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# Does Bid/Ask Spread React to the Increase of Internet Search Traffic?

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**ABSTRACT**

This article solely examines the effect of investor attentions on bid-ask spread. We find that investors' attention surrogated by Internet Search Traffic (IST) contribute positively and significantly toward bid-ask spread (SPREAD). This result indicates that the incoming information directs the market within the stock circumstance and thin trading activity. Here, our samples were obtained from the manufacturing index, in the Indonesia Stock Exchange (IDX) during the period of observation ranging from 2009 to 2011. The hypothesis testing in this research is performed by using panel data regression analysis (Fixed Effect Model). Test result reveals that the search of online information through Google is beneficially one of the efforts to reduce asymmetry information between informed investors and uninformed investors. Besides, we also note that asymmetric information not only exists between the informed and uninformed investors, but also happens to market makers and informed investors. Finally, our findings lead to a conclusion, in which the high search of information tends to help investors in making appropriate investment decisions.

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**INTRODUCTION**

Investors who have the good understanding of the dynamics and the fluctuation of stock, generally try to find the best method and evaluation in making an assessment of their financial investment. This circumstance directs them obtaining better information as the consideration to reduce the potential risks. Tandelilin (2010) points out that one of the potential risks that can be faced by

investors is liquidity risk. In this case, it is closely related to how fast a stock bought and sold within a certain period, in which the level of liquidity can be measured by identifying the spread of bid and ask prices.

A factor that is necessarily important to be considered for investors in holding, buying or selling a certain stock is monitoring the spread

of stock prices. The difference of the spread will eventually show which stock is the most liquid or actively traded during a short time period (Chan, Christie and Schultz, 1995). In this study, bid-ask spread relates to the access of information. According to Husnan (1998), investors need to have information which corresponds to the dynamics of price changes. The knowledge and comprehension of specific information are obviously needed, particularly in anticipating the potential risks, attenuating the gap of news, and determining consecutive decisions with respect to what type of criteria of stocks that deserve to be included in the investment portfolio.

In line with the investment theory stated by Brigham and Daves (2001), virtually all forms of investments containing risks that lead to uncertainty condition. Generally, most of the investors will not be able to accurately predict how much returns they will gain in the future. Consequently, in this circumstance, investors incline to face numerous types of risks, and one of them is the liquidity risk. An alternative method which can be used to minimise the risk is by collecting various types of data and related information of specific stocks on the internet. Therefore, it is envisaged that information retrieval over the internet (i.e. macro and microeconomics variables) is more attractive in order to collect the most relevant information rather than obtaining information through the physical annual reports as conventionally published by many companies (Bank, Larch and Peter, 2011; Joseph, Wintoki and Zhang, 2011; Scheitle, 2011; Usman and Tandelilin, 2014; Nurazi, Kananlua and Usman, 2015).

The incoming information within the market inclines to be spread unevenly. It generally causes investors separated into two types, namely informed investors and uninformed investors (Copeland, 1976a, 1977b). Referring to asymmetric information theory, the differences arise because the informed investors commonly have more information. Otherwise, uninformed investors have less information than informed

investors (Husnan, 1998; Brown and Hartzell, 2001; Hanafi, 2004; Tandelilin, 2001; 2010; Nurazi and Usman, 2015; 2016). This study investigates a notion that asymmetric information occurs between informed and uninformed investors in Indonesia stock exchange (IDX). Hereby, investors' awareness toward specific information would have implications for their portfolio achievement, particularly in terms of trading activity which requires a lot of information (Usman and Tandelilin, 2014). The imbalance information among these two types of investors will eventually lead the uninformed investors to experience inferior performance. In order to examine this issue, we apply an extended version of the model suggested by Bank, Larch and Peter (2011).

Our study contributes to the burgeoning of the literature review that focuses on the relationship between investors' attention and liquidity. Hereby, the concept of investor attention is represented by internet search traffic, which is measured by utilising Google Trend. Moreover, we considerably employing bid-ask spread as the surrogated indicator of liquidity. There have been many empirical studies examined the relationship between the information as needed by investors and bid-ask spread. As outlined in a literature review by Amihud, Mendelson and Pedersen (2006), adding individual investors who are represented as small investors within the company should increase the liquidity of stock. Bank, Larch and Peter (2011) further conduct an examination to investigate the association between public interest, return and liquidity in German stocks. They note that public interest represented by Google search volume is indeed a powerful measure of investor recognition. Jiang, Petroni and Wang (2012) show that public disclosures revealed by Over the Counter Market (OTC) in several types of categories are definitely associated with the subsequently observed liquidity changes. In this case, they point out firm's labels for discovering the group of company which has either current or no information. However, just a few empirical

research try to attribute the effects of the Internet usage toward bid-ask spread.

This research is obviously interesting to be conducted and performed to the current condition of the capital market in emerging country such as Indonesia. In 2011, Deloitte Access Economics & Nielsen, a research institution that represents Google Asia Pacific, elucidates that the contribution of Internet to the economy of Indonesia was around 1,6 per cent or about IDR. 116 trillion (Indonesian Rupiah). This number equals to 13 billion U.S. Dollars of the total Indonesia's Gross Domestic Product (GDP) in 2011. Usman and Tandelilin (2014) indicate that although the level of Internet penetration in Indonesia is relatively still low in the past decades, but currently the value of the Internet economy has a dominant proportion of its GDP. For further description, the following line chart illustrates the growth rate of internet users in Indonesia from 1990 to 2010.

Figure 1 clearly displays the population of Internet users in Indonesia, which had been growing rapidly. The recorded number of Internet users in 1990's was only about 0.002 percent of the total population of Indonesian at that time. The growing

number of internet users had started to grow significantly since the year of 2000. Consequently, the rate of Internet users in Indonesia reached about 9.8 percent, and that value according to Central Bureau of Statistic (2010) equals to 20.3 million of the total population of Indonesian by the end of 2010. It denotes that the increasing number of internet users opportunely corresponds to economics activity, which is reflected by the GDP growth as the impact of internet contribution.

Economic activity and capital market are recently fully integrated with the Internet. Bank, Larch and Peter (2011) note that the development of information technology has created a pattern of rapid transition from the use of analog technology systems to the digital technology systems (e.g. investors easily find the firm-specific and macro news of firms in certain industry just only by accessing firms' official website on Google, particularly when the firms had stored all the related information on internet). This condition inclines to cause the flow of incoming information getting scattered and can freely be accessed by anyone who has interests. The phenomenon like this is a fascinating topic that can be observed from an economic point of view. Therefore, this study

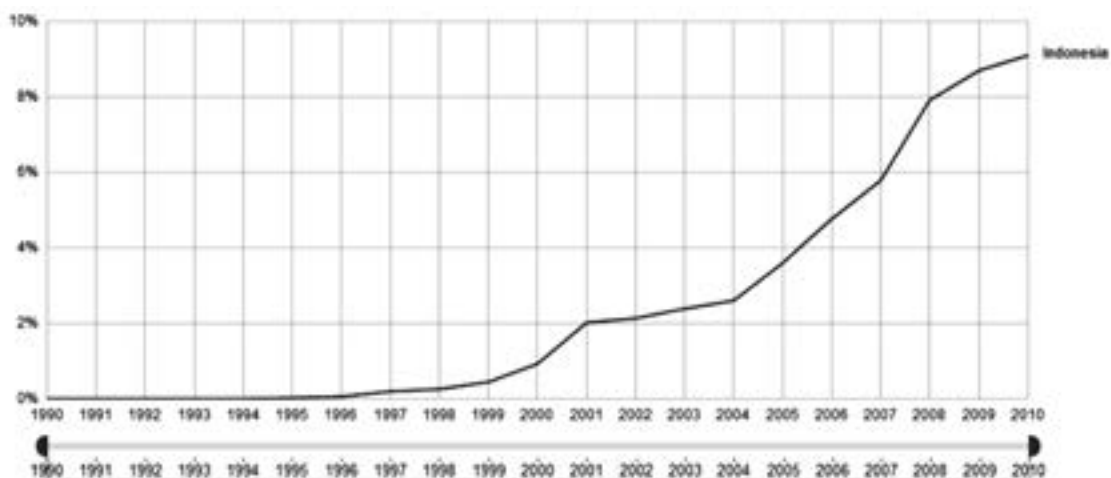


Figure 1. Internet Users as Percentage of Population in Indonesia from 1990 to 2010  
 Source: Usman and Tandelilin (2014); World Bank Data, Accessible Through Google Public Data.

aims to examine the effect of investors' attention that is represented by the number of searching activities in Google towards bid-ask spread.

### **Literature Review and Hypothesis Development Google Trend and Internet Search Activity**

Google trend is mostly known as one of internet features that can be operated by Google. Firstly, it was named Google Insight, but it has currently been changed to Google Trend. This feature is fundamentally aimed at researching specific keywords and search trends in many regions of the world. Google Trend has a potential measurement tool that can be utilised in many social researches. This is due to its ability in quantifying phenomena across time and across the ecological issue. Further, the data obtained from Google then should be compared to the total data recorded in Google servers all around the world (Bank, Larch and Peter, 2011; Da, Engleberg and Gao, 2011; Joseph, Wintoki and Zhang 2011; Scheitle, 2011; Usman and Tandelilin, 2014; Nurazi, Kananlua and Usman, 2015; Nurazi and Usman, 2015).

According to research reported by Da, Engleberg and Gao (2011) Bank, Larch and Peter (2011) Nurazi, Kananlua and Usman (2015) Google does a word search based on the taxonomy of the specific word as entered by the Internet users all over the world. All the data entered into Google's server will be immediately transformed by eliminating a number of common trends in popular search on the Internet. In this case, each sample is categorised either based on the company names or its ticker symbols as listed on the Indonesia Stock Exchange (e.g KRAS is the ticker symbol of Krakatau Steel Persero Tbk, ADES for Akasha Wira International Tbk and so forth). Also, hereby Google Trend as the tool in measuring the quantity of internet search traffic filters the search results to anticipate the existence of bias in the data used. In the more specific way, the filtration of search results in this study refers to our previous study (Usman and Tandelilin, 2014; Nurazi and Usman, 2015; Nurazi, Kananlua and Usman, 2015) which is limited to

the categories of Finance, Business and Industries. We determine to classify our search data based on those topics in order to get the closest objective of information retrieval which is envisaged to be conducted by the uninformed investors.

### **Investors' Attention and Liquidity**

Stock liquidity is indicated by its trading activity and the spread between bid and ask prices. The active stock trading and the narrow spread reflect that the related stock is favoured by the investors. This makes informed investors actively affecting the level of liquidity, which the tendency of price changes will relatively alter the stock trading volume and spread (Wang, 1993; Christie and Schultz, 1995). Several empirical studies have been noted to examine the relationship between investors' attention and liquidity. Research conducted by Kiyamaz (2001), point out an association between the incoming news, rate of return, and liquidity. Companies which experience good news tend to earn the better return and trading volume than companies which experience bad news for the next period of trading activity. Meanwhile Tumarkin and Whitelaw (2001); Trueman, Wong and Zhang (2003); Benbunan and Fich (2004); Grullon, Kanatas and Weston (2004); Chae (2005); Gunduz and Hatemi (2005); Sumiyana (2007); Benzion, Tavor and Yagil (2010) also report similar results. They note that the impact of price changes on return and the liquidity depicts the entrance of new information within the market. Nurazi and Usman (2016) find that in terms of financial industry, Bank stock prices and its returns responsively react to the changes of macro news. Jiang, Petroni and Wang (2012) further show that investors' attention tend to have a bigger contribution in explaining the liquidity which is represented by the spread. In this case, they find an evidence that firms labeled as current information experience an increase in liquidity, while firms labeled as no information experience a decrease in liquidity. The incoming information that is depicted in stock price changes, has a positive influence on the alteration in trading

volume and relatively directs the spread of the bid and ask prices getting tighter.

The higher level of searches on a certain stock inclines to cause the uninformed investors transform into the informed investors. This transition ultimately directs each investor to have balance information about the related companies and the market condition. Knowledge and information about stocks which have good prospects will be utilised by investors to make a purchase decision. Besides, some stocks are traded regularly, while others are only traded a few times and even never been traded at all. The stocks and indices that have large trading volume tend to have tighter spread than those are infrequently traded. When a stock has a low trading volume, it is considered that the stock is illiquid because it is not easily converted to cash. Investors can easily detect and identify the type of this stock, particularly by tracking several fundamental information through the Internet. As a result, based on the information gathered before deciding to buy a stock, it inclines to push the bid-ask spread getting tighter. Therefore, we hypothesise that investors' attention represented by internet search traffic contributes negatively toward bid-ask spread

## **METHODS**

### **The Method of Data Collection**

We obtain our data by conducting the literature study in order to learn textbooks, academic journals, annual financial reports, and various form of sources related to the study. In addition, data collection is based on the result of company's search volume by using Google trend that is facilitated by Google on <https://www.google.com/trends/>. This public website provides a measure of searches intensity for any keyword from January 2004. The search volume for a specific keyword provided by Google Trend is not given in absolute terms, but as a relative score to the total number of searches on Google in the corresponding time interval (Bank, Larch and Peter, 2011; Usman and Tandelilin, 2014; Nurazi and Usman, 2015;

Nurazi, Kananlua and Usman, 2015). Further, the secondary data as stock prices, which is used to calculate the bid-ask spread is obtained from the official website of the Indonesia Stock Exchange ([www.idx.co.id](http://www.idx.co.id)), while the data of age and outstanding shares are collected from Indonesian Capital Market Directory CD-ROM (ICMD).

For every stock used in our samples, we manually design the corresponding time series of internet search activity for the period of time from January 2009 to December 2011. We definitely realise that every keyword used is essentially crucial in quantifying the accurate searches activity. In order to avoid the arbitrariness and ensure the reliability of the analysis, we employ each company's name or the ticker symbol as given by Indonesia stock exchange. As explained by Bank, Larch and Peter (2011), a company that had only very few search records in Google usually has the largest variation due to normalization of the data. We discard and truncate the firms which have no search in Google because they do not provide any analyzable data for our investigation.

### **Data and Sample**

The population in this study is all stocks incorporated in the Indonesia Stock Exchange (IDX). Given our research objectives, we retrieve the intensity of searches for all tickers in the IDX and focus on the period from 2009 to 2011. Specifically, the sample used in this study is all companies within the Manufacturing sector. As many as 131 companies have been selected and should be filtrated by using purposive sampling method with the following criteria. (i) Our sample should have to be incorporated and actively traded in Indonesia Stock Exchange. (ii) The sample must have to be incorporated within the manufacturing sector during the observation period from 2009 to 2011. (iii) The sample must have to publish their financial statements during the observation period. (iv) The companies must be able to perform searches intensity which can be quantified by employing Google Trend and

have not experienced suspension during the observed period.

The reason of using manufacturing sectoral indices as research sample is because it has experienced the remarkable progress in its trading activity. Rudiyanto (2011) reports that among 12 sectoral indices in Indonesia Stock Exchange, there is no one of them able to outperform the performance of the composite stock index (IHSG) over the past six-year period from 2005 to 2010. However, he notes some interesting facts in which there are three sectoral indices consistently able to generate better returns than the other indices, namely, Mining index, Agriculture index, Consumption index and Jakarta Islamic Index (JII). From the

three sectoral indices, Consumption index is incorporated within the manufacturing sector. Furthermore, to strengthen the sample size, we observe three additional sub-sectoral indices which are incorporated in the manufacturing sector, namely the Consumer goods industry, Chemical industry, and Miscellaneous industrial sectors.

**Operational Definitions**

The operational definition is necessary for understanding and describing the concept of study. It includes the measurement and definition of each variable. The operational definition of every variable used in this study can be seen in Table 1 as follows:

Table 1. Operationalization of Variables

No	Variable	Definition	Measurement
1	Internet Search Traffic (IST)	In order to quantify the intensity of information retrieval, we use Google Trend as provided by Google. The searches data of related companies has experienced scaling and normalization. Thus the available data is ratio which ranges from 0 as the lowest level to 100 as the highest searches. It should be noted that Google Trend relatively shows a tendency for users in a specific area, and it is not absolute (Bank and Peter, 2009; Bank, Larch and Peter, 2011; Usman and Tandelilin, 2014).	Scale based on ratio (0-100)
2	Bid-ask Spread (SPREAD)	The percentage of monthly bid-ask spread is calculated as the absolute value of the difference between closing bid and closing ask prices, and is divided by the midpoint of the bid and ask Prices (Chan, Christie and Schulltz, 1995).	$\text{Spread} = \frac{\text{Ask}_t - \text{Bid}_t}{(\text{Ask}_t + \text{Bid}_t) / 2}$
3	Stock Price (PRICE)	The stock price is used as a control variable that can affect the level of liquidity (Gunduz and Hatemi, 2005).	
4	(AGE)	The age of the company is necessarily important to be included in order to identify the characteristic of samples. We count the age of company according to when the first time specific company launched its Initial Public Offering (IPO) in Indonesia Stock Exchange (Nurazi, Kananlua and Usman, 2015).	
5	Firm size (SIZE)	Market capitalization is utilised to measure the size of every firm which is calculated by multiplying the number of logarithms natural of shares outstanding and the stock prices (Bank, Larch and Peter, 2011).	$\text{Size} = \ln (P_s \times S_s)$

Note: The formulas were collected from Chan, Christie, and Schulltz, (1995); Bank, Larch and Peter, (2011); Usman and Tandelilin, (2014); Nurazi, Kananlua and Usman, (2015).

### Analysis Method

The analysis method used in this study is panel data regression technique with Ordinary Least Square concept (OLS). There are several advantages in using panel data regression. Gujarati (1995) and Baltagi (2005) note that panel data regression is a combination of time-series and cross-sectional data. It provides more data and the greater ability to produce the degree of freedom. Panel data also reduces the collinearity between independent variables, thus it can provide an efficient output of econometric estimation. Further, the combination of information from the time series and cross section can anticipate the problem of omitted variable. Based on the description of panel data regression above, the hypothesis testing will employ the equation model as follow.

$$\text{SPREAD}_{i,t} = \alpha + \beta_1 \text{IST}_{i,t} + \beta_2 \text{PRICE}_{i,t} + \beta_3 \text{AGE}_{i,t} + \beta_4 \text{SIZE}_{i,t} + \varepsilon \quad (1)$$

The statistical model 1 is performed to test the effect of independent variables toward dependent variable. As can be seen in the equation 1,  $\text{SPREAD}_{i,t}$  denotes the percentage of the monthly bid-ask spread, calculated as the absolute value of the difference between the closing bid and closing ask prices, divided by the mid-point of the bid and ask prices. Moreover,  $\text{IST}_{i,t}$  denotes the search data of the company, which has experienced scaling and normalization by Google. Since Google is considered to have a contribution in explaining the SPREAD, we add three explanatory variables to clarify the correlation of every variable. Hereby,  $\text{PRICE}_{i,t}$  is the actual cost that should be spent by investors in order to obtain a stock.  $\text{AGE}_{i,t}$  is the period when the first time the company launched its stock to the public.  $\text{SIZE}_{i,t}$  is the market capitalization which is calculated by multiplying the number of logarithm natural of shares outstanding and the stock prices.

### Model Selection

The model selection will influence the output of the empirical and statistical research. This

indicates that the selection of an appropriate model greatly affects the interactions of each independent variable toward the dependent variable. Based on the techniques of estimation in panel data regression, Baltagi (2005) suggests three approaches namely Pooled Least Squares (PLS), Fixed Effect Models (FEM) and Random Effects Models (REM). We apply Chow test to determine which model will be used to perform panel data estimation on the hypothesis testing. Chow test is needed to compare between pooled least square model (PLS) and fixed effects models (FEM). Moreover, we also perform Hausman test in order to compare between the fixed effect model (FEM) and random effects model (REM) (Gujarati, 1995; Baltagi, 2005).

### RESULTS AND DISCUSSION

The sample used in our study consists of 131 companies in the manufacturing sector, Indonesia stock exchange. However, given to purposive sampling method that has been previously described in sampling criteria, only 76 companies are determined as the final samples. Therefore, we meticulously truncate 55 companies that do not meet purposive sampling criteria. Our data is processed and defined in the descriptive statistics analysis. The average characteristics of the sample are sorted according to changes in Internet search volume by using Google. Further, the results about the fundamental information of each variable are presented in Table 2.

Table 2 provides the plot for the time series of monthly Internet retrieval (IST) and bid-ask spread (SPREAD) results. It is clearly known that the average bid-ask spread (SPREAD) of manufacturing firms during the period from 2009 to 2011 is about 0.19 on average, with minimum spread 0 and maximum spread 1.31 on average. Investors' attention surrogated by Internet Search Traffic (IST) shows positive searches around 27.34 on average. This means that the level of searching information relative to the total searches of the available information on Google is about

Table 2. Descriptive Statistics Related to Variables in consolidated sample

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Observations	Cross sections
<b>Panel A: Dependent Variable</b>							
SPREAD	0.19	0.16	1.31	0	0.15	2,736	76
<b>Panel B: Independent Variables</b>							
IST	27.34	21	100	0	28.06	2,736	76
PRICE	8,167	750	369,000	25	3,017	2,736	76
AGE	17.7	18	32	2	5.24	2,736	76
SIZE	27.61	27.35	33.33	23.13	2.05	2,736	76

Panel C: The Mean of SPREAD According to its Level of Attention (IST)

	IST (%)				
	VLA	LA	NA	HA	VHA
SPREAD	0.18	0.19	0.20	0.19	0.23

Notes: In Panel C, we classified the mean of SPREAD according to the level of attention by categorizing the variable IST into five groups; (i) VLA denotes Very Low Attention (The range is between 0-20% of the investors' attention as recorded by Google Trend in the observed period of data). (ii) LA denotes Low Attention (The range is between 21-40%). (iii) NA denotes Normal Attention (The range is between 41-60%). (iv) HA denotes High Attention (The range is between 61-80%), and (v) VHA Very High Attention (The range is between 81-100%). It should be noted that Google Trend relatively shows a tendency for users in a specific area (Indonesia), and it is not absolute.

27.34 on average, with a minimum search 0% and a maximum search 100%. Meanwhile, the other variables such as PRICE, AGE, SIZE are the controlling variables used to clarify the correlation of the main variables (IST and SPREAD).

**Panel Data Analysis and Hypothesis Testing**

**Hypothesis Testing**

In this section, we employ panel data regression to discover whether Internet search intensity continues to exhibit explanatory power for the bid-ask spread. Before estimating the model, we firstly run a proper model selection procedure in order to obtain the most efficient results. In the first stage, testing is done by using fixed effect model (FEM) with Chow test estimation result as follow.

Table 3. Chow Test

Redundant Fixed Effects Tests			
Pool: Manufacturing Firms			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	5.8318	(75.2656)	0.0000
Cross-section Chi-square	417.0918	75	0.0000

Sourced: The data is processed by authors.

Table 3 presents Chow test result of the regression equation model between fixed effect model (FEM) and pooled least square (PLS). It shows that both F and Chi-square have performed significant value



(p-value 0.0000 is less than 5%). Thus H0 (pooled least square) is unsupported and H1 (fixed effect model) is supported. Therefore, the chow test indicates that the model follows fixed effect model (FEM).

As the result obtained from the estimation of the chow test in Table 3, it is discernible that the recommended approach is fixed effect model. However, we still have to perform the model selection by comparing fixed effect model with random effect model. To choose the best model among them, we perform the Hausman test as follow.

Table 4. Hausman Test

Correlated Random Effects - Hausman Test			
Pool: Manufacturing Firms			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Shi-Sq. d.f.	Prob.
Cross-section			
Random	61.8012	4	0.0000

Sourced: The data is processed by authors.

Table 4 illustrates the Hausman test result of the regression equation model between fixed effect model and random effect model. Hausman statistical output in Table 4 shows that the probability (P-value) is 0.0000 and significant at the level of alpha 5% ( $p < 0.05$ ). This means that the appropriate model is fixed effect model. Moreover, panel data estimation controls the influence of investor's attention that is proxied by Internet search traffic (IST) toward bid-ask spread (SPREAD). Therefore, Table 5 reflects the coefficient value of Internet search traffic, bid-ask spread and the explanatory variables for the consolidated samples.

According to the result of statistical output in Table 5, it is clearly known that the independent variables in the statistical model contribute significantly to the dependent variable. This is obviously seen from the value of Prob (F-statistic)  $< \alpha (0.0000 < 0.05)$ . Therefore, by using 95% level of confidence, we infer that all variables have abilities in explaining the variation in bid-ask spread (SPREAD). Furthermore, the value of coefficients

Table 5. The Summary of Hypothesis Testing

Dependent Variable: SPREAD				
Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.9484	0.1688	-5.6167	0.0000
IST	0.0002	0.0001	2.3222**	0.0203
PRICE	-5.3087	2.3087	-2.2993**	0.0216
AGE	-0.0218	0.0046	-4.6945***	0.0000
SIZE	0.0553	0.0074	7.4210***	0.0000
R-squared	0.1630	Durbin-Watson stat		1.4121
Adjusted R-squared	0.1381			
F-statistic	6.5502			
Prob(F-statistic)	0.0000			

Notes: The model used in hypothesis testing is a model that can be denoted as  $SPREAD_{it} = \alpha + \beta_1 IST_{it} + \beta_2 PRICE_{it} + \beta_3 AGE_{it} + \beta_4 SIZE_{it} + \epsilon$ . Further, based on the results of statistical output by using fixed effect model, the value of the coefficient of determination or  $R^2$  equal to 0.1630 or 16.30%. This means that approximately 16.30% of the variation that occurs in the dependent variable bid-ask spread (SPREAD) can be explained by the independent variables (IST, PRICE, AGE, SIZE). Meanwhile, 83.70% of variation can be explained by factors that exist outside the research model.

\*\*\* (Significant at the level of alpha 1%)

\*\* (Significant at the level of alpha 5%)

\* (Significant at the level of alpha 10%)

IST is 0.0002 and it is significant at 5% level of alpha ( $p < 0.05$ ). This shows that  $SPREAD_{i,t}$  rises as  $IST_{i,t}$  gets bigger. We suppose this happens because the informed investors and uninformed investors who have turned into informed investors tend to hold their decision and willingness in buying or selling any stock. Particularly, the incoming information tends to make the market less liquid and the prices detained. According to the annual report published by IDX (2011), investors do not want to take risks in making investment decisions due to some external issues. Moreover, in time period observation from 2009 to 2011, IDX had been experiencing the impact of the financial global crisis. Therefore, many investors either individual or institutional investors tend to postpone their investment decision to buy certain stocks. As mentioned above, the contribution of Internet Search Traffic (IST) shows a small value of coefficient beta ( $\beta$ ) as 0.0002 and it contributes significantly ( $p < 0.05$ ) toward the change of bid-ask spread. Hereby, we envisage that there are external factors that should be identified in order to explain the phenomenon of spread in the manufacturing sector, Indonesia stock exchange.

Our finding is atypical from research reported by Kiyamaz (2001), Tumarkin and Whitelaw (2001), Trueman, Wong and Zhang (2003), Benbunan and Fich (2004) and Nurazi, Kananlua and Usman (2015) in which the increasing number of information retrieval inflicts in increasing stock liquidity. The difference comes from the different condition of specific markets and indices, in which our study is drawn in the relatively volatile emerging market. Meanwhile, most of the previous studies have been conducted in the area of developing markets. Given that, as considered by Nurazi, Kananlua and Usman (2015) we envisage that there might be a typical significant difference in practice and phenomenon in developed and emerging countries. Several of economies in emerging countries have the similar characteristic of markets and a group of samples, which includes the effect of the transition of the

economy, a tendency of positive and higher economic growth, huge prospects of a market, promising returns on investment, and bigger role in the world economy as emerging market player. Even, Nurazi, Santi and Usman (2015) argue that the probability of tunneling activity (the expropriation activity conducted by the controlling shareholders of a company on the lower level, e.g., subsidiary to the higher level or known as the parent company) between the employed samples considerably exists. Due to those circumstances, the specific public listed companies (PLC) used as the sample in our research, and the current condition of Indonesian stock exchange as one of emerging countries might behave differently due to economics and institutional condition of the country itself. Thus, the further explanation of this phenomenon is explained in the sub-topic of discussion.

In the next step, we carry out an extensive test that considers how different elements of the analysis may affect our results. Firstly, we meticulously test the effect of each independent variable, including the controlling variables toward the dependent variable (SPREAD). Table 6 presents the comprehensive analysis of panel data regression results and the magnitude of each coefficient beta ( $\beta$ ) as obtained from the empirical test of independent variable toward dependent variable.

Table 6 depicts that even though the examination has been conducted by employing additional explanatory variables, the contribution of IST towards spread still positive. It means that the bid-ask spread (SPREAD) rises as information retrieval conducted by investors (IST) gets bigger. Recall that early studies show a negative contribution of investors' attention toward Spread. In most cases, the magnitude of Investors' attention significantly negative. However, this finding shows that even though the market is fully integrated with information, it makes the market less liquid and inclines to make the spread getting wider. As pointed in Table 5, the results somehow contradict

Table 6. The Magnitude of Internet Search Traffic on Bid-Ask Spread

Independent variables	$\beta_1$	$\beta_2$	$\beta_3$	$\beta_4$
IST	0.0003 (2.8561)***	0.0003 (2.9559)***	0.0003 (2.8904)***	0.0002 (2.3222)**
PRICE		-2.3428 (-1.0469)	-2.1891 (0.9546)	-5.3087 (-2.2993)**
AGE			-0.0011 (-0.3079)	-0.0218 (-4.6945)***
SIZE				0,0553 (7.4210)***
R <sup>2</sup>	0.1453	0.1456	0.1457	0.1630

Notes: t values are in parentheses.

\*\*\* (Significant at the level of 1%)

\*\* (Significant at the level of 5%)

\* (Significant at the level of 10%)

to the relationships between main variables. This exists because informed investors hold their investment and try to wait the condition of the market become normal after being experienced the negative impact of the global crisis between 2009 and 2011. Moreover, it is prevalent that the larger spread can be found in the thin market, including the emerging markets, in which Hamilton (1991) confirms that thin trading is one of the characteristics of the emerging capital market.

Further, it is noticeable that Indonesia stock exchange, particularly every manufacturing company is related to the current economic condition. Circumstances such as the bullish and bearish effects have driven the market performance (Usman, Nurazi and Zulkarnain, 2012; Usman, 2016). At the time when Indonesia had experienced the worst impact of the global financial crisis, several event studies in Indonesia stock exchange showed that the information had influenced either the price or stock return (i.e. Indonesian economy faced the turbulent not only in manufactured or certain industry, but most of the industries. However, in this case, IDX is still able to perform positive return). We suppose that asymmetric information happens between informed investors and uninformed investors. In addition to this, brokers also have interests in order

to compensate their cost when holding stocks. Trueman, Wong and Zhang (2003) shows that one of human nature is considering about self-interest. It denotes that conflict of interest not only exists between informed investors and uninformed investors, but also between informed investors and market makers which relate to spread. Hereby, the research about spread determinants has been done by many researchers. The results regarding those researches are divided into two streams. The first stream is famously known as inventory model (Stoll, 1978) and the second one is known as the model of information (Copeland and Galai, 1983).

In accordance with inventory model, the spread is relatively provided as compensation to the dealers or market makers for time and capital which is prepared by them. It is plausible for them to cover the cost of the activity (Harris, 1994). In line with the results in Table 6, information is positively related to spread. This condition reflects a condition in which every investor and dealer face systematic risks. Dealers or even market makers as participants in the market have limited ability in predicting the future perception of traders. They have no superior data as what informed investors have. This condition leads them to the inferior performance and they probably tend to face the

loss when trading with the informed investor. The existence of asymmetric information between investors and market makers push them to cover the probability of loss by increasing the spread toward the informed investors. As mentioned above, it can be inferred that the asymmetric information which can be identified from the spread not only exist between informed and uninformed investors, but also between informed investors and market makers. This finding is associated with research conducted by Harris (1994), where the spread is determined as compensation to dealers or market makers in bearing the risks when they store the inventory.

Moreover, the model of information suggests that spread is needed in order to compensate the market makers when they transact to all types of investors. Generally, Copeland and Galai (1983) confirm that there are two types of investors, namely informed and uninformed investors. Dealers have no ability to differentiate between informed and uninformed investors. Dealers tend to experience loss when they have a transaction with the informed investors and gain profit when having a transaction with the uninformed investors. Thus, dealers incline to determine the value of spread which can generate maximum profit. Hereby, the result in Table 6 is in line with the previous study conducted by Harris (1994). The more information gathered by informed and uninformed investor, the more dealers increase the spread to compensate the risk.

### **Discussion**

The transaction of trading activity in IDX uses the order-driven market system and continue auction system. Implementing order-driven market denotes that buyers and sellers of securities need a broker in order to conduct the transaction. Investors cannot directly decide to commence the transaction in the market. A broker is the only party which can start conducting the buying and selling activities based on the order of investors. Further, in Indonesia, each broker has staff who are known

as security dealer-broker representative and assigned to form the investment portfolio. On the other hand, the continue auction market has a little difference from the order-driven market system. Hereby, the transaction is determined either by supply or demand from investors. Broker delivers the position of the bid and asks prices. Therefore the investors need fundamental information about the company and tendency of its price movements.

Recall that in the summary regression Table in 5, we find that the number of information gathered by investor tends to cause the spread getting wider. This finding is typically different from the early studies which report the public attention contributes positively and significantly toward spread. We have investigated that investors are very concerned with return and liquidity. In addition, we have employed three explanatory variables to clarify the relationships between the main variables. Firstly, we note that we use relative spread which is negatively related to stock prices. This finding indicates that if the price is low, the spread will tend to be larger. The reason for those linked to the idea of liquidity. Most low-priced securities are either new or small in size. Therefore, the number of these securities that can be traded is limited and tend to be less liquid. This explanation is supported by the research suggested by Bank and Peter (2009). They argue that the public information such as data about price movement is supposed as an informative signal. Thus, the investors incline to discover the appropriate stock, in which the stock is provided by the help of a broker. In Indonesia, the capital market has adopted the system of order market. The transaction is confirmed base on the demand and supply. Therefore, the range of spread is determined by the broker. For further additional information, Indonesia capital market has announced the fraction system of stock prices. Satiari (2009) investigates that to examine the difference of tick size system in bid-ask spread, and to increase the stock in order to be more attractive, Indonesia Stock Exchange (IDX) has

released a new policy to change the tick size system. The policy has written in Kep-307/BEJ/12-2006 by the Board of Directors Decision Jakarta Stock Exchange, concerning Regulation of Change (tick).

In line with information in Table 5 and 6, it is obviously known that price is negatively and significantly contributes to bid-ask spread. According to the Tables, the coefficient of Price shows a negative sign of spreading. The higher stock prices, the lower relative spread. These findings also have similarities with the research conducted by Satiari (2009). She discovers that the circumstance is caused by the implementation of governance policy, in which it splits the tick size into several categories such as IDR. 10, IDR. 25, and IDR. 50. The implementation of new policy in Indonesia stock exchange is addressed to be referenced in the stock bargaining process, especially within a certain price range. The alteration of price fraction as the impact of the price changes has to be the multiple prices of the recent price fraction. Thus, the price will be the reference in determining the fraction of the closing price on the previous day. The reference price is important for the investor in making an investment decision to buy a certain stock in their portfolio investment. Porter and Weaver (1997) find that the impact of the decrease of price fraction theoretically is positively or even negatively correlated to spread. The first reason comes from the influence of volatility. Volatility inclines to increase as the result of the decrease from price fraction. Due to the lower depth, virtually all of the canceled transaction will result in the decrease of trading volume. This condition regards to the price volatility. Hereby, we find that the stock price in our study negatively contributes to relative bid-ask spread.

#### **MANAGERIAL IMPLICATIONS**

As previously highlighted by the recent works of literature and recall back to the results of our study, it is highly considered that information commonly penetrating the market fast. The number of

information in relation to either firm-specific or macro-based news can be classified as the good and bad news. It depends on the information users how can they interpret the obtained information and use it to support their investment performance. Hereby, this information can be also utilized by the uninformed investors in order to minimise the level of asymmetry information between them and the informed investors. However, in the case of incoming information is available as a fresh news in the market, some counterparts will also compete to get benefit from it, even though the market experiences bearish or bullish conditions (Usman, 2016).

In the context of market competition, particularly in terms of trading activity which is based on the short-term profit taking action, the incoming information is conjectured as the factor that can drive the market into a specific trend of price movements. This pattern results in various opportunities for investors and market makers in order to design the strategy in gaining the best decision regarding their investment activity. Therefore, our managerial implications concentrate on the market players and firms as follows. (i) public information is currently available and can be obtained from various sources such as the internet. The Internet has played an important role in terms of transforming the physical needs of information into the digital information. Thus, in order to find the fast information with respect to their portfolio of investment, investors' literacy of technology utilization is obviously compulsory. (ii) illiquidity is clearly detrimental to the performance of portfolio investment. In the case of unpredictable market situation, virtually all of investors are meticulously considering the number and quality of the obtained information in determining to selling or buying actions. While in some condition, it is noted that not all of incoming information are relevant to the needs of investors and market players. Sometimes more noise and distortion are embedded to the related information. Noise and distortion will eventually drive the investors into

wrong decisions. Otherwise, investors who can filtrate this information well, incline to wait and hold their portfolio of investment. (iii) instead of informed investors, dealers and even market makers are having limited ability in predicting the trend of market movements. Hereby, the dealers will be probably bear a loss. The loss is supposed to exist when the market actively reacts to the incoming information. Moreover, when the search of information about specific stocks on the internet is attracting many uninformed investors, the level of asymmetry information reflected by bid-ask spread gets closer.

## CONCLUSION

The objective of this study is to examine the asymmetric information theory between the informed investors and uninformed investors in

IDX. In particular, we examine the public interest toward firms based on the bid-ask spread. By applying the Internet search traffic (IST) and entering the ticker of the company's name on Google, we find that variation in search traffic of a firm significantly contributes to bid-ask spread. Further, we also point out that the asymmetric information not only exists between the informed and uninformed investors, but also happens to the informed investors and the market makers. According to the result obtained, it is clearly known that IDX is one of the emerging markets which has adopted the order-driven market system. The transaction will be held based on the information about supply and demand. Hereby, the role of dealers or market makers as the broker is essential in boosting the bid-ask spread. ■

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