Asian Economic and Financial Review
ISSN(e): 2222-6737
ISSN(p): 2305-2147
DOI: 10.18488/journal.aefr.2017.79.921.928
Vol. 7, No. 9, 921-928

URL: www.aessweb.com

IMPACT OF INTRADAY TRADING OF SECURITIES ON MARKET LIQUIDITY: REVISITING THE PRICE IMPACT FUNCTION

Tsung-Yu Hsieh[1]
Chih-Ling Lin[2+]
Ting-Yi Wu[3]

[1,3]*MingDao University, Chang Hua, Taiwan*
[2]*Central Taichung University of Science and Technology, Taichung, Taiwan*

(+ Corresponding author)

Article History
Received: 20 April 2017
Revised: 25 May 2017
Accepted: 15 June 2017
Published: 3 August 2017

Keywords
Liquidity
Price impact function
Intraday trading of the same securities
Market for trading orders
Short selling.

ABSTRACT

The chronic lack of trading momentum and volume in the Taiwan stock market has been a problem for the government. Various policies and measures have been put in place to energize the domestic stock market. In 2014, the government lifted the bank on intraday trading (first on buying followed by selling on January 6, 2014, and then on selling followed by buying on June 30, 2014), in an attempt to stimulate the market. This paper seeks to examine whether intraday trading of securities is beneficial to the liquidity of the constituents of the FTSE TWSE Taiwan 50 Index and the FTSE TWSE Taiwan 100 Index by sampling data from 2013 to 2014. The research purpose is to explore the effects of (1) buying followed by selling; (2) selling followed by buying; and (3) intraday trading of securities in general on market liquidity. As the market depth indicators such as spreads used in literature are not suitable for a market geared toward trading orders (Hu and Chan, 2001) this paper contributes that the price impact function can yield some insight for research institutes into the formation of policies on intraday trading of the same securities.

1. INTRODUCTION

The lack of trading momentum and liquidity has been a chronic problem for the Taiwan stock market, largely due to the imposition of capital gain taxes and other taxes levied on traders with over NT$1 billion in annual trading volume. Government agencies in Taiwan have been initiating a variety of economic and financial policies to attract interest from the investing public and to boost the liquidity of the stock market. The Financial Supervisory Commission (FSC) has come up with three initiatives designed to increase trading volumes. Among the three measures, the allowance of intraday trading of securities is expected to be the most effective policy tool. The FSC lifted the bans on buying followed by selling on January 6, 2014, and then on selling followed by buying on June 30, 2014. It is hoped that two-directional intraday trading of the same securities can enhance the trading mechanism and provide a vehicle for risk hedging.

The Taiwan Stock Exchange is a market driven by trading orders, with queuing starting at 8:30 am. The trading hours are from 9:00 to 13:30, and the matching of orders begins at 9:00, based on the dual criteria of price priority and time priority at a frequency of every 15 seconds. Approximately 70% of the trading volume comes from retail investors. Intraday trading refers to the predetermined purchase (sale) and then sale (purchase) of the same marketable securities in the same account with the same broker on the same business day. The counter transactions

must be completed at the latest before the end of after-market fixed-price trading hours (14:00-14:30)[1]. Investors may initiate trades in opposite directions in response to market volatility, misjudgments or prices trending in the direction contrary to that anticipated. This mitigates investment risks with early profits and provides trading flexibility and risk hedging opportunities.

The regulators lifted the restrictions on short selling upon the same or lower closing price for the constituents of the FTSE TWSE Taiwan 50 Index and the FTSE TWSE Taiwan 100 Index on May 16, 2005 and September 22, 2007, respectively. Intraday trading allows investors to bypass margin borrowing or short lending to complete buying followed by selling or selling followed by buying. Retail investors with limited capital can avoid risk that arises overnight and take profits early.

This paper samples the data of the constituents of the FTSE TWSE Taiwan 50 Index and the FTSE TWSE Taiwan 100 Index from July 1, 2013 through December 31, 2014 to explore the impact of intraday trading of the same securities on market liquidity. Investment funds, proprietary trading desks (of securities firms), and foreign (or Chinese) institutional investors can only engage in very limited intraday trading under a stringent set of risk control measures. Meanwhile, as retail investors account for approximately 70% of trading volumes, the empirical results suggest that intraday trading is mostly undertaken by retail investors. Further, retail investors mostly trade on noise (Campbell and Kyle, 1993) and exhibit behavior biases such as overconfidence and overreaction (i.e., chasing winners and selling losers) (Shleifer and Summers, 1990). This paper hence seeks to examine the trading behavior of retail investors, as distinct from the results in the literature that focuses on institutional investors. Finally, there are no market makers in Taiwan, where trading orders dictate the market momentum. Therefore, it is not appropriate to use spreads as the measurement of market liquidity[2]. Instead of using the variables from past studies, this paper intends to construct a more appropriate model to examine the impact of intraday trading on the liquidity of a market driven by trading orders.

This paper attempts to explore how the lifting of the bans on (1) buying following by selling; (2) selling followed by buying; and (3) intraday trading of the same securities affects market liquidity. A robust set of statistical techniques are deployed to produce results as a template for further empirical studies and a reference to regulators regarding the impact of day trading.

Chapter 2 of this paper summarizes the literature review. Chapter 3 describes the research methodology. Chapter 4 presents the empirical results and Chapter 5 develops the conclusions.

2. LITERATURE REVIEW

Intraday trading of the same securities is often deemed as a form of short selling. However, intraday trading is much timelier than shorting. Shorting is allowed on all stocks listed in the U.S., so it is not possible whether the effects are a result of change in the system or the nature of stocks. In addition, a cross-market comparison may not produce reliable conclusions as the effects may be a consequence of different market mechanisms. However, similar to the market in Taiwan, there are no market makers in the stock market in Hong Kong, and measurements based on spreads may not be appropriate (Hu and Chan, 2001).

This paper thus hopes to refer to the price impact function, an indicator more appropriate to the markets driven by trading orders, in order to provide evidence of a different dimension regarding the impact of intraday trading of the same securities on market liquidity.

[1] Source: promotional literature from the Taiwan Stock Exchange.

[2] See Hu and Chan (2001).

3. RESEARCH METHODOLOGY

3.1. Data Sources

This paper gauges the impact of intraday trading on market liquidity by referring to the price impact function. Other variables (i.e., spreads, depth and liquidity ratios) and control variables are sourced from the Taiwan Economic Journal. In order to avoid any bias caused by a change in index constituents (Harris and Gurel, 1986; Hegde and McDermott, 2003) this paper only includes a total of 122 companies both in the FTSE TWSE Taiwan 50 Index and the FTSE TWSE Taiwan 100 Index during the research period[3], from July 1, 2013 through December 31, 2014.

3.2. Variable Measurements

This paper segments the intraday data of individual stocks into a total of 54 5-minute timeslots to examine the impact of the policy changes regarding intraday trading of the same securities on market liquidity. As the momentum of the stock market in Taiwan is dictated by trading orders[4], this paper refers to the price impact function in the exploration of the influence of intraday trading of the same securities on liquidity, after a careful evaluation of the appropriateness of the relevant variables.

A change in quantities may be divided into the change during the current period and the change during the subsequent periods, resultant from specific trading volumes in the measurement of liquidity based on the price impact of transactions. This then differentiates the trading costs during the period (borne by all investors) and during the subsequent periods (borne by institutional investors or block traders). In short, this measurement can meet the requirements of different types of traders. Any change in market efficiency and trading mechanisms may prevent prices from instantaneously reflecting information. This can be resolved with the appropriate setup in a multi-period model. Meanwhile, price changes triggered by factors other than trading can be captured by a constant. This paper adopts the market depth model developed by Kyle (1985) to measure liquidity. The model is specified as

$$P(y)=\mu+\lambda y\ ;\ D=1/\lambda\ , \qquad (1)$$

where $P(y)$ is the price as a function of the trading volume, y is the trading volume, λ is the regression coefficient, and μ is the true function. As $D=1/\lambda$, the greater the value of D, the less susceptible the price is to the trade impact. This means the greater the market depth and the better the liquidity. The D value is derived through regression on the intraday data at 5-minute intervals.

The criteria for sample screening are as follows: To avoid any bias to the estimates with the regression equation and to ensure the representativeness of the results based on excessive scarcity of trading data, this paper only includes the observations with at least one match (i.e., transaction) within each 5-minute interval. The mean prices and trading volumes in each interval are used as indicative values.

$$Spread_{i,t}=((Ask_{i,t}-Bid_{i,t})/((Ask_{i,t}+Bid_{i,t}))*100\quad ; \qquad (2)$$

$$TR1_{i,t}=V_{i,t}/O_{i,t} \qquad (3)$$

$$TR2_{i,t}=V_{i,t}*P_{i,t}/O_{i,t}*P_{i,t} \qquad (4)$$

$$\sigma_{i,t}=(\ln(P_{i,t,h}/P_{i,t,l})^2/4\ln 2)^{0.5}\times 100\quad ; \qquad (5)$$

[3]Except for the stocks deleted or requiring different trading methods, the constituents of the FTSE TWSE Taiwan 50 Index, FTSE TWSE Taiwan Mid-Cap 100 Index and the Taipei Exchange 50 Index can all be bought and sold during the same day. During the research period, only 33 companies were also in the Taipei Exchange 50 Index. These companies were removed from the sample pool and this paper only analyses the companies listed on the Taiwan Stock Exchange.

[4] This paper refers to the liquidity measurements and reviews by Hu and Chan (2001). published in Journal of Humanities and Social Sciences.

where $TR1_{i,t}$ denotes the first turnover ratio of Company i on Day t, V is the number of shares traded, O is the number of shares outstanding, $TR2_{i,t}$ is the second turnover ratio of Company I on Day t, P is the transaction price, $Bid_{i,t}$ ($Ask_{i,t}$) is the best bid (ask) for Company i for the closing price of Day t, $Q_{bid,i,t}$ ($Q_{ask,i,t}$) is the volume requested by the best bid (ask) for Company i for the closing price of Day t, and $P_{i,t}$ is the trading price for Company i on Day t.

3.3. Research Methodology

To enhance the robustness of the results, the research design of this paper divides the intraday data into three segments: from July 1, 2013 through January 3, 2014, from January 7, 2014 through June 29, 2014 and from July 1, 2014, through December 31, 2014. The empirical approach based on a panel regression is expressed as follows:

$$\Delta D_{i,t} = \beta_0 + \beta_1 I_{i,pre} + \beta_2 Volume_{i,pre} + \beta_3 \sigma_{i,pre} + \beta_4 MV_{i,pre} + \varepsilon_{i,t} \quad (6)$$

$$D_{i,t} = \alpha_0 + \alpha_1 I_{i,t} + \alpha_2 Volume_{i,t} + \alpha_3 \sigma_{i,t} + \alpha_4 MV_{i,t} + \varepsilon_{i,t} \quad (7)$$

In equations (6) and (7), the symbol ΔD_i is the variance in the price impact function (i.e., the mean value during the second half of the period less the mean value during the first half of the period), $I_{i,pre}$ is a dummy variable for intraday trading of th1e same securities with 1 indicating "allowed" and 0 indicating "not allowed", $Volume_{i,pre}$ is the mean trading volume of Stock i before the permission of intraday trading, $\sigma_{i,pre}$ is the mean volatility of Stock i before the permission of intraday trading, and $MV_{i,pre}$ is the mean market capitalization of Stock i before the permission of intraday trading.

To ensure the rigour of the empirical results, the constituents in both the FTSE TWSE Taiwan 50 Index and the FTSE TWSE Taiwan 100 Index during the research period are classified as the experiment group; other stocks (for which intraday trading is not allowed) are considered the control group. A difference analysis is performed on each of the above three segments of data. If the conclusion remains the same, the results are regarded as robust.

4. EMPIRICAL RESULTS AND ANALYSIS

4.1. Impact of Intraday Trading of the Same Securities on Liquidity

Table 1 summarizes the influence of intraday trading of the same securities on liquidity. Panel A compares the intraday quality of the market before and after the permission of buying before selling (i.e., the period from July 1, 2013 through January 3, 2014 vs. the period from January 7, 2014 through June 29, 2014). The results indicate that the intraday volatility (σ) dramatically declined after the permission of buying before selling. This implies the buying before selling of the same securities mitigates trading risks. Panel B compares the intraday quality of the market before and after the permission on selling followed with buying (i.e., the period from January 2, 2014 through June 9, 2014 vs. the period from July 1, 2014 through December 31, 2014). The statistics suggest a limited impact from the permission of selling before buying, possibly because buying before selling of the same securities had already been possible. The value of σ rose significantly during two intervals (or time periods).

Obviously, investors who actively sell before buying the same securities assume higher risks. The volatility data (σ) shows that the trading volume goes up and down throughout the day, but the market is relatively active at

opening and closing. In general, the attempt by the government to energize the market through the permission of selling before buying of the same securities failed to deliver the expected results[5].

Table-1. Influence of intraday trading of the same securities on liquidity

This table shows the influence of intraday trading of the same securities on liquidity under pilot group								
	Spread	**Volume**	**TR1**	**TR2**	**volatilities(σ)**		**Depth**	
Panel A: Buy first and sell later								
Pre.	0.0012	11531.2	0.0053	5.3563	6.0440		144525.0	
Post	0.0012	12356.4	0.0058	5.8870	6.0518		-673389.0	
Diff.	-0.00005	-825.2	-0.0005	-0.5306	-0.0077	***	817915.0	
Panel B: Sell first and buy later								
Pre.	0.0012	11531.2	0.0053	5.3563	6.0440		144525.0	
Post	0.0012	12930.5	0.0049	4.9578	6.0493		-72495.7	
Diff.	-2.55×10^{-6}	-1399.3	0.0003	0.3985	-0.0053	**	217021.0	
Panel C: Day trading								
Pre.	0.0012	12356.4	0.0058	5.8870	6.0518		-673389.0	
Post	0.0012	12930.5	0.0049	4.9578	6.0493		-72495.7	
Diff.	0.00004	-574.1	0.0009	0.9291	0.0024		-600894.0	

Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Panel C contrasts the change in effective spreads and market depth before and after the permission of intraday trading of the same securities (i.e., the period from July 1, 2013 through January 3, 2014 vs. the period from July 1, 2014 through December 31, 2014). The statistics show no significant changes other than those for volatility and spread measurements in relation to selling before buying.

4.2. Difference in Difference Analysis

In addition to the examination of market quality in association with buying before selling and selling before buying of the same securities, this paper refers to Alexander and Peterson (2008) for difference in difference analysis. An analysis is conducted on the experiment group (the stocks for which intraday trading was allowed) and the control group (the stocks for which intraday trading was prohibited). If the difference in difference analysis reaches statistical significance, it implies significant variances in the change to market quality variables between the experiment group and the control group after intraday trading was allowed. This ensures the robustness of the empirical results, as the effects were a consequence of buying before selling or selling before selling, not due to other factors. The difference (Diff.) in Table 2 indicates the gap in the difference between the experiment group and the control group before and after the permission of intraday trading. Panel A and Panel B show no significant variances in the spread difference (Δspread) between the experiment group and the control group. The statistics in Panel A suggest significant variances only in the difference in trading volumes (ΔVol) after the permission of buying before selling. None of the other variables report significant variances. The numbers in Panel B show significant variances in the difference in trading volumes (ΔVol), the difference in the first turnover (ΔTR1), the difference in the second turnover (ΔTR2) and the difference in volatility ($\Delta\sigma$) after the permission of selling before buying. According to the results shown in Panel C, there are significant variances in the difference in the first turnover (ΔTR1) and the difference in the second turnover (ΔTR2) after both buying before selling and selling before buying became possible. The statistics of the three variables indicate that the difference in difference is exactly the opposite regarding buying before selling and selling before buying. Two-directional intraday trading became possible after the permission of selling before buying. However, the impact of selling before buying is stronger than that of buying before selling. Compared to the control group, the experiment group reported a smaller gap in spreads and a less obvious difference in depth. The difference in trading volumes was greater at

[5]The permission of intraday trading (of selling before buying) on the Taiwan Stock Exchange requires securities brokers to build up positions or secure access to securities loanable in advance in order to respond to requests from investors for settlements.

opening but narrowed after the third interval. Apparently, the results for certain variables concerning intraday market quality do not indicate that the experiment group was any more active than the control group after two-directional intraday trading was made possible. Panel A and Panel B exhibit the changes three months after the permission of buying before selling and selling before buying, respectively. A further examination of the data shown in Panel C sheds light on the difference six months before and after intraday trading was allowed (i.e., the period from July 1, 2013 through January 3, 2014 vs. the period from July 1, 2014 through December 31, 2014). This difference serves as a benchmark to compare the experiment group and the control group. This paper does not find many intervals with significant variances for individual variables. In sum, the permission of intraday trading did not cause any significant variances in terms of intraday quality between the experiment group and the control group.

Table-2. Difference between the experiment group and the control group before and after the permission of intraday trading

	Spread	Volume		TR1		TR2		Volatilities(σ)		Impact
Panel A: Buy first and sell later										
A	1.847×10^{-6}	-768.9		0.0003		0.2973		0.0089		-26295.2
B	0.000057	562.6		0.0002		0.2479		0.0066		-866785.0
Diff.	-0.00006	-1331.5	*	0.00005		0.0494		0.0022		840490.0
Panel B: Sell first and buy later										
A	-0.00004	1177.8		5.8110		5.8110		-0.0003		12425.6
B	-0.00002	-966.0		0.3170		0.3170		-0.0056		234433.0
Diff.	-0.00002	2143.8	***	5.4940	***	5.4940	***	0.0053	**	-222008.0
Panel C: Day trading										
A	-0.00002	700.3		0.0036		3.6981		0.0042		-11550.6
B	0.00003	-562.4		0.0005		0.5356		0.0012		-668596.0
Diff.	-0.00006	1262.7		0.0031	**	3.1625	**	0.0029		657045.0

Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

4.3. Cross-Sectional Analysis

This paper incorporates additional variables in the examination of the factors that may influence the effects of intraday trading on the price impact function. The control variables are included in the exploration of the intraday trading on price impacts (e.g., Eq. (6)). This section reviews the mean trading volumes (Volume), the mean volatility (σ) and mean market capitalization (MV) before the permission of intraday trading. The regression results for the cross-sectional data are shown in Table 3. The dependent variable is the difference in intraday quality of the experiment group before and after the permission of buying before selling and selling before buying of the same securities. The independent variable is a dummy variable indicating whether trading occurred every 30 minutes after opening but excluding the last 30 minutes before closing. The intercept β_0 represents the gap between the 30 minutes before closing and individual intervals. The purpose is to examine the changes in intraday quality throughout the trading intervals. Panel A suggests that the spread difference at closing was significantly smaller than that in other intervals after the permission of buying before selling. The difference in volatility and the change in trading volume were also relatively lower. The change in the liquidity ratio (ΔMLR) was also reduced. Meanwhile, Panel A also suggests that trading volumes started to increase closer to the eighth 30-minute timeslot.

According to Panel B, the difference in trading volume (ΔVol) is significantly lower at opening (α_1) and closing (α_0) after the permission of selling before buying. However, other variables showed no significant variances throughout the time intervals[6]. Panel C summarizes he variance in intraday quality variables in different time intervals before and after the permission of intraday trading. The coefficient of α_0 is significantly negative in the

[6] the tables (not shown here) indicate that the narrowing of spreads in the experiment group was not as meaningful as the control group after the permission of buying before selling. However, the experiment group showed better depth difference and liquidity ratios, as well as larger trading volumes at closing than during other trading intervals.

regression for ΔMLR, indicating a massive drop in liquidity at closing. Meanwhile, the coefficients for α_2, α_5 and α_6 in the regression for ΔVol are also significantly negative. However, other variables showed no obvious variances throughout the trading intervals. In general, and as shown in Table 3, the permission of buying before selling may have benefited the intraday quality, but when two-directional intraday trading became possible, this benefit vanished.

Table-3. Regression results for the cross-sectional data

$\Delta D_{i,t} = \beta_0 + \beta_1 I_{i,pre} + \beta_2 Volume_{i,pre} + \beta_3 \sigma_{i,pre} + \beta_4 MV_{i,pre} + \varepsilon_{i,t}$

	β_0		β_1		β_2		β_3		β_4
Panel A: Buy first and sell later									
(1)	-80357594				-21.8679		13205543		0.6313
(2)	-51674824		-620070		-15.5344		8508603		0.8488
Panel B: Sell first and buy later									
(1)	-99929948				-5.8885		16422407		0.5372
(2)	-82048668		-331888		-2.8534		13493364		0.6273
Panel C: Day trading									
(1)	9445965				21.7131	***	-1575098		-0.3036
(2)	-3356437		259228	*	19.9749	***	522960		-0.3834

Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

4.4. Panel Regression

With panel data, we can control for omitted variable bias and unobserved or unmeasurable sources of individual heterogeneity. Therefore, we use panel regression to show robust regression analysis results in this section. The equation is as follows:

$$D_{i,t} = \alpha_0 + \alpha_1 I_{i,t} + \alpha_2 Volume_{i,t} + \alpha_3 \sigma_{i,t} + \alpha_4 MV_{i,t} + \varepsilon_{i,t} \quad (8)$$

The definition for the variables in equation (8) is the same as for equation (6). Equation (8) is mainly used for analysis of the effect of price impact function on the individual stocks i before and after time t.

The results are similar to those of the regression analysis in Section 4.4 and show no significant effect on the price impact function. It can be observed that day trading does not significantly impact on price impact function and relative trading volume.

Table-4. Panel Regression results for the cross-sectional data

Panel Regression $D_{i,t} = \alpha_0 + \alpha_1 I_{i,t} + \alpha_2 Volume_{i,t} + \alpha_3 \sigma_{i,t} + \alpha_4 MV_{i,t} + \varepsilon_{i,t}$

	Intercept		**I**		**Volume**		**Stdev**		**MV**	
Panel A: Buy first and sell later										
(1)	-29807961				-2.3958		4897770		0.1901	
(2)	-24393166		-145689		-1.3388		4014851		0.2346	
Panel B: Buy first and sell later										
(1)	10094790				7.8882		-1651398		-0.2861	
(2)	-5097421		351564		6.0509		833719		-0.3846	
Panel C: Day trading										
(1)	-6970426				-22.2538	***	1197435		0.2632	
(2)	-5535962		-43790		-22.1024	***	964494		0.2733	

Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

5. CONCLUSION

Intraday trading is a big issue for market regulators, and it impacts market efficiency. The majority of the relevant literature focuses on the profitability of intraday trading (Barber et al., 2004; Garvey and Murphy, 2005). Few studies examine the impact of intraday trading (i.e., buying before selling and selling before buying of the same securities) on intraday market quality. The research period of this paper spans from July 1, 2013 through December

31, 2014. As retail investors contribute to approximately 70% of the trading volumes in the market studied, the greenlight to intraday trading can save the costs associated with margin trading for traders whose capital is limited. This paper makes up the gap in literature addressing the influence of intraday trading on intraday market quality in a market driven by retail investors. The empirical results indicate a U-shape trend in trading volumes before and after the permission of buying before selling. In other words, the trading volume expanded at opening and closing. Meanwhile, the spreads of the stocks for which (at first) buying before selling was allowed dropped significantly and market depth increased significantly. However, the improvement in liquidity was offset after selling before buying was allowed. In fact, the intraday risks went up significantly. Cross-sectional analysis also suggests that the permission of buying before selling may have benefited the intraday quality initially. However, once selling before buying was also allowed, this benefit disappeared. The difference in difference analysis shows no significant difference in intraday quality between the experiment group (the stocks for which intraday trading was allowed) and the control group (the stocks for which intraday trading was not allowed). The research findings in this paper indicate that the effects of buying before selling and the effects of selling before buying on intraday market quality may have cancelled each other out. However, the effects of buying before selling alone did have a positive impact on intraday market quality. Hence, competent authorities should enhance market transparency and reduce information asymmetry to boost market liquidity and attract investors. It is suggested that follow-up studies examine and compare trading orders from institutional investors and retail investors to produce in-depth findings.

Funding: This study received no specific financial support.
Competing Interests: The authors declare that they have no competing interests.
Contributors/Acknowledgement: All authors contributed equally to the conception and design of the study.

REFERENCES

Alexander, G.J. and M.A. Peterson, 2008. The effect of price tests on trader behavior and market quality: An analysis of reg SHO. Journal of Financial Markets, 11(1): 84-111. *View at Google Scholar* | *View at Publisher*

Barber, B.M., Y.T. Lee, Y.J. Liu and T. Odean, 2004. Do individual day traders make money? Evidence from Taiwan. Working Paper. Retrieved from http://www.econ.yale.edu/~shiller/behfin/2004-04-10/barber-lee-liu-odean.pdf.

Campbell, J.Y. and A.S. Kyle, 1993. Smart money, noise trading and stock price behaviour. Review of Economic Studies, 60(1): 1-34. *View at Google Scholar* | *View at Publisher*

Garvey, R. and A. Murphy, 2005. Entry, exit and trading profits: A look at the trading strategies of a proprietary trading team. Journal of Empirical Finance, 12(5): 629 - 649. *View at Google Scholar* | *View at Publisher*

Harris, L. and E. Gurel, 1986. Price and volume effects associated with changes in the S&P 500 list: New evidence for the existence of price pressures. Journal of Finance, 41(4): 815–829. *View at Google Scholar* | *View at Publisher*

Hegde, S.P. and J.B. McDermott, 2003. The liquidity effects of revisions to the S&P 500 index: An empirical analysis. Journal of Financial Markets, 6(3): 413–459. *View at Google Scholar* | *View at Publisher*

Hu, S.Y. and C. Chan, 2001. The review of the liquidity measure. Proceedings of the National Science Council, 11(3): 205-221.

Kyle, A.S., 1985. Continuous auctions and insider trading. Econometrica, 53(6): 1315-1336. *View at Google Scholar* | *View at Publisher*

Shleifer, A. and L.H. Summers, 1990. The noise trader approach to finance. Journal of Economic Perspectives, 4(2): 19-33. *View at Google Scholar*