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David E. Allen

Josephine Sudiman

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By

David E. Allen[1] and Josephine Sudiman[1]

[1]School of Accounting, Finance and Economics, Edith Cowan University

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Correspondence author:

David E. Allen
School of Accounting, Finance and Economics
Faculty of Business and Law
Edith Cowan University
Joondalup, WA 6027
Australia
Phone: +618 6304 5471
Fax: +618 6304 5271
Email: d.allen@ecu.edu.au

ABSTRACT

The market regulators of the Indonesia stock exchange have made several changes in permissible minimum price variations, from a single tick size (IDR 5) in 2000 to multiple tick sizes (IDR1, 5, 10, 25, 50) in 2007 for the purposes of promoting efficient trading and liquidity improvements. Researchers have demonstrated that finer tick sizes will lower bid-ask spreads, yet studies which examine the impact of tick size on other key liquidity dimensions such as realized market depth and speed of quote revision are limited. As tick size diminishes so too do the benefits of time precedence rules and encouragement is given to the existence of front-runners, traders are more reluctant to show their orders and more aggressive to consume market orders which leads to a thinner order book. This paper will adopt the V-Net measurement (Engle & Lange, 2001) to assess whether there is a significant difference in net directional volume pre and post tick size changes and to further assess the relationship amongst realized market depths, price durations and spreads. This study employs four major stocks to analyse the impact of tick size on liquidity provision using intraday trading data for six weeks (2 October – 10 November 2009). Two sample stocks experienced an increase of tick size; from IDR 5 to IDR 25 (as their price level is between IDR 2000 and IDR 5000) and the rest had a larger increase of tick size from IDR 5 to IDR 50 (as their price level is higher than IDR 5000). The results are as follows: first, since movement to a larger tick size is a binding constraint for the absolute spread which further restricts price competition in the market, the increase in tick sizes shows a clear pattern of resulting in slower quote adjustments. Second, the absolute value of volume bought and sold before price changes is different between the periods of small and coarse tick size changes for all stocks. Third, although the price duration of all stocks demonstrates an ARCH effect, further tests show that the conditional expected price duration is not a significant independent explanatory variable for V-NET either pre or post tick size changes. Finally, trading intensity improved through small time intervals between trades in the period of coarse tick sizes. Trade duration is influenced by spread during the small tick size period but its relation is somewhat more vague when tick size becomes larger.

Keywords: Price duration; Trade duration; Tick size

1. Introduction

Liquidity is the ability to buy and sell particular amount of assets during the trading period without having a significant impact on their prices. It is an important issue in market microstructure theory and empirical work, and a concern to issuers, market traders and regulators due to its close relationship with asset pricing and trading behaviour. It is crucial for equity issuers because traders take account of the cost of trading when valuing financial assets. The rationale is straightforward; when traders want to sell their stocks at the same time, illiquid stocks cost them more so they discount their value. Amihud, Mendelson, & Pedersen (2005) show that the reduction in liquidity will result in price reductions. Thus the cost of capital for companies with illiquid stocks is higher than for companies with frequently-traded stocks. Market traders also prefer to participate in liquid markets since they have lower trading costs and subsequently achieve better actual returns for their portfolios. Liquidity is important for regulators because it can encourage the efficient flow of funds among capital suppliers and demanders, leading to higher trading activity and immediate price discovery.

Market regulators usually influence liquidity provision, in particular trading cost, through the implementation of tick size. Tick size is the minimum variation of price movement allowed in a trading mechanism and acts like the binding constraint for the bid-ask spread in the asset pricing equilibrium. A very small tick size can increase the risk of advantage for front runners and informed traders, so the liquidity providers will be reluctant to submit limit orders, leading to a thin order book. In addition, the reward for submitting limit orders is also not significant. In short, small tick sizes can destroy the price and time priority of limit orders. Conversely, a small tick size will lower trading costs, particularly spreads, which is beneficial for small and medium-sized traders, yet the impact of this is not certain for large trades. There are numerous studies about the impact of tick size change on liquidity yet the operationalization of the liquidity concept is often simplified and usually only involves price and size dimension. Therefore, it will be interesting to build a more comprehensive model which can accommodate the time dimension. Since time contains information, incorporating duration to measure liquidity can also give better insights into the impact of tick size on trading activity and whether tick size will provide more benefits to particular traders.

2. LITERATURE REVIEW

Liquidity is a subtle and complex concept which can be interpreted in different ways. According to Harris (2003), liquidity presents in three dimensions: time, price and size. The time dimension (immediacy) is about the possibility of buying and selling whenever the traders are willing to do so. The less time needed to sell or to buy stocks, the more liquid the stocks are. The price dimension (spread) means the difference between bid and ask prices; liquid stocks will have a narrow spread indicating that the trading cost for such stocks is relatively low. Spread is usually relevant for small and medium orders as it can misrepresent trading costs for large orders in the presence of insufficient depth in the order book. The size dimension (depth) can be interpreted as the midpoint quantity of the best bid and ask price or the number of orders waiting to be executed for different trading prices and is generally useful for predicting the price impact of trades. A more liquid stock will have a higher volume of units available for trading at a given price, so a large block of trading does not have a significant price impact. Therefore, the appropriate measurement or liquidity proxy needs to include the dimensions of immediacy, spread and depth.

Most prior studies find that a finer tick size will reduce the spreads for actively-traded stocks and lower-priced stocks; this is also found in the Indonesia market. Purwoto and Tandelilin (2004) studied the impact of tick size reduction from IDR 25 to IDR 5 on July 3, 2000 and showed that about 85% of the sample experienced a decline for rupiah spreads and the percentage spread in the post reduction period, with the changes of spreads mostly noted for lower-priced and frequently-traded stocks. In addition, their time series plot also indicated that the depth of all stocks in the sample decreased within a few days of tick size reduction, most notably for low-priced and frequently traded stocks. There was no change in trade frequency pre and post tick size change, but trading values experienced a significant decrease and trading volume fell for more than 50% of the stocks. The low-priced stocks experienced a moderate increase in the average number of trades, share volume and rupiah volume but frequently traded high-priced stocks experienced a decrease in trading activity. Ekaputra and Ahmad (2007) studied the impact of the implementation of a change in tick size from a previous level of IDR 25 to IDR 10 on January 3, 2005 and found that the average ask depth and bid depth declined significantly. Since spread is an important component for trading execution of small and medium orders while depth is crucial for large orders, Ekaputra and Ahmad calculate Depth to Spread Ratio and found

that the decrease in depth was larger than the decrease in relative spreads following finer tick size but the difference is not statistically significant. Their paper also examined the impact of tick size reduction on order submission strategy and order size (JSX does not allow hidden orders). Generally, their results supported the hypothesis that traders are more likely to use market orders and split their orders after a tick size reduction event.

The question of how long it will take for a set amount of volume to be transacted and how long it will take for the price to move by more or equal to a specified amount (price duration) is a useful metric for understanding the liquidity effect of tick size changes. The method used by Engle and Lange (2001) to combine the use of price durations with the cumulative signed volume (the difference between the number of shares purchased and number of shares sold) transacted over the price duration, V-Net, is the method that this paper will follow to study the impact of tick size on time, size and price dimensions. It is formally written as: $V - Net,$ the summation of d_i (the direction of trade indicator) and vol_i (the number of shares traded) within a given price duration. Engle and Lange suggest that the model for price duration models is better than calculating price changes over demand changes because (1) the excess volume of demand can be positive or negative, (2) the issue of price discreteness problems in the numerator, (3) the time internal should be long whilst using long intervals but this will reduce the statistical ability to capture the short-run dynamics and (4) the possibility that demand change is zero is high. In their study, price duration is firstly diurnally adjusted with respect to stylized effects within intraday data before testing for the existence of serial correlation. The conditional expectation of the price duration is obtained using the Weibull Autocorrelation Conditional Duration (1,1) model which is regressed on one lagged value of price duration, one lagged value of expected price duration and one lagged value of the nominal bid-ask spread. This model is relevant for high-volume traders as it estimates the realized market depth through the observation of net trade volume and the corresponding price change over a predetermined interval of time. Thus, this model can suggest how many shares can be traded within particular time to minimize price impact.

3. INSTITUTIONAL BACKGROUND

As a result of the Indonesia Minister of Law Decree Number C-04552 HT TH 2007, Indonesia only has one stock exchange which is the result of a merger between the Jakarta

Stock Exchange (JSX) and the Surabaya Stock Exchange (SSX). The SSX ceased to exist in November 30, 2007 and all its activities were moved to the JSX as per December 3, 2007. The name of newly merged stock exchange was changed into the Indonesia Stock Exchange (IDX) as per January 1, 2008. The purpose of the merger which was a proposal resulting from a program in the 2006 Financial Sector Policy Package was to create more synergy and efficiency in the Indonesian capital market. The Indonesian composite market index has shown a significant increase since 2002 and at the end of trading in 2007, the IDX composite index had a significant raise of 52.08% from the previous year which placed the IDX in the third place for the best performance amongst the Asian Pacific stock markets after the Shenzhen and Shanghai stock markets. In parallel with the IDX Composite Price Index, market capitalization of the IDX also improved significantly by 59.18%. The Index continued to improve in the first portion of 2008 with the highest level at 2,830.263 on January 9th, before it had a moderate decrease in the last four months of 2008 with the lowest index level of 1,111.39 occurring on October 28th as the impact of global financial crisis was felt. The Composite Index was at a level of 1,1355.408 on Dec 30th , 2008 which is about half the previous closing index in 2007. By the end of 2008, there were 383 active stocks and 121 active brokerage houses.

The IDX, which is a pure order-driven market, has five trading days (Monday to Friday) and each trading day is divided into two trading sessions. During the period of observation, the first session is held between 9.30 and 12.00 and the second session is held between 13.30 and 16.00 from Monday to Thursday. On Friday, the first session ends 30 minutes earlier and the second session starts 30 minutes late due to the Muslim Friday prayer session. There is also no preopening call system to form the opening price at that moment. The regulators made several changes in the trading rules such as in the tick size in order to accelerate trading activity and improve the price formation process.

Table 1. Tick size changes from 2000 – present.

Group	**Price (P)**	**Before July 3, 2000**	**July 3 – October 19, 2000**	**October 20, 2000 – Dec 31, 2004**	**January 3, 2005 – Dec 31, 2006**	**January 2, 2007 – Present**
1	$P < 200$	IDR 25	IDR 5	IDR 5	IDR 5	IDR 1
2	$200 \leq P < 500$	IDR 25	IDR 5	IDR 5	IDR 5	IDR 5
3	$500 \leq P < 2000$	IDR 25	IDR 5	IDR 25	IDR 10	IDR 10
4	$2000 \leq P < 5000$	IDR 25	IDR 5	IDR 25	IDR 25	IDR 25
5	$P \geq 5000$	IDR 25	IDR 5	IDR 50	IDR 50	IDR 50

4. DATA

This paper which is the first study to examine the impact of tick size changes on liquidity provision in the Indonesia stock exchange (IDX) will employ tick-by-tick data for 4 companies for a period of 6 weeks between October 2nd , 2000 and November 10th , 2000 or three weeks pre and post tick size changes on October 19th , 2000. The companies are Astra International Tbk (ticker symbol ASII), PT Telekomunikasi Indonesia Tbk (ticker symbol TLKM), PT Indosat Tbk (ticker symbol ISAT) and PT HM Sampoerna Tbk (ticker symbol HMSP). These companies are chosen because of their significant contribution in trading activity to the IDX as well as their consistent performance over their listing period. Another reason is that these stocks are the highly liquid stocks which are very appropriate to analyse using intraday trading information, a view supported by Husodo & Henker (2007). Two of the sample data (ASII and TLKM) fall in the fourth group and the rest (ISAT and HMSP) are in the fifth group (in terms of tick classifications), during the period of analysis (2nd October – 10th November 2000). As shown in the table above, the fourth group had an increase of tick size 5 times after October 19, 2000 which is relatively high as the minimum price variation is between 0.5% and 1.25%. The fifth group also experienced a moderate increase of the minimum price variation of 1% for lowest-priced-stocks in this category.

(1) Astra International Tbk which was originally established as trading company in 1957 is now a successful diversified company with 6 core business; Automotive, Financial Services, Heavy Equipment, Agribusiness, Information Technology and Infrastructure and became a public-listed company on 4th April 1990 on the Jakarta stock exchange. It is one of top five leading companies in market capitalization (5.56% in 2007, 3.97% in 2008) and trading value (3.51% in 2007, 3.64% in 2008).

(2) PT Telekomunikasi Indonesia Tbk which listed on 14th Nov 1995 is the largest provider for communication and information services in Indonesia with 51.19% of its shares owned by the Indonesian government (as per January 2009). It is the largest market capitalization on the IDX with 10.29% in 2007 and 12.92% in 2008 and the second largest in total trading value for both years with shares of 7.11% in 2007 and 5.71% in 2008.

(3) PT Indosat Tbk, listed on 19th October 1994, is the second largest mobile operator in Indonesia which was owned by the Government of Indonesia before it was taken over by Singapore Technologies Telemedia Pte. Ltd (SingTel) in 2002. In 2008, SingTel sold all its shares to Qatar Telecom. ISAT is in one of the top-ten companies in market capitalization in 2007 and 2008, with shares of 2.36% and 2.9% respectively.

(4) PT HM Sampoerna Tbk, which listed on 15th August 1990, is the major tobacco company in Indonesia which was acquired by Philip Morris Intl on the 18th May 2005 with a value of approximately USD 5.2 billion. 40% of this transaction value was accounted for by the founding family and the rest was mainly acquired through the subsequent tender offer within 90 days. As the proportion of shares owned by public is relatively small following the acquisition, the total trading value of PT HM Sampoerna Tbk remains insignificant. Nevertheless, it is still one of the top ten largest companies in market capitalization on the IDX with relative proportions of 3.15% in 2007 and 3.30% in 2008.

This paper uses the trade and quote details obtained from the Taqtiq/SIRCA database, (sourced from Reuters), consisting of event (trade/quote) time, price, volume, Volume Weighted Average Price (VWAP), bid and ask price, bid and ask size, all of which is summarized below.

Table 2. Data Description

		ASII	**HMSP**	**ISAT**	**TLKM**
Number of observations	2 – 19 Oct 2000	12,470	9,651	8439	16.244
	20 Oct – 10 Nov 2000	14,777	12,157	17,832	19.695
Bid Interval	2 – 19 Oct 2000	IDR 2,200 – 2,490	IDR 10,300 – 12,000	IDR 6,200 – 7,455	IDR 2,405– 2,885
	20 Oct – 10 Nov 2000	IDR 2,100 – 2,500	IDR 10,900 – 13,800	IDR 6,400 – 7,800	IDR 2,275– 2,575
Ask Interval	2 – 19 Oct 2000	IDR 2,250 – 3,000	IDR 10,310 – 12,200	IDR 6,250 – 7,500	IDR 2,440– 3,500
	20 Oct – 10 Nov 2000	IDR 2,125 – 2,525	IDR 11,000 – 13,900	IDR 6,450 – 7,850	IDR 2,300– 2,600
Trade Price Interval	2 – 19 Oct 2000	IDR 2,250 – 2,500	IDR 10,350 – 12,000	IDR 6,250 – 7,450	IDR 2,425- 2,890
	20 Oct – 10 Nov 2000	IDR 2,250 – 2,500	IDR 10,950 – 13,850	IDR 6,450 – 7,850	IDR 2,275- 2,600

Since there is no information whether the trade is initiated by sellers or buyers, the following rules are made to determine the sign of each transaction and the results of this trade classification rules are shown in Table 3.

(a.) If the trade price is higher than the mid-quote price, it is categorized as positive and called buyer initiated. The opposite applies for seller initiated. If it occurs at the mid-quote price, the trade is classified as unidentified. (b.) The unidentified trade is adjusted to the buyer (seller) initiated category if the trade price is higher (lower) than previous mid-quote price.

Table 3. Proportion of buyer/seller initiated trades.

Trade Indicator		**ASII**	**HMSP**	**ISAT**	**TLKM**
Buyer - initiated	2 – 19 Oct 2000	41.20 %	47.98 %	52.67 %	56.63 %
	20 Oct – 10 Nov 2000	52.51 %	41.83 %	47.62 %	48.02 %
Seller – initiated	2 – 19 Oct 2000	49.58 %	46.69 %	41.48 %	34.33 %
	20 Oct – 10 Nov 2000	46.83 %	44.52 %	46.59 %	51.18 %
Unidentified	2 – 19 Oct 2000	9.22 %	5.33 %	5.85 %	9.04 %
	20 Oct – 10 Nov 2000	0.66 %	13.66%	5.79 %	0.8 %
After adjustment of the unidentified into buyer / seller initiated					
Buyer - initiated	2 – 19 Oct 2000	47.19 %	51.18 %	55.69 %	61.19 %
	20 Oct – 10 Nov 2000	52.97 %	49.95 %	50.37 %	48.22 %
Seller - initiated	2 – 19 Oct 2000	52.81 %	48.82 %	44.31 %	38.81 %
	20 Oct – 10 Nov 2000	47.03 %	50.05 %	49.63 %	51.78 %

4. RESULTS

Because of the bid-ask bounce, this paper use the changes in the midpoint quotes (instead of trade prices) to determine the price duration. Thus, price duration is defined as the time interval between the changes in midpoint quotes whilst the trade duration is the time interval between trading events. The descriptive statistics for the price durations (table 4) confirms that the quote adjustment process is slower following an increase of tick size, a similar conclusion to Chung, Chuwonganant, and Jiang (2008). On the other hand, the calculation of trade duration (table 5) shows that the trading intensity is faster for all stocks with the coarse price grid. The median of trade durations is about 1 second, which in reality is less than 1 second because the spreadsheet program which is used in this paper is only able to calculate to the minimum of 1 second.

Table 4. Descriptive Statistics of the Price Durations (in seconds)

Price Duration (in seconds)		ASII	HMSP	ISAT	TLKM
Mean	2 – 19 Oct 2000	123.7273	88.2614	121.641	103.6228
	20 Oct – 10 Nov 2000	382.5046	142.7325	226.5477	351.5803
Median	2 – 19 Oct 2000	42	32	45	34
	20 Oct – 10 Nov 2000	53	35	47	47.5
Minimum	2 – 19 Oct 2000	1	1	1	1
	20 Oct – 10 Nov 2000	1	1	1	1
Maximum	2 – 19 Oct 2000	3883	2498	3725	2154
	20 Oct – 10 Nov 2000	6990	3605	6711	6266
Standard Deviation	2 – 19 Oct 2000	233.4097	164.7385	223.2528	193.4458
	20 Oct – 10 Nov 2000	885.3585	341.8983	568.0229	827.1708
Skewness	2 – 19 Oct 2000	5.605829	5.581478	5.776	4.3589
	20 Oct – 10 Nov 2000	4.037162	5.600352	6.062	4.0967
Kurtosis	2 – 19 Oct 2000	55.68521	48.76952	57.039	26.5988
	20 Oct – 10 Nov 2000	19.15942	39.0135	48.942	18.472
Number of durations	2 – 19 Oct 2000	1903	2697	2075	2267
	20 Oct – 10 Nov 2000	323	845	880	436

Table 5. Descriptive Statistics of Trade Durations (in seconds)

Trade duration (in seconds)		ASII	HMSP	ISAT	TLKM
Mean	2 – 19 Oct 2000	40.24476	58.0439	68.0087	56.00117
	20 Oct – 10 Nov 2000	33.23328	34.7612	27.8363	25.50649
Median	2 – 19 Oct 2000	3	8	11	21
	20 Oct – 10 Nov 2000	1	1	1	1
Minimum	2 – 19 Oct 2000	1	1	1	1
	20 Oct – 10 Nov 2000	1	1	1	1
Maximum	2 – 19 Oct 2000	2886	2246	4246	1339
	20 Oct – 10 Nov 2000	2477	5441	9076	3615
Standard Deviation	2 – 19 Oct 2000	114.7244	144.739	182.5607	99.91465
	20 Oct – 10 Nov 2000	138.6369	155.927	157.4801	109.4245
Skewness	2 – 19 Oct 2000	7.529753	5.64956	8.1616	4.489523
	20 Oct – 10 Nov 2000	8.802559	17.5896	29.2524	12.4881
Kurtosis	2 – 19 Oct 2000	100.0424	46.34829	116.625	29.18559
	20 Oct – 10 Nov 2000	103.1269	461.2657	1420.995	256.7036
Number of durations	2 – 19 Oct 2000	5916	4004	3695	4274
	20 Oct – 10 Nov 2000	6653	4305	8785	9084

The standard ACD (1,1) model is used to calculate the conditional expected price duration and all stocks demonstrated the existence of ARCH effects. Using Bollerslev-Wooldridge robust standard errors and covariances, the following in Table 6 are the results for the variance equations of price durations for each stock during the period of observation:

Table 6. ACD (1,1) Parameters

		Coefficient	Prob.
ASII	C	1262.723	0.0153
	ARCH (1)	0.515888	0.0010
	GARCH (1)	0.764505	0.0000
HMSP	C	537.3603	0.1588
	ARCH (1)	0.068861	0.0022
	GARCH (1)	0.940178	0.0000
ISAT	C	1169.921	0.0585
	ARCH (1)	0.585259	0.0005
	GARCH (1)	0.780999	0.0000
TLKM	C	428.6194	0.0842
	ARCH (1)	0.132896	0.0001
	GARCH (1)	0.905697	0.0000

When the fitted values of this test are further investigated by treating them as the independent variables for V-Net for each period of observation, the conditional expected price duration is not found to have significant effects. For all stocks, the analysis of Variance test is also conducted and it shows that the absolute value of the net directional volume of bought and sold (AB_VNET) amounts during the price duration pre and post tick size changes are statistically significant at a 1% level. Prior to tick size changes, when AB_VNET is regressed on the spread and price duration, ISAT and HMSP do not have any significant coefficient on these variables. The significant coefficients are only found for two stocks: ASII and TLKM, as shown in Table 7 below.

Table 7. Determinants of AB_VNET before the tick size changes

AB_VNET		**Coefficient**	**p-value**
ASII	C	34170.5	0.0000
	SPREAD	-47.8775	0.0635
TLKM (p-value of F-test 0.000)	C	34604.6	0.0000
	SPREAD	-334.523	0.0010
	PRICE DURATION	33.8471	0.0000

After the tick size changes, the spread and price durations are found to be significant explanatory variable which influence the realized market depth. The coefficient of spreads shows a negative relation with market depth which is reasonable as market depth will be lower in the presence of a high spread. The relation between price duration and market

depth is somewhat ambiguous because a long time interval between price movements can reduce the market imbalance of buy and sell trading volume. However, given AB_VNET is a proxy for market depth, this also means that the trading volume in either side (buy/sell) can be higher during longer price durations, as described in Table 8 below for all stocks except TLKM.

Table 8. Determinants of AB_VNET after the tick size changes

AB_VNET		**Coefficient**	**p-value**
ASII (p-value of F-test 0.000)	C	205703	0.0000
	SPREAD	-1542.14	0.0030
	PRICE DURATION	150.954	0.0000
HMSP	C	14785.4	0.0000
	PRICE DURATION	6.25372	0.0134
ISAT (p-value of F-test 0.000)	C	51710.8	0.0000
	SPREAD	-128.322	0.0749
	PRICE DURATION	30.2528	0.0000
TLKM	C	286689	0.0000
	SPREAD	-3198.02	0.0003

During higher tick size period, durations between trades falls which indicates the trades increase for all stocks. As spread usually altered as the result of tick size change, it will be useful to analyse whether spread changes are a significant explanatory variable for trading intensity. In addition, trades tend to be clustered, which means short (long) trading intensity are usually followed by another short (long) period of trading intensity. The results for the regression of trade duration on spreads, spreads lagged 1 period and trade durations lagged 1 period is shown in Table 9:

Table 9. Determinants of Trade Durations

A. Period 2 – 19 October 2000		Coefficient	p-value
ASII (p-value of F-test 0.0000)	C	43.4956	0.0000
	SPREAD	-1.87184	0.0219
	SPREAD (-1)	3.75780	0.0042
	TRADE DURATION (-1)	0.232327	0.0000
HMSP (p-value of F-test 0.0000)	C	61.2393	0.0000
	SPREAD	-0.526369	0.0027
	SPREAD (-1)	0.857573	0.0000
	TRADE DURATION (-1)	0.205122	0.0000
ISAT (p-value of F-test 0.0000)	C	55.4083	0.0000
	SPREAD	-1.45831	0.0003
	SPREAD (-1)	2.77774	0.0000
	TRADE DURATION (-1)	0.193540	0.0000
TLKM (p-value of F test 0.0000)	C	47.4992	0.0000
	SPREAD	-1.30450	0.0005
	SPREAD (-1)	1.23699	0.0245
	TRADE DURATION (-1)	0.159772	0.0000
B. Period 20 Oct – 10 November 2000		**Coefficient**	**p-value**
ASII (p-value of F-test 0.0000)	C	46.5880	0.0065
	SPREAD	*-0.223434*	*0.5746*
	SPREAD (-1)	*0.528479*	*0.3832*
	TRADE DURATION (-1)	0.30209	0.0000
HMSP (p-value of F-test 0.0007)	C	51.1002	0.0002
	SPREAD	*-0.0898447*	*0.4312*
	SPREAD (-1)	0.360758	0.0777
	TRADE DURATION (-1)	0.173957	0.0004
ISAT (p-value of F-test 0.0000)	C	38.4088	0.0534
	SPREAD	*-0.968417*	*0.1352*
	SPREAD (-1)	*1.29632*	*0.2131*
	TRADE DURATION (-1)	0.150210	0.0311
TLKM (p-value of F test 0.0000)	C	40.1945	0.0000
	SPREAD	*-0.401822*	*0.1815*
	SPREAD (-1)	0.510986	0.0862
	TRADE DURATION (-1)	0.267694	0.0000

The coefficient of spreads, first lag of spreads and trade durations are found to be significant explanatory variables during the period of smaller tick size, yet only the first lag of trade duration is statistically significant during the coarser tick size period. In other words, trade duration is influenced by spread during the small tick size period but its relation is somewhat vague when the tick size becomes larger.

5. CONCLUDING REMARKS

This paper studied the relationship between realized market depth, price durations and spreads pre and post tick size increases. The realized market depth is defined using the V-NET measurement which is the net directional volume which can be bought and sold before a price movement occurs. Price duration is the time interval of the changes in the midpoint quote. The spread which is the difference between the bid and ask quote is usually the main component which is influenced by the tick size rule. Although the absolute value of V-Net in the small tick size period is statistically significant and different from the period with coarse minimum price variation, the results do not convincing support the conclusion that market depth is always significantly affected by price durations and spreads as the relationship is only found in 2 of the 4 stocks after the tick size change. In contrast to price durations, trade durations are found to be lower during periods with higher tick sizes which indicate more intensive trading activity. However, trade duration seems to be affected by spreads in the period with small tick sizes but its relation is unclear during the larger tick size period. The more obvious pattern is that the existence of clustering trade duration for highly liquid stocks is not affected by tick size rules. This is consistent with suggestions that periods of information impounding have lower durations.

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REFERENCES

Amihud, Y., Mendelson, H., & Pedersen, L. H. (2005). Liquidity and asset prices. *Foundations and Trends in Finance, 1*(4), 269-364.

Chung, K. H., Chuwonganant, C., & Jiang, J. (2008). The dynamics of quote adjustment. *Journal of Banking & Finance, 32*(11), 2390-2400.

Ekaputra, I. A., & Ahmad, B. (2007). The impact of tick size reduction on liquidity and order strategy: Evidence from the Jakarta stock exchange (JSX). *1st International Conference on Business and Management Research*. doi: http://ssrn.com/abstract=9836522007

Engle, R. F., & Lange, J. (2001). Predicting VNet: A model of dynamics of market depth. *Journal of Financial Markets, 4*(2), 113-142.

Harris, L. (2003). *Trading and Exchanges*. New York: Oxford University Press, Inc.

Husodo, Z. A., & Henker, T. (2007). Intraday speed of price adjustment in the Jakarta Stock Exchange. *20th Australasian Finance & Banking Conference 2007 Paper*. doi: http://ssrn.com/abstract=1010498

Purwoto, L., & Tandelilin, E. (2004). The impact of the tick size reduction on liquidity: Empirical evidence from the Jakarta stock exchange. *Gadjah Mada International Journal of Business, 6*(2), 225-249.