International Research Journal of
BUSINESS STUDIES

ISSN: 2089-6271 | e-ISSN: 2338-4565 | https://doi.org/10.21632/irjbs

Vol. 11 | No. 2

Herding Behavior in Indonesian Investors

Maria Fransiska, Sumani, Willy, Stevanus Pangestu

Faculty of Economics and Business, Atma Jaya Catholic University of Indonesia, Jl. Jenderal Sudirman 51, Jakarta 12930

ARTICLE INFO

Keywords:
Herding Behavior,
LQ 45,
stock index,
Vector Autoregression (VAR)

Kata kunci:
perilaku herding,
LQ 45,
indeks saham,
vector autoregression

Corresponding author:
sumani@atmajaya.ac.id

ABSTRACT

This research attempts to investigate the herding behavior of the companies that invested in IDX LQ45 Index during 2014 through 2016. Herd behavior is the tendency of investors to follow other investors' actions in the market. LQ45 was chosen as it comprises the most heavily-traded stocks of the Indonesian Stock Exchange. This research used Vector Autoregressive model to determine the effects of size and market return on the herding behavior. The Granger causality test suggests that there are dynamic interactions: (i) between size and herding behavior; and (ii) between market return and herding behavior. In addition, Variance Decomposition and Impulse Response reveal that market capitalization (size) has variable of the greater role in defining herding behavior, compared to that of market return.

SARI PATI

Penelitian ini mengenai perilaku herding behavior *pada perusahaan LQ 45 di Bursa Efek Indonesia periode 2014 – 2016.* Herding behavior *merupakan kecenderungan perilaku investor untuk mengikuti perilaku investor lain di pasar. Penelitian dilakukan untuk mengetahui pengaruh* size *dan* return *pasar terhadap perilaku* herding *dengan menggunakan metode* Vector Autoregression (VAR)*, data penelitian adalah kepemilikan saham investor dengan sampel menggunakan perusahaan yang terdaftar pada indeks saham LQ 45 periode 2014 – 2016. Menggunakan sampel perusahaan LQ 45 karena sahamnya merupakan yang paling likuid dan memiliki kapitalisasi pasar yang tinggi. Untuk menjawab permasalahan dalam penelitian ini, penulis melakukan analisis VAR,* Impulse Response Function (IRF), Variance Decomposition*, dan uji Kausalitas Granger. Hasil dari pengujian analisis VAR yaitu uji kausalitas Granger, menunjukkan adanya interaksi dinamis antara size dan perilaku herding dan juga antara* return *pasar dan perilaku* herding*. Berdasarkan analisis* variance decomposition *dan* impulse response *dilihat bahwa variabel kapitalisasi pasar (*size*) lebih berperan dalam menjelaskan variabel CSAD dibandingkan dengan variabel return pasar.*

INTRODUCTION

Capital market is a medium for investors to place their funds to increase value. According to Indonesian Capital Markets Law (Law No. 8 of 1995 on Capital Markets), capital market is where activities such as public offering and trading of securities issued by corporations occur. Capital market plays an important role as a bridge for corporations to gather funds from investors.

Investment is an indicator of economic growth. For the past several years, Indonesian capital market has shown a rapid growth, along with the country's overall economic growth. This is shown by the positive, growing trend in IHSG (Indonesia Stock Exchange Composite Index). Particularly in 2016 when the market closed at 5.296.71, a 290.71% increase from 2008 (Indonesia Stock Exchage, 2016).

In harmony with financial technology advancements, investors are enabled to conduct equity transactions with ease. The availability of electronic trading, provided by various stockbrokers, triggers more investors. The increase in number of investors in Indonesia is demonstrated by the growth in stock ownership. Table 1 displays LQ45 stock ownership based on investor types.

Table 1 shows a consistent increase in number of local, individual investors from 2010 to 2014. However, it took a downturn in 2015. Similar pattern also occurred for institutional investors. Individual foreign investors fluctuated more compared to the other types of investors. The number peaked in 2011 and continued to go down until 2013, before it rebounded in 2014. This trend difference was allegedly caused by information asymmetry, i.e. a condition where a certain party in a transaction possesses more information than the other (Al-Shboul, 2012). Such asymmetry would result in different investment decisions and would lead to irrational herding, which renders a market inefficient.

Herd behavior happens when an investor makes an investment decision that follows other investors in the market, rather than through an informed analysis (Szyszka, 2013). Herding investors believe that they follow those with superior information and consequently, they think that they made a less risky decision. This behavior can be labeled as irrational. Furthermore, herding investors may also cause instability in a financial market due to ignorance of important and fundamental information (Baddeley, 2012).

According Chang, Cheng, and Khorana (2000), herd behavior causes stock price fluctuation and mispricing in equity valuation. This is caused by a biased expected return and risk perception, which leads to a significant difference between stock price and its fundamental value.

Kremer and Nautz (2013) further states that herding causes instability in the form of return

Table 1. LQ45 stock ownership from 2010-2015

Investor Types	Number of shares (in billions)					
	2010	2011	2012	2013	2014	2015
Individual - Local	589.895	653.805	732.558	789.839	824.738	452.665
Institutional - Local	1.207.803	1.671.373	1.750.977	2.014.649	2.230.610	1.524.911
Individual - Foreign	1.458.705	2.635.751	138.914	53.383	72.830	70.280
Institutional-Foreign	1.914.010	2.380.688	2.593.619	3.117.799	3.332.964	2.089.111

Source: PT Kustodian Sentral Efek Indonesia reversal. More studies have shown evidences about herd behavior aggravating market stability and weakening financial systems (Bickhandani & Sharma, 2001).

Venezia et al (2010) performed a research on herding by differentiating professional and amateur investors and found that herding behavior was present in corporations with small market capitalization. Information availability influences the size of the corporation. More availability would reduce bias in markets, which enables investors to make better decisions and as a result, probability of herding is lower.

Saastamoinen (2008) argued that herding is trading action done by investors without regard for the fundamentals of investment. Such behavior causes investors to put their funds in investments they do not understand, thus taking more risk. Herding normally occurs in emerging markets. Gunawan et al (2011) gave evidence that there were herding investors all over the world, e.g. China, Taiwan, Republic of Korea, Finland, Italy, Greece, and Portugal. Moreover, Chang, Cheng, & Khorana (2000) found that (i) there was no herding in USA and Hong Kong regardless of the market condition, (ii) there was partial herding in Japan when the market was declining, and (iii) there was herding in Republic of Korea and Taiwan, i.e. emerging markets.

Hirshleifer & Teoh (2003) and Brunnermeier (2011) presented four reasons why institutional investors would be inclined to make similar investing decisions. These investors obtain and process the same information; particularly in an emerging market, where one must focus on macro information due to inadequate micro information; investors opt for prudent, liquid, and better-known stocks; low-skilled managers tend to follow the moves of their high-skilled counterparts. This is a managerial tactic accomplished to protect the managers' reputation; Gutierrez & Kelley (2009) expressed that for stock valuations, managers conform to the outcomes of other managers. This triggers herd behavior in institutional investors caused by peer pressure between financial managers.

Bikchandani & Sharma (2001) also listed three explanations for herd behavior in the market: information-based herding, reputation-based herding, and compensation-based herding. Information-based herding arises from doubtfulness in the minds of an investor regarding the information he/she possesses. Reputation-based herding occurs when investment managers are uncertain about their capabilities in managing a portfolio, despite their eagerness to perform for the company. Lastly, compensation-based herding takes place when institutional fund managers are stimulated to take profits. Such event usually transpires prior to earnings reporting.

If there is herding in the market, then its determinants and consequences have to be identified because it may explain market anomalies that causes a market to be inefficient, i.e. equity securities being inaccurately valued. Moreover, it would aid investors in making a better and informed decision by considering the factors that influence a stock market's direction. By assessing the dynamic interaction between herding, return, and trading activity, investors would be more informed in predicting, anticipating, and responding to herding anomalies

Herding Behavior

Herding is a psychological condition where investors ignore their own abilities and beliefs, and choose to follow others without proper contemplation (Devenow & Welch, 1996). Banerjee (1992) defines herding as a behavior in which people follow what other people do regardless of what they may feel or think personally.

Bickhandani & Sharma (2001) categorized herding into intentional and unintentional. Intentional herding occurs when an investor disregards his or her own knowledge and opt to follow another investor. Intentional herding is considered to be irrational because one would follow the sentiment of the market, be it panic or euphoria. It is also inefficient due to the destabilizing effect which causes the market to be more volatile. Whereas unintentional herding happens when investors are of the same viewpoint; they read the market conditions similarly. Quality information exists in the market which results in rational herding based on proper analysis. Unintentional herding would render the market more efficient and faster in price adjustments (Kremer & Nautz, 2013).

Previous studies have stated that herding behavior affects asset pricing because it influences stock price movement, as well as the risk and return of the stock. Lindhe (2012) argued that investors succumbing to market sentiments would cause the price of assets to deviate from its intrinsic values. This causes a chain reaction: inefficient stock trading transactions. Trend-following herd also worsens the level of return and stock volatility (Bickhandani & Sharma, 2001).

In 1995, Christie and Huang introduced Cross Sectional Absolute Deviation (CSAD) to detect herd behavior. In 2000, Chang, Cheng, and Khorana provided a significant contribution by proving that the nonlinear relationship between CSAD and market return would be more substantial in identifying herd behavior. In Indonesia, herd behavior research was first conducted by Bowe and Domuta (2004) and in subsequent years, many academics followed.

Lakonishok, Shleifer, dan Vishny (1992) analyzed 769 pension funds to study the influence of herding financial managers on stock price. It was discovered that herding affected stock price when trading feedback was positive. Whereas herding was not discovered in the sale of smaller stocks. They concluded that there was not sufficient evidence to claim that institutional investors shook individual stock prices. Institutional investors implement various styles and strategies; they trade equally without significantly influencing stock price. Lakonishok, Shleifer, & Vishny concluded that there would be no herding in a market because a purchased share is also a sold share. Moreover, they claimed that herding would be found merely in a subset of investors.

Chen, Yang, & Lin (2012) studied herding behavior in foreign institutional investors in Taiwan. They found that on average, foreign institutional investors were herding in the Taiwan Stock Exchange, i.e. industrial herding. Moreover, herding behavior affected future industrial returns positively in both normal and unstable economic periods. They concluded that foreign institutional investors exhibit contrarian trading strategies; purchasing past losers to support prices and selling past winners to repress volatility.

Mabrouk & Mohamed (2013) investigated return indices of 28 countries in Africa, Asia, Europe, and America from January 2006 to February 2009. They detected herding during market upturns and downturns by using Cross-Sectional Standard Deviation and Cross-Sectional Absolute Deviation from Christie & Huang (1995) and Chang, Cheng, & Khorana (2000), respectively. Initially, Mabrouk & Mohamed did not detect herd behavior. However, when they separated market turns, they found that herding behavior was asymmetric to them. They determined that herd behavior was significantly higher during market upturns.

In Indonesia, Ramli, Agoes, & Setyawan (2016) studied herd behavior by observing domestic investors following foreign investors. This research categorized buy herding and sell herding to prove donation effect as mentioned by Testa (2012) Data were obtained from daily trade history from 2009 to 2011 and they found that Indonesian investors herded. The herd behavior continued even after the financial crisis. Furthermore, they discovered that sell herding was specifically caused by asymmetric information; panic selling due to herd mentality.

Chang, Cheng, & Khorana (2000) examined investors in international markets, such as USA, Hong Kong, Japan, Republic of Korea, and Taiwan. They used Cross-Sectional Absolute Deviation to measure herd behavior based on the behavior of equity return. They found that there was no evidence of herding in the US and Hong Kong markets. The finding on USA was in line with Christie & Huang (1995). However, South Korea and Taiwan showed significant evidence of herding. These two countries showed lower dispersion of returns when prices were increasing and decreasing. The difference of dispersions between emerging market and developed market was also caused by different information disclosures in the market; there were more available information in developed markets. As for Japan, there was only partial evidence of herding. Finally, their research also proved that macroeconomic information had more significant effect (than company-specific information) on investors' herd behavior.

To assess herd behavior in LQ45 stocks and its dynamic causal relationship, the following hypothesis is formulated:

H_1: **There is a herding phenomenon for LQ45 stocks during 2014-2016.**

When market volatility is high, investors are more likely to ignore their own opinions and beliefs. They would opt to follow market sentiment, i.e. to herd.

H_2: **There is a dynamic interaction between market return and herd behavior for LQ45 stocks during 2014-2016**

Return is an important aspect of an investment. The higher the return, the more attractive an investment becomes. When the market is soaring, investors would share the news of their gains; words would spread, and this would trigger herding (Lan & Lai, 2011). Ozsu (2015) found that in Istanbul, return significantly influences herd behavior. In China, Lan & Lai (2011) also found a positive causality between market return and herding, as well as a negative causality between herding and market return.

H_3: **There is a dynamic interaction between market size and herd behavior for LQ 45 stocks during 2014-2016.**

Companies with large market capitalization (size) generally possess more superior information. They are more capable in making better investment decisions. The influence of size corresponds to information-based herding theory. This theory explains that investors without quality information would be unsure about their investment purchases, causing them to follow other investors

METHODS

Data

This research employed Return and Size as independent variables to predict Herding Behavior. The Indonesia Composite Index (IHSG) would be observed to determine stock return and as for the stocks, they would be selected from the stocks which were consecutively included in the LQ45 stock market index from 2014 until 2016.

Definition of variables

1. Return

Return is the result generated from an investment. This result would be considered by other investors in performing investing decisions. Investors would predict future returns by reflecting at past returns. The following is the formula to calculate return (Jogiyanto, 2000):

$$R_i = \frac{IHSG_t - IHSG_{(t-1)}}{IHSG_{(t-1)}}$$

Where R_i is market return; $IHSG_t$ is Indonesia Composite Index for period t; and $IHSG_{t-1}$ is Indonesia Composite Index for the period one year prior to t.

2. Size (Market capitalization)

Market capitalization is generally an important measure for the success of a public corporation. It is also related to the market demand for a company's stock. If the stock is lowly demanded, then it would result in a price drop, thus reducing the market capitalization. Market capitalization can be calculated with the following formula (Global Mining Investing eBook, 2014):

$$\textit{Market capitalization} = \textit{Outstanding shares} \times \textit{Share price}$$

3. Herd Behavior

Herd behavior, the dependent variable in this research, is the tendency of investors to follow the investment decisions of other investors. It is measured with Cross Sectional Absolute Deviation or CSAD to measure return dispersion (Christie & Huang, 1995).

$$CSAD_t = \frac{\sum_{i=1}^{N} \mid R_{i,t} \mid R_{m,t}}{N} \qquad (1)$$

where $R_{i,t}$ is the stock return i for period t and $R_{m,t}$ is the average cross-section return. Chang, Cheng, and Khorana (2000) would then modify equation (1); using CSAD as proxy for herd behavior where R_m is the proxy for expected market return, expressed in the following regression:

$$CSAD_t = \alpha + \beta \mid R_{m,t} \mid + \gamma R^2{}_{m,t} + \varepsilon_t \qquad (2)$$

where $\mid R_{m,t} \mid$ is the absolute aggregate market return and $\gamma R^2_{m,t}$ is the square of market return. γ signifies the nonlinear relationship between squared market return and CSAD; a negative and significant value indicates herding. Using the cross-sectional absolute deviation of returns (CSAD) as the measure of dispersion, it's demonstrate that rational asset pricing models predict not only that equity return dispersions are an increasing function of the market return but also that the relation is linear. If market participants tend to follow aggregate market behavior and ignore their own priors during periods of large average price movements, then the linear and increasing relation between dispersion and market return will no longer hold. Instead, the relation can become non-linearly increasing or even decreasing.

On Eviews, ordinary least squares would be utilized to detect herd behavior. As for describing the dynamic relationship, vector autoregression (VAR) would be used. VAR is a non-theoretical model used to predict a system with time-series variables. It is a model suited for economic models. VAR includes several stages: stationarity testing, lag order determination, cointegration testing, model stability testing, Granger causality testing, variance decomposition, and impulse response function.

RESULTS AND DISCUSSION

Descriptive statistics

Table 2 presents the descriptive statistics for all of the observed variables: Cross-sectional Absolute Deviation (CSAD), Market Return (Rm), and Market Capitalization (Size).

From 686 observations, *CSAD*, which shows return dispersion, shows an average of 0.013950. *RETURN* shows a 0.000375 average, whereas *SIZE* has a 1.068841 average.

Regression Analysis

The Tables 3 and 4 display the results of cross-sectional regression.

Table 3 shows the p-value of $R_{m,t}{}^2$ to be 0.1824, which is greater than 0.05 level of significance. It can be concluded that there was no indication of herd behavior for LQ45 stocks.

Table 4 displays the p-value of $Size_t^2$ to be 0.2907, which is greater than 0.05 level of significance. It can be concluded that size does not cause herd behavior.

Table 2. Descriptive Statistics

	CSAD	RETURN	SIZE
Mean	0.013950	0.000375	1.068841
Median	0.013141	0.000903	1.068300
Maximum	0.039766	0.065617	1.228892
Minimum	0.000000	-0,061617	0.860189
Std. Dev.	0.005230	0.012827	0.084097
Observations	686	686	686

Table 3. Regressing CSAD on Market Return

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	0.010657	0.000329	32.37678	0.0000
ABS_RM	0.368498	0.045220	8.149038	0.0000
RM2	-1.511327	1.1132185	-1.334876	0.1824
R-squared	0.262792	Mean dependent var		0.013950
Adjusted R-squared	0.260633	S.D. dependent var		0.005230
S.E. of regression	0.004497	Akaike info criterion		-7.966383
Sum squared resid	0.013813	Schwarz criterion		-7.946569
Log likelihood	2735.469	Hannan-Quinn criter.		-7.958716
F-statistic	121.7340	Durbin-Watson stat		1.370864
Prob(F-statistic)	0.000000			

Table 4. Regressing CSAD on Size

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-0.084465	0.070281	-1.201832	0.2298
ABS_SIZE	0.150286	0.132684	1.132664	0.2578
SIZE_2	-0.065935	0.062357	-1.057385	0.2907
R-squared	0.006032	Mean dependent var		0.000375
Adjusted R-squared	0.003122	S.D. dependent var		0.012827
S.E. of regression	0.012807	Akaike info criterion		-5.873297
Sum squared resid	0.112024	Schwarz criterion		-5.853483
Log likelihood	2017.541	Hannan-Quinn criter.		-5.865630
F-statistic	2.072498	Durbin-Watson stat		1.854120
Prob(F-statistic)	0.126662			

Vector Autoregression (VAR)

a. Test of stationarity

The unit root test was employed to test for stationarity. *CSAD* and Market Return are stationer at level as their p-values are lower than five percent. Whereas for Size, it is stationary at first-difference level.

b. Lag Order

Maximum lag can be estimated by determining lag structure and AR roots table. Based on roots of characteristic polynomial, maximum lag is obtained from modulus value that is lower than 1. As shown on Table 6, maximum lag is determined from the values of LR, FPE, AIC, SC, and HQ. Optimal lag length is determined based on the lowest AIC, which is indicated by the star (*) sign. There are three lags with (*); they are lag 1, 2, and 4. Lag 4 has the most (*), therefore lag 4 would be used for further analysis.

Figure 1 shows that using lag 4, the VAR model is stable (stationer) because the roots possess modulus placed in the circle with values less than one. The greatest modulus value is 0.990203, which is lower than 1.

c. Cointegration test

Cointegration test was conducted to determine whether a relationship exists between variables. From the Johansen Cointegration test (Trace Statistic and Max-Eigen Statistic), it is found with 95 percent confidence that there are two cointegration relationships based on the stars in the output.

Table 5. Stationarity Test Results

Variable	ADF			
	Level	Prob.	1st difference	Prob.
CSAD	-6.676125	0.0000	-14.36813	0.0000
Market Return	-24.43615	0.0000	-15.72183	0.0000
Size	-1.942660	0.3127	-26.04247	0.0000

Table 6. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	5373.823	NA	2.64e-11	-15.84314	-15.82314	-15.83539
1	7382.921	3994.490	7.24e-14	-21.74313	-21.66314*	-21.71216
2	7410.947	55.47466	6.84e-14	-21.79926	-21.65928	-21.74507*
3	7423.402	24.54196	6.77e-14	-21.80945	-21.60948	-21.73203
4	7441.914	36.31448*	6.59e-14*	-21.83751*	-21.57755	-21.73687
5	7444.585	5.215749	6.71e-14	-21.81884	-21.49890	-21.69498
6	7451.354	13.15805	6.76e-14	-21.81225	-21.43233	-21.66517
7	7457.652	12.18679	6.81e-14	-21.80428	-21.36437	-21.63398
8	7462.948	10.20168	6.88e-14	-21.79336	-21.29345	-21.59983

*indicates lag order selected by the criterion
LR : sequential modified LR test statistic (each test at 5% level)
FPE : Final prediction error
AIC : Akaike information criterion
SC : Schwarz information criterion

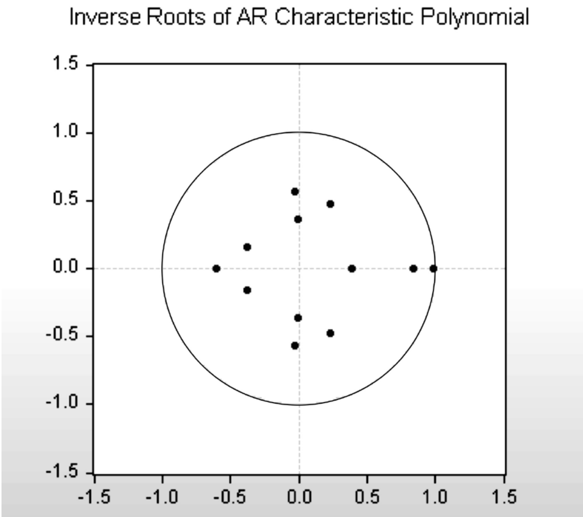

Figure 1. Inverse Roots of AR Characteristic Polynomial

Table 7. Johansen Cointegration Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE (s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.212175	206.5221	29.79707	0.0001
At most 1 *	0.057915	44.11789	15.49471	0.0000
At most 2	0.005111	3.489488	3.841466	0.0618

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE (s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.212175	162.4043	21.13162	0.0001
At most 1 *	0.057915	40.62840	14.26460	0.0000
At most 2	0.005111	3.489488	3.841466	0.0618

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

This cointegration shows that Vector Error Correction Model (VECM) can be used as an alternative to VAR. In order to choose between these two models, model stability test has to be conducted.

d. Stability test

The stability of VAR and VEC can be seen from the values of Inverse Roots of AR Characteristic Polynomial. If the values of modulus (refer to the AR-roots table) are lower than 1, then it can be determined that the system is stable.

Table 8. Johansen Cointegration Test

Root	Modulus
1.000000	1.000000
1.000000	1.000000
0.127183 – 0.643564i	0.656010
0.127183 + 0.643564i	0.656010
-0.462794 – 0.290168i	0.546238
-0.462794 + 0.290168i	0.546238
0.292134 – 0.459579i	0.544569
0.292134 + 0.459579i	0.544569
-0.117806 – 0.515659i	0.528944
-0.117806 + 0.515659i	0.528944
-0.519098	0.519098
0.398841 – 0.264614i	0.478639
0.398841 + 0.264614i	0.478639
-0.317170 – 0.127411i	0.341804
-0.317170 + 0.127411i	0.341804

VEC specification imposes 2 unit root(s).

From Table 8, it is shown that VECM is unstable. Whereas VAR is stable, whose modulus values are less than one.

Table 8 shows the VECM model to be unstable. This is seen from 2 moduli showing the values of 1, as well as the “VEC specification imposes 2 unit root(s)” statement that was generated by the Eviews software.

These tests show VECM to be unstable and VAR to be stable.

e. Granger causality test

Granger test was conducted to determine causal relationship between variables in the VAR model. H_0 states that observed variables do not have a causal relationship. H_0 would be rejected if the p-value is lower than the level of significance (0.01, 0.05, or 0.1). Table 9 displays the output of the Granger test.

From Table 9, it can be determined that there are the following: A two-way relationship between *RETURN* and *CSAD*, and a two-way relationship between *SIZE and CSAD,* and a one-way relationship from *SIZE* to *RETURN.* Figure 2 shows the relationships mentioned in Table 9.

Variance Decomposition

This analysis is used to establish the percentage of error variance of each variable explained by shocks to the other variables in the VAR model. Tables 10 through 12 display the results of variance decompositions.

Table 10 presents that variations in *CSAD* were attributed to *CSAD* itself (92% to 100%). Despite its gradual decrease, the contribution of *CSAD* variance continued to be the most dominant. Meanwhile, variations in *CSAD* were also shown to be influenced by *SIZE* (1% to 7%). As for *RETURN,* it did not really influence in the variations of CSAD.

Table 11 shows that *SIZE* contributed the largest in the variations of *SIZE* itself at 96-99%. *CSAD* only influenced lower than 3%, whereas *SIZE* only affected an average of 0.3%.

Table 9. Granger Causality Test of the Variables

Null Hypothesis	F-Statistic	Prob.	Description	
RETURN does not Granger Cause *CSAD*	5.36776	0.0003	H_0 rejected	Two-way relationship
CSAD does not Granger Cause *RETURN*	3.30509	0.0107	H_0 rejected	
SIZE does not Granger Cause *CSAD*	8.33752	1.E-06	H_0 rejected	Two-way relationship
CSAD does not Granger Cause *SIZE*	2.46776	0.0437	H_0 rejected	
SIZE does not Granger Cause *RETURN*	2.28353	0.0590	H_0 rejected	One-way relationship (*SIZE* to *RETURN)*
RETURN does not Granger Cause *SIZE*	1.24977	0.2885	H_0 accepted	

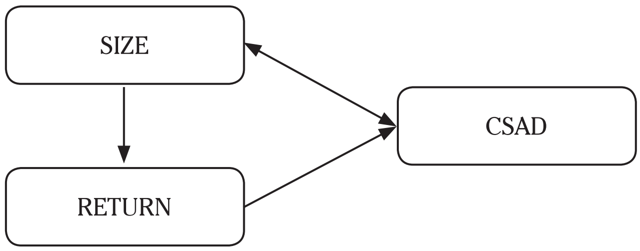

Figure 2. Granger Causality Test

Table 10. Variance Decomposition of CSAD

Variance Decomposition of CSAD:				
Period	S.E.	CSAD	SIZE	RETURN
1	0.004311	100.0000	0.000000	0.000000
2	0.004437	98.55923	1.437921	0.002851
3	0.004587	96.17133	3.825630	0.003040
4	0.004677	95.18801	4.406485	0.405502
5	0.004814	94.49496	5.015523	0.489512
6	0.004867	93.99975	5.464300	0.535954
7	0.004913	93.50944	5.945642	0.544921
8	0.004974	93.06206	6.351778	0.586162
9	0.004974	92.69408	6.701000	0.604923
10	0.004992	92.38872	6.991685	0.619598

Table 12 shows that variations in *RETURN* were greatly influenced by *SIZE* at 83-85%. They were also influenced by *RETURN* itself at 13-14%. However, *CSAD* did not really influence the variations in *RETURN*.

Impulse Response Function (IRF)

This analysis is used to identify the response of one variable to an impulse in another variable, dynamically. IRF also tracks the responses of endogenous variables in the VAR due to shocks in error term. (Widarjono, 2013)

Table 11. Variance Decompositions of SIZE

Variance Decomposition of SIZE:				
Period	S.E.	CSAD	SIZE	RETURN
1	0.012322	0.323360	99.67664	0.000000
2	0.017361	0.598840	99.23652	0.164636
3	0.020842	1.660603	98.19310	0.146297
4	0.023440	2.341730	97.39054	0.267731
5	0.025576	2.391999	97.28405	0.323951
6	0.027563	2.441563	97.21679	0.341643
7	0.029421	2.526483	97.13196	0.341560
8	0.031153	2.618848	97.03295	0.348204
9	0.032753	2.680073	96.96346	0.356465
10	0.034243	2.734874	96.90263	0.362497

Table 12. Variance Decompositions of RETURN

Variance Decomposition of RETURN:				
Period	S.E.	CSAD	SIZE	RETURN
1	0.012682	0.411509	85.67894	13.90955
2	0.012747	0.826037	84.84242	14.33154
3	0.012832	1.675467	84.03814	14.28639
4	0.012851	1.683216	84.01760	14.29918
5	0.012856	1.755747	83.95534	14.28891
6	0.012858	1.780902	83.93128	14.28781
7	0.012861	1.810473	83.90299	14.28653
8	0.012862	1.818257	83.89799	14.28375
9	0.012863	1.818174	83.90029	14.28154
10	0.012865	1.820226	83.90030	14.27947

Figure 3 illustrates the response given by *CSAD* toward the shock given by *SIZE* (left figure). The shock in *SIZE* gave positive and negative reponses toward *CSAD*. At the early period, *SIZE* showed an increase (positive response). Starting from period 5, the response of market capitalization toward herding became relatively stable at 0.18% level.

The figure (right figure) also illustrates the response of CSAD toward the shock in *RETURN*. The response was, at the beginning, positive for *CSAD*. At period 4, the response fell down into the negatives at -0.03% level. It rose and became relatively stable from period 6.

Discussion

Prior to forming the VAR model, the data were deemed stationary, which means that the mean variance and autocorrelation structure do not change over time. Cointegration test was conducted to determine whether the model was more suited for VAR or VECM. Stability test would then reveal that VECM was unstable and therefore, VAR was chosen due to its stability.

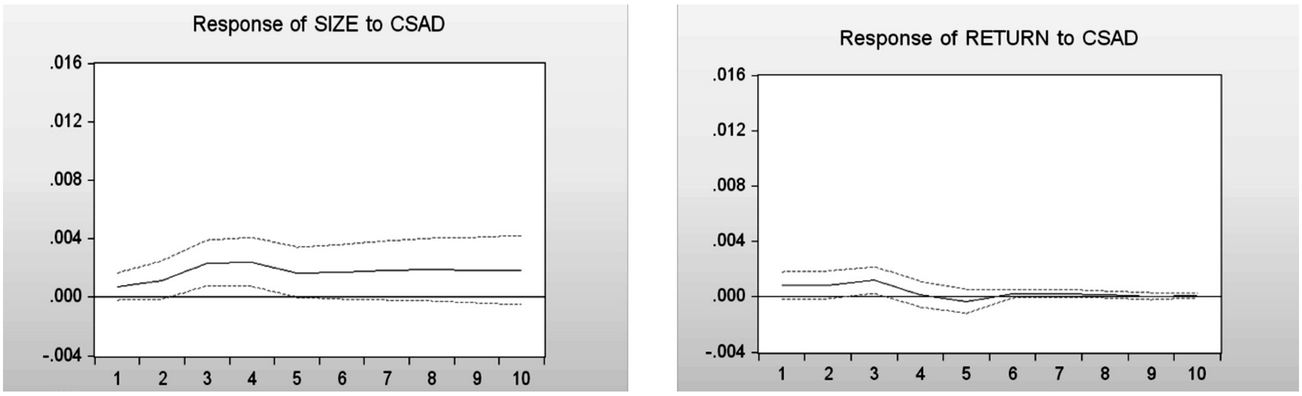

Figure 3. Response Functions

Variance decomposition analysis of market capitalization shows that in the first period, the contribution of Market Capitalization to the variance was influenced by the variance of market capitalization itself (99.67%), whereas the contribution of CSAD to the variance was 0.33 percent; and return did not contribute at all. For subsequent periods, the contribution of Market Capitalization to the variance experienced a continual decrease. It was still, however, the highest variance contributor.

The variance decomposition of market return shows that the variance contribution of the market capitalization in influencing market return is high. In the first period, market capitalization influences 85.68%, whereas Return and CSAD merely influenced 13.9% and 0.41%, respectively.

Impulse Response diagram shows that fluctuations in response to market capitalization gave positive response. This shows that an increase in market capitalization (size) would result in an increase in herd behavior. The response that was given by CSAD due to the shock experienced by return was positive. However, in the third period, it experienced a negative response. This indicates that an increase in return does not really cause herd behavior.

Variance Decomposition and Impulse Response present that compared to market return, market capitalization has the greater role in explaining CSAD. In other words, market capitalization catalyzes herd behavior for corporations with smaller market capitalization. Corporations with big market capitalization have more accessible quality information that investors can obtain. This corresponds with information-based herding theory that explains imperfections in information in the market causes investors to doubt the information they have. This would result in investors abandoning or ignoring the information, and just follow the actions of other investors.

Furthermore, the Granger causality test output reveals that market capitalization and return have two-way direction relationships with CSAD. This indicates that market capitalization and return can transpire herd behavior, and that herd behavior can transpire market capitalization and return. Additionally, there is a one-way causality from size to return. In general, stocks with large capitalization would become investors' long-term investment choice. This is attributable to the corporation's growth potential and relatively low risk. These stocks are highly-demanded, which make them highly-priced as well. The higher the price in the future means the higher return for investors. However, if the price and demand drop, then the return would move in the same direction.

The two-way causation between return and herd behavior may be explained by several factors. High return would trigger herd behavior when the market condition is favorable; investors would then communicate about their profitable portfolio. This would attract other investors to purchase the same instruments with the intention of gaining yield, thus triggering herding behavior among investors. This is consistent with the findings of Chang, Cheng, & Khorana (2000).

Herd behavior also affects market return. The higher the intensity of the herd behavior would result in lower market return. According to Harris (2003), there are informed investors and uninformed investors. Informed investors possess information and technical skills; they herd and speculate to maximize their portfolio. Whereas uninformed investors are those with limited information and resources. The act of herding is carried out by speculators (informed investors) and then followed by uninformed investors. These private investors would trade at a later time, which cause them either not to gain as much return as the speculators, or even lose their money.

Finally, the unidirectional causality from size to herd behavior could stem from the investors assuming security when they invest in large cap-stocks: should there be any organizational crises, the corporation would not just collapse right away. Another illustration is to consider commodity firms: the price of the product is determined by the market and not the firm itself. Consequently, large market capitalization would trigger herd behavior. More herding investors means larger market capitalization. Conversely, when these investors simultaneously sell their stocks, it would cause a decline in the market capitalization of the stock.

MANAGERIAL IMPLICATIONS

Based on the Granger causality test, it can be determined that there is a dynamic interaction between herd behavior and size, indicating that high market capitalization would cause herd behavior; and intense herd behavior would cause market capitalization to increase.

Moreover, there is a causal relationship between herd behavior and market return. High market return can cause herd behavior; and intense herding causes market return to decrease. Finally, there is also a one-way relationship between size and market return.

An important investment implication of our study is that in economies such as Indonesia where market participants tend to herd around the aggregate market consensus, a larger number of securities are needed to achieve the same level of diversification than in an otherwise normal market.

The results of this study suggest that in Indonesia, macroeconomic information tends to play a great role in the decision-making process of market participants. Through an understanding of this, investors would be enabled to rationally respond to herding anomalies.

CONCLUSION

This study finds that there is no indication of herding behavior in LQ45 investors during the period of 2014 until 2016. Based on the Granger causality test, it can also be determined that there is a dynamic interaction between herd behavior and size; as well as between herd behavior and market return. Finally, there is a one-way relationship between size and market return. Investors should be more rational in managing their portfolio, e.g. using fundamental analysis before purchasing stocks. They should be fully aware when they are herding in performing investment decisions.

Future researches about herd behavior may want to include other listed companies, while also expanding the observation period. Other methods that can be applied include Kalman Filter and LSV. ■

REFERENCES

Al-Shboul, M. (2012). Asymmetric Effects and the Herd Behavior in the Australian Equity Market. *International Journal of Business and Management*, 7(7), 121-140.

Baddeley, A. (2012). Working Memory: Theories, Models, and Controversies. *Annual Review of Psychology,* 63, 1-29.

Banerjee, A.V., (1992). A Simple Model of Herd Behavior. *The Quarterly Journal of Economics*, 107(3), 797-817.

Bickhandani, S. & Sharma, S. (2001). Herd Behavior in Financial Markets. *IMF Staff Papers*, 47(3), 279-310.

Bowe, M. & Domuta, D. (2004). Investor herding during financial crisis: A clinical study of the Jakarta Stock Exchange. *PacificBasin Finance Journal*, 12(4), 387-418.

Brunnermeier, M.K. (2001). *Asset Pricing under Asymmetric Information.* Oxford: Oxford University Press.

Chang, E.C., Cheng, J.W., & Khorana, A. (2000). An Examination of herd behavior in equity markets: an international perspective. *Journal of Banking and Finance*, 24, 1651-1679.

Chen, Y.F., Yang, S.Y., & Lin, F.L. (2012). Foreign Institutional Industrial Herding in Taiwan Stock Market. *Managerial Finance*, 38(3), 325-340.

Christie, W. G. & Huang, R. D. (1995). Following The Pied Paper: Do Foreign Individual Returns Herd Around the Market. *Journal of Financial Analyst*, 31-37.

Devenow, A. & Welch, I. (1996). Rational Herding in Financial Economics. *Journal of European Economic Review*, 40, 603-615.

Gunawan, Wijayanto, H., Achsani, N.A., & Rahman, L.O.A. (2011). Pendeteksian Perilaku Herding pada Pasar Saham Indonesia dan Asia Pasifik. *Forum Statistika dan Komputasi,* 16(2), 16-23.

Gutierrez, R.C., & Kelley, E.K. (2009). Institutional Herding and Future Stock Returns. Retrieved from Research Gate website: https://www. researchgate.net/publication/228666518_Institutional_Herding_and_Future_Stock_Returns.

Harris, L. (2003). *Trading and Exchanges: Market Microstructure for Practitioners.* Oxfrod: Oxford University Press.

Hirshleifer, D. & Teoh, S.H. (2003). Herd Behavior and Cascading in Capital Markets: A Review and Synthesis. *European Financial Management,* 9, 25-66.

Indonesia Stock Exchange. (2016). *Fact Book 2016.* Jakarta: Indonesia Stock Exchange

Jogiyanto. (2000). *Teori Portofolio dan Analisis Investasi.* Yogyakarta: BPFE.

Kremer, S. & Nautz, D. (2013). Short-term Herding of Institutional Traders: New Evidence from the German Stock. *European Financial Management*, 19, 730-746.

Lakonishok, Shleifer, A., & Vishny, R. W. (1992). The impact of institutional trading on stock prices. *Journal of Financial Economics*, 32, 23–44.

Lan, Q.Q. & Lai, R.N. (2011). Herding and Trading Volume (University of Macau). Available online at http://dx.doi.org/10.2139/ssrn.1914208.s

Lindhe, E. (2012). *Herd Behavior in Stock Markets: A Nordic Study* (Master's Thesis). Lund Universitet, Lund, Sweden.

Mabrouk, H.B. & Mohamed, F. (2013). Herding During Market Upturns and Downturns: International Evidence. *The IUP Journal of Applied Finance,* 19(2), 5-26.

Ramli, I., Agoes, S., & Setyawan, I. R. (2016). Information Asymmetry and The Role of Foreign Investors in Daily Transactions During the Crisis: A Study of Herding in The Indonesian Stock Exchange. *The Journal of Applied Business Research.* 32 (1), 269-288.

Saastamoinen, J. (2008). Quantile Resression Analysis of dispersion of stock returns-evidence of herding?. *Keskustelualoitteita* 57, 1-19.

Sheldon, A. (2014). *Global Mining Investing (eBook).* Google Books.

Szyszka, A.(2013). *Behavioral Finance and Capital Markets: How Psychology Influences Investors and Corporations.* US: Palgrave Macmillan.

Testa, A. (2012). Path-Dependent Behavior with Asymmetric Information about Trader's Type. *Discussion Paper.* University of Bonn, 1-36.

Venezia, I., Nashikkar, A., & Shapira, Z. (2010). Firm Specific and Macro Herding by Professional and Amateur Investors and their Effects on Market Volatility, *Journal of Banking & Finance* 35(7), 1599-1609.

Widarjono, A. (2013). *Ekonometrika Teori dan Aplikasi.* Yogyakarta: Ekonisia FE UII.