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INFORMATION ASYMMETRY AND HERDING BEHAVIOR

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Abstract

Conceptually, the stock market is strong form efficient in the long term. However, in practice, there are various forms of market anomalies that undermine the accuracy of the efficient market hypothesis. One factor suspected as the cause of market inefficiency is herding behavior. Investors herd when they imitate the actions of other investors. This behavior occurs when there is a continuous interaction among rational investors that prevents them from seeking information about market fundamentals. This study provides new insights by including information asymmetry as a moderating variable. This research examines the phenomenon of herding behavior in the Indonesia Stock Exchange as well as examines directly the effect of information asymmetry on herding behavior. The period of study is 2008 using time series of daily stocks data that actively traded in the capital market. Results of this study find that investor tends to follow market consensus when price changes at the low level, but when there is large price swing market participant acts independently from other investors. Interestingly, this study finds that information asymmetry is a necessary condition for the existence of herding behavior.

Keywords: behavioral finance, herding behavior, information asymmetry, information cascades

Abstrak

Secara konseptual, dalam jangka panjang pasar modal bersifat efisien bentuk kuat. Namun, dalam praktik, terdapat berbagai bentuk anomali pasar yang menurunkan akurasi dari hipotesis pasar efisien. Salah satu faktor yang diduga sebagai penyebab inefisiensi pasar yaitu perilaku kawanan (*herding behavior*). Investor berperilaku *herd* ketika mereka mengimitasi tindakan investor lain. Perilaku ini terjadi ketika terdapat interaksi yang terus-menerus di antara investor rasional yang menghalangi mereka untuk mencari informasi mengenai fundamental pasar. Penelitian ini memberikan wawasan baru dengan memasukkan asimetri informasi sebagai sebuah variabel moderasi. Penelitian ini menguji fenomena perilaku kawanan di Bursa Efek Indonesia sekaligus secara langsung menguji dampak dari asimetri informasi terhadap perilaku kawanan. Penelitian ini menggunakan tahun 2008 sebagai periode penelitian dengan menggunakan data harian atas saham-saham yang diperdagangkan secara aktif di pasar modal. Hasil penelitian ini menemukan bahwa investor cenderung untuk mengikuti konsensus pasar ketika terjadi perubahan harga pada tingkat rendah, namun ketika terdapat lonjakan harga yang besar, partisipan pasar bertindak secara independen dari investor lain. Menariknya, penelitian ini menemukan bahwa asimetri informasi merupakan kondisi yang diperlukan bagi keberadaan perilaku kawanan.

Kata kunci: keuangan keperilakuan, perilaku kawanan, asimetri informasi, *information cascades*

INTRODUCTION

According to financial market microstructure theory, investors will learn about fundamental of market step by step until the difference between market price and fundamental value of the market disappeared. It happens because each investor uses private information about fundamental of stock to make an investment decision, so stock price reflects information owned by the investor. This means that stock market is strong form efficient in the long term.

However, in practice, there are various forms of market anomalies that undermine the accuracy of the efficient market hypothesis. One factor suspected as the cause of market inefficiency is herding behavior. Investors herd when they imitate the actions of other investors. This behavior occurs when there is a continuous interaction among rational investors that prevent them from seeking information about market fundamental. Herding behavior arises because the investor does not act in accordance with his private information, but based on actions taken by other investors. This herding behavior causes social learning process stops. Herding behavior is believed to occur in financial markets (Devenow and Welch 1996).

Further, Devenow and Welch (1996) explain that there are three reasons for herding. First, the motivation of payoff-externalities encourages investors to make transactions at the same time in order to get profit from a higher stock liquidity. The second motivation is the reputational effect. The success of institutional investors is often judged by comparing their performance from a benchmark. For this reason, investment managers often hide behind herd behavior in order to get performance near to its benchmark. On average, herding behavior eliminates opportunities for investment managers to earn performance exceeding its benchmark. But, herding behavior provides protection for their reputation from declining performance below benchmark. The third reason is informational externalities. It means that investors often have incomplete information when they observe the behavior of other investors. Informational externalities become very powerful when investors decide to ignore the signal of information that they own and choose to imitate actions and decisions taken by other investors.

Several studies have been conducted to estimate herding behavior (e.g. Cipriani and Guarino 2008; Fu and Lin 2010; Degirmen et al. 2012). Gunawan et al. (2011) found that in Indonesia, herding behavior occurs in a market stress condition, whereas in normal condition or in a condition of very high stock return, investor behavior tends to be more rational. By using the model of Lakonishok et al. (1992), Setiyono et al. (2013) found that there is institutional herding in Indonesia capital market. The majority of these studies examined herding behavior in capital markets done by individual investors, institutions, as well as analysts/professionals. However, there are few empirical researches that examine effects of information asymmetry on herding behavior. Kremer (2011) has studied causes and effects of herding behavior. Kremer (2011) showed that information asymmetry does not affect herding behavior. The weakness of Kremer (2011) is to use firm size as a proxy of information asymmetry in which firm size does not measure asymmetric information directly. In fact, herding behavior arises because of information asymmetry among market participants. This study attempts to improve Kremer (2011) by using the bid-ask spread as a proxy of information asymmetry.

The objective of this study is to investigate the existence of herding behavior in Indonesia capital market during the crisis period. The main contribution of this study is introducing information asymmetry into a model for detecting herding behavior based on Chang et al. (2000) framework. Moreover, this study uses the model of bid-ask spreads for estimating the level of information asymmetry among market participants.

Using daily data in 2008, this study documents a weak evidence of herding behavior in Indonesia capital market. This research finds that at the low level of price

changes, investor tends to follow the crowds (i.e. herding). Conversely, when prices change drastically, there is no herding behavior. Investors tend to not follow the crowds when market prices largely swing. In addition, this study finds that information asymmetry has an important role in herding behavior.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Behavioral Finance

Behavioral finance attempts to seek evidence and explanation about someone's economic decisions by combining behavioral and cognitive psychology theory with economic and conventional finance theory. Behavioral finance is a paradigm where emotions and subjective factors have an important role in investment decisions. Investor's decisions are influenced by beliefs and certain choice. This view differs from economic theory that gives more space to human preferences, but almost no place for their ignorance or knowledge, their feelings of hope, doubt and fear, as well as the power of their imagination (Shackle 1942). The assumption of behavioral finance is information structure and characteristics of market participants influence individual investment decisions as well as the market (Baker and Nofsinger 2010).

In terms of investment decision, behavioral finance uses the assumption that individual is not entirely rational because the decisions are based on individual preferences. Several studies used this assumption to examine the existence of behavioral bias (e.g. DeBondt and Thaler 1985; Shefrin and Statman 1985; Hirshleifer 2001). Barberis and Thaler (2003) provide an excellent literature review about types of behavioral biases done by investor and explore how these biases might affect decision making and the financial markets. Psychology literature noted that individual conducts systematic errors in their thinking, e.g. they might over confidence, focus on existing information, and so forth. Herding behavior is one of the forms of behavioral finance.

Herding Behavior

Our day-to-day activities, including investment and financial activities, are often influenced by others. Thoughts, feelings, and actions can be influenced by others through multiple media such as words, observing the actions of others (i.e. observation number of demand and supply), and observations on the consequences of actions (such as a person's payoff or market price).

Investors are said to herd if they would have taken an investment decision without knowing investment decisions of other investors, but when other investors have decided to not invest, neither do they. Thus, herding behavior occurs when knowledge about investment decision of other investors changes their investment decision from not investing in making the investment, or vice versa.

In psychology, imitation action is often considered to be nature of human. Hirshleifer (2001) showed that 'conformity' has encouraged someone to replicate the actions of another person around them. The imitation behavior arises through interactive communication between individuals both explicitely—through talking to each other directly (Shiller 1995)—or tacitly—through observation, just like as in the case of fashion (Bikhchandani et al. 1992).

An alternative explanation of herding behavior is 'rational herding'. Devenow and Welch (1996) argue that herding behavior arises because of rational considerations i.e. it is more sensible for the investor to mimic decision that taken by other investors in order to get an informational advantage. This rational consideration occurs when a person (a) has no private information, (b) has private information but hesitated with the quality of the information, (c) considers that ability of other people to process information is better, and (d) believes that other investors have better information.

Rational considerations can be explained from the viewpoint of career and reputation. Investment managers and financial analysts are required to maintain their career and reputation. When their performance is evaluated by

comparing it with other investment managers, it is quite reasonable for investment managers who have lower ability or reputation to replicate other investment manager's actions who have higher ability and reputation in order to improve their image (Scharfstein and Stein 1990). However, investment managers who have higher ability and reputation may also choose to follow investment decisions taken by the majority of existing investment managers, despite suboptimal, when they perceived that risk of potential failure is greater than the potential for success if they did alone (Graham 1999).

Intentional herding model assumes that amount of information available and reliable in the market is very little, and investors become hesitant to make a decision and finally they decide to follow on other investor's decision. In contrast, in unintentional herding, investors believe that they have reliable information, and then they interpret in the same way until finally take the same decision. So, both intentional and unintentional herding behaviors are strongly associated with uncertainty about the availability of information.

Lakonishok et al. (1992) examine behavior of herding on the NYSE. They separate stocks based on market capitalization, i.e. stocks with low and high market capitalization. The purpose of this separation is to see what kind of herding behavior, whether intentional or unintentional. Stocks with low market capitalization tend to drive intentional herding because of information available to small companies is very limited and less reliable. In stocks with high market capitalization, intentional herding is driven by the high degree of uniformity of information between investors, so they take the same decision. Lakonishok et al. (1992) show that herding behavior is more common in small firms than large firms.

There are several studies on herding behavior in developed and emerging markets. Choe et al. (1999) conduct a study of herding behavior in the international market. They found strong evidence of the existence of herding among foreign institutions in Korea before the financial crisis in 1997. Grinblatt and Kelojaru (2001) found that investors in Finland prefer to invest in stocks that are close to their homebase. In another word, familiarity factor has determined investor decision.

Cipriani and Guarino (2014) developed a new methodology to estimate informational herding behavior. They argued that there is a gap between theoretical framework of herding behavior and its empirical research. This gap arises because of the difficulty of obtaining data on private information held by the investor. But, this model is too complex and needs more detail information about transactions.

Chang (2014) examined the relationship between social interactions, herding behavior, and bubbles. He found that herding behavior arises naturally when there are strong enough social interactions among individual investors, and in an extremely small bubble, herding behavior tends to increase when the social interactions among traders are strong.

Information Asymmetry

Information asymmetry occurs when there is an imbalance of information among investors. Agency theory implies the existence of information asymmetry between managers as agent and shareholders as principal. Information asymmetry arises when the manager is better informed concerning internal and prospects of the company than shareholders and other stakeholders. Thus, information asymmetry arises when one party has knowledge that is not possessed by the others.

Information asymmetry in the capital market is shown by the adverse selection problem faced by market makers (dealers) when dealing with more informed investors. Measurement of information asymmetry in the stock market is often proxied with liquidity. Liquidity in the market has a variety of definitions and interpretations. The simplest notion of liquidity is the ability to conduct transactions without significant costs. Kyle (1985) broke down liquidity into three components, namely tightness, depth,

and resiliency. Tightness refers to deviation of stock prices from their efficient price, i.e. price that should occur in equilibrium. Dealers often set bid and ask prices slightly above and below equilibrium value. The market is said to be liquid perfectly if spread between bid and ask prices is set to be zero, so broker could buy and sell at the same price. Tightness component is often called as bid-ask spread.

Model of information asymmetry (e.g. Copeland and Galai 1983) assumes that there are three types of agents in the market, that are traders with excess of information (informed traders), traders with little information (uninformed traders), and risk neutral specialist. Traders with excessive information will make transaction based on their private information that is not reflected in the stock price, and they are speculative. Traders with excess of information come to the market because they have information regarding the future value of assets that have not been published, while traders with little information—or better known as liquidity traders—trade to adjust their portfolio in order to optimize their cash flow. Specialists are market participants who can act as broker or dealer. Brokerage transaction is aimed to meet investment orders from his clients, while a dealer has an authority to make transactions for himself. Specialist is assumed to have identical information with liquidity traders. In this condition, dealers face the problem of adverse selection and face a potential loss when trading with informed traders. In order to cover losses from more informed traders, the dealer should increase spread from liquid traders.

In Indonesia capital market, a dealer also serves as a broker so they are called as broker-dealer. This dual function causes the quoted spread not fully reflect dealer spread as in the developed capital market (e.g. New York Stock Exchange). However, this theory is still relevant to be implemented in Indonesia capital market because broker-dealer also carry out transactions for themselves, so they do set a bid price and ask the price before putting the order. Broker-dealer have a potential loss when trading with the informed trader (e.g. foreign investors, or institutional investors). Otherwise, broker-dealer face potential advantage when dealing with uninformed investors.

The second component of liquidity is the depth that represents trading volume at quoted prices. Technically, the bid-depth is a number of shares to be purchased by a specialist or a dealer at the current bid-price, while the ask-depth is a number of shares to be sold by a specialist or a dealer at the current ask-price. Based on the perspective of market liquidity, depth indicates the number of shares that can be traded without effect on the market price. Graphically, the two components of liquidity can be described as follows:

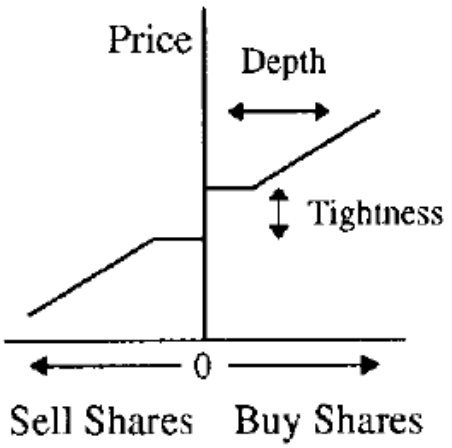

Figure 1
The Component of Liquidity
(Engle and Lange 1997)

The third component is resiliency, i.e. the speed of a price to return to efficient (equilibrium) price after any deviation or price jump. In a highly liquid market, the stock price will return to the efficient level quickly after temporary price jump that does not affect the value of a stock. However, this component is very difficult to be measured because of a continuous flow of information into the market. So, it is difficult to determine the speed of price jump to return to efficient price for specific information. In other words, it is very difficult to control other factors that go into the market.

The Influence of Information Asymmetry on Herding Behavior

Lakonishok et al. (1992) define herding as the tendency that a group of investors to buy (sell) a particular stock in line with other traders, but this behavior will be different when they make investment decisions independently. For example, an investor imitates other investors when he decided not to invest in a particular stock, but after observed that other investors buying the stock, then he changes his beliefs and decides to invest too.

When investment decisions are influenced by other investors, they probably mimic the wrong investment decisions. Suppose there are a hundred investors who have their own beliefs—which may be different—about the potential profitability when investing in emerging market. Assume that 20 investors believe that emerging market is a promising market for investment (profitable), while 80 investors believe that investing in emerging market will not provide any benefits. Each investor is convinced to their valuation about emerging market and they did not know what the other investors' valuation. If every investor's knowledge and belief were collected, collectively they will decide that investing in emerging market is not a good idea. However, when there is an investor that comes from the 20 optimistic investors decides to invest in emerging market, then some of the pessimistic investors change their belief and decide to invest in emerging market. It encourages the emergence of snowballing phenomenon, and eventually, 100 investors invest in emerging market. Then, if emerging market is not profitable, they will out of the emerging market concurrently.

These illustrations presented by Bikhchandani and Sharma (2001) indicate that herding behavior occurs because of differences in the information held by each investor. This phenomenon is referred as information cascade, which is a phenomenon that occurs when investors observe other investors' actions and then take the same option and ignore their signal information. A cascade will develop when investors ignore their private information and imitate the action taken by another investor (Easley and Kleinberg 2010). Initially, herding behavior is observed as the effect of psychological factors. But, economists have modelled rational behavior of investors. Spreading of herding behavior in the market will drive collective action that affects market efficiency adversely, regardless of herding behavior motivation. If many investors decide to ignore their private information and want to be free riders of other investors, it will speed up informational cascade (Banerjee 1992; Bikhchandani et al. 1992), so that the process of information aggregation in security prices is slower.

Hypothesis Development

Conventional economics assumes that everyone thinks about himself and is not affected by his surrounding environment. But, behavioral economics recognizes that humans often follow other people when making decisions. This condition underlies the existence of behavioral finance. Behavioral finance is a new alternative paradigm for analyzing behavior of market participants through learning the mistakes that have been done by the investor when processing information. Moreover, in terms of psychological, behavioral finance also describes the causes of bias or deviation from efficient market hypothesis (Daniel and Titman 1999).

Herding behavior can be influenced by market conditions at the time when it occurs. Changes in market conditions will be followed by changes in investor behavior, changes in economic activity, and the government's policy that is aimed to stimulate or stabilize market activity in the market. Christie and Huang (1995) stated that the decision-making process made by market participants depend on overall market conditions. During normal periods, rational asset pricing models predict that the dispersion of returns will increase with an increase in the absolute value of market return because the individual investor will trade based on their private information. When

market conditions change extremely, people tend to ignore their personal judgement and decide to follow market consensus.

Degirmen et al. (2012) examine herding behavior in developing and developed markets. They argued that quality of information is one of the factors that differentiate herding behavior between developing and developed markets. The accuracy of information signals in market influences herding behavior. The more informative signal received by investors, herding behavior tends to get smaller because investors trust their private information. Further, Degirmen et al. (2012) stated that distribution of market information in developing market is relatively less informative than developed markets. In other words, the quality of market information in developed markets is better than developing markets. Therefore, herding behavior is more common in developing markets due to relatively low of information precision.

Kallinterakis (2009) examines herding behavior in Vietnam, a thin market—that is a market where shares are rarely traded. A thin market is one characteristic of an emerging market. Kallinterakis (2009) found that phenomenon of herding behavior in thin markets is caused by illiquidity of market structure. Indonesia capital market is characterized as a thin market, the market that some securities are traded passively (Hartono 2010). This condition drives the phenomenon called as non-synchronous trading. Indonesia Stock Exchange (IDX), which also has characteristics of an emerging market (World Economic Forum 2015), may show herding behavior in the market. This research states an alternative hypothesis as follows:

H_1: There is herding behavior in Indonesia Stock Exchange.

Bickchandani et al. (1992) hold a fundamental theory of informational cascade that is often referred by many researchers in financial markets. According to them, informational cascade occurs when individual's actions are not dependent on his private information. When cascade begins, the decision of herding investors does not carry any information because they ignore their private signals. Therefore, informational cascade continues and causes blocking of information.

The informational cascade is triggered by information uncertainty in the capital market. Information uncertainty is not only about the real value of the asset being traded but also regarding the quality of information. Under uncertainty, market makers tend to think that informed investors have better information (i.e. information asymmetry) that encourages them to follow the actions taken by informed investors. Moreover, in conditions of information asymmetry, fears of making a wrong decision and potential loss to be borne by investors interfere their ability to analyze rationally, and ultimately investors tend to converge market consensus in order to relieve their discomfort by imitating other investors' behavior. So, herding occurs as a response to the uncertainty and individual perceptions about his unknowing: people may follow the crowd because they think that people in the crowd have better information (Keynes 1930). Lobao and Serra (2007) argue that herding behavior occurring in emerging markets can be attributed by an incomplete regulatory framework, particularly in terms of transparency of information. Low level of information disclosure and quality drive emergence of uncertainty in the market, cast doubt on the reliability of public information, and consequently, it is hard to do the fundamental analysis.

Oktaviani and Martani (2006) examine disclosure level of multi-finance companies in Indonesia by using financial statements in 2003 and 2004 as their object. Their research found that disclosure level of multifinance companies is 78.35% in 2004. Even though there is slightly increasing disclosure level, but Oktaviani and Martani (2006) said that companies' disclosure does not fully cover important information.

In 2010, Ministry of Finance of the Republic of Indonesia published a master plan for capital market and nonbank financial industry

with the aim to build market and industry that is efficient, competitive, transparent, stable, and fulfil international standards. Several agendas and programs to improve Indonesia capital market quality during 2010-2014 rationalize the disclosure obligation for issuers companies, improve the effectiveness of E-Reporting implementation, and encourage the industry to provide qualified information. The preparation of this master plan implies that level and quality of disclosure in Indonesia had not been satisfying. This argument is supported by Tandiono and Martowidjojo (2013) who explored voluntary disclosure profile of family businesses that are listed in IDX. By using financial reports in 2009-2011, their research found that family business tends to provide more information about firm background than other important information such as financial projection.

Studies of Oktaviani and Martani (2006) and Tandiono and Martowidjojo (2013), as well as the master plan of capital market published by Ministry of Finance of the Republic of Indonesia imply that disclosure quantity and quality in Indonesia are far from the ideal condition. This condition could potentially increase information asymmetry in Indonesia capital market. Based on arguments of Lobao and Serra (2007) and Keynes (1930), this study argues that information asymmetry influences herding behavior positively because of the doubt on information credibility.

H_2: Information asymmetry has a positive impact on herding behavior.

RESEARCH METHOD

Sampling

The object of this research is companies listed in IDX. Herding behavior is believed as one of the important elements in the behavior of financial markets, especially when the market is stress (Hwang and Salmon 2004) such as the Asian crisis in 1998 and the global crisis in 2008. Based on this argument, our study uses 2008 as investigation period to estimate herding phenomenon.

This study takes daily data to examine the phenomenon of herding behavior. Total observations used for data analysis are 240 days in 2008. The reason for 2008 as the research object is the global crisis that affects IDX. According to the World Bank, total market capitalization of global stock markets before the 2008 global financial crisis reached $64 trillion. This amount was almost halved by the 2008 financial crisis. In three years following the crisis, stock markets partially recovered, reaching $45 trillion of market capitalization by end of 2011. This condition allegedly encouraged herding behavior. Purnomo and

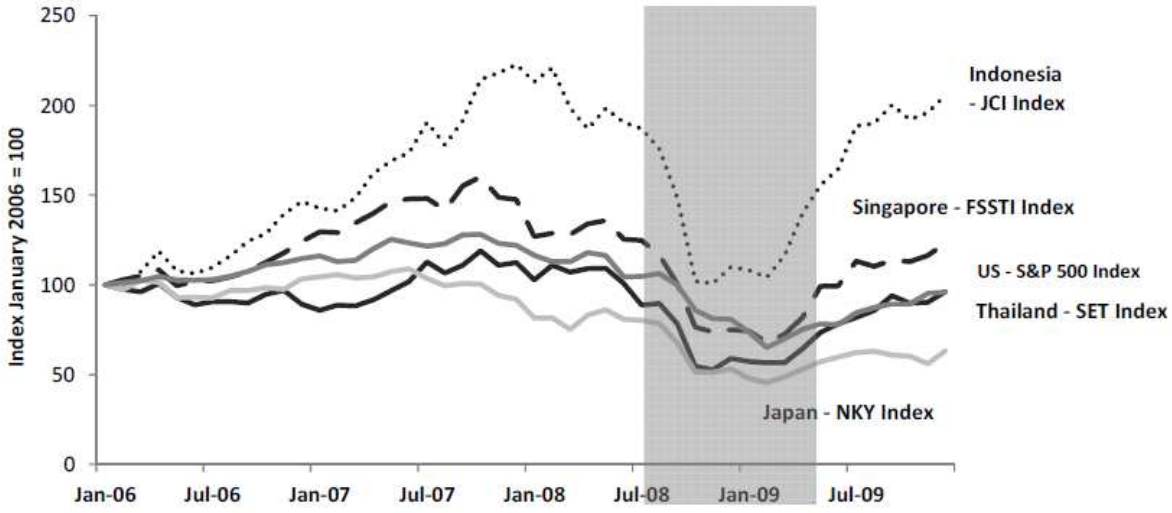

Figure 2
Movements of Stock Market Indexes in the Case of 2008 Global Financial Crisis
(Purnomo and Rider 2014)

Rider (2014) depicted fluctuation in Indonesia capital market during the 2008 global financial crisis:

By using time series of daily data, this study selects the object based on its liquidity. Specifically, sampling criteria used in this study is a company whose shares are actively traded in the IDX. This study defines actively traded stocks when trading frequency in one day is more than or equal to fifty transactions.

Total observations in this study are 240 days. The use of daily data is based on an argument of Christie and Huang (1995) that herding behavior often occurs in a short period of time (short term). Further, they said that herding behavior can be detected on the data with high frequency.

Variables

Variables used in this study include information asymmetry and herding behavior. To examine the hypotheses, this study uses three variables that are:

1. Dependent variable: return dispersion, that is deviation of return from its index.
2. Independent variable: market return.
3. Information asymmetry is used as a moderating variable.

Model of Analysis

The underlying model of herding behavior measurement is Capital Asset Pricing Model (CAPM). Model of rational asset pricing implies that when market conditions are more volatile—i.e. when there are extreme market movements—the dispersion of returns from the market return will be wider because individual stocks have a different sensitivity to the market return. However, if the return dispersion gets smaller when the market stress, it indicates herding behavior. Therefore, based on Bhaduri and Mahapatra (2013), the basic model in this study is:

$$\textbf{Return Dispersion}_t = \alpha_0 + \alpha_1 |R_{m,t}| + \varepsilon_t \ldots\ldots \textbf{(1)}$$

The slope in equation (1) captures a positive effect of the dispersion of returns with the average market return (as hypothesized in the CAPM). The relationship between market return and return dispersion depicted in the CAPM is linear. During the period of relatively large stock price movements, market participants do herd around indicators such as the average market consensus (Chang et al. 2000). This large price swing causes higher correlation among stock returns. In turn, dispersion among returns tends to decrease or at least increase at decreasing rate. In other words, there is nonlinearity between market return and return dispersion. For this reason, the square terms of market return are included in the model. In short, herding behavior is not measured by the large-small dispersion of return, but the lack of linearity in the relationship between market return and return dispersion. Therefore, according to Chang et al. (2000), equation (1) was developed into equation (2):

$$\textbf{Return Dispersion}_t = \alpha_0 + \alpha_1 |R_{m,t}| + \alpha_2 R^2_{m,t} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots \textbf{(2)}$$

This study hypothesizes that under the condition of herding, individual investor beliefs tend to move together toward a consensus of all market participants. The phenomenon of herding behavior is reflected by the negative and significant coefficient of α_2 in equation (2). In order to examine the effect of information asymmetry on the phenomenon of herding behavior, this study adds information asymmetry as moderating variable. Thus, the final model used in this study is adopted from Chang et al. (2000) and modified by new variable i.e. information asymmetry.

$$\textbf{Return Dispersion}_t = \alpha_0 + \alpha_1 |R_{m,t}| + \alpha_2 R^2_{m,t} + \alpha_3 AI^* + \alpha\_4\ AI^* R^2_{m,t} + \varepsilon_t \ldots\ldots\ldots \textbf{(3)}$$

Notes :
$R_{m,t}$: market return at time t
AI_t : information asymmetry at time t

Based on models (2) and (3), this study predicts that α_2 and α_4 are negative. A negative coefficient of α_2 in equation (2) points to herding behavior phenomenon, and a negative coefficient of α_4 in equation (3) indicates that information asymmetry strengthens the relationship between R_m^2 and return dispersion.

Measurement of Variables

1. Dispersion of return as one of herding behavior signals is measured using three approaches, namely:

   a. Return dispersion measurements using Christie and Huang's approach (hereafter abbreviated as CH) in 1995. CH used cross-sectional standard deviation (CSSD) to measure return dispersion by following formula:

$$CSSD_t = \sqrt{\frac{\sum_{i=1}^{N}(R_{i,t} - \bar{R}_t)^2}{N_t - 1}}$$

   b. Measurement of dispersion using the approach of Chang, Cheng and Korana (hereafter referred as CCK) in 2000. In contrast to CH, CCK dispersion measured returns using cross sectional absolute standard deviation (CSAD) with the formula:

$$CSAD_t = \frac{1}{N_t}\sum_{i=1}^{N}|R_{i,t} - \bar{R}_t|$$

   c. Measurement of dispersion of returns using Bhaduri and Mahapatra's approach (2013) with the formula:

$$\gamma_t = |R_{mean,t} - R_{median,t}|$$

2. Market return (R_m) is measured by Indonesia composite index (Hartono 2010). Operationally, R_m is measured by the formula:

$$R_m = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}}$$

3. Information asymmetry (AI) is measured by the residual error of bid-ask spread function (ADJSPREAD) as used by Komalasari dan Baridwan (2001).

$E(SPREAD) = \alpha_0 + \alpha_1 PRICE_t + \alpha_0 TRANS_t + \alpha_0 VAR_t + \alpha_0 DEPTH_t + \varepsilon_t$

in which: $SPREAD_{i,t} = \frac{(Ask_{i,t} - Bid_{i,t})}{\frac{(Ask_{i,t} + Bid_{i,t})}{2}}$ as used by Greenstein dan Sami (1994).

Notes:

$R_{i,t}$: stock return of firm i at time t
$R_{m,t}$: market return at time t
N_t : number of firm at time t
$R_{mean,t}$: average return at time t
$R_{median,t}$: median return at time t
$Ask_{i,t}$: highest ask for stock i at time t
$Bid_{i,t}$: lowest bid for stock i at time t
$PRICE_t$: log normal of average closing price at time t
$TRANS_t$: log normal of average volume of transaction at time t
VAR_t : average standard deviation of stock return at time t
$DEPTH_t$: log normal of average bid and ask volume at time t
ε_t : residual error. The absolute value of this residual error is used as proxy of information asymmetry (AI) at time t.

RESULT AND DISCUSSION

Descriptive Statistics

Descriptions of variables used in this study are presented in Table 1. It shows that average market return is minus 0.24%. The low average return in 2008 is due to declining in performance of the capital markets as a result of economic crisis impact in the United States. The standard deviation of information asymmetry shows that there is a high volatility of information asymmetry data during 2008.

Return dispersion as measured by CSSD, CSAD, and γ indicates that CSSD has a higher value than the others. This indicates that CSSD provides the widest measure of return dispersion, while γ is the smallest. This could be due to the majority of the median value of the average daily return is zero, so the value of γ will be closed to the average value return.

Classical Assumption Test

Classical assumption test found that the data used in this study did not meet non-autocorrelation assumptions. However, the stationary test indicates that the data used in this study are stationary. In order to overcome

Table 1
Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
AI	240	.00009	1.01485	.0674191	.13626534
$\|R_m\|$	240	.00014	.10375	.0170265	.01831267
CSAD	240	.01636	.09039	.0292555	.00949638
CSSD	240	-.01982	.11725	.0420782	.01693848
γ	240	-.02650	.02561	.0041589	.00679759
ModAI	240	.00000	.00444	.0001279	.00057964
R_m	240	-.10375	.07921	-.0024155	.02491204
R_m^2	240	.00000	.01076	.0006239	.00140448

Notes: ModAI is accronim for moderating variable of information asymmetry

Table 2
Herding Behavior Test
$Return\ Dispersion_t = \alpha_0 + \alpha_1 |R_{m,t}| + \alpha_2 R_{m,t}^2 + \varepsilon_t$

Independent Variable	Dependent Variable								
	CSSD			CSAD			Γ		
	Unstandardized Coefficients	T	Sig.	Unstandardized Coefficients	T	Sig.	Unstandardized Coefficients	T	Sig.
Constant	0.0329	30.0374	0.0000	0.0173	29.0025	0.0000	0.0049	9.8030	0.0000
$\|R_m\|$	(0.3095)	(2.8775)	0.0044	(0.1103)	(1.7648)	0.0789	(0.0080)	(0.1747)	0.8615
R_m^2	6.4077	4.6483	0.0000	4.2102	5.2830	0.0000	0.6260	1.0553	0.2923
R^2	0.1245			0.2641			0.0216		
F-Value	16.7846			42.3426			2.6047		
F-Sig.	0.0000			0.0000			0.0760		

the problem of autocorrelation, this study transformed variables by using Cochrane Orcutt method. Based on the transformation data, this study did not violate the assumption of autocorrelation and other classical assumptions. Moreover, this study excluded some outliers by removing observations that have an absolute studentized residual value greater than 3 and Mahalanobis probability less than 0.001.

Testing Result and Discussion

Testing result of the first hypothesis can be seen in Table 2. Table 2 shows that coefficient of α_2 is positive and significant when using CSSD and CSAD as dependent variables. These indicate that there is no herding behavior in Indonesia capital market during the test period.

Table 2 presents results from estimating equation (2). Table 2 shows that coefficient α_1 is negative and significant for return dispersion measured by CSSD and CSAD, and insignificant when using γ as a proxy of return dispersion. It means that the higher market price changes, market participant are more likely to follow market consensus. According to Christie and Huang (1995), the negative coefficient in a linear relationship between market return and return dispersion indicates herding behavior. Differ from Christie and Huang (1995), Chang et al. (2000) argue that herding behavior should occur when there is large price change as shown by negative coefficient of α_2.

The coefficient of α_2 in Table 2 is positive and significant statistically for CSSD

Table 3
Information Asymmetry Test

$$\text{Return Dispersion}_t = \alpha_0 + \alpha_1 |R_{m,t}| + \alpha_2 R_{m,t}^2 + \alpha_3 AI + \alpha_4 AI*R_{m,t}^2 + \varepsilon_t$$

Independent Variable	Dependent Variable								
	CSSD			CSAD			Γ		
	Unstandardized Coefficients	T	Sig.	Unstandardized Coefficients	T	Sig.	Unstandardized Coefficients	T	Sig.
Constant	0.0314	29.6834	0.0000	0.0173	32.2223	0.0000	0.0045	9.2129	0.0000
$\|R_m\|$	(0.1906)	(1.8990)	0.0588	(0.0656)	(1.2302)	0.2199	(0.0646)	(1.5169)	0.1306
R_m^2	4.5625	3.2118	0.0015	3.4294	4.4901	0.0000	0.9046	1.5193	0.1300
AI	0.0098	0.6805	0.4969	0.0117	1.4298	0.1541	0.0294	5.4316	0.0000
AI * R_m^2	(3.8500)	(1.0468)	0.2963	(4.4010)	(2.1477)	0.0328	(3.2350)	(2.2849)	0.0232
R^2	0.0616			0.1955			0.2198		
F-Value	3.7612			13.7868			16.4825		
F-Sig.	0.0060			0.0000			0.0000		

and CSAD. It means that very large price swing drives higher return dispersion. The larger dispersion of returns indicates that investors are moving independently from each other and do not herd. This behavior indicates that there is no herding behavior in Indonesia capital market in 2008. This result is consistent for two return dispersion's measurements at 5% significance level (α). Since our two measurements of return dispersion exhibit significance statistically for coefficient α_1 and α_2, so we can ignore one of them.

CSSD has the highest impact on return dispersion followed by CSAD and γ. This may indicate that CSSD is a better measurement of return dispersion than the others.

Influence of information asymmetry on herding behavior is presented in Table 3.

Consistent with Table 2, Table 3 shows that in two of three models of return dispersion (i.e. CSSD and CSAD), coefficient of R_m^2 (i.e. α_2) is positive and significant based on 5% degree of error, while the information asymmetry variable (AI) has a positive and significant effect on γ based on 5% significance level and insignificant on CSSD and CSAD. The negative and significant parameter estimate for absolute R_m suggests that over the low level of price changes, as price increases, the level of return dispersion decrease. This result does not support herding behavior prediction as suggested by CCK (2000). The positive and significant sign on R_m^2 suggests that at a high level of price movement, investor tends to against the crowds as shown by higher return dispersion (CSSD and CSAD).

Information asymmetry (AI) gives no significant impact to the degree of dispersion of returns as measured by CSSD and CSAD. However, when using γ as a proxy for return dispersion, this study finds a positive impact of information asymmetry. The greater the information asymmetry faced by dealers, the higher dispersion of returns occurs. It means that investment decisions taken by investors tend to be far away from market consensus. This indicates that speculative actions of investor tend to increase when information asymmetry is high.

The impact of information asymmetry on herding behavior is captured by coefficient α_4. Theoretically, coefficient α_4 should be negative when there is herding behavior. Based on Table 3, this study finds that there is no herding behavior when there is very large market movement (i.e. positive coefficient of α_2), and the existence of information asymmetry suppress the independence of investor's decision (i.e. negative coefficient of α_4). It indicates that high information asymmetry triggers herd behavior.

In short, this research finds herd behavior when the stock price change is not large. The market participant will act independently and

not follow market consensus when there is very large price swing. This result contradicts with Chang et al. (2000) who found herding behavior in the capital market of South Korea, Taiwan, and Japan. This difference may be due to differences in method of research and capital market profile.

In sum, this study could not reject the null hypothesis. It implies that there is no herding behavior in Indonesia capital market when testing is done using daily data in 2008 because it is appeared to be less supportive for herding behavior testing. It may be due to the impact of the global crisis that not occurred throughout 2008. The following are depicted charts of the movement of the stock price index in 2008.

Figure 3 shows that the biggest fluctuations in Indonesia capital market in 2008 began around July 2008 to early 2009. It indicates that further research should be more focus on the period of high price fluctuations to examine herding behavior. It is suggested for future studies to test herding behavior in a period of time that matches with the level of market fluctuation.

In 2008, trading volume and stock index experienced a great decline, forcing the authorities to stop trading (blackout) in October 2008. The stock index dropped dramatically, from 2,830 at the beginning of the year to 1,355 by the end of 2008. In addition, the turmoil in the stock market cannot be separated by the high proportion of foreign investors (more than 60%) in the trading of shares in Indonesia (Bank Indonesia 2009). A number of losses in the global financial markets led to a lot of foreign investors experiencing liquidity problems and having to withdraw their funds (deleveraging) from Indonesia. In addition, due to liquidity problems, the stock market crash also allegedly was driven by risk aversion of investors who then triggered a shifting of asset allocation from risky assets into safer assets (Bank Indonesia 2009). This phenomenon indicates that the great decreasing in 2008 may due to the great of capital outflow, not merely herding behavior. In this case, it may be more difficult to capture herding behavior in Indonesia capital market.

Test on information asymmetry indicates that information asymmetry is less likely to affect return dispersion. However, the most interesting result of this study is the impact of information asymmetry on herding behavior. In particular, when there is asymmetric information, investors tend to follow the crowds, i.e the higher the information asymmetry, investors are more likely to ignore their private information and choose to follow market consensus. Without considering information asymmetry, this study found no herding behavior. However, when a setting of asymmetric information is included, this study

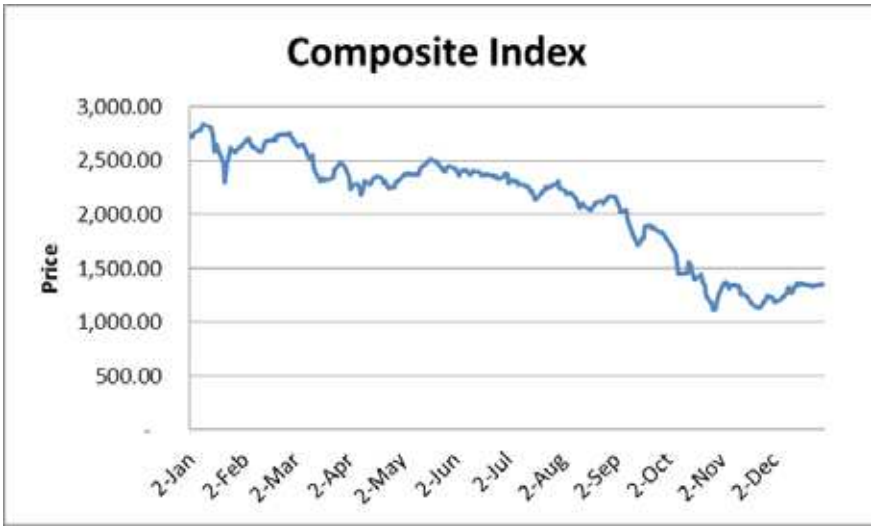

Figure 3
Graph of Jakarta Composite Index in 2008
(Source: Data Processed from Yahoo Finance)

found the likelihood of herding behavior. This implies that information asymmetry is a necessary condition for herding behavior.

Finally, the result is highly influenced by the measurement of variables. There is no 'true' formula to detect herding behavior based on secondary data. It can challenge future research to find the best formula that fully reflects herding behavior and to improve research methodology.

CONCLUSION

This study examined the phenomenon of herding behavior in Indonesia and the effect of information asymmetry on herding behavior. This study used several alternatives to capture the phenomenon of herding. The first approach is by using CH method (1995) for measuring dispersion return, while the second approach using CCK (2000). The difference between CH and CCK method is CH using standard deviation whereas CCK using absolute deviation of individual returns.

Existing studies give more attention to the association between herding behavior and market conditions, but studies that investigate the effect of information asymmetry on herding behavior are very limited. Hwang and Salmon (2004) stated that intensity of herding by institutional investors occurs when the market is more stable. This result is reinforced by Setiyono et al. (2013) who found the phenomenon of herding behavior in Indonesia that not only happens in extreme fluctuating market conditions but also when the market is in a stable condition.

Results of our study found that over the low level of price changes, as price increases, investors are more likely to follow the crowds, but when the price fluctuates largely, there is no phenomenon of herding behavior detected in IDX in 2008. Non-negative relationship on quadratic functions shows that there is no herding phenomenon. However, this study found that information asymmetry strengthens the likelihood of herding behavior. The higher the information asymmetry between informed traders and uninformed traders pushed return dispersion lower. This study implies that information asymmetry is a necessary condition for the existence of herding behavior.

Our study can be used to enrich the investigation of herding behavior in Indonesia. Specifically, future studies need to test the level of information asymmetry in Indonesia capital market when market condition is stable and fluctuative in order to investigate whether the phenomenon of herding behavior is influenced by market conditions or information asymmetry.

The weakness of this study is examining phenomenon of herding behavior in 2008 without making a separation between a period of market stress and normal condition. The further investigation is suggested to integrate between market conditions and level of information asymmetry in order to provide a more representative result.

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