Effect of Minimum Tick Size Policy on Price Efficiency and Execution Cost

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Abstract: Research Question: Whether the minimum tick size has effect on small caps price efficiency and execution cost on the Indonesia Stock Exchange (IDX). **Motivation:** The market microstructure of the Indonesia Stock Exchange (IDX) is based on the emerging market-order driven system which is different than developed market and identified by the problem of inefficiency market. The previous related literatures to minimum tick size policy are only limited to the concept of liquidity and the bid-ask spreads (Bessembinder, 1999; Goldstein and Kavajecz, 2000; Ekaputra and Ahmad, 2007). We propose a new empirical model using Market Efficiency Coefficient (MEC) approach as the only proxy of the price efficiency, Price Inefficiency (PINE) to measure the level of price inefficiency level, and Execution Cost (COST) to measure the probability of error pricing in stock trading. This empirical model is applied to the testing of the effectiveness of minimum tick size policy and its impact on stock trading efficiency. **Idea:** Based on the empirical research literature, the minimum tick size policy will increase the price efficiency and reducing the execution cost for some of the securities transactions, then the execution cost can also be minimalized to create a beneficial transaction. **Data:** We collect the daily stock price trading, intraday price trading, and trading volume from Regular Board (RG) and RTI data recording. **Method/Tools:** We run the Ordinary Least Square (OLS), Quintile Regression as robust test, and General Linear Model to test the empirical model. **Findings:** We find that the minimum tick size insignificantly effects price efficiency and partially affects execution cost. The minimum tick size significantly affects mean of execution cost, but insignificantly affects median of execution cost. We also find that insignificant difference of small caps price efficiency level between pre-implementation of the minimum tick size and post-implementation of the minimum tick size and significant difference of execution cost level between pre-implementation of the minimum tick size and post implementation of the minimum tick size**. Contributions:** Our research contributes to develop a robust empirical model to analyse the impact of market microstructure policy.

Keywords: Minimum tick size, price efficiency, price inefficiency, execution cost, IDX.
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1. Introduction

Price of securities traded in the stock exchange is basically determined by the analyst investors on the various types of information available to assess the value of the traded securities. This fact revealed that the investor's ability to analyze information will greatly affect the efficiency of the securities price. However, different investors respond differently to a particular information available, resulting in dispersion of information in determining the price of the securities (Chordia *et al.*, 2008).

Furthermore, the information of a certain securities will determine the efficiency of transaction activities as a whole. Thus, the transaction that contain more relevant information on the valuation of an asset will lead to an efficient price of the securities traded, however the investors still have different preferences and valuation of the securities traded price (Camelia and Vasile, 2012). Nevertheless, trading securities are not necessarily able to provide all the relevant information, causing the price of securities to be less efficient. This causes traded securities to bear an execution costs. This kind of execution cost is a hidden cost generated from the mechanisms and conditions (rules) of the transactions (Hasbrouck and Schwartz, 1988).

One of the provisions related to the transaction securities is the tick size policy. Tick size is the minimum variance stated through stock exchanges policy to limit the rate of variation of stock price on each of transaction activity. Tick size consists of two types of systems namely single tick size system and multi-tick size system (Chiang *et al.*, 2001). The policy of tick size in Indonesian is aimed to create a fair and efficient trading activity as well as to improve the liquidity of the securities in the capital market. In addition, tick size policy is also expected to increase the interest of the investors to be involved in the capital market transaction.

In addition to smooth the securities transactions, Indonesia Stock Exchange (IDX) also applies JATS (Jakarta Automatic Trading System). JATS works in two trading sessions in the stock exchange. The first session takes place from 09:00 am until 12:00 pm on Monday to Thursday and from 09:00 pm until 11:30 pm on Friday. While the second trading session takes place from 13:30 am until 16:00 pm on Monday to Thursday and from 14:00 pm until 16:00 pm on Friday. Securities purchase in the first session will not be amended and withdrawn before it enters the second trading session, in which in the second trading session, the purchase order of the securities from the first session will be expired, so that in the second session, there will not be any purchase order securities.

Announcement of change in tick size of securities or stock is treated as the guidelines for the investor in transacting the securities, in which this tick size policy is considered to increase the efficiency of trading activities which is characterized by the increased of securities trading liquidity and volume. Tick size policy is also expected to attract investors and the public to participate in securities transaction (Ekaputra and Ahmad, 2007). The practice of tick size policy has been previously used by a number of international capital markets. American Stock Exchange reduces the tick size policy from $1/8 to $1/16 to the stock price below US$5 in August 1992 and under US$10 in February 1995 and eventually tick size policy applies to all securities in March 1997. Different from AMEX, Singapore Stock Exchange (SSE) reduced the tick size policy from 50 cents to 10 cents for the stock, whose price is more than 25 dollars in July 1994. Subsequently, the Toronto Stock Exchange also reduced the tick size policy from CS$0.125 to CS$0.05 for the stock whose price is traded at CS$5 and reduced the tick size policy from CS$0.05 of into the CS$0.01 for the stock whose price is from 10 cents to 50 cents on December 4th, 1996. A number this tick size policy practices was successful in increasing securities trading activities in trading through the increase of trading volume and price discovery. The decline of tick size policy is considered highly beneficial to investors due to the fact that higher tick size policy could

limit the price that was set by traders which will restrict price competition between investors and traders. With a smaller tick size policy, then the price competition among the liquidity providers will be increased, so that the market order trade (liquidity demanders) will benefit from this narrowing spreads (Wu *et al.*, 2011). Since the market order can take advantage of this, then the investor is expected to be interested to buy (sell) stocks. Different from the many of previous researches, this study focuses on the effect of the minimum tick size policy on the price efficiency and the execution cost. Price efficiency is often assumed as an instrument for traders to allocate their funds on investments that will generate an optimum return.

In addition, this study will contribute to the minimum tick size policy from at least five major approaches. First, this study is in relation to emerging order which is structurally different from the developed markets in the Asia-Pacific region. Second, the previous related studies about minimum tick size policy are only limited to the concept of liquidity and the bid-ask spreads (Bessembinder, 1999; Goldstein and Kavajecz, 2000; Ekaputra and Ahmad, 2007). Third, this study focuses on low cap stocks (small caps) which are rarely traded and usually transacted at an inefficient price. Fourth, previous studies only use Market Efficiency Coefficient (MEC) approach as the only proxy of the price efficiency, but in this study, inefficiency price proxy is also used in order to avoid ambivalent theoretical approach. Fifth, this study is involved in more well established testing, not only limited to the testing of effectiveness of minimum tick size policy, but also on the impact of policies on trading efficiency. This tick size policy is expected to increase the efficiency of small caps indicated by a substantial increase in liquidity trading activities (Chordia *et al.*, 2008). In this way, the minimum tick size policy will increase the price efficiency and reducing the execution cost for some of the securities transactions. Thus, the execution cost can also be minimalized to create a beneficial transaction.

2. Literature Review

2.1 Price Efficiency, Execution Cost and Tick Size

The price discovery of stocks trading is generated by the market price matching process (Schreiber and Schwartz, 1986), the collecting and implicitly interpreting to the trading information (Baillie *et al.*, 2002) and the accommodation of information from trading activities to the stocks market price (Lehmann, 2002). Generally, the observed assets price could be categorized into two main components, i.e. the assets which indicate common price efficiency dispersion and assets which extend in trading transition process related to bid-ask spreads change, liquidity and price rounding. For that, assets price will be efficient within fundamental value and investor expectation revision. For that, the price adjustment to the trading information will causes the increasing of price efficiency (Fama *et al.*, 1969). Then, securities trading volume indicates market's respond to a trading information when the investors improve their activities in securities trading according to analytic projection on financial data forecasting which are available to their investment risks.

The price adjustment including trading volume movement is a result of investor's valuation to the securities fair price. Generally, the investors which are involved in assets valuation consist of informed traders and uninformed traders. Informed traders have information related to underlying assets probability distribution which contain future price and they take the bargaining position according to the information. But, uniformed traders invest without any ability to collect the information and depend on securities price observation (Grossman, 1976).

Investors should collect overall information which is related to stocks trading and recommend it to the market trading (Asquith *et al.*, 2005). Some of traders generate important information in the trading activity and reduce asymmetric information to

securities price (Green, 2006). The information usually is generated on the trading days in constant level. Most of the information is public information and other else private information (Jones *et al.,*1994). The investors contribute to analyses the value of price as information intermediation. Information dispersion can be obtained through investors action in market activity and securities price, whom investors should have invested to the predictable securities and the investors knowledge to the securities are restricted. Investors will depend on the information availability to a security and the investors have various information preferences.

Investors as cause of restriction information availability are categorized into two main types. i.e. securities information observers and common traders. The first investors only involved in fundamental private trading assets and the second investors only involved according to securities price movement. The first investors trade according to private fundamental information, because the information is dispersed restrictedly in the information observers and some of investors who hold valid information will receive trading profit and some else obtain the benefit of undershoot trading and reactively affect to long term trading.

Although, investors are not always obtaining the information perfectly and the most of investors often valuate partially the trading information which generate the price would be pressured (Barberis *et al.*, 1998). Although, according to investor's behavior concept, investor's resistance to valuation deviation in the price securities as results of investors that ignore evaluation and validation of securities information (Dische, 2002). Commonly, price efficiency depends on information which is contained in investor's trading activity. In securities trading, the securities information is dispersed to all of investors through the pricing system. Higher securities price that is generated by pricing system in stocks trading contain more securities price information (Grossman and Stiglitz, 1980). However, the stocks trading generate the informational excess of prices efficiency as the cause of investor's overconfidence in stocks trading valuation without validate and hold the less accurate pricing of information (Grossman, 1976). The condition might be caused the trading volume excessively increase (Odean, 1998). But, usually also causes undershoot trading which reduces utility expectation and costly information.

Principally, the security trading information will be inseminated to all traders followed by stocks trading price change and price adjustment (Fama *et al.*, 1969). Commonly, the investor's preference to trading information is related to analysis forecasting dispersion and analysis forecasting ranges which indicate investor's expectation heterogeneity. Then, the total of analysts is indication of information dispersion where investors try to obtain accurate information in stocks price valuation.

Insider traders as informed traders have access better information rather than common investors. But the insider traders would be disturbed the trading activity e.g. (1) It reduces liquidity of trading, (2) preserve managerial incentive and (3) an assumption of unfairness and loss of investor confidence of capital market. Some others evidence suggests that the insider trading leads to more informationally efficient stock price. In another aspect, informed traders are risk neutral and they strategically influence the price. Variance of liquidity increasing leaves the information efficiency of prices unchanged as response to liquidity trading. When traders observe an increase in the number intensifies trading competition between them, it leads to the market efficiency. But, risk averse informed traders are less aggressive in respond an increasing in liquidity trading. Even information acquisition is exogenous, variance of liquidity trading increasing decreases price efficiency. This cause of marginal effect of number informed traders increasing on market liquidity to be negative despite greater competition between the traders. Short horizon return predictability is diminished by arbitrage trading especially in effective market liquidity. It is

caused as impact of varying liquidity over time and market turbulent and effective trading cost improvement and liquidity decline or even disappears (Chordia *et al.*, 2006).

The informed investors constantly and strategically observe price deviations and place orders to exploit the deviations, thereby market systems become more efficient, investors will obtain even from smaller price deviations, also increasing the efficiency of the markets. They analyze the price stocks according to the information of fundamental value of securities. The informed traders affect stock price through their trading. Price becomes increase when informed traders buy it and decrease when they sell it. When informed traders accurately estimate the securities price, it will improve price efficiency (Zhao and Chung, 2006).

Execution cost is a hidden trading cost. Generally, execution cost is generated by trading activity as causes of some factors like price movement, *bid-ask spreads* more than tick size and error in pricing (Hasbrouck and Schwartz, 1988). Execution cost generates the expansion of return variance for the short term. If the stock informationally efficient without any execution cost, MEC will be greater than one. For that, the decreasing of execution only impact to the small caps traders (Porter and Weaver, 1997).

Tick size is minimum price change unit which and regulated according to specific multiples and important market protocol (Chiang *et al.*, 2001). Tick size consists of single tick size system and multiple tick size system. Partially stock exchanges use single tick size system which is bearsed to the all stock price ranges and multiple tick size system which a number of tick size are pointed to different price ranges (Chung *et al.*, 2011). As a stock exchange authority polish, tick size regulation related to trading activity. Tick size polish will be impact to the price efficiency and reduce execution cost (Van Ness *et al.*, 2000). Minimum tick size will improve public investors to participated in the stock trading activity.

2.2 The Effect of Minimum Tick Size on Price Efficiency and Execution Cost

Trading liquidity is closely related to the price efficiency of the securities, in which the more liquid trading is assumed to support the trading efficiency through the increase in prices of securities, narrowing bid-ask spreads and an increase in the volume of trading activities (Hasbrouck and Schwartz, 1988). One of the policies associated with the increased in trading liquidity is the minimum tick size policy (Chung *et al.*, 2011). Minimum tick size policy might seem to have an impact on a certain price range characterized by informational securities trading (Angel, 1997). Information on securities trading activity is positively related to the trading efficiency (Porter and Weaver, 1997). This is due to the minimum tick size that can affect the efficiency of the price through trading liquidity (Chordia *et al.*, 2008).

The securities price will only be efficient if all information is included in the determined traded securities price. In addition, the minimum tick size policy can also affects the efficiency of the price through trading liquidity. Despite all of these matter, minimum tick size policy in some extend might also affect the price inefficiency, whereby the minimum tick size policy affects the decreasing of variance ratio (Ekaputra and Asikin, 2012).

H_1: Minimum tick size effects on the small caps price efficiency.

Execution costs occur in the short term volatility, indicated by a number of factors such as the limitation of ordered record (limit order) and the sequence of information arrival that resulted in inaccuracies of price determination, so the prices can only reach a relatively low adjustment. Basically a high execution costs are concentrated to the stocks that are less in number and more liquid in transaction (Griffiths *et al.*, 2000). So the execution cost and the price of such securities is very much influenced by or dependent on the tick size, to which

the minimum tick size is considered to encourage investors to increase trading activity and make the execution cost of the transaction becomes substantially reduced (Kuo *et al.*, 2010). Additionally, minimum tick size might also have an impact on the execution cost for traders who transact at the relatively higher stock price (Hasbrouck and Schwartz, 1988).

H_2: Minimum tick size affects the execution cost.

2.3 The Difference Level of Price Efficiency and Execution Cost Between Old Tick Size Period and New Tick Size Period

There are some indications that the level of efficiency of the securities price after minimum tick size policy is implemented is greater than before the policy is implemented, that indicates the informational efficiency of securities (Kuo, 2010; Kurov, 2008).

H_3: There is a difference in the level of small caps price efficiency rates between old and new tick size period under the control of closing price, variant returns and trading volume.

Execution costs thoroughly increased after the tick size policy is implemented, especially for traders who expect on the liquidity. If the low order execution costs (less than 1,000 sheets) decreases, the execution cost of large orders (more than 100,000 copies) will increase , resulting in the increase of average execution cost. Because of this, tick size policy will result in a lower execution costs (Jones and Lipson, 2001).

H_4: There is a difference in the level of execution costs between old and new tick size periods under the control of closing price, variant returns and trading volume.

3. Methodology

This research is event study research which restrictively involves some of sources to singular entity according to space and time horizon (Getz, 2014). The objects of research include tick size as categorical data, price efficiency and execution cost. The type of data in this research is panel data or pooled data that is the combination of time series data and cross section data. The data used in this study involved the daily stock closing price, intraday price data per 30 minutes and the volume of daily transactions. Source of data used comes from the records of Indonesia Stock Exchange (IDX). Data resources consist of transaction data on Regular Board (RG) and recording data of RTI. Observations in this research are differed into old tick size period and new tick size period within 30 transaction days for each period. Old tick size period begins from November 11th, 2013 to December 20th, 2014 and new tick size period begins from January 13th, 2014 to February 25th, 2014. This research includes early period beginning after a week minimum tick size policy to avoid non-trading days.

Population of the research data consist of all listed stock of Indonesia Stock Exchange (IDX). Then, we only select 37 samples that had been selected were used in this study as can be seen from the table below:

Table 1: Sample selection process

No.	Sample Criteria	Total
1.	Securities that are fully traded in old and new tick size period.	98
2.	Securities that are always traded in average price of Rp200,- to less than Rp500 both in old tick size period and new tick size period.	80
3.	Securities which are not affected by *corporate action.*	78
4.	Above average securities trading value	37
	Final Sample	37

Furthermore, to construct the dependent variable of price efficiency, we use Market Efficiency Coefficient (MEC) as price efficiency proxy. MEC relates to stocks price for each a half hour is assumed as short term volatility as implicated by long term volatility. MEC is derived according to the fact that stock price is involved through accumulation of return on *T* period as explained:

$$\frac{P_T}{P_0} = \frac{P_1}{P_0} \times \frac{P_2}{P_1} \times \ldots \times \frac{P_t}{P_{t-1}} \tag{1}$$

The accumulation of log short term return, long term return is obtained as explained in the equation:

$$R_L = \sum_{T-1}^{T} R_{S,t} \tag{2}$$

If stock price informationally efficient and assumed that stock return is identically and independently distributed, long term variance return will be equal to the total of shorter return variance as explained here:

$$\text{Var } R_L = \sum_{T-1}^{T} \text{Var}\left(R_{S,t}\right) = T\left(\text{Var}(R_S)\right) \tag{3}$$

The use of this MEC is intended to determine the short-term price changes on the long-term price changes. MEC can be measured from the ratio of long-term variance returns in relation to the volatility of short-term return (Hasbrouck and Schwartz, 1988)

$$\text{MEC} = \frac{\text{Var}R_L}{T(\text{Var}R_s)} \tag{4}$$

However, the use of the MEC as a proxy for the price efficiency is still ambiguous. Perfect MEC value is equal to one. Sometimes the value of MEC can be increased from less than one to more than one, which means that there exist a switch of securities trading conditions, from overaction to underreaction. Then, the higher frequency of trading will improve the value of MEC more than one (MEC > 1). It will generates that the market trading is in overreaction of price discovery. Otherwise, the lower frequency of trading will reduce the value of MEC less than one (MEC < 1). It implies that the market trading is underreaction of price discovery (Ekaputra and Asikin, 2012).

To anticipate the problem of trading volatility, the Price Inefficiency (PINE) approach is used, which is the absolute deviation value of one, as shown as follows (Ekaputra and Asikin, 2012).

$$\text{PINE} = |\text{MEC} - 1| \tag{5}$$

Less efficient trading will cause an execution costs. Execution costs are the hidden costs that come from securities transactions due to some factors such as the increase in price, widening of the bid-ask spreads and trade protocol. Execution costs can be calculated by the derivation of MEC value. If the MEC value is less than one, then the equation is as follows:

$$C = [1 - MEC(VarR_s)]^{\frac{1}{2}} > 0 \quad (6)$$

Whereas if the MEC is greater than one, then the equation is as follows:

$$C = [MEC - 1(VarR_s)]^{\frac{1}{2}} < 0 \quad (7)$$

The execution cost will be negative when the MEC is greater than one. In the economics context, the negative execution cost shows that a certain party in the capital market is subsidizing the transaction. This party might be a trader who does not have information, thus offering bid for the old price limit or might also a trader who sell stock inefficiently (Ekaputra and Asikin, 2012).

The independent variables that will be used in this research is a dummy variable (DUMMY) which equal to 1 for the period after the implementation of the minimum tick size policy and is 0 for the period prior to the implementation of the minimum tick size policy. In addition, a control variable is also used, that consists of the average closing price (PRICE), variance returns (VARIANCE) and trading volume logs (VOLUME). The equation used as following (Porter and Weaver, 1997; Ekaputra and Asikin, 2012).

$$MEC_{it} = \beta_0 + \beta_1 PRICE_{it} + \beta_2 VARIANCE_{it} + \beta_3 VOLUME_{it} + \beta_4 DUMMY_{it} + \varepsilon_i \quad (8)$$

$$PINE_{it} = \gamma_0 + \gamma_1 PRICE_{it} + \gamma_2 VARIANCE_{it} + \gamma_3 VOLUME_{it} + \gamma_4 DUMMY_{it} + \varepsilon_t \quad (9)$$

$$COST_{it} = \delta_0 + \delta_1 PRICE_{it} + \delta_2 VARIANCE_{it} + \delta_3 VOLUME_{it} + \delta_4 DUMMY_{it} + \varepsilon_t \quad (10)$$

The equation models based on the theoretical assumptions of market microstructure model development:

1. Price stock indicates attention of investor analyst and market participants. The higher attention of investor analyst and market participants implies the high dispersion of information in the trading (Ekaputra and Asikin, 2012).
2. Long term variance return reflects information revelation for long time period. Short time variance returns are expected to cause excessive volatility which is observed as error pricing. Then, the long term variance returns which reflect information revelation will indicate the value of variance ratio of long term variance returns to short term variance returns. (Hasbrouck and Schwartz, 1988; Ekaputra and Asikin, 2012).
3. Long term variance returns will increase the execution costs which imply that the information is costly (Hasbrouck and Schwartz, 1988; Ekaputra and Asikin, 2012).
4. Volume of trading measures the arrival of utilitarian traders which is identified as non-driven traders. It generates uninformed trading which increase price inefficiency and execution cost (Cramton, 1997; Ekaputra and Asikin, 2012).

Furthermore, we run OLS regression and Quintile regression to test the effect of minimum tick size on price efficiency and execution cost. Quintile regression is employed as robust test because of small sample size (Ekaputra and Asikin, 2012). Then, we run GLM (*General Linear Model*) to test the difference of price efficiency and execution cost between old tick size period and new tick size period.

4. Result and Discussion

The following statistical description shows the difference between the old tick size period, and the tick size period on the price efficiency, price inefficiency, execution cost, price, variant returns and volume.

Table 2: Descriptive statistic

	MEC	PINE	COST	PRICE	VARIANCE	VOLUME
Old Tick Size Period						
Mean	0.419	0.588	0.014	340.8	0.0007	18.97
Median	0.396	0.604	0.016	332.6	0.0003	19.22
Maximum	1.135	0.961	0.026	485.5	0.0135	21.75
Minimum	0.039	0.135	-0.008	208.4	0.0000	13.81
Std. Dev.	0.197	0.173	0.006	73.15	0.0022	1.87
Obs.	37	37	37	37	37	37
New Tick Size Period						
Mean	0.397	0.610	0.021	325.8	0.0006	18.98
Median	0.320	0.682	0.020	323.3	0.0005	18.84
Maximum	1.069	0.996	0.050	490.2	0.0046	22.25
Minimum	0.004	0.050	-0.005	217.8	0.0000	13.99
Std. Dev.	0.241	0.222	0.012	63.84	0.0008	1.95
Obs.	37	37	37	37	37	37

Table 2 shows that the average value and median of MEC in new tick size period decrease from 0.419 and 0.396 to 0.397 and 0.320. The average and median of PINE in new tick size period increase from 0.588 and 0.604 to 0.610 and 0.682. It implies that the price efficiency of new tick size period decrease, then the price inefficiency of new tick size period increase due to the low liquidity observed than the average decline in trading transaction. Meanwhile, the mean and the median value of execution costs in new tick size period increases from 0.014 and 0.016 to 0.021 and 0.020. This indicates that execution costs increase quite dramatically so that trading activities is becoming costly. The mean and median value of PRICE in the new tick size period decreases from 340.8 and 332.6 to 325.8 and 323.3. It indicates the lower analyst and market participant intention in new tick size period. The mean and median of VARIANCE in the old tick size period change from 0.0007 and 0.0003 to 0.0006 and 0.0005. The mean of variance returns decreases slightly, but the median of variance returns improves well. The mean and median value of trading volume on the old tick size period is 18.97 and 19.22, while on the new tick size period they are changed to 18.98 and 18.84. The arrival of utilitarian traders in mean of trading volume increases slightly, but the median of trading volume decreases.

Furthermore, we run OLS, Quintile Regression, and GLM which show statistical results in Table 3. Table 3 shows that the minimum tick size policy affects positively on the MEC but not significant either by OLS or Quintile regression analysis tool. This indicates that the minimum tick size policy insignificantly improves mean and median of price efficiency. It indicates that minimum tick size policy is unable to improve the stocks liquidity which reflects the problem of volatility returns. The problem of volatility returns indicates the higher price liquidity but lower price efficiency, than it will generate an overreaction stocks price trading. Similarly, GLM analysis shows that there are no significant differences in the level of the MEC between the old tick size policy and new tick size policy. In these problems, we should observe the effect of stock trading quality indicators which consist of average stock price, variance returns, and trading volume. Price of stocks insignificantly improves mean and median of price efficiency. It indicates insignificant analyst and market participant attention to be involved in stocks trading. The lower attention of analyst and market participant reflects asymmetric information problem among traders. Informed

traders generate higher abnormal returns rather than uninformed traders. Meanwhile, the variance returns significantly improves the mean and median of price efficiency. It implies that the higher information revelation indicates lower hidden action problem and the information is costly. Subsequently, the trading volume significantly reduces the mean of price efficiency, but insignificantly reduces the median of price efficiency. The higher arrival of utilitarian traders significantly will increase uninformed trading activity and reduce price efficiency significantly in mean of stocks trading, but insignificantly in median of stocks trading. It indicates that the uninformed trading impacts on higher hidden information problem. The higher uninformed trading will impact on inefficient trading which indicates the higher cost of transaction including information cost and execution cost. The price equilibrium of stocks is stick to be changed quickly due to costly trading information.

Table 3: The result of first equation

Independent Variables	Expected Sign	Analysis Tools		
		OLS	QR	GLM
Intercept	None	-13.759*	-12.001*	18.348*
Price	+	0.124	0.096	1.312
Variance	+	19.318*	16.822*	18.262*
Volume	-	-0.416*	-0.307	7.460*
Tick Size	+	0.011	0.021	0.329
$F_{statistic}$		5.917*	-	-
Quasi LR-(Stat)		-	15.587*	-
R^2		0.255	-	-
Pseudo R^2		-	0.155	-
Adjusted R^2		0.212	0.106	0.212

Notes: *) Significant at 1%.

Table 4 shows that the minimum tick size policy negatively affects the price inefficiency, but not significant based on the results of the OLS regression and Quintile Regression (QR) analysis, as well as the analysis of covariance using the General Linear Model (GLM) that we do not find any significant difference at the level of inefficiency price (PINE) between old and new tick size period. This indicates that the minimum tick size policy insignificantly reduces the mean and median of price inefficiency. It means that minimum tick size policy is unable to reduce uninformed and speculative trading activity which is indicates stocks error pricing. The informed traders receive abnormal returns from inefficient trading activity, meanwhile the trading activity will be costly. Furthermore, we should observe the effect of stock trading quality indicators which consist of average stock price, variance returns, and trading volume. Price of stocks insignificantly reduces the mean and median of price inefficiency. It indicates the problem of asymmetric information in trading activity which reflects the lower attention of analyst and market participant in stocks trading. Meanwhile, variance returns significantly reduces mean of price efficiency, but insignificantly reduce median of price inefficiency. It implies that the higher information revelation indicates lower hidden action problem in mean of price inefficiency, but higher hidden action problem is still occurred in median of price inefficiency. Subsequently, the trading volume significantly improves the mean and moderately improves median of price inefficiency. It indicates that the arrival of utilitarian traders significantly impacts on higher uninformed trading which reflects higher hidden information problem. The higher uninformed trading also indicates the problem of price inefficiency which implies on higher cost information in trading. The dispersion of trading information will be dispersed slowly and the information will be scarcely to be accessed in trading activity. The price equilibrium

will be stickily changed to the subsequent information arrival in trading activity. The evidence of stickily price proves the theory of market microstructure of costly information trading activity which contradicts Hypothesis Market Efficient assumptions.

Table 4: The result of second equation

Independent variables	Expected Sign	Analysis Tools		
		OLS	QR	GLM
Intercept	None	-0.107	-0.293	0.180
Price	-	-0.000	-0.000	1.395
Variance	-	-53.018*	-43.891*	16.644*
Volume	+	-0.035*	-0.027**	9.360*
Tick Size	-	-0.011	-0.050	0.076
$F_{statistic}$		-5.739*	-	-
Quasi LR-(Stat)		-	14.758*	-
R^2		-0.255	-	0.250
Pseudo R^2		-	-0.148	-
Adjusted R^2		-0.206	-0.099	0.206

Notes: *) Significant at 1%, **) Significant at 10%.

Table 5 shows that the minimum tick size policy partially reduces the execution cost. The minimum tick size policy affects significantly the mean of execution costs, but insignificantly affects the median of execution cost. This suggests that the traded securities on the mean (average) is experiencing a very low response towards the information, resulted the investors to trade at a price that does not match with the information for some of the securities and invest inefficiently. It also implies that the trading information is costly and price stocks will be stick to be changed in price equilibrium. The stock price will be slowly changed to the arrival of new information revelation due to costly trading information. Similarly, information used by most corporate investors and traders are not well distributed or absorbed by all investors. In addition, the analysis of GLM covariance shows that there are significant differences between the level of execution cost within the old and new tick size period.

Table 5: The result of third equation

Independent Variables	Expected Sign	Analysis Tools		
		OLS	QR	GLM
Intercept	None	-0.008	-0.007	0.191
Price	-	-0.000*	-0.388	10.107*
Variance	+	-1.204**	-1.197	3.531**
Volume	+	-0.002*	-0.001	7.656*
Tick Size	-	-0.006*	-0.005	8.813*
$F_{statistic}$		-7.726*	--	-
Quasi LR-(Stat)		--	18.257*	-
R^2		-0.309	--	0.309
Pseudo R^2		--	-0.168	-
Adjusted R^2		-0.269	-0.121	0.269

Notes: *) Significant at 1% , **) Significant at 10%.

5. Conclusion

The statistical testing on minimum tick size policy is aimed to create a fair and efficient stock transaction. Minimum tick size policy will be supported by the investors through their willingness to increase the transaction volume. Minimum tick size policy affects positively on the price efficiency, but the effect is not significant. This is due to the low level of securities trading transactions caused by the low trade capitalization among the informed

investor and low support from securities traders to increase the value of trade transactions. It leads to the information related to securities are restricted by insider investors, causing the securities to be traded at prices that are not relevant.

Furthermore, the minimum tick size policy partially effects on the execution cost, the minimum tick size policy affects the mean execution costs significantly, but insignificantly affects the median of execution cost. These evidences may indicate that the security information partially absorbed leads to only a fraction of investors get the benefits of the information while the other investors go on transacting at an unfair and inefficient price caused to generate a reasonable execution cost. In addition to the results, the investors are intended to take some benefit from their responses on the arrival of new information.

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