

Day Trading is Good to Your Wealth

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Abstract

In this study we examine the influence of a new trading policy that favors day traders on the Taiwan Futures Exchange. The new policy was launched on October 8, 2007. It allows investors who commit to being day traders *ex ante* to enjoy a 50% reduction in the initial margin requirement. It is a commonly held view that day traders have to trade as quickly as possible and monitor price movements very carefully so as not to miss any arbitrage or speculative opportunities. Therefore, whereas individual traders are usually viewed as having low cognitive ability, being relatively passive, and losing money in trading, we show that behaving like a day trader will help a generic individual trader to further improve his or her cognitive ability, submit orders more aggressively, and lose less (or win more) money when trading. Interestingly, we believe that individual day traders are not necessarily aware of these changes when they trade; the day-trading mechanism in the market simply forces individual day traders implicitly to trade at an even higher functioning manner and ultimately benefit their trading behavior. In contrast to studies in the literature that claim trading is hazardous for one's wealth; our study provides a different but not exclusive conclusion: Day trading is good for one's wealth.

Key words: Day traders; Individual traders; Cognitive limitation; Order aggressiveness; Trading performance

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1. Introduction

“Our main point is simple: Trading is hazardous to your wealth.”

B. Barber and T. Odean, *Journal of Finance*, 2000

It is well documented in the literature that individual investors lose money in trading. Furthermore, the more individual investors trade, the more they lose (see, e.g., Barber and Odean, 2000; Barber, Lee, Liu, and Odean, 2009). The fact that individual traders rarely earn better returns does not seem surprising to us as many studies show that individual investors are commonly affected by behavioral biases, making them unprofitable in trading activities. For example, the behavioral finance model of Odean (1998a) provides a strong prediction: Active investment strategies will underperform passive investment strategies. Overconfident investors will overestimate the value of their private information, causing them to trade too actively and consequently to earn below average returns.¹ Similarly, Kuo, Lin, and Zhao (2015) show that individual traders who are disadvantaged by limited cognitive ability in trading suffer greater losses.

Given the prototype of individual investors in the literature; in this paper, we find that individual investors who participate in short-term day-trading activities are less subject to behavioral biases compared to those who do not day trade. Since behavioral biases usually cause inferior trading performance, we also show that individual day traders exhibit better performance when they trade. The improvement in trading is less directly due to individual investors' learning in day-trading activities; instead, we believe that the engagement in day trading serves as a natural frame to “correct”

¹ Subsequently, Barber and Odean (2000) provided empirical evidence for the behavioral model of investor overconfidence.

behavioral biases temporarily and that day traders receive a payoff in better trading profits.

Previous studies have shown that individual investors, regardless of whether they are day traders or non-day traders, lose money in trading activities. These studies, however, examine individual traders and individual day traders respectively. For instance, Barber et al. (2009) found that the losses of individual investors were equivalent to more than 2% of Taiwan's gross domestic product in their sample period. Kuo and Lin (2013) show that individual day traders perform worse than institutional day traders in all type of trading activities. Barber, Lee, Liu, and Odean (2014) also show that individual day traders tend to lose money over their long-term trading history. Given these findings, thus far we have very limited evidence to identify whether day traders, particularly individual investors, are essentially identical to non-day traders. To the best of our knowledge, the comparison between individual day traders and non-day traders has never been examined in the literature. We attempt to address the following research questions to fill the gap in related studies. Do individual day traders suffer from the same behavioral biases as non-day traders? How do individual day traders perform in trading compared to non-day traders? In answering these questions, we aim to enrich our understanding of individual day traders.

To derive the finding above, we analyze a unique data set that consists of all records of trading activity for more than 4,000 individual day traders over 15 months ending in December 2008 and more than 60,000 individual traders who do not day trade from July 2006 through December 2008 on the Taiwan Futures Exchange (TAIFEX). Our analyses allow us to observe the details of individual traders' behaviors, particularly the individual day traders. Notably, another important unique aspect of our

data set is worthy of mention: All day traders in our sample are identified *ex ante*. This enables us to arrive at firm conclusions by analyzing “real” day-trading activities.

The advantage of being able to identify day traders *ex ante* is the result of a change in trading policy for the TAIEX. On October 8, 2007, the TAIEX launched a new rule to favor day trading: Investors who characterize themselves as “day traders” under the new policy enjoy a 50% reduction in the initial margin requirement for the exchange. This new policy to favor day trading provides us with a clear-cut way of identifying day traders *ex ante* because it is more likely that those individual traders who really want to engage in restricted day-trading activities will agree to the commitment under the new trading rule.² By taking the advantage of this new margin rule, we make our contribution in examining how the restriction of day trading affects individual investors’ behavior, and more importantly their trading performance.

As mentioned, although the literature shows that individual investors are commonly affected by behavioral biases, we find that individual investors who choose to engage in restricted day-trading activities are less subject to cognitive bias compared to generic individual traders.³ Individual day traders trade with proper aggressiveness, have higher cognitive ability, and ultimately perform better in trading. The rationale behind these expectations is that day traders have to pay close attention to the status of the market, particularly the limit order book, to ensure their speculations succeed. The “self-control” requirement helps day traders distance themselves from behavioral biases resulting from reluctant engagement in effortful monitoring when they trade.

² We use “restricted” day trading to represent those trades that can be classified as day trades *ex ante* from October 8, 2007. Restricted day trading must be closed out at the end of the trading day; therefore, it is essentially different from “unrestricted” day trading. Traders using unrestricted day trades independently, not restricted day trades under the new policy, can still leave their trades unclosed to subsequent trading days if they do not find satisfactory prices to offset their positions.

³ Hereinafter, generic individual traders are defined as individual traders not involved in restricted day-trading activities, while individual day traders are specifically defined as individual traders who engage in restricted day-trading activities (committed to being day traders *ex ante*) from October 8, 2007.

These arguments imply that behaving as day traders serves as an exogenous mechanism to benefit individual traders.

Furthermore, the well-known classic “learning by doing” models (Arrow 1962; Grossman, Kihlstrom, and Mirman 1977) assume investors might improve their ability as they trade; relatively recent studies, e.g., Nicolosi, Peng, and Zhu (2009) and Seru, Shumway, and Stoffman (2010), have provided empirical evidence to support the argument. Distinct from these seminal works, however, our study on the make-up of day traders aims to verify whether adopting an outside mechanism can also be an efficient substitute for “learning” in guiding individual traders to trade with better sense, even though they have not prepared themselves to learn from trading.

The rest of the paper is organized as follows. Section 2 briefly reviews relevant literature and the hypotheses we test, while Section 3 describes our data and main variables. Section 4 describes our analyses and discusses the findings and Section 5 concludes.

2. Literature Review and Hypotheses

The prior literature on day trading is relatively scant, essentially as a result of the lack of availability of accurate trading records on day traders. Most studies on day traders are limited by identification *ex post* as having completed at least one round-trip trade on the same trading day. For example, the definition of day traders adopted by Kyrolainen (2008) is that an investor buys and sells the same stock on the same day, although such traders may not buy and sell an equal number of shares. Chou, Wang, and Wang (2015) also use the *ex post* approach but adopt a stricter definition of day traders by requiring traders to close their outstanding positions daily.⁴ However,

⁴ Some previous studies also use indirect measure to define day trades. For example, Koski, Rice, and Tarhouni (2008) use message board activity to proxy day-trading activity, adopting data on a set of

unrestricted trading behavior, even behavior that can be identified *ex post* as day trading, may be the result of other motives, including liquidity needs, portfolio rebalancing, or the anticipation of tax law changes (Kuo and Lin, 2013). The *ex post* identification strategy may obscure the traders' motive in profiting solely from day-trading activities. Fortunately, the TAIEX implemented a new margin requirement rule on October 8, 2007, and provided us with an ideal *ex ante* opportunity to identify day traders who trade only for profit in anticipating short-term price movements, thus yielding more accurate documentation of their trading activities.

In one previous line of research, the focus was placed on the profitability of day-trading strategies. Related studies, including Jordan and Diltz (2003), Linnainmaa (2005), Kuo and Lin (2013), and Barber et al. (2014), show that after taking into consideration the trading costs, day traders generally tend to lose money. Similarly, some studies have also shown that generic individual traders lose from trades. Among these, but not exclusively, Barber et al. (2009) have shown that the aggregate portfolio of individuals suffers an annual performance penalty of 3.8 percentage points. Individual investor losses are equivalent to 2.2% of Taiwan's gross domestic product or 2.8% of total personal income. The economic losses in individual trading have been found to be very large.⁵

These studies generally claim that trading losses for individual traders or individual day traders are usually caused by behavioral biases. For example, Barber and Odean (2000) find that individual investors who hold common stocks directly pay a tremendous performance penalty for active trading due to investor overconfidence. Kuo and Lin (2013) argue that individual day traders are not only overconfident about the

NASDAQ stocks for only two quarters, to test the impact of day trading on volatility. Battalio, Hatch, and Jennings (1997) and Harris and Schultz (1998) use SOES trades as a proxy for day trading to explore trading behavior.

⁵ For studies regarding individual investors, see also Odean (1998b), Barber and Odean (1999, 2000, 2008), Grinblatt and Keloharju (2000), Goetzmann and Kumar (2008), and Linnainmaa (2010).

accuracy of their information, but are also biased in their interpretations of information. Their results show that the 3,470 individual day traders in their sample incurred on average a significant loss of 61,500 (26,700) New Taiwan dollars after (before) transaction costs over the period October 2007 to September 2008.

Closely related to the notion of overconfidence are self-assessments of competence, as studied by Graham, Huang, and Harvey (2009). They argue that “people are more willing to bet on their own judgments when they feel skillful or knowledgeable.” To test this conjecture, they used survey responses from 475 U.S. investors to study the impact of self-assessed competence on trading. The measure of competence was based on the answer to the following question “How comfortable do you feel about your ability to understand investment products, alternatives, and opportunities?” Subjects responded on a five-point scale ranging from “1 – very uncomfortable” to “5 – very comfortable.” Graham et al. (2009) demonstrate a strong link between self-assessed competence and the propensity to trade.

Using a Finnish dataset, Grinblatt and Keloharju (2009) analyzed both sensation-seeking and overconfidence as mechanisms that lead to trading.⁶ They found that both sensation-seeking and overconfidence affect trading. Similarly, Barber et al. (2009) propose that a combination of the mistaken belief that they are well-informed and an entertainment-seeking attitude account for much of the active trading and substantial losses of individual investors in the Taiwan stock market.⁷

In another line of research, the focus was placed on the possible impacts of day-trading activities on day traders’ behavior. Linnainmaa (2005) argues that day traders

⁶ Interestingly, Grinblatt and Keloharju (2009) used traffic tickets as a proxy for sensation-seeking, arguing that those who speed are more likely to be sensation seekers. To measure overconfidence, they used data from tests administered to men entering the Finnish Armed Forces that measure the candidates’ actual ability (i.e., test outcomes) and perceived ability (i.e., self-assessments). Finally, they used the measure of perceived ability orthogonal to actual ability as a measure of overconfidence.

⁷ In addition to trading losses, Barber et al. (2009) show that turnover in Taiwan during the sample period is nearly 300% annually and two to three times that observed in the United States.

have to pay close attention in monitoring the state of the market to avoid missing any opportunities for speculation. Given the phenomenon that engaging in self-control activities will help to reduce systematic errors on the part of decision makers (Kahneman, Lovallo, and Sibony, 2011), we can expect that day traders should be less subject to cognitive errors. Recently, Kuo et al. (2015) have found that individual traders on the TAIEX use disproportionately large volumes of limit orders submitted at round-number prices, representing investors' cognitive limitations in trading. They show that investors with lower cognitive abilities, defined as higher limit order submission ratios at round-number prices, suffer greater losses on all types of orders. The positive correlation between cognitive ability and investment performance is monotonic and robust across futures and options markets. Therefore, if day traders are more focused on trading activities and able to improve their cognitive ability, their limit order submission ratios at round-number prices will be lower than those of generic individual traders.

In addition to the likelihood of affecting investors' cognitive ability, trading as day traders could also affect investors' ordering aggressiveness. Speed of execution is crucial for speculators, especially when they have to realize their trading strategy in a short time period or when their information advantage is short-lived. Such "fast-paced" traders are also the prototype of day traders (Linnainmaa, 2005). Thus, compared to generic individual traders, day traders should trade more actively. Day traders' order aggressiveness could be also affected by overconfidence. This supposition comes from the findings of Malmendier and Tate (2005), who argue that an overconfident CEO will tend to hold options too long. Some statistics based on lists compiled by Forbes magazine over the period 1980 to 1994 also show that 16% of CEOs in 477 large publicly traded U.S. firms held an option at least once until the year of expiration.

Furthermore, these options were typically deep in the money.⁸ Long-holding figures prominently as one of the key determinants of overconfident investors. If day traders are overconfident (Kuo and Lin, 2013), they should also view their options, if any, as more valuable and hold options too long. Interestingly, when traders submit limit orders, their standing limit orders are viewed as trading options that offer liquidity. In this regard, overconfident day traders will be reluctant to provide the options, or at least not to make the options available on the market too long. The intuition behind this action is straightforward: the more valuable they consider their options, the less willing they will be to release the options to the market.

Notably, Agarwal, Faircloth, Liu, and Rhee (2009) show that inferior performance for traders can be explained by their aggressive trading behavior. When traders trade too aggressively, their execution prices should be worse than less aggressive traders and result in inferior trading performance. Under the day-trading restriction, day traders are not in a position to expect even higher (lower) prices on the next trading day when they execute at relatively high (low) prices by trading aggressively. Therefore, compared to the period without the day-trading restriction (the pre-policy period), they should trade less aggressively to prevent themselves executing at inferior prices. Interestingly, Chen, Chen, and Huang (2014) also show that traders' order aggressiveness is related to trading performance; they find that aggressive traders earn better profits in trading. In line with Agarwal et al. (2009) and Chen et al. (2014), it seems that individual day traders should perform relatively better than generic individual traders because

⁸ The study is cited in Shefrin (2007).

individual day traders are generally more aggressive; however, they should also be less impatient in the period with the day-trading restriction.

In sum, based on the overall findings of previous studies, we conduct this study in two major parts. First, we analyze two major issues related to behavioral biases, i.e., cognitive limitation, and order aggressiveness, for both individual day traders and generic individual traders. We also perform comparisons between these two types. Second, based on the results found in the first part, we calculate and evaluate trading performance for individual day traders and generic individual traders. Our special focus is on associating the trading performance and the patterns of behavioral biases. The first part of our study tests H1 and H2, while the second part of our study tests H3

H1: Day traders are more self-controlled and suffer less from cognitive limitation than generic individual traders. Therefore, their limit order submission ratios at round-number prices will be lower compared to those of generic individual traders.

H2: Day traders are eager to execute their orders more quickly. Therefore, they will behave more actively, and their orders will be more aggressive. However, individual day traders tend to be less aggressive under the day-trading restriction.

H3: Given support for H1 and H2, day traders' trading performance will be better than that of generic individual traders.

3. Market Description, Data and Main Variables

3.1 Market Description

Taiwan is the fifth largest emerging economy in the Asia Pacific area. The rapid growth in trading volume has made the TAIEX one of the world's major emerging derivatives

exchanges. The TAIEX was named the “Financial Derivatives Exchange of the Year” in the Asia Pacific region three times in 2004, 2009, and 2015.⁹

On October 8, 2007, the TAIEX implemented a new margin requirement policy to boost the trading volume of index futures. For all qualified traders, the initial margin requirement is now reduced by 50% if a trader declares an order to be a day-trade order. When a day-trade order is successfully executed, the position has to be closed by the investor before 1:30 pm, 15 mins before the market closes. Otherwise, the position will be forced to close by the TAIEX through either a market order or a limit order that is five ticks within the latest trade. In other words, the maximum duration of an index futures position that is initiated by a day-trade order is less than five hours.¹⁰

The TAIEX is an order-driven market that uses an electronic trading system (ETS) operating from 8:45 am to 1:45 pm. After the opening call auction at 8:45 am, the TAIEX operates as a continuous electronic auction market before the closing auction at 1:45 pm. During regular trading hours in the continuous auction market, all orders submitted are matched on a real-time basis according to price and time priority without the intermediation of designated market makers. Investors are allowed to submit both market orders and limit orders to the ETS. Orders on the TAIEX are valid only for the current trading day, and will not be included in the limit order book on future trading days even if they are not successfully executed. Order and transaction information for futures contracts is disseminated to the public on a “real-time” basis using an electronic

⁹ The TAIEX won the title at the *Asia Risk Awards* (<http://www.asiariskcongress.com/awards>) in 2004 and 2009, and won the title at the *Asian Banker Financial Market Awards* (<http://www.asianbankerawards.com/financialmarkets/>) in 2015.

¹⁰ In the US, “pattern day traders” are defined as investors who trade the same stock four or more times in five business days. In this study, index futures investors are defined as day traders if their positions are established through day-trade orders. Our definition is thus different from that in the US as we have a clear way of classifying day traders ex ante.

screen, with information on the last traded price, transaction volume, the best five bid and ask prices, and the trading volumes desired by investors to trade at these prices.

3.2 Data

The major contract traded on the TAIFEX is the Taiwan Stock Exchange Index Futures (hereinafter TXF). The TXF is the foremost product on the TAIFEX and its underlying index, the Taiwan Stock Exchange Capitalization Weighted Index, is a value-weighted index of all stocks traded on the Taiwan Stock Exchange. The TXF is also the most actively traded contract on the TAIFEX. The delivery months for the TXF are the nearby month, the next nearby month, and the next three consecutive quarterly months. We use the nearby contracts in our study because the trading percentage of the nearby contracts accounts for most of the total daily trading volume. We obtain a unique dataset from the TAIFEX. Our sample covers the period from July 1, 2006, to December 31, 2008, for generic individual traders and the period from October 8, 2007, to December 31, 2008 for individual day traders. The unique dataset contains a detailed history of order flows, the order book, transaction data, and the identity of the traders. For each order, the dataset reports the date and time of arrival of the order, the indicator of the opening or closing position, its direction (buy or sell), the quantity demanded or offered, and—most importantly for our purposes—the identification of day traders. The trader

code enables us to categorize two types of traders: generic individual traders and individual day traders.¹¹

3.3 Main Variables

3.3.1 Cognitive limitation

As Kuo et al. (2015) show, some investors have a tendency to use round numbers as cognitive shortcuts to save energy spent on extensive algorithmic processing, leading to a disproportionately large volume of limit orders submitted at round-number prices.¹²

To measure the level of cognitive limitation, similar to Kuo et al.’s (2015) definition, we use the last two digits of the limit order prices to identify round-number prices.¹³

For example, if a limit buy order price is 7,100, we characterize the order as “submitted at 00.” Limit order prices can end with 100 different “XYs” (where X and Y are integers ranging from 0 to 9). We refer to round-number prices as $XY = 00, 05, 10, 15, 20, \dots, 95$ and calculate the submission ratio as:

$$\begin{aligned} & \textit{RoundRatio} \\ &= \frac{\textit{Number of limit orders submitted at "X0" or "X5"}}{\textit{Total Number of submitted limit orders}} \end{aligned} \quad (1)$$

Theoretically, if investors trade index futures fully based on their information and are not cognitively constrained, their limit orders should be equally likely to be

¹¹ In the following analysis in Section 4, we exclude traders who submit fewer than five orders within our sample period.

¹² A recent wave of research on investor inattention and trading can be also seen in the work of Barber and Odean (2008), Hirshleifer, Lim, and Teoh (2009), and Yuan (2015), among others. Whereas Barber and Odean (2008) and Yuan (2015) studied limited cognitive capability at the market level, Kuo et al. (2015) investigate whether there is heterogeneity in cognitive limitation at the investor level and whether this is related to investment performance.

¹³ Kuo et al. (2015) only use the round numbers ending in “0”, e.g., 10, 20, 30...etc., while we also consider the round numbers ending in “5”, e.g., 5, 15, 25, 35,...95.

submitted at any given price. In contrast, if investors are affected by the round-number heuristics, they will submit disproportionately more limit orders at round-number prices.

For individual day traders and generic individual traders, we calculate the proportion of orders submitted at all “XY”s and perform the following regression for the pre-policy and policy periods separately:

$$\begin{aligned} (SubP_{XY} - 0.01) = & a + b_1 D_{50} + b_2 D_{00} + b_3 D_{X0} + b_4 D_{X5} + b_5 D_{50} \times D_{DT} \\ & + b_6 D_{00} \times D_{DT} + b_7 D_{X0} \times D_{DT} + b_8 D_{X5} \times D_{DT} + e, \end{aligned} \quad (2)$$

where $SubP_{XY} - 0.01$ is the deviation of the actual submission ratio at the “XY” price point from its theoretical value assuming uniform distribution of the limit order prices. D_{50} , D_{00} , and D_{X0} are dummy variables for price points “50”, “00”, and “X0” (X is not 5 or 0). D_{X5} is the dummy for all price points “X5”. D_{DT} is the indicator for orders submitted by individual day traders.

3.3.2 Order aggressiveness

We apply a quantitative measure of order aggressiveness using limit orders similar to Hao, Chou, Ho, and Weng (2015).¹⁴ The aggressiveness index is defined as:

$$Aggressiveness = \begin{cases} \frac{\sum_i (P^M - P^B) \times Q^B}{Q^{TB}} & \text{if } order = buy, \\ \frac{\sum_i (P^S - P^M) \times Q^S}{Q^{TS}} & \text{if } order = sell. \end{cases} \quad (3)$$

where P^M is the prevailing mid-quote price for order i ; P^B (P^S) is the buy (sell) order price for order i ; Q^B (Q^S) is the buy (sell) order quantity for order i ; Q^{TB} (Q^{TS}) is the

Hao et al. (2015) use only limit orders to calculate order aggressiveness.

daily total buy (sell) order quantity. As the index increases, the less aggressive the order submission becomes.

In addition to the univariate comparisons, we perform the following regression to further test the results:

$$Aggn_t = a + b_1 D_{IDT} + b_2 Policy + b_3 Buy + b_4 D_{HVOL} + b_5 Policy \times D_{IDT} + e, \quad (4)$$

where $Aggn_m$ is the aggressiveness index of buy orders or sell orders for individual day traders and generic individual traders in month t . D_{IDT} is the indicator for the individual day trader. $Policy$ is equal to 1 if the month is in the policy period, zero otherwise. Buy is the indicator for buy orders. D_{HVOL} is a dummy variable for the months with a trading volume ranked in the top 30% among all months. If b_1 is negative, it indicates that individual day traders tend to be more impatient traders. If b_2 is negative, it indicates that generally all traders become more aggressive in the policy period. In addition, if b_5 is positive, it means that individual day traders trade in less aggressive manner in the policy period compared to the pre-policy period.

3.3.3 Trading performance

Similar to the methodology used by Choe, Kho, and Stulz (2005), we examine whether individual day traders are at an advantage or disadvantage in their trading activities relative to generic individual traders. Trading performance is measured by the following ratio:

$$TPR_{i,t} = \left(\frac{WP_{i,t,sel}}{WP_{t,sel}} - \frac{WP_{i,t,buy}}{WP_{t,buy}} \right) \times 100\% \quad (5)$$

where $TPR_{i,t}$ denotes the aggregated weighted price ratio for trader i in month t . WP_t is the volume-weighted average price in month t , and WP_{it} is the volume-weighted average buying or selling price for trader i in month t . This price ratio is computed for

individual day traders and generic individual traders, separately. The ratio is simply a measure of how much more or less a trader pays than the average price in the month in which he or she buys and how much more or less the trader receives when he or she sells. If a trader generally sells at higher prices and buys at lower prices, he or she must have a higher price ratio and also relatively better trading performance than others.

In addition to the pair comparison, we further examine the following panel regression to test trading performance:

$$\begin{aligned}
 TPR_{i,t} = & a + b_1 RoundRatio_{i,t} + b_2 Aggressiveness_{i,t} + b_3 Policy_{i,t} \\
 & + b_4 Log_Vol_{i,t} + b_5 RoundRatio_{i,t} \times D_{DT\ i,t} \\
 & + b_6 Aggressiveness_{i,t} \times D_{DT\ i,t} + b_7 Policy_{i,t} \times D_{DT\ i,t} + e_i
 \end{aligned} \tag{6}$$

where $TPR_{i,t}$, $RoundRatio_{i,t}$, and $Aggressiveness_{i,t}$ is the trading performance ratio (%), the round-number ratio, and the aggressiveness index for trader i in month m , respectively; $D_{DT\ i,t}$ is the indicator for trader i in month t if he is individual day trader, zero otherwise. $Policy_{i,t}$ is equal to 1 if the trading month t is in the policy period, zero otherwise. $Log_Vol_{i,t}$ is the log of the number of volume submitted by trader i in month t . We focus especially on all interaction terms with D_{DT} . Positive b_7 will confirm that the performance of individual day traders is better than that of generic individual traders in the policy period. According to Kuo et al. (2015), higher ratio of round number represents lower cognitive ability and reduce the trading performance; we expect that both of b_1 and b_5 are negative. According to Agarwal et al. (2009), over-aggressiveness would hurt the trading performance of investors; we expect that both of b_2 and b_6 are positive. The significance of b_5 and b_6 will further suggest that the

cognitive ability and the order aggressiveness of individual day traders have extra influence on trading performance.

4. Empirical Results

4.1 Description Statistics

We first provide some basic statistics as an overview of our sample. All the trades of generic individual traders and individual day traders from July 2006 to December 2008 are included. The statistics are reported in Table 1. The period after the adoption of the new day-trading policy (from October 2007 to December 2008) is displayed in Panel A, and the pre-policy period (from July 2006 to September 2007) is shown in Panel B. As reported in Panel A, after the TAIFEX launched the new trading policy to encourage day trading, 4,454 individual traders committed to being day traders *ex ante*. Their total trading volume in terms of the number of TXF contacts traded is around 2.2 million, while the average and median trading volumes for all individual day traders are 495 and 38, respectively. The difference between the average number and median number indicates that most individual day traders are very small traders, but some individuals trade very frequently. The maximum trading volume for a single day trader is 237,886, which is greater than 10% of the total trading volume. In the same time period, there were 67,568 generic individual traders in the market. Their total trading volume in terms of the number of TXF contacts traded is around 21 million. The average and median trading volumes for all generic individual traders are 312 and 41, respectively, indicating that the distribution of trading volume among traders is tilted to the left tail. From the results given above, we observe that generic individual traders and individual day traders have similar trade volumes, but individual day traders, on average, trade in greater volume or trade more frequently.

[Insert Table 1 about here]

Although 4,454 individual traders commit to being day traders *ex ante* during this period, the new rule does not restrict them from executing non-day trades in the transaction. Therefore, we review all these 4,454 day traders' trading history and find 4,431 of them still participate in generic trading activities. We report the statistics for this subgroup in the final column of Panel A. As can be seen, the total trading volume for these 4,454 traders is around 4.7 million, with an average number of 1,063 and a median number of 145. Interestingly, on average, those individual traders who engage in day trading tend to trade much more in generic trading activities compared to generic individual traders.

Similar to Panel A, Panel B first reports the statistics for the trades of generic individual traders during the period prior to the launch of the new trading policy. There are 55,513 individual trades in this period and their total volume is around 13.5 million. The average and median trading volumes for all generic individual traders are 243 and 36, respectively. Individual traders trade less frequently and also in relatively smaller volumes compared to the policy period. This finding is consistent with Hao et al. (2015), who show that the TAIEX exhibited steady increases in market growth from 2006 to 2008. As individual traders were not allowed to register as committed day traders in this period, we report no statistics for individual day traders in Panel B. In the final column of Panel B, however, we report the statistics for non-day trades executed by the traders involved in day-trading activities under the new day-trading policy from October 2007 to December 2008. By merging the datasets, we filter 2,343 individual traders who have both generic trading records in the pre-policy period and day-trading records in the post-policy period. The total trading volume in the pre-policy period is 2.35 million, resulting in a boom in the average and median numbers of contracts to 1,004 and 152 respectively. Compared to the same column in Panel A, we observe that the trade size or trade distribution is similar for the two periods for individual day

traders' non-day trades. This finding implies that day trading activities in the policy period were invoked by the new trading policy.

4.2 Order submissions at round-number prices

Following Equation (1), we calculate the post-policy period monthly percentage of orders submitted at round-number prices for individual day traders and generic individual traders from October 2007 to December 2008 separately. The results are reported in Table 2.

[Insert Table 2 about here]

As reported in Table 2, for each month, day traders have distinctly lower percentages of round numbers used when they submit orders. On average, the round-number ratio of individual day traders is 12.23% lower than that of generic individual traders. This finding supports our first hypothesis, expecting that individual day traders should be less subject to cognitive limitation compared to generic individual traders. Interestingly, although individual day traders seem to be more “self-controlled” when they trade, they still submit a disproportionate volume of limit orders at round-number prices, at 29.16% on average, suggesting that individual day traders do not fully overcome their cognitive limitation through day trading.

In Table 2, we show that individual day traders' order submission behavior represents better cognitive abilities. However, we do not exclude the possibility that these individual day traders happen to be traders with higher cognitive ability originally. This means that day trading does not help reduce their cognitive errors. To solve such a “self-selection” problem, we perform a follow-up examination. We calculate the monthly percentage of orders submitted at round-number prices for individual day traders and generic individual traders from July 2006 to September 2007, the period in which the new day-trading policy had not yet been launched and thus there was no

official rule forcing traders to liquidate their trading positions on the same day. In other words, in that period the market mechanism would not implicitly help them to improve their cognitive ability. Traders were free to abandon their original day-trading strategy and leave their positions open for the next couple of days if they found no satisfactory prices to offset their new-built position before the market closed on that day.

Therefore, if the round-number ratios of generic individual traders and individual day traders are similar, this means that individual day traders did not originally have better cognitive ability; they do reduce their cognitive limitation through engaging in day-trading activities. On the other hand, if the round-number ratios of individual day traders are lower than those of generic individual traders before the launch of the new trading rule, it means that our argument is not supported and the hypothesis fails. Table 3 reports the results of the comparison.

[Insert Table 3 about here]

As can be seen, on average, the differences in the round-number ratios for generic individual traders and individual day traders are quite minor. Essentially, these two types of traders trade indifferently with low cognitive abilities. The results in Table 3 therefore exclude the possibility of self-selection and support H1.

To provide further support, we test the clustering of limit orders through regressions on dummy variables indicating round-number prices and trader types. The regression function is Equation (2). Table 4 reports the coefficient estimates for this regression for policy period (Panel A) and pre-policy period (Panel B).

Panel A, Model 1, shows that the coefficients of all dummies are significantly positive with p-value smaller than 1%. The submission proportion ratios at “50” and “00” are higher than “X0” and “X5”, which is consistent with the pattern found by Kuo et al. (2015). Round-number price points at “00” and “50” have the highest proportion among all “XY” price points. When the focus is exclusively on individual day traders,

Model 2 shows that b_5 to b_8 are all significantly negative with p-value smaller than 1%, which is consistent with our earlier finding in Table 2: individual day traders tend to use fewer round numbers as cognitive shortcuts in their trading decisions.

[Insert Table 4 about here]

Panel B, Model 1, shows similar results as those in Panel A. However, Model 2 in Panel B reports that the submission ratios of limit order clustering at round-numbers are indifferently among generic individual trader and individual day traders. The coefficients of interaction terms for individual day traders (b_5 to b_8) are all insignificant. Again, over all these results support our first hypothesis as well as the earlier findings in Table 2 and Table 3.

4.3 Order aggressiveness

Similar to 4.2, we calculate the order aggressiveness index for generic individual traders and individual day traders. Using Equation (2), the order aggressiveness indices are measured for buy orders and sell orders, and for each month, separately. The results are shown in Table 5.

[Insert Table 5 about here]

Similar to Table 2, we find that generic individual traders and individual day traders behave differently. In all the months after the launch of the new day-trading rule, individual day traders trade much more aggressively than generic individual traders. On average, the order aggressiveness index for generic individual traders is 10.06 for

buy orders and for 7.18 sell orders, while that for individual day traders is only 8.34 for buy orders and 2.85 for sell orders.¹⁵

Table 5 indicates that individual day traders submit more aggressive orders compared to generic individual traders. We report further results in Panel B to observe whether individual day trades became relatively aggressive or passive in trading by committing to being day traders *ex ante*. We calculate the order aggressiveness index for generic individual traders and individual day traders from July 2006 to September 2007, the results of which are shown in Table 6.

Interestingly, the results in Table 6 show that individual day traders also trade more aggressively than generic individual traders in the pre-policy period. On average, the order aggressiveness index for generic individual traders is 14.5 for buy orders and for 10.65 sell orders, while that for individual day traders is 7.47 for buy orders and 2.78 for sell orders. However, the findings in Table 6 also indicate that individual day traders in pre-policy period are relatively more aggressive than themselves in policy period. We can see the difference between the order aggressiveness indices between individual day trader and generic individual trader is 7.02 for buy orders and 7.87 for sell orders in the pre-policy period, while in the post-policy period the difference is 2.88 for buy orders and 5.49 for sell orders. In other words, even though individual day traders could originally have been more aggressive than generic individual traders, they show less aggressive order behavior after the launch of the new policy.

[Insert Table 6 about here]

The regression of Equation (4) provides further analysis. The results are reported in Table 7. The findings of Table 7 show that when the interest exclusively on the effect

¹⁵ In unreported results, we also calculate aggressiveness index for generic trades of individual day traders. As what we have shown in Table 2, individual day traders have similar aggressiveness index for their generic trades and day trades.

of individual day traders, both b_1 and b_5 are all significantly with the signs as our expectations. b_2 is significantly negative, which is also consistent with our expectation. b_3 is significantly positive, indicating that sell orders are more aggressive than buy orders. b_4 is negative, suggesting that high trading volume months tend to relatively aggressive months, although the coefficient is insignificant.

[Insert Table 7 about here]

The findings here are consistent with the reported in Table 5 and Table 6, and provide evidence to support H2: Day traders will be more eager to execute orders as quickly as possible; however, the tendency to be aggressive in trading will be alleviated in the policy period when individual day traders have to trade under the daily liquidation restriction.

4.4 Trading performance

The previous subsections comprise the first part of this study, and provide empirical evidence as to that the commitment to being a day trader *ex ante* essentially affects trading behaviors to make the trades more aggressive and less cognitively limited. In line with previous studies, any of order aggressiveness (e.g., Agarwal et al., 2009; Chen et al., 2014) or cognitive limitation (e.g., Kuo and Lin, 2013) should affect trading performance. Therefore, the second part of this study examines whether the difference between the trading performance of individual day traders and generic individual traders are related to these behavioral factors in the policy period. Using Equation (3), we first compute weighted price ratios as the trading performance measure for generic individual traders and individual day traders in the policy period. Table 8 reports the

average value of weighted price ratios in basis points for generic individual traders and individual day traders in each policy month from October 2007 to December 2008.

As reported, Table 8 shows that the trading performance of individual day traders is better than that of generic individual traders. Every month, when generic individual traders lose to the market by greater than 4 basis points on average, individual day traders lose only 0.28 basis points to the market, which is essentially identical to the market average. Over all, individual day traders' trading performance is around 4 bps better than generic individual traders.¹⁶

[Insert Table 8 about here]

We take a closer look at the performance differences between individual day traders and generic individual traders. Interestingly, we find that individual day traders win over generic individual traders in more than half of fifteen policy months. In some periods, they can even earn positive returns based on the market average as the benchmark. Furthermore, the performance between individual day traders and generic individual traders is significantly different only in the months that individual day traders have higher trading performance ratio. The finding means that individual day traders' trading performance is superior persistently.

In addition to pair comparison, we conduct the regression for trading performance. The results are reported in Table 9. Table 9, both Model 1 and Model 2, report significantly negative coefficients of round-number ratio, and aggressiveness index, which is consistent with our findings in previous tables. Higher cognitive ability and more aggressive trading can help traders to performance better. b_3 is insignificant, indicating that generic individual traders perform indifferently before and after the new

¹⁶ The comparison is also conducted for the pre-poly period. The unreported results show that the performance of individual day traders' generic trades is close to that of generic trading of their counterparts.

day-trading policy. Notably, Model 2 shows that b_6 is significantly positive, but both coefficients of the interaction term with D_{DT} for round-number ratio and aggressiveness index are insignificant; the former result indicates that individual day traders do have better trading performance in policy period, while the latter results suggests that individual day traders are not superior traders compared to generic individual traders. The finding rationalizes the fact why individual day traders have better trading performance: individual day traders' better performance is less likely due to better endowment in skills or learning experience, but more likely resulted from when individual traders trade by the day-trading commitment, they are unconsciously (or consciously) forced to raise their cognitive ability and adjust their order aggressiveness. In this regard, the new day-trading policy launched from October 8, 2007 on the TAIEX serves like a exogenous mechanism to affect individual trader and play the beneficial role for their trading activities.

[Insert Table 9 about here]

In sum, overall the findings in this stage of the analysis of the trading performance of generic individual traders and individual day traders support H3.

4.5 Further robustness

In the previous analysis, we excluded investors who submit fewer than five orders within our sample period. We constructed the round-number ratio at multiples of 5, calculated aggressiveness index using limit orders, and computed trading performance ratio using market average prices as the benchmark. To ensure that our results are not driven by the filtering criteria and how we define the measures, we check whether our results hold when we require traders to submit more than 10 (or 15) orders to be included in the analysis and when we construct the round-number ratio at multiple of 10, calculate aggressiveness index using market orders and limit orders together, and

compute mark-to-market returns for all traders.¹⁷ In the unreported results, we find that our main findings are robust to different sampling filtering criteria and various definitions of measures.

5. Conclusion

In this study, we examine the influence of a new trading policy for individual day traders on the TAIFEX. The new rule, launched on October 8, 2007, allows investors who commit to being day traders *ex ante* to enjoy a 50% reduction in the initial margin requirement. This rule change provides an opportunity to identify day traders precisely *ex ante*. Based on the expected results of this study, we show that in addition to the original purpose of reducing the margin requirement and encouraging investors to trade, this new trading policy favors day trading, bringing about behavioral impacts for those individual investors who engage in day-trade activity and affecting their trading performance. We summarize the findings in what follows.

It is a commonly held view that a day trader has to trade as quickly as possible and monitor price movements very carefully so as not to miss any arbitrage or speculative opportunities. Therefore, whereas individual traders are usually viewed as having low cognitive ability (Kuo et al., 2015), being relatively passive (Hao et al., 2015), and losing money in trading (Barber et al., 2009), we argue that behaving like a day trader may help a generic individual trader to improve his or her cognitive ability, submit

¹⁷ The mark-to-market return is the intraday return using the difference between the daily closing price and the initiating order's execute price, divided by the execution price. This calculation assumes that the initiating orders are covered at the closing price of the trading day.

orders more aggressively, alleviate the disposition effect, and lose less (or win more) money when trading.

By detailing our empirical evidence, we confirm three hypotheses concerning the arguments above and draw a new portrait of individual traders: Individual traders behaving as day traders are less affected by cognitive limitation; individual day traders submit relatively aggressive orders; individual day traders are able to perform better in some circumstances than the market average and earn positive profits. Interestingly, we believe that individual day traders are not necessarily aware of the changes in their cognitive abilities and behaviors when they trade under the restriction of the new rule; the day-trading mechanism implicitly forces individual day traders to trade in a higher functioning manner and ultimately benefits their trading activities.

Previous studies have shown that individual investors tend to lose money to the market. Individual investors trade often and their trading hurts their performance (Barber and Odean, 2000). Trading by some individual investors in emerging markets is even more deleterious for performance because individuals execute too many trades with an extreme turnover rate and face very high commission costs (Barber et al., 2009). Whereas all the previous findings in the literature conclusively view individual traders as overconfident, irrational, lazy in cognition, hardly learning by trading, etc., our study argues that seeking an external mechanism to alleviate behavioral biases is a useful alternative to help individual investors. Finally, based on all our findings, we can enrich our understanding of individual day traders and, more interestingly, we might have the chance to conclude: Day trading is good for one's wealth.

References

- Agarwal, S., Faircloth, S., Liu, C., & Rhee, G. S. (2009). Why do foreign investors underperform domestic investors in trading activities? Evidence from Indonesia. *Journal of Financial Markets*, 12, 32–53.
- Arrow, K. J. (1962). The economic implications of learning by doing. *The Review of Economic Studies*, 29(3), 155-173.
- Barber, B. M., & Odean, T. (1999). The courage of misguided convictions. *Financial Analysts Journal*, 55(6), 41–55.
- Barber, B. M., & Odean, T. (2000). Trading is hazardous to your wealth: The common stock investment performance of individual investors. *The Journal of Finance*, 55(2), 773–806.
- Barber, B. M., & Odean, T. (2008). All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors. *Review of Financial Studies*, 21(2), 785–818.
- Barber, B. M., Lee, Y.-T., Liu, Y.-J., & Odean, T. (2009). Just how much do individual investors lose by trading? *Review of Financial Studies*, 22(2), 609–632.
- Barber, B. M., Lee, Y.-T., Liu, Y.-J., & Odean, T. (2014). The cross-section of speculator skill: Evidence from day trading. *Journal of Financial Markets*, 18, 1–24.
- Battalio, R. H., Hatch, B., & Jennings, R. (1997). SOES trading and market volatility. *Journal of Financial and Quantitative Analysis*, 32, 225–238.
- Chen, C.-N., Chen, C. R., & Huang, Y. S. (2014). Which types of traders and orders profit from futures market trading? *Journal of Derivatives*, 21(4), 49–62.
- Choe, H., Kho, B.-C., & Stulz, R. M. (2005). Do domestic investors have an edge? The trading experience of foreign investors in Korea. *Review of Financial Studies*, 18(3), 795–829.
- Goetzmann, W. N., & Kumar, A. (2008). Equity portfolio diversification. *Review of Finance*, 12(3), 433–463.
- Graham, J. R., Huang, H., & Harvey, C. (2009). Investor competence, trading frequency, and home bias. *Management Science*, 55, 1094–1106.
- Grinblatt, M., & Keloharju, M. (2000). The investment behavior and performance of various investor types: A study of Finland's unique data set. *Journal of Financial Economics*, 55(1), 43–67.
- Grinblatt, M., & Keloharju, M. (2009). Sensation seeking, overconfidence, and trading activity. *Journal of Finance*, 64, 549–578.
- Grossman, S. J., Kihlstrom, R. E., & Mirman, L. J. (1977). A Bayesian approach to the production of information and learning by doing. *The Review of Economic Studies*, 44(3), 533–547.
- Hao, Y., Chou, R. K., Ho, K.-Y., & Weng, P.-S. (2015). The impact of foreign institutional traders on price efficiency: Evidence from the Taiwan futures market.

- Pacific-Basin Finance Journal*, 34, 24–42.
- Harris, J. H., & Schultz, P. H. (1998). The trading profits of SOES bandits. *Journal of Financial Economics*, 50, 39–62.
- Hirshleifer, D., Lim, S. S., & Teoh, S. H. (2009). Driven to distraction: Extraneous events and underreaction to earnings news. *The Journal of Finance*, 64(5), 2289–2325.
- Jordan, D. J., & Diltz, J. D. (2003). The profitability of day traders. *Financial Analysts Journal*, 59(6), 85–94.
- Kahneman, D., Lovallo, D., & Sibony, O. (2011). Before you make that big decision. *Harvard Business Review*, 89(6), 50–60.
- Kumar, A., & Lim, S. (2008). How do decision frames influence the stock investment choices of individual investors? *Management Science*, 54, 1052–1064.
- Kuo, W.-Y., & Lin, T.-C. (2013). Overconfident individual day traders: Evidence from the Taiwan futures market. *Journal of Banking and Finance*, 37(9), 3548–3561.
- Kuo, W.-Y., Lin, T.-C., & Zhao, J. (2015). Cognitive limitation and investment performance: Evidence from limit order clustering. *Review of Financial Studies*, 28(3), 838–875.
- Koski, J. L., Rice, E. M., & Tarhouni, A. (2008). *Day trading and volatility: Evidence from message board postings in 2002 vs. 1999*. Working Paper. University of Washington.
- Kyrolainen, P. (2008). Day trading and stock price volatility. *Journal of Economics and Finance*, 32, 75–89.
- Linnainmaa, J. T. (2005). *The individual day trader*. Working Paper. University of California, Berkeley.
- Linnainmaa, J. T. (2010). Do limit orders alter inferences about investor performance and behavior? *The Journal of Finance*, 65(4), 1473–1506.
- Nicolosi, G., Peng, L., & Zhu, N. (2009). Do individual investors learn from their trading experience? *Journal of Financial Markets*, 12(2), 317–336.
- Odean, T. (1998a). Volume, volatility, prices and profit when all traders are above average. *Journal of Finance*, 53(5), 1887–1934.
- Odean, T. (1998b). Are investors reluctant to realize their losses? *Journal of Finance*, 53(5), 1775–1798.
- Shefrin, H. M., & Statman, M. S. (1985). The disposition to sell winners too early and ride losers too long: Theory and evidence. *Journal of Finance*, 40, 777–790.
- Seru, A., Shumway, T., & Stoffman, N. (2010). Learning by trading. *Review of Financial Studies*, 23(2), 705–739.
- Yuan, Y. (2015). Market-wide attention, trading, and stock returns. *Journal of Financial Economics*, 116(3), 548–564.

Table 1: Descriptive Statistics

This table reports basic statistics for all the trades of generic individual traders and individual day traders from July 2006 to December 2008. Panel A presents the period after the launch of the new trading policy (2007.10-2008.12) and Panel B presents the period before the launch of the new trading policy (2006.07-2007.09).

	<i>Generic Individual Trading</i>	<i>Individual Day Trading</i>	<i>Generic Individual Trading from Indv. Day Traders</i>
<i>Panel A: After the launch of the new trading policy</i>			
Number of Traders	67,568	4,454	4,431
Total Trading Volume (Contacts)	21,093,922	2,204,683	4,710,161
Trading Volume			
Average	312	495	1,063
Median	41	38	145
Standard Deviation	3,488	5,022	7,754
Maximum	397,812	237,886	244,311
Minimum	1	1	1
<i>Panel B: Before the launch of the new trading policy</i>			
Number of Traders	55,513	-	2,343
Total Trading Volume (Contacts)	13,490,174	-	2,353,553
Trading Volume -			
Average	243	-	1,004
Median	36	-	152
Standard Deviation	2,230	-	7,860
Maximum	235,414	-	255,970
Minimum	1	-	1

Table 2: The Trading Performance Ratio (bps) after the Launch of the New Trading Policy

This table calculates the post-policy period monthly trading performance ratio (Equation (3)) for individual day trading and generic individual trading from October 2007 to December 2008 separately. All differences are examined by *t*-test. *, **, and *** indicate significance level of 0.1, 0.05, and 0.01, respectively.

<i>Panel A: Generic individual trading and individual day-trading</i>			
<i>Month</i>	<i>Generic Individual Traders</i>	<i>Individual Day Traders</i>	<i>Differences</i>
OTC 2007	-10.27	-5.62	-4.65
NOV 2007	-40.40	-11.86	-28.54***
DEC 2007	-52.83	-19.44	-33.38***
JAN 2008	-8.78	22.35	-31.13***
FEB 2008	-7.49	37.49	-44.98***
MAR 2008	-36.43	-28.01	-8.42
APR 2008	-27.36	10.42	-37.78***
MAY 2008	7.10	20.90	-13.80***
JUN 2008	-7.54	4.40	-11.93
JUL 2008	-32.54	-28.30	-4.24
AUG 2008	-4.29	0.29	-4.58
SEP 2008	-57.83	-33.68	-24.15***
OTC 2008	-52.66	-0.31	-52.35***
NOV 2008	-26.85	23.54	-50.34***
DEC 2008	-15.10	-7.66	-7.44
All	-25.07	-1.35	-23.72***

<i>Panel B: Individual day-trading and generic individual trading from indiv. day traders</i>			
<i>Month</i>	<i>Generic Individual Traders</i>	<i>Individual Day Traders</i>	<i>Differences</i>
		<i>Doing Generic Trades</i>	
OTC 2007	-10.27	-9.18	-1.08
NOV 2007	-40.40	-19.85	-20.55***
DEC 2007	-52.83	-22.07	-30.75***
JAN 2008	-8.78	-18.87	10.09**
FEB 2008	-7.49	-22.46	14.97***
MAR 2008	-36.43	-9.52	-26.91***
APR 2008	-27.36	-19.55	-7.81***
MAY 2008	7.10	-12.17	19.27***
JUN 2008	-7.54	-5.85	-1.69
JUL 2008	-32.54	-4.71	-27.83***

AUG 2008	-4.29	-8.75	4.46*
SEP 2008	-57.83	-23.24	-34.58***
OTC 2008	-52.66	-28.43	-24.24***
NOV 2008	-26.85	-27.21	0.36
DEC 2008	-15.10	-10.63	-4.47
All	-25.07	-16.11	-8.96***

Table 3: The Trading Performance Ratio (bps) before the Launch of the New Trading Policy

This table calculates the post-policy period monthly trading performance ratio (Equation (3)) for individual day trading and generic individual trading from July 2006 to September 2007 separately. All differences are examined by *t*-test. *, **, and *** indicate significance level of 0.1, 0.05, and 0.01, respectively.

<i>Month</i>	<i>Generic Individual Traders</i>	<i>Individual Day Traders</i>	<i>Differences</i>
JUL 2006	-19.96	-12.29	-7.67***
AUG 2006	0.08	-2.74	2.82
SEP 2006	-3.30	-3.29	-0.01
OTC 2006	0.88	0.46	0.42
NOV 2006	-10.78	-3.89	-6.88***
DEC 2006	2.03	-3.28	5.32***
JAN 2006	-3.83	-4.50	0.66
FEB 2007	4.95	2.21	2.74*
MAR 2007	-19.49	-13.30	-6.19***
APR 2007	3.50	3.40	0.10
MAY 2007	-3.08	-2.58	-0.49
JUN 2007	-31.11	-14.00	-17.11***
JUL 2007	-16.20	-11.07	-5.13***
AUG 2007	-1.99	-3.28	1.29
SEP 2007	9.96	3.81	6.15***
All	-6.43	-4.43	-2.01***

Table 4: The Percentages of Round Numbers Submitted after the Launch of the New Trading Policy

This table calculates the post-policy period monthly percentage of orders submitted at round-number prices (Equation (1)) for individual day trading and generic individual trading from October 2007 to December 2008 separately. Panel A performs the comparison between the trades from generic individual traders and the trades from individual day traders; Panel B performs the comparison between the trades from generic individual traders and generic trades from individual day traders. All differences are examined by *t*-test. *, **, and *** indicate significance level of 0.1, 0.05, and 0.01, respectively.

<i>Panel A: Generic individual trading and individual day-trading</i>			
<i>Month</i>	<i>Generic Individual Traders</i>	<i>Individual Day Traders</i>	<i>Differences</i>
OTC 2007	46.13	38.12	8.01
NOV 2007	49.41	40.03	9.37
DEC 2007	48.73	38.20	10.54
JAN 2008	52.92	40.30	12.62
FEB 2008	46.67	34.86	11.81
MAR 2008	50.89	39.02	11.86
APR 2008	47.52	34.19	13.33
MAY 2008	46.75	33.49	13.26
JUN 2008	47.00	33.40	13.60
JUL 2008	49.36	35.21	14.14
AUG 2008	47.07	32.50	14.57
SEP 2008	47.75	34.92	12.82
OTC 2008	45.70	35.73	9.98
NOV 2008	48.75	36.46	12.29
DEC 2008	45.14	33.83	11.31
All	48.01	35.98	12.03

<i>Panel B: Individual day-trading and generic individual trading from indiv. day traders</i>			
<i>Month</i>	<i>Generic Individual Traders</i>	<i>Individual Day Traders</i> <i>Doing Generic Trades</i>	<i>Differences</i>
OTC 2007	46.13	41.47	4.67
NOV 2007	49.41	42.58	6.83
DEC 2007	48.73	41.64	7.09
JAN 2008	52.92	44.67	8.25
FEB 2008	46.67	40.05	6.62
MAR 2008	50.89	43.54	7.35
APR 2008	47.52	39.15	8.37

MAY 2008	46.75	37.51	9.24
JUN 2008	47.00	37.25	9.75
JUL 2008	49.36	40.04	9.32
AUG 2008	47.07	37.58	9.49
SEP 2008	47.75	37.58	10.16
OTC 2008	45.70	37.75	7.96
NOV 2008	48.75	39.18	9.57
DEC 2008	45.14	35.48	9.66
All	48.01	39.79	8.22

Table 5: The Percentages of Round Numbers Submitted before the Launch of the New Trading Policy

This table calculates the policy period monthly percentage of orders submitted at round-number prices (Equation (1)) for individual day trading and generic trading of individual day traders from July 2006 to September 2007 separately. All differences are examined by *t*-test. *, **, and *** indicate significance level of 0.1, 0.05, and 0.01, respectively.

<i>Month</i>	<i>Generic Individual Traders</i>	<i>Individual Day Traders</i>	<i>Differences</i>
JUL 2006	41.88	36.00	5.88
AUG 2006	41.87	35.18	6.69
SEP 2006	42.22	36.22	6.00
OTC 2006	39.32	34.07	5.25
NOV 2006	38.80	33.43	5.37
DEC 2006	39.87	34.87	5.00
JAN 2006	42.32	36.93	5.39
FEB 2007	39.07	32.79	6.28
MAR 2007	41.40	35.40	6.00
APR 2007	40.24	34.87	5.37
MAY 2007	39.10	32.84	6.26
JUN 2007	39.90	35.05	4.85
JUL 2007	45.04	39.30	5.74
AUG 2007	51.60	46.37	5.23
SEP 2007	45.97	40.48	5.49
Average	42.06	36.86	5.20

Table 6 Limit Order Clustering Regression

This table tests the clustering of limit orders through regressions on dummy variables indicating round-number prices and trader types. For individual day traders and generic individual traders, we calculate the proportion of orders submitted at all “XY”s and perform the following regression for the pre-policy and policy periods separately:

$$(SubP_{XY} - 0.01) = a + b_1D_{50} + b_2D_{00} + b_3D_{X0} + b_4D_{X5} + b_5D_{50} \times D_{DT} + b_6D_{00} \times D_{DT} + b_7D_{X0} \times D_{DT} + b_8D_{X5} \times D_{DT} + e,$$

where $SubP_{XY} - 0.01$ is the deviation of the actual submission ratio at the “XY” price point from its theoretical value assuming uniform distribution of the limit order prices. D_{50} , D_{00} , and D_{X0} are dummy variables for price points “50”, “00”, and “X0” (X is not 5 or 0). D_{X5} is the dummy for all price points “X5”. D_{DT} is the indicator for orders submitted by individual day traders. Panel A reports the coefficient estimates for this regression for policy period and Panel B reports the coefficient estimates for this regression for pre-policy period. *, **, and *** indicate significance level of 0.1, 0.05, and 0.01, respectively.

<i>Panel A: Policy Period (2007.10-2008.12)</i>		
Independent Variables	Model 1	Model 2
<i>Intercept</i>	-0.002*** (0.000)	-0.002*** (0.000)
<i>D₅₀</i>	0.017*** (0.001)	0.024*** (0.001)
<i>D₀₀</i>	0.028*** (0.001)	0.035*** (0.001)
<i>D_{X0}</i>	0.011*** (0.000)	0.016*** (0.000)
<i>D_{X5}</i>	0.005*** (0.000)	0.007*** (0.000)
<i>D₅₀ × D_{IDT}</i>		-0.013*** (0.001)
<i>D₀₀ × D_{IDT}</i>		-0.014*** (0.001)
<i>D_{X0} × D_{IDT}</i>		-0.008*** (0.000)
<i>D_{X5} × D_{IDT}</i>		-0.003*** (0.000)
<i>Adjusted R²</i>	0.734	0.823
<i>Panel B: Pre-Policy Period (2006.07-2007.09)</i>		
Independent Variables	Model 1	Model 2

<i>Intercept</i>	-0.002*** (0.000)	-0.002*** (0.000)
<i>D₅₀</i>	0.014*** (0.001)	0.017*** (0.001)
<i>D₀₀</i>	0.020*** (0.001)	0.023*** (0.001)
<i>D_{X0}</i>	0.010*** (0.000)	0.012*** (0.000)
<i>D_{X5}</i>	0.005*** (0.000)	0.005*** (0.000)
<i>D₅₀ × D_{IDT}</i>		-0.001 (0.001)
<i>D₀₀ × D_{IDT}</i>		-0.001 (0.001)
<i>D_{X0} × D_{IDT}</i>		-0.000 (0.000)
<i>D_{X5} × D_{IDT}</i>		-0.001 (0.000)
<i>Adjusted R²</i>	0.624	0.630

Table 7: The Order Aggressiveness Index after the Launch of the New Trading Policy

This table calculates the post-policy period monthly order aggressiveness index (Equation (2)) for individual day trading and generic individual trading from October 2007 to December 2008 separately. Panel A performs the comparison for buy orders; Panel B performs the comparison for sell orders. All differences are examined by *t*-test. *, **, and *** indicate significance level of 0.1, 0.05, and 0.01, respectively.

<i>Month</i>	<i>Generic Individual Traders</i>	<i>Individual Day Traders</i>	<i>Differences</i>
<i>Panel A: Buy Orders</i>			
OTC 2007	0.0662	0.0290	0.0371***
NOV 2007	0.0859	0.0204	0.0656***
DEC 2007	0.0807	0.0180	0.0627***
JAN 2008	0.0930	0.0251	0.0679***
FEB 2008	0.0710	0.0140	0.0569***
MAR 2008	0.0814	0.0187	0.0627***
APR 2008	0.0670	0.0138	0.0532***
MAY 2008	0.0665	0.0158	0.0507***
JUN 2008	0.0710	0.0192	0.0518***
JUL 2008	0.0882	0.0259	0.0623***
AUG 2008	0.0842	0.0161	0.0682***
SEP 2008	0.0999	0.0277	0.0722***
OTC 2008	0.1170	0.0350	0.0821***
NOV 2008	0.1170	0.0315	0.0855***
DEC 2008	0.1046	0.0272	0.0774***
All	0.0876	0.0227	0.0649***
<i>Panel B: Sell Orders</i>			
OTC 2007	0.0484	0.0124	0.0360***
NOV 2007	0.0580	0.0126	0.0455***
DEC 2007	0.0627	0.0169	0.0458***
JAN 2008	0.0740	0.0171	0.0568***
FEB 2008	0.0583	0.0136	0.0447***
MAR 2008	0.0669	0.0153	0.0516***
APR 2008	0.0574	0.0102	0.0473***
MAY 2008	0.0556	0.0108	0.0448***
JUN 2008	0.0586	0.0111	0.0475***

JUL 2008	0.0591	0.0157	0.0434***
AUG 2008	0.0596	0.0118	0.0478***
SEP 2008	0.0660	0.0210	0.0450***
OTC 2008	0.0938	0.0280	0.0659***
NOV 2008	0.0968	0.0309	0.0659***
DEC 2008	0.0883	0.0221	0.0662***
Average	0.0679	0.0172	0.0507***

<i>Month</i>	<i>Generic Individual Traders</i>	<i>Individual Day Traders Doing Generic Trades</i>	<i>Differences</i>
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Panel C: Buy Orders

OTC 2007	0.0662	0.0364	0.0298***
NOV 2007	0.0859	0.0374	0.048***
DEC 2007	0.0807	0.0344	0.046***
JAN 2008	0.0930	0.0393	0.053***
FEB 2008	0.0710	0.0311	0.039***
MAR 2008	0.0814	0.0340	0.047***
APR 2008	0.0670	0.0278	0.039***
MAY 2008	0.0665	0.0299	0.036***
JUN 2008	0.0710	0.0311	0.039***
JUL 2008	0.0882	0.0427	0.045***
AUG 2008	0.0842	0.0316	0.052***
SEP 2008	0.0999	0.0487	0.051***
OTC 2008	0.1170	0.0545	0.062***
NOV 2008	0.1170	0.0489	0.068***
DEC 2008	0.1046	0.0483	0.056***
Average	0.0876	0.0385	0.0481***

Panel D: Sell Orders

OTC 2007	0.0484	0.0269	0.021***
NOV 2007	0.0580	0.0277	0.030***
DEC 2007	0.0627	0.0290	0.033***
JAN 2008	0.0740	0.0330	0.041***
FEB 2008	0.0583	0.0299	0.028***
MAR 2008	0.0669	0.0298	0.037***
APR 2008	0.0574	0.0249	0.032***
MAY 2008	0.0556	0.0272	0.028***
JUN 2008	0.0586	0.0267	0.031***

JUL 2008	0.0591	0.0266	0.032***
AUG 2008	0.0596	0.0274	0.032***
SEP 2008	0.0660	0.0326	0.033***
OTC 2008	0.0938	0.0503	0.043***
NOV 2008	0.0968	0.0460	0.050***
DEC 2008	0.0883	0.0371	0.051***
Average	0.0679	0.0317	0.0362***

Table 8: The Order Aggressiveness Index before the Launch of the New Trading Policy

This table calculates the policy period monthly order aggressiveness index (Equation (2)) for individual day trading and generic individual trading from October 2007 to December 2008 separately. Panel A performs the comparison for buy orders; Panel B performs the comparison for sell orders. All differences are examined by *t*-test. *, **, and *** indicate significance level of 0.1, 0.05, and 0.01, respectively.

<i>Month</i>	<i>Generic Individual Traders</i>	<i>Individual Day Traders</i>	<i>Differences</i>
<i>Panel A: Buy Orders</i>			
JUL 2006	0.0708	0.0453	0.0255***
AUG 2006	0.0759	0.0408	0.0351***
SEP 2006	0.0807	0.0476	0.0331***
OTC 2006	0.0595	0.0446	0.0149***
NOV 2006	0.0645	0.0523	0.0122***
DEC 2006	0.0601	0.0418	0.0183***
JAN 2006	0.0624	0.0446	0.0178***
FEB 2007	0.0515	0.0411	0.0104**
MAR 2007	0.0688	0.0386	0.0302***
APR 2007	0.0555	0.0366	0.0189***
MAY 2007	0.0559	0.0387	0.0172***
JUN 2007	0.0537	0.0350	0.0187***
JUL 2007	0.0612	0.0341	0.0271***
AUG 2007	0.1065	0.0509	0.0556***
SEP 2007	0.0715	0.0396	0.0319***
Average	0.0669	0.0416	0.0253***
<i>Panel B: Sell Orders</i>			
JUL 2006	0.0513	0.0241	0.0272***
AUG 2006	0.0532	0.0424	0.0108**
SEP 2006	0.0540	0.0354	0.0186***
OTC 2006	0.0534	0.0316	0.0218***
NOV 2006	0.0464	0.0357	0.0107**
DEC 2006	0.0423	0.0239	0.0184***
JAN 2006	0.0465	0.0292	0.0173***
FEB 2007	0.0442	0.0314	0.0128***
MAR 2007	0.0503	0.0296	0.0207***
APR 2007	0.0418	0.0288	0.0130***

MAY 2007	0.0419	0.0234	0.0185***
JUN 2007	0.0438	0.0255	0.0183***
JUL 2007	0.0504	0.0335	0.0169***
AUG 2007	0.0645	0.0377	0.0268***
SEP 2007	0.0527	0.0306	0.0221***
Average	0.0493	0.0308	0.0185***

Table 9: Aggressiveness Index Regression

This table performs the following regression to test the results in Table 5 and Table 6:

$$Aggn_{i,t} = a + b_1 D_{IDT} + b_2 Policy + b_3 Buy + b_4 Log_Vol + b_5 Policy \times D_{IDT} + e,$$

where $Aggn_t$ is the aggressiveness index of buy orders and sell orders for any trader i in month t . D_{IDT} is equal to 1 if the trader i is an individual day trader, zero if it is a generic individual trader. $Policy$ is equal to 1 if the month t is in the policy period, zero otherwise. Buy is the indicator for buy orders. Log_Vol is the logarithmic monthly trading volume for trader i . Standard errors are shown in the parentheses. *, **, and *** indicate significance level of 0.1, 0.05, and 0.01, respectively.

	<i>Intercept</i>	<i>D_{IDT}</i>	<i>Policy</i>	<i>Buy</i>	<i>Log_Vol</i>	<i>Policy</i> $\times D_{IDT}$	<i>Adj. R²</i> <i>(%)</i>
(1)	0.0740*** (0.0004)	-0.0373*** (0.0009)		0.0180*** (0.0004)	-0.0072*** (0.0001)		0.54
(2)	0.0634*** (0.0005)		0.0192*** (0.0004)	0.0180*** (0.0004)	-0.0079*** (0.0001)		0.59
(3)	0.0646*** (0.0005)	-0.0367*** (0.0009)	0.0189*** (0.0004)	0.0181*** (0.0004)	-0.0075*** (0.0001)		0.72
(4)	0.0636*** (0.0005)	-0.0161*** (0.0013)	0.0211*** (0.0004)	0.0182*** (0.0006)	-0.0076*** (0.0001)	-0.0402*** (0.0019)	0.76