

Information Asymmetry And The Role Of Foreign Investors In Daily Transactions During The Crisis; A Study Of Herding In The Indonesian Stock Exchange

Ishak Ramli, Tarumanagara University, Indonesia
Sukrisno Agoes, Tarumanagara University, Indonesia
Ignatius Roni Setyawan, Tarumanagara University, Indonesia

ABSTRACT

The purpose of this study is to prove that there was herding behavior by domestic investors following that of foreign investors in the Indonesian Capital Market (IDX) and that the herding was influenced by information asymmetry. It began when global investors undertook international diversification to the IDX because the returns on their portfolios were not on the efficient frontier during the crisis and because of the low correlation between Indonesia's economy and the American and European economies. Utilizing the IDX daily transaction data during the years 2009-2011, the herding behavior of domestic investors, which followed that of foreign investors, was tested by Lakonishok models as was the influence of information asymmetry on the herding. It was found that the herding behavior in the IDX occurred in buy, sell or entire herdings (buy and sell). There were 0.40 to 0.55 buy herdings and 0.20 to 0.40 sell herdings during the crisis in 2008 and 2009. Buy herding then continued in 2010 onwards, although with lower intensity (0.05 to 0.20); however, sell herding decreased dramatically, and there has been almost no sell herding since then. Nevertheless, domestic investors did then sell in the opposite strategy, which was to sell when foreign investors tended to buy. Subsequent findings demonstrated that herding occurred with the influence of information asymmetry between domestic and foreign investors.

Keywords: Herding; Buy Herding; Sell Herding; Information Asymmetry; Feedback Trading

1. INTRODUCTION

The global crisis began in 2008, and the liberalization of financial markets since the 1990s prompted global investors to look for alternative investments in emerging countries that were less affected by the crisis. Indonesia, as an emerging country, was an alternative investment destination country of the international diversification. Indonesia is significant to global investors because of the advantage in the form of its low correlation with the American and the European economies. At the time of the economic crisis in America and Europe, the economies in emerging countries, particularly Indonesia, were not affected. This, then, caused Indonesia and the Indonesian Capital Market (IDX) to gain an economic benefit from the crisis and the impact of financial market openness. Financial liberalization, then, caused the IDX to benefit from the increased flow of funds from global investors, which in turn raised the Jakarta Composite Index (JCI). The JCI increase, among the highest in the world since 2006, would attract foreign investors to continue to diversify internationally in the capital market of Indonesia (IDX).

Foreign investors were believed to have large capital funds, more knowledge, abilities, and mastery of information; this then often turned out to be a reference for domestic investors in targeting their investment to the leading stocks in the LQ 45 on the Stock Exchange for the past 5 years (Dvorak, 2005, and Aggarwal, et al., 2009). Then, Panggabean (2006) and Setiyono (2012) found there was herding behavior in the IDX, in which domestic investors mimicked the action of foreign investors' trading strategy. Generally, domestic investors conducted herding based on foreign investors trading strategy by following the transactions of purchases and sales of shares of the foreign

investors. The importance of herding then led many researchers to search for the determinants of herding, particularly the herding of domestic investors following that of the foreign investors. The financial literature highlights that the main determinant of herding is information asymmetry as a result of the impact of reputation [Dvorak (2005)] and transaction costs [Chiang, et al. (2011)]. Domestic investors in the IDX have always been considered inferior to foreign investors, so herding was bound to happen. We will highlight the transaction costs argued by Chiang et al. (2011) because of the impact of reputation arguments.

In Chiang et al. (2011), herding will only occur when stocks are traded with high liquidity. Strong flows of trade orders that are triggered by low transaction costs will increase the herding behavior of domestic investors. Transaction costs, argued by Chiang et al. (2011), were confirmed by the results of previous studies, which found herding after the next transaction and followed the pattern of previous transactions. The basis for the herding of Chiang et al. (2011) is oriented more to lower transaction costs for domestic investors than to the reputation concern. It is more reasonable than Dvorak (2005), in which the effects of the reputation supported herding, but it is the transaction fee of Chiang et al. (2011) that is closer to the information asymmetry.

It is not yet conclusive whether the information asymmetry will be a determinant factor of herding. Al Shboul (2012) found in Australia that the market capitalization and return growth was up to 51%, not only because of the information asymmetry of the domestic investors but also because of their sophistication in the market as global investors. However, there were some different conditions in Australia compared with Indonesia. Domestic investors in Indonesia are more information asymmetric than Australians. This was why domestic investors in Indonesia herd to the foreign investors, while Australians do not. Domestic investors in Australia can play the global investors' role to internationally diversify in the IDX. Despite the global and European crises, geographical proximity between Indonesia and Australia would still be attractive for global investors to increase investing in the IDX as an alternative.

Herding behavior of information asymmetry is one of the most powerful forms of aberration theory of EMH (Efficient Market Hypothesis) of Professor Eugene Fama. The EMH assumes that investors will generally be rational in expecting the price of the stock market to come to reflect all market information. However, in the real world, rationality is not the case because many investors who get abnormal returns trigger other investors to do the same. The actions of the investors are able to indicate their herding behavior in the capital market. Herding behavior occurs when investors decide to emulate the decisions of others in the capital markets rather than follow their own beliefs as well as information in their possession. Such behavior can be seen as rational for a number of reasons, although it may not always lead to efficient market outcomes. Herding can be in the realm of rational utility maximizing, for example, if the other participants in the market are expected to have better information or lack information asymmetry [Hwang and Salmon (2004)]. Herding behavior is shown by the special characteristics of the investor, and it is not only sophisticated investors can also conduct herding. Iihara et al. (2001) describes more professional investors herding than amateur investors. Thus, the results of their studies support Chiang et al. (2011) that herding and information asymmetry are interconnected (having causality).

Herding also depends on the size and the systematic risk of the company, but no herding was conducted by professional investors who are less sensitive to these variables. In addition, herding conducted by both amateur and professional investors is positively correlated with and significant to the volatility of stock market returns. Herding conducted by amateur investors would cause market volatility. The increase in volatility caused by the information asymmetry of the stock price dynamics is employed by amateur investors to not lose from professional investors [Franke and Westerhoff (2011)]. Financial markets are known to be characterized by a number of facts relating to matters with and or without preconditions in a time series order. It turns out that the price volatility in the capital markets often occurred differently from the fundamental factors underlying them. Then, widely agreed upon in the literature is the difficult to explain Efficient Market Hypotheses (EMH). The literature explains that the interaction between actors of diverse and various investors (heterogeneity) in the capital market with limited rationality supports the price volatility that occurs in the capital market. The investors have different information about the growth level of performance and of dividend of the issuers in the future so that they have different expectations of the value of the company. It is investors' rationality utilizing information regarding the stock prices, dividends, and historical performance in the future that maximizes expected utility.

Wang (2000) and Aggarwal et al. (2009) found a size or a proxy of information asymmetry, that is, the difference in bid and ask prices in the stock market that determines the highest and lowest prices of everyday transactions. The existence of investors who have less or no information because they do not do the research would increase the risk premium. Particularly when there are supply shocks in the turmoil situation, the asymmetry of information will increase the risk premium, while supply shocks do not increase the risk premium in the situation when there is information asymmetry. Information asymmetry among investors also may increase the volatility of stock prices and returns with negative autocorrelation. The uninformed investors will behave as rationally as price hunters. They will follow the herding of investors who have performed the research to gain better information about the company.

Hwang and Salmon (2004) stated that herding behavior occurs particularly when the market is relatively quieter than in stressful times, and herding occurs because of shared values, particularly after an economic crisis. Herding behavior was influenced by the financial crisis, the quite large stock trading volume, and the decisions of foreign investors [see Al Shboul (2012) in his study of Australia]. They said that herding occurs in the stocks of large issuers because it is the stocks of large issuers that are researched by mutual fund investors. Performing research requires a considerable cost, which usually can only be paid by large listed companies. Generally, small fund investors do not conduct research because it requires huge costs, so they generally do not have information or only have insufficient information. Therefore, investors or portfolio managers who have information for conducting research will utilize the information to select a portfolio of stocks that is expected to provide a sizeable return because it is below its fundamental price. The portfolio manager will be able to maintain a high return because he has more information and the stock portfolio is not disclosed. The SEC in the United States requires disclosure of stock mutual fund portfolios every quarter (May 2004; previously every six months); this makes it easier for investors with small funds, as they will select a mutual fund with big funds so they can follow the herding behavior.

In the Indonesian capital market (IDX), herding occurs by domestic investors to foreign investors, and the stock price volatility is affected by the effect of the herding. [Setyawan and Ramli (2013)]. The implication is that the more information the foreign investors and the fund managers have, the greater they control the capital market. Excess stock price volatility then becomes the deciding factor for high returns. This triggers the hot money in foreign funds related to the interest spread of the banking sector.

Thus, it is important to investigate herding behavior in the IDX because of its potential impact on the fluctuating returns in the capital market, while according to Kremer and Nautz (2013), the intensity of the herding behavior depends on the characteristics of stocks including returns and its volatility in the past. The instability of herding has an impact on stock prices in the short term, mostly unplanned. It is done in part to avoid risk. Fernandez (2010) suggests herding on individual stocks occurs when the market weakens, and there is an inverse relationship between volatility and trading volumes, particularly in cases of the stocks with extreme returns. Most of the previous research on herding focused only on the existence and extent of the herding behavior of investors, and to date, there is less empirical evidence on the determinants of institutional herding behavior in emerging markets. The information asymmetry as a determinant of herding is still not consistent, so it is still necessary to study evidence in the Indonesian capital market (IDX). Understanding the determinants of institutional herding could provide better solutions to reduce market volatility stemming from the irrational herding behavior.

In addition, previous studies that primarily examined herding behavior among institutional investors relied on monthly or quarterly data, and because in the growing capitalization shares on the Stock Exchange there was often short-term speculation (daily data) on particular individual stocks, it is necessary to perform better herding observations utilizing short-term daily transaction data of each share. The study will be conducted employing each stock's daily transaction to see the herding behavior and whether information asymmetry becomes a determinant of the herding in the period of the crisis (years 2009-2011). Determinants of herding in the literature are the liquidity of the stock, stock price volatility and stock returns of the past, which are mostly derived from information asymmetry. Measurements are conducted employing the herding measure of Lakonishok et al. (1992). The sizes are 0-1; 1 characterizes herding, and 0 otherwise. Information asymmetry is measured by the ratio of the difference between the high and low prices of Aldea and Marin (2007), in which the greater is the ratio, the higher is the information asymmetry.

The study is intended to answer two research questions: 1) was there a herding behavior of domestic investors to foreign investors during the crisis (2009 - 2011) utilizing daily stock transactions on the Indonesian Stock Exchange (IDX) 2) Did the information asymmetry affect the intensity of herding behavior during the crisis (2009 -2011) utilizing daily stock transactions on the Indonesian Stock Exchange (IDX).

2. LITERATURE REVIEW

2.1 Herding Concept

Herding is defined as the behavior of investors who follow the behavior of other investors during a certain period; the investors put aside their own opinions of what to believe and follow the behavior of other investors [Davenow and Welch (2004)]. An important implication of the formation of herding is that actors tend to rely on consensus opinion and not on the past trading price of the underlying asset. As a result, according to Fernandez (2010), herding could exacerbate asset return volatility and destabilize financial markets, particularly under the stress conditions (turmoil).

From the theoretical point of view, the existence of herding can be rationalized in the context of the information advantage enjoyed by some investors and information externalities, which can affect the capital structure, research and development or merger decisions, panic in the industry [Devenow and Welch (2004)], the signal by investor institutions, anxiety experienced by investors due to conflicting opinions (contradiction) and the incentive to hide the inability by mimicking the decision making of more able managers. This is reasonable due to the pressure of having the best-expected results from the shareholders.

The theoretical literature mostly conceptualized herding behavior as a behavior that is characterized by the actions of individuals collectively buying and selling by following (trailing) a particular factor (performance) or style (market portfolio), certain sectors, styles, or macroeconomic signals [Al Shboul (2012)]. Consequently, herding is identified by utilizing the information contained at the movement of stock prices in cross-sections. Hwang and Salmon (2004) argued herding would be stronger in the extreme market conditions compared to the stress capital market situation due to potential of decreasing the cross-sectional standard deviation of return.

2.2 The Existence of Herding Hypotheses

Henker et al. (2006) examined whether herding in the broad market sector and industry occurs every day and intraday in the Australian equity market. Employing 160 of the most actively traded stocks on the Australian Stock Exchange for the period 2001-2002, they did not find any intraday sector herding behavior either in the entirety or in industrial markets. However, herding that occurs intraday just occurs to a particular company stock. The difficulty in distinguishing herding in normal market circumstances and the extreme market conditions led the researchers then to distinguish the actual herding concept from the two following concepts: rational and irrational herding. The concept suggests that investors adopt rational investment decisions of other investors to protect their own interests [Bickchandani et al. (1992) and Davenow and Welsh (2004)]. Irrational herding occurs when investors blindly copy other decisions despite having their own information [Nofsinger and Sias (1999) and Sias (2004)]. In addition to the rational and irrational, according Davenow and Welsch (2004), there is still a semi-rational herding concept, where an investor will be based on heuristics in decision-making of other investors, combined with their own information. The motive of the heuristics is for the sake of long-term yield maximization.

Lakonishok et al. (1992) developed it specifically to detect the size of herding among pension fund managers. They analyzed the correlation of trading patterns among a group of investors to buy or sell a particular asset in the same time period, and they found that there was no convergence of trade between pension fund managers. Research demonstrates that many who apply the size of Lakonishok et al. (1992) reported this, and there is strong evidence of herding through the correlation between stock returns and trading volumes [Hiemstra and Jones (1994) and Wei et al. (2009)]. However, to capture the differences in the behavior of traders, a group of researchers found weak evidence of the existence of herding through the correlation between individual and aggregate stock returns and trading volumes [See Alemanni and Onelas (2009)].

Another study investigating the group herding behavior among foreign investors in emerging markets reported no evidence of herding [Chen (2001), Koutmos and Saidi (2002) and Park and Sabourian (2011)]. Although these studies have made enough contributions to the literature, there will still be discussions about different herding measurements (as a correlation pattern among group of investors to buy and sell a particular asset) between developed and developing countries. They have discussed differences in the magnitude of herding between developed and developing countries, and many other studies still indicate there is herding in the market.

Chang et al. (2000) analyzed the markets in the US, Hong Kong, Japan, South Korea, and Taiwan, and they did not find evidence of herding in the US and Hong Kong, but there was only some evidence for Japan. However, Chang et al. (2000) reported significant herding evidence in emerging markets, such as South Korea and Taiwan. Choe et al. (1998) studied the Korean currency crisis period in 1997 and found foreign investors were more likely to herd than domestic investors. Empirical evidence for the case of IDX herding has been discovered by Gunawan et al. (2011), Setiyono (2012) and Setyawan and Ramli (2013). Based on the previous description, an alternative hypothesis as follows could be proposed:

Hypothesis 1. In the daily stock transactions in the Indonesia Stock Exchange (IDX), there was herding behavior by domestic investors following that by foreign investors during the crisis (2009-2011).

2.3 Hypotheses of the Herding Determinants

Herding intensity is negatively related to the size of the market, which indicates that institutional herding in the Taiwan stock market is primarily driven by information asymmetry [see Zhou and Lai (2009)]. The size of the market in Taiwan will be perceived differently by investors. Chamley (2004) suggested that the problem of information asymmetry in the capital market can explain the volatility of the stock price. Imperfectly informed investors in the capital markets may cause the stock price to be more volatile than the capital market of perfectly informed investors. There are two factors that contribute to the change in stock price: changing expectations of future cash flow and a lack of information. Usually stocks that have less information are small in capitalization compared to the large stakes. Small stocks are generally less researched by capital market researchers compared to the large stakes. This is due to the relatively high cost of research. Conducting research for large stocks are expected to provide greater profits, considering their trading stocks will be more liquid than those of small stocks.

The liquid or illiquid stock situation discussed in the literature mainly tested the impact on the stock returns [Lee and Rui (2002) and Li and Wang (2010)]. Assets that react strongly to changes in the overall market liquidity crisis make the illiquidity to cause investors' expected returns to be higher, and investors tend to require systematic liquidity premiums [Campbell, et al. (2009)]. Other research that focuses on the direct impact of illiquidity on stock prices is Amihud and Mendelson (1986) and Amihud (2002). Amihud and Mendelson (1986) argued that the spread (the difference between the stock prices) is a liquidity-based transaction cost for traders. When liquidity increases, transaction costs (spread) decrease. Consequently, the share price will rise. However, illiquidity will reduce investors' interest due to the reduced attractiveness of the stock. When illiquidity occurs, corporate issuers will perform various actions to raise the liquidity of their shares in more ways than discounting the price.

Amihud (2002) established the relationship between illiquidity and stock prices. He found illiquidity decreases the share price on the basis of an increase in price volatility. During volatility, the asset liquidity premium increases. As a result, the stock becomes more risky. Amihud (2002) used a general equilibrium model to connect the liquidity of the stock market and its impact on asset prices. Amihud (2002) found that the trade in the stock market will be liquid (increased in liquidity) when trading has a complete match between the seller and the buyer. Lou and Shu (2014) found that in China's stock market, the illiquidity factor is derived from information asymmetry. Kremer and Nautz (2013) found that the herding intensity depends on the characteristics of the stock, including stock liquidity, as well as on historical stock returns and volatility of stock prices (unintentional herding). However, in contrast to the intentional herding theory, herding is more inclined to the more liquid and larger shares. Herding intensity depends on the volatility of the past within the asymmetric information situation. The volatility leads to increased sell herding and decreased buy herding.

When investors are uninformed about the real dividend growth rate, expectations of future cash flows are less varied. This has the effect of reducing price volatility. However, it illustrates that there is uncertainty of cash flows over these shares in the future. Investors then demand higher premiums to accommodate the information asymmetry, and the stock price becomes more sensitive in trade deals. This would increase price volatility. The net changes in the volatility of the price (highest and lowest price) depend on factors expectations or information asymmetry that has a dominant influence on the stock price. When information asymmetry is considered more important or more dominant, then the prices become more volatile as investors are uninformed.

Wang (2000) found that the information asymmetry among investors can lead to increased price volatility. In the information asymmetry situation, the investors who have more information will have the advantage over the uninformed investors. Therefore, the uninformed investors will face miscast (adverse selection) problems when they respond to various types of information, so they will buy the stock at a price higher than the actual price (overpriced). They demand an additional premium for the risk they trade off to the investors who have more information. This situation makes it more elastic and will increase the price volatility. The existence of uninformed investors may cause the risk premiums to become much higher than in the situation of symmetric information (type of efficient markets). When many investors are less informed (uninformed investors), the price then is formed on the basis of less fundamental information. This will result in the greater uncertainty of future cash flows. Therefore, in stock investing, the uninformed investors will require higher premiums. Lou and Shu (2014) stated that as uninformed investors increase, the premiums they will assign will increase. In situations where the uninformed investors increase, the asymmetry of information will be greater, and the greater the difference between the highest and lowest prices (spread). Therefore, investors are increasingly demanding higher premium as compensation.

De Long et al. (1990) suggested that the trade within the information asymmetry in the capital market could increase price volatility due to a greater risk premium. Such high expectations of stock returns depend only on the risk of stock future cash flows. Furthermore, according to De Long et al. (1990), although the trade within the increased price volatility is without information asymmetry, this does not affect the risk premium because it will not change the stock fundamental risk. However, if there is information asymmetry in the capital market, the trade will occur with different information, and this will affect the quality of the price of the personal information of each investor of the expected future cash flows.

Amihud (2002) demonstrated that there was a significant negative correlation sequence of long-term stock returns. There was a successive negative correlation between the stock returns and the average of excess return (the difference between actual returns and expected returns) that can be derived from a negative average of the underlying variables. However, in the presence of information asymmetry, the uninformed investors then can only learn from the state variables or from the realized returns (past). The future investors' expected return will depend on the average return in the past, and this will allow generating negative stock returns. Herding is due to the stock's liquidity, volatility and past stock returns derived from information asymmetry [see opinions Testa (2012) and Bootrz and Kremer (2013)].

Hypothesis 2: *information asymmetry affects the intensity of herding.*

3. RESEARCH METHODS

3.1 Research Data

Employing daily stock transaction of each share traded, the study was conducted during the crisis period of 2009-2011. We used the Iq prime plus daily transactions data, such as transactions of each foreign buy and sell stocks, and domestic buy and sell stocks with the high and low prices.

3.2 Operational Variables

3.2.1 Herding Behavior

Setyawan and Ramli (2013) described herding behavior of investors that follows the decisions taken by other investors. Operationally, the herding will be measured by the herding measure of Lakonishok et al. (1992), Nofsinger (1996) and Neal et al. (2002). This herding size has a major component of the purchase and sale of shares interaction between foreign investors and domestic investors. The code symbol size is according to herding research by Lakonishok et al. (1992), Nofsinger (1996) and Neal et al. (2002), and is represented by H_i with the formulation:

$$H_i = 1/N \sum \sum ABS (B_{ijt}/ (B_{ijt} + S_{ijt}) - p_{it}) - AF_{ijt} \tag{1}$$

For the effectiveness of the above H_i value, the data B_{ijt} and S_{ijt} are required to be present in the database trading. B_{ijt} and S_{ijt} are buy and sell transactions between foreign investors and domestic investors. If there is an indication of trading between domestic and foreign investors, the potential for domestic investor herding appears.

Component	Notes
H_i	herding measure from investor group i
B_{ijt}	number of buy trades from investors group i, in stock j, on day t
S_{ijt}	number of sell trades from investors group i, in stock j, on day t
P_{it}	the proportion of trades by group i; across all stocks; on day t that are buys (i.e., the average of $B_{ijt}/(B_{ijt}+S_{ijt})$ over j)
AF_{ijt}	adjustment factors, i.e., expected value of the absolute value of $(B_{ijt}/ (B_{ijt} + S_{ijt}) - p_{it})$ with the assumption that B_{ijt} follows a binomial distribution with the probability p_{it} of success.

Based on the formula of herding measure, if the H_i value is higher, it means there is no indication of herding behavior. The more positive the H_i is, the bigger the buy herding behavior indication, while if it is more negative, there is an indication of herding because of the behavior of the sell. When the value of H_i is close to zero, it means there is no indication of herding behavior. For the case when the value of the $IDX P_{it}$ and AF_{ijt} are difficult to estimate, it is possible to be equated with zero. Purpose ABS is the absolute value when the results are compared with the minus positive results.

Information Asymmetry

“Information asymmetry is present when one party to a transaction has more or better information than the other party. (This is also called a state of asymmetric information). Most commonly, information asymmetries are studied in the context of principal-agent problems”. (Aldea and Marin, 2007)

$$IA_{jt} = [(HTi_{jt} - HTe_{jt}) / (HTi_{jt} + HTe_{jt}) 0,5] \times 100\% \tag{2}$$

IA_{jt} = Information Asymmetry of Transaction on Stock j on day t.

HTi_{jt} = The Highest Price of Transaction on Stock j on day t.

HTe_{jt} = The Lowest Price of Transaction on Stock j on day t.

3.3 Analysis Method

3.3.1 Herding Existence Model of Hypothesis Testing

To test the potential of herding in the Indonesian Stock Exchange (IDX), in addition to using the amount of herding as size in B.1, we will use descriptive chart patterns. Using the dummy variable of the amount of herding, which is measured by 1, and 0 otherwise, it was proven that the existence of herding is one point only (discrete). The pattern in the chart shows the continuity of herding that occurs in the IDX. We consider the continuity of herding to be as

important as the dynamics of the herding patterns, in terms of them being stationary or fluctuating. When the movement indicates stationary herding, there is an indication of information asymmetry as a determinant of herding, or else the fluctuated herding movement signals that there is a stronger effect of information asymmetry.

Frequency chart patterns and sizes were employed by Lakonishok et al. (1992) in a herding study. The indications of herding will be proven (H_1 will be accepted) when the pattern of the frequency and size of herding by Lakonishok et al. (1992) are not too stationary, and they will be characterized by a certain trend. The total (H), buy (Hb) and sell (Hs) herding were tested.

3.3.2 Herding Determinants Model of Hypothesis Testing

For this hypothesis testing, we will be using analysis of VAR or VEC. VAR analysis is used when herding relationship patterns and information asymmetry are linear, while the VEC analysis is used when the relationship between the two is non-linear. The terms of VAR or VEC analysis is the existence of a causal relationship between herding and information asymmetry with a Granger Causality test.

Technically, a VAR or VEC analysis model of herding and information asymmetry can be described as follows:

$$H_{it} = \beta_0 + \beta_1 H_{i(t-1)} + \dots + \beta_n H_{i(t-n)} + \psi_1 IA_{i(t-1)} + \dots + \psi_n IA_{i(t-n)} + \varepsilon_{it} \tag{3}$$

$$IA_{it} = \delta_0 + \delta_1 IA_{i(t-1)} + \dots + \delta_n IA_{i(t-n)} + \omega_1 H_{i(t-1)} + \dots + \omega_n H_{i(t-n)} + \varepsilon_{it} \tag{4}$$

Hypothesis 2 (H_2) is accepted when $\beta_1, \dots, \beta_n, \psi_1, \dots, \psi_n, \delta_1, \dots, \delta_n$ and $\omega_1, \dots, \omega_n$ have a significant influence on H and IA. [p-value ≤ 0.05].

4. RESULTS AND DISCUSSION

4.1 Identification of Herding During 2009-2011

Descriptive statistical analysis of the frequency herding behavior (Freq_herding), either buy or sell, demonstrates that the average buy herding is larger than sell herding. Likewise, the median is greater for freq. herding to buy than freq. herding to sell. This suggests that more domestic investors conduct herding when they buy shares. While there is herding of domestic investors to the foreign investors in the context of the sale of shares, or freq. herding to sell, domestic investors do not always conduct herding. Looking at the not supportive economic situation (not good), then domestic investors tend to conduct a good buy or sell herding. This happened in 2009. However, when the economy started to recover in the first quarter of 2010 to 2011, domestic investors tended to conduct buy herding rather than sell herding. Maximum Freq. herding to buy is at 0.275168, while the result for the maximum freq. herding to sell is 0.323077 (see table 4.1).

This suggests that when the current economic situation is volatile, the panicked domestic investors follow the trading transactions undertaken by foreign investors, either sale or purchase of shares, even when freq. herding to sell exceeds freq. herding to buy. This is supported by the smaller standard deviation of freq. herding to buy than the standard deviation of freq. herding to sell. The domestic investors respond better to a volatile economic situation and become more panicked by selling shares compared to buying stocks by following foreign investors who sell their shares. Frequency of herding against foreign investors buying has a smaller deviation than the frequency deviation of sell herding. Domestic investors are more convinced by the foreign investors in purchasing stocks, so they are more stable following the purchase of shares bought by foreign investors. When selling stocks in the normal or not volatile economic situation, domestic investors do not get hung up on the sale of the shares by foreign investors, but rather on the stock return. Except in a turbulent economic situation, they tend to follow the behavior of foreign investors selling shares.

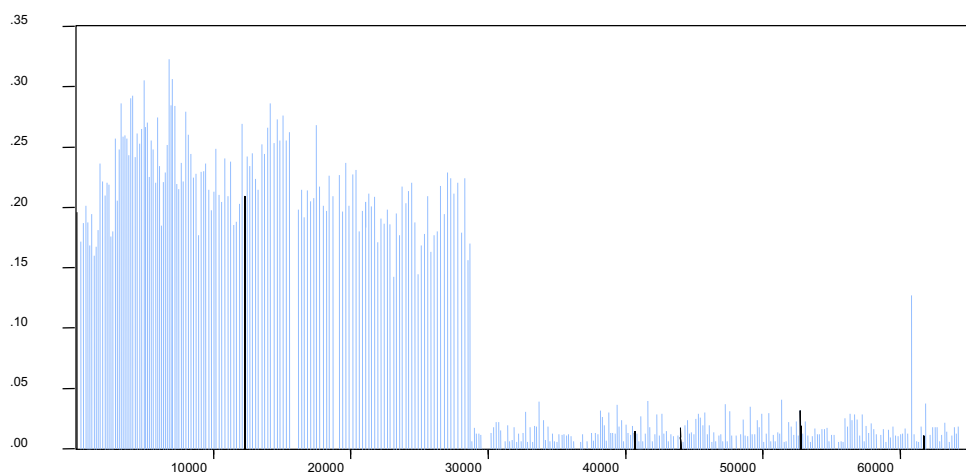
Table 4.1. Freq. herding to buy and Freq. herding to sell in 2009 – 2011

Component	Freq. Herding To Buy	Freq. Herding To Sell
Mean	0.141794	0.093766
Median	0.123529	0.019231
Maximum	0.275168	0.323077
Minimum	0.000000	0.000000
Std. Dev.	0.053798	0.103082
Skewness	0.255314	0.568319
Kurtosis	2.267630	1.535438
Jarque-Bera	14.77969	63.58243
Probability	0.000617	0.000000
Sum	63.09835	41.63214
Sum Sq. Dev.	1.285057	4.707241
Observations	445	444

Figure 4.1 provides a more detailed picture of the freq. herding to sell; in 2009, there was a fairly large freq. herding to sell, even exceeding freq. herding to buy. This reinforces the view that in the current economic turmoil, domestic investors tend to follow the trading behavior of foreign investors in buying and selling shares, particularly in selling shares. While in a normal or stable economic situation, the domestic investors do not really follow sell herding because they believe that in the sale of shares, they will follow the pattern of returns in accordance with their desired return.

When the economic situation is in a normal state, freq. herding to buy is declining but still larger than freq. herding to sell (Figure 5.2., 5.3.). After 2009, the economic situation in Indonesia tended to be stable and even increasing, so freq. herding to buy continues although the intensity decreases. However, freq. herding to sell is down dramatically and occurs only in small to zero frequency.

Figure 4.1. Freq. Herding to Sell in 2009 - 2011



The buy herding by domestic investors following foreign investors in emerging markets indicates that domestic investors still lack confidence in the results of the analysis of their own work, and the domestic investors’ number of transactions is much smaller than the foreign investors’ transactions conducted. Therefore, they prefer to follow the purchase transaction of foreign investors. In addition, market analysis knowledge of domestic investors on the price of a share is far less than that of the foreign investors. It makes it much safer for them to follow the purchase transaction of foreign investors who are believed to have more expertise than domestic investors.

The data types of stocks with zero or no herding have a large enough frequency or greater per week compared with the average data of the stocks that have a herding transactions by domestic investors, and it usually occurs in the second or third tier stocks, which are less attractive to foreign investors. This suggests that the majority of domestic investors tend to invest in stocks that are not traded by foreign investors, with a small total volume transaction. The price of the stock is not influenced by foreign investors. Domestic investors traded the stocks with each other in stocks that are outside of the seed stocks or outside the 45 blue chip stocks. The portfolio developed by the domestic investors are more in stocks other than the LQ 45 index stocks, so the information asymmetry among domestic investors was allegedly not large enough. Because the supply and demand of shares involve domestic investors' lack of knowledge or lack of information, the information asymmetry is not large enough, except in the case of insider trading. Insider trading is alleged by the large enough volume of transactions that is above the average transactions volume during the period (per week), although there is no information that could lead to an increase in the amount of the transaction.

Figure 4.2. Freq. Herding to Buy in 2009 - 2011

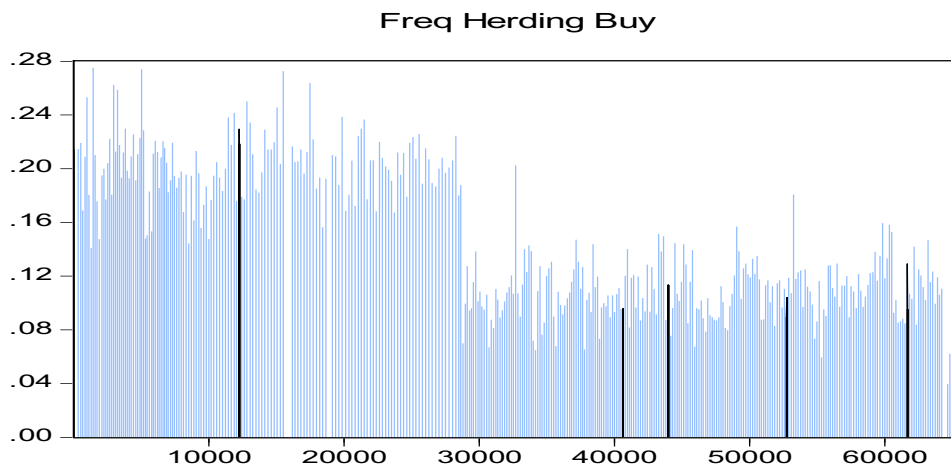
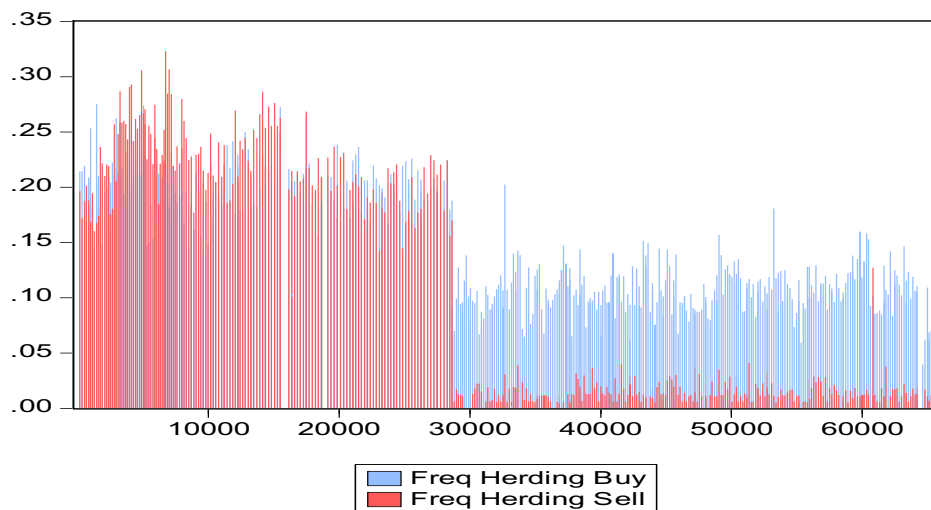


Figure 4.3. Freq. Herding to Buy and Freq. Herding to Sell in 2009 - 2011



4.2 Herding Identification During 2009-2011

During 2009 (the unit data of 100-300), the total herding (H) chart did not fluctuate too much at the beginning and then declined in the second quarter following. It was between .40 and .50. The buy herding (Hb) and sell herding (Hs) were similar and did not fluctuate too much either; it was between .20 and .30. A different case is in the second quarter following; the buy herding dropped to .10 - .15, and the sell herding to .00 - .02. After the second quarter of 2009, there was still buy herding (Hb) with smaller frequency, but it was not with the sell herding. There was not sell herding since. For the years 2010-2011 (the unit data 300-700), there was buy herding, but it was not with the sell herding. This indicates that during the crisis (beginning of 2009), larger herding occurred in the IDX, and it still continued afterwards but with a smaller frequency. The buy and sell herding occurred during the crisis, but there was only buy herding afterwards. Domestic investors are more inclined to conduct buy herding.

Figure 5.4. Herding (H, Hb and HS) in 2009 – 2011

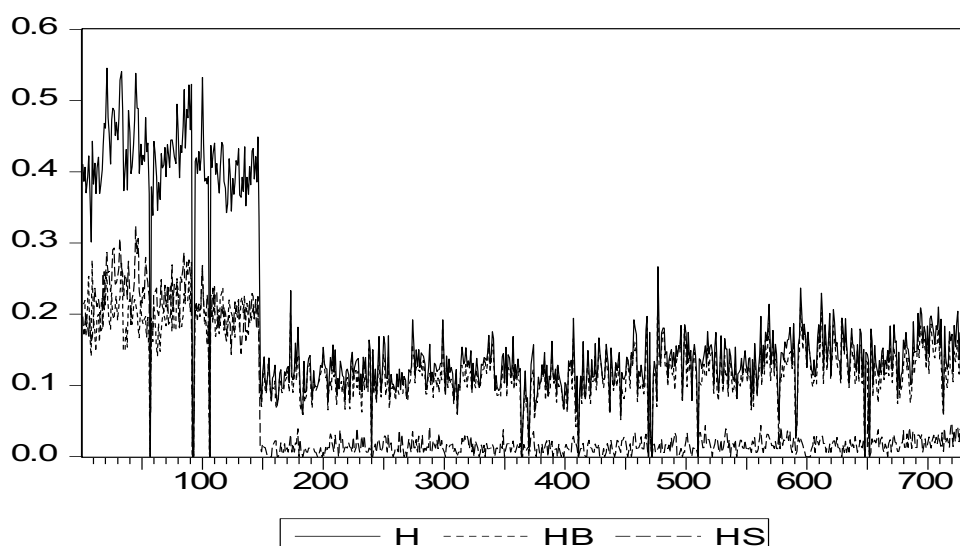


Table 5.2 Normality of Herding (H, Hb and Hs) in 2009 – 2011 with Proxy from Lakonishok, et. al. (1992)

Component	H	Hb	Hs
Mean	0.185524	0.130625	0.054899
Median	0.138122	0.122222	0.017442
Std. Dev.	0.122408	0.047988	0.083068
Jarque-Bera	231.5994	15.71057	354.9736
Probability	0.000000	0.000388	0.000000

4.3 Identification Information of Asymmetry During 2009-2011 Utilizing The Size of Aldea and Marin (2007)

In Figure 5.5, the visible range of the value of information asymmetry is 0.005 to 0.015. It indicates that the information asymmetry is not fluctuating too much. There was an indication that the domestic investors had difficulty in obtaining additional information in deciding trading strategies. However, the rather stable value of information asymmetry implicates high liquidity in stock exchange trading among domestic investors. The high liquidity of the stock exchange will have a positive impact on the performance of the Jakarta Composite Index (JCI), which is expected to lead to special attraction for foreign investors. The resulting implications include that the high information asymmetry could improve herding behavior between foreign and domestic investors on the stock exchange.

Figure 5.5. Information Asymmetry in 2009 – 2011 with proxy from Aldea and Marin (2007)

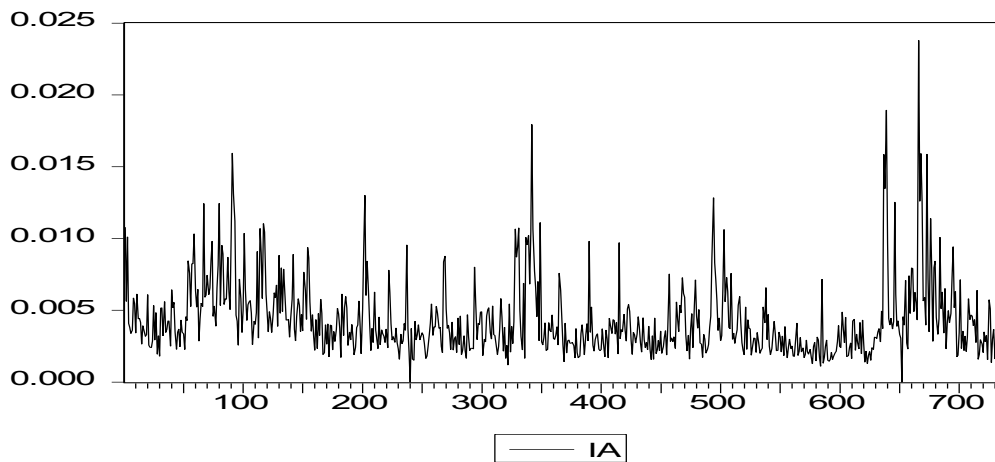
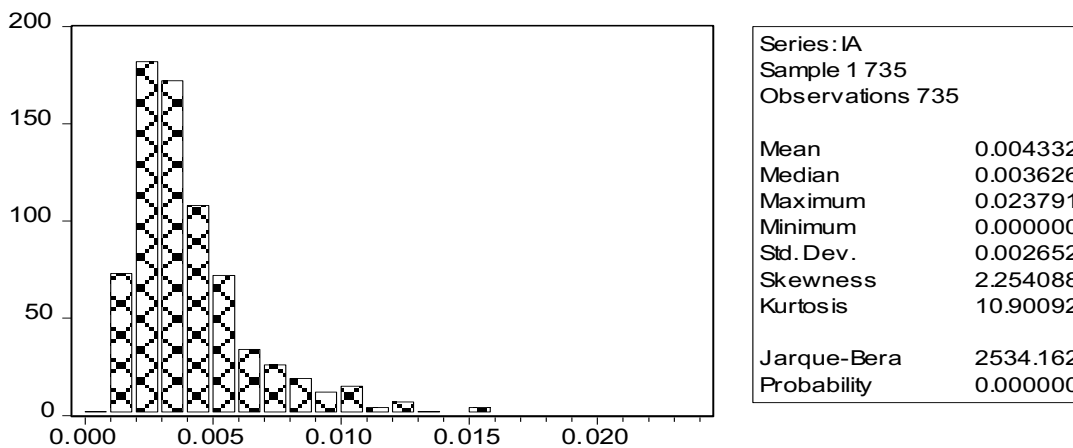


Figure 5.6. The visible evidence of normality for information asymmetry is shown in the histogram pattern above, i.e., the value of the Jarque-Berra is very high, and the amount of information asymmetry exceeds the average value of the standard deviation. The normality of information asymmetry will support stationary patterns when tested with herding.

Figure 5.6. Test of Normality from Information Asymmetry in 2009 – 2011 with proxy from Aldea and Marin (2007)



4.4 Granger Causality and the VEC Model

4.4.1 Granger Causality Analysis on the 4th Lag

The Granger causality analysis is effective on the 4th lag. Reciprocal relationships were found between total herding and buy herding, total herding and information asymmetry, and sell herding and information asymmetry. Reciprocal relationships between total herding and buy herding, total herding and information asymmetry, and sell herding and information asymmetry indicate that the three relationships can be estimated by the VAR or VEC model. The VAR model could be employed if a reciprocal relationship is linear, whereas if the reciprocal relationship between these three models is nonlinear, the VEC model would be more relevant.

The cause of the non-linear nature of the relationship among herding and various determinants is the herding measure, which is the ratio of the number of purchases and sales of stocks of foreign and domestic investors. The herding amount obtained of 0-1, cannot be in the form of a straight diagonal line of data distribution when mapped in P-Plot, which is usually used as normality check.

4.5 VEC Model

4.5.1 Total Herding and Buy Herding

The value co-integration equation of the buy herding significant t-test indicates the existence of a long-term equilibrium relationship between total herding and buy herding. Most of the long-term period shares to buy transactions on the stock exchange have been turned out by the foreign investors. The actions of the foreign investors to buy shares in a period will be followed by the domestic investors.

The VEC regression model results found that there is significant influence of herding in the past compared with herding now. This supports the theory of technical analysis stock: history repeats itself. In the transactions of purchases and sales of shares on the stock exchange, foreign investors will look at historical performances. In addition, there is also a significant effect of buy herding in the past on the current herding. The historical performance of all transactions will be important information for foreign investors; this then is followed by the domestic investors.

4.5.2 Total Herding and Information Asymmetry

In this section, it is found that there is a visible long-term relationship (co-integration) between total herding and information asymmetry. The existence of co-integration between herding and information asymmetry indicates that the action of purchases and sales of shares of foreign investors is followed by the domestic investors. This also results in increasing price volatility as a result of a wide range of stock prices in the order book.

Related to the VEC model regression results, herding behavior is influenced by information asymmetry. However, information asymmetry will not be influenced by herding behavior. The information asymmetry is influenced by the information asymmetry of the two and three previous periods. This finding indicates that the domestic investors followed the action of the foreign investors due to the lack of information. This is caused by the differences in access to the latest information and most comprehensive data between foreign investors and domestic investors that are still imposed in the IDX.

4.5.3 Sell Herding and Information Asymmetry

The VEC model analysis between sell herding and information asymmetry found that sell herding and information asymmetry had a co-integration. The co-integration between the two is the act of the sale of shares of foreign investors, followed by the domestic investors. The co-integration is more due to the information asymmetry. In the long term, when the price volatility is increasing on the stock exchange, this will be encouraged by domestic investors who conduct panic selling.

The information asymmetry shown affects the sell herding during 1, 2 and 3 periods previous. However, as an endogenous variable, the sell herding as exogenous in VEC does not have a significant effect on information asymmetry. The information asymmetry is only affected by the information asymmetry itself from the previous period. These findings suggest that the information asymmetry the domestic investors suffer could potentially lead to panic selling when they do not have enough confidence in and experience with a share.

4.6 Results Discussion

Hypothesis 1: Testing (Existence of Herding)

The existence of herding in the study can be proved by the results of herding frequency movements during 2009-2011. The frequency of buy herding and sell herding movement is shown in the results of different graphs. Sell herding frequency movement was the dominant frequency in the period 2009-2010 and less dominant in the period 2010-2011. Different things occurred to produce a consistent buy herding movement that was dominant in the period 2009-2011. The dynamic movement of buy and sell herding confirms the existence of herding in the IDX and automatically receives H_1 .

Employing the amount of the existence of herding of Lakonishok et al. (1992), it is found that there was also a dynamic movement of buy herding and sell herding during the period 2009-2011. The dynamic buy herding movement appears more dominant than sell herding. The magnitude of sell herding has a range of 0.05 to 0.10, smaller than buy herding, which has the range of 0.20 to 0.30. The results also indicate that domestic investors are more inclined to conduct buy herding than sell herding. Evidence of the existence of herding in the IDX supports the studies by Neal et al. (2002), Bowe and Domuta (2004), Gunawan et al. (2011), Setiyono (2012) and Setyawan and Ramli (2013).

Hypothesis 2: Testing (Determinants of Herding)

At the time of the analysis of the dynamic movement of information asymmetry with the graphical analysis, the results demonstrated that a movement pattern is not as dynamic as herding. When we utilize the scatter plot analysis (distribution of data) with a concern for herding and information asymmetry, a quadratic pattern is detected with the characteristic of information asymmetry forming a parabolic curve with a maximum value of 0.20.

When regression was performed to test hypothesis 2, the VEC (Vector Error Correction) model was then implemented, which preceded the Granger causality analysis; it was proved significant in the 4th lag. The VEC analysis results prove the existence of herding influenced by information asymmetry, and more surprising, changes in the IDX information asymmetry will lead to sell herding. These results support the study and confirm H_2 , Testa (2012) and Brootz and Kremer (2013).

5. CONCLUSIONS AND SUGGESTIONS

5.1 Conclusions

There are two objectives in this study: 1) Confirming the existence of herding in the IDX and 2) Confirming whether information asymmetry could be a determinant of herding. The results demonstrated that herding behavior still occurs on the stock exchange, but of a different pattern from the previous studies by Gunawan et al. (2011), Setiyono (2012) and Setyawan and Ramli (2013). We split herding into buy herding and sell herding. The purpose of this herding solution is to see whether there is a donation effect of information asymmetry in accordance with Testa (2012) and Brootz and Kremer (2013).

When analyzing the dynamic movement of buy herding and sell herding frequency utilizing the amount of herding of Lakonishok et al. (1992), the second type of herding presents the dynamic movement patterns that prove the existence of herding continuously during the period 2009-2011 that remained since the crisis. These results extend the existence of discrete herding occurring in earlier studies.

The second objective of this study was also successfully demonstrated by the effect of information asymmetry, in particular, on sell herding. This result is unique to the case of the stock exchange because it means the phenomenon of panic selling that occurs is caused by herding and information asymmetry in accordance with the opinions of Testa (2012). Domestic investors who are exposed to information asymmetry tend not to disagree with foreign investors' trading position but instead always support them.

5.2 Suggestions

This research still needs to be improved in terms of the measurement of buy herding and sell herding because it employs only the negative indication of the proxy of herding by Lakonishok et al. (1992), which leads to sell herding, and a positive indication for buy herding. Another important aspect to improve is to reconstruct the proxy of information asymmetry of Aldea and Marin (2007) from daily data into the intraday level.

AUTHOR INFORMATION

Ishak Ramli was born in 1952; Formerly Finance and Administration Manager for thirteen years, Finance Director for thirteen years and Human Resources Director for eleven years; has been teaching Corporate Finance, and Management Accounting for 26 years, and Capital Market & Investment for six years. E-mail: ishakr@fe.untar.ac.id

Sukrisno Agoes was born in 1947; Public Accountant since 1985; Professor in Auditing; has been teaching Auditing and Financial Accounting for 36 years. E-mail: sukrisno.a@gmail.com

Ignatius Roni Setyawan was born in 1973; has been teaching Corporate Finance and Investment for fifteen years. Email: ignronis@gmail.com

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APPENDIX

Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Probability
HB does not Granger Cause H	731	11.2304	7.6E-09
H does not Granger Cause HB		13.7490	8.2E-11
HS does not Granger Cause H	731	11.2304	7.6E-09
H does not Granger Cause HS		0.59546	0.66603
IA does not Granger Cause H	731	3.29053	0.01098
H does not Granger Cause IA		2.55494	0.03778
HS does not Granger Cause HB	731	13.7490	8.2E-11
HB does not Granger Cause HS		0.59546	0.66603
IA does not Granger Cause HB	731	1.80201	0.12657
HB does not Granger Cause IA		2.79296	0.02545
IA does not Granger Cause HS	731	3.07651	0.01579
HS does not Granger Cause IA		2.33977	0.05376

VEC Model of Total herding and Buy herding

Error Correction:	D(H)	D(HB)
CointEq1	0.230447 (0.03747) (6.14954)	0.222268 (0.02569) (8.65229)
D(H(-1))	-0.538892 (0.08545) (-6.30619)	-0.059217 (0.05858) (-1.01086)
D(H(-2))	-0.381836 (0.09120) (-4.18680)	-0.070385 (0.06252) (-1.12581)
D(H(-3))	-0.364917 (0.08955) (-4.07487)	-0.124379 (0.06139) (-2.02604)
D(H(-4))	-0.316925 (0.08055) (-3.93469)	-0.164306 (0.05522) (-2.97572)
D(HB(-1))	0.341833 (0.15335) (2.22911)	-0.180090 (0.10512) (-1.71313)
D(HB(-2))	0.233172 (0.15317) (1.52235)	-0.098826 (0.10500) (-0.94122)
D(HB(-3))	0.323090 (0.14150) (2.28337)	0.088022 (0.09700) (0.90746)
D(HB(-4))	0.359472 (0.11739) (3.06215)	0.194395 (0.08047) (2.41563)
C	-0.000682 (0.00185) (-0.36775)	-0.000228 (0.00127) (-0.17958)
R-squared	0.289442	0.375356
Adj. R-squared	0.280560	0.367547
Akaike Information Criteria	-8.599291	
Schwarz Criteria		-8.460870

VEC Model of Total Herding and Information Asymmetry

Errzor Correction:	D(H)	D(IA)
CointEq1	0.002486 (0.00576) (0.43192)	0.002061 (0.00025) (8.32205)
D(H(-1))	-0.551717 (0.03732) (-14.7819)	-0.000224 (0.00161) (-0.13953)
D(H(-2))	-0.400188 (0.04127) (-9.69702)	0.000530 (0.00178) (0.29846)
D(H(-3))	-0.262418 (0.04101) (-6.39863)	0.000935 (0.00176) (0.52997)
D(H(-4))	-0.148139 (0.03679) (-4.02651)	0.001094 (0.00158) (0.69103)
D(IA(-1))	-1.040831 (1.11656) (-0.93218)	-0.244567 (0.04805) (-5.08985)
D(IA(-2))	-2.608741 (1.07675) (-2.42279)	-0.075645 (0.04634) (-1.63250)
D(IA(-3))	-2.198762 (1.01300) (-2.17054)	-0.035876 (0.04359) (-0.82295)
D(IA(-4))	-0.303504 (0.86213) (-0.35204)	-0.034578 (0.03710) (-0.93199)
C	-0.000730 (0.00190) (-0.38415)	-3.46E-06 (8.2E-05) (-0.04225)
R-squared	0.252449	0.287775

VEC Model of Sell Herding and Information Asymmetry

Error Correction:	D(HS)	D(IA)
CointEq1	-0.000569 (0.00393) (-0.14470)	0.002939 (0.00035) (8.38374)
D(HS(-1))	-0.471031 (0.03711) (-12.6941)	-0.003662 (0.00331) (-1.10703)
D(HS(-2))	-0.312762 (0.03990) (-7.83862)	-0.002827 (0.00356) (-0.79472)
D(HS(-3))	-0.249787 (0.03976) (-6.28167)	0.000617 (0.00354) (0.17396)
D(HS(-4))	-0.145180 (0.03683) (-3.94182)	0.000117 (0.00328) (0.03569)
D(IA(-1))	-0.958616 (0.53784) (-1.78236)	-0.241414 (0.04795) (-5.03497)
D(IA(-2))	-1.366803 (0.51937) (-2.63166)	-0.074879 (0.04630) (-1.61722)
D(IA(-3))	-1.021588 (0.48941) (-2.08739)	-0.038732 (0.04363) (-0.88772)
D(IA(-4))	-0.043326 (0.41661) (-0.10400)	-0.038223 (0.03714) (-1.02914)
C	-0.000469 (0.00092) (-0.51031)	-5.68E-06 (8.2E-05) (-0.06941)
R-squared	0.204056	0.286646

NOTES