THE ROLE OF VOLATILITY IN MEDIATING THE IMPACT OF ANALYST' RECOMMENDATIONS ON HERDING IN THE MALAYSIAN STOCK MARKET

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by

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LIST OF ABBREVIATIONS

CSSD   Cross-Sectional Standard Deviation

CSAD   Cross-Sectional Absolute Deviation

EPS   Earnings Per Share

ROA   Returns on Assets

EMH   Efficient Market Hypothesis

CAPM   Capital Asset Pricing Model

NASDAQ National Association of Securities Dealers Automated Quotations

PERANAN KEMERUAPAN DALAM PENGANTARAAN HUBUNGAN ANTARA CADANGAN PENGANALISIS DAN KELAKUAN KUMPULAN DALAM PASARAN SAHAM MALAYSIA

ABSTRAK

Tesis ini mengkaji kesan kemeruapan dalam pengantaraan hubungan antara pengesyoran penganalisis dan kelakuan kumpulan dalam pasaran saham Malaysia dari 2015 hingga 2021. Kelakuan kumpulan didapati sebagai salah satu punca salah harga sekuriti disebabkan oleh tingkah laku kolektif menolak harga daripada asas. Kelakuan kumpulan sering dikaitkan dengan krisis kewangan disebabkan oleh maklumat yang melata atau meninggalkan maklumat peribadi untuk mengikuti kelakuan orang lain. Walau bagaimanapun, peranan pengesyoran penganalisis dalam mempengaruhi kelakuan kumpulan terlalu baik untuk menjadi kenyataan tanpa mengambil kira peranan kemeruapan yang mencetuskan emosi pelabur untuk membuat keputusan. Oleh itu, kajian ini meneroka kewujudan kelakuan kumpulan dalam pasaran dan mengkaji kesan pengesyoran penganalisis terhadap kelakuan kumpulan. Untuk metodologi, kajian ini mengguna pakai Sisihan Piawai Keratan Rentas (CSSD) oleh Chang, Cheng dan Khorana (2000) dan Sisihan Mutlak Keratan Rentas (CSAD) oleh Chiang dan Zheng (2010) dalam data panel dan regresi kuantil untuk mengesan kelakuan kumpulan. Berdasarkan model pengantaraan Baron dan Kenny (1986), keputusan menunjukkan bahawa kelakuan kumpulan wujud dalam pasaran saham Malaysia, dan turun naik menjadi pengantara hubungan antara pengesyoran penganalisis dan kelakuan kumpulan. Kemeruapan yang direalisasikan ialah satu-satunya ukuran turun naik yang penting kepada pengesyoran penganalisis dan kelakuan kumpulan kerana pelabur bergantung pada harga saham hari sebelumnya sebagai penanda aras untuk berdagang. Selain itu, taburan harga sasaran adalah satu-

satunya pembolehubah pengesyoran penganalisis yang ditunjukkan penting kepada turun naik harga saham dan kelakuan kumpulan. Keputusan regresi kuantil menunjukkan bahawa kelakuan kumpulan lebih ketara dalam kuantil atas CSAD. Secara teorinya, kajian ini mengesahkan implikasi EMH dan kelakuan kumpulan berasaskan maklumat. Kewujudan kelakuan kumpulan mempercepatkan pantulan maklumat dalam harga saham, dan pelepasan pengesyoran penganalisis adalah maklumat baharu dalam pasaran yang mencetuskan pelabur untuk mengumpul. Untuk implikasi praktikal, penyelidikan ini membantu ahli akademik, pelabur, pengamal dan pengawal selia dalam meneliti kewujudan kelakuan kumpulan dalam pasaran saham Malaysia dan menyiasat penentu kelakuan kumpulan. Kerajaan harus memberi tumpuan kepada mengawal selia dan memantau kesan pengesyoran penganalisis yang boleh menyebabkan pelabur berkumpul. Peraturan, undang-undang dan peraturan yang berkaitan harus diwujudkan untuk menyasarkan kelakuan kumpulan yang tidak rasional dan naif yang sering menjauhkan saham daripada asas dan membawa kepada krisis kewangan.

THE ROLE OF VOLATILITY IN MEDIATING THE IMPACT OF ANALYST' RECOMMENDATIONS ON HERDING IN THE MALAYSIAN STOCK MARKET

ABSTRACT

This thesis examines the role of volatility in mediating the relationship between analyst recommendations and herding in the Malaysian stock market from 2015 to 2021. Herding has been found as one of the causes of securities mispricing due to the collective behaviour of pushing prices away from fundamentals. Herding is often associated with financial crises due to information cascades or abandoning private information to follow the crowd. Nonetheless, the role of analyst recommendations in affecting herding can be too good to be true without considering the mediating role of volatility that triggers the investors' emotions to make investment decisions. Hence, this study explores the existence of herding in the market and examines the impact of analyst recommendations on herding. For methodology, this study adopts the Cross-Sectional Standard Deviation (CSSD) by Chang, Cheng and Khorana (2000) and Cross-Sectional Absolute Deviation (CSAD) by Chiang and Zheng (2010) in the panel data and quantile regressions to detect herding. Based on the Baron and Kenny (1986) mediation model, the results show that herding exists in the Malaysian stock market, and volatility mediates the relationship between analyst recommendations and herding. Realized volatility is the only volatility measurement significant to analyst recommendations and herding because investors rely on the previous day's stock price as the benchmark to trade. Besides, the dispersion of target price is the only variable of analyst recommendations shown to be significant to stock price volatility and herding. The result of the quantile regression indicates that herding is more pronounced in the upper quantile of CSAD. Theoretically, this study validates the

implication of EMH and information-based herding. The existence of herding accelerates the reflection of the information in stock prices, and the release of analyst recommendations is the new information in the market that triggers investors to herd. For practical implication, this research assists academicians, investors, practitioners and regulators in examining the existence of herding in the Malaysian stock market and investigating the determinants of herding. The Government should focus on regulating and monitoring the impact of analyst recommendations that may cause investors to herd. Pertinent rules, laws and regulations should be established to target irrational and naïve herding that often drives the stocks away from fundamentals and leads to financial crises.

CHAPTER 1

INTRODUCTION

1.1   Introduction

Herding is a form of convergent social behaviour that can be broadly defined as an alignment of thoughts or behaviours of individuals in a group through local interaction and without centralized coordination (Raafat, Chater and Frith, 2009). In a stock market, it is a behaviour that manifests the often irrational and psychological behaviour of investors. This herd behaviour has been widely documented in practice and academic studies.

The case of Luckin Coffee of China is an excellent real-case example of how investors' herd behaviour can affect stock prices. Luckin Coffee was founded in October 2017 as the 'China Starbucks' and listed on the NASDAQ with an initial public offering at $17. Analysts claim that Luckin Coffee has strong financial performance and rapid speed in opening over 2000 stores in China and US. At that time, investors herded to the positive analyst recommendations to buy the stocks, and the share price skyrocketed to approximately $40. Nonetheless, Muddy Waters Research accused Luckin Coffee of manipulating financial and operational figures in 2020. None of the analysts successfully warned about the existence of herding on the unrealistic growth before the bubble burst. Needham & Company LLC and Morgan Stanley released strong buy recommendations with a target price of $42 after the accusation. Investors who herded to the recommendations suffer from a loss in investment because they were seduced by the lucrative return to follow the analyst recommendations. The scandal of Luckin Coffee infers that analyst recommendations can cause herding in the market.

In academic studies, herding has been documented to exist among retail investors (see for examples, Economou, Hassapis and Philippas, 2018; Ahmad Sabir, Mohammad and Kadir Shahar, 2019) and professional investors (see for examples, Lo, 2019 and Kholdy, Miller and Sun, 2021). Besides, the evidence of herding is also observed in developed markets (see for examples, Chiang and Zheng, 2010; Wahyudi, Najmudin and Rachmawati, 2018) and Asian markets (see for examples, Satish and Padmasree, 2018; Bui, Nguyen and Nguyen, 2015).

It is widely believed that the nature of herding is irrational. Herding is a blind behaviour in following the footsteps of other investors to make the same investment decision without sufficient independent judgement (Brown, Wei and Wermers, 2014). Brown et al. (2014) ascertain that the existence of herding is also associated with financial crisis. Behind the Japanese stock market crash in 1994, the changes in stock price expectations and speculative strategies have fostered herding among investors (Shiller, Kon-Ya and Tsutsui, 2016). Herding exists when investors blindly mimic and shadow the behaviour of a larger group of investors to sell off their shares.

Nonetheless, there is another school of thought arguing that herding is rational. Herding can be rational in speeding up the price adjustment in financial markets to reflect all available information in stock prices (Chen, 2020). There is nothing wrong with investors following the market trend to mitigate risk due to the existence of informed investors. One example where information becomes available to the market is the release of analyst recommendations.

Investors tend to react to new information in the form of analyst recommendations. Analyst recommendations can have an impact on the market reaction when investors herd to the primary revised recommendation that moves away

from consensus (Jegadeesh and Kim, 2010). Chan and Hameed (2006) also claim that a higher number of analyst recommendations can lead to more firm-specific and market-wide information that allows investors to herd and respond to it. Analyst recommendations are a crucial source of information, which transmits into the market and can subsequently affect investors' investment decision to herd in the market.

One potential aspect that has been quite overlooked in academic research is the role of volatility in explaining the relationship between analyst recommendations and herding. The release of sell recommendations can increase volatility, while buy recommendations reduce volatility (Corbet, Dowling and Cummins, 2015). On the contrary, volatility is also found to have a direct impact on the existence of herding due to information asymmetry, which drives uninformed investors to herd with market trends (Blasco, Corredor and Ferreruela, 2012). These studies have shown that volatility has the potential to act as a mediating variable. Furthermore, Guo, Holmes and Altanlar (2020) argue that the impact of analyst recommendations can cause the fluctuation of volatility (proxy of market sentiment) that subsequently affects spurious herding. Similar evidence is documented in the studies of Aharon (2021) and Prasad, Bakry and Varua (2020). Nonetheless, the mediating effect of volatility lacks empirical evidence even though numerous studies (see for example, Gu, Guo & Zhang) have also proven the impact of analyst recommendations on herding.

1.2   Herd Behaviour

Herding is a social behaviour commonly found in the market when a smaller group of investors mimic and shadow the behaviour of a larger group of investors whom they perceive as "informed investors" (Chen, 2020). Although some scholars argue that herding is an instinct used to protect human beings from harm, pieces of

evidence have pointed out that herding in the financial market brings more harm than benefits in the field of investment (Ye, Li and Cao, 2020).

Herding is often detected in global stock markets. Yao, Ma and He (2014) show that herding exists in Chinese A and B markets, and similar evidence is documented in the US (Clements, Hurn and Shi, 2017) and Australia (Espinosa-Méndez and Arias, 2020), Saudi Arabia (Gabbori, Awartani, Awartani and Virk, 2021) Furthermore, herding is also observed to be associated with the emergence of an economic crisis. Chang, McAleer and Wang (2020) argue that herding has caused investors to panic and make unwise investment decisions to sell off their stocks during the crisis of SARS and COVID-19. The emergence of a bubble is a self-organizing process of infection among traders leading to equilibrium prices deriving from fundamental values (Lux, 2016). Herding occurred in the market due to the optimistic attitude of investors, which has fostered the disposition to overtake other bullish beliefs (Blasco, Corredor and Ferrer, 2018).

The rationality of herding is controversial and often argued by many scholars. Risal and Khatiwada (2019) claim that some investors receive information before others, and it is not a mistake to herd and follow informed investors' investment decision. Rational herding relies on a crucial assumption, which is the information held by the other investors must be correct. Economou et al. (2018) argue that the so-called "rational herding" is not precisely rational for investors due to emotional factors. They explain that investors are driven by emotions such as greed and fear in making investment decisions. Investors can be seen to join frantic purchasing and sales of stocks and thus, exposed to the pitfall of herding. In this context, herding should be considered irrational.

Following the Efficient Market Hypothesis (EMH), herding should not exist. EMH argues that investors are rational in interpreting the arrival of new information to make their own investment decision independently. Fama, Fisher, Jensen and Roll (1969) claim that a market is a self-regulated machine in which prices are adjusted with the arrival of new information, and there is only one and true price for every stock because all information is reflected in the prices. Based on the EMH approach, when new information emerges in the market, the market will automatically absorb the new information, and the initial price will be adjusted to a new equilibrium price (either higher or lower). This is because investors make investment decisions based on new information.

Nonetheless, herding occurs when investors are affected by the behaviour of a larger group of investors and blindly follow the decision of others, which causes doubt in rationality. Even though Fama and French (1998) argue that market anomalies are fragile and tend to disappear with reasonable changes in the way they are measured, they cannot deny the existence of market anomalies found in the short-term with the arrival of new information. Herding is one of the market anomalies that challenge the EMH approach in explaining stock price behaviour. Some scholars also argue that EMH is not applicable in the real market but rather a perfect illusion in assuming full rationality of human and financial behaviour (Seidens, 2018). Therefore, irrational herding is the opposite of EMH, and its existence challenges EMH in explaining stock price behaviour.

Herding can be caused by many reasons such as asymmetric information (Hirshleifer and Hong Teoh, 2003) and lack of financial literacy (Altman, 2012),

overconfidence (Kukacka and Barunik, 2013). Nonetheless, many scholars believe that the determinations of herding can be broadly categorised into three main causes.

One of the determinations is reputation-based herding. Reputation-based herding explains that reputable analysts, investors and investment institutions taking a specific stand on securities can cause herding in the market. Reputable managers can predict markets due to the "let us follow others" effect (Shao, Siponen and Liu, 2020). Less-reputable managers are most likely to herd and follow the decision of other reputable managers because they tend to discount their information. Agents are concerned about their reputations as capable, where capability is the capacity for exercising judgment in various situations (Komalasari et al., 2022). The fundamental presumption is that there are elements of the investment value that are consistently unexpected. When investors face reputational incentives and asset values grow sufficiently precise, they are more likely to participate in herd behaviour. When an agent decides to overlook her private knowledge in favour of imitating the behaviour of another agent who has behaved in the past, this is an example of reputational herding. However, reputational herding models have an additional layer of mimicking that results from positive reputational externalities that can be obtained by acting as part of a group or selecting a particular project. These positive reputational externalities can have a positive effect on a company's ability to attract and retain customers. Hence, the reputation of managers may cause herding in the stock markets.

Another cause of herding is compensation-based herding. Compensation-based herding exists when institutional investors intend to increase fund appearance and secure compensation within a short period. This is because fund managers tend to neglect their superior information and adjust their fund allocation to pair with other

managers due to the peer effect (Maug and Naik, 2011). The compensation of fund managers is benchmarked to the other fund performances. Therefore, the herding of fund managers can be caused by the compensation scheme. If an investor's income (i.e., an agent's compensation) is based on how well he or she performs relative to other investors, this distorts the agent's incentives and results in an inefficient portfolio, which can lead to herding (Ferrouhi, 2021). A safe investor is an investor who does not want to take risks and whose reward depends not only on their own success but also on the performance of another investment. The investors and her benchmark have access to incomplete and confidential information, such as returns on the portfolio. Nonetheless, the lucrative compensation and the urgency of improving the appearance of funds have increased the herding tendency to follow the same investment decision with benchmarks.

Last but not least, information-based herding is also one of the determinants of herding. Information-based herding explains that the arrival of new information causes herding, and investors are manipulated by the information to herd. Investors herd if there is strong public information indicating a similar direction which is inconsistent with their private information (Eyster and Rabin, 2010). The investors may believe they do not possess higher quality information than the public and follow the crowd to herd. One of the most common sources of information is the release of analyst recommendations. When a significant number of investors respond in the same manner to the newly disclosed information, this phenomenon is known as information-based herding. Herding investors have the misconception that they are following investors who have better knowledge; as a result, these investors feel that they have made less hazardous decisions. Irrational herd behaviour may exist in this circumstance. In addition, herding investors may generate instability in a financial market because they

lack essential information to make investment decisions. There is information of high quality available on the market, which leads to rational herding founded on accurate analysis. Because of unintentional herding, the market would become more efficient and quicker in its ability to change prices (Fransiska, Sumani and Pangestu, 2018).

1.3   Analyst recommendations and Herding

Analyst recommendations are the investment suggestions analysts provide to hold a significant position in a stock covered (Firth, Lin, Liu and Xuan, 2013). It is also the opinion and proposal of analysts released to the public after conducting analyses. Analyst recommendations are included in the analyst report to outline the analyst's point of view (buy, hold, sell) with a targeted share price of a company. Nonetheless, not all analyst recommendations accurately predict share prices. Analysts with a conflict of interest may trade off the benefit of accuracy in earning forecasts against profitability, and thus, the recommendation can mislead investors (Ertimur, Sunder and Sunder, 2007).

Analyst recommendations are crucial information that can be rapidly transmitted to the market, yet investors may react and herd to the new information. Investors tend to herd when the revised recommendation has deviated from the market consensus (Jegadeesh and Kim, 2010). The herding tendency is also stronger when investors react to the recommendation of either downgrading or upgrading the target prices. Besides, the recommendation of lead analysts can cause herding in the market even after controlling public information (Booth, Chang and Zhou, 2014). The lead analyst's recommendation can direct a path to achieve consensus, which the recommendations of other analysts can accompany. Moreover, fund managers were also observed to herd to the analyst recommendations. Fund managers are most

frequently to herd in both positive and negative recommendations because they are not confident to believe that they are well informed as their peers (Guo et al., 2020).

Other than herding, studies on analyst recommendations are found to affect volatility. Higher analysts' coverage of a stock can lead to more firm-specific and market-wide information that allows investors to respond to it, which subsequently causes fluctuation in volatility to achieve stock price synchronicity (Chan and Hameed, 2006). Lin (2018) also claims that the disagreement among the analysts' forecasts has generated a high level of volatility due to information asymmetric. Besides, higher analyst coverage with numerous recommendations can weaken the presence of volatility, which indicates the impact of analyst recommendations on volatility (Gu, Jiang and Xu, 2019).

Previous studies have shown that the release of analyst recommendations can have an impact on herding and volatility. Nonetheless, one potential aspect that may be overlooked in academic research is the impact of volatility on herding. If volatility can be correlated to analyst recommendations and herding simultaneously, it indicates that volatility has the potential to act as a mediating variable to mediate the relationship between analyst recommendations and herding.

1.4   Volatility

Volatility is the movement rate of stock prices within a specific time embedded with risk information (Corradi, Distaso and Mele, 2013). As mentioned in the previous section, analyst recommendations are associated with volatility but are also shown to be correlated to herding. In most circumstances, volatility can trigger the existence of herding and drive investors to the turning point of decisive change in investment decisions (Gong and Dai, 2017).

In academic research, volatility is associated with herding. The impact of volatility can be linear to herding when asymmetric information causes the investors to follow market trends and herd (Blasco et al. 2012). With the occurrence of asymmetric information, investors may fall into a dilemma and hesitate to make new information decisions. The volatility can trigger investors to follow the investment decision of others due to the "share-the-blame" effect. Moreover, volatility is also one of the most prominent causes of sell-herding when a market is experiencing a high level of volatility (Kholdy et al., 2021). BenSaïda (2017) claims that market sentiment caused by volatility can contribute to more vigorous herding intensity. Investors can panic and side-line their private information to blindly copy the investment decision of other presumed well-informed investors, which results in herding.

The impact of analyst recommendations on volatility is not symmetrical (Corbet, Dowling and Cummins, 2015; Loh and Stulz, 2011). Analyst recommendations, for example, increase volatility (Prasad et al., 2020) but also can decrease volatility (Medovikov, 2019; Schutte and Unlu, 2009), as documented in previous studies. Furthermore, influential recommendations tend to have a greater impact on volatility than normal recommendations released by less popular analysts (Loh and Stulz, 2011). Influential recommendations are those recommendations made by reputable analysts who have a stronger impact on the market due to their long track history. Investors accept influential recommendations to guide them in making investment decisions. Hence, not all stock recommendation changes are equal because investors tend to react stronger to influential recommendations and volatility is expected to be stronger with the release of influential recommendations.

Based on previous studies, changes in volatility can be caused by the release of analyst recommendations and volatility is also found to be correlated to herding. The potential mediating role of volatility on analyst recommendations is shown in the studies of Guo et al. (2020), Aharon (2021) and Chiang and Lin (2019) and yet lack of empirical evidence to validate the mediating effect on herding. In this context, the impact of volatility in mediating the relationship between analyst recommendations and herding is potentially overlooked in academic research. Therefore, this study proposes volatility as a mediator variable that mediates the relationship between analyst recommendations and herding. This is because the explanation of the direct impact of analyst recommendations on herding is too plain, and previous studies have shown that volatility triggers investors. There is a need to examine the mediating role of volatility in the relationship between analyst recommendations and herding

1.5   Problem Statement

The concept of herding is essential to behavioural economics and may have a variety of implications for our everyday lives. It often results from a tendency to imitate the behaviour or decision of other investors. The herd mentality is a crucial behaviour that assists in explaining the asset price bubble, which is one of the most consequential phenomena. It occurs when the price continues to grow until it is far higher than expected. In a market where information is lacking, herd behaviour may arise. Herding creates a one-to-four-fold increase in market volatility compared to ordinary volatility (Maouchi, Charfeddine and El Montasser, 2021). An overly volatile market leads to mispricing and stocks being erroneously to reduce the market's efficiency. As claimed in the EMH, a less efficient market often leads to deadweight losses. Most investors will succumb to the trap of asset mispricing and purchase

overpriced assets, which might result in investment losses. Herding may distort market efficiency with asset mispricing.

Individual investors engaged in investment herding suffered worse investment returns and monetary losses. The 2018 subprime crisis is an important historical event that may be used to examine herd behaviour in which most securities prices have decreased tremendously within a short period. With extreme herding, the investors' behaviour of following a similar investment decision accelerates the process of the market crash. This is because herding is consistently found to be associated with the emergence of the global financial crisis, SARS and COVID-19 (Chang et al., 2020). Numerous studies have shown that herding tends to exist before the financial crisis (Yousaf, Ali and Shah, 2018). Undoubtedly, economic crises such as the COVID-19 market crash and the 1997 Asian crisis are the outcomes of herd behaviour in the market. The emergence of the dot-com bubble is a self-organizing process of infection among traders, such as herding, that leads the prices to deviate from fundamental values. Herd behaviour occurred in the market because the optimistic attitude of investors has fostered the disposition to overtake other bullish beliefs. It is possible to view herding as a sign of investors' irrational conduct, which, if allowed to persist, might ultimately lead to a market crash (Bowe and Domuta, 2004).

Analysts have two unique responsibilities in the financial market: generating new information and monitoring the firms they follow. Analysts research and communicate the results to the market to keep the market updated. The theory of information-based herding posits that investors respond in a herding way when new information enters the market. If new information is transmitted to the market, investors may follow the analyst recommendations to herd or use either less of their

private expertise or herd together. In any event, the herding effect will reduce the market's access to independent opinions on a firm. Analysts risk compromising the efficacy of their monitoring duties if they do not commit sufficient time and effort to perform exhaustive analyses of the firms they are responsible for reviewing. Herd behaviour among analysts may impede the flow of information from a corporation to the market and diminish the effectiveness of analyst monitoring. Therefore, the possibility of a corporation swiftly reporting bad facts is diminished. Herding may cause a flood of mostly negative information entering the market and trigger investors to behave irrationally. Securities prices may not reflect the fundamentals. If analysts can preserve their independence and produce bold (anti-herd) estimates, they may communicate extra information to the market based on their research and may be able to provide thorough monitoring. Consequently, negative information may be broadcast to the public in a timely way, decreasing the possibility of a stock price fall as a potential crash risk.

1.6   Research Question

Based on previous literature, the following research questions are established to outline the concerns of this study, which are connected and focused on the problem statement. These research questions also aim to narrow the research gaps from previous literature:

1.   Does herding exist in the Malaysian stock market?

2.   Does volatility mediate the relationship between analyst recommendations and herding?

   2.1   Is there a relationship between analyst recommendations and herding?

   2.2   Is there a relationship between analyst recommendations and volatility?

2.3   Is there a relationship between volatility and herding?

1.7   Research Objective

Based on the abovementioned research questions, the following objectives are established to guide this study in exploring answers and evaluating the outcome of this study. These research objectives are also built to examine and support the validation of the theoretical framework:

1.   To examine the existence of herding in the Malaysian stock market

2.   To investigate the mediating effect of volatility on the relationship between analyst recommendations and herding

   2.1   To examine the relationship between analyst recommendations and herding

   2.2   To examine the relationship between analyst recommendations and volatility

   2.3   To examine the relationship between volatility and herding

1.8   Significance of Study

This research assists academicians, investors, practitioners and regulators in gaining a deeper understanding of the existence of herding and its determinants. This research challenges the concept that analyst recommendations are a primary driver of herding by showing that volatility mediates the relationship between analyst recommendations and herding. Previous studies have shown that analyst recommendations are the primary reason for herding. However, this research illustrates that the distribution of analyst recommendations does not instantly impact investors. Investors are only triggered to herd with the mediating effect of volatility.

In addition, the Government and regulators may find the methodology of this research useful in evaluating which stocks display herding.

From a theoretical perspective, the result of this study can validate one of the potential causes of herding, which is information-based herding. Information-based herding argues that the arrival of new information can cause herding, and investors rely upon the new information to herd. Nonetheless, the explanation of the direct relationship between new information and herding lacks convincing. There must be a factor that triggered the investors to herd after the arrival of new information. Herding exists when a big crowd of investors make the same investment decision, and subsequently, other investors follow the same direction. In this context, this study introduces volatility as a mediator variable to examine its impact on the relationship between analyst recommendations and herding, which can enhance the arguments for information-based herding. The result of this study can validate and enhance the literature on information-based herding. Secondly, this study contributes to the implication of EMH. EMH claims that all available information is quickly reflected in stock prices in an efficient market. In this context, the existence of herding can be said to be the drive to push the information to be reflected in stock prices.

From a practical perspective, this study provides awareness to practitioners, allowing them to understand the impact of market information on investors' behaviour. The primary role of financial analysts is to publish analyst reports to guide and advise investors in making rational investment decisions. Nevertheless, this study presents a contradictory viewpoint, which argues that analyst recommendations can cause herding in the market. Investors who trade based on the analyst recommendations may suffer from a loss of investments if the recommendation is false and misleading. Hence,

this study provides an alarming alert to the financial analyst as their recommendation can cause herding. An analyst report should be published deliberately with reasonable facts and endorsement of psychological factors. Furthermore, investors need to understand the determinants of herding and the reaction of investors in response to the arrival of new information in the stock market to avoid herding pitfalls.

From a policy perspective, this study can enhance the current "stop limit order", which is being practised by most stock exchanges to halt sudden changes in stock prices. Undoubtedly, herding can move prices away from fundamentals. There is a need to review the "stop limit order" by incorporating other factors, such as analyst recommendations and volatility, into consideration. If the analyst recommendations and volatility are significantly correlated in this study, the policy makers should regulate and control the impact of market information, which may cause a higher level of volatility and herding. The collective behaviour of analysts in targeting a specific stock may manipulate the investors' decision and form a bubble, which may distort the market efficiency. A pertinent rule should be formulated to target the release of analyst recommendations as new information to the markets.

In summary, the result of this study can contribute to the field of behavioural finance, more explicitly to herding. Introducing volatility as a mediator variable allows this study to provide an alternative explanation of the relationship between analyst recommendations and herding. The empirical result of this study can also validate the argument of information-based herding as one of the causes of herding. The result of this study can create awareness for the analysts to be more deliberate in releasing analyst recommendations, as their recommendations may cause herding in the market.

For practitioners and investors, this study can assist them in understanding the investors' reaction to the release of analyst recommendations to avoid herding pitfalls.

1.9   Definition of Key Terms

The following definitions explain the terms used in this study:

i   **Analyst recommendations**: Describe the suggestions and opinions provided by analysts as outlined in the analyst's report published to the public. (Kothari, So and Verdi, 2016)

ii   **Volatility**: Fluctuation and changes in the stock return within a period of time (Chow, Jiang and Li, 2021)

iii   **Herding**: Behaviour of a smaller group of investors to mimic and shadow the investment decision of a larger group of investors (Komalasari, Asri, Purwanto and Setiyono, 2021)

iv   **Information-based herding**: As cause of herding in explaining that investors herd and behave towards the same direction with the arrival of new information (Alhaj-Yaseen and Rao, 2019)

v   **Baron and Kenny Mediation Model**: An analysis strategy for testing mediation hypotheses to indicate the existence of a mediating variable that changes the relationship path between independent and dependent variables. (Memon, Jun, Ting and Francis, 2018)

vi   **Cross-Sectional Standard Deviation:** A regression approach to detect the market-wide herding through the gap between stock return and market return. Chiang and Zheng (2010) modify the model from Chang, Cheng and Khorana (2000) by adding a variable to market return to capture the asymmetric information of investors that may lead to herding. (Kyriazis, 2020)

vii **Cross-Sectional Absolute Deviation:** A regression approach modified from Cross-Sectional Standard Deviation by adding the non-linear term of market return to reduce multicollinearity. (Kyriazis, 2020)

viii **Panel Data Regression:** A regression combining cross-sectional data and time series in which the same unit cross-section is assessed at several periods. (Juniardi, Amar and Aimon, 2022)

ix **Quantile Regression**: The estimation procedure begins with the central median scenario in which the median regressor estimator minimizes a sum of absolute errors. (Koenker, 2017)

1.10   Organization of Thesis

The first part of Chapter 1 discusses the existence, causes, and consequences of herding. The second part of Chapter 1 outlines the relationship between analyst recommendations and herding, as well as the role of volatility. Volatility is the mediator variable to mediate the relationship between analyst recommendations and herding. The objectives of this study are also outlined in detail to discuss the research problems and the contributions of this research to academicians and practitioners.

Chapter 2 outlines the literature on EMH, behavioural approach to price adjustment, herd behaviour, information-based herding, analyst recommendations and volatility. The control variables, which are firm size, volume and cross-market herding, are also discussed. Subsequently, the result is presented in Chapter 4, discussing the mediating effect of volatility to indicate the impact of volatility on the relationship between analyst recommendations and herding. Chapter 5 summarises the result and discusses the potential limitation of this thesis. Future recommendations are provided for consideration to future researchers who are keen to conduct similar research.

CHAPTER 2

LITERATURE REVIEW

Introduction

This chapter critically reviews the previous studies on the Efficient Market Hypothesis, behavioural approach to price adjustment, herd behaviour, information-based herding, analyst recommendations and volatility. It outlines the contradictory arguments and research gaps found in previous literature, which inspire this study to explore the potential relationships between analyst recommendations, volatility and herding. Besides, this chapter provides definitions and elaborations on each variable used to construct the theoretical framework in the next chapter.

2.1   Underlying Theory: Efficient Market Hypothesis

Eugene Fama developed the theory of EMH in the 1970s. EMH explains that investors are impossible to beat the market because the prices of securities in the markets have incorporated and reflected all relevant information, which causes the fluctuation in stock prices. From his point of view, technical and fundamental analyses cannot assist investors in gaining arbitrage if the market is efficient. It implies that investors cannot beat the market. The accepted argument is that when information arrives in the market, the news spreads quickly to incorporate into the prices of securities without delay (Kaushik, 2020). The EMH approach to price adjustment is highly controversial, and many researchers argue that the EMH theory is too good to be true and would not happen in the real stock market.
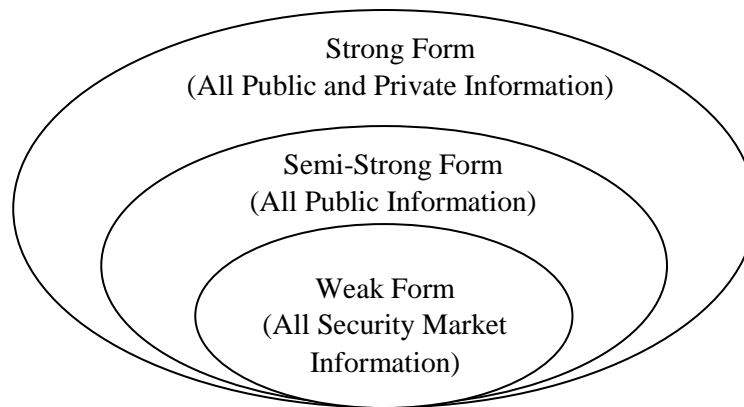
Figure 2.1: Spectrum of Market Efficiency

Source: Naseer and Bin Tariq (2015)

Nonetheless, EMH is a spectrum of market efficiency. As shown in Figure 2.1, the spectrum of market efficiency covers three classifications, which are weak, semi-strong and strong forms in explaining price adjustment. A stronger form of market efficiency indicates that more new information (public and private) has rapidly transmitted through the market and incorporated into the stock prices. The market is seemingly adjusted continuously and immediately to the arrival of new information. The stock price adjustment process is gradual rather than instantaneous (Batista, Maia and Romero, 2018). Based on previous studies (see for example, Tokić, Bolfek and Peša, 2018) developed markets have high liquidity and higher market capitalisation, which cause the market to be more efficient than less developed markets. The spectrum of market efficiency provides flexible arguments for EMH to describe the market as an eternal machine to reflect all new information. It is just a matter of time and speed to adjust the stock prices, but the market will never fail to adjust prices with new information.

Strong form efficiency is the purest form of the EMH, which is the idea that all current and past, public and private, information that might impact an asset's price has

already been included in its price and represents its true worth. In other words, according to strong form efficiency, a stock's price already represents its true worth. In this context, the stock prices on exchanges are entirely valid (Dias, Heliodoro, Teixeira and Godinho, 2020). Investors who adhere to this notion think that a trader cannot acquire an edge, even if they have access to confidential information. This implies that regardless of how much information a trader has access to or how much analysis and study they do, they cannot obtain returns that exceed the average market return. According to adherents of the strong variation of the efficient market hypothesis, the current price of security reflects all accessible information, regardless of whether it is public or private. Under these conditions, having access to unique knowledge does not guarantee investors a better rate of return.

The semi-strong form makes the same assumptions as the weak form, plus the assumption that all newly disclosed information is immediately priced into the market. In this sense, it is difficult to earn excess returns using either fundamental or technical analysis. In its semi-strong version, the EMH indicates that only current and past public information (and not private information) should be used to determine the values of publicly traded equities. It is the most relevant form of the efficient market hypothesis, and empirical evidence indicates that most capital markets in developed countries are normally semi-strongly efficient. This efficiency is contingent on the fact that public information about a particular firm or security immediately impacts the market's stock prices. Additionally, it states that technical and fundamental research cannot be used to generate additional stock market profits. Investors can only get an advantage in trading if they have access to private information that is undisclosed to the market as a whole, according to one variant of the market efficiency hypothesis with moderate support.

Although investors who subscribe to the efficient market hypothesis think that securities prices reflect all available public market information, investors who adhere to the weak hypothesis believe that prices may not reflect fresh information that has not yet been made public. Investors who subscribe to the efficient market hypothesis assume that asset prices represent all available public market data. It also assumes that past prices do not influence future prices, which will be set by new information. If this is true, then doing technical analysis is a useless endeavour. A fundamental analyst with competence and a weak version of the efficient market hypothesis can select stocks that will succeed in the short term. This potential is contingent on the fundamental analyst's ability to anticipate the effect of new price information. A less robust version of the EMH said that fundamental stock research was fraught with mistakes and that technical stock analysis (which depended on past data) was mostly incorrect. It is impossible to use previous data on an asset's price and volume of trading to predict its future price since, according to the theory, such information is useless. To be more specific, trading a particular asset every day is independent of trading on previous days, and the stock prices reflect only the most current information about securities. Prices may fluctuate based on expectations for future profits, but past profits are not necessarily predictive of future profits.

Apart from that, EMH supports the law of one price, which argues that there is only one true price for an asset at any moment. EMH assumes that investors behave rationally and that no arbitrage exists in the market. Market anomalies will be eliminated in a short period by the "invisible hand" (Wade, 2003). Nevertheless, the idea of only the correct price is a neat and clean way of thinking (Krishnan, Mukherji and Basu, 2020). The theory explains that no arbitrage can occur under a strong form of the EMH market. The EMH, in explaining price adjustment, is straightforward and

reasonable because it claims that prices are rapidly adjusted to new information. Nonetheless, there is a drawback of EMH because it assumes that all investors are rational. This assumption of EMH receives major criicism from behavioural finance scholars (see for example, Holzhauer, 2020) because they argue that investors are irrational in making investment decisions and easily affected by their emotions. If investors are irrational, the stock price will not be true in representing the value of securities. It will violate the explanation of EMH in stock price adjustments.

In regards to the market information that can affect price adjustment, earning announcements and news have a substantial impact in causing fluctuation in stock prices. Typically, bad news can generate a stronger market response than good news on announcement day. Nonetheless, investors are delayed in responding to the bad news rather than the good news event (Syed and Bajwa, 2018). Based on the EMH, the market adjusts to the information and news flow into securities prices, and the random walk hypothesis is generic across global stock markets (Kayal and Maheswaran, 2018). Developed markets have a higher speed in price adjustment in reflecting all information than emerging markets. Investors react to new information and news, but price adjustment is not instantaneous because it depends on the market efficiency of different markets.

The development of the EMH has faced critiques from behavioural finance scholars who argue that the existence of market anomalies is against EMH. This is because the EMH adopts rational expectations to assume that all investors are rational in making judgments. Nevertheless, behavioural finance scholars argue that investors are irrational. In this context, the emergence the theory of "bounded rationality" was introduced by Herbert Simon. Human beings' rationality is bounded/ restricted when

making decisions (Simon, 1991) due to the cognitive limitations inherent in the human mindset. Investors can make irrational decisions when they lack time and information, which can further push them to herd in the market. After introducing bounded rationality, more behavioural finance scholars examine the existence of market anomalies against EMH. One type of seasonal anomaly is the day-of-the-week effect, which is one of the most investigated topics. Cross (1973) and French (1980) were among the first to demonstrate the existence of a negative Monday impact. In accordance with the day-of-the-week effect, mean returns on Mondays are negative. This theory violates the EMH, which states that the market should have no predictable return pattern. Furthermore, Thaler (1987) introduced anomalies known as the January effect to claim that the stock prices of January are higher than other months as the beginning effect of the year. Anomalies are market price movements that are out of the ordinary. These market anomalies show that EMH does not hold strong in the financial market, although Eugene Fama argued that market anomalies have only short-term effects. Scholars have moved their focus from EMH to behavioural finance as more empirical evidence has shown that investors are irrational and can be affected by other factors while making investment decisions. In this context, the behavioural approach in price adjustment exists to replace the EMH in explaining the investors' behaviours by incorporating psychological and behavioural factors.

Previous studies have confirmed the arguments of EMH in explaining the price adjustment process following the spectrum of market efficiency. Nonetheless, the major controversy of EMH is the lack of accounting for the psychological factors and behaviour of investors in the model of stock price behaviour. Previous studies have limited evidence examining the rationality and accuracy of adjusted stock prices. The adjusted price may not reflect the financial position and prospect of the individual