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# CAPITAL MARKET REVIEW

## New Liquidity Measurement: Mechanical Approach (Case of Pre Opening Session on IDX)

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*The aim of this study is to develop a new liquidity measurement. The mechanical approach is used to measure the liquidity. This study uses trade order base that is more pronounced than conventional ones. To confirm the result of this study, we use pre opening session in the term of event as Kholisoh and Hermawati (2010) and Kholisoh (2011). This study collects trade base and order base intraday data one month period before and after pre opening session was implemented with the 25 most active stocks in LQ45. This study examines the velocity (how fast the order is executed) as new liquidity measurement. The result of this study confirms Kholisoh (2011), but contradicts to Kholisoh and Hermawati (2010) in the same event. The use of “velocity” as a metric of liquidity measurement is better in understanding the theoretical wisdom. This new liquidity measurement can cover the speed of the order to be executed in all capital market.*

**Keywords:** Market microstructure, opening call, liquidity measurement, velocity

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### Introduction

Availability of intraday data allows research in the field of market microstructure emerged rapidly. Intraday data allows research in trade base or order base more comprehensive. Measurements with intraday data are used to describe the characteristics or performance of a capital market, such as measures of liquidity. One purpose of the capital market establishment is to create a liquid market. However, the notion of liquidity itself is still in debate among the experts. One of the generally accepted definitions of liquidity is as an ability to convert shares into cash at low transaction costs. Understanding of the change in liquidity is also important from public and firms' policy point of view. Amihud and Mendelson (1988) argue that

firms had incentives for the liquidity increase of the financial claims they issued since this might increase their values. Therefore, the decreasing liquidity in emerging markets may also induce corporations to cross list their stocks in more liquid and developed markets, and thereby hindering domestic market development (Tandelilin, 2002).

Researchers in the field of capital market liquidity use different measurements. Usually the measurement of liquidity can be divided into two categories, namely trade based and order based. Selection of measuring devices becomes very important considering the conclusions of the research could affect the liquidity of the market structure changes. In concept, liquidity expresses how fast a stock is executed on the market. With speed concept, then the ele-

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ment of time is one component that should be included in formulating liquidity. Given the importance of measuring instruments that better reflect the performance of capital market, forming trade and order data for measuring liquidity is the subject of this study. This study is interesting because in Indonesia there is still a few who do research in the field of market microstructure, particularly to make a new formula as a measurement of performance of a capital market. The new measurement in this study is expected to contribute the development of methodologies in the field of market microstructure, especially in capital markets. In addition, intraday data allows this study to explore more widely against the new findings as a contribution to the market information.

This study uses pre opening session implementation as the event to apply the new liquidity measurement. The objective of this study is to see the impact of pre opening session on market liquidity, especially in comparing different measurements. Kholisoh and Hermawati (2010), using trade and order base, find evidence that pre opening session does not impact market volatility and market liquidity.

The results of the analysis provide insights of the factors in which the observed differences in the periods of before and after pre opening session is implemented. It has important implications for investors seeking liquid assets in their portfolios. This study makes a first pass attempt to provide an analysis of the impact of pre opening session on liquidity, especially on the level of firms' stock by using new liquidity measurement. The objective of this study is to highlight the use of new liquidity measurement for appropriate measurement to cover the speed of information flow in capital market.

Using the same sample size, this study mixes the trade and order base in order to find "velocity" as a measure of liquidity. The result confirms Kholisoh (2011), but contradicts Kholisoh and Hermawati (2010). This study finds evidence that pre opening session impacts market liquidity, indicating less time consumed for such an order become executed. Although there is no increasing trade volume

and value after pre opening session, there is an increasing ability to execute the order.

The following sections provide a body of paper including review of related studies, research method, and result discussion. Conclusion of the paper can be found in the last section.

## Literature Review

Liquidity refers to how quick and how cheap investors can trade an asset when they want to. Harris (1990) notes that a perfectly liquid market is the one where any amount of a given security can be instantaneously converted into cash and back to securities at no cost. In a less than perfect world, a liquid market is one where the transaction costs associated with this conversion are minimized.

Although liquidity seems easy to measure, in fact, some experts find difficulty. In the literature, there are liquidity measurements used. Aitken and Winn (1997) in Aitken and Comerton-Forde (2003) find approximately 68 measurements of liquidity and have not reached an agreement. In theory, the measurement of liquidity can be divided into two categories, based on trade and based on order.

### Trade based measures

Trade based measures are commonly used by researchers. Trading value, trading volume, the number of trades (frequency), and the turnover are widely used in measuring liquidity. These measures are very simple and easy to be used, but still problematic when measuring what happen in the future. The problems arise when using ex post measure are when all information are released and transactions are traded. These measures fail to indicate the ability of investors to transact immediately and the cost associated with this, which is the essence of liquidity (Aitken and Comerton-Forde, 2003).

Thus, there will be inconsistencies in the measurement results of transaction based liquidity. Researchers will have difficulties in making conclusions about the measurement results.

## Order based measures

Order based measures are also commonly used in many researches, including spread, relative spread, depth, and relative depth. These measures are more complex and so many data must be used. Using order based measures is appropriate to indicate the motive of investors.

Measurement based orders better reflect the expectations of investors rather than transaction based measurement. Still, there is no time variable in liquidity measurement.

## Research Method

This study uses the same method as Kholisoh and Hermawati (2010) and Kholisoh (2011). This study uses one month period before and after pre opening session was implemented with the 25 most active stocks in LQ45. The implementation of this new trading rule is divided into five time periods. Four stocks are implemented on 5<sup>th</sup> February 2004; six stocks on 8<sup>th</sup> March 2004; five stocks on 23<sup>rd</sup> March 2004; five stocks on 6<sup>th</sup> April 2004; and five stocks on 19<sup>th</sup> April 2004.

The data used in this study is taken from the JATS database maintained by the Database of *Pasar Modal Universitas Gadjah Mada* (DPMUGM). The JATS database provides details of all transactions and order books data. The transactions and order contain all information from date transaction and order and the identity of investors. This study focuses on transaction and order in the regular market.

Liquidity is measured by “velocity” as how fast the order can be executed in capital market. So, this study mixes trade base and order base intraday data. Finding the speed of the order executed is done by matching the order number of these two based measurements. As the initial step, we find “time” as the difference between trading time and order time. Time factor becomes the decisive factor in measuring one of the speed of an executed stock that has never been included in the formulation of liquidity in previous studies, including Aitken and Comerton-Forde (2003). The difference between order and execution time can be traced from the

order number on the transaction data and order data. Order number is the keyword to measure the time difference in the two data. SAS is used to manage two different data.

Blending the two disciplines will result in a formulation that is quite creative. Mechanics (in physics) is a discipline that serves as the approach in this research in formulating the measurement of liquidity. If liquidity is the concept defined as “how fast” associated with “velocity” ( $v$ ) and “time” execution associated with “time” ( $t$ ), then the “distance” ( $s$ ) can be adjusted with what is more variable affecting whether or not a long time transaction in execution. The results of some previous studies find evidence that the magnitude of the order price is more influenced executed or not an order (other than volume orders). Thus, the order price as a variable measuring “distance” ( $s$ ) are quite acceptable.

So, the formulation of new liquidity measurement proposed in this study is:

$$Velocity (v) = \frac{Average Order Price}{Average time} \quad 1)$$

The significant difference between velocity before and after pre opening session is performed using  $t$ -test. This is usually used in many researches to compare two sample means.

## Result and Discussion

The most 30 active stocks as sample sizes are used in this study. Figure 1 shows the transactions for each stock before and after pre opening session, in which a) transaction before pre-opening session, and b) transaction after pre-opening session.

The sample of 30 stocks represents approximately 80% of the volume traded on the IDX. Table 1 provides descriptive statistics about the average, volume, value, and time for one month period of the whole sample stocks for pre and post opening call.

Table 1 shows the average time an order can be executed at before pre opening session is longer than after. An order can be executed

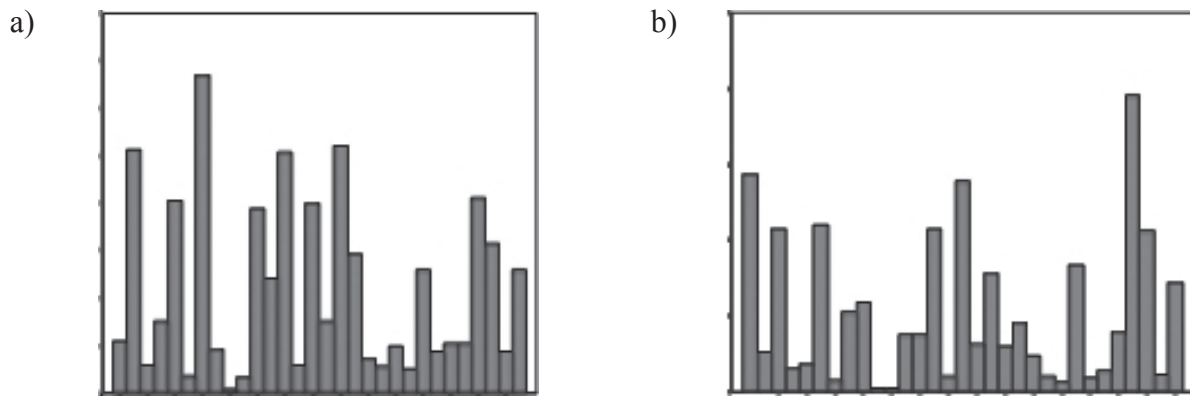


Figure 1. Transaction for 30 stocks before and after pre opening session

Table 1. Descriptive statistics of the average volume, value, and time of sample stocks, pre and post opening call

Period	Average time	Average volume	Average value (Rp.)
Pre-Opening	00:13:31.45	48,614.66	$7.5 \times 10^7$
Post-Opening	00:11:35.77	57,116.78	$1.0 \times 10^8$

in 13 minutes and 31.45 seconds at before pre opening session. An order can be executed in 11 minutes and 35.77 seconds at after pre opening session period. The same pattern also presents in average volume and average value. The average volume and average value at after pre opening session period is higher than before pre opening session period.

Table 2 shows that after pre opening session, the market is more liquid than before pre opening session.  $V_1$  is defined as velocity of average price divided by average time, and  $V_2$  is defined as velocity of average volume divided by average time.

To show the effectiveness of new liquidity measurement, this study compares it to the other measurements. Table 3 presents a comparison of the liquidity measurements based on trade, order, and trade order of the whole sample stocks. The table also reports the  $t$ -statistic for different trading rules in each liquidity measurement. Based on the trade, only one of four metrics (value) is significant at 10% level. For order base, two of four metrics are significant at 1% level. Finally, for trade order base, time is significant at 1% level. It seems there is some kind of hierarchical measurement. These results demonstrate that there is a significant effect on liquidity by new measurement. At the level of 1%, the opening call improves market liquidity.

The analysis shows that there is a significant difference in average time between

before and after pre opening session. The average time required in execution period before pre opening session is 13 minutes 31.45 seconds, while the average time required in execution period after pre opening session is 11 minutes 35.77 seconds. The time difference between the two test periods with  $t$ -test is significant at 1% level. It means that the time required to execute on a stock after pre opening session is shorter than before pre opening session. This shows that changes of trading mechanism impact on orders are executed faster. One yardstick to measure whether or not liquid capital markets can be seen from how fast a stock executed. The result of this study has shown that the change in market mechanism influences market liquidity. Thus, these results support the findings by Commerton-Forde (1999), which states that the system call at the opening will create a liquid and efficient market.

The result shows significant difference on average time an order is executed. Using time metric is useful to measure how fast an order of stocks can be executed. Research in illiquidity area should be considered on time variable when using liquidity measurement. However, this study is not perfect. Time variable is enough to serve as a measure of liquidity, but will be more complete if the next studies also measure the speed. In the velocity measurements, it will be seen in detail for each price category.

Table 2. Average liquidity

Period	$V_1$	$V_2$
Before	370.37	3915.97
After	421.46	5497.76

Table 3. Comparison of the liquidity measurements by trade base, order base, and trade order base

	Before	After	Change	t-statistic
<i>Trade base</i>				
Volume	48,614.66	57,116.78	8,502.12	0.73
Relative volume	0.0006	0.0007	0.0001	1.24
Frequency	38.8254	40.1036	1.2782	0.56
Value	$7.5 \times 10^{+7}$	$1.0 \times 10^{+8}$	$2.7 \times 10^{+7}$	1.65*
<i>Order base</i>				
Spreads	-11.1533	-10.1020	1.0513	0.351
Relative spreads	0.0027	0.0011	-0.0016	-1.21
Depth	62,712.34	213,522	150,809.6	3.63***
Relative depth	0.00003	0.00005	0.00002	2.67***
<i>Trade order base</i>				
Time	00:13:31.45	00:11:35.77	-1:55.68	-5.6590***
Velocity (by price)	370.37	421.46		
Velocity (by volume)	3915.97	5497.76		

Data is taken from Kholisoh (2011)

\*Significant at the 10% level.

\*\*\*Significant at the 1% level.

## Conclusion

By using event study method on intraday data, this study indicates that the average time period after pre opening session on the Indonesia stock is shorter than the average time period before pre opening session. The difference is significant at 1% level. Liquidity measurement by looking at the differences in average time on event study is still relevant to the purposes and objectives of this research.

This research still has several limitations. It is still possible to improve the model by collab-

orating with several teams of experts from both academic and practitioner side that controls the activity of trading in the Indonesian capital market. In addition, the SAS program is necessary to improve the way trials and control systems and procedures for standard orders. However, the preparation of the program is still experiencing technical obstacles so that the formulation of the measurement of liquidity can only be seen from the side of the time, that is, the average time required for a stock to be executed. Future research should consider the speed of an order executed beside time variable.

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