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Investor Herding Behavior in Infrastructure Companies on the IDX: Data Panel Approach

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ABSTRACT

This research aims to examine the behavior of herding investors due to the information on interest rates and trading volume. By using daily infrastructure company data on the IDX, it is found that interest rates have a negative effect, while volume has a positive effect on herding behavior. The results show that herding behavior decreases when information on interest rates is entered, while herding behavior increases when there is a trend in trading volume. These results indicate that information announced and scheduled will reduce the behavior of herding investors, such as information about interest rates. On the other hand, investor herding behavior tends to increase when information is random, such as trends in stock trading volumes.

Keywords: *Infrastructure Companies; Interest Rate; Investor Herding Behavior; Stock Trading Volume*

1. Introduction

Information becomes important for investors to make investment decisions, whether that information comes from a country's macroeconomic environment (the company's external environment), the company's microenvironment (the company's internal environment), and

investor behavior. Investment decisions affect stock price movement, such as buying, selling, or even making transactions. Stock price movements caused by developments in the global economy have been widely reported in the latest news.

Macroeconomic variables affect the company systematically, or macroeconomic variables are fundamental factors outside the company that significantly impact company performance. Research produced by Sudiyanto (2010) shows that macroeconomic variables (inflation, exchange rates, interest rates, and economic growth) have a significant effect on systematic risk, while systematic risk has a significant effect on company performance, and company performance has a significant effect on firm value. From the results of this study, it can be explained that macroeconomic variables always have a significant effect on systematic risk (beta stock market). Systematic risk caused by the macro environment cannot be eliminated through diversification or portfolio formation. Therefore, investors must be able to take into account the level of systematic risk that intensively affects the company's performance and the value of the company itself. Information on the development of macroeconomic variables is very important to be understood by investors in making investment decisions.

Information entered the trading floor influencing the investor's decision-making process. In addition to the macroeconomic and microeconomic reference variables used by investors, other variables often influence investors' decisions to invest their capital in the stock exchange. The variable is the volume of stock trading in a given period. Stock trading volume figures are reported daily by the exchange, both for individual emission trading and the total number of trades carried out on a stock exchange. The sharp increase in trading volume is believed to be a significant sign of an increase or decrease in prices because it reflects the increased investor interest in a particular security or stock. In most empirical studies, the trading volume variable becomes a proxy for the flow of information that enters the trading floor. This variable is also a determining factor for how investors make their investment decisions.

In making investment decisions, investors are strongly influenced by their adequate knowledge of the investment types and procedures (Junaeni, 2020), market variables, and investor herding behavior in the capital market (Ghalandari & Ghahremanpour, 2013). This herding behavior is the behavior of investors in following the direction of stock movements in general, or it could be following the directions of analysts or following the trends of foreign investors regardless of the underlying reasons for making such investments. This behavior is done because investors do not have enough information about the movement of certain variables which affect stock prices. Hence, investors only attend when there is a movement to buy or sell shares of certain companies together. Then this investor will also do the same thing. When herding behavior occurs, they make investments without calculating the risk and return they will gain. Some of the negative effects of this herding behavior are investors may make investments that they do not understand and take unnecessary risks.

Many researchers in several countries conducted much research on the herding behavior of investors; herding behavior was studied by Agarwal (2011) in Indonesia, Al-Shboul (2012) in Australia, Prosad et al. (2012) in India, Moradi & Abbasi (2012), Golarzi & Ziyachi (2013) in Tehran, Chen et al. (2004) in China, Elkhaldi (2014) in Tunisia, and Ahsan & Sarkar (2013) in Dhaka. Herding behavior in the capital market has been extensively studied. Still, this paper proposes how this herding behavior occurs due to the announcement of local (domestic) macroeconomic variables and the movement of stock trading volumes as a sign of the flow of information entering the capital market. Regarding the movement of trading volume, most of them are used as a reference to the momentum of an important event so that the direction of the movement is related to an investor's belief in information or news.

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Many studies prove that macroeconomic variables strongly influence investment in stocks, bonds and currencies. Those studies are conducted by Kim & In (2002), Tan & Gannon (2002), Christie-David et al. (2003), Nikkinen & Sahlstrôm (2004), Jones et al. (1998), Nguyen & Ngo (2014), and Wulandari (2014), these studies have been carried out in various countries.

The effect of release of macroeconomic information affects investors in revising their assessment of the stock market performance. Macroeconomic information released by the government is carried out on a scheduled basis. Ederington & Lee (1996) divided information into concerned and unconcerned information on the bond and currency markets. Macroeconomic information is concerning information that can provide certainty to investors so that market turmoil decreases. Macroeconomic news, which is released periodically, can help to solve the problem of market uncertainty. Connolly & Stivers (2005) at the NYSE also added the same evidence that periodic announcements can provide certainty for investors in investing. Research conducted by Shaikh & Padhi (2013) also provided the same evidence on the Indian stock market. Based on the research results from Belgacem & Lahiani (2013), periodic macroeconomic news releases can reduce the intensity of herding behavior. The result of research conducted by Belgacem and Lahiani is also in line with Saeedi & Chahardeh (2013), which states that the uncertainty effect of available information, if the information is public, then the herding behavior will be decreased.

The stock trading volume becomes a reference for investors to make investment decisions. The trading volume shows the investor's interest in a particular stock. For investors, the movement of a company's stock trading volume can be a clue to current market trends. According to Karpoff (1987), the stock trading volume is positively related to the magnitude of price changes in the capital market and the company's stock prices. According to Al-Shboul (2012) and Economou et al. (2010), herding behavior increased due to the high stock trading volume.

Some of the negative effects of this herding behavior are that investors may make investments that they do not understand and take unnecessary risks. The model used to detect the presence of herding behavior is $CSAD_t = \alpha + \delta_1 r_{m,t} + \delta_2 r_{m,t}^2 + \varepsilon_t$. $CSAD_t$ or known as *cross-sectional absolute deviation* at the t-time and $r_{m,t}$ is the market portfolio return at the t-time. According to Chang et al. (2000), if there is a herding behavior in a market, the rate of spread of the return rate (CSAD) will increase lower when compared to the proportion of an increase in market portfolio returns or even the rate of spread of the return will decrease. This can be seen from the model in equation 1, the parameter's value. Suppose there is a herding behavior in a market. In that case, the rate of spread of the return rate (CSAD) will increase lower when compared to the proportion of an increase in market portfolio returns, or even the rate of spread of the return will decrease. This can be seen from the model in equation 1 if the value of the parameter δ_2 is negative and statistically significant, then there is an indication of herding behavior in the stock market.

Herding behavior occurs when the market is not transparent, and investors face uncertainty about public information sources and receive unclear signals about the company's future (Kremer & Nautz, 2012). Chandra (2012) explained herding behavior according to experts. Chang (1999), as cited in Chandra (2012), provides four reasons institutional investors trade in the same direction. First, they process the same information as emerging markets with limited micro information and focus more on macro information. Second, they prefer shares with common characteristics, prudent, liquid, and better known. Third, managers tend to follow the steps of transactions carried out by other managers to maintain their reputation. Fourth, managers follow the stock price valuation of other managers. This reinforces the possibility that

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herding behavior by institutional investors tends to occur due to peer pressure among financial managers. According to Bikchandani & Sharma (2001), when having limited information, investors will follow the movements of other investors in making investment decisions that will ultimately ignore their signal and follow the majority's decision (herding behavior) and form an 'information cascade'.

1.1. Relationship of Macroeconomic Release with Herding Behavior

The changes in macroeconomic variables are an important indicator in investment decisions, especially by investors on the stock exchange. Changes in macroeconomic variables make investors will correct their assessment of the portfolio and will make reallocation some of their assets. It has become a measure that macroeconomic variables, especially inflation and interest rates, affect individual company performance.

According to Tandelilin (2001), rising inflation will reduce consumer purchasing power and undermine corporate profits. Otherwise, high-interest rates will reduce the stock market's performance because there is a transition from stock investment to investment in deposits. Both of these variables are the main concern, but these variables are released periodically by the government so that the emergence of this news can be anticipated by investors (Jones et al., 1998; Nikkinen & Sahlstrôm, 2004; Connolly & Stivers, 2005). Based on the result of research conducted by Belgacem & Lahiani (2013), periodic macroeconomic news releases can reduce the intensity of herding behavior. The results of Belgacem & Lahiani's research are also in line with Saeedi & Chahardeh (2013), which state that the uncertainty effect of the available information, if the information is public, then the herding behavior will be decreased. Thus, the alternative hypotheses proposed are:

Ha 1: Macroeconomic releases negatively affect the herding behavior of investors.

1.2. Relationship of Stock Trading Volume with Herding Behavior

Volume is the total number of shares traded in a given period. Volume figures are reported daily by the stock exchange for individual emissions trading and the total number of trades carried out on the exchange. A sharp increase in volume is believed to be a significant sign of an increase or decrease in prices because it reflects the increased investor interest in a particular security or market index. Volume is a proxy for the entry of information into the trading floor, so an increase or decrease in the trading volume of a particular stock is a measure of investor interest in a stock. The various information entered in the exchange, and the possibility is due to the corporate action information, issues or developing rumors. Concerning investor herding behavior, the volume of stock trading indicates investor interest in general, so the following factors (herding behavior) will increase.

In contrast, the volume of stock trading will decrease. Investors make herding behavior because they do not have certainty of information or do not understand the movement of variables that influence investors' decisions in investing. This is reinforced by research conducted by Al-Shboul (2012) and Economou et al. (2010), who tested asymmetric herding behavior, where herding behavior is created because of a high stock trading volume. Herding behavior increases due to the high stock trading volume. The general direction of movement in the stock market is reflected in the trading volume. The higher volume will cause the behavior of investors to increase. Thus, the second hypothesis that researchers will propose is:

Ha 2: High stock trading volume positively affects the herding behavior of investors.

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2. Research Methodology

This study used population shares of infrastructure companies listed on the Indonesia Stock Exchange (IDX) using the observation period from 2014 to 2018. The research sample was selected by purposive sampling, with the criteria being shares of infrastructure companies classified as active. It is indicated by the availability of daily company data consistently from 2014 to 2018. By using daily data, the data needed to form variables in the study consists of 1) Composite Stock Price Index, 2) Company stock prices, 3) Trading volume, 4) Number of shares outstanding, and 5) Date of release of macroeconomic variables (Sertifikat Bank Indonesia or SBI). The data was obtained from the Bloomberg database.

Measurement of research variables applied to independent variables (herding behavior variables) and dependent variables (macroeconomic variables and stock trading volume) can be presented in the following table:

Table 1. Variable Measurement

No	Variable	Measurement
Dependent Variable		
1.	Herding Behavior (CSAD = Cross Sectional Absolute Deviation)	$CASD = \frac{1}{N}\sum_{i=1}^{N}\lvert R_{i,t} - R_{m,t}\rvert$ …….. (1) Note: N is the number of companies, $R_{i,t}$ is the return of the infrastructure company shares at time t, $R_{m,t}$ s the composite stock price index return at time t (Chang et al., 2000; Belgacem & Lahiani, 2013).
Independent Variable		
1.	SBI Release	Dummy SBI release. SBI release is a dummy variable = 1 if there is a release and 0 if there is no release ... (2) (Belgacem & Lahiani, 2013)
2.	Stock Trading Volume (Share Turnover)	$TO = \frac{VOLUME}{shares\ outstanding}$ ….. (3) (Connolly & Stivers, 2005). The level of share turnover used is a high and low dummy variable. Dummy variable = 1 if the TO value is higher than the moving average value, and 0 if the other.

Data analysis techniques can be done by using the Eviews 8 program as a tool to process data and regress the models that have been previously formulated. The proposed hypothesis testing model is based on the model used by Chang et al. (2000) and Belgacem & Lahiani (2013). The empirical model of research is:

$$CSAD_t = \alpha + \beta R_{m,t} + \gamma\lvert R_{m,t}\rvert + \theta R_{m,t}^2 + \sum_{k=1}^{2}\delta_k D_k R_{m,t}^2 + \vartheta D_k TO_t + \varepsilon_t \quad (4)$$

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Note: $CSAD_t$ is *cross-sectional absolute deviation* as a measure of herding behavior, $R_{m,t}$ is return market, $D_k R_{m,t}^2$ is *dummy* variable = 1 if there is a macroeconomic release and 0 if other, $D_k TO_t$ is *dummy* variable = 1 if the share turnover rate is higher than the moving average value. $\beta, \gamma, \theta, \delta_k, \vartheta$ is the estimated coefficient. And ε_t is the residual value of this model.

The overall model used in this study was estimated using the generalized least square (GLS) method in the panel data model. There are three-panel data regression estimates: the model using the OLS (common) method, the fixed effect model, and the random effect model. The question is often which technique should be chosen for panel data regression. First, is the F statistical test used to choose OLS methods without dummy variables or fixed effect models. Second, the Lagrange Multiplier (LM) test is used to choose among OLS without dummy variables or random effects. The third, the Hausman test, is used to choose between the fixed effect model and the random effect model.

2.1. Test of Significance Model Fixed Effect

The F-test statistic selects the best model in panel data regression. In contrast, the F statistic test tests the differences in the two regressions. Chow's test analyzes the structural changes in the regression model between the two OLS models without dummy variables (common effect) and the fixed effect model. The use of the F-statistic test or the Chow test with the formula as follows:

$$F = \frac{SSR_R - SSR_{U/q}}{SSR_u/(n-k)} \quad (5)$$

Note: 〖SSR〗_R and 〖SSR〗_U is a sum of squared residuals technique without a dummy variable (common effect), namely as a restricted model and a fixed effect technique with a dummy variable as an unrestricted model.

After estimating the panel data with the assumption that intercept and slope are similar (common effect) and the assumption of intercept is different, but the slope is similar (fixed effect). The null hypothesis seems to have a similar intercept value or accepts the common effect model as the best. Instead, the alternative hypothesis is that the intercept values are different or accept the fixed effect model best. The calculated statistical value F will follow the statistical distribution of F with degrees of freedom (df) of q for the numerator and n-k for the denominator. Q is the number of restrictions or restrictions in the model without a dummy variable. If the calculated F statistic value is greater than the critical F statistic value, then an alternative hypothesis (Ha) is accepted. This means that the fixed effect model is better than the common effect model. Vice versa, if the calculated F statistic value is smaller than the critical F statistical value, then the null hypothesis (H_0) is accepted. This means that the common effect model is better than the fixed effect model.

2.2. Test the Significance of the Random Effect Model

The best model test that follows in panel data regression is the Lagrange multiplier test (LM test), where the LM test is used to find out the best model between the common effect model and the random effect model. Breusch-Pagan developed the LM statistical test based on the residual value of the OLS method to test the significance of the random effect model. To find the LM-statistical value, the following formula is used:

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$$LM = \frac{nT}{2(T-1)}\left(\frac{\sum_{i=1}^{n}\left(\sum_{t=1}^{T}\hat{\varepsilon}_{it}\right)^2}{\sum_{i=1}^{n}\sum_{t=1}^{T}\hat{\varepsilon}_{it}^2} - 1\right)^2$$

$$LM = \frac{nT}{2(T-1)}\left(\frac{\sum_{i=1}^{n}(T\hat{\varepsilon}_{it})^2}{\sum_{i=1}^{n}\sum_{t=1}^{T}\hat{\varepsilon}_{it}^2} - 1\right)^2$$

(6)

Note: n = individuals number; T = periods number; dan ε̂ = residual value of method OLS.

The LM test is based on the distribution of chi-squares with degrees of freedom equal to the number of independent variables. H_0 is accepted, and H_A is rejected. Suppose the LM statistical value is smaller than the chi-squares statistical value as a critical value. In that case, the OLS (common effect) method is better than the random effect method. H_0 is rejected or accepts H_A if the LM value is statistically greater than the chi-square value, which means that the estimation of the random effect model is better than the common effect model.

2.3. Test the Significance of the Fixed Effect or Random Effect Model

After testing the significance of each fixed effect and random effect model, the next step is to choose which model will be chosen among the two models. The model used a statistical test developed by Hausman for the testing process. The Hausman test is based on the idea that both OLS and GLS methods are consistent, but OLS is inefficient in the null hypothesis. In contrast, in the alternative hypothesis, the OLS method is consistent, and GLS is inconsistent. Therefore, the null hypothesis test is that the estimation results of the two models are not different, so the Hausman statistical test can be done based on the difference in these estimates. The Hausman test can be explained by using the covariance matrix of vector differences $[\hat{\beta}_{OLS} - \hat{\beta}_{GLS}]$:

$$var[\hat{\beta}_{OLS} - \hat{\beta}_{GLS}] = var(\hat{\beta}_{OLS}) + var(\hat{\beta}_{GLS}) - cov(\hat{\beta}_{OLS}, \hat{\beta}_{GLS}) - cov(\hat{\beta}_{OLS}, \hat{\beta}_{GLS})$$

(7)

Because the difference in covariance between an efficient estimator and an inefficient estimator is zero, thus:

$$cov[(\hat{\beta}_{OLS} - \hat{\beta}_{GLS}), \hat{\beta}_{GLS}] = cov(\hat{\beta}_{OLS}, \hat{\beta}_{GLS}) - var(\hat{\beta}_{GLS}) = 0$$
$$cov(\hat{\beta}_{OLS}, \hat{\beta}_{GLS}) = var(\hat{\beta}_{GLS})$$

(8)

Then equation 7 is substituted into equation 8, and it will produce the covariance of the matrix as follows:

$$var[\hat{\beta}_{OLS} - \hat{\beta}_{GLS}] = var(\hat{\beta}_{OLS}) - var(\hat{\beta}_{GLS}) = var(\hat{q})$$

(9)

Rejection of Hausman statistics means rejection of fixed effects or dummy variables. The greater the Hausman statistical value, the greater it leads to the acceptance of the suspected component model or the acceptance of random effects as the best model. Following the Wald criteria, the Hausman test follows the chi-squares distribution as follows:

$$m = \hat{q}' var(\hat{q})^{-1}\hat{q}$$

(10)

Note: $\hat{q} = [\hat{\beta}_{OLS} - \hat{\beta}_{GLS}]$ dan $var(\hat{q}) = var(\hat{\beta}_{OLS}) - var(\hat{\beta}_{GLS})$

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This Hausman test statistic follows the statistical distribution of chi-squares with a degree of freedom of k, where k is the number of independent variables. Based on the results of the calculation of the null hypothesis E-views, (H_0) rejected or accepted an alternative hypothesis (H_A), when the Hausman statistical value is greater than its critical value, the right model in panel data regression is the fixed effect model. Instead of the null hypothesis, (H_0) accepted or alternative hypothesis (H_A) rejected when the Hausman statistical value is smaller than its critical value, the right model in panel data regression is the random effect model. The conditions that must be met are:

Chi-Statistic > Chi-Table → fixed effect (individual effects correlated with independent variables).

Chi-Statistic < Chi-Table → random effect (there is no relationship between individual effects and independent variables).

2.4. Hypothesis Test Panel Data Model

The conclusion of the estimation results based on two methods first is the probability value of t-count or t-statistic (ρ-value) each coefficient estimated with α = 0,05, and second based on the results of the F-hit value with α = 0,05. The fit model is seen from adjusted R^2, where if this value approaches 1, then the model is getting better.

To test the first hypothesis, the direction of the coefficient is known, which is a negative effect (-) then the hypothesis is made through a one-sided test. Hypothesis formulation to test the effect of macroeconomic news (MN) on herding behavior is H_0: $\delta_1 \geq 0$ and Ha: $\delta_1 < 0$. Testing the significance of the effect of macroeconomic release on herding behavior was carried out by using a t-test and comparing probability values (ρ-value) to the level of significance α. If the probability value is smaller than α, then H_0 is rejected, and Ha is accepted. Thus, it can be concluded that economic news influences herding behavior.

To test the second hypothesis, the direction of the coefficient is known as a positive effect (+) then the hypothesis is made through a one-sided test. Hypothesis formulation to test the effect of high and low share turnover on herding behavior is $H_0: \vartheta_1 \leq 0$ dan $H_A: \vartheta_1 > 0$. Testing the significance of the effect of high and low share turnover on herding behavior, performed by t-test and comparing the probability value (ρ-value) to the significance level α. If the probability value is smaller than α, then H_0 is rejected, and Ha is accepted. Thus, it can be concluded that the level of share turnover influences herding behavior.

3. Results and Discussion

The study population was drawn from infrastructure, utilities & transportation companies. There are 32 companies in this sector, but not all have consecutive data. During the five years of observation from 2014-2018, there were only four companies in the data screening process; the companies are PT Jasa Marga Tbk (JSMR), a company managing toll roads, bridges, air and sea ports, PT Panorama Sentrawisata Tbk (PANR) is a transportation company, PT Perusahaan Gas Negara Tbk (PGAS) is a company engaged in the energy sector. PT Telekomunikasi Indonesia Tbk (TLKM) is a telecommunications company; where these companies have different data characteristics, so this study used panel data regression. To get a description of herding behavior and the information affecting it can be seen in sub discussion of the data description.

3.1. Data Description Information, Turnover, and Herding Behavior

Observing investor herding behavior is identical to changing several triggers, including the

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company's internal and external information. Investor herding behavior is measured by one divided by the number of observations and then multiplied by the difference between a company's stock return and a composite stock price index (CSPI) return. This investor herding behavior is referred to as following the direction of market movement or 'loading' behavior due to the lack of information obtained by investors. The higher the heterogeneity of information coming to the market, the higher the herding behavior. The following is the direction of investor herding behavior:

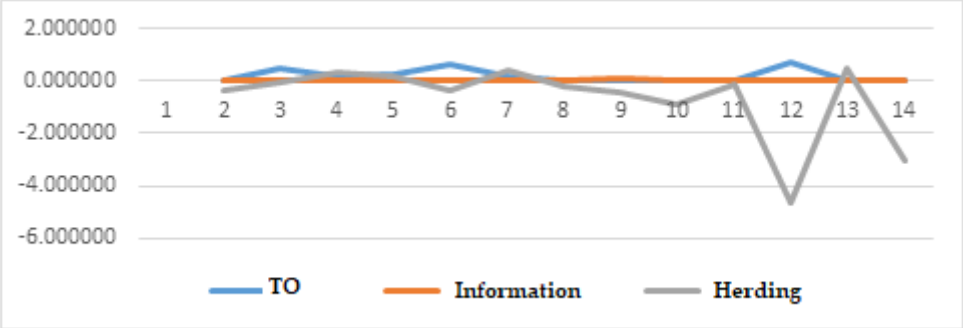

Figure 1. Data Characteristics of Information, Turnover, and Herding Behavior

From Figure 1 above, it can be explained that herding data tends to be negative areas and turnover data tends to be positive areas or fluctuating data. At the same time, SBI information data is more stable. The data variation is visible in the herding data, which equals 1.37, while the average is -0.47. Thus, herding behavior is very vulnerable to various incoming information.

3.2. Panel Data Regression Model Estimation

After conducting the sampling procedure and obtaining a total of 4,600 observations, four companies for five consecutive years of observation from 2014-2018, then at this stage, the researchers present the results of estimating the effect of several independent variables on the dependent variable (herding behavior) in the Indonesia Stock Exchange. In the following table, the researchers will present the data processing results using panel data regression with pooled least squares (PLS) estimation methods and feasible generalized least squares (FGLS) methods. The use of panel data regression is based on research data obtained by combining time series data (2014-2018) and cross-section data (4 companies), where company observation is very important in research because heterogeneous types of companies are in different sub-industries. It is well known that shares of various companies are likely to have different impacts in response to changes in several factors proposed in this study.

The following table summarizes the research findings to determine the value of the regression coefficient, the direction of the regression coefficient, the t-calculated probability, the F-calculated probability, the adjusted coefficient of determination, and the selection of panel data regression estimation techniques:

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Table 2. Summary of Statistical Research Findings

Variable	Panel Data Model															
	Common Effect		Fixed Effect		Random Effect		Full Sample		Sub Sample							
									JSMR		PANR		PGAS		TLKM	
	Coeff	Pr t-Stat	Coeff	Pr t-Stat	Coeff	Pr t-Stat	Coeff	Pr t-Stat	Coeff	Pr t-Stat	Coeff	Pr t-Stat	Coeff	Pr t-Stat	Coeff	Pr t-Stat
C	6,52	0,00*	7,63	0,00*	6,80	0,00*	-1,43	0,00*	1,48	0,00*	1,55	0,00*	2,10	0,00*	4,30	0,00*
SBI Information	-0,07	0,00*	-0,04	0,00*	-0,06	0,00*	-0,07	0,00*	-0,05	0,00*	-0,25	0,24	-0,16	0,40	-0,25	0,00*
Share Turnover	0,57	0,00*	0,63	0,00*	0,59	0,00*	0,62	0,00*	0,16	0,00*	0,27	0,31	0,23	0,00*	0,47	0,00*
Adjusted R-Squared		0,1790		0,7291		0,1785		0,0677		0,1014		0,0015		0,1500		0,2673
Prob-F Stat		0,0000		0,0000		0,0000		0,0000		0,0000		0,2396		0,0000		0,0000
Prob Chow Test		n/a		0,0000		n/a		n/a		n/a		n/a		n/a		n/a
Prob Hausman Test		n/a		n/a		1,0000		n/a		n/a		n/a		n/a		n/a
LM-Statistik		n/a		n/a		61,0500		n/a		n/a		n/a		n/a		n/a

Note: These results are obtained directly from data using Eviews 8.1, except LM-Statistics results which are calculated manually because LM-statistics for collecting random effects models in the panel data model cannot be run through Eviews 8.1. The research model is $CSAD_t = \alpha + \beta R_{m,t} + \gamma|R_{m,t}| + \theta R_{m,t}^2 + \sum_{k=1}^{2} \delta_k D_k R_{m,t}^2 + \vartheta D_k TO_t + \varepsilon_t$. One-star symbols (*) significance at alpha 5%. Symbol not available. The dependent variable in the regression model is herding behavior (CSAD).

3.3. Panel Data Regression Model Estimation

Looking at the summary of the results of the panel data processing, it can be concluded that the random effect model is the best model to explain and analyze the results of the hypothesis. The random effect model is the best compared to the two-panel data models (common and fixed effect models). Comparison between the common effect model and the fixed effect model by using the Chow test with the Redundant test, where the statistical value of the cross-section F is 9.319, and the probability value is 0,000 (attachment of the results of data processing). The F-table value with the numerator number 5 = (6-1) and the denominator 92 = (98-6) at α = 5% is 2.32, or the smaller F-count probability value α = 5% is 0.0000. Thus, the test of this model rejects the null hypothesis that the right panel data model to analyze the behavior of the volatility of the company's shares is the fixed effect model.

The conclusion that the fixed effect or random effect model is the best model in this study is seen from the Hausman test value, where the statistical value of a random cross-section is 0.0000, and the probability value is 1,000 (attachment of the results of data processing). The critical value of chi-squares with df of 5 at α = 5% is 11.07, or the value of the random cross-section probability is greater than α = 5%, which is 1,000. Based on the Hausman test value, it fails to reject the null hypothesis (random effect model) or the alternative hypothesis (fixed effect model). Thus, this study's random effect model for analyzing corporate stock volatility behavior is the right model.

Furthermore, both tests are not consistent yet, or the tests still provide answers in two versions. First, the Chow test shows the best model is the fixed effect model, while the second version, the Hauman test, shows the best model is the random effect model, not the fixed effect. For this reason, the third test is the significance of random effects through the Lagrange Multiplier (LM) test developed by Breusch-Pagan. This method is based on the residual value of the OLS method, which can be rewritten for the formula $LM = \frac{nT}{2(T-1)}(\frac{\sum_{i=1}^{n}(\sum_{t=1}^{T}\hat{\varepsilon}_{it})^2}{\sum_{i=1}^{n}\sum_{t=1}^{T}\hat{\varepsilon}_{it}^2} - 1)^2$, where n is the number of individuals (companies), T is the number of periods, and ε̂ is the residual OLS

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method. The results of calculations in this test are $LM = \frac{98(5)}{2(5-1)} * 0{,}996673 = 61{,}05$. The calculation results are conducted manually because Eviews 8.1 does not support the existence of random effect testing through the LM test. These results indicate that the LM statistic is 61.05, while the critical value of the chi-squares distribution table with df of 5 (number of independent variables) at α = 5% is 11.07. The null hypothesis is the common effect model, and the alternative hypothesis is the random effect model. The comparison of LM statistical values is greater than the table value $\mathcal{X}^2$ so that the conclusion is an alternative hypothesis is accepted, or the random effect model is the best in analyzing the behavior of stock volatility in 4 companies on the Stock Exchange during the 2014-2018 observation period. Thus, the discussion of this study follows the results of data processing obtained from the random effect model.

Table 3. Summary of Hypothesis Testing Results

No	Hypothesis	Hypothesis direction	Research result						Information
			REM	*Full Sample*	Sub-Sample				
					JSMR	PANR	PGAS	TLKM	
1	SBI information affects decreasing herding behavior	(-)	(-)*	(-)*	(-)*	(-)	(-)*	(-)*	The results of the study follow the direction of the hypothesis, but in the PANR sample, the information becomes insignificant
2	TO affects the increase in herding behavior	(+)	(+)*	(+)*	(+)*	(+)	(+)*	(+)*	The results of the study follow the direction of the hypothesis, but in the PANR sample, the TO becomes insignificant

Note: Discussion of hypothesis testing with panel data models. REM for the random effect model. Information and TO are tested using a full sample and sub-sample (issuer). Symbol (+) for positive; symbol (-) for negative; star symbol (*) for the level of significance of the variable.

3.4. Discussion of Hypothesis Testing Results

Based on the data processing results using Eviews 8.1, the independent variable information shows the direction of the negative coefficient. The direction of this negative coefficient indicates a herding behavior around the release of macroeconomic variables by Bank Indonesia. SBI releases are reported periodically, which can reduce uncertainty in the stock market so that this herding behavior will decrease. Likewise, with the TO variable, the direction

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of the coefficient is positive and significant. When the market is uncertain, the herding behavior will increase because investors prefer to use the 'debilitating' behavior that follows the general direction of market movements. The existence of SBI released by the government and the high volume of stock trading affect investors' herding behavior on the Indonesia Stock Exchange. Herding behavior can be proven on the Indonesian stock market when information on SBI releases and stock trading volume is entered. The results of the processed data are in line with the hypothesis proposed earlier.

4. Conclusion

This study examines the presence of investor herding behavior on the Indonesia Stock Exchange when information on SBI is released and the high volume of stock trading. The estimation of research results is based on daily data for five years. Herding behavior was found in this study because the release of macroeconomic news on SBI interest rates was a fundamental macroeconomic factor that Bank Indonesia officially announced, which means that investors had and could predict the certainty of the information so that the psychological bias of the investor did not occur or in other words herding behavior did not happen in the event. This verification is in line with Fernández et al. (2011), which showed that herding behavior is more common in uncertain information. Hence, investors tend to follow decisions made by other investors. The same fact was also found in the study by Chang et al. (2000) that macroeconomic information affects the herding behavior of investors in the US, Hong Kong and Japanese stock markets. This fact shows that this fundamental information plays a role in making investment decisions because a variety of information is circulating on the trading floor.

This study provides significant results on the effect of the high stock trading turnover on investor herding behavior in Indonesia. The results of this study provide additional evidence that the high level of stock trading turnover shows the entry of some information so that the market looks more liquid. Information disclosure is increasingly high, so investors' behavior in grouping certain information movements is very significant on the IDX.

The limitation of this study is that it still uses limited data, so it does not provide a maximum effect on the study results. Second, the study sample was only four companies, which is the limitation of researchers in explaining and analyzing herding behavior on the IDX.

Subsequent research can be carried out at sectoral or industry-level analysis, such as research conducted by Demirer et al. (2014) regarding the existence of herding behavior in sector-based ADR portfolios or research directed at individual, foreign and domestic investor groups. Then it can be grouped into age, gender, marital status, education, profession, and monthly income (Ic & Kahyaoglu, 2013). In addition, research can also be directed at market stress conditions because, under normal conditions, investors tend to act more rationally (Gunawan et al., 2011).

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6. Declaration of Conflicting Interests

The authors have declared no potential conflicts of interest concerning this article's research, authorship, and/or publication.

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