

# The Correlation between Trading Friction and Trading Characteristic in Indonesian Stock Exchange

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Abstract: The main purpose of this research is to measure the correlation trading friction and some variabel that affect it for high frequency financial data in Indonesian Stock Exchange. Trading friction define as the difficulties faced by investors in the stocks trading which is sourced from implicit transaction cost. Using research result of trading friction calculation generated in previous studies by Nurhayati, Ekaputra and Husodo (2018), that the average trading friction of high market capitalization and relatively liquid stocks, scattered in various fractions price is equal to 1% per year and the highest trading frictions derived from the information, correlation test will be carried out between trading friction to characteristics of trading. The result can prove that trading friction measures are negatively and highly correlated with stock price, market capitalization and number of transactions, and uncorrelated with the volume of transactions as parameters proved to be insignificant.

## 1 INTRODUCTION

Liquidity is one of the most important factors to be considered by investors when investing in stocks that are trading through stock exchange. Simply, liquidity can be defined as the facility in trading asset (Black, 1971). The previous understanding concerning liquidity was started by the presence of the equilibrium concept from Walras that known as "Walrasian Friction Auctioneer", where equilibrium market formed from the power side of supply and demand by some assumptions that the market is always in the balance condition, perfectly liquid, has no transaction cost, no tax of balance result and there is the same information received by investor (systematic information). The next development regarding the formation of balance price stated that balance in reality does not always happen (Demsetz, 1968). The balance can be obtained by agreeing on a certain price as cost of immediacy. *Cost of Immediacy* is cost associated with *immediate execution of tradings*. Demsetz's analysis is regarded as the beginning of the market microstructure theory. Demsetz suggested two things that are not stated in the previous view which

were the cost of trading both explicit and implicit costs and dimension of time (the time in which the number of seller is equal to the number of buyer). Therefore, some assumptions that stated previously can't be fulfilled.

The view of the transaction cost continues to grow with the discovery of the composition of transaction cost which includes order processing cost, inventory holding cost and cost dues to asymmetric information (adverse information cost). These transaction costs are the obstacles for investors to reach the balance in market. Stoll called it a friction in trading (Stoll, 2000). Friction is divided into real friction and informational friction. Real friction is sourced from order processing cost and inventory holding cost while informational friction is sourced from adverse information cost. Some other literatures categorized transaction costs into implicit transaction cost and explicit transaction cost. Implicit transaction cost is an invisible cost and its existence cannot be felt, such as bid-ask spread, while explicit transaction cost is a visible cost and its existence can be felt directly by investors such as broker fee, fee of stock manager and government tax (Harris, 2002).

This research will analyze the correlation between trading friction as implicit cost in Indonesian Stock Exchange with some trading characteristics such as stock prices, trading volume, transaction amount and market capitalization that is estimated to affect friction. Average trading friction and characteristic data used in this research is the result of trading friction calculated in generated research in previous studies by Nurhayati, Ekaputra and Husodo (2018).

## 2 THEORETICAL FRAMEWORK

Trading friction, which is defined in this research, is implicit transaction cost that investors cannot feel its existence. As market risk (systematic risk), although friction cannot be felt but its existence can affect the market and lead to changes in prices, it can be seen from the increase in beta (Nurhayati, Ekaputra and Husodo, 2018). Besides implicit transaction costs, there are other type of friction, namely explicit transaction cost. This fee is clearly known by all investors such as brokerage commission, fee exchange and government tax.

The static measure standard, which is used to measure total friction that can be observed in trading are quoted and effective half spread, which reflects total trading cost that covers real friction and informational friction (Stoll, 2000). Half spread term is used when friction measurement is done in every transaction, while quoted spread measures spread in round trip trading. Quoted half spread can be noted as:

$$S = (A - B) / 2$$

Where :

A: ask price

B : bid price

To get the average value of quoted half spread is by dividing spread with the quantity of the spread trading. Another alternative of measurement friction is effective half spread.

$$ES = |P - M|$$

Where :

P is trading price

M is quoted mid point

The effective half spread is lower than quoted half spread. Effective half spread is an actual total friction measured because using a stock price variable than quoted half spread with bid and ask (Cai *et al.*, 2008).

Trading friction consist of real and information Friction. Trading half spread is one of the model used for measure real friction, half from the differences average trading price in ask minus average trading price in bid. Trading half spread consists of first trading half spread and second trading half spread.

The first trading half spread defined as (Stoll, 2000) :

$$TS1 = (\bar{P}_1^A - \bar{P}_1^B) / 2$$

$\bar{P}_1^A$  is price in trading in i in the side of ask,  
 $\bar{P}_1^B$  is price in trading in i in the side of bid.

The second trading half spread defined as (Stoll, 2000) :

$$TS2 = (\bar{P}_2^A - \bar{P}_2^B) / 2$$

$\bar{P}_2^A$  is price in trading in i in the side of ask,  
 $\bar{P}_2^B$  is price in trading in i in the side of bid.

After all measurements of friction were completed, proceed with the calculation of the proportional half spread to the four friction measures (S, ES, TS1 and TS2). Proportional half spread is obtained by dividing the average half of the spread by the average price of each stock during the observation period. Informational friction is a cost caused by adverse information. Informational friction can be said as a profit of informed trading for the loss of uninformed trader [(Glosten and Milgrom, 1985)(Kyle, 1985) (Copeland and Galai, 1983)]. Stoll did not formulate a specific model for informational friction. In this case, informational friction is considered to be difference between total friction and real friction.

Trading friction that can affect trading liquidity can be expanded by analyzing several determinants of the bid-ask spread itself. Quoted spread is influenced by several factors including trading volume, stock price, number of market makers and risk of securities (Glosten and Harris, 1988). In line with Glosten and Harris, Stoll states that friction is strongly influenced by the characteristics of trading. Friction is directly proportional to volatility and inversely proportional to the number of tradings, transaction volume, stock price and market capitalization (Stoll, 2000). Friction will decrease with increasing the number of tradings, volume, market capitalization and stock prices will increase with increasing volatility.

The hypothesis that will be built in the correlation analysis between proportional half spreads and some trade characteristics is:

- Hypothesis 1a: There is a strong and negative correlation between friction and the average price of a stock.
- Hypothesis 1b: There is a strong and negative correlation between friction and the average number of transaction.
- Hypothesis 1c: There is a strong and negative correlation between friction and transaction volume.
- Hypothesis 1d: There is a strong and negative correlation between friction and market capitalization.

### 3 RESEARCH METHOD

Based on the results of previous studies about trading friction and decomposition spread, it was founded that the amount of friction in the Indonesian Stock Exchange was 1%. The friction of 1% per year is a friction generated at relatively liquid company, high market capitalized stocks, which are scattered at various prices of friction (Nurhayati, Ekaputra and Husodo, 2018). High market capitalization stocks will have high liquidity (Husodo, Zaäfri A and Henker, 2009).

To develop Nurhayati's research (Nurhayati, Ekaputra and Husodo, 2018), this research will use the data, that also used in Nurhayati's research to carried out an analysis of the correlation of trading friction with several characteristics of trading. Besides average trading friction, the data employed in the study consist of stock price, trading volume, trading quantity and market capitalization. The samples were chosen purposively from regular market was sorted based on the top 10 stocks are sorted by capitalization which represents each tick size from the biggest to smallest.

In collecting data at three time points, there were some data released from the sample due to the inavailability and incompleteness. The sample consist of 38 stocks in 2006 or 10,9 % from the population, which is 348 emitens, 43 stocks in 2007 or 12 % from 357 emitens and 50 stocks in 2008 or 12,3 % from 406 stocks. Observation period was divided in three points, which are in 2006, 2007 and 2008 which consist of three months in 2006 and 2008 (August, September and October) and two months in 2007 (July and August). The average number of trading days in 2006 are 51 days with the trading transactions of 541.875 transactions. In 2007, the average numbers of trading days are 41 days with the number of trading transactions of

804.785 transactions. In 2008, the average number of transactions days are 50 days with the number of trading transactions of 1.719.175 transactions. The transaction data employed in the study, which was obtain from data stream at Economic Data Center and Business Library of Faculty of Economics University of Indonesia (PDEB UI).

### 4 ANALYSIS

Nurhayati, Ekaputra and Husodo (2018) have calculated trading friction using quoted half spread (S), effective half spread (ES), first trading half spread (TS1), second trading half spread (TS2) with proportional half spread and this research will develop it. Using the same object of research, this study will examine and correlate some trading characteristic to trading friction. Based on the calculation of frictions during the observation period, Nurhayati, Ekaputra and Husodo (2018) have found that the average amount of frictions in Indonesian Stock Exchange on large capitalized stocks is 1%.

The average proportional quoted half spread (%S) at Indonesian Stock Exchange in 2006 is 1.1%, and the average proportional effective half spread (%ES) is 1.1%. In 2007 the average of proportional quoted half spread (%S) is 1.2%, and the average of proportional effective half spread (%ES) is 1.2%. While in 2008, the average of proportional quoted half spread (%S) at Indonesian Stock Exchange is 1%, and the average of proportional effective half spread (%ES) is 1.2%. Based on the results of the measurement of friction, the next analysis of the correlation between trading friction and trading characteristics such as stock price, transaction volume, number of transactions and market capitalization will be analyzed (Nurhayati, Ekaputra and Husodo, 2018).

Table 1 presents data on correlation test results between several friction measures with several characteristics of trade. Correlation coefficient between proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread (% TS1), proportional second traded half spread (% TS2) with the average price of 2006 was -26.5%, -27.5%, -28.6% and -25.7% and significant at  $\alpha$  10% on % S, % TS2 and significant at 5% on % ES and % TS1.

Correlation coefficient between proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread

(% TS1) and proportional second traded half spread (% TS2) with the average price in 2007 was -14%, 14.1%, -17.9% and -20.9%. Although the correlation between proportional half spread shows a relationship that is inversely proportional, but the resulting parameters show a non-significant relationship between the two, so it cannot prove hypothesis 1a which states that there is a strong and negative relationship between spread and stock price.

Correlation coefficient values are proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread (% TS1), proportional second traded half spread (% TS2), and to the average price in 2008, respectively at -21.7%, -24.2%, -25.6% and -26.2%, and significant at  $\alpha$  10% on % S, 10% on % ES, % TS1, and % TS2. The correlation shows that there is an inverse relationship between the proportional half spread to the average price, meaning that the higher the average price, the smaller the proportional spread

Correlation coefficient between proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread (% TS1) and proportional second traded half spread (% TS2) with the number of transactions in 2006 was -44.8%, -44.6%, -42.7% and -42.3%.

Correlation coefficient between proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread (% TS1) and proportional second traded half spread (% TS2) with the number of transactions in 2007 was -38%, -38.7%, -30.9% and -41.1%. Correlation coefficient between proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread (% TS1) and proportional second traded half spread (% TS2) the number of transactions in 2008 was -31.3%, -31.4%, -25.8% dan -26.7%, significant at  $\alpha$  5% on % S, % ES and significant at 10% on % TS1, % TS1. All the correlation test results were significant at 1% , so the 1b hypothesis is proven.

Correlation coefficient between proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread (% TS1) and proportional second traded half spread (% TS2) with the volume of transactions in 2006 was -5.8%, -4.6%, -3.9%, -0.5%. Correlation coefficient between proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread (% TS1) and proportional second traded half spread (% TS2) with the volume of transactions in 2007 was -2.2%, -

2.2%, -1.4%, -2.1%. Correlation coefficient between proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread (% TS1), proportional second traded half spread (% TS2) with the volume of transactions in 2008 was -13.8%, -11.4%, -11%, -13.6%. The overall results for 2006, 2007 and 2008 were not significant. so the 1c hypothesis is not proven.

Correlation coefficient between proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread (% TS1) and proportional second traded half spread (% TS2) with the market capitalization in 2006 was -28.8%, -29.1%, -29.6%, -28.7%. Correlation coefficient between proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread (% TS1) and proportional second traded half spread (% TS2) with the market capitalization in 2007 was -25.7%, -26.1%, -26.1%, -32.5%. Correlation coefficient between proportional quoted half spread (% S), proportional effective half spread (% ES), proportional first traded half spread (% TS1), proportional second traded half spread (% TS2) with the market capitalization in 2008 was -28.5%, -31.3%, -26.8%, -29.1%. The overall results for 2006, 2007 and 2008 were significant at  $\alpha$  5 and 10%, so the 1d hypothesis is proven.

Table 1: The Correlation of trading friction with trading characteristics

Year	Trading Characteristic	Proportional Half Spread of Friction			
		%S	%ES	%TS1	%TS2
2006	Price	-0,265	-0,275	-0,286	-0,257
	sig	0,108	0,095	0,081	0,12
	Transaction Amount	-0,448	-0,446	-0,427	-0,423
	sig	0,005	0,005	0,007	0,008
	Transaction Volume	-0,058	-0,046	0,039	-0,005
	sig	0,731	0,782	0,814	0,974
2007	Market Capitalization	-0,288	-0,291	-0,296	-0,287
	sig	0,08	0,076	0,071	0,08
	Price	-0,14	-0,141	-0,179	-0,209
	sig	0,371	0,367	0,251	0,179
	Transaction Amount	-0,38	-0,387	-0,309	-0,411
	sig				

	sig	0,012	0,01	0,043	0,006
	Transaction Volume	-0,22	-0,227	-0,142	-0,217
	sig	0,156	0,144	0,364	0,162
	Market Capitalization	-0,257	-0,261	-0,261	-0,325
	sig	0,096	0,091	0,091	0,033
2008	Price	0,217	-0,242	-0,256	-0,262
	sig	0,13	0,091	0,073	0,066
	Transaction Amount	-0,313	-0,314	-0,258	-0,267
	sig	0,027	0,026	0,071	0,061
	Transaction Volume	-0,138	-0,114	-0,11	-0,136
	sig	0,338	0,429	0,448	0,346
	Market Capitalization	-0,285	-0,313	-0,268	-0,291
	sig	0,045	0,027	0,06	0,041

## 5 RESULTS

Based on the result, trading volume and holding price are not proved to be able to decrease the *spread*, although in substance, both of them negative correlated with trading friction, but trading character such as holdings price or trading volume are can not explain trading friction because the parameter is not significant. Variable of transaction amount and market capitalization empirically verify is negative to the spread. More high the transaction quantity, the spread will more decrease and more high market capitalization, *spread* / friction will be lower. Research conducted by Rhee and Wang (2008) found a high preference for foreign investors in large capitalized stocks because it was proven that large capitalized stocks had a lower level of risk. Hypothesis testing conducted in this study can prove the effect of market capitalization dan number of transaction on spreads. The higher the spread market capitalization and number of transaction will be lower.

Trading friction have negative related with holdings price, trading volume, transaction quantity and market capitalization. The correlation result can verify the tight correlation between trading friction with holdings price, transaction quantity and market capitalization, however cannot verify correlation

with trading volume because of the parameters has not effect. As The number of transaction also related with how many trading. When the transaction, there is the information from the *buy* to *sell* or otherwise. The oft transaction holding and high transaction quantity, then decrease the gap information between buyer and seller, so the spread will smaller and liquidity will higher. Market capitalization showed the size of company. Small capitalized companies have a higher level of risk (Fama and French, 1992). Correlated analysis between trading friction and some trading character such as holdings price, trading volume, transaction quantity and market capitalization is needed.

## 6 CONCLUSIONS

By using the intraday data with high frequency in the Indonesian Stock Exchange, this study can prove that trading friction has a negative relationship with stock prices, trading volume, number of transactions and market capitalization. The correlation test results can prove the closeness of the relationship between trade friction and stock prices, the number of transactions and market capitalization, and cannot prove its relationship with trading volume because the parameters prove to be insignificant.

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