# Modeling Herding Behavior in the Indonesian Capital Market

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**Abstract**
Herding behavior generally occurs in developing markets and emerging markets. The condition of a capital market in a bullish or bearish state coupled with information asymmetry between investors will cause an increase in herding behavior phenomena. The phenomenon of herding behavior occurs when investors follow a crowd's behavior at a certain period and ignore their beliefs. Herding behavior explains the tendency of investor behavior to follow the behavior of other investors in the capital market. The study aims to analyze the herding behavior in the general, bearish, and bullish market conditions in the Indonesian capital market for the 2021-2022 period. This research is quantitative research based on the formulation of the problem. This research is classified as associative research. The data used is secondary data in the form of monthly data from LQ45 for 2021-2022. The analysis was carried out in two stages: 1) cross-sectional absolute deviation (CSAD) was used to determine to herd. 2) Multiple linear regression analysis with three market conditions: general, bearish, and bullish. The results showed that the general market and bearish market conditions explained the herding behavior in the Indonesian capital market for the 2021-2022 period, while for bullish market conditions, there was no herding behavior in the Indonesian capital market for the 2021-2022 period. Investors should still conduct fundamental and technical analysis before making investment decisions during bullish and bearish market conditions in the Indonesian capital market.

**Keywords:** csad, herding, bearish, bullish, lq45

## 1. Introduction

Investors make an investment decision regarding allocating a certain amount of capital in the form of investment. Investors always act rationally in making investment decisions by considering all available information. According to Tandelilin (2010), investment decisions are influenced by the level of trade-off between risk and return. Investors will make decisions that can maximize returns and minimize risk. Investors will conduct technical and fundamental analyses to make the best investment decisions, but under certain conditions, investors can act irrationally when facing uncertainty (Bogdan et al., 2022; Jiang et al., 2022; Wen et al., 2022). This irrationality is strongly influenced by investors' psychological factors, which cause deviations or biases to influence the decisions taken. Investors who experience bias will add all existing information and facts with all their abilities; investors will conclude for themselves and consider the choice the most correct (Pradhana, 2018).

Investor decision-making that is influenced by a person's psychological factors can be explained by financial behavior. Baker and Nofsinger (2010) classify four financial behavior themes: heuristics, farming, emotions, and market impact. Heuristics are mental shortcuts that simplify complex methods for making judgments. Framing is an investor's perception to frame a choice from the investor's selection. Emotions are universal subconscious emotions and needs, fantasies, and fears that drive every investor's decision. *Market impact* is an anomaly that affects market prices and is likely to be explained by psychology. The underlying assumption of behavioral finance is that investor information and characteristics systematically influence investor decisions and their impact on the market. The human brain often processes information using shortcuts and emotions. Emotions such as fear and greed play an essential role in an investor's decision-making; psychological studies reveal that the fear of losing money from investment is three times greater than the pleasure of getting money from investment (Chaudhary, 2013).

Herding is one of the market anomalies that undermines the accuracy of the efficient market hypothesis due to irrational decision-making by investors (Carissa et al., 2022). Herding is the process by which investors trade in the same direction, imitating others and basing decisions on other investors (Galariotis et al., 2016). Herding is mainly due to low investor resources, lack of investor expertise, and incomplete market-related investor knowledge. Herding behavior is mainly found in emerging market countries due to high volatility movements. Indonesia has had positive economic growth in recent years as one of the emerging market countries. The Central Bureau of Statistics reported that Indonesia's economy grew by 5.31% in 2022 is higher than the previous year. With increasing economic growth, the Indonesian stock market has become an alternative for global and domestic investors to invest in the Indonesian Stock Exchange.

Indonesia's capital market has several stock indices, including the LQ45 Index. The development of LQ45 as 45 company stocks with the highest liquidity and market capitalization criteria in Indonesia shows that in 2019 the LQ45 Index performed positively and was stable, but in 2020 there was a decline in LQ45 performance. The lowest LQ45 downtrend occurred on March 24, 2020, at 566.83. The weakening was caused by the increase in COVID-19 cases in Indonesia, resulting in various speculations and news related to COVID that reacted to the market, which caused capital market fluctuations. Russia's invasion of Ukraine at the beginning of 2022 weakened the Jakarta Composite Indeks (JCI) at the beginning of the week to 0.86% and continued to move down to 6,869.06. JCI's performance deteriorated in line with the weakening of most stock exchange performance in Asia, triggered by concerns about the worsening war between Russia and Ukraine. Market participants continue to worry about the adverse impact on the global economy due to the war. The war between Russia and Ukraine has also impacted inflation rates in several countries in Europe and the United States due to supply chain disruptions and droughts in several countries.
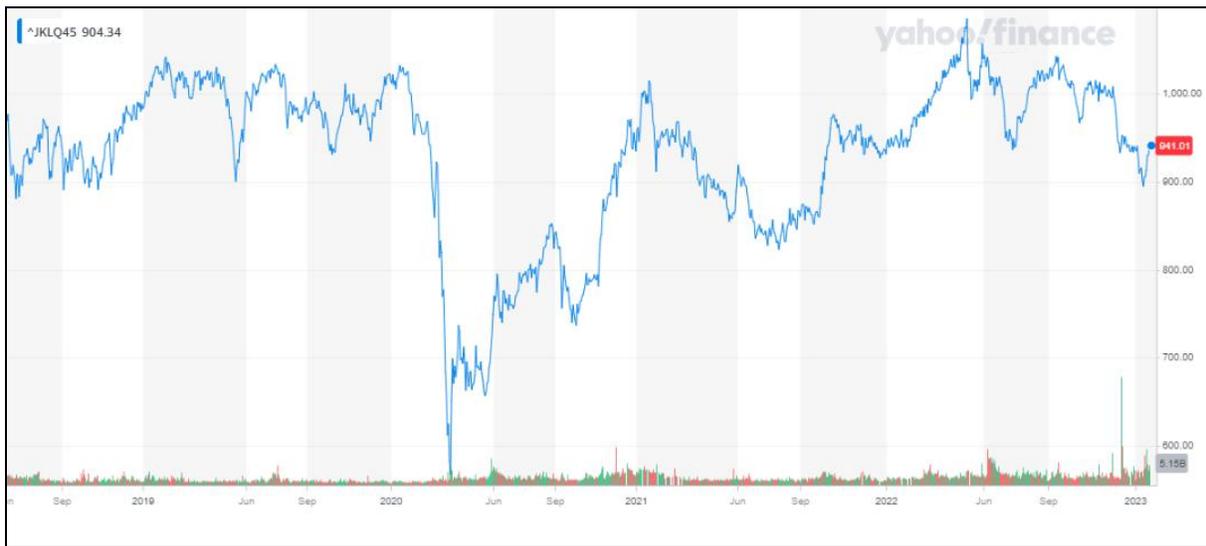
Source: Yahoo Finance (2023)

Figure 1. LQ45 Index Movement

Uncertain market conditions due to COVID-19 and several phenomena of the global economic crisis have become rumors and information asymmetries among investors. Uninformed investors will mimic the decisions of other investors with complete information. This behavior resulted in a herding effect on the stock market. This statement is in line with the results of research by Sadewo and Cahyaningdyah(2022), Jiang et al. (2022), Bogdan et al. (2022), and Bharti and Kumar (2022) found herding behavior during the COVID-19 pandemic. Research by Ng et al. (2022) revealed that herding behavior occurs when market conditions rise and fall but increases during market crashes. In contrast to the results of Yalçin and Aybars' (2022) research that herding behavior is not present in rising or falling market conditions. Investors act on their rational thinking and insight without being influenced by the behavior of other investors.

This study aims to detect herding behavior on the LQ45 index in the Indonesian Capital Market with three market conditions, namely general, bearish, and bullish conditions for the 2021-2022 period. General Market is the overall condition of the market period used to provide a more comprehensive analysis to determine the market reaction after the stock market crash due to the Covid-19 pandemic and the uncertain global economic crisis. Negative market returns describe bearish market conditions. Unfounded rumors, mainly those spread in the mass media related to the Covid issue and the global economic crisis, caused investors to build their speculations to withdraw their funds from the capital market, making stock prices decline, which caused the market to be in a bearish condition. Bullish market conditions are the opposite of bearish market conditions, where market returns have positive values.

Based on differences in market conditions on herding behavior, the hypothesis can be written as follows:

$H_1$: There is Herding Behavior in General Market Conditions

$H_2$: There is Herding Behavior in Bearish Market Conditions

$H_3$: There is Herding Behavior in Bullish Market Conditions

## 2. Method

This study is an associative study examining the relationship between two or more variables (Sugiyono, 2019). The data used is in the form of secondary data sourced from IDX and Yahoo Finance. The research data is in the form of a monthly time series for January 2021-December 2022. The population in this study is all stocks that are members of the LQ45 Index. The sample in this study is companies listed on the LQ45 Index from January 2021-December 2022. The sampling technique used is purposive sampling by considering several criteria, in the form of 1) companies incorporated in LQ45; 2) companies listing on the LQ45 Index during the period January 2021-December 2022; and 3) the availability of the company's financial statements during the period January 2021-December 2022. Based on the above criteria, 34 companies will be obtained. The analysis is carried out in two stages; 1) *Cross-Sectional Absolute Deviation* (CSAD) method; and 2) Multiple linear regression to detect herding behavior in the LQ45 Index from January 2021 – December 2022.

*2.1 Data Analysis Techniques*

2.1.1 Calculating Stock Return ($R_i$)

The first step taken is to calculate the return value of each issuer used as a research sample using the following equation:

$$R_{mt} = \frac{P_{mt} - P_{m(t-1)}}{P_{mt-1}} \qquad (1)$$

Description:

$R_{it}$: Return of individual stocks in period t

$P_{it}$: The stock price in period t

$P_{it-1}$: The share price in period t-1 (previous period)

2.1.2 Calculating Market Return ($R_m$)

The second step is to calculate the market return of the LQ45 Index using the following equation:

$$CSAD = \frac{1}{n}\sum_{i=1}^{n}|R_{it} - R_{mt}| \qquad (2)$$

Description:

$R_{mt}$: Market return in period t

$P_{it}$: The value of the market index in period t

$P_{it-1}$: The value of the market index in period t-1 (previous period)

2.1.3 Calculating Cross-Sectional Absolute Deviation (CSAD)

The average CSAD value of each stock return with the market return in period t. The calculation of the CSAD value can be done using the following equation:

$$R_{it} = \frac{P_{it} - P_{i(t-1)}}{P_{it-1}} \qquad (3)$$

Description:

$R_{it}$: Return of individual stocks in period t

$R_{mt}$: Market return in period t

N: Number of companies in the sample

*2.2 Multiple Linear Regression*

The linear regression model in this study was used to test and analyze the relationship between CSAD and monthly market returns, which was used to detect herding behavior in the market. The regression equation can be written with the following formulation:

$$CSAD = \alpha + \gamma_1 + |R_{mt}| + \gamma_2 |R_{mt}|^2 + \varepsilon_t \qquad (4)$$

Description:

α: Intercept

$\gamma_1$: Linear coefficient between CSAD and market portfolio return

$\gamma_2$: Non-linear coefficient between CSAD and market portfolio return

$R_{mt}$: Market return on period t (monthly)

$\varepsilon_1$: Standard Error

Herding behavior results in a relationship between the CSAD dispersion value and market returns that were initially linear to non-linear. The non-linear relationship is characterized by a negative and statistically significant coefficient ($R_{mt}^2$) ($\gamma_2 < 0$), which is reflected in the decrease in CSAD value.

## 3. Results

The LQ45 index is an index that measures the performance of the 45 most active company stocks that meet specific criteria, namely being listed as the top 60 stocks with the highest market capitalization for the last 12 months, listed as the top 60 stocks with the highest transaction value for the last 12 months, officially listed as issuers going public at least for three months on the

IDX and have good financial conditions and growth prospects for issuers. Shares that do not meet the criteria will be issued, then replaced with shares that have met the selection criteria. Stock replacement is carried out every six months in early February and August.

The following is a list of companies that are members of the LQ45 index and listings from January 2021-December 2022 and the companies used in this study.

Table 1. Companies Listed on LQ45 January 2021 – December 2022

| No. | Code | Company Name |
|-----|------|--------------|
| 1 | ADRO | Adaro Energy Indonesia Tbk. |
| 2 | ANTM | Aneka Tambang Tbk. |
| 3 | ASII | Astra International Tbk. |
| 4 | BBCA | Bank Central Asia Tbk. |
| 5 | BBNI | Bank Negara Indonesia (Persero) Tbk. |
| 6 | BBRI | Bank Rakyat Indonesia (Persero) Tbk. |
| 7 | BBTN | Bank Tabungan Negara (Persero) Tbk. |
| 8 | BMRI | Bank Mandiri (Persero) Tbk. |
| 9 | CPIN | Charoen Pokphand Indonesia Tbk |
| 10 | ERAA | ErajayaSwasembadaTbk. |
| 11 | EXCL | XL Axiata Tbk. |
| 12 | HMSP | H.M. SampoernaTbk. |
| 13 | ICBP | Indofood CBP SuksesMakmurTbk. |
| 14 | INCO | Vale Indonesia Tbk. |
| 15 | INDF | Indofood SuksesMakmurTbk. |
| 16 | INKP | Indah Kiat Pulp & Paper Tbk. |
| 17 | INTP | Indocement Tunggal Prakarsa Tbk. |
| 18 | ITMG | Indo TambangrayaMegahTbk. |
| 19 | JPFA | JapfaComfeed Indonesia Tbk. |
| 20 | KLBF | Kalbe FarmaTbk. |
| 21 | MDKA | Merdeka Copper Gold Tbk. |
| 22 | MEDC | Medco EnergiInternasionalTbk. |
| 23 | MIKA | MitraKeluargaKaryasehatTbk. |
| 24 | MNCN | Media Nusantara Citra Tbk. |
| 25 | PGAS | Perusahaan Gas Negara Tbk. |
| 26 | PTBA | Bukit AsamTbk. |
| 27 | SMGR | Semen Indonesia (Persero) Tbk. |
| 28 | TBIG | Tower Bersama Infrastructure Tbk. |
| 29 | TLKM | Telkom Indonesia (Persero) Tbk. |
| 30 | TOWR | SaranaMenara Nusantara Tbk. |
| 31 | UNTR | United Tractors Tbk. |
| 32 | UNVR | Unilever Indonesia Tbk. |
| 33 | TPIA | Chandra Asri Petrochemical Tbk. |
| 34 | WIKA | WijayaKarya (Persero) Tbk. |

Source: IDX (2023)

*3.1. Descriptive Statistical Analysis*

Descriptive statistical analysis is a method that aims to provide a general overview of the data and characteristics of the research sample. The closing price is used to find individual stock returns and market returns, which will be used to find the dependent variable, namely CSAD, and the independent variable, market return. This study divides market conditions into general, bullish, and bearish conditions. The general market describes market conditions in the overall period. A bearish market describes a bearish market condition characterized by negative returns. A bullish market describes rising market conditions characterized by positive market returns.

Table 2. Descriptive Analysis of General Market, Bearish Market, and Bullish Market

| | General Market | | | Bearish Market | | | Bullish Market | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | RMT_AB | | | RMT_A | |
| | CSAD | RMT_ABS | RMT2 | CSAD | S | RMT2 | CSAD | BS | RMT2 |
| Mean | 0.06826 | 0.032222 | 0.00149 | 0.06826 | 0.029415 | 0.00129 | 0.06825 | 0.035540 | 0.00172 |
| Maximum | 0.09345 | 0.070516 | 0.00497 | 0.08928 | 0.070516 | 0.00497 | 0.09345 | 0.064727 | 0.00419 |
| Minimum | 0.04110 | 0.000462 | 2.13E-0 | 0.04110 | 0.005684 | 3.23E-0 | 0.04423 | 0.000462 | 2.13E-0 |
| Std. Dev. | 0.01537 | 0.021736 | 0.00150 | 0.01598 | 0.021466 | 0.00158 | 0.01539 | 0.022614 | 0.001452 |
| Observat. | 24 | 24 | 24 | 13 | 13 | 13 | 11 | 11 | 11 |

Source: Data Processed (2023)

The following table will present regression test results from research hypotheses and classical assumption test results. The study used only three classical assumptions, including the normality test, heteroscedasticity test, and autocorrelation test. Based on the classical assumption test presented, all observational data of the study are normally distributed, free from heteroscedasticity and autocorrelation problems, so it can be concluded that all observational data from the three models used in this study have met the classical assumptions.

*3.2. Regression Analysis*

3.2.1 General Market Regression Analysis

*General market conditions* describe overall market conditions in the research period. The general market regression analysis results can be seen in the table below.

Table 3. Herding Behavior Analysis on General Market

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.047791 | 0.006450 | 7.409769 | 0.0000 |
| RMT_ABS | 1.349629 | 0.458681 | 2.942413 | 0.0078 |
| RMT2 | -15.43518 | 6.618126 | -2.332259 | 0.0297 |
| R-squared | 0.367182 | Mean dependent var | | 0.068264 |
| Adjusted R-squared | 0.306914 | S.D. dependent var | | 0.015375 |
| S.E. of regression | 0.012800 | Akaike info criterion | | -5.762269 |
| Sum squared resid | 0.003441 | Schwarz criterion | | -5.615013 |
| Log likelihood | 72.14723 | Hannan-Quinn criter. | | -5.723202 |
| F-statistic | 6.092461 | Durbin-Watson stat | | 1.629533 |
| Prob(F-statistic) | 0.008193 | | | |
| Classical Assumption Test | | | | |
| Prob. J-Bera | 0.343 | | | |
| Prob. Glejser | 0.362 | | | |
| LM Test | 0.466 | | | |

Source: Data processing, 2023

The regression analysis results on general market conditions show a non-linear coefficient value between CSAD and the market return ($R_{mt}^2$) of -15.435 with a probability value of 0.0297. Show that the market return ($R_{mt}^2$) has a significant effect on CSAD with a probability value smaller than the α value (0.0297 < 0.05). Therefore, this study accepts hypothesis $H_1$, namely, there is herding behavior in general market conditions in the Indonesian capital market from January 2021-December 2022.

3.2.2 Bearish Market Regression Analysis

Bearish market conditions are rising market conditions characterized by negative market returns in the study period. The bearish market regression analysis results can be seen in the table below.

Table 4. Herding Behavior Analysis on Bearish Market

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.042501 | 0.010179 | 4.175565 | 0.0019 |
| RMT_ABS | 1.864278 | 0.720558 | 2.587270 | 0.0271 |
| RMT2 | -22.52480 | 9.788983 | -2.301036 | 0.0442 |
| R-squared | 0.424643 | Mean dependent var | | 0.068269 |
| Adjusted R-squared | 0.309571 | S.D. dependent var | | 0.015989 |
| S.E. of regression | 0.013285 | Akaike info criterion | | -5.605154 |
| Sum squared resid | 0.001765 | Schwarz criterion | | -5.474781 |
| Log likelihood | 39.43350 | Hannan-Quinn criter. | | -5.631952 |
| F-statistic | 3.690251 | Durbin-Watson stat | | 2.028372 |
| Prob(F-statistic) | 0.063050 | | | |
| Classical Assumption Test | | | | |
| Prob. J-Bera | 0.065 | | | |
| Prob. Glejser | 0.787 | | | |
| LM Test | 0.721 | | | |

Source: Data processing, 2023

Based on the results of regression analysis in bearish market conditions, it shows a non-linear coefficient value between CSAD and the market return ($R_{mt}^2$) of -22.524 with a probability value of 0.0442. Show that the market return ($R_{mt}^2$) has a significant effect on CSAD with a probability value smaller than the $\alpha$ value (0.0442 < 0.05). Therefore, this study accepts the $H_2$ hypothesis; namely, there is herding behavior in bearish market conditions in the Indonesian capital market from January 2021-December 2022.

3.2.3 Bullish Market Regression Analysis
Positive market returns in the research period characterize bullish market conditions. The bullish market regression analysis results can be seen in the table below.

Table 5. Herding Behavior Analysis on Bullish Market

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.050621 | 0.009261 | 5.466044 | 0.0006 |
| RMT_ABS | 0.859586 | 0.677105 | 1.269502 | 0.2399 |
| RMT2 | -7.472090 | 10.54169 | -0.708813 | 0.4986 |
| R-squared | 0.381990 | Mean dependent var | | 0.068259 |
| Adjusted R-squared | 0.227488 | S.D. dependent var | | 0.015393 |
| S.E. of regression | 0.013529 | Akaike info criterion | | -5.540918 |
| Sum squared resid | 0.001464 | Schwarz criterion | | -5.432401 |
| Log likelihood | 33.47505 | Hannan-Quinn criter. | | -5.609323 |
| F-statistic | 2.472390 | Durbin-Watson stat | | 1.546096 |
| Prob(F-statistic) | 0.145875 | | | |
| **Classical Assumption Test** | | | | |
| Prob. J-Bera | 0.985 | | | |
| Prob. Glejser | 0.194 | | | |
| LM Test | 0.706 | | | |

Source: Data processing, 2023

The regression analysis results in bullish market conditions show a non-linear coefficient value between CSAD and the market return ($R_{mt}^2$) of -7.472 with a probability value of 0.4986. Show that the market return ($R_{mt}^2$) does not affect CSAD, with a probability value more significant than the $\alpha$ value (0.498 > 0.05). Therefore, this study rejects hypothesis $H_3$, namely that there is no herding behavior in bullish market conditions in the Indonesian capital market from January 2021-December 2022.

## 4. Discussion

Herding behavior was detected in this study using the LQ45 index research object from January 2021-December 2022. This study uses monthly closing price data from LQ45 company stocks to determine individual stock returns and market returns to obtain CSAD values as the dependent variable and market return as the independent variable. Market conditions consist of three, namely general, bearish, and bullish. The overall market period describes general market conditions, positive market returns reflect bullish market conditions, while negative market returns reflect bear market conditions. The following is a discussion of indications of herding behavior in general, as bearish and bullish market conditions for January 2021-December 2022.

### 4.1.1 General Market Conditions

The overall condition of the market for the period January 2021-December 2022 is used to provide a more comprehensive analysis to determine the market's reaction after the stock market crash due to the COVID-19 pandemic and the Russia-Ukraine war. OJK said that COVID-19 had

dealt a heavy blow to the development of the Indonesian stock market. This situation is exacerbated by global economic turmoil due to the Russia-Ukraine war in early 2022. The decline in performance is inseparable from the issues and negative sentiments that arise from investors, so investors who are worried about the performance of their portfolios tend to secure their portfolios by following the collective decisions of other investors or following market consensus.

Information asymmetry under the influence of COVID and global economic turmoil led to increased volatility in stock prices affecting investor preferences and psychology. Bikhchandani and Sharma (2001) state that when they have limited information, investors tend to follow the actions of other investors and ignore their analytical skills. In addition, in emerging *market* conditions such as Indonesia, macro-scale information is usually more dominant than micro-scale information such as company-specific information. Company-specific information leads to a need for more information to conduct investor analysis. Investors ignore the analysis and follow the market consensus, believing other investors are suitably informed. Information asymmetry and negative sentiment cause deviations from stock prices' intrinsic value, so stock prices do not reflect information from the company's actual fundamental conditions. The results of this study support the research of Sadewo and Cahyaningdyah (2022), Ng et al. (2022), Bogdan et al.(2022), and Jiang et al.(2022) that herding behavior was found in the capital market.

### 4.1.2 Bearish Market Conditions

Negative market returns describe bearish market conditions. In the 2021-2022 period, the Indonesian stock market is still under the influence caused by the COVID-19 pandemic and global economic turmoil. However, domestic and global investors have increased sharply over the past two years. Based on data from the Indonesia Stock Exchange (IDX), the number of investors at the end of December 2022 increased by 10.3 million from the previous investors, who totaled 7.48 million at the end of December 2021. The increase in the number of investors must be balanced with an increase in literacy about the capital market so that investors do not just follow along (herding) in determining their investment decisions. Unfounded rumors, mainly those spread in the mass media related to COVID issues and global economic turmoil, caused investors to build their speculations to withdraw their funds (capital outflow) from the capital market, making stock prices decline, which caused the market to be in a bearish condition.

The uncertainty of the COVID pandemic and global economic turmoil has increased the risk of investment in the capital market. Investors with a short-term, speculative trading style with a lack of confidence in the fundamental value of long-term stocks cause them to be more sensitive to bad news and react abruptly by following collective behavior to sell their stocks during periods of down markets. Chang et al. (1996) revealed that investors tend to follow the market consensus during periods of a down market. Investor education is essential, especially for retail investors, to create awareness, learn how to invest correctly and avoid wrong investment decisions. Investor education can help strengthen aspects of investment psychology and reduce cognitive biases in investing. The results of this study support the research of Sadewo and Cahyaningdyah (2022)

and Ng et al. (2022) that there is herding behavior in periods of a bear market in the capital market.

### 4.1.3 Bullish Market Conditions

Positive market returns describe bullish market conditions. In the bullish market condition, no herding behavior was found on the LQ45 stock index from January 2021-December 2022. There is no herding behavior explaining that investors in the capital market behave rationally in bullish market conditions, and stock prices have reflected relevant information for investors to make investment decisions. Information that is easily accessible, valid, and managed adequately will prevent investors from making decisions based on market conditions or other investors' decisions. The indication of herding behavior during bullish market conditions explains that investors move independently and can analyze the market. When the stock market was affected by COVID and global economic turmoil, investors' decisions, followed by other investors, triggered an oversold or bullish reversal. Investors are beginning to realize that there are undervalued companies with low risk and begin to consider the fundamental analysis of the company carefully. Bullish market conditions tend to show more rational investor behavior than bearish market periods, in line with research conducted by Chaudhary (2013), where investors have less fear and worry when receiving money from investments than when losing money from investments. The results of this study support the research of Sadewo and Cahyaningdyah (2022) and Pasaribu and Sadalia (2018) that no herding behavior is found in the bullish market period in the capital market.

Based on the study results, there are several implications for capital market investors and stakeholders: first, for the government to maintain the country's economic and political stability, which can affect the index in the capital market and prevent herding behavior. Second, regulators must consider that herding behavior can occur in any market. Socialization of the capital market can be done as a step to prevent herding behavior in the capital market. This step is expected to create sophisticated investors to reduce capital market distortion. In addition, regulators also need to supervise short-sell transactions during bearish markets because herding is more likely to occur in bearish market conditions. Third, investors still consider fundamental and technical analysis before making investment decisions during bearish or bullish market conditions.

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