning at this date, the TSEC changed its disclosure policy after each trade to include information about four more best bids/asks and their corresponding orders. That is, from that date on, the TSEC requires disclosure of the transaction price, transaction volume, and the best five bids/asks and concurrent orders to all traders after each trade. This is called the post-trade transparency event.

Seppi (1997), Madhavan et al. (2005), Asriyan et al. (2017), Banerjee et al. (2018), and Goldstein and Yang (2019). There have been several empirical studies on post-trade transparency focusing on liquidity, volatility, information fairness, price discovery, and profit distribution including those by Madhavan et al. (2005), Eom et al. (2007), Hendershott et al. (2011), Riordan and Storkenmaier (2012), Lewis and Schwert (2018). Although much effort has been made, the empirical results have been mixed and inconsistent.

A review of the existing literature shows a lack of direct empirical evidence on how increased post-trade transparency impacts the payoff distribution between informed and uninformed traders of stock for different sized firm. We seek to fill this gap by examining changes in the components of effective spread, realized spread and information asymmetry, before and after the TSEC event described above. To the best of our knowledge, this study is the first to use the realized spread and information asymmetry to measure the payoff among traders. There are two general questions to be answered. First, whether post-trade transparency is beneficial to market fairness. Second, whether post-trade transparency is helpful or harmful to different types of traders. These two questions have rarely been touched upon in the literature, but we will try to make up for the shortage of research.

Although this dramatic change in transparency happened several years ago, it is still valuable to study the TSEC's experience of increased post-trade transparency because, first of all, a shift in post-trade transparency requirements for a stock market is very rare, the TSEC's experience affords a reference for other stock exchanges around the world. Secondly, since all stocks listed on the TSEC were affected by the changes in 2003, this condition allows us to study the effects on the same stocks in the same market. In addition, the difference in payoff to informed and uninformed traders for both large and small size firms has not been discussed in the past. The findings of this study indicate that, with the exception of a significant decrease in the payoff to informed traders of large firms, there is no obvious change in the payoff to other types of traders.

The rest of this paper is organized as follows: Section 2 is literature review and hypothesis development; Section 3 gives a description of the Taiwan Stock Exchange (TSEC) and the data sources; the methodology is discussed in Section 4; the empirical results and their economic meanings are provided in Section 5, and in the final section some conclusions are offered.

II. Literature review and hypothesis development

Past studies have paid a lot of attention to the post-trade transparency argument, but the findings have been mixed and inconclusive. On the positive side of the argument, Adamati and Pfleiderer (1991) and De Frutos and Manzano (2005) theoretically demonstrated that sunshine trading or trade disclosure would increase the information contained in prices, elevating price efficiency, while reducing volatility. Baruch (2005) argued that an open limit-order book would increase market quality by reducing the bid-ask spread and increase information efficiency of price because it strengthens the competitive pressure among liquidity traders and promotes even more aggressive trading among informed traders. Bessembinder and Maxwell (2008) found that it is not easy for informed traders to exploit liquidity traders in a transparent bond market. Baruch and Glosten (2013) pointed out that updating the limit-order book represents the offer of liquidity and allows for information to be revealed in the prices. Aİt-Sahalia and Saglam (2013) found that reduced latency produces higher profit for traders and makes liquidity provision higher.

On the negative side of the argument for post-transparency, Glosten (1994) and Seppi (1997) found that additional disclosure of other bids and asks beyond the best bid and ask conveyed little information. Madhavan (1996) argued that the impact of transparency was different for different types of stocks. If a stock's liquidity is not as much as it needs, the transparency measure will harm the price equilibrium, increasing the volatility and the execution cost,

thereby diminishing price efficiency. Madhavan et al. (2005) constructed a theoretical model and predicted that limit-order book disclosure would decrease the liquidity as measured by the depth and price impact. Furthermore, others have investigated how transparency negatively affects efficiency. Asriyan et al. (2017) found that when assets are correlated, higher transparency does not necessarily lead to higher welfare and efficiency. Banerjee et al. (2018) argued that higher transparency would actually prevent liquidity traders from learning about the fundamentals of a stock because of lower informativeness. Goldstein and Yang (2019) discussed the possible adverse impact of public transparency on price efficiency. In short, the results of empirical studies of transparency impact have been mixed and inconclusive. Madhavan et al. (2005) developed a model and used Toronto Stock Exchange data to test it. They found larger spreads and higher volatility after transparency was increased. Eom et al. (2007) investigated the impact of transparency on the Korean market. Their findings indicated that market quality would improve with exposure to increased numbers of bid and ask prices, but the benefit would diminish as the numbers reached beyond a critical point. Hendershott et al. (2011) and Riordan and Storkenmaier (2012) investigated the impacts of algorithmic trading and reduced latency and obtained results showing that these measures are beneficial to market liquidity, information fairness and price discovery. Lewis and Schwert (2018) found that the introduction of trade data dissemination in the bond market caused dealers to earn lower profits, which is consistent with but not completely driven by reductions in bid-ask spreads. However, they also provided evidence that prices are less informative when trades are publically disseminated, in line with the dealers' improved ability to respond to market variation reducing the motives for informed investors to trade in the market.

Most of the existing literature has focused on price information, price efficiency, price discovery, execution cost, market liquidity and volatility. The drawback is that it has not been definitively shown how increased post-trade transparency impacts the payoff distribution among different types of traders of stocks for different size firms. Hence, we arrive at the following four hypotheses which will be tested using intraday transaction data from the TSEC:

H1a: The post-trade transparency event has no impact on the payoff to informed traders of large firms.

H1b: The post-trade transparency event has no impact on the payoff to informed traders of small firms.

H2a: The post-trade transparency event has no impact on the payoff to uninformed traders of large firms.

H2b: The post-trade transparency event has no impact on the payoff to uninformed traders of small firms.

III. TSEC Description and Data

The TSEC is a purely order-driven market with no designated market makers, specialists, or dealers[3]. It started disclosing additional information from only the best bid/ask price with orders to the best five bids/asks with orders, after each trade, beginning on January 2, 2003. Based on their 2001 year-end capitalization, we sorted the firms listed on the TSEC into two groups with the top tier composed of the larger capitalization stocks, and the bottom tier comprised of smaller capitalization stocks. The simple random sampling approach used in

[3] For additional information please referred to our related paper by Lin et al. (2016).

statistics was applied to both the top and bottom tiers, to obtain the 100 large firms and 100 small firms comprising our sample. The capitalizations values are 2,087–54,649 million of NTD for large firm stocks and 189–1,017million of NTD for small firm stocks. Our sample firms are distributed across various industries, representative of the TSEC stock market. The estimation period is defined as one year before the event; the year after the event is called event period. The sample period is from January 2, 2002 to December 31, 2004. All the intraday data used were retrieved from the Taiwan Economic Journal (TEJ) database.

IV. Methodology

There has been a lack of direct empirical evidence on how increased post-trade transparency impacts the payoff distribution between informed and uninformed traders for different size firm stocks. One common and simple measure of payoff distribution is the realized spread and information asymmetry, which are the component of effective spread. The effective spread is deduced from quoted spread which is defined as follows:

$$Quoted\ spread_{i,t} = ((Ask_{i,t} - Bid_{i,t})/Mid_{i,t})/2) \quad (1)$$

where $Mid_{i,t}$ is the midpoint of the ask and bid price for stock i at time t. The difference between the ask and bid price measures the round-trip trading cost, but since a single trade is expected, the quoted spread is divided by 2. However, trades usually occur between the ask and bid price, not at the quoted prices, so the quoted spread probably biases the trading cost. To overcome this problem, the effective spread is substituted for the quoted spread which can be computed as follows:

$$Effective\ spread_{i,t} = q_{i,t}(p_{i,t} - Mid_{i,t})\ /Mid_{i,t} \quad (2)$$

where $p_{i,t}$ is the transaction price for stock i at time t. The term $q_{i,t}$ is an indicator whose value is +1(-1) if $p_{i,t}$ is greater (less) than $Mid_{i,t}$.

As in Huang and Stoll (1996), the effective spread is further decomposed into two components, the realized spread (RS) and information asymmetry (IA), which are defined as follows:

$$RS_{i,t} = q_{i,t}(p_{i,t} - mid_{i,t+5m})/mid_{i,t} \quad (3)$$

$$IA_{i,t} = q_{i,t}\ (mid_{i,t+5m} - mid_{i,t})/mid_{i,t} \quad (4)$$

here $mid_{i,t+5m}$ is the middle point price 5-min after a trade[4]. Huang and Stoll (1996) argued that the realized spread refers to the price reversal since a dealer realizes his earnings only when the price reverses[5]. Bessembinder and Venkataraman (2010) and Bacidores and Sofianos (2002) further expanded and explained the argument that the liquidity supplier's revenue net losses to better informed traders can be measured by the reversal from the trade price ($p_{i,t}$) to the post trade value ($mid_{i,t+5m}$). The realized spread captures the range of reversal. They thought of information asymmetry as the amount lost to informed traders, as measured by equation (4). In short, in a trade, the realized spread is the payoff for liquidity or uninformed traders while information asymmetry is the payoff for informed traders.

[4] Following Riordan and Storenmaier (2002).

[5] See Huang and Stoll (1996) p326.

We first test the difference in the realized spread and information asymmetry before and after the 2003 event. Since the difference could be caused by other factors, rather than being due to the event. Robustness testing is carried out employing the methodology of Madhavan et al. (2005):

$$\overline{m_{i,t}} = \beta_0 + \beta_1 \overline{A_{i,t}} + \delta D_{i,t} + \varepsilon_{it} \quad (5)$$

where $\overline{m_{i,t}}$ is the mean value of the realized spread or information asymmetry for stock i pre- and post-event, respectively; $\overline{A_{i,t}}$ is the control variables, including the mean value of volatility, turnover rate, inverse of average price, and log market capitalization for stock i before and after the event[6]; $D_{i,t}$ is a dummy variable, with a value of 1 after the event; otherwise 0. The $\varepsilon_{i,t}$ is assumed to obey classical assumptions. Running model (5) by ordinary least squares (OLS) regression, we observe the coefficient of the dummy variable indicating whether the transparency event truly impacts the realized spread and information asymmetry.

V. Empirical Findings

By using TSEC transaction data and applying the methodology described in this study, we can test the hypotheses and arrive at empirical results which are discussed below.

The patterns of information asymmetry and realized spread around the event for large- and small firms are depicted in Figures 1 and -2, respectively. From Figure 1, we can see that there is a gradual decrease in information asymmetry for large firms after the event but this does not occur for small firms. For the realized spread (Figure 2), there is no obvious change for either large- or small firms. Next, we further test for any difference in information asymmetry and realized spread for large- and small firms before and after the post-trade transparency event. The results are shown in Table 1 and -2 and are similar to the patterns shown in Figures 1 and -2. The results indicate that after the event, there is a significant decrease only in the payoff to informed traders of large firms; there is no remarkable change in the payoff to informed traders of small firms or uninformed traders of either large- or small firms. Thus, based on these empirical results, H1a is rejected while H1b, H2a, and H2b cannot be rejected.

Institutional or informed traders in the TSEC prefer trading in large firm stocks,[7] so post-trade transparency makes the competition more intense, lessening information asymmetry between informed and uninformed traders (from 7.853 to 7.081), thereby decreasing the level of payoff to informed traders (i.e., information asymmetry; -0.772). The reason for this is similar to the arguments of Bessembinder and Maxwell (2008) and Schultz and Song (2019) who suggested that transparency makes it more difficult for informed traders to extract rents from uninformed traders, while opacity protects inefficient high-cost dealers. Moreover, the decreased payoff to informed traders discourages them from gathering/sharing information. We suggest that there is a lack of competition for small firms because the number of informed traders interested in these firms is not enough, leading to an insignificant change in the information asymmetry (from 7.863 to 8.037) and the payoff to informed traders (+0.174). In terms of payoff to uninformed traders (i.e., realized spread), the event has clearly brought little benefit to them. In the TSEC, almost all individuals, usually thought to be liquidity or uninformed traders with limited ability, refer to the increase in information of post-trade

[6] The control variables are referred to Hendershott et al. (2011).

[7] See https://www.twse.com.tw/zh/page/trading/fund/MI_QFIIS.html

transparency. Hence, the event has not helped to increase the payoff for individual investors. This explanation is different from that advanced by De Frutos and Manzano (2005), who argued that trade disclosure effects are short-lived and that the impact on the traders' welfare is ambiguous. All in all, there are two implications which can be derived from our findings. First, the event is beneficial to fairness in the stock market for large firms, but it has the drawback of preventing informed traders from producing and/or sharing information. Second, the impact of the reforms is neither universal nor equivalent for different groups of investors, because they are affected in different ways.

Figure 1 Information asymmetry

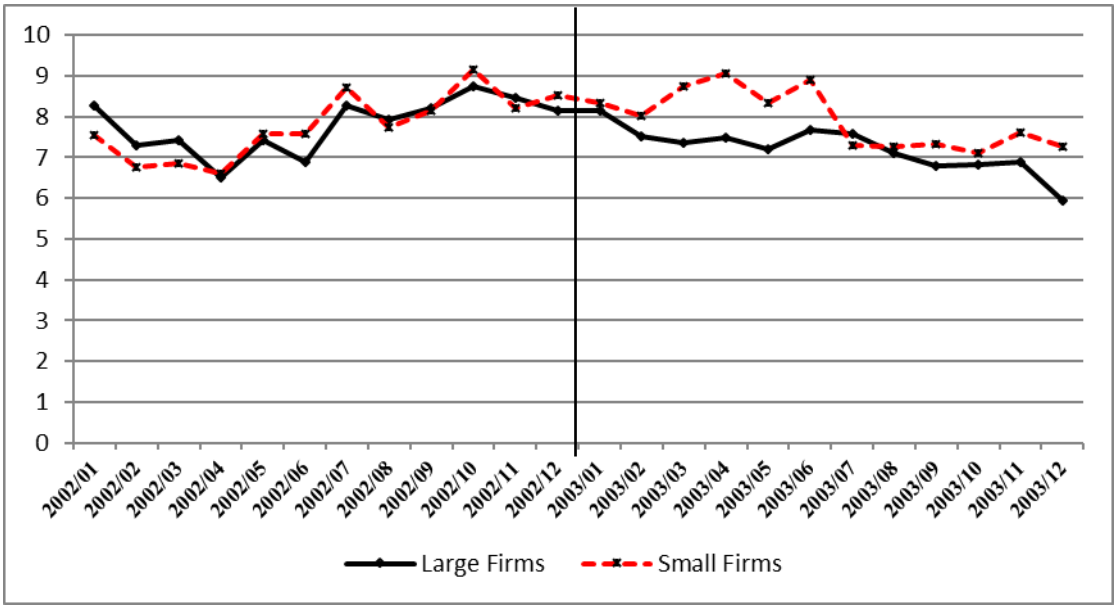

Figure 2 Realized spreads

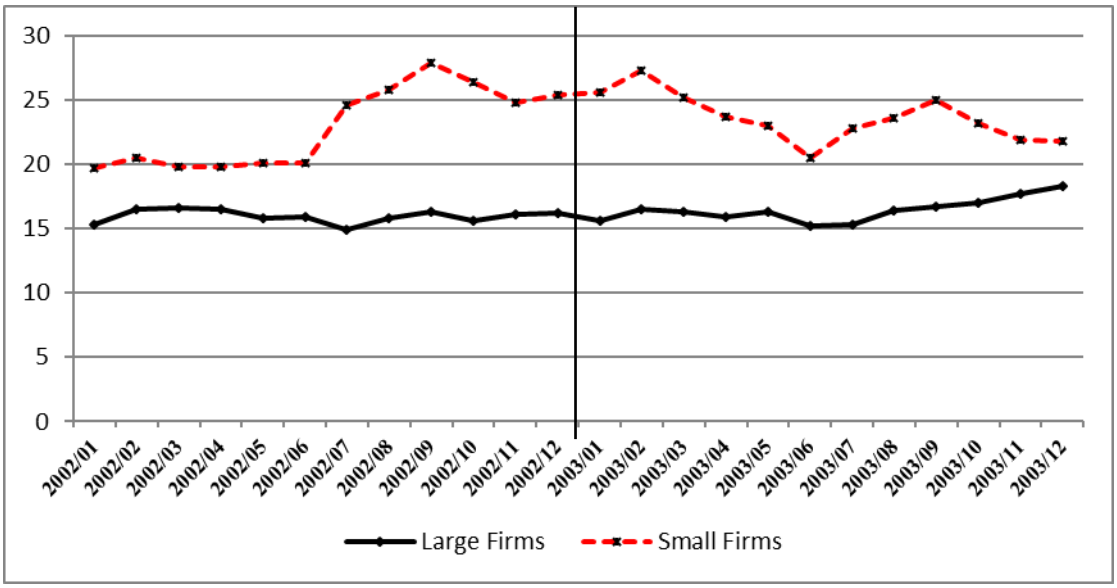

Table 1 Information asymmetry and realized spread before and after the event

The Wilcoxon sign rank test is used to test the differences between before and after the event. *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.

Periods	Before event (1)	After event (2)	Diff. (3)
Panel A: Large firms			
Information asymmetry	7.853	7.081	-0.772*** (<0.000)
Realized spreads	16.200	16.677	0.477 (0.1832)
Panel B: Small firms			
Information asymmetry	7.863	8.037	0.174 (0.3980)
Realized spreads	23.921	24.807	0.886 (0.2365)

Table 2 Robustness testing

The model is formulated as follows: $\overline{M_{\iota,t}} = \beta_0 + \beta_1 \overline{A_{\iota,t}} + \delta D_{i,t} + \varepsilon_{i,t}$.
The symbols *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Variable	Dummy variables	T-values
Panel A: **Large firms**		
Information Asymmetry	-0.328*	-1.70
Realized spreads	0.231	0.28
Panel B: **Small firms**		
Information Asymmetry	0.274	1.46
Realized spreads	0.037	0.05

VI. Conclusion

Post-trade transparency is an important issue because it matters for market quality. Although there has been much research, both theoretical and empirical, on this topic, the results showing its impact on market quality have been inconclusive. The controversy continues to the present. However, we have been presented with a rare opportunity to study this topic using real data.

Beginning 2 January 2003, the TSEC increased its open limit-order book after each trade. Hence, we are able to investigate the payoff distribution among traders in the time surrounding this event.

The outcome shows that, after the event, there was only a significant decrease in the payoff to informed traders of large firms, but there was not an obvious change in the payoff to informed traders of small firms or uninformed traders of either large- or small firms. Our explanation for the payoff to informed traders of large firms is similar to that offered by Bessembinder and Maxwell (2008) and Schultz and Song (2019). The explanation for why the event was of little influence to informed traders of small firms or uninformed traders of both large- and small firms is different from the argument advanced by De Frutos and Manzano (2005). There are two implications which can be derived from our findings. First, the event is beneficial to market fairness for large firms in the stock market, but it has the drawback of preventing informed traders from producing and/or sharing information. Second, the impact of the reforms is neither universal nor equivalent for different groups of investors. They are affected in different ways.

To best of our knowledge, this study is the first to use realized spread and information asymmetry to measure the payoff for different types of investors. This study also supplies direct empirical evidence on how post-trade transparency impacts the payoff distribution between informed and uninformed traders for different size stocks.

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