Analisis Perilaku Herding Pada Saham Perusahaan Sub Sektor Konstruksi Bangunan Periode 2010-2019
Analyzing Herding Behavior On Company Shares In Building Constructions Sub-Sector During Period 2010-2019

Novita Sari Ginting1[1], Nora Amelda Rizal2[1],
[1] International ICT Business, Faculty of Economic and Business, Indonesia, novitasariginting@student.telkomuniversity.ac.id
[2] International ICT Business, Faculty of Economic and Business, Indonesia, norarizal@telkomuniversity.ac.id

Abstrak

Penelitian ini bertujuan untuk menganalisis adanya perilaku herding investor pada saham subsektor kosntruksi bangunan di Bursa Efek Indonesia. Serta adanya asimetri *herding* yang akan menganalisa *herding* saat kondisi *rising market* dan *falling market*. Data yang digunakan adalah data sekunder berupada harga indeks harian saham perusahaan konstruksi bangunan dan harga harisan IHSG. Data tersebut akan diolah menjadi *return* dan dispersi *return (Cross-Sectional Absolute Deviation),* yang selanjutnya dianalisa mengguna metode GARCH. Penelitian ini menghasilkan bahwa tidak terdapat perilaku *herding* investor pada saham subsektor konstruksi bangunan di Bursa Efek Indonesia. Serta, asimetri *herding* tidak terjadi pada saham syariah di Bursa Saham Indonesia, dimana perilaku *herding* tidak terjadi di kedua kondisi pasar.
Kata kunci: perilaku herding, *Cross-Sectional Absolute Deviation* (CSAD), GARCH**.**

Abstract
This study aims to analyze the herding behavior of investors in the building construction sub-sector shares on the Indonesia Stock Exchange. As well as the existence of herding asymmetry which will analyze herding during rising and falling market conditions. The data used is secondary data in the form of daily index prices for building construction companies and the daily prices of JCI. The data will be processed into returns and dispersion returns (Cross-Sectional Absolute Deviation), which are then analyzed using the GARCH method.
This research results that there is no herding behavior of investors in the building construction sub-sector shares on the Indonesia Stock Exchange. Also, herding asymmetry does not occur in sharia shares on the Indonesia Stock Exchange, where herding behavior does not occur in both market conditions
.***Keywords****: herding behavior, Cross-Sectional Absolute Deviation (CSAD), GARCH.*

I. INTRODUCTION

The capital market has a role as a means for society to invest in financial instruments. Investment is the current commitment of money or other resources expected to obtain future benefits (Bodie *et al.*, 2014). Invest in financial assets include securities such as stocks and bonds. Stocks are one of the common investment tools in society that investors are interested in. The stock trading volume of the Indonesian stock exchange tended to increase and also it can be seen from the Indonesian capital market set a record for the highest market value in 2019, as much as the IDR. 7,265 trillion. Another effort made by the Indonesian capital market to attract potential new domestic investors is by classify the sector and sub-sectors of companies stocks registered on IDX. Building construction is one of the sub-sectors stocks listed on IDX, it especially for those who want to invest in company stocks in building construction sub-sector. It can be seen from Figure 1.4, the market capitalization of building construction sub-sector has experienced a significant decline in 2019, but its market capitalization continued to always increase, especially from 2010 to 2018, with it highest point is in 2017 by IDR 116.849 billion.

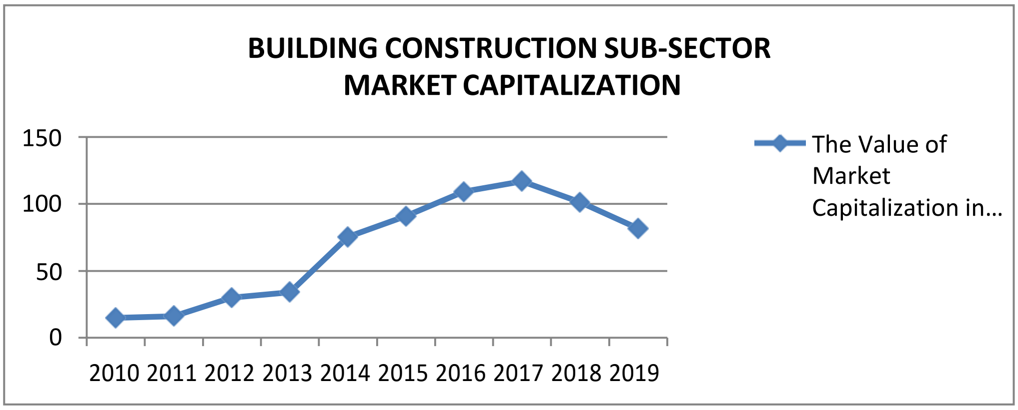

Figure 1.4 Building Construction Sub-sector Market Capitalization
Sources: www.idx.co.id

Investors certainly expect to benefit from an investment they make. According to efficient market theory, prices fully reflect available information. So that investors are informed and make investment decisions according to their technical and fundamental analysis. Investors must be rational, or if investors are irrational, the bias should not be related, so that the market becomes efficient. If investors act irrationally and their biases are correlated, the market becomes inefficient. Inefficient markets encourage the development of behavioral finance. Despite the perfect information, many studies have concluded that investors tend to make irrational decisions. Irrational decisions cause bias that can affect investor behavior. The existence of information asymmetry in the stock market that is less efficient, investors in making investment decisions are also influenced by psychological factors, resulting in bias.

Herding behavior is a form of cognitive errors or errors that come from one's way of thinking and the emotional influence in describing ambiguity into the fear of not knowing. So that investors will follow the market consensus and follow the decisions of other investors without doing fundamental analysis. Herding behavior is a condition when investors imitate other investors in making investment decisions based on market consensus even though they actually do not agree with the action. Herding behavior is categorized into irrational and rational herding behavior. The irrational view is based on investor psychology, when investors ignore their analysis and follow the market consensus. The rational view is based on externalities where problems of incentives or access to information can distort optimal decision making.

Investors in emerging markets are more likely to do herding behavior. This is because the financial sector in developing countries is not very regulated, and the flow of money in and out is unstable. When herding behavior occurs, it will damage the market price or can shift the market price from the equilibrium value.

Although there have been many studies on herding behavior, there is still a research gap and it is still rare to examine the herding behavior of investors in the Islamic stock market in Indonesia. So it is still necessary to conduct research on herding behavior, especially in the stock market of the building construction subsector in Indonesia.

In time series data such as stock price data, heteroscedasticity generally occurs, therefore this study uses the GARCH model to process the data. The GARCH model is a model that does not view heteroscedasticity as a problem, but uses the heteroscedasticity to create a model.

II. LITERATURE REVIEW

a. Efficient Market Hypothesis

The market is efficient when nobody (whether it is an individual or institutional investor) is unable to obtain excess return (abnormal return) after adapting to risks and using existing trading strategies (Halim, 2015). If investors are rational, the market will become efficient; if they are irrational, their biases must be uncorrelated; if their biases are correlated, rational arbitrageurs must be able to make large trades to offset in order to restore the efficiency of market (Baker and Nofsinger, 2010).

b. Behavioral Finance

Behavioral finance is a financial field that deals with the implication of investors' reasoning errors on investment decisions and market prices (Jordan and Miller, 2009). Therefore, behavioral finance can be understood as a rational and unreasonable way of thinking in financial science, which ultimately affects investment decisions..

c. Herding Behavior

According to Banarjee (1992), herding behavior what investors do is the same as what other investors do, even if their private information suggest to do something different

d. Return

Return is the profit or loss borne by the investor on an investment within a certain period. The return market has always been one of the factors that motivates investors when investing in the financial market and is also a reward for risky investments that investors dare to take. A rational investor always tries to maximize returns by considering the amount of risk that must be borne in connection with the investment. Return can be calculated using the following formula:

$$R_{i,t} = \log\left(\frac{P_{i,t}}{P_{i,t-1}}\right) \quad (2.1)$$

Where,
$R_{i,t}$ = Stock return for t-period.
$P_{i,t}$ = Stock price for t-period.
$P_{i,t-1}$= Stock price for the previous period.

e. Chang *et al.* Method with CSAD (Cross Sectional Absolute Deviation) Measure

According to Chang *et al.*, 1999, CSAD can be calculated using the following formula:

$$CSAD_t = \frac{1}{N}\sum_{i=1}^{N} |R_{i,t} - R_{m,t}| \quad (2.2)$$

Where,
$CSAD_t$: Stock return dispersion around the average return for t-period.
$R_{i,t}$: Individual stock return on day *t*.
$R_{m,t}$: Market stock return on day *t*.
N : the number of firm in samples.

During periods of extreme market movements or times of financial crisis, some academics argue that the relationship between the dispersion of returns and market returns is non-linear. In general market condition, herding behavior can be detected using the regression equation developed by Chiang and Zheng (2010) to determine the non-linear relationship between individual returns and market returns, as follows:

$$CSAD_t = \beta_0 + \beta_1 R_{m,t} + \beta_2 |R_{m,t}| + \beta_3 R^2_{m,t} + s_t \quad (2.3)$$

Where,
$CSAD_t$: stock return dispersion.
β_0 : intersect variable.
β_1 : the linear coefficient between CSAD and market return during a rising market.
β_2 : the linear coefficient between CSAD and market return during a falling market.
β_3 : the non-linear coefficient between CSAD and market return.
$R_{m,t}$: market return in t period.
$|R_{m,t}|$: absolute value of market return.
s_t : standard error.

Based on the above model, it assumes that herding behavior occurs during period of market stress. Statistically, herding behavior exist if the estimated non-linear coefficient β_3 is significantly negative, while if the estimated non-linear coefficient β_3 is significantly positive, it indicates that the herding behavior does not exist (Chang et *al.*, 1999). Previous study from Chiang and Zheng (2010), modified the model by examine the asymetric conditions between down and up market periods to obtain a more comprehensive analysis. Herd regression is estimated separately, when the market return is positive or the value is greater than 0 (zero), it defines the data for the upward market period, and when the market return is negative or value is worthless from 0 (zero), it defines the downward market period. Chiang and Zheng (2010), developed the equation (2.3) as follows:

$$CSAD^{Up}_t = \beta_0 + \beta_1 |R^{Up}_{m,t}| + \beta_3 (R^{Up}_{m,t})^2 + s_t \text{ if } R_{m,t} > 0 \quad (2.4)$$

Where,
$CSAD^{Up}_t$: the CSAD at time t due to the rising market returns.
β_0 : intersect variable.
β_1 : the linear coefficient between CSAD and market return during a rising market.
β_3 : the non-linear coefficient between CSAD and market return during a rising market.
$R_{m,t}$: return market in period t.
s_t : standard error.

$$CSAD^{Down}_t = \beta_0 + \beta_1 |R^{Down}_{m,t}| + \beta_3 (R^{Down}_{m,t})^2 + s_t \text{ if } R_{m,t} < 0 \quad (2.5)$$

Where,
$CSAD^{Down}_t$: the CSAD at time t due to the falling market returns.
β_0 : intersect variable.
β_1 : the linear coefficient between CSAD and market return during a falling market.
β_3 : the non-linear coefficient between CSAD and market return during a falling market.
$R_{m,t}$: return market in period t.
s_t : standard error.

Herding behavior in a capital market can be detected from the non-linearity relationship between the CSAD and the market return; the non-linearity relationship would be captured when the coefficient $R^2_{m,t}$ is negative.

f. GARCH

GARCH is a model used to detect herding behavior. In time-series data on economics and finance generally occur heteroscedasticity because it has very high volatility, therefore it needs a time-series model that can model most of the economic and financial data that has heteroscedasticity. GARCH model used in forecasting data that has a problem of heteroscedasticity without eliminating the heteroscedasticity. GARCH (1,1) model is the most commonly used GARCH and is considered as a benchmark. Accordint to Hansen and Lunde (2005), there are no ARCH and GARCH models can outperform the GARCH (1,1) model.

III. RESEARCH METHOD

a. Research Method

Table 3.1 Research Characteristics

No.	Research Characteristics	Type
1.	Method used	Quantitative
2.	Time horizon	Time-series
3.	Purpose	Descriptive
4.	Research involvement	No intervention

b. Data Analysis Techniques

The data used to solve the research problem is time-series data, which are in the form of daily price of company shares in building construction sub-sector and daily price of Indonesia Composite Index, and then these data are calculated as daily returns. Time-series data is data collected based on a specific time sequence. According to research of Gujarati and Porter (2009), time-series data usually has heteroscedasticity and is not stationary so there is autocorrelation. Therefore, the data processing and analysis completed by the author are unit root test and GARCH test

c. Calculating Return

In this research, the daily price of building construction sub- sector companies and the daily price of Indonesia Composite Index that have been obtained from Yahoo Finance are then processed from price data to return data. The return of building construction sub-sector companies will become the individual return (R_i) and the return of Indonesia Composite Index will become the market return (R_m). Return can be calculated using the equation (2.1).

d. Calculating CSAD

Return data that has been processed can be used to calculate CSAD. The return of the Indonesia Composite Index is the market return and the return of building construction Sub-sector Company is an individual return. The CSAD can be calculated using the equation (2.2). To test herd activities under general market conditions, equation (2.3) can be used to calculate herd behavior. By using the equation (2.4) to test the herding behavior in the down market period, and the equation (2.5) used to test the herding behavior in up market period. Statistically, it can be said that when the coefficient of market return squared $R_{m,t}^2$ is negative, it indicates that herding behavior in the capital market can be detected (Chang *et al*., 1999).

e. Stationarity Test

Data stationarity testing on time-series data is important. Based on Gujarati and Porter (2009), the time-series data stationarity test need to be done because when the time-series data is not stationary, the behavior that can be learned only during the period in the discussion, so it is not possible to flatten for another period. A widely known test of the stasionarity is the unit root test. The process of the unit root test was first modeled by Dickey-Fuller (ADF) (Gujarati and Porter, 2009).

According to Fama (1970), the stationarity test is conducted to test the market efficiency of weak form by seeing whether the data is stationary or not, because if the data is stationary, then the data does not follow the theory of random walk.

This research tests the data stationarity by using Augmented Dickey Fuller (ADF). The process of unit root test was first modeled by Dickey-Fuller (ADF) (Gujarati and Porter, 2009) with the following models:

$$Y_t = \rho Y_{t-1} + u_t \quad (3.1)$$

Where,

ρ = estimation parameter $-1 \leq \rho \geq 1$

u_t = white noise (interference variable)

Y = random variable.

If ρ = 1, then the data has a random walk, so the data is not stationary. However, equations (3.1) cannot be estimated and carried out tests against hypotheses ρ = 1 with regular *t*-test directly, as the test is very biased in the case of the unit root, so, according to Gujarati and Porter (2009), the equation should be changed (3.1) by substract Y_{t-1} from both sides of equation, to obtain the following equation:

$$Y_t - Y_{t-1} = \rho Y_{t-1} - Y_{t-1} + u_t \quad (3.2)$$

$$\Delta Y_t = (\rho - 1) Y_{t-1} + u_t \quad (3.3)$$

which can be alternatively written as:

$$\Delta Y_t = \delta Y_{t-1} + u_t \quad (3.4)$$

Where,

δ = $(\rho - 1)$

Δ = difference operator.

ρ = estimation parameter $-1 \leq \rho \geq 1$

u_t = white noise (interference variable)

Y = random variable.

From the equation, the following hypothesis is obtained:

Ho: $\delta = 0$

Ho: δ G 0

If the hypothesis δ = 0 is rejected, then ρ = 1, means that the data time-series Y_t is not stationary, where there is a unit root, assuming error term u_t is not correlated. Dickey-Fuller have developed another test for time-series data with the u_t condition are correlated, which known as Augmented Dickey Fuller Test (ADF) test, this test is conducted by "augmenting" the preceeding three equations by adding the lagged values of the dependent variable ΔY_t, thus produce the following model:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Y_{t-1} + s_t \quad (3.5)$$

Where,

s_t = white noise error

Y = variable observed

t = time trend

m = length of lag used

The data stationarity can be viewed from the ADF test results with the following hypotheses:

Ho: time-series data is nonstationary

H1: time-series data is stationary

The testing criteria are as follows (Gujarati and Porter, 2009):

If the probability ≥ 0.05 , then Ho is accepted.

If the probability < 0.05, then Ho is rejected.

f. GARCH Test

Based on Chaffai dan Medhioub (2018), this research will only apply the following GARCH model:

i. GARCH (1.1) model with normal distribution

In the model with normal distribution, it is assumed that the model of the residual or error follows the normal-Gaussian distribution (Gaussian error distribution). It can describe as the model below:

$$s_t | I_{t-1} = \sqrt{h_t}.v_t$$
$$v_t \sim N\ (0,1) \quad (3.6)$$
$$h_t = \alpha_0 + \beta_1 h_{t-1} + \alpha_1 s_{t-1}^2$$

Then follow the model below:

$$y_t = c + s_t \sim N(c, h_t) \quad (3.7)$$

Where,

v = degree of freedom,

I_{t-1} = all the information before t moment,

Parameters:

$\omega > 0$ = requirement to ensure that the value of volatility is always positive

$\alpha \geq 0$ = requirement to ensure that the value of volatility is always positive

$\beta \geq 0$ = requirement to ensure that the value of volatility is always positive, and

$\alpha + \beta < 1$ = the condition for the volatility stationary.

In addition to the asymmetrical nature in data, many financial studies have found that the distributions of yield series of financial markets has heavy-tails and skewness characteristics, so it violated the normal distribution assumption. To overcome heavy-tail in the context of the GARCH model, Bollerslev (1986) applied the Student-t distribution, and Nelson (1991) proposed a Generalized Error Distribution (GED) to be able describe the character of the heavy tails.

ii. GARCH (1.1) model with student's t distribution

Bollerslev (1986) proposed the GARCH model (p, q), which allows longer memory and the lag structure is more flexible. The GARCHt (1,1) can be described as below:

$$R_t = \sqrt{h_t} s_t, s_t \sim \text{Student} - t(v),$$
$$h_t = \omega + \alpha R_{t-1}^2 + \beta h_{t-1}, \quad (3.8)$$
$$h_0 = \frac{\omega}{1-\alpha-\beta'}$$

Where,

v = degree of freedom,

Parameters:

$\omega > 0$ = requirement to ensure that the value of volatility is always positive

$\alpha \geq 0$ = requirement to ensure that the value of volatility is always positive
$\beta \geq 0$ = requirement to ensure that the value of volatility is always positive, and
$\alpha + \beta < 1$ = the condition for the volatility stationary.

iii. GARCH (1,1) model with General Error Distribution

The GARCH (1,1) model with General Error Distribution can be described as the model below:

$$s_t|I_{t-1} = \sqrt{h_t}.v_t$$
$$v_t \sim G(0,1,r) \quad (3.9)$$
$$h_t = \alpha_0 + \beta_1 h_{t-1} + \alpha_1 s_{t-1}^2$$

Then follow the model below:

$$y_t = c + s_t \sim GED\ (c, h_t, r) \quad (3.10)$$

Where,
v = degree of freedom,
I_{t-1} = all the information before t moment,
Parameters:
$\omega > 0$ = requirement to ensure that the value of volatility is always positive
$\alpha \geq 0$ = requirement to ensure that the value of volatility is always positive
$\beta \geq 0$ = requirement to ensure that the value of volatility is always positive, and
$\alpha + \beta < 1$ = the condition for the volatility stationary.

iv. IGARCH (1.1) model

IGARCH model is used when there is a unit root that can cause non-stationary in the GARCH model. IGARCH has stationary solutions for infinite variances, so that IGARCH can be used if the data used for forecasting has problems in terms of stationarity, namely when the number of GARCH coefficients is equal to one. IGARCH modeling according to Engle and Bollerslev (1986), is as follows:

$$\sigma_t^2 = \omega + \sum_{i=1}^{p} \alpha_i e_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2 \quad (3.11)$$

With,

$$\sum_{i=1}^{p} \alpha_i + \sum_{j=1}^{q} \beta_j = 1 \quad (3.12)$$

Where,
The parameters to be estimated = α_i and β_j
Number of parameters α_i and β_j are equal to 1 = a condition indicating that the parameter to be estimated has a non-stationary problem.

v. GARCH Asymmetry Model

The Power ARCH (PARCH) model is a model combined by Ding *et al.* (1993) from Taylor (1986) and Schewrt (1989) who used the GARCH model with standard deviation. In this model, the power parameter of δ at the standard deviation can be estimated instead of being forced, and a choice of parameter γ is added to capture asymmetry of order r. It can be described as the following model:

$$\sigma_t^{\delta} = m + \sum_{i=1}^{p} \alpha_i (|c_{t-i}| - \gamma_t c_{t-i}) + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^{\delta} \quad (3.13)$$

Where,
$\delta > 0$,
≤ 1 for $I_{-1}, \ldots\ldots, r$,
$\gamma_i = 0$ for all $i > r$, and $r \leq p$
If $y_i \neq 0$ means there is an asymmetric effect.

IV. CONCLUSION AND SUGGESTION

a. Research Result and Discussion

The daily price of company shares in building construction sub-sector and the daily price of Indonesia Composite Index must be processed into return, then the return data can be processed into descriptive statistics, so that its characteristics can be known.

Table 4.1 Descriptive Statistics

	CSAD	RM	CSAD DOWN	RM DOWN	CSAD UP	RM UP
Mean	0.0075	0.00016202	0.00736717	-0.00337441	0.0077	0.00304199
Median	0.0065	0.00043219	0,00650518	-0.0022495	0.0066	0.00228447
Maximum	0.0656	0.03045971	0.04621593	-1.07706E-05	0.0656	0.00500702
Minimum	-0.0001	-0.04038801	6.81081E-05	-0.04038801	0.0007	0.00067784
Std. Dev.	0.0044	0.00452450	0.00418214	0.00357308	0.0047078	0.00287787

Skewness	2.7521	-0.58275404	2.14039608	-2.89582381	3.0701153	2.53355166
Kurtosis	18.004	6.28316373	9.69577223	15.5431305	21.719652	11.6206817
Observation	2405	2405	1079	1079	1325	1325

Source: Processed by the writer

b. Calculating Return

The daily prices of company shares in building construction sub-sector and the daily prices of Indonesia Composite Index that have been obtained from Yahoo Finance during the observation period of January 5, 2010 to December 30, 2019 must be processed into return data. It can be seen in attachment 2. The following is an example of calculating return based on equation 2.1:

t	Date	Indonesia Composite Index Price
0	04 January 2010	2.575
1	05 January 2010	2.605

$$R_{IndonesiaCompositeIndex.january\ 5,2010} = log\ (\frac{2,605}{2,575}) = 0.0050$$

c. Calculating CSAD

After calculating the return of company shares in building construction sub-sector and return of Indonesia Composite Index, then the data can be processed into CSAD. The return of company shares in building construction sub-sector as R_i and the return of Indonesia Composite Index as R_m, with N is 7 because there are seven individual stocks namely ADHI, DGIK, JKON, SSIA, TOTL, WIKA, and PTPP. It can be seen in attachment 2. The following is an example of calculating CSAD based on equation 2.2:

$$CSAD_{January\ 5,2010} = \frac{1}{7}\sum_{i=1}^{N} (|-0.01072389 - 0.00500702| + |0 - 0.00500702| + |0 - 0.00500702| + |0.007686829 - 0.00500702| + |0.002316215 - 0.00500702| + |0 - 0.00500702| + |0 - 0.00500702|) = 0.59\%$$

d. Stationarity Test

In time-series data, generally the data is not stationary or the data has autocorrelation problems, while to analyze time-series data, the data that will be used must be stationary. Therefore, it is necessary to do the unit root test by using the Augmented Dickey-Fuller (ADF) test to test the stationarity of the data. The probability of the unit root test must be <0.05, so that H0 is rejected, which means that the RM does not have a unit root and the data is stationary.

Table 4.2 Stationary Test of All Variable for All Market Condition

All Market		R_m	$\lvert R_m \rvert$	R_m^2	**CSAD**
Prob		0.0000	0.0000	0.0000	0.0000
ADF t-Stastistic		-27.84947	-10.11041	-11.45262	-20.51262
Test Critical Value	1% level	-3.432886	-3.432895	-3.432892	-3.432916
	5% level	-2.862546	-2.862550	-2.862549	-2.862560
	10% level	-2.567351	-2.567353	-2.567353	-2.567358

Table 4.3 Stationary Test of All Variable for Rising Market Condition

Rising Market		$\lvert R_m \rvert$	R_m^2	**CSAD**
Prob		0.0001	0.0000	0.0000
ADF t-Stastistic		-47.00689	-10.39765	-20.03320
Test Critical Value	1% level	-3.432875	-3.432887	-3.432878
	5% level	-2.862542	-2.862547	-2.862543
	10% level	-2.567349	-2.567351	-2.567349

Table 4.4 Stationary Test of All Variable for Falling Market Condition

Falling Market		$\|R_m\|$	R_{m^2}	CSAD
Prob		0.0000	0.0000	0.0000
ADF t-Stastistic		-14.59315	-13.44459	-20.28009
Test Critical Value	1% level	-3.432882	-3.432882	-3.432878
	5% level	-2.862545	-2.862545	-2.862543
	10% level	-2.567350	-2.567350	-2.567349

e. Herding Behavior on Company Shares in building construction Sub-sector During Overall Market Conditions

Table 4.5 Herding Behavior Overall Market Conditions: GARCH (1,1) Model Normal Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006441	0.000136	47.38215	0.0000
R_m	0.055697	0.018489	3.012427	0.0026
$\|R_m\|$	0.210480	0.042813	4.916263	0.0000
R_{m^2}	6.618913	1.869788	3.539927	0.0004
Log likelihood	9786.469			

Table 4.6 Herding Behavior Overall Market Conditions: GARCH (1,1) Model Student's t Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.005669	0.000101	56.38716	0.0000
R_m	0.025807	0.014067	1.834618	0.0666
$\|R_m\|$	0.242631	0.033427	7.258585	0.0000
R_{m^2}	6.080800	1.751950	3.470875	0.0005
Log likelihood	10144.07			

Table 4.7 Herding Behavior Overall Market Conditions: GARCH (1,1) Model GED Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.005677	8.86E-05	64.06177	0.0000
R_m	0.011354	0.012655	0.897163	0.3696
$\|R_m\|$	0.223773	0.030941	7.232330	0.0000
R_{m^2}	5.439180	1.734646	3.135613	0.0017
Log likelihood	10092.26			

Table 4.8 Herding Behavior Overall Market Conditions: IGARCH (1,1) Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006580	8.93E-05	73.67661	0.0000
R_m	0.037505	0.011879	3.157358	0.0016
$\|R_m\|$	0.215065	0.031027	6.931498	0.0000
R_{m^2}	7.899455	1.079503	7.317680	0.0000
Log likelihood	9723.176			

Table 4.9 Herding Behavior Overall Market Conditions: GARCH (1,0) Assymetry Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006393	0.000133	47.92463	0.0000
R_m	0.047641	0.017843	2.670045	0.0076
$\|R_m\|$	0.252879	0.044423	5.692497	0.0000
R_m^2	4.401364	2.163109	2.034739	0.0419
Log likelihood	9784.391			

Based on the table above, the stationary test of all variables for overall market condition, falling market condition and rising market condition have the probability value of all variables are <0.05, then Ho is rejected so that the data is said to be stationary.

f. Herding Behavior on Company Shares in building construction Sub-sector During Falling Market Conditions

Table 4.10 Herding Behavior Falling Market Conditions: GARCH (1,1) Model Normal Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006530	4.87E-05	134.1612	0.0000
$\|R_m\|$	0.121347	0.013588	8.930147	0.0000
R_m^2	1.349382	0.618523	2.181620	0.0291
Log likelihood	10671.35			

Table 4.11 Herding Behavior Falling Market Conditions: GARCH (1,1) Model Student's t Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006224	4.91E-05	126.8461	0.0000
$\|R_m\|$	0.027659	0.017990	1.537459	0.1242
R_m^2	9.398886	0.934857	10.05382	0.0000
Log likelihood	10800.17			

Table 4.12 Herding Behavior Falling Market Conditions: GARCH (1,1) Model GED Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006331	4.98E-05	127.1282	0.0000
$\|R_m\|$	0.052990	0.016855	3.143764	0.0017
R_m^2	8.266606	0.932807	8.862076	0.0000
Log likelihood	10722.51			

Table 4.13 Herding Behavior Falling Market Conditions: IGARCH (1,1) Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006769	2.77E-05	244.6961	0.0000
$\|R_m\|$	0.058048	0.012134	4.783915	0.0000
R_m^2	7.513107	0.514264	14.60945	0.0000
Log likelihood	10397.83			

g. Herding Behavior on Company Shares in building construction Sub-sector During Rising Market Conditions

Table 4.15 Herding Behavior Rising Market Conditions: GARCH (1,1) Model Normal Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006498	5.58E-05	116.4205	0.0000
$\|R_m\|$	-0.074290	0.023621	-3.145056	0.0017

R_{m^2}	25.55518	1.799291	14.20291	0.0000
Log likelihood	10352.32			

Table 4.16 Herding Behavior Rising Market Conditions: GARCH (1,1) Model Student's t Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006357	5.90E-05	107.7827	0.0000
$\|R_m\|$	-0.076719	0.031900	-2.405009	0.0162
R_{m^2}	23.83481	2.898648	8.222733	0.0000
Log likelihood	10539.32			

Table 4.17 Herding Behavior Rising Market Conditions: GARCH (1,1) Model GED Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006350	5.64E-05	112.4842	0.0000
$\|R_m\|$	-0.085901	0.029794	-2.883162	0.0039
R_{m^2}	25.31245	2.531191	10.00021	0.0000
Log likelihood	10472.25			

Table 4.18 Herding behavior Rising Market Conditions: IGARCH (1,1) Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006957	1.83E-05	380.6303	0.0000
$\|R_m\|$	0.011684	0.015279	0.764689	0.4445
R_{m^2}	18.25340	2.027697	9.002032	0.0000
Log likelihood	10048.25			

Table 4.19 Herding Behavior Rising Market Conditions: GARCH (1,0) Assymetry Estimate

Variable	Coefficient	Std. Error	Z-Statistic	Probability
C	0.006515	5.29E-05	123.0746	0.0000
$\|R_m\|$	-0.063576	0.024299	-2.616431	0.0089
R_{m^2}	24.87093	1.786953	13.91806	0.0000
Log likelihood	10346.30			

It can be seen that all of the regression results of all GARCH models during overall market condition, falling market condition and rising market condition reveals the coefficient of market returns squared (R_{m^2}) are positive significantly. It suggests that herding behavior does not exist significantly in building construction sub-sector during overall, falling and rising market period. It also suggests that there is no asymmetry-herding behavior in building construction sub-sector.

V. CONCLUSION

a. Conclusions

b. There is no significant evidence of herding behavior on company shares in bulding construction sub-sector during all market conditions for period 2010 – 2019.

c. There is no significant evidence of herding behavior on company shares in bulding construction sub-sector during rising market conditions for period 2010 – 2019.

d. There is no significant evidence of herding behavior on company shares in bulding construction sub-sector during falling market condition for period 2010 – 2019.

b. Recommendation

a. Theoretical

Other researchers are encouraged to do a further research with a different type of sub-sector companies stock market, such as the subsector of health, insurance, energy, food and beverage, electronics, forestry, oil and gas mining, and many others sub-sector of company shares registered on IDX. The writer believes that further research on those sub-sector stock market will be useful for investor, companies, researchers, and academicians.

b. Practical

Investors shoud not be worried to invest in building construction sub-sector as there is no significant herding behavior found, investor in this sub-sector tend to create investment decisions based on their fundamental analysis. It means that investors create their investment decisions based on the forecast of the state of macroeconomy, industry and company analysis.

REFERENSI

Baker, H. K., and R Nofsinger, J. (2010). Behavioral finance h. kent baker and john r. Nofsinger, editors investors, corporations, and markets.

Banerjee, A., V. (1992). A simple model of herd behavior. *The quarterly journal of economics*, *107*(3), 797-817.

Bodie, Z., *et al.* (2014*). Essentials of Investments*. New York, Amerika: McGraw-Hill/Irwin.

Chang, E.C., Cheng, J. W., and Khorana, A. (1999). An Examination of Herd Behavior in Equity Markets: An International Perspective. *Journal of Banking and Finance, 24,* 1651-1679.

Chiang, T. C., and Zheng, D. (2010). An empirical analysis of herd behavior in global stock markets. *Journal of Banking and Finance, 34,* 1911-1921. Retrieved from Elsevier Science B.V.

Fama, E. F. (1970). *Efficient Capital Markets: A Review of Theory and Empirical Work. The Journal of Finance, 25*(2), 383

Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics*. Boston, Mass: McGraw-Hill.

Hagstrom, R. G. (2014). The Buffet Portofolio: Step-by-step Menciptakan Portofolio Pemenang dengan Prinsip-prinsip Value+Growth Investing Warren Buffet. Jakarta: Daras Books.

Hansen, P. R., & Lunde, A. (2005). *A forecast comparison of volatility models: does anything beat a GARCH(1,1)? Journal of Applied Econometrics, 20*(7), 873–889.

Jordan, B., D., and Miller, T., W. (2009). *Fundamentals of investments valuation and management*. McGraw-Hill Education