Changes Tick Size

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The Effect of Changes in Tick Price and Lot Size on Stock Liquidity: Evidence from Indonesia Stock Market

Abstract

New regulation in the tick price and lot size was implemented in Indonesia Stock Exchange on 6 January 2014. This research aims to examine the effects of the changes toward stock liquidity. Comparison of stock liquidity measurement variables before and after the event is conducted with 15 days window period. 370 stocks fulfilled the criterion and used as sample in this paper. This study employs paired sample t-test for normally distributed data and Wilcoxon test for not normally distributed data to assess mean significant differences before and after the event. Result shows that to some extent, the event enhanced stock liquidity.

Keywords: changes in tick price and lot size, stock liquidity, Indonesia Stock Market

I. INTRODUCTION

On 6 January 2014, government implement new regulation regarding tick price and lot size as written in "Surat Keputusan Direksi PT. Bursa Efek Indonesia Kep-00071/BEI/11-2013". Tick price is the minimum threshold in bargaining stock price which is established by the Stock Exchange. It is the minimum change in stock price either an increase or a decrease. Tick price that is applicable to all the stocks in all price range is called single fraction. On the other hand, tick price that is applicable differently to stocks based on its price range is called multi fraction. Meanwhile, lot size is the minimum volume of shares traded in the stock exchange or the volume within one lot.

Table 1 below shows the difference in tick price and lot size between new regulation after 6 January 2014 and old regulation before 6 January 2014. In the new regulation, 1 lot size equal 100 shares compared to 500 shares in the old regulation. Hence, with the new regulation, traders can purchase only 100 shares while the old regulation required traders to purchase at least 500 shares. Not just lot size, tick price also changed in the new regulation. Within the category of Rp 200 until less than Rp 500, the new regulation stated that the tick price becomes Rp 1 instead of Rp 5. In addition, within the category of Rp 500 until less than Rp 5000, the new regulation set the tick price is Rp 5. As for the category of equal or more than Rp 5000, the new regulation arranged that the tick price is Rp 25.

Table 1 Changes in Tick Price and Lot Size

Old Regulation	
Lot Size	500

New Regulation	
Lot Size	100

Old Regulation	
Price Range	**Tick Price**
< Rp 200	Rp 1
Rp 200 - < Rp 500	Rp 5
Rp 500 - < Rp 2.000	Rp 10
Rp 2000 - < Rp 5000	Rp 25
≥ Rp 5000	Rp 50

New Regulation	
Price Range	**Tick Price**
< Rp 500	Rp 1
Rp 500 - < Rp 5000	Rp 5
≥ Rp 5000	Rp 25

Source: PT. Bursa Efek Indonesia, 2014

According to Ito Warsono, president director of PT. Bursa Efek Indonesia, government decided to impose the changes in tick price and lot size in order to increase

stock liquidity which will eventually boost local investment. With lower lot size, Samsul Hidayat, director monitoring compliance of BEI members, revealed that government expects the stock price to be more affordable for the investors hence leads to higher purchasing power of public investors and eventually to higher liquidity. As for the tick price, the changes expected to diminish the spread between bid and ask (Perubahan Lot Size dan Tick Price BEI: Seluruh AB Sudah Siap, 2014). In addition, Argha J Karo Karo, analyst of Creative Trading System, said that retail investors are having difficulties in purchasing and managing diverse portfolio due to its expensive price for a single lot (BEI Menyatakan Siap Terapkan Fraksi Baru, 2014). By lowering lot size, it is expected that retail investors can purchase their portfolio of stocks and finally increase stock liquidity.

There are several studies that have been conducted around the world, regarding the changes in tick price. Lau and McInish (1995) analyzed the event on 18 July 1994, when Stock Exchange of Singapore decreased the tick price from 50 cent to 10 cent for stocks traded at SGD 25 or more. They found out that bid-ask spread hence transaction costs were decreased significantly (Lau & McInish, 1995). Porter and Weaver (1997) conducted a research to examine the impact of reduction in tick price on market quality in Toronto Stock Exchange. They report lower execution costs and a decrease in quoted market depth (Porter & Weaver, 1997).

Ronen and Weaver (1998) analyzed the case happened on 1997, when AMEX (American Stock Exchange) reduced the tick price from $1/8 to $1/16 for all stocks. They found out that bid-ask spread and depth were significantly decreased while trading volume was insignificantly increased due to the changes (Ronen & Weaver, 1998). For similar event, Goldstein and Kavajecz (2000) also documented significant decrease in bid-ask spread and depth in New York Stock Exchange (NYSE).

Aitken and Comerton-Forde (2005) investigate the impact of reduction in tick size on stock liquidity which occured in Australian Stock Exchange on 4 December 1995. They found out that low priced stocks, overall, experience improvement in liquidity particularly for high volume stocks which exhibit the utmost increase but stocks priced higher than AUD 10 particularly in the group of low volume stocks displays overall deterioration in liquidity (Aitken & Commerton-Forde, 2005).

Although there are several studies has been conducted regarding with changes in tick size, this paper gives contributions in several aspects. First, this paper examine the

effect of slightly different event in dissimilar context. The event in the previous studies is only changes in tick size while new regulation in Indonesia Stock Exchange per 6 January 2014 is changes on both tick size and lot size. The context also different since it happen in different market. Second, previous studies also give various results particularly in term of effect of the changes on depth and trading volume. Results of this paper can be used to enrich the existing studies and literatures. Lastly, several studies that had been carried out are limited in term of number of sample such as Lau and McInish (1995) which only cover three stocks and limited window period such as 5 days before and 5 days after the changes took place as in Lau and McInish (1995). This paper expands the works by scrutinizing larger number of sample and examining the effect of the changes through longer window period which is 15 days before and 15 days after the event.

Based on the background above, this research particularly aims to evaluate whether the new regulation, changes in tick price and lot size effective per 6 January 2014, have effect on stock liquidity in Indonesia Stock Exchange.

II. STOCK LIQUIDITY MEASURES

Liquidity is the ability to buy and sell stocks without having significant changes in their prices. Fleming (2003) stated that the liquidity of a stock is depending on how high the transaction cost is. If the transaction cost is low it means the stock is liquid, while if transaction cost is high then the stock is illiquid. Furthermore, liquidity can be defined as the ability to execute a transaction directly at that time at the bid and ask price. Thus, a stock is liquid when there is always a buyer whenever a stock is about to be sold with low volatility in the price.

Stock liquidity is important because it reflects how liquid a bourse is. There are many measurements of liquidity according to experts. Based on Fleming (2003), stock liquidity can be measured through the bid-ask spread, depth, and trading volume. Meanwhile, Wyss (2004) measured liquidity through trading time, tightness, depth, and resiliency. This research will employ four measurements of liquidity which are bid-ask spread, depth, trading volume, and trading time.

A.   Bid-ask Spread

Bid-ask spread is the difference between ask and bid price. It related measures gives an approximation of the cost incurred when trading as in Wyss (2004). Beside fees and taxes, traders also have to pay the spread as the transaction cost. Instead of buying at the bid price, traders sometimes choose to buy at the ask price to execute immediate transaction. Same goes when traders want to sell, instead of selling at the ask price, traders decide to sell at the bid price to be able to execute immediate transaction. There are three types of spread based on Wyss (2004) which are absolute spread or quoted spread, relative spread, and effective spread. Relative spread itself can be calculated using last trade or mid price as the denominator. Absolute or quoted spread is not being used in this paper because the result would be as obvious as the tick price itself. Relative spread with last trade and effective spread also not chosen because there is no solid reason to determine the base price. Thus, among all types of spreads, this study use relative spread, specifically relative spread with mid-price. Relative spread with mid price is able to compare spread of different stocks because it uses middle price as the denominator of the gap between bid price and ask price. Wyss (2004) stated that relative spread could make stock comparable one to another while Christie and Huang (1994) stated that relative spread is more appropriate measurement in measuring liquidity compare to absolute-dollar spread. Relative spread with mid-price is calculated as follows:

$$SrelM_t = \frac{P_t^A - P_t^B}{P_t^M} \qquad (1)$$

Relative spread with mid-price ($SrelM_t$) calculates the difference between the lowest ask and the highest bid divided by P_t^M, where $P_t^M = \frac{P_t^A + P_t^B}{2}$.

B.   Depth

Fleming (2003) stated that depth (quote size) is an estimation of the quantity of securities tradable at the bid and offer price. Just like bid-ask spread, depth is also commonly used as one of the measurements of liquidity. Depth is the total number of demand and supply of stocks in bid and ask price respectively as in Wyss (2004). For depth, basic depth is employed in this research. Lau & McInish (1995), in analyzing Stock Exchange of Singapore, also used basic depth in their research. Basic depth is calculated below:

$$D_t = q_t^A + q_t^B \qquad (2)$$

q_t^A denotes the quantity depth on ask price in time t, while q_t^B signifies the quantity depth on bid price in time t.

C. Trading Volume

Trading volume is the number of trades executed within a specified interval regardless the trade size as in Fleming (2003). High trading volume indicates higher liquidity. Trading volume in this research considers not about the nominal of the transaction but the number of stock involved within trading hours per day as commonly used by previous studies such as Lau and McInish (1995) and Bacidore (1997).

$$Q_t = \sum_{i=1}^{N_t} q_i$$

where N_t is the number of trades happened in that specified interval of time, while q_i is the number of shares traded in particular i.

D. Trading Time

Trading time measures the time interval between one transaction to another as in Wyss (2004). The more transaction happen in a certain period of time makes the trading time lower which leads to a higher liquidity (Wyss, 2004). This measure is also known as waiting time in which it can be measured in second, minute, or even hour. Trading time in this study deliberates the average waiting time between each transaction.

$$WT_t = \frac{1}{N-1} \sum_{i=2}^{N} tr_i - tr_{i-1}$$

where WT_t is the waiting time in time t, tr_i indicates the time of the trade, while tr_{i-1} denotes the time of the trade before. N is the frequency of transaction between the time tr_i and tr_{i-1}. Trading time together with trading volume is able to show which stocks have few large trades and which stocks have many small trades.

III. RESEARCH METHOD

As explained in the section 2, bid-ask spread specifically relative spread with mid price, basic depth, trading volume, and trading time are employed as proxies for stock liquidity.

Data

Data are taken from Indonesia Stock Exchange (IDX) official website and KSEI (Kustodian Sentral Efek Indonesia). Details needed for the calculation of stock liquidity such as daily stock listed, closing bid and ask price, closing bid and ask volume, trading volume, and trading frequency were gathered from the official website of Indonesia Stock Exchange while the details regarding corporate actions occurred between the window period were gathered through Kustodian Sentral Efek Indonesia. The window period is determined to be 15 working days before and 15 days after the event took place, excluding holiday, joint holiday, and the event itself.

Sample selection

To get the appropriate samples to answer the research objectives of this study, there are several criterion need to be fulfilled. The first criterion is stocks should be listed in Indonesia Stock Exchange during the whole 15 days window period before and after the event. Stocks that are not listed since the beginning of the window period or removed before the end of the window period will be omitted since it cannot be used in the comparison.

The second criterion is that stocks must not be affected by any kind of corporate actions such as stock split, right issue, distribution of dividend, and merger and acquisition during the window period. Collected the necessary data from KSEI (Kustodian Sentral Efek Indonesia), stocks which have any corporate action in between the window period will be excluded.

The third criterion is that stocks should be traded during the window period. Stocks which has zero mean *trading volume* and *trading time* will be excluded since it means that they are not traded even once during the entire window period. In the end, 370 stocks fulfilled the criterion and used as sample for 15 days window period.

Statistical Tests

Means significant differences for each measurement of stock liquidity which are bid-ask spread, depth, trading volume, and trading time before and after the event is tested using Paired sample t-test or Wilcoxon test. Paired sample t-test is used when data is

normally distributed while Wilcoxon test is employed when data is not normally distributed. To analyze the distribution of data, One Sample Kolmogorov-Smirnov test is used.

If data is not normally distributed, natural log transformation will be carried out. Data which are still not normally distributed even after being transformed would be analyzed using its original value with Wilcoxon test, while data which are normally distributed after being transformed would be analyzed using its transformed value with paired sample t-test.

IV.   RESULTS AND DISCUSSIONS

Table 2 below shows brief summary of normality test for all variables within 15 days window period in this study using One-Sample Kolmogorov Smirnov Test. From table 2, it can be seen that data of bid-ask spread, trading volume and trading time before and after the event are not normally distributed hence should be tested using Wilcoxon test. On the contrary, data of depth after ln transformation both before and after the event are normally distributed thereby will be tested using Paired sample t-test.

Table 2 One Sample Kolmogorov Smirnov Test All Variables - 15 days window period

One-Sample Kolmogorov-Smirnov Test

		BidAsk Before	BidAsk After	Ln Depth Before	Ln Depth After	TradingVol Before	TradingVol After	Trading Time Before	Trading Time After
N		370	370	370	370	370	370	370	370
Normal Parameters^a,$_b$	Mean	,057	,055	12,212	11,660	6925336,1	7501628,4	2069,654	1981,258
	Std. Deviation	,120	,117	1,979	1,915	19107334,2	18931061,8	2421,761	2378,645
Most Extreme Differences	Absolute	,322	,324	,030	,052	,359	,346	,197	,203
	Positive	,304	,303	,030	,029	,311	,315	,182	,201
	Negative	-,322	-,324	-,028	-,052	-,359	-,346	-,197	-,203
Kolmogorov-Smirnov Z		6,190	6,241	,584	1,004	6,896	6,655	3,781	3,902
Asymp. Sig. (2-tailed)		,000	,000	,885	,265	,000	,000	,000	,000

a. Test distribution is Normal.
b. Calculated from data.

After conducting normality test, appropriate statistical test for each stock liquidity measurement variable is carried out. Results of statistical test for stock liquidity measurement variables (bid-ask spread, depth, trading volume and trading time) within 15 days window period are summarized in Table 3.

Table 3 Summary of Statistical Test Results for Liquidity Measures – 15 days Window Period

Variables	Before	After	Differences	test statistics	p-value
Bid-Ask Spread	0,057	0,055	-0,002	-6,645	0,000
LnDepth	12,2118	11,6604	-0,552	-11,398	0,000
Trading Volume	6925336,13	7501628,41	576292,29	0,935	0,350
Trading Time	2069,654	1981,258	-88,396	-3,783	0,000

From Table 3, it can be seen that there are mean significant differences for bid-ask spread, depth, and trading time before and after the event while mean trading volume is not significantly different before and after the event. In line with the result of previous studies in other stock markets, this research found that there is a significant decrease in bid-ask spread thereby improvement in stock liquidity after reduction in the tick price and lot size took place in Indonesia Stock Exchange. Chung and Chuwonganant (2004) mentioned that reduction in the tick price required traders to compete which resulted in smaller bid-ask spread. In other words, when tick price decrease, the willingness for traders to either buy or sell stocks increase, which results in lower price sellers want to sell and higher price buyers want to buy and in the end, spread gets narrowed. Thus, when tick price decrease, it reduce the minimum spread and improve stock liquidity.

Table 3 shows that there is significant decrease in the depth after the changes in tick price and lot size in Indonesia Stock Exchange. The transformed mean of depth before and after are 12.212 and 11.660 respectively. Using the formula to transform back the data, the mean of depth before is 201,148.757 lots, while the mean of depth after is 115,890.377 lots. It indicates that there is a decrease of 85,258.42 or 42.4% in mean of depth after the event. Depth is decreased because with the lower tick price the more likely the transaction occurs since the traders would tolerate the small gap between bid and ask price. Traders would be more willing to sell at bid price and buy at ask price to execute immediate transaction, rather than queue in the order book. Hence, depth could decrease as the spread are small (Huang, 2000). Furthermore, Niemeyer and Sandas (1994) found out that the changes of tick size in the Stockholm Stock Exchange (SSE) are positively correlated to the market depth. Thus, when the tick size is decrease, depth would also decrease, which supports the results of this study. There are other similar researches done by Bacidore (1997), Porter and Weaver (1997), Ronen and Weaver (1998) which is in overall found out that the depth were significantly decreased following reduction in tick price.

In term of trading volume within 15 days window period, this paper finds that mean trading volume before and after are 6,925,336.126 shares and 7,501,628.414 shares correspondingly. However, an increase in trading volume after the evet is not significant. Ryan and Taffler (2004) suggested that trading volume activity and stock price are significantly generated by internal firm performance such as firm formal accounting releases because traders, investors, and other financial market participants are driven by fundamental information and not by fads or other prior news releases (Ryan & Taffler, 2004).

Finally, as can be seen from table 3, for trading time, this study documented that there is significant difference between mean trading time before and after the changes of tick price and lot size in Indonesia Stock Exchange. The mean trading time before and trading time after are 2,069.654 seconds and 1,981.258 seconds. Result shows that there is a decrease of 88.396 seconds or 4.27% in trading time after the event took place. Furthermore, result shows that decrease in the trading time is significant. The decrease in trading time happened because when tick size was reduced, trading frequency would increase and eventually improved the market liquidity. When trading frequency was boosted, it would diminish the trading time as trading time equals to working hours divided by trading frequency (Chordia, 2012).

V. CONCLUSION

This research paper empirically investigates the effect of changes in tick price and lot size which implemented on January 2014 toward stock liquidity in Indonesia Stock Exchange. This study utilizes bid-ask spread, depth, trading volume and trading time as measurement variables of stock liquidity and found out that bid-ask spread, depth, and trading time have significant mean difference before and after the event, while trading volume has no significant mean difference before and after the event. Based on the analysis, mean bid-ask spread was significantly decreased by 36.78% after the changes. Same goes with depth which was also significantly decreased by 42.4%. On the other hand, mean trading volume was insignificantly increased. Lastly, mean trading time was significantly decreased by 88.396 seconds or 4.27% after the changes.

The result of this study showed that the changes makes mean bid-ask spread and mean trading time significantly better off, mean trading volume insignificantly improved, while depth significantly diminished. Through this study, regulator can evaluate the effectiveness of the new regulation and consider the impact that might occur if same decision needs to be taken in the future.

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15 Days Window Period

BID-ASK SPREAD

Table 4.1 Descriptive Statistics *Bid-Ask Spread,* Wilcoxon Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
MeanBidAskSpread_Before	370	.05739	.12024	.00174	.97894
MeanBidAskSpread_After	370	.05528	.11713	.00195	.88986

Table 4.2 Ranks *Bid-Ask Spread,* Wilcoxon Test

Ranks

		N	Mean Rank	Sum of Ranks
MeanBidAskSpread_After - MeanBidAskSpread_Before	Negative Ranks	269[a]	178.43	47997.00
	Positive Ranks	101[b]	204.34	20638.00
	Ties	0[c]		
	Total	370		

a. MeanBidAskSpread_After < MeanBidAskSpread_Before
b. MeanBidAskSpread_After > MeanBidAskSpread_Before
c. MeanBidAskSpread_After = MeanBidAskSpread_Before

Table 4.3 Test Statistic *Bid-Ask Spread,* Wilcoxon Test

Test Statistics[a]

	MeanBidAskSpread_After - MeanBidAskSpread_Before
Z	-6.645[b]
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.

DEPTH

Table 4.4 Paired Samples Statistics *Depth,* Paired Sample T Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	LnMeanDepth_Before	12.2118	370	1.97890	.10288
	LnMeanDepth_After	11.6604	370	1.91520	.09957

Table 4.5 Paired Samples Correlations *Depth,* Paired Sample T Test

Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 LnMeanDepth_Before & LnMeanDepth_After	370	.886	.000

Table 4.6 Paired Samples Test *Depth,* Paired Sample T Test

Paired Samples Test

| | | Paired Differences | | | | | T | df | Sig. (2-tailed) |
| | | Mean | Std. Dev. | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
					Lower	Upper			
Pair 1	LnMeanDepth_After - LnMeanDepth_Before	-.55145	.93065	.04838	.45631	.64658	-11.398	369	.000

TRADING VOLUME

Table 4.7 Descriptive Statistics *Trading Volume,* Wilcoxon Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
MeanTradingVolume_Before	370	6925336.13	19107334.23	66.667	157282800
MeanTradingVolume_After	370	7501628.41	18931061.79	6.667	158545113

Table 4.8 Ranks *Trading Volume,* Wilcoxon Test

Ranks

		N	Mean Rank	Sum of Ranks
MeanTradingVolume_After - MeanTradingVolume_Before	Negative Ranks	188[a]	172.30	32393.00
	Positive Ranks	182[b]	199.13	36242.00
	Ties	0[c]		
	Total	370		

a. MeanTradingVolume_After < MeanTradingVolume_Before
b. MeanTradingVolume_After > MeanTradingVolume_Before
c. MeanTradingVolume_After = MeanTradingVolume_Before

Table 4.9 Test Statistic *Trading Volume,* Wilcoxon Test

Test Statistics[a]

	MeanTradingVolume_After - MeanTradingVolume_Before
Z	-.935[b]
Asymp. Sig. (2-tailed)	.350

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

TRADING TIME

Table 4.10 Descriptive Statistics *Trading Time,* Wilcoxon Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
MeanTradingTime_Before	370	2069.654	2421.761	1.759	11880
MeanTradingTime_After	370	1981.258	2378.645	3.627	10858

Table 4.11 Ranks *Trading Time,* Wilcoxon Test

Ranks

		N	Mean Rank	Sum of Ranks
MeanTradingTime_After - MeanTradingTime_Before	Negative Ranks	254[a]	164.92	41890.00
	Positive Ranks	115[b]	229.35	26375.00
	Ties	1[c]		
	Total	370		

a. MeanTradingTime_After < MeanTradingTime_Before

b. MeanTradingTime_After > MeanTradingTime_Before

c. MeanTradingTime_After = MeanTradingTime_Before

Table 4.12 Test Statistic *Trading Time,* Wilcoxon Test

Test Statistics[a]

	MeanTradingTime_After - MeanTradingTime_Before
Z	-3.783[b]
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

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