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Trading Friction and Spread Decomposition in Indonesian Stock Exchange

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Abstract **-** We examine the intraday trading and price change for frequently traded stocks in Indonesian Stock Exchange. Using bid and ask price, trade price, number of trade, trade volume, we study how to measure and identify the source of trading friction and to infer what is the biggest component of trading friction. The result of 50 most frequently traded stocks in the Indonesian Stock Exchange using trading friction estimator conclude that the average trading friction of high market capitalization and the most relatively liquid stocks, scattered in various fractions price is equal to 1% per year, and the highest trading frictions derived from the information and it is consistent with spread decomposition estimator.

Keywords**:** Trading friction; Spread decomposition; High market capitalization; Frequently traded stock; Liquid stock.

1. Introduction

Some empirical studies, at least since Demsetz who examined the determination of prices in security market argued that the balance can be obtained by agreeing on a certain price as cost of immediacy (Demsetz, 1968). This cost could be either explicit or implicit. Explicit cost arising for example from charge levied by a particular market and its existence can be felt directly by investors such as brokerage fee and government tax, while implicit reflecting cost connected with the immediate executing trading, arose because unlike in the Walrasian auction, trading had a time dimension. If the number of trader wishing to sell immediately did not equal the number who wished to buy immediately, the imbalance of trade would make it possible to find a market clearing price at a given time t. Demsetz argue that this lack of equilibrium could be overcome by paying a price of immediacy (Demsetz, 1968). This implicit costs referred to the price of immediacy. Implicit transaction cost is an invisible cost and its existence cannot be felt, such as bid-ask spread and missed trade opportunity cost. 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 asymmetric information cost (adverse information cost). These transaction costs are the obstacles for investors to reach the balance in market, Stoll called it trading friction (Stoll, 2000).

Empirical study of trading friction for the first time is carried out by Stoll (2000). He review the understanding of friction and look for simple and robust empirical regularities in the measurement of trading friction. Seven distinct measure of trading friction are computed from transactions data for 1.706 NYSE/AMSE stocks and 2.184 NASDAQ stocks. The measures provide insights into magnitude of trading costs, the importance of informational versus real friction and the role of market structure. He also examine the degree of which the

various measures are associated with each other and with trading characteristics. Stoll define trading friction as a constraint for traders when trading their assets, which caused unbalanced. Trading friction on Stoll's research stated as a cost on each transaction or half spread, while similar research that had been done previously is the cost for two times transactions (round trip) or the spread. Stoll classified friction into real friction and informational friction. Real friction as consequence to used resource such as order processing cost and inventory holding cost, and informational friction arising from adverse information cost. He conclude that the quoted spread and the effective spread, which accounts for negotiation inside the quoted spread, reflect total friction. Stocks with high total friction (as measured either by the quoted or effective spread) also tend to have high real friction (as measured by the traded spread or Roll implied spread). He found that the traded half spread (using volume weights) averages 3.7 cents over all stocks on the NYSE/AMSE and 8.0 cents over all stocks on NASDAQ. The informational component of the spread is reflected in the difference between total friction (such as the quoted or effective spread) and real friction (such as the traded spread or the Roll implied spread). The informational friction averages 2 to 2.5 cents per share on both NYSE/AMSE and NASDAQ.

Cai, Hillier, Hudson, and Keasey (2008) examine trading friction in hybrid system (both electronic order book and competitive dealer market). Using bid-ask spreads, they present evidence which suggests that while real frictions associated with the costs of supplying immediacy are less in order driven systems, informational frictions resulting from increased adverse selection risk are considerably higher in these markets. This research result is consistent with previous research conducted by (R. D. Huang & Stoll, 1996) and (H. R. Stoll, 2000b). R. D. Huang & Stoll (1996) compares the execution cost of stock trading on NASDAQ and NYSE using several friction measurement models such as quoted spreads, effective spreads, realized spreads and roll spreads, find that spread on NASDAQ which is dealer driven market is bigger than the NYSE which is order driven market.

The high of informational friction on order driven market is because limit order book market is dominated by small trader, considering that limit order is a market which has a strong foundation so it is profitable for a small trading (Glosten, 1994). The high of effect of information on order driven market shows that there is a loss of uninformed trader in information ownership of informed trader.

Allen (2014) examine how such information frictions affect trade. Using data on regional agricultural trade in the Philippines, he documented a number of observed patterns in trade flows and prices that suggests the presence of information frictions and conclude that information frictions are quantitatively important.

Trading friction in financial market is an important determinant of the liquidity of securities and the price efficiency. The importance of trading frictions and their impact on asset pricing is illustrated by the large number of studies that examine the interrelationship between transaction costs, expected returns, liquidity and informational efficiency.

In a classic article of the theory of information based security price establishment, Kyle (1985), identifies liquidity based on three indicators (dimensions), such as tightness, depth and resiliency. Tightness of bid-ask

spread is about how much cost needed to turn a trader's position in a market in a short time, which means how much transaction cost to do a security sale and then repurchase it back or vice versa. Depth is a placement of minimum order quantity, which can cause a price changing. Resiliency is how long the price goes back to its original position after shock or bid-ask bounce. Liquidity can be reviewed from immediacy aspect, how fast trade transaction in specific quantity and specific price (Harris, 2002).

Stock market is said to be liquid when bid and ask for investor who will sell and purchase stocks in a short period of time, are always available, with a lower bid-ask spread, and the stocks can be traded quickly in a small amount with market price or vice versa (Black, 1971). Bid is a cost where all market traders are ready to purchase and ask is a price when the traders are ready to sell. The difference between ask and bid shows the bid-ask spread. Some components of bid-ask spread that are faced by dealer are order processing cost, inventory holding cost and adverse information (Campbell, Lo, & MacKinlay, 1997).

The different between bid and ask spread has long been of interest to traders, regulators and researcher. While acknowledging that the bid-ask spread must cover the order processing cost incurred by the providers of market liquidity. Several statictical models empirically measure the components of the bid-ask spread. In one class pioneer by Roll (1984), inferences about the bid-ask spread are made from the serial covariance properties of observed transaction process. Covariance serial price reversal model that is formulated by Roll (1984) has an important role in the first model of covariance spread that can define probability of price reversal (π) or continuation ($1 - \pi$). Reversal will occur if after bid trading is ask trading and vice versa.

Statistical model of spread components have been applied in a number of ways for example to determine the source of spread components [(R. D. Huang & Stoll, 1997), (H. R. Stoll, 1989)]. Previous study of spread decomposition find that asymmetric information on order driven market is higher than real friction (H. R. Stoll, 2000). Voetmann (2016) investigates the cost components of bid-ask spreads around earnings announcements on the small Danish stock market in the 1990s. The results indicate that negative earnings surprises convey pricing information, suggesting the existence of significant information asymmetry between market makers and informed traders. Negative earnings surprises resulted in an increase in adverse-selection cost and trading volume while inventory-holding and order-processing costs decreased, leading to a combined decrease in the realized spread. The change in the realized spread is significant, while the change in the quoted bid-ask spread is negligible. Overall, the results suggest that informed traders' ability to assess firms' performance in the Danish stock market affects the bid-ask spread around announcements of earnings. The observed changes in cost components on the small Danish stock market are similar to those observed in larger and more active capital markets.

Gregoriou and Rhodes (2017) examine the empirical relationship between trades undertaken by informed agents (managers) and the proxies for informed trades computed by bid-ask spread decomposition models in London Stock Exchange. He find overwhelming evidence of non-stationary behaviour between the actual and predicted informed trade prices. The findings suggest that there is a clear need for an alternative to extant spread decomposition models perhaps incorporating findings from behavioural finance. Originality/value given the

importance of stock market liquidity and the extensive use of spread decomposition models in predicting informed trades.

This study focuses on the intraday high frequency data activity of the most liquid stock in Indonesian Stock Exchange for 3 months trading in 2006, 2 months trading in 2007 and 3 months trading in 2008 to measure and identify the source of trading friction and to infer what is the biggest component of trading friction using trading friction and spread decomposition estimator. We find that, the percentage of trading friction is equal to 1% per year, trading friction at the time of crisis in 2008 is higher than at the time before the crisis in 2007 and 2006, and the highest trading frictions derived from the information and it is consistent with spread decomposition estimator.

Based on literature study, research on trading friction is still limited. Empirical studies on asset pricing that develop recently have loosen assumptions on frictionless market (riskless), imperfectly liquid market and symmetric information. There is no trading transaction can be done without cost, the market was not always in the condition of equilibrium because to achieve the balance required costs and not all of the investors can access the information that develop as a consequence of its presence in the market not all the time or the existence of asymmetric information. Further research on trading friction was not much be done. Considering that evidence, our further investigation to measure trading friction and spread decomposition can be a contribution of this research.

The rest of the paper proceeds as follows: Section one describes introduction. Section two explores measurement of trading friction and spread decomposition. The research methods is presented in section three. Section four report results and discussions and the paper is concluded in section five.

2. Literature Review

Friction in financial markets measures the difficulty with which an asset is traded (Stoll, 2000). Trading friction is defined as a constraint for traders when trading their assets, which caused unbalanced. Moreover, trading friction is also defined as implicit transaction cost. A certain price is needed to overcome it (Demsetz,1968). Demsetz named it price for immediacy or cost of immediacy and (H. R. Stoll, 2000b) named price for immediacy as a friction.

2.1. Measurement of Trading Friction

In this study, we use quoted half spread, effective half spread, traded half spread and covariance price revearsal or covariance of transaction price change to measure trading friction. These are based on the models proposed by Stoll (2000).

Quoted and Effective Half Spread

The quoted and effective spread is used to measure total friction that reflect both real and informational friction. A quoted half spread is associated with each transaction while quoted spread measures spread in round trip trade. Quoted half spread defined as

$$S = (A - B)/2 \quad (1)$$

where A is the ask price and B is the bid price. The daily average value of the quoted half spread is calculated by weighting each spread by number of trades at

that spread. An alternative measure of friction is the effective half spread. The effective half spread defined as

$$ES = |P - M| \quad (2)$$

where P is the trade price and M is the quote midpoint. The daily average value of the effective half spread is calculated by weighting each spread by number of trades at that spread. The research result from (Cai, Hillier, Hudson, & Keasey, 2008b), (R. D. Huang & Stoll, 1996) and Stoll (2000) show 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.

Traded Half Spread

Traded half spread is one of the model used to measure real friction. The traded half spread is half the difference between the average price of trades at the ask side less the average price of trades at the bid side. A trade is at the ask side if its price is closer to the ask than to the bid. It is at the bid side if its price is closer to the bid than to the ask. There are two version of the traded half spread, differing in the weighting of trades are calculated. The first weights each trade equally. The second weights by trade volume. The first traded half spread defined as (Stoll,2000)

$$TS1 = \frac{\overline{P}_1^A - \overline{P}_1^B}{2} \quad (3)$$

where $\overline{P}_1^A = \frac{1}{m}\sum_1^m P_i^A$ and $\overline{P}_1^B = \frac{1}{n}\sum_1^n P_i^B$

m is number of trades on the side of ask,
$\overline{P}_i^A$ is price in trade in i in the side of ask,
n is trade quantity in the side of bid, and
$\overline{P}_i^B$ is price in trade in i in the side of bid.

The second traded half spread defined as

$$TS2 = \frac{\overline{P}_2^A - \overline{P}_2^{\mathbf{B}}}{2} \quad (4)$$

where $\overline{P}_2^A = \frac{1}{\sum w_i^A}\sum_1^m w_i^A P_i^A$ and $\overline{P}_2^B = \frac{1}{\sum w_i^B}\sum_1^n w_i^B P_i^B$

w_i^A is *share volume* of the first buy in i and
w_i^B is *share volume* of the first sell in i.

Stoll (2000) 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.

Covariance of Transaction Price Change

Covariance of transaction price change or covariance price reversal model which formulated by Roll (1984) has an important role in the first model of covariance spread that can define probability of price reversal (π) or continuation (1– π). Reversal will occur if after bid trading is ask trading and vice versa. In efficient market where is assumed there is no adverse information and inventory holding cost or $\alpha = \beta = 0$, covariance price reversal model is formulated as

$$\operatorname{cov}(\Delta P_t, \Delta P_{t+1}) = -\frac{1}{4} S^2 \tag{5}$$

Based on the Roll assumed, spread is not from the information effect or inventory. Based on equation 5, then spread can be noticed as

$$S = 2\sqrt{-\operatorname{cov}(\Delta P_t, \Delta P_{t+1})} \tag{6}$$

Equation 6 next called Roll price (Roll P) and half spread formulated as

$$S = \sqrt{-\operatorname{cov}(\Delta P_t, \Delta P_{t+1})} \tag{7}$$

2.2. The Components of Bid-ask Spread

While there have been several studies about bid-ask spread, has not emerged entirely satisfactory theory yet. Demsetz (1968) was the first to define bid-ask spread as a (transaction) cost to the trader for immediacy. The second line of thought follows, Bagehot (1971) assume that trader will face two different of traders, namely those possessing special information or public information and liquidity motivated trade that not have nonpublic information. Trader that have special information have better estimate of the future security price than liquidity motivated traders, so he only loss and never gain from them.

Following the seminal work of Demsetz (1968), many papers have attempted to model the cost components of the quoted spread: order processing costs (Tinic, 1972), inventory holding costs [Amihud & Mendelson (1980) and (Ho & Stoll, 1981)] and adverse information costs [Copeland & Galai (1983) and (Glosten & Milgrom, 1985)]. Glosten & Harris (1988) also provide some evidence for the existence of adverse selection in securities markets. The focus of recent research has been to estimate the bid-ask spread, and its components, using transaction returns. Under the assumption that the market maker faces only order-processing costs, (Roll, 1984) derives a simple measure of the spread based on the negative autocovariance of security returns.

The amount of information asymmetry faced by dealers will be reflected in the spread. Dealers will try to maintain the bid-ask spreads are optimal, so the need to determine the factors that affect the bid-ask spread . Research conducted by Y. C. Huang (2004) analyze the effect of stock returns, trading volume, variants of stock returns and stock prices to bid-ask spread stock in manufacturing companies that publish financial statements in the period 2010-2012. The results showed that the first, the stock return significant negative effect on the bid- ask spread stock. Second, the volume of stock trading is not a significant positive effect on the bid- ask spread stock . Third, the stock price significant negative effect on the bid- ask spread stock. Fourth, variant stock

returns are not significant positive effect terdahap stock bid-ask spread. Future studies could add other variables that stock price fluctuations (volatility) in the given period. Predicted volatility can affect the bid- ask spread stocks as investors memilliki enough information about the investment that not only perform certain transactions on the stock .

Estimation of bid-ask spread and its components (adverse selection costs; combined inventory and order processing costs) from trade prices in Indian Stock Exchange conclude that the adverse selection cost and the combined order-processing and inventory-holding cost each account for approximately 50 percent of the bid-ask spread. The estimated bid-ask spreads are approximately 80 percent of the quoted bid-ask spreads. The relative bid-ask spreads have decreased over the years (Singh & Pandey, 2013).

Luo (2017) compare the effective bid-ask spread and examines the decomposition of spread in London Stock Exchange (LSE) and New York Stock Exchange (NYSE). Result indicate that order persistence cost is higher in NYSE than in LSE, while order processing cost is lower in NYSE. Higher proportion of bid-ask spread is directly related to information inefficiency in LSE.

Dewanto and Asri (2004) decomposed the components of bid-ask spread and examined the relationship between the components and trade size in Jakarta Stock Exchange (before its name changed in 2007 after merging with the Surabaya Stock Exchange). This research estimate mean of adverse selection component is 21,8% of effective spread and mean of order processing component is 33,8% of effective spread. The results show that adverse selection cost and order processing cost negatively correlated with trade size. Finally, order persistence negatively correlated with trade size.

Aprilia (2015) examine the factors that affect of bid-ask spread LQ-45 in Indonesia Stock Exchange from 2012 to 2014 and conclude that stock price, variance return, and trading volume simultaneously have significance affect to bid-ask spread. The others results of this study also showed that stock price has a negative significance affect to bid-ask spread, variance return has a positive significance affect to bid-ask spread, and trading volume has a negative siginificance affect to bid-ask spread.

2.3. Measurement of Spread Decomposition

There are three views on the trade process and the costs associated with the formation of the spread (H. R. Stoll, 1989). If the spread only reflects order processing cost, ask (A) and bid (B) will remain at the true price. the market maker will cover the transaction costs by buying on B_0 and selling on A_1. Buying on bid price will offset by sales on the ask price, so the realized *spread* A_1 - B_0 is the same with quoted *spread* A_0 - B_0 The wider the spread formed, the transaction costs will increase and the investor is no longer interested in the securities. If spread only reflects the inventory holding cost, bid and ask price at time t = 1 will be lower than true price. The goal is to induce stock sales and hinder the addition of stock purchase activities to anticipate transactions that cause unwanted inventory. The resulting spreads are below the true price, or atau A_1 - B_0 lower than the 0.5% quoted spread (Ho and Stoll, 1981). If the spread only reflects the adverse information cost, the price moves as a movement caused by inventory costs, purchase, and ask price will be lower due

to the informed trader. The assumption used in this condition is that all traders have superior information, so A_1 - B_0 lower than quoted spreads.

As stated by Roll (1984), covariance return is an estimation of the realized spread as expected revenue in the efficient market. Covariance for transaction cost change is covP, covariance for quote at bid is covB and covariance for quote at ask is covA. The covariance of transaction price change is (H. R. Stoll, 1989)

$$\text{Cov P} = \text{cov}\,(\Delta Pt, \Delta Pt+1) = S^2[\delta^2(1-2\pi)-\pi^2(1-2\delta)] \quad (8)$$

$$\text{cov}\,B = \text{cov}\left(\Delta B_t, \Delta B_{t+1}\right) = \delta^2 S^2\left(1-2\pi\right) \quad (9)$$

$$\text{cov}\,A = \text{cov}\left(\Delta A_t, \Delta A_{t+1}\right) = \delta^2 S^2(1-2\pi) \quad (10)$$

The equation 8 to 10 can apply in regression equation such as in equation 11 and 12

$$\text{cov}\,P = a_0 + a_1 S^2 + u \quad (11)$$

$$\text{cov}\,Q = b_0 + b_1 S^2 + v \quad (12)$$

where u and v are random error. Intercept and slope in equation 11 and 12 can be formulated

$$a_1 = \delta^2\left(1-2\pi\right) - \pi^2(1-2\delta) \quad (13)$$

$$b_1 = \delta^2\left(1-2\pi\right) \quad (14)$$

Next spread decomposition can be used to measure adverse selection cost is

$$1-2(\pi-\delta) \quad (15)$$

to measure inventory holding cost is

$$2(\pi - 0.5) \quad (16)$$

and to measure order processing cost is

$$1-2\delta \quad (17)$$

According to (R. D. Huang & Stoll, 1997), it is assumed π = ½, and β = 0 or nothing inventory holding cost, so equation 8 can be formulated :

$$\text{cov}(\Delta P_t, P_{t+1}) = -(1-\alpha)\frac{S^2}{4} \quad (18)$$

In the calculation of spread decomposition, we use both models [Stoll (1989) and Huang and Stoll (1997)], with consideration that even though Indonesia has not currently adopted the role of market maker to increase stock trading activity, liquidity, but in stock trading activity, it is not possible there are traders who have

inventory with varying amounts of liquidity supply. We will be compared the result of decomposition of spread using both model with result of friction measurement.

3. Research Methods

Friction measurement and spread decomposition will be tested in some samples from the go public companies in Indonesian Stock Exchange. This research use secondary data which are order data, intraday trade price transaction, Indonesian composite index, trade volume, number of trade and market capitalization.

The consequence of very high frequency data is the large volume of transactions, its trade off is a limitation in the number of stocks. For comparison, the similar research used high frequency data is (Stoll, 2000) which used same duration 3 months, (Bowsher, 2007) used 2 sample of stocks for 2 months, and Darminto (2010) used 4 sample company Stocks for 1 month trading on January 2008 (20 day exchange). This is also due to the lack of data at the Center for Economic and Business Data Library of the Faculty of Economics, University of Indonesia that can be accessed.

The sample selection was done purposively. We sorted the entire population based on market capitalization and tick size ranging from the largest to the smallest. 50 stocks which have the highest market capitalization value representing four categories of price fraction in 2006 and five categories of price fraction (tick size) in 2007 and 2008. Four categories of price fraction in 2006 consisted of 10 stocks representing fraction of price Rp 50 , 10 stocks representing fraction of price Rp. 25, 10 stocks representing fraction of price Rp. 10 and 8 stocks representing the fraction of the price of Rp. 5. In 2007, obtained 7 stocks representing the fraction price of Rp 50, 9 stocks representing the fraction of the price Rp.25, 10 stocks representing the fraction of the price Rp.10, 10 stocks representing the fraction of the price of Rp.5 and 10 stocks representing the fraction of the price of Rp. 1. In 2008, there were 10 stocks representing each price fraction. The order and transaction data to be collected from the regular market because its takes place in accordance with the open auction market mechanism and uses price and quantity standardized by the exchange.

The consideration of using high market capitalization stocks is because those stocks have relatively high trading frequency so observation in the observation period is easy to do. Conversely, stocks with low market capitalization have low trading frequency causing observations at certain time intervals to see price volatility levels are difficult to do. In addition, companies with large market capitalization have a higher level of liquidity than firms with low capitalization rates (Husodo & Henker, 2009).

The period of observation is divided into three years, 2006, 2007 and 2008. We would like to analyze how frictions affect trade at the time of crisis caused by Lehman Brothers in 2008 and in the period before crisis in 2006 and 2007. In collecting data, for 2008, all data both transaction and order data on each sample selected are available and accessible, but for 2006 and 2007, there are some samples have limited data both transaction and order data. From 40 samples selected in 2006, there are 2 stocks were excluded from the sample because of unavailability data and from 50 samples selected in 2006. Overall, research stock consist of 38 liquid stocks in 2006 or 10,9 % from the population, 43 liquid stocks in 2007 or 12 % from the population and 50 liquid stocks in 2008 or 12,3 % from the population.

The data to be processed in friction measurement model and spread decomposition. Research data obtained through data stream at Economic Data Center and Business Library of Faculty of Economics University of Indonesia (PDEB UI). Before we examine all data, we have to determine the bid and ask within 5 seconds before the transaction for each sample of the research. As Lee and Ready (1991) and Stoll (2000) use in their research, using 5 seconds before the transaction is intended to anticipate the occurrence of missclasification in the quote recorder, where the quote recorder often appears before the price.Then, we calculate trading friction using quoted half spread (S), effective half spread (ES), first traded half spread (TS1), second traded half spread (TS2) and Roll price (Roll P). Moreover, we calculate proportional half spread and spread decomposition.

Table 1 present our research data from three years, 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 for 3 months of 38 stocks that researched in 2006 is 51 days with the trading transactions of 541.875 transactions. In 2007, the average numbers of trading days for 2 month of 43 stocks that researched are 41 days with the number of trading transactions of 804.785 transactions. In 2008, the average number of transactions days for 3 months of 50 stocks that researched in 50 days with the number of trading transactions of 1.719.175 transactions.

Table 1. Trading Stock Data

	Year		
	2006	2007	2008
Observation Period	3 months	2 months	3 months
Average Trading Day	51	41	50
Total Transaction	541.875	804.785	1.719.175
Average daily Transaction	277	453	693

The samples are chosen purposively. All of the population in observation period is sorted based on the market capitalization and tick size, from the biggest to smallest. Next, we determine 50 stocks that have highest value of market capitalization, which represent four categories of tick size in 2006 and five categories of the tick size in 2007 and 2008. Order data and transaction is collected only from the regular market, because regular market is suitable with mechanism of open market auction and proceed continuously with price and quantity, which are standardized by exchanges.

Furthermore, we construct several hypothesis to identify the source of trading friction (real friction or informational friction) and to prove that the informational friction is bigger than real friction and the inventory holding cost is the littlest spread decomposition.

3.1. Construct Hypothesis

There are several friction measurement models consisting of traded half spread (TS), quoted half spread (S), effective half spread (ES) and Roll Price (Roll P). Quoted and effective half spreads are the total friction measures consisting of real friction and informational friction while traded half spread and Roll Price (Roll P) is a friction measure that reflects only real friction (Stoll, 2000).

Roll (1984) states that effective spreads should be lower than quoted spreads, this is because actual trading usually occurs at the value between quotes. Stoll (2000) found that effective half spreads are less than quoted half spreads. Similarly, the results of Roll (1984) research suggest that the realized spread (in the paper, he calls it effective spread) on the NYSE is smaller than the quote spread.

In the Indonesia Stock Exchange, price movements often occur outside the bid-ask spread. The price jumped so high that it exceeded the bid-ask spread. This trend may be due to the high information asymmetry of the order driven market rather than the dealer driven market (Stoll, 2000). The different conditions of this microstructure market need to be analyzed further, therefore, the first hypotheses that can be built is the effective half spread is less than the quoted half spread.

Real friction is a transaction fee that paid by investor so that the order can be executed as soon as possible, consist of order processing cost including brokerage commission fees, government taxes, fees for managing trading, recording and clearing transactions and inventory holding cost [(Stoll, 1989). (Amihud & Mendelson, 1980)].

The other friction component is informational friction. As Copeland & Galai (1983), Glosten & Milgrom (1985) and Kyle (1985)), informational friction is caused by the defeat of uninformed traders for informed traders or asymmetric information. Informational friction is strongly influenced by trade characteristics. Informational friction is directly proportional to volatility and inversely proportional to the amount of trade, volume and stock price. Informational friction will be lower as an increase in the amount of trade, volume and stock price and will increase with increasing volatility. So, the second hypotheses that can be built due to Indonesian stock exchange as order driven market as follow : The informational friction is bigger than *real friction* [Glosten (1994), Cai et al , (2008)].

Indonesia Stock Exchange as an order driven market plays a very big role in determining the sustainability of trading activities, without a limit order book, the activity of the exchanges will be stalled in the absence of liquidity supply. Another case in the exchange driven by quotations proposed by dealers (called a quote driven market or dealer driven market), liquidity is determined by the role of market maker as a provider of liquidity. Based on the description, several hypotheses to be built related to the decomposition of the spread. So, the final hypotheses that can be built in is that inventory holding cost is the lowest spread component.

4. Results and Discussions

4.1. Some alternative of friction measurements

Table 2 present the result of some alternative of friction measurement. Effective half spread (ES) and quoted half spread (S) are total frictions which consist of order processing cost, inventory holding cost and adverse information cost. Based on the calculation of frictions during the observation period, it is known 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%. The total frictions in 2008 is higher than in previous years, corresponding to the results of the Pedersen research (2005), which stated in the time of crisis the frictions were greater.

Table 2. Measures of Friction and Proportional Friction

Year	Friction									
	S	ES	TS1	TS2	Roll P	%S	%ES	%TS1	%TS2	%Roll P
2008	22.364	23.677	9.632	8.716	3.166	0.010	0.012	0.006	0.005	0.002
2007	20.516	21.404	8.698	7.984	3.180	0.012	0.012	0.003	0.003	0.002
2006	20.283	20.048	9.264	8.951	3.505	0.011	0.011	0.005	0.005	0.002
Difference (2007-2008)	18.478	22.735	0.935	0.732	(0.014)	(0.001)	(0.000)	0.002	0.002	0.000
Difference (2006-2008)	20.808	36.292	0.368	(0.235)	(0.339)	(0.000)	0.000	0.000	0.000	0.000

By defining trade friction as the constraints that are faced by investors in trading transactions which is implicit cost consists of real friction and informational friction, it can be seen that the highest trade friction are sourced from adverse information cost. Table 3 shows the test result for all data describes average difference between informational friction and real friction.

Table 3. Average Difference between Informational Friction and Real Friction

Average Difference between Informational Friction and Real friction				
	2006	2007	2008	All Data
Panel A: %S-%TS1 and %TS1				
Average of %S-%TS1	0.61%	0.8%	0.47%	0.62%
Average of %TS1	0.54%	0.37%	0.58%	0.5%
Average Different	0.07%	0.43%	-0.11%	0.12%
st dev.	0.57%	1.81%	0.6%	1.16%
t-stat	0.8835	16.787	-1.3437	0.725
Sig	0.1913*	0.0503**	0.0926**	0.2349
Panel B: %S-%TS2 and %TS2				
Average of %S-%TS2	0.63%	0.82%	0.5%	0.64%
Average of %TS2	0.51%	0.36%	0.55%	0.48%
Average Different	0.11%	0.46%	-0,05%	0.17%
st dev.	0.63%	1.66%	0.56%	1.08%
t-stat	1.282	19.671	-0.5964	10.924
Sig	0.1039*	0.0279***	0.2768	0.1383*
Panel C: %ES-%TS1 and %TS1				
Average of %ES-%TS1	0.61%	0.84%	0.59%	0.68%

Average of %TS1	0.54%	0.37%	0.58%	0.5%
Average Different	0.08%	0.47%	0.01%	0.18%
st dev.	0.57%	1.83%	0.48%	1.14%
t-stat	0.9541	18.086	0.1516	11.141
Sig	0.1731*	0.0388***	0.4401	0.1336*
Panel D: %ES-%TS2 and %TS2				
Average of %ES-%TS2	0.63%	0.86%	0.63%	0.7%
Average of %TS2	0.51%	0.36%	0.55%	0.48%
Average Different	0.12%	0.5%	0.08%	0.23%
st dev.	0.62%	1.69%	0.45%	1.07%
t-stat	13.582	21.012	12.127	15.118
Sig	0.0913**	0.0208***	0.1155*	0.0665**

* significant at 10% level, **significant at 5% level, ***significant at 1% level.

The difference of average result between informational friction measured based on the differences % quoted half spread with % first traded half spread (%S-%TS2) describes informational frictions significantly higher than real fiction (%TS2) in all data. The difference of average result between informational friction measured based on the differences % effective half spread with % first traded half spread (%ES-%TSI) describes informational frictionis significantly higher than real fiction (%TSI) in all data process especially in 2006 and 2007. All of average proportional informational friction measured based on differences % effective half spread with % second traded half spread (%ES-%TS2) higher than real friction (%TS2). It is similar with the difference of average result in every year observation, it shows significant result with average 23% significant to α 5% in 2006, the average 50% significant to α1% in 2007 and the average 8% significant to α 10% in 2008.

The high of informational friction at the order driven market like in Indonesian Stock Exchange is similar with the previous research by Glosten (1994) and Cai et al.(2008). The high effect of information of order driven market shows that there is secretion or loss market participant for the information from the informed trader. In general order driven market tends to have higher informational friction and real friction than dealer driven because the information of small trader is higher.

4.2. Spread Decomposition

To measure spread decomposition, we use Stoll model (1989) that assumed there is three form components of spread, consist of order processing cost, inventory holding cost and adverse information cost and Huang and Stoll model (1997) that assumed there is two form components bid-ask spread, consist of order processing cost and adverse information cost

Table 4 present the result of spread decomposition using Stoll model (1989). Based on the result of spread decomposition test using this model, the components of transaction cost in Indonesian Stock Exchange include adverse information cost 70,3%, inventory holding cost 49,34% and order processing cost -19,65%. As well as hypothesis based on the earlier research, that the highest component transaction cost at the order driven market is adverse

information cost. In general during observation period, order processing cost is the lower cost, moreover has percentage negative, which indicated decrease order cost during observation period.

The comparison analysis between years show that adverse selection cost in 2008 is the lowest, while inventory holding cost is the highest cost. In crucial moment 2008, the low order processing cost is compensation from the higher inventory cost, as a effect so many investor, who has not active transaction and choose not active in trade exchange, so in one side inventory cost increase, and the other side order processing cost decrease.

If we compared with the normal situation in 2007, show that transaction cost dominated with adverse selection cost, than inventory holding cost and order processing cost. Similar in 2006 adverse information cost is the highest cost, follow with inventory holding cost and decrease order processing cost. Compare with 2006 and 2007, adverse information cost in 2008 is the lowest, it show that during the crucial, spread the publish information or private information is more open and spread fast, so decrease asymmetry effect. This result verify the early hypothesis that the highest cost component in Indonesian Stock Exchange is adverse information cost, but the inventory holding cost not suitable with the prediction.

Table 4. Spread Decomposition according to Stoll (1989) Model

Cost Parameter	2006	2007	2008	All Data
Adverse Selection	0.7327	0.7783	0.5853	0.7031
Inventory Holding	0.3218	0.1568	0.7579	0.4934
Order Processing	-0.0545	0.0649	-0.3433	-0.1965

Comparing the calculated result of spread decomposition use Stoll model (1989) with quote half spread and effective half spread models, there is a consistency result. The result of trading friction showed, during observation period (2006 – 2008) quoted half spread and effective half spread (both of them as total friction) increase, while the roll price, which reflect order processing cost is decrease, it's also with the result of spread decomposition, where the proportion of order processing cost is the lowest and negative.

Table 5 present spread decomposition used Huang and Stoll (1997). Based on this model, transaction cost will use to two cost type, order processing cost and inventory holding cost. This result consistence with the research conducted before by Cai et al. (2008), Glosten (1994) who declared that the decrease friction and high informational friction in order driven market caused the market limit order book dominated with small trader, who profitable in small trade, but it frequently secretion or loss information from the informed trade.

Table 5. Spread decomposition using (R. D. Huang & Stoll, 1997) Model

Cost Parameter	2006	2007	2008	All Data
Adverse Selection	0.5792	0.6594	0.5939	0.5069
Order Processing	0.4208	0.3406	0.4061	0.4931
Sig	0.2628	0.0242	0.1843	0.9221

5. Conclusions

The average trade friction generated in this study is 1% per year. Considering the stocks samples in this study are the high market capitalized stocks, which are scattered at various prices of friction, and then the friction of 1% per year is a friction generated at relatively liquid company. By defining trade friction as the constraints that are faced by investors in trading transactions which is implicit cost consists of real friction and informational friction, it can be seen that the highest trade friction are sourced from adverse information cost.

Based on the result of spread decomposition test using Stoll (1989) model, as well as hypothesis based on the earlier research, that the highest component transaction cost at the order driven market is adverse information cost. In general during observation period, order processing cost is the lower cost and it is consistent with trading friction estimator.

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