Herding Behaviour in Vietnamese Stock Market

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**Abstract:**  
This study examines the presence and attribution of market wide herding behaviour in Vietnamese stock market using the data form listed stocks on the Ho Chi Minh City stock exchange from 2008 to 2017. The study employs the market-wide approach introduced by Chang et al. (2000) with modifications regarding the measure of return dispersion. The study finds strong evidence of herding behaviour in Vietnamese stock market, especially during the period 2009-2016, whereas there are no evidence of this behaviour during the period 2008 and 2016-2017. The results also indicate that herding behaviour tends to be more pronounced in this market under market rising, high volatility and high trading conditions. In addition, the study finds that herding behaviour is more prevalent towards firms with high P/B ratio and strong return volatility, and somehow towards stocks with large capitalization.  

**Keywords:** Herding, market-wide herding, cross-sectional absolute deviation, market conditions, firm characteristics, frontier market, Vietnamese stock market
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1 INTRODUCTION

In the 1960s the efficient market hypothesis had been introduced as an investment theory by Eugene Fama (Fama, 1965). Fama, in his study, argued that the price of each security always reflects all information related to that security and investors will make rational decisions based on that information; thus there will be no arbitrage opportunities and markets are efficient. However, this argument may only hold true in an ideal world and it may not be applicable in reality. In real world investors may not have sufficient information to make rational decisions and they may be instead governed by their own beliefs and emotions, causing them to make irrational decisions and the market to be inefficient (Shiller, 2003). Recent decades have witnessed many market inefficiencies, such as bursting and speculative bubbles, significant deviations of stock prices from the fundamental values and crashes of stock markets, which cannot be explained by traditional financial theories. These inexplicable anomalies have created room for a new financial research field, namely behavioural finance, which incorporates investors' unique psychological traits in order to explain their decision-making behaviours.

In the field of behavioural finance, herding behaviour is the most well-known phenomenon and has been considered an alternative explanation for investor's irrational behaviour in the financial markets (Devenow and Welch, 1996). "Herding behaviour" or "crowd effect" is a common psychological phenomenon in socio-economic life. Choi and Skiba, in their research, defined herding behaviour in financial market as a convergence of investment behaviour which means investors make the investment decision following the decisions of others, instead of based on their private information and analyses, from security to security and from market to market (Choi and Skiba 2015).

The importance of examining the existence of herding arises from its impact on both market participants and the financial market itself. If herding exists, investors will make investment based on collective decision instead of on their own analysis and rationale. Hence, herd behaviour may cause mispricing and market inefficiencies as stock prices will be driven away from their true values (Devenow and Welch, 1996). The difference between the market prices and the fundamental values of stocks may create arbitrage opportunities and some market participants can gain profit from that (Hwang and Salmon, 2004; Tan et al., 2008). However, herding may cause prices of assets
move together, thus increasing the correlation between assets’ returns and making it harder for investors to maintain diversified portfolios (Chang et al., 2000; Chiang and Zheng, 2010). Furthermore, due to its great impact on the stability of financial markets, herding behaviour is of great concern to regulators and policymakers. If herd behaviour is long-lasting and the stock prices fail to adjust towards their true values, it may cause excess volatility, especially in crisis periods, and cause the market to be inefficient and unstable, or even to collapse (Demirer and Kutan, 2006).

Given the importance of examining the herding behaviour in the financial market, in recent decades herding behaviour has become topic for much research. Christie and Huang (1995) applied the statistical measure, called the cross-sectional standard deviation, to investigate the herding behaviour in the US market. Chiang and Zheng (2010) focused their study on a sample consisting of companies from 18 European countries. Chang et al. (2000), using another statistical measure called the cross-sectional absolute deviation, examined the herding behaviour in different international markets: US, Japan, Taiwan, Hongkong and Korea. Chinese stock market, a big emerging market, was a frequent subject for studies on herding behaviour. This market has been examined in many studies, such as Tan et al. (2008) and Chiang and Zheng (2010).

Although many studies have been conducted on this topic, however, most of the papers investigating herding behaviour are focusing on developed markets or large emerging market such as China; whereas the amount of studies focusing on small frontier markets which are still at an early stage of development is very limited. Therefore, this paper is expected to contribute to studies in herding behaviour in the frontier market in general and fill the literature gap about the herding behaviour in Vietnamese stock market in particular. Given the fact that Vietnam is classified as a frontier market by MSCI, information non-transparency and asymmetry will be problems in Vietnamese stock market. As non-transparency is considered one of the key reasons leading to herding behaviour (Bikhchandani et al., 1992), Vietnamese stock market will be an ideal subject for the study on this topic.

In the context of Vietnam, several studies have been conducted regarding the herding behaviour, few of them have examined how certain market conditions affect herding, and none of them have examined how firm characteristics may encourage herding behaviour.
behaviour. Thus, this paper will extend these studies by not only examining the existence of herding behaviour in Vietnamese stock market but also incorporating the impacts of certain market conditions and certain firm characteristics on herding behaviour. Moreover, all of the previous studies on herding behaviour in Vietnam employed the equally-weighted cross-sectional absolute deviations. However, according to McQueen, Pinegar, and Thorley (1996), the slow response of small stocks to news may lead to extra return dispersion in the market. Given the context of Vietnamese stock market where the majority of stocks are medium and small stock, the equally-weighted cross-sectional absolute deviation (CSAD) might not reflect correctly the return dispersion in this market, thus cause the herding detection results to be lower than they actually are. Therefore, in this paper, both the equally-weighted and value-weighted versions of CSAD will be employed in order to provide a more correct detection of herding in Vietnamese stock market.

1.1 Research questions

This study aims to investigate the herding behaviour in Vietnamese stock market and attempts to answer several research questions:

- Does market-wide herding exist in Vietnamese stock market?

- How is the prevalence of herding behaviour in Vietnamese stock market under different market conditions?

- How is the prevalence of herding behaviour in Vietnamese stock market towards different firm characteristics?

1.2 Scope of the study

This study aims to examine herding behaviour in Vietnamese stock market using the market-wide approach. Thus, this study will focus only on the presence and attribution of herding in this particular market at the market level, rather than the causes and motivations behind this behaviour. This study employs a statistical method which is introduced by Christie and Huang (1995) and further developed by Chang et al. (2000), using both the value-weighted and equally-weighted measures of dispersion. Certain market conditions such as up and down market movements, excessive volatility, excessive trading volume and certain firm characteristics such as size, stock volatility, P/B ratios are also incorporated in the study.
This study is conducted based on data from companies listed on Ho Chi Minh Stock Exchange (HOSE) from Jan 2008 to Dec 2017. Data regarding the market conditions such as and data regarding the firm characteristics also cover the same period.

1.3 Contribution

This paper provides a clearer picture on herding behaviour in Vietnamese stock market by examining the effects of different market conditions and different stock characteristics on the prevalence of herding. By employing the value-weighted version of CSAD to detecting herding behaviour, this paper is expected to provide more correct results compared to previous studies on this market. It also extends and contributes to literature about herding behaviour in Vietnamese stock market as the first study to investigate whether certain firm characteristics can affect the herding behaviour of investors. Furthermore, given the importance of examining the herding behaviour to the stability of the financial markets and profitability of investors, this paper is expected to provide some implications for investors, firm managers and policy makers so that they can make investment wisely and operate the market properly. Finally, this study is expected to shed light on the herding behaviour in Vietnamese stock market using more updated dataset.

1.4 Limitations

The study is subject to some possible limitations. Firstly, as Vietnamese stock market is a young market with a short history of development, the number of listed companies in this market is small. Furthermore, only stocks with complete data for the period 2008-2017 are included. As the result, the sample size in this study is quite small compared to sample sizes of previous studies. In addition, as the sample size is small, it cannot be divided into more than 8 portfolios (2x2x2). Thus, the inference on the prevalence of herding behaviour towards different firms’ characteristics might somehow be limited.

Secondly, as will be mentioned in the theoretical background section, state-ownership and political connections may lower the transparency on the information disclosure of the firms and cause information asymmetry between insiders and outsiders. As information asymmetry is one of the main reasons causing herding behaviour, ones can expect that the herding behaviour towards state-owned enterprise (SOE) will be more pronounced compared to non-SOE. However, due to the inavailability of historical data.

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2 To be explained more clearly in the Data section
on the ownership structure of Vietnamese listed firm, the above argument cannot be
tested in this paper. Nevertheless, it leaves room for further study on this matter.

1.5 Structure of the thesis

The rest of the paper consists of 6 sections. The section 2 will provide an overview of
the Vietnamese stock market, including development stages, the main exchange, the
market index as well as the summary on main features of this market. The section 3
describes the theoretical framework regarding herding behaviour. This section includes
an overview about traditional finance and behavioural finance theories as well as the
definitions, classifications and theoretical motivations behind herding behaviour.
Empirical evidences regarding herding behaviour in financial market are also
presented in this section. The sections 4 and 5 will cover the methodology and data that
will be employed in the study: which methods will be used, how data will be collected
and processed. The next section consists of the data descriptive, regression results and
discussions on the findings. Finally, section 7 will present the conclusion on the
findings of the study.
2 OVERVIEW OF VIETNAMESE STOCK MARKET

Vietnamese stock market was established about two decades ago and had been undergone different stages of development up to now. In this session, the development stages of Vietnamese stock market from 2007 to 2017, the exchanges and indexes, and the main characteristics of this market will be presented, providing the reasons why this market is ideal for research on herding behaviour. All the information presented in this section is collected from the official website of Ho Chi Minh City stock exchanges\textsuperscript{3} and Ha Noi stock exchange\textsuperscript{4}.

2.1 The stock exchanges

There are two stock exchanges in Vietnam: the Ho Chi Minh City stock exchange (HOSE), which was officially put into operation since 2000, and the Ha Noi stock exchanges (HNX), which was put into operation since 2005. Most of companies listed on Ho Chi Minh City securities trading center are ones with large capitalization whereas most of companies listed on Hanoi securities trading center are medium and small ones.

Among these two, the Ho Chi Minh City stock exchange is the main stock exchange in Vietnam as its market capitalization accounts for more than 95% of total market capitalization of two exchanges ($115.34 billion over $120.08 billion). Therefore, this study will be conducted based on the data of listed companies on HOSE only as this stock exchange can be considered representative for Vietnamese stock market.

2.2 The VN-index

The market index of the Ho Chi Minh city stock exchange is the Vietnam stock index (VN-index), which is the capitalization-weighted index of all listed companies on HOSE and was first created on July 28th 2000 with an initial value of 100. As the study will employ the Ho Chi Minh City stock exchange as the representative for Vietnamese stock market, the VN-index will be used as the proxy for the market index of this market. The figure 1 below shows the movements of the index from the beginning of 2005 to the end of 2017.

\textsuperscript{3} https://www.hsx.vn
\textsuperscript{4} https://www.hnx.vn
As can be seen from the chart, the VN-index increased dramatically from 2006 to 2007, corresponding to the booming period of Vietnamese stock market. The total market capitalization of Vietnamese stock market has increased by about 13 times only in only one year 2016, from $351 million to $4.48 billion. At the end of 2017, the total market capitalization was over $13.9 billion, accounting for 18.05% of Vietnam’s GDP. Investors were also trading much more actively in the market, with the average daily trading volume increased from $27.5 million in 2006 to over $110 million in 2007. The VN-index also reached its peak of 1170.67 points in 2007.

After that, as the market nearly collapsed in 2008, the index dropped from its peak in 2007 to the bottom of 235 points in Feb 2009, indicating a “bearish” period of the market. Investors, especially foreign investors, kept selling their shares in order to withdraw their investments from the market. Despite of the significant increase in number listed companies thank to the effort of Vietnamese Government to promote the privatization of state owned enterprises in the second half of 2008, the situation had not improved. At the end of 2008, the total market capitalization was only $9.48 billion, accounting for only 9.23% of the GDP.

In late 2009, Vietnamese Government prescribed stimulus packages of $6 billion aiming to stabilize the economy. After that, the Vietnamese stock market gradually
recovered and become more stable. However, the market still fluctuated considerably during this period 2009-2015. The VN-index increased during early 2010, reaching 541.37 points then dropping to 336.73 points in Jan 2012, before climbing to 640.75 points in Sep 2014. Also, the number of companies listed on HOSE and the total market capitalization significantly increased during this period, reaching 312 companies and $51.88 billion of capitalization by the end of 2015.

In the last stage, from 2016 to 2017, the market index and the total market capitalization of Vietnamese stock market increased steadily, indicating a “bullish” period of the market. The VN-index increased more than 70%, from 574.41 points to 984.24 points. The total market capitalization of HOSE also reached $115.34 billion at the end of 2017, accounting for about 54% of Vietnam GDP.

In summary, the period from 2008 to 2017, which will be studied in this paper, can be divided into three different stages: "bearish” period from 2008 to the beginning of 2009, "fluctuation” period from 2009 to 2015 and the "bullish” period from 2016 to 2017.

2.3 Main features of Vietnamese stock market

Vietnamese stock market is a young market with less than 20 years of development. Up to 2017, the market was still classified as a frontier market by both MSCI and FTSE. The main reasons causing Vietnam to stay in the frontier class are the illiquidity problem, lack of foreign investments and the slow pace of privatization of state-owned enterprises. As a frontier market, Vietnamese stock market is supposed to have certain other problems, namely high volatility and fluctuations, low market liquidity and lack of information disclosure, especially in state-owned enterprises.

Majority of listed companies in Vietnamese stock market are medium and small ones and there are huge differences in market capitalization between largest and smallest companies in the market. In fact, the total capitalization of only ten largest companies can account for more than 50% of the total capitalization of the whole market. In addition, among these ten companies, six are state-owned enterprises with over 80% of their shares owned by the State, giving the government enormous influence over the stock market. Bushman et al. (2004) and Leuz and Oberholzer-Gee (2006) claimed that state-ownership and political connections may lower the transparency of information in the market. As the result, the non-transparency tends to be a serious problem in Vietnamese stock market, especially before 2016.
Furthermore, these years witnessed a series of violations regarding the activities in the Vietnamese stock market. For instance the price manipulation by insiders in large listed companies or the manipulation of accounting data by audit companies, which leads to the disapproval of financial data of 15 listed companies. These incidents, along with the deficiency of legal framework and frequent intervention of the government, are causing non-transparency and information asymmetry problems in Vietnamese stock market.

Noticeably, during the period 2016-2017, Vietnamese government had issued several important regulations such as circular 155, 180, 197, 202, 203, etc. regarding the information disclosure of listed companies as well as the operation of the stock market. The main purpose of these regulations was to enhance the information transparency and improve the effectiveness of the stock market. Therefore, the impacts of these issuances on herding during this period are worth to be noticed.

In general, Vietnamese stock market possesses characteristics of a frontier market such as lack of legal framework, state-ownership and non-transparency problems, and irrationality of investors. As information asymmetry and investor irrationality are key reasons leading to herding behaviour, Vietnamese stock market will be an ideal subject for study on this topic.
3 LITERATURE REVIEW

Herding behaviour is one of the key concepts among behavioural finance theories, which contradict the traditional finance theories. This behaviour is considered possible explanation for many anomalies in the financial market and even one of the causes of financial bubbles and crises. This session will provide a theoretical background for herding behaviour, especially in the financial market, as well as the previous empirical research on this topic.

3.1 Theoretical background

3.1.1 Traditional finance vs. Behavioural finance

Traditional finance theories are based on the rationality of investors. Investor is assumed to be “Rational Economic Man” who is logical, rational, possessing sufficient knowledge and doing calculations using pure mathematics to make investment decision.

The most important cornerstone of traditional finance is the Efficient Market Hypothesis (EMH), which was first introduced by Eugene Fama in the 1960s. An efficient market can be defined as “a market where there are large numbers of rational, profit-maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants” (Fama, 1965). Following the EMH, it is impossible for investor to gain excessive return over the market, as all the available information is already incorporated in the securities’ prices. In addition, the security price is assumed to follow a random walk pattern, meaning that it is impossible for any investor to predict the future movements of the price based on its historical information.

Under the market efficiency theories, the investor is assumed to be fully rational; he acquires and processes information completely and makes decisions in order to maximize his utility. When there is new information regarding the fundamental value of the securities, the investor will adjust his offer price for the securities accordingly. As the results, the price of the securities will always be equal to their fundamental value, leaving no room for arbitrage. Fama (1965) also claims that even in case investor makes irrational decision, this irrationality is only occasional and will be cancelled out by irrationality of other investors, leaving no impact on the price of security. Furthermore, Friedman (1953) argued that in case the security is mispriced, an
arbitrage opportunity to make easy money will be created and rational investors in the market will immediately take this opportunity to sell and buy mispriced security, then pushing the security price toward its true value and eliminating the mispricing.

However, since the 1980s, there were anomalies that traditional finance theories could not explain and many empirical findings that contradict the EMH. For example, Basu (1977) and Dreman (1980) claimed that stocks with high low P/E ratios tend to be undervalued and tend to outperform the market, thus challenging the EMH that no ones can beat the market. De Bondt and Thaler (1985), analyzed the overreaction of investors and found that price movement of winner and loser stocks in the market can somehow be predicted. Jegadeesh and Titman (1993) found trends in the stock prices, with the past winner continuing being winners and past losers continuing being losers when considering period less than one year. When considering period longer than one year, these trends were reversed. Similar patterns were also found by other studies such as Rouwenhorst (1998) and Lee and Swaminathan (2000). Another noticeable phenomenon is the calendar effect. For example, Keim (1983) and Reinganum (1983) found evidence that the abnormal returns in January were larger in average compared to those in other months of the year. Another evidence on calendar effect was found by French (1980), showing that the stock returns tend to be negative on Monday, while tend to be positive on other weekdays. These anomalies and the difficulties that tradition finance theories face when explaining these anomalies give rise to the behavioural finance, which focuses on the irrationalities of investors, including herding behaviours, as the explanation for these anomalies.

In contrast to traditional finance, behavioural finance does not have assumptions on the rationality of the investors or the efficiency of the market. Under behavioural finance theory, some financial phenomena can be explained using models in which investors are not fully rational and asset price can be deviated from its fundamental value as the result of irrationality of investors (Barberis and Thaler, 2002).

The field of behavioural finance has three main blocks: limits to arbitrage, investor sentiment and investor preference (De Bondt et al., 2008). Limits to arbitrage theory states that, in reality, when an arbitrage opportunity is created due to the mispricing of a security, there will be certain risks and costs that arbitrageurs have to face in order to take this opportunity. Due to these risks and costs, the arbitrageurs may not take this opportunity and, as the result, the mispricing will not be corrected. Investor sentiment
and investor preferences, on the other hand, focus on investigating the kinds of irrationalities that investors may have when making decisions.

De Bondt et al. (2008) claimed that people’s sentiments or beliefs are often biased and people often use heuristic rules of thumb when making decisions, sometimes leading to systematic error. The authors also listed out several examples of biases in people's beliefs such as anchoring, conservatism, representativeness, availability bias, overconfidence, etc.

About investor preferences, the most important preference framework is the prospect theory, which was introduced by Kahneman (1979). Under the prospect theory, investors value one identical amount of gains and losses in different ways, with downside losses being more painful than the joy coming from upside gains. Investors also tend to overweight the probabilities of bad outcome, rather than using objective probabilities when making decisions. In addition, investors are considered to be regret averse as they wish to avoid regret in case they make wrong decision. Koenig (1999) suggested that, as the result of regret averse, investors tend to follow the decisions of others in order to avoid being left behind, instead of follow their own analysis, which in turn may create herding behaviour. As the results, investors may not always make rational decisions aiming to maximize utility, as the assumption of the tradition finance theory. With the understanding of these psychological traits of investors, behavioural finance may offer possible explanations for the anomalies that traditional finance theories find difficult to explain. Nowadays, among the field of behavioural finance, the behaviour of investors to disregard their own information to follow others’ decision, i.e. herding behaviour, is drawing more and more attention (De Bondt et al., 2008).

3.1.2 Herding behaviour

Herding behaviour is one of the key concepts in the field of behavioural finance and is believed to contribute to the irrationality in financial decision making (Devenow and Welch, 1996). Herding behaviour is considered frequent explanation for unexpectedly high volatility in the stock market (Christie and Huang, 1995) and even one of the underlying reasons for recent financial crises (Chari and Kehoe, 2004). Given the great impacts of herding behaviour on the stability of markets, this topic has been drawn more and more attention from market participants, academics as well as policy makers.

There are different definitions of herding behaviour. Hirshleifer and Teoh (2003) defined herding as the “behavioural similarity brought about by the interaction of
individuals”. In the context of behavioural finance, Chiang and Zheng (2010) use the term “herding” to describe the correlations in trading behaviours of market participants. More recently, Choi and Skiba (2015) defined herding behaviour as a convergence of investment behaviour, which means investors make the investment decision following the collective decisions, instead of based on their own information and analyses, from security to security and from market to market.

As this paper focuses on market wide herding, the definition of herding behaviour to be used will be similar to ones used in the research of Christie and Huang (1995), Chang et al (2000) and Hwang and Salmon (2004). In these studies, market wide herding is defined as the behaviour of investor to follow and make investment decision based on the collective decisions and performance of the market (reflected by market return or other macroeconomic factors). This form of herding is quite different to the usual form of herding in which the investors behave similarly by trading the same assets simultaneously. However, this market based herding is as serious as of the usual form, as it also leads to mispricing of assets (Hwang and Salmon, 2004).

In fact, not only retail investors' decisions are influenced by the investment decisions of other investors but even institutional investors are not out of the loop. Individual investors, due to the limitations of owning information or deliberately ignoring private information, tend to apply herding investment strategy and be easily influenced by the investment actions of other investors. On the other hand, less skilled and reputed fund managers might choose to imitate the investment decisions of their better peers in order to extract more information (Devenow and Welch, 1996), to improve their reputation and somehow secure their career prospects (Scharfstein and Stein, 1990). Hsieh (2013) investigates the investment behaviours in Taiwan individual and institutional investors and finds evidence of herding behaviour in both groups of investors, with stronger tendency in the institutional group.

3.1.2.1 Intentional vs. spurious herding

Bikhchandani and Sharma (2000) divided herding into two types: intentional herding and spurious herding. Intentional herding arises when investors are aware of and influenced by others’ actions, thus they intentionally imitate the decisions of other investors when making their own decisions. As the results, all of they may take the same wrong decision (Bikhchandani and Sharma, 2000).
In contrast, spurious herding refers to the situation in which investors have similar set of information and face similar decision problems, thus the decisions they made will be similar. For example, in case interest rates suddenly drop and stocks in turn will become more attractive investments, investors may take similar decisions to increase the portion of stocks in their portfolio. These decisions are not results of herding behaviour, as investors are not following others’ decisions, but just common reactions to common public information, and thus they are indeed efficient (Bikhchandani and Sharma, 2000).

As decisions made by intentional herding behaviour are inefficient whereas decisions made by spurious herding are efficient, it is important to distinguish between these two types of herding behaviours. However, in practice it is hard to separate these types from each other. The reasons are that there are many different factors affecting the decisions of investors and it is difficult to separate and measure these factors precisely (Bikhchandani and Sharma, 2000).

3.1.2.2 Irrational vs. rational herding

Herding behaviour can also be classified based on the motivations behind the phenomenon. Many studies have divided herding into two categories: irrational herding and rational herding.

Irrational herding refers to the herding behaviour caused by psychological traits of investors. It means that even investors possess adequate information and have ability to do rational analysis; they still ignore them and blindly follow the decisions of others (Devenow and Welch, 1996). This may stem from people’s psychological biases or from the behaviour preference of people for safety and certainty. Devonow and Welch (1996) argued that in case of facing huge uncertainty, investors will feel more secured when following the crowd, even if it means they have to set aside their own beliefs.

On the other hand, rational herding refers to the herding behaviour caused by external factors. According to Bikhchandani and Sharma (2000), there are three main reasons for rational herding behaviour in financial market, namely the imperfect information, concern for reputation and compensation structures.

**Imperfect information** refers to the situation in which investors face similar decision making tasks and possess private (however imperfect) information regarding the right decisions should be made. All the information regarding the tasks is public but
its quality is uncertain. Investors can observe the actions of others but cannot know about the private information that other investors possess. Even when investors decide to exchange their private information with each other, they still prefer observing the actual actions of others instead of just believing in their words. Investors may believe that others have better private information, especially insider information, and the decisions of other investors are made based on this information. Thus, investors draw inferences from others’ decisions and make their own decisions accordingly; and information-based herding occurs. However, the arrival of new information will easily break this kind of herding. Furthermore, if stock prices on the stock market reflect all available information, including private information, information-based herding behaviour will not occur (Bikhchandani and Sharma, 2000).

**Concern for reputation** is the common reason for herding behaviour among fund managers and financial analysts. As the reputations or even careers of fund managers depend on their investment decisions, the appropriateness of these decisions will be of great concern. If a fund manager makes a decision that is different from other managers’ decisions and this decision turns out to be “bad”, the reputation of this manager will be compromised. However, if this manager makes a similar decision to others and these similar decisions turn out to be all “bad”, he can suggest that the reason is not his poor ability but market conditions, thus protecting his reputation and career. As the results, mimicking the investment decisions of other investors may be an inefficient, but a rational strategy for fund managers (Scharfstein and Stein, 1990).

**Compensation structure** is another reason for herding among fund managers. If compensation plan for a manager are based on his performance compared to the performance of benchmark investors, the aversion of having his compensation decreased if he underperforms the benchmark will eventually cause the manager to end up with a portfolio which is similar to the benchmark investors’ portfolios, even these portfolios are not optimal or inefficient (Roll, 1992). Furthermore, as the manager is aware of the benchmark investors, he may be somehow influenced by investments decisions of these investors, leading to herding behaviour.

**Concerns for relative wealth** or “keeping up with the Joneses” preference can also be considered another cause of rational herding behaviour. Under “keeping up with the Joneses” utility, the investors’ wealth and performance relative to their peers are the real matters, not their wealth and performance in absolute term (Ang, 2014). DeMarzo et al. (2008) argues that, in a market in which there is a “scarce good” whose
price changes accordingly to the wealth of the investors, the relative wealth of an individual investors compared to his peers will determine his ability to purchase the good and, thus, affect his final utility. Given that this individual investor is fully rational and possesses adequate information, he will make his own decisions based on this information. However, if his decisions are contradict to the collective decisions of his peers, going against the crowds will increase the risk of lowering his relative wealth. This investor may decide to disregard his own analysis and follow the collective decisions, thus ensuring his relative level of wealth. Especially, in case of price bubbles, even though they know that the prices are driven far away from fundamental values; investors may keep participating in the bubbles as long as other investors participate in order to maintain their relative wealth during the upside of bubbles.

More specifically, Campbell and Cochrane (1999) introduced the external habit model to illustrate the keeping up with the Joneses preferences. In this model, the expected utility of representative investor takes the form:

\[
E \left[ \sum_{t=0}^{\infty} \delta^t \frac{(C_t - X_t)^{1-\gamma} - 1}{1 - \gamma} \right]
\]

In which, \(\delta^t\) is the time discount factor, \(C_t\) denotes the level of consumption of the investor, which reflect the wealth of this individual investors, and \(X_t\) denotes the “habit level”. Under the external habit model, the “habit level” \(X_t\) does not depend on the historical consumption (the habit) of this individual investor, but instead depends on the historical aggregate consumption levels of all other peers in the economy. Thus, \(X_t\) reflects the aggregate wealth of other peers. This model defines the “bad” state in which the investor’s consumption is close to “habit level” \(((C_t - X_t) \to 0)\) and the expected utility approach zero. Consider a circumstance in which the group of investors (the Joneses) take a certain investment position, if an investor decides to go against the group, there will be the case that the group is right and the investor himself is wrong, then the aggregate wealth level (habit level: \(X_t\)) will increase and the investors’ own wealth \((C_t)\) will decrease, thus leading to the “bad” state. If the investor follows the group, then whether the investment decision is right or wrong, the aggregate peers’ wealth level and investor’s own wealth level will change in the same direction, thus the “bad” state will be less likely to happen. As the results, investor tends to take the same decision to other peers, whether a rational or irrational investment, in order to avoid these “bad” state, then leading to the prevalence of herding.
3.2 Previous research

There are two most popular approaches used by researchers in order to investigate herding behaviour in financial market: The empirical approach focuses on using purely statistical methods in order to investigate the presence and attribution of herding behaviour, regardless of any particular theories or motivations behind this behaviour. The experimental approach, on the other hand, focuses on building models for herding behaviours and examining the motivations behind these behaviours by conducting surveys or experiments on groups of investors.

3.2.1 Experimental approach

Using the experimental approach, many studies have developed theoretical models for herding behaviour. Scharfstein and Stein (1990) developed a herding “equilibria” model with reputational concerns to investigate the investment decisions of fund managers and compared these decisions with efficient investment decisions. The results of the study showed that concerns for reputation of fund manager may lead to herding behaviours. Banerjee (1992) investigated the rationale behind decision making and claimed that information cascades can cause herding and in turn create bubbles, as these cascades can affect the rational thinking of investors.

Shiller and Pound (1989) used survey approach and found evidence of herding behaviour among institutional investors, as investment decisions of these investors tend to be substantially affected by advices of other professionals, especially when facing risky investments. Cote and Sanders (1997) carried out a field experiment on group of earnings forecasters who are skilled investors. They found that herding behaviour does exist even among skilled investors and the extent of this behaviour depend of several factors, namely forecasting ability, reputation and confidence of the investors, as well as the perceived credibility of the consensus forecast. Gonzalez et al. (2006), using similar approach to Cote and Sander (1997), examined the herding behaviour among group of directors when they are making decisions regarding an investment project. The results showed that the final director to make the vote regarding the investment decisions tend to ignore his own information and analysis and agree with the previous consensus decisions of other directors. Other studies, such as Devenow and Welch (1996), Bikhchandani and Sharma (2000), reviewed and summarized results of other studies and provided an overview about theories and motivations of herding behaviour in financial markets.
3.2.2 Empirical approach

Besides these experimental studies, many others studies employed empirical methods in order to investigate the presence of herding behaviour in financial markets. This approach is also called the market-wide approach, which aims to detect the presence and examine the attributions of herding at the market level. Most popular researches following the empirical approach in the literature are Christie and Huang (1995) and Chang et al (2000).

3.2.2.1 Christie and Huang (1995)

Christie and Huang (1995) examine the presence of herding behaviour among investors in US stock markets using the daily and monthly returns of NYSE and Amex firms. The data periods are from 1962 to 1988 for daily data and from 1925 to 1988 for monthly data. The study was conducted based on the idea that in the duration of extreme market conditions, herding behaviour is more likely to exist. In this circumstance, investors will disregard their own analyses in favor of the market consensus, thus making the dispersion of stock return be relatively lower.

Christie and Huang measured the dispersion of stock return by the standard deviation of returns, which is calculated by the following formula:

$$CSSD = \sqrt{\frac{\sum_{i=1}^{N}(R_i - \bar{R})^2}{N - 1}}$$

To determine the presence of herd behaviour in extreme market conditions, the dummy variable technique is employed. The CSSD series is regressed against a constant and two dummy variables with the following equation:

$$CSSD = \alpha + \beta_1 D^L_t + \beta_2 D^U_t + \epsilon_t$$

In which, $D^L_t = 1$ if the market return on day $t$ lies in the extreme lower tail (1%, 5%) of the return distribution and 0 otherwise, $D^U_t = 1$ if the market return on day $t$ lies in the extreme upper tail (1%, 5%) of the return distribution and 0 otherwise. Based on this model, Christie and Huang suggest that the negative and significant values of $\beta_1$ and $\beta_2$ will indicate that the CSSD is indeed lower in the extreme market conditions, indicating the existence of herding behaviour.
The results of the study showed no evidence of herding for neither daily and monthly returns, both in market level and industry level, indicating that herding behaviour does not exist in US market.

3.2.2.2 Chang et al. (2000)

Chang et al. (2000) employed another method, which is based on the similar idea with Christie and Huang (1995) but uses different measures, to examine the herding behaviour in five different markets: US, Hong Kong, Korea, Taiwan and Japan. The data employed in this study is daily returns in these 5 markets from 1963 to 1997.

In this study, the dispersion of stock returns is measured by the cross-sectional absolute deviation (CSAD) and the tendency of herding behaviour in the market will be measured by the relationship between the CSAD and the equally-weighted market return. As the method of Chang et al. (2000) will be employed as the main method in my study, detailed information regarding this method will be presented in the methodology part of my paper.

The study found no evidence of herding behaviour in US market and Hong Kong market and some evidence in Japan market. However, clear evidences of herding behaviour are found in two emerging markets Taiwan and Korea. The underlying reason for this difference, according to Chang et al. (2000), may be the incomplete information disclosure in these two emerging markets.

3.2.3 Empirical evidence

3.2.3.1 Presence of herding

Employing the method of Christie and Huang (1995), Demirer and Kutan (2006) examined herding behaviour in Chinese markets at both individual firm level and industry level using data collected on Shanghai and Shenzhen stock exchanges. Similar to Christie and Huang (1995), Demirer and Kutan (2006) found no evidence of herding behaviour in these stock exchanges. Kremer and Nautz (2013), which investigated the daily stock data on German stock market from 2006 to 2009, also suggested that the presence of herding is correlated to information non-transparency and imperfect regulatory frameworks, especially in emerging markets. Interestingly, Choi and Skiba (2015) studied the herding among institutional investors in 41 countries and found quite different results. The results showed that institutional investors herd more in market with high information transparency.
3.2.3.2 Herding under market conditions

Since market conditions can affect the sentiments and investment behaviours of investors, the prevalence of herding can also be different according to the specific market conditions. There is much previous literature has investigated the asymmetry effects of herding behaviour under different market conditions, mainly focus on the up and down states of the market, the market volatility and trading volume.

Herding under up and down market

There are many empirical studies focusing on the presence of herding during bearish and bullish periods of the market as well as the asymmetry of herding in up and down market days. The results of these studies are quite different. Hwang and Salmon (2004) investigated the herding behaviour in US, UK and Korea markets using the sample data from 1993 to 2002. They found evidence of herding in both bull and bear periods of the market, especially when investors have high confidence in the future prospect of the market. Chiang and Zheng (2010) examined the herding behaviour in a global context using data from 18 different countries. The results of the study showed that herding exists in most markets, except US and several American Latin countries, in both up and down markets. The study also indicated that in Asian countries, during rising markets, herding tends to be more prevalent. More recently, Yao et al. (2014) investigated Chinese stock exchanges using different periods of data, claimed that herding behaviour in these stock exchanges is more pronounced in declining markets.

Herding under high and low market volatility

Many previous studies had found evidence on the relationship between the prevalence of herding and the volatility of the market. Boyer et al. (2006), using weekly stock data across different countries from 1996 to 2000, suggested that herding behaviour exists in different markets and that herding is more intense during high volatility periods. Venezia et al. (2011) investigated the herding behaviour in Israel market and claimed that herding behaviour is positively correlated to the volatility of the market. Further evidence was found by Balcilar et al. (2013) which examined the Gulf Arab stock markets from 2006 to 2011. This study found evidence of herding behaviour in all examined markets and, especially, found that herding behaviour is more pronounced in Qatar market under high volatility. More recently, Bernales et al. (2016), by examining US market from 1996 to 2012, suggest that herding is more prevalent during periods of high market volatility.
**Herding under high and low market trading**

Some studies had found evidence on the correlation between market trading volume and herding behaviour. Tan et al. (2008) investigated dual-listed A-share and B-share stocks in Chinese markets and found evidence of herding in both markets. In A-share market, the study also found evidence that herding behaviour is more pronounced when the market is rising and, especially, when the trading volume and market volatility are high. However, no evidence of herding asymmetry is found in B-share market. Similar results were found by Economou et al. (2011) when examining four southern European markets. The study claimed that the extent of herding behaviour depends on markets conditions, as it tends to be more intensive in the day with high volatility and trading activities. More recently, Ouarda et al. (2013), using data of Euro Stoxx 600 firms, concluded that herding is more prevalent when trading volume is high and market volatility is strong.

### 3.2.3.3 Herding towards firm characteristics

Beside macroeconomic factors, firm characteristics are also considered factors that affect the tendency of investors to herd. Christie and Huang (1995) suggested that individual investors when making decisions may herd around the return of stocks that have common characteristics instead of herding around the return of the whole market. Characteristics that are commonly tested in previous literature are industry sector, ownership and specific characteristics such as size, growth/value and volatility of stock.

Concerning the firms’ specific characteristics, Hwang and Salmon (2004) incorporated factors such as growth, value, size when examining herding behaviour in financial markets. The results of the study showed that investors tend to herd towards value rather than growth firms whereas size’s role as herding objective is not significant. Different result was shown by Venezia et al. (2011). This study claimed that company’s sizes and risk do have effect on herding behaviour towards company’s stock, with herding behaviour being lower toward firms with greater size and less risks. More recently, Lin and Lin (2014) found strong evidence that herding behaviour is correlated to market conditions and firms’ characteristics, especially towards high-volatility stock.

In summary, several points can be drawn from previous research on herding behaviour across the world. First, herding behaviour is a common phenomenon in financial markets, especially in emerging markets which are characterized by illiquidity, imperfect regulatory frameworks, frequent government intervention, and non-
transparency information environment. Secondly, the extent of the herding behaviour in the financial markets seems to be affected by market conditions, though the effects vary differently depending on the conditions and the markets themselves. Finally, firms’ characteristics such as size, risk, value and growth seem to have impacts on herding behaviour towards firms’ stocks. These impacts also vary differently from market to market.

3.2.3.4 Herding evidence in the context of Vietnam

In the context of Vietnam, there are several studies that investigate the herding behaviour in Vietnamese stock market. My and Truong (2011) was the first published study to investigate the herding behaviour in Vietnamese stock market. The study employed the methods of CSSD and CSAD introduced by Christie and Huang (1995) and Chang et al. (2000) to examine the existence of herding behaviour in Ho Chi Minh stock exchange (HOSE) during the period from 2002 to 2007. The study found evidence of herding in HOSE during the period. In addition, the extent of herding behaviour is slightly different in rising and declining markets. Truong and Le (2014) used a different method to examine the herding behaviour during the period from 2006 to 2011 and also found evidence of herding behaviour during this period. Recently, Bui et al. (2016) applied the method of Chang et al. (2000) to investigate the herding behaviour in both stock exchanges in Vietnam, the Ho Chi Minh stock exchange and the Ha Noi stock exchange. The results of the study showed that herding behaviour exists in both exchanges, both at market level and industries level. In addition, the study found evidence that investment behaviours of Vietnamese investors are somehow affected by market movements of US and Hong Kong stock markets. Vo and Phan (2016; 2017), applied the same method of Chang et al. (2000) with little modification in the regression method, i.e. the quantile regression, to investigate the presence and attribution of herding behaviour in Vietnamese stock market on daily, weekly and monthly basis during the period 2005-2015. Their results confirmed the short-lived feature of herding behaviour as they found evidence of herding behaviour only in daily and somehow in weekly data and no evidence in monthly data. Furthermore, their findings showed that herding behaviour in Vietnamese stock market was more pronounced in declining market and in low volume state. Interestingly, the study found that herding did not exist during the crisis period 2008, and the prevalence of herding was indeed stronger during the post-crisis period than in pre-crisis period. In contrast, the findings of Dang and Lin (2016), which employed a longer dataset from 2000 to
2015, showed that the herding was more pronounced in rising market and during pre-crisis period.

In general, the previous findings in Vietnamese market are quite consistent regarding the presence of herding behaviour but not consistent when it come to the prevalence of this behaviors under market up and down conditions. Thus it is beneficial to conduct a recheck regarding this matter. In addition, other conditions of market such as high and low trading volumes or high and low volatility are not thoroughly accounted for in the previous literature. As far as I know, the research of Vo and Phan (2016) was the only one to examine the impact of trading volume on herding prevalence and there is no previous research has examined the impact of market volatility on herding behaviour in Vietnamese context. Furthermore, as all these studies employed the equally-weighted CSAD of Chang et al. (2000), the dispersion measured may be exaggerated, thus lessen the significant of herding behaviour in the Vietnamese stock market. Moreover, all of them only focused on the presence and attribution of herding behaviour under market conditions, while did not concern about the impact of firm characteristics on the tendency of herding behaviour among investors. Therefore, my study will provide contribution by addressing these issues.

3.3 Research hypotheses

As mentioned before, herding behaviour is one of irrationalities of investors in stock market. The psychological traits of investors such as regret aversions or the preference for safety and certainty, together with the external factors such as information asymmetry, are reasons for the existence of herding behaviour in stock markets. In addition, herding behaviour is expected to be more prevalent in emerging markets which are characterized by small stocks, information asymmetry, imperfect regulatory systems, etc. Given the features of Vietnamese stock market discussed in the previous section and the empirical evidence found by previous studies, herding behaviour is expected to present in Vietnamese stock market and the research hypothesis regarding this matter is established as follow:


As discussed in the previous section, investor tends to be averse of being the only one in the group that makes the wrong decisions. Nofsinger (2008) suggested that, when an investor make an investment decision and this decision turn out to be bad, that
investor will feel less disappointed if other investors make the similar bad decisions. As a result, ones may argue that when the market goes down and the chance of getting loss increases, investors will have more intention to mimic others. The most recent findings of Vo and Phan (2017) in Vietnam context regarding the herding behaviour under up and down market are quite consistent with this argument. However, in this paper, "the keeping up with the Joneses"/ "external habit" preference will be considered. Following the function of expected utility proposed by Campbell and Cochrane (1999):

\[ U = E \left[ \sum_{t=0}^{\infty} \delta^t \frac{(C_t - X_t)^{1-\gamma} - 1}{1 - \gamma} \right] \]

The coefficient of relative risk aversion of individual investor will be:

\[ RRA = -\frac{C_t \times (U)''}{(U)'_C} = \frac{C_t \times \gamma}{C_t - X_t} \]

When the market going up, the aggregate wealth level of all investors in the market will increase, which means when the market going up \( X_t \) will increase. From the relative risk aversion function we can see that, if \( X_t \) increases relatively to \( C_t \), the relative risk aversion of individual investor indeed increase. On the other hand, when the market going down, \( X_t \) will decrease relatively to \( C_t \), leading to the decrease in relative risk aversion. Thus, we can infer that in fact, investors with external habit utility will be more risk averse when the market going up instead of going down, as they are afraid of being left behind. As the results, they will be more likely to herd around the market consensus during the market rising days, instead of during the market declining days. Therefore, the below hypothesis, though being opposite to recent findings in Vietnamese context, is established based on the above argument and previous empirical evidences:

\[ H2: \text{Herding behaviour is more prevalent in Vietnamese stock market during market rising day than during market declining day.} \]

Besides, other market conditions such as high market volatility and high trading volume also affect the tendency towards herding among investors. As discussed above, investors tend to apply herding investment strategies when they face huge uncertainty, as they may feel more secured when doing so. Higher market volatility means larger uncertainty in the market, thus it may cause herding behaviour to be more intensive.
Similarly, high trading volume is also related to high prevalence of herding behaviour as it not only facilitate the herding of investors but also is the consequence of investors’ herding activities. Previous empirical evidences also support this argument. Thus, two hypotheses are established regarding high intraday volatility and trading volume:

H3: Herding behaviour is more prevalent in Vietnamese stock market during trading day with high volatility.

H4: Herding behaviour is more prevalent in Vietnamese stock market during trading day with high relative trading volume.

Finally, regarding firm characteristics, this paper will examine prevalence of herding behaviour towards the firm’s stock with different characteristics such as different sizes, different P/B ratios, and different level of stock volatility. Normally, large firms tend to applied good accounting system and have their financial data audited by reputational auditors. Thus, one can expected that the information disclosure and transparency of large firms are better compared to small ones. As information asymmetry is one of main reasons causing herding behaviour, one can expected that herding behaviour will be for prevalent towards small firms. In addition, low P/B ratio indicates that the firm has uncertain and low earnings growth, higher leverage, and is more likely to face distresses (Fama and French, 1995). Thus, ones can consider investment into firms with low P/B to be riskier, especially in bad time. As herding behaviour is more likely to occur when investors face risky investment, ones can expect that herding towards low P/B stock will be more pronounced. The same argument can be applied to stock with high volatility. Therefore, based on above argument, below hypotheses can be established:

H5: Herding behaviour is more pronounced toward small stock in Vietnamese stock market.

H6: Herding behaviour is more pronounced toward low P/B stock in Vietnamese stock market.

H7: Herding behaviour is more pronounced toward high volatility stock in Vietnamese stock market.
4 DATA AND METHODOLOGY

This paper focuses on investigating the presence and attribution of herding behaviour in Vietnamese stock market, rather than the specific motivations behind this behaviour. Thus this paper will employ quantitative method developed by Chang et al. (2000) (CCK method from now on), which aims to detect the market-wide herding. This section will describe the method and how the method will be applied in this paper, as well as the data to be employed and how the data will be collected.

4.1 Methodology

4.1.1 The Chang et al. (2000) method

Chang et al. (2000) developed the method based on the argument that under rational asset pricing models there is a positive linear relationship between the return dispersion of individual stocks and the return of the market. If market-wide herding exists among investors in the stock market, investors will tend to ignore their own information and analyses and follow the performance of the whole market. In this case, the relationship between the return dispersions and the absolute value of the market return is no longer linearly increasing, but becomes non-linear increasing at decrease rate instead (Chang et al., 2000).

The following procedure will describe the rationale behind the argument. This procedure is based on the original procedure of Chang et al. (2000) with some modification and more detailed explanation.

Chang et al. (2000) considered an equally-weighted market portfolio and started with the conditional version of CAPM (Black, 1972):

\[ E_t(R_i) = R_0 + \beta_i \times E_t(R_m - R_0) \]

In which \( E_t(R_i) \) is the expected return on stock \( i \) at time \( t \), \( R_m \) is the return on the market portfolio and \( R_0 \) is the return on the risk free asset. \( \beta_i \) is the measure the systematic risk of stock \( i \) and is assumed to be constant over time.

Similarly, we have the expected return on the market portfolio

\[ E_t(R_m) = R_0 + E_t(R_m - R_0) \]
The absolute deviation between the expected return on stock $i$ and the expected return on the market portfolio at time $t$ will be:

$$AD_{i,t} = |E_t(R_i) - E_t(R_m)|$$

$$= |R_0 + \beta_i \times E_t(R_m - R_0) - R_0 - E_t(R_m - R_0)|$$

$$= |\beta_i - 1| \times E_t(R_m - R_0)$$

The expected cross-sectional absolute deviation of return (ECSAD) will be determined by taking average of all absolute deviations of N stocks on the portfolio:

$$ECSAD_t = \frac{1}{N} \times \sum_{i=1}^{N} AD_{i,t} = \frac{1}{N} \times \sum_{i=1}^{N} |\beta_i - 1| \times E_t(R_m - R_0)$$

Take the first and second level derivative of ECSAD with respect to $E_t(R_m)$ we have:

$$\frac{\partial (ECSAD_t)}{\partial (E_t(R_m))} = \frac{1}{N} \times \sum_{i=1}^{N} |\beta_i - 1| = k = constant > 0$$

$$\frac{\partial^2 (ECSAD_t)}{\partial (E_t(R_m)^2)} = 0$$

As the first derivative is a positive constant given that the $\beta_i$ is time-invariant, so if all investors are fully rational and follow the rational pricing model to analyze and make investment decisions, the expected CSAD will be linearly related to the expected return on the market $E(R_m)$. More importantly, there will be no non-linear relationship between ECASD and $E(R_m)$ as the second derivative is equal to zero. Specifically, for any 1 unit increased in the magnitude of the market return, the dispersion of returns, which measured by CSAD, will increase by a proportional amount ($k$ units).

Consider a simple example in which risk free rate equal to zero. When the market index goes up by 20%, the price of stock X with beta of 0.5 goes up by 10% and the price of stock Y with beta of 2 goes up by 40%. If investors are rational, they will conduct analyses regarding the beta and expected returns of stock X and stock Y using rational pricing model and realize that the returns on stock X and stock Y are indeed equal to the expected returns on these stocks ($R_X = E(R_X) = 10\%$ and $R_Y = E(R_Y) = 40\%$). Thus they will find no “cheap” or “expensive” stocks to trade.
However, if investors herd around the market consensus, or market wide herding exists, they will make investment decisions following the market consensus instead of their own analysis. They will disregard the information and analyses on the expected returns of stock X and stock Y. They will not care about the rational expected returns anymore but simply compare the returns of stock X and stock Y to the return of the market consensus. Since stock X appears to be relatively cheap compared to the market as its price increases less than the market index, these herding investors will tend to buy the stock X and cause the price of stock X to increase, thus increase the return on stock X toward the market return. For stock Y, as it appear to be more expensive compared to the market, herding investors will sell it and cause its price to decrease, thus lower the return on stock Y toward the market return (Hwang and Salmon, 2004).

This behaviour will cause the returns of individual stocks to converge toward the market return, leading to the decrease in the corresponding return dispersion. In this case, for any 1 unit increased in the magnitude of the market return, the dispersion of returns will increase by less than the normal proportional amount (\(k'\) units with \(k' < k\)). Furthermore, the larger the price movements in the market, which is reflected by the larger magnitude of \(E(R_m)\), the more likely the investors will herd and suppress their own beliefs to follow the market consensus. Thus, the larger magnitude of \(E(R_m)\), the lower the \(k'\) and the larger the difference between \(k'\) and \(k\), indicating a increasing at decreasing rate relationship (quadratic relationship) between ECSAD and \(E(R_m)\).

Figure 2  
Relationship between ECSAD and \(E(R_m)\)
Based on above argument, Chang et al. (2000) used the realized CSAD and $R_m$ as the proxies for ECSAD and $E(R_m)$ and used the following model specification to detect herding behaviour:

$$CSAD_t = \beta_0 + \beta_1 |R_{m,t}| + \beta_2 (R_{m,t})^2 + \epsilon_t$$  \hspace{1cm} (1)

$CSAD_t$ is the cross-sectional absolute deviation of stock returns, which measures the dispersion of stock returns, and is calculated using the following formula:

$$CSAD_t = \frac{1}{N} \sum_{i=1}^{N} |R_{i,t} - R_{m,t}|$$  \hspace{1cm} (2)

In formula (1) and (2) above, $R_{i,t}$ is the return on stock $i$ for period $t$ and $R_{m,t}$ is the equally-weighted average of returns of $N$ stocks in the sample portfolio for period $t$. Chang et al. (2000) emphasized that the prevalence of herding is not measured by CSAD, but instead by the relationship between CSAD and $R_m$, which is represented by the magnitude and sign of $\beta_2$.

Based on the model specification (1), Chang et al. (2000) suggested that if herding behaviour does not exist in the market, a significant positive value of $\beta_1$ and an insignificant value of $\beta_2$ will be expected, reflecting the positive linear relationship between dispersion of stock returns and the market return. On the other hand, a significant negative value of $\beta_2$ will indicate increasing at decrease rate relationship between stock return dispersion and market return, thus indicating the presence of herding behaviour in the market. The larger the magnitude of $\beta_2$, the higher the prevalence of herding behaviour in the market.

### 4.1.2 Detection of Herding in Vietnamese stock market

This paper will deploy the CCK method with some modifications in order to examine the herding behaviour in the context of Vietnamese stock market. Chang et al. (2000) employed an equally-weighted CASD as proxy for the return dispersion on the market. However, McQueen, Pinegar, and Thorley (1996) suggested that the stocks with small capitalization tend to react more slowly to news compared to stocks with large capitalization and this slow response may lead to extra return dispersion, especially in up markets. Given the context of Vietnamese stock market where the majority of stocks are ones with medium and small capitalization, the equally-weighted CSAD might be
driven by the return dispersion of these stocks and hence might not reflect correctly the return dispersion in this market; thus the result of the examination on herding behaviour may be affected. As the result, in addition to the CCK’s equally-weighted versions of CSAD which is calculated by equation (2), this paper will also employ the market capitalization weighted versions of CSAD and the regression results using both versions of CSAD will be reported. The market capitalization weighted CSAD is calculated using the following formula:

\[ CSAD_t = \sum_{i=1}^{N} w_{i,t} |R_{i,t} - R_{m,t}| \]  

In which \( w_{i,t} \) is the weight of stock \( i \) in sample portfolio at time \( t \) and is calculated by taking the market capitalization of stock \( i \) at time \( t \) divided by the total capitalization of all stock in the sample at time \( t \). \( N \) is the number of available stocks in the sample portfolio at time \( t \). In this paper, \( R_{m,t} \) – the market return – will be proxied by the return on the VN-index (the market value-weighted index of Vietnamese stock market) and will be calculated using the following logarithmic return formula:

\[ R_{m,t} = 100 \times \ln \left( \frac{P_{m,t}}{P_{m,t-1}} \right) \]

In which \( R_{m,t} \) is the continuously compounded return on the market index on day \( t \), \( P_{m,t} \) and \( P_{m,t-1} \) are the VN-index quotes on day \( t \) and day \( t-1 \).

Similarly, \( R_{i,t} \) - the returns on individual stock \( i \) at time \( t \) – will be calculated using the following formula:

\[ R_{i,t} = 100 \times \ln \left( \frac{P_{i,t}}{P_{i,t-1}} \right) \]

In which \( R_{i,t} \) is the continuously compounded return on stock of company \( i \) on day \( t \), \( P_{i,t} \) and \( P_{i,t-1} \) are the closing stock prices of company \( i \) on day \( t \) and day \( t-1 \).

The equation (1) will be firstly estimated with the CSADs calculated from equations (2) and (3) using the data from beginning of 2008 to the end of 2017 in order to detect the herding behaviour in Vietnamese market for the whole period. Then, the whole period will be divided into three sub periods: 1/1/2008 - 31/12/2008; 1/1/2009 - 31/12/2015; 1/1/2016 – 31/12/2017. These three sub periods are corresponding to 3 main periods of
Vietnamese stock market from 2008 to 2017: the “bearish” period, the fluctuation period and the “bullish” period, respectively. Then the equation (1) will be estimated for each period in order to examine the presence of herding behaviour in each period separately.

All the regressions in this paper are conducted using Ordinary Least Square (OLS) method. As high frequency time series financial data such as daily CSAD or daily market return $R_m$ tends to have autocorrelation and heteroskedasticity, the standard errors of coefficients estimated by original OLS method might be wrongly calculated. Thus, in this all the models will be estimated using the Newey and West (1987) robust standard errors in order to address the potential autocorrelation and heteroskedasticity problems which may adversely affect the standard errors and in turn the inference of coefficients.

### 4.1.3 Herding under market conditions

Similar to the previous part, in order to examine the asymmetry of herding behaviour under different market conditions, both the equally-weighted versions and market value-weighted versions of CASD and $R_m$ will be used. The regression results using both versions will be reported and compared.

#### 4.1.3.1 Herding under market up and down

Herding is considered to be asymmetric under up and down market movements since the investors react differently toward different directions of market returns (Christie and Huang, 1995; Chang et al., 2000). For instance, when the market goes up and the investor makes the wrong decision, he will lose the gain that he should be able to get; and in contrast, when the market goes down and the investor makes the wrong decision, he will suffer the loss that he should be able to avoid. Since people usually weight the pain from an amount of loss much larger than the joy from the same amount of gain (Kahneman and Tversky, 1982), investor’s anxiety and fear of being regretful after making wrong decisions will be much larger under market declining conditions than under market rising conditions. Furthermore, when an investor make a wrong decision, he will feel less regretful and disappointed if other investors make the similar bad decisions (Nofsinger, 2008). Therefore, following the crowd may be a way to alleviate regret and disappointment, especially under down market with high chance of getting loss. As the result, the regret-averse investor may have more tendency herd when the market goes down, as they may feel more secured when doing so.
On the other hand, according to the concerns for relative wealth and the "keeping up with the Joneses" preference mentioned above, in cases of price bubbles, during the upside of the bubbles in which the price increases steadily, investors will have more intention to herd and follow the decisions of others investors in order to maintain their relative wealth. As investors have different reasons to herd under each of the directions of market movements, the extent of herding behaviour may be different under market rising days and declining days, being more pronounced in the former than in the latter.

Instead of estimating two separate models corresponding to the rising day and declining day as in Chang et al. (2000) and Tan et al. (2008), this paper follows the approach of Chiang and Zheng (2010), which utilizes the indicator variable into one single model. In order to examine the herding behaviour in Vietnamese stock market under market rising day and declining day, the following model specification will be employed:

\[
CSAD_t = \beta_0 + \beta_1 D_t^U |R_{m,t}| + \beta_2 (1 - D_t^U) |R_{m,t}| + \beta_3 D_t^U (R_{m,t})^2 + \beta_4 (1 - D_t^U)(R_{m,t})^2 + \epsilon_t
\]  

(4)

In which, \(D_t^U\) is the indicator variable which takes the value of 1 in market rising day \((R_{m,t} > 0)\) and takes the value of 0 in market declining day \((R_{m,t} < 0)\). Significant and negative \(\beta_3\) and \(\beta_4\) will indicate the presence of herding in market rising and declining day, respectively. Furthermore, \(\beta_3\) and \(\beta_4\) will be compared using Wald test in order to compare the extent of herding behaviour under market up and down day. According to hypothesis H2 above, \(\beta_3\) is expected to be significantly higher than \(\beta_4\) in term of magnitude.

4.1.3.2  Herding under high and low market volatility

Christie and Huang (1995) argued that herding is most likely to occur during under stress market periods, which may be characterized by large unusual market movements and unusual high volatility. High volatility of market returns means high uncertainty for investors when making decisions, thus pushing them to apply herding strategies to avoid being left behind. On the other hand, as mentioned above, herding can, in turn, create excessive volatility in the market. Bikhchandani and Sharma (2000) suggested that, in case investors apply herding strategies to make investment decisions, the decisions that these investors follow may turn out to be incorrect when new information arrives. These investors then will eventually herd on new new information.
and make new decisions. The frequent repetition of this process will cause the prices of the target assets to fluctuate, in turn increase the volatility in the market.

Regarding the high and low intraday volatility of the market, the following model specification will be employed:

\[
CSAD_t = \beta_0 + \beta_1 D_t^{HV} |R_{m,t}| + \beta_2 (1 - D_t^{HV}) |R_{m,t}| + \beta_3 D_t^{HV} (R_{m,t})^2 + \beta_4 (1 - D_t^{HV}) (R_{m,t})^2 + \epsilon_t
\]  

(5)

In the model (5), \(D_t^{HV}\) is the indicator variable which takes the value of 1 in the day with high market volatility and 0 otherwise. There are several possible measures for intraday volatility of the market on day \(t\) such as the squared value of return on the market on day \(t\) \(\left( \left| R_{m,t} \right|^2 \right)\) will be used to measure the intraday volatility on day \(t\). Following the classification used by Tan et al. (2008) and Economou et al. (2011), if the intraday volatility on day \(t\) is higher than the average of volatilities on previous 30 days, day \(t\) will be classified as high volatility day. Similar to the previous part, \(\beta_3\) and \(\beta_4\) will be compared using Wald test in order to compare the extent of herding behaviour between high volatility days and the rest. According to hypothesis H3 stated in the previous section, \(\beta_3\) is expected to be significant and also larger than \(\beta_4\) in term of magnitude.

4.1.3.3 Herding under high and low market trading volume

Chordia et al. (2008) suggested that market liquidity, which is reflected by trading volume and turnover, has relationship with the flows and efficiency of information in the market. Higher trading volume means more trading activities made by investors, revealing more about the private information that these investors may possess, which can in turn facilitate the observation and imitation of other investors who employ herding strategies. On the other hand, other studies such as Baker and Wurgler (2006) claimed that investors’ irrationalities, such as herding behaviour, can in turn create abnormal trading volume. When investors herding toward particular stocks, they may conduct massive trading activities regarding these stock, thus creating unusual high trading volume.

As the prevalence of herding behaviour may be related to the market trading volume, this paper will employ the following model specification in order to examine any possible asymmetry of herding under high and low trading volume:
\[ CSAD_t = \beta_0 + \beta_1 D_t^{HT} \mid R_{m,t} \mid + \beta_2 (1 - D_t^{HT}) \mid R_{m,t} \mid + \beta_3 D_t^{HT} (R_{m,t})^2 + \beta_4 (1 - D_t^{HT}) (R_{m,t})^2 + \epsilon_t \] 

(6)

In which $D_t^{HT}$ is the indicator variable which takes the value of 1 in high trading volume day and 0 otherwise. The market turnover ratio on day $t$, which is calculated by taking the total volume traded of all stocks in the market on day $t$ divided by the total share outstanding of all stocks on day $t$, will be used to measure the relative level of trading volume in day $t$. If the market turnover ratio on day $t$ is higher than the average of market turnover ratios on previous 30 days, which indicates that the trading volume in day $t$ is relatively higher than the average of previous 30 days, day $t$ will be classified as high trading day. Again, $\beta_3$ and $\beta_4$ will be compared using Wald test in order to compare the prevalence of herding behaviour between high and low trading days. According to hypothesis H4 stated above, $\beta_3$ is expected to be significant and also its magnitude is larger than that of $\beta_4$.

### 4.1.4 Herding behaviour towards stock’s characteristics

Besides examining the presence of herd behaviour in the stock market and the asymmetry effects of herding under different market conditions, this paper also focuses on investigating whether investors in Vietnamese stock market tend to herd around the market when they face investment decision towards stocks of firms with certain characteristics. This paper will focus on some most classic characteristics, such as the size of the firm, the P/B ratio which reflects the sentiment of investors on the firm’s prospect, and the volatility of firm’s stock. In order to do so, this paper will employ the method as follow:

For each day $t$ from 1/1/2008 to 31/12/2017, all stocks available on day $t$ are ranked and divided into two groups with equal number of stocks in each group based on size. The moving average of stock’s market capitalizations in 30 continuous days, including day $t$, will be used as proxy for firm’s size. This process will yield two groups of stocks for each day $t$: High capitalization (HC) and low capitalization (LC).

Similar process will be conducted regarding P/B ratio. For each day, all available stocks are ranked and divided into two groups based on the moving average of their P/B ratios in previous 30 days, including day $t$, with equal number of stocks in each group. The
process will yield different set of stock groups for each day $t$: High ratio (HR) and low ratio (LR).

Finally, regarding volatility of individual stock, for each day $t$, the volatility of stock $i$ will be measured by the standard deviation of returns of stock $i$ during 30 days prior to day $t$, day $t$ included. All available stocks in each day are ranked and divided into another two equal groups based on their volatility. The process will yield two stock groups: High volatility (HV) and low volatility (LV).

Through the three procedures above, 8 different portfolios will be constructed from the intersection of two size groups, two price-to-book value groups and two volatility groups. For example, the portfolio (L/H/H) will consist of stocks that have small size (low market capitalization), high price-to-book ratio and high stock volatility. The list of portfolio and characteristics of each portfolio is presented in the appendix A1. Each portfolio consists of stocks that have certain size, P/B and volatility characteristics. The procedure of re-ranking and re-establishing portfolios will be conducted on daily basis, from 1/1/2008 to 31/12/2017. As the numbers of stocks in the sample are only 89 stocks so if the sample is divided into more than 2x2x2 portfolios (for example 3x3x3), the process may result in only 1 stock in each portfolios at some periods. Thus, only 8 portfolios will be formed in this paper.

In this part of the study, as the effects of stocks’ size are accounted by separate portfolios, only the equally-weighted versions of CSAD will be employed. Therefore, after forming these portfolios, the equation (2) will be used to calculate the CASD at time $t$ of and the model specification (1) will be used to examine the herding behaviour in each portfolio separately.

The values of coefficient $\beta_2$ in these 8 regressions will be stored and compared to each other. As the higher magnitude of negative $\beta_2$ will indicate stronger level of herding, by comparing the magnitude of $\beta_2$ coefficients in these regressions, the prevalence of herding behaviour towards each portfolio of stocks will be compared. In turn, the tendency of Vietnamese investors to herd towards different characteristics of firm such as size, P/B ratio, and stock volatility will be examined. Furthermore, by constructing 8 portfolios based on all three characteristics, each characteristic can be examined separately while controlling the other two. For example, in order to examine the tendency of investors to herd towards high volatility and high P/B stocks with different sizes, the $\beta_2$ coefficient of portfolio (H/H/H) will be compared the coefficient of
portfolios (L/H/H). Given that both the portfolios consists of stocks with high P/B and high volatility, the prevalence of herding behaviour towards size factors can be examined separately.

4.2 Data

As mentioned in the previous section, Ho Chi Minh stock exchange is the main stock exchange in Vietnam and accounts for more than 95% of total market capitalization of two stock exchanges. Thus, this stock exchange can be considered representative for the Vietnamese stock market and this paper will be conducted using the data of listed companies on Ho Chi Minh stock exchange only.

The initial sample of this study consists of all listed companies on Ho Chi Minh stock exchange from 2008 to 2017. The reason to choose this particular period is that this period covers different phases of the market, including “bearish”, “fluctuation” and “bullish” periods. For each stock, all financial data including stock price indexes, market capitalization, and P/B ratio is collected on daily basis. There are several particular stocks whose historical financial data are not available; these stocks will be excluded from the sample. Finally, all the non-trading days will also be excluded.

Noticeably, there are many IPOs during the sample period as well as many companies going delisted from the market. These new IPO stocks tend to experience some anomalies such as long-run underperformance and these anomalies can last for around 3 years (Ritter, 1991; Schultz, 2003). These phenomena can bring down the returns and in turn affect the result of examining the herding behaviour. On the other hand, companies going delisted also experience abnormal returns, especially on the delisting announcement day and during the pre-delisting period (Sanger and Peterson, 1990). Thus, the delisting of these stocks may affect the return dispersion of stocks on the market and in turn the examination results of herding behaviour. As the result, in this paper all new IPOs stocks and delisted stocks will be excluded from the sample, leaving only the stocks that have complete data for the spanning time 2008-2017 to be included. This process may lead to survivorship bias as many stocks will be excluded, however the effect of herding behaviour on stocks return and dispersion can be separated from the anomalies related to new IPO stocks and delisting stocks. Thus, this will provide better results given the main purpose of the study being examining herding behaviour in Vietnamese stock market.
After performing these collecting and filtering processes, our final sample consists of 2490 daily observations constructed from data of 89 stocks, which have complete data for the spanning 2008-2017. Furthermore, for the purpose of examining the herding behaviour in different stages of Vietnamese market, the whole sample period will be divided into three sub-sample periods: 1/1/2008 – 31/12/2008, 1/1/2009 – 31/12/2015, 1/1/2016 – 31/12/2017.

The historical data on stock prices are obtained from Datastream. Other financial data, such as market capitalization, which is used as proxy for size of company, or Price-to-book value, are also obtained from Datastream database. The historical data regarding the market conditions are retrieved from Thompson Reuter Eikon. These data include the historical prices, the intraday high and low price, and the intraday trading turnover, both by volume and value, of VN-index.

As several variables will require historical data of previous 30 days to be calculated, all raw data will be indeed collected from 11/2007 – 01/2018 in order to ensure the calculation of all variables for the whole studied period 1/1/2008 – 31/12/2017.
5 RESULT AND DISCUSSION

5.1 Descriptives of data

The table (1) shows the data descriptive statistics for both equally-weighted version and market value-weighted version of CSAD. The statistics include mean, maximum, minimum, median and standard deviation values, as well as the skewness, kurtosis and Jacqure-Bera test for the normality of the CSAD series. The statistics for the whole sample period and 3 sub periods are reported separately and the graphical illustrations of both series are shown in the appendixes A2.

Table 1: Descriptive statistics for Cross-sectional Absolute Deviation

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009-2015</th>
<th>2016-2017</th>
<th>Whole sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EW-CSAD</td>
<td>VW-CSAD</td>
<td>EW-CSAD</td>
<td>VW-CSAD</td>
</tr>
<tr>
<td>Mean</td>
<td>1.5584</td>
<td>1.3952</td>
<td>1.8183</td>
<td>1.3168</td>
</tr>
<tr>
<td>Median</td>
<td>1.5833</td>
<td>1.376</td>
<td>1.7786</td>
<td>1.2223</td>
</tr>
<tr>
<td>Min</td>
<td>0.1625</td>
<td>0.1485</td>
<td>0.1731</td>
<td>0.1506</td>
</tr>
<tr>
<td>Stdev</td>
<td>0.8746</td>
<td>0.8438</td>
<td>0.397</td>
<td>0.5288</td>
</tr>
<tr>
<td>JB stat</td>
<td>6.39</td>
<td>9.60</td>
<td>443.16</td>
<td>284.65</td>
</tr>
<tr>
<td>Probability</td>
<td>0.0410</td>
<td>0.0083</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Obs.</td>
<td>245</td>
<td>1744</td>
<td>501</td>
<td>2490</td>
</tr>
</tbody>
</table>

There are 245 observations in the “bearish” period - the year 2008, 1744 observations in the “fluctuating” period – from 2009 to 2015, and 501 observations in the “bullish” period – 2016-2017. Totally, the whole sample consists of 2490 daily observations from the beginning of 2008 to the end of 2017.

The equally-weighted CSAD (EW-CSAD) series of “bearish” period 2008 has the lowest mean value (1.55%), indicating that during this period the dispersion of returns of individual stocks from the returns on the market, on average, is lower compare to other period. However, this “bearish” period has largest range of fluctuation (0.16% - 4.01%)
and has highest standard deviation (0.87%) among the three sub periods, showing that the levels of return dispersion fluctuate much more strongly in this period than in other two. The period 2009-2015 and the year 2016 have quite similar mean values of EW-CSAD, with the values being 1.81% and 1.74%, respectively. The series of “bullish” period 2016-2017 has the smallest range of fluctuation (1.05% - 2.92%) and also the smallest standard deviation. The EW-CSAD series of the whole sample period has the mean value of 1.77% with the standard deviation of 0.45%.

Comparing the two version of CSAD, during the “bearish” period, there are indeed differences between the statistics of equally-weighted CSAD (EW-CSAD) and market value-weighted CSAD (VW-CSAD), however these differences are not much. The VW-CSAD ranges slightly more narrowly than the EW-CSAD, from 0.14% to 3.72%, with slightly lower mean of 1.39% and standard deviation of 0.84%. These small differences indicate that there is not much effect of stock size on the level of return dispersion. The underlying reason might be that there is not much difference between sizes of stocks listed on the market during this period. In contrast, there are large differences between the statistics of EW-CSAD and VW-CSAD in the other two sub periods and the whole sample series. During the “fluctuating” period 2009-2015, the mean value of EW-CSAD is much lower while the standard deviation of this series is higher compared to VW-CSAD. During the “bullish” period 2016-2017, the VW-CSAD series has lower mean, lower maximum and minimum values than the EW-CSAD series. However, the standard deviation of VW-CSAD in this period is much higher, being 0.45% compared to 0.28% of EW-CSAD. For the whole sample period, the VW-CSAD series has the lower mean value (1.27%) but fluctuates in larger range (0.14% - 3.92%) and has higher standard deviation (0.56%).

In general, the values of VW-CSAD tend to be smaller compared to the EW-CSAD. This agrees with the suggestions of McQueen, Pinegar, and Thorley (1996) that as the slow response of small stocks to good news may lead to extra dispersion and as the EW-CSAD might overweight the effects of small stocks, the level of return dispersion measured by EW-CSAD will be higher than the dispersion measured by VW-CSAD.

Regarding the Jacque-Bera test for normality distribution of the series, the test statistics are significant at 1% for all series except the EW-CSAD of the year 2008, which is significant at 5%. The results indicate that these series are not normally distributed. However, according to the central limit theorem, as the sample has already
consisted of large number of observations (over two thousands), the adverse effects of non-normality will be not serious.

Table 2: Descriptive Statistics for Market Return

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009-2015</th>
<th>2016-2017</th>
<th>Whole sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-0.4398</td>
<td>0.0348</td>
<td>0.1059</td>
<td>0.0024</td>
</tr>
<tr>
<td>Median</td>
<td>-0.5979</td>
<td>0.0597</td>
<td>0.1512</td>
<td>0.0648</td>
</tr>
<tr>
<td>Max</td>
<td>4.6421</td>
<td>4.6468</td>
<td>3.7784</td>
<td>4.6468</td>
</tr>
<tr>
<td>Min</td>
<td>-4.8019</td>
<td>-6.0512</td>
<td>-3.1179</td>
<td>-6.0512</td>
</tr>
<tr>
<td>Stdev</td>
<td>2.3406</td>
<td>1.3852</td>
<td>0.7629</td>
<td>1.4212</td>
</tr>
</tbody>
</table>

|                |         |           |           |              |
| JB stat        | 5.1316  | 155.0101  | 75.9439   | 306.0176     |
| Probability    | 0.0769  | 0.0000    | 0.0000    | 0.0000       |

| Obs.           | 245     | 1744      | 501       | 2490         |

The table (2) shows the descriptive statistics for the market return $R_m$. The average market return during the first period, the year 2008, is -0.44%, clearly indicating that this is a “bearish” period. This period also has the highest standard deviation of market return (2.34%) among the three sub periods, suggesting that the market return fluctuates strongly in this period. The market return in the second period 2009-2015 has quite small average values, only 0.034%, but has the largest range of fluctuation (-6.05% - 4.65%). The last period 2016-2017 has the highest average level of market returns. This period also has smallest range of fluctuation and lowest standard deviation. Considering the whole sample period, the average market return is slightly higher than zero, at 0.0024%, with the standard deviation of 1.42%.

Similar to the CSAD series, all the $R_m$ series are not normally distributed as all the Jacque-Bera test results for all series are significant at 1% level except the series of the year 2008 of which the test results being significant at only 10%. However, the adverse effects of non-normality are expected to be not serious as there are large numbers of observations in each series.
Regarding the formation of portfolios and the CSAD of these portfolios, the table (3) below shows the descriptive statistics for these series as well as the average number of stocks in each portfolio throughout the sample period:

**Table 3: Descriptive statistics for CSADs of portfolio**

<table>
<thead>
<tr>
<th></th>
<th>HHH</th>
<th>HHL</th>
<th>HLH</th>
<th>HLL</th>
<th>LHH</th>
<th>LHL</th>
<th>LLH</th>
<th>LLL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.0194</td>
<td>0.0137</td>
<td>0.0197</td>
<td>0.0144</td>
<td>0.0222</td>
<td>0.0158</td>
<td>0.0215</td>
<td>0.0159</td>
</tr>
<tr>
<td>Median</td>
<td>0.0194</td>
<td>0.0132</td>
<td>0.0188</td>
<td>0.0132</td>
<td>0.0217</td>
<td>0.0148</td>
<td>0.0214</td>
<td>0.0154</td>
</tr>
<tr>
<td>Max</td>
<td>0.0565</td>
<td>0.0410</td>
<td>0.0842</td>
<td>0.0828</td>
<td>0.0615</td>
<td>0.0616</td>
<td>0.0574</td>
<td>0.0556</td>
</tr>
<tr>
<td>Min</td>
<td>0.0007</td>
<td>0.0010</td>
<td>0.0005</td>
<td>0.0001</td>
<td>0.0005</td>
<td>0.0002</td>
<td>0.0013</td>
<td>0.0011</td>
</tr>
<tr>
<td>Stdev</td>
<td>0.0069</td>
<td>0.0050</td>
<td>0.0090</td>
<td>0.0076</td>
<td>0.0090</td>
<td>0.0082</td>
<td>0.0065</td>
<td>0.0062</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>JB stat</th>
<th></th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>96.46</td>
<td>751.20</td>
<td>542.70</td>
<td>5060.70</td>
<td>108.37</td>
<td>766.82</td>
<td>266.50</td>
<td>688.66</td>
</tr>
<tr>
<td>Probability</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

| Average number of stocks in portfolio | 12.73 | 20.00 | 6.05 | 6.20 | 7.17 | 5.10 | 19.04 | 12.68 |

Among 8 portfolios, the portfolio L/H/H has the highest mean value of CSAD, indicating that the stocks with low market capitalization, high P/B ratio and high volatility tend to have highest return dispersion from return on the market index. In contrast, the portfolio H/H/L has the lowest mean value of CSAD, indicating that stocks with high market capitalization, high P/B ratio and low volatility tend to have lowest return dispersion from market return on average.

The Jacque-Bera test results show that CSAD series of all portfolios are not normally distributed. But the adverse effect will not be serious thank to the large number of observations in the sample.

Finally, among 8 portfolios, the portfolios H/H/L and L/L/H have the largest average numbers of stocks throughout the sample period, with the figures being 20.00 and 19.04, respectively. On the other hand, the lowest average number of stocks belongs to the portfolio L/H/L, with only 5.10 stocks, on averages, in this portfolio.
5.2 Detection of herding

To begin with, the existence of market wide herding behavior in Vietnamese stock market will be investigated by estimating equation (1) using both equally-weighted CSAD (EWCSAD) and market value-weighted CSAD (VWCSAD). Each sub-period and the whole period 2008-2017 are estimated separately. The estimation results are shown in the table 4a and 4b below:

We can that for the whole sample period, the coefficients $\beta_2$ in the tables 4a and 4b are both negative and highly significant, showing that herding behaviour did exist in Vietnamese stock market during the period 2008-2017. This result confirms the findings of previous researches regarding herding behaviours in Vietnamese stock market (Vo and Phan, 2016and2017; Bui et al., 2016; etc.) and agrees with the claims of Kremer and Nautz (2013) that the presence of herding is correlated to information non-transparency and imperfect regulatory frameworks, which are popular in frontier and emerging market like Vietnam.

Noticeably, the magnitude of the coefficient $\beta_2$ estimated using VW CSAD is indeed larger than the magnitude of the coefficient estimated using EW CSAD, indicating that the detected prevalence of herding behaviour tend to be smaller when using EW CSAD. This provide evidence for the idea that using equally-weighted cross-sectional absolute deviation as the proxy for the dispersion may exaggerate the real dispersion, thus may understate the prevalence of herding in the market.
Table 4a: Regression results using EW CSAD

The table reports the regression results of the equation:

\[ EWCSAD_t = \beta_0 + \beta_1 |R_{m,t}| + \beta_2 (R_{m,t})^2 + \epsilon_t \]

In which \( EWCSAD_t \) is the equally-weighted cross-sectional absolute deviation on day \( t \), \( R_{m,t} \) is the market return on day \( t \).

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009-2015</th>
<th>2016-2017</th>
<th>Whole sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta_0 )</td>
<td>1.8800</td>
<td>1.5895</td>
<td>1.5313</td>
<td>1.5808</td>
</tr>
<tr>
<td></td>
<td>(0.000)***</td>
<td>(0.000)***</td>
<td>(0.000)***</td>
<td>(0.000)***</td>
</tr>
<tr>
<td>( \beta_1 )</td>
<td>-0.0949</td>
<td>0.4127</td>
<td>0.3341</td>
<td>0.4049</td>
</tr>
<tr>
<td></td>
<td>(0.665)</td>
<td>(0.000)***</td>
<td>(0.000)***</td>
<td>(0.000)***</td>
</tr>
<tr>
<td>( \beta_2 )</td>
<td>-0.0224</td>
<td>-0.1005</td>
<td>0.0196</td>
<td>-0.1094</td>
</tr>
<tr>
<td></td>
<td>(0.587)</td>
<td>(0.000)***</td>
<td>(0.224)</td>
<td>(0.000)***</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.0973</td>
<td>0.1274</td>
<td>0.4357</td>
<td>0.1072</td>
</tr>
</tbody>
</table>

***: Significant at 1% level; **: significant at 5% level; *: significant at 10% level

Table 4b: Regression results using VW CSAD

The table reports the regression results of the equation:

\[ VWCSAD_t = \beta_0 + \beta_1 |R_{m,t}| + \beta_2 (R_{m,t})^2 + \epsilon_t \]

In which \( VWCSAD_t \) is the market value-weighted cross-sectional absolute deviation on day \( t \), \( R_{m,t} \) is the market return on day \( t \).

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009-2015</th>
<th>2016-2017</th>
<th>Whole sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta_0 )</td>
<td>1.8015</td>
<td>1.0048</td>
<td>0.9438</td>
<td>0.9894</td>
</tr>
<tr>
<td></td>
<td>(0.000)***</td>
<td>(0.000)***</td>
<td>(0.000)***</td>
<td>(0.000)***</td>
</tr>
<tr>
<td>( \beta_1 )</td>
<td>-0.1761</td>
<td>0.5076</td>
<td>0.2270</td>
<td>0.5060</td>
</tr>
<tr>
<td></td>
<td>(0.381)</td>
<td>(0.000)***</td>
<td>(0.013)**</td>
<td>(0.000)***</td>
</tr>
<tr>
<td>( \beta_2 )</td>
<td>-0.0099</td>
<td>-0.1077</td>
<td>0.0284</td>
<td>-0.1142</td>
</tr>
<tr>
<td></td>
<td>(0.803)</td>
<td>(0.000)***</td>
<td>(0.386)</td>
<td>(0.000)***</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.0913</td>
<td>0.1241</td>
<td>0.2420</td>
<td>0.0996</td>
</tr>
</tbody>
</table>

***: Significant at 1% level; **: significant at 5% level; *: significant at 10% level
When it comes to three sub-periods, for the period 2008, the coefficients $\beta_2$ estimated using the both EWCSAD and VWCSAD are negative but not significant at any level, indicating that herding behaviour did not exist in Vietnamese stock market during the “bearish” period 2008. These results agree with the previous results of Vo and Phan (2017). However, it is noticeable that even herding behaviour did not exist, the investment behaviours of Vietnamese investors during this period were still not rational. If the investors are rational, a linear relationship between return dispersion and the absolute value of the market return is expected. From the results we can see that as both $\beta_1$ and $\beta_2$ coefficients are not significant at any level, thus indicating that there is no linear relationship. Therefore, we can infer that during this period, Vietnamese investors were indeed irrational when making decisions, however these irrationalities did not include herding. The possible reason for this situation might be the unexpected movements or “shocks” on the market, since Vietnamese stock market nearly collapsed in this period. According to Hwang and Salmon (2004), when there are sudden unexpected shocks on the market, investors may find it impossible to forecast the direction of the market, even with private information. In this situation, they could assume that no one else can forecast the market movements and possess better information. Thus, investors might returns back towards using their own belief and information, even these ones are imperfect and biased due to the limited information disclosure in the market at that time. As the results, Vietnamese investors in this period did not herd around the market consensus but instead experienced other irrationalities such as overconfidence and cognitive biases, which are incorporated in their imperfect information and analyses.

For the period 2009-2015, the coefficients $\beta_2$ estimated by using both EW CSAD and VW CSAD are negative and highly significant, while the coefficients $\beta_1$ are significantly positive. These results indeed indicate an increasing at decreasing rate relationship between the dispersion of return and the market return. Thus, we can infer that during this period, market wide herding behaviours did prevail in Vietnamese stock market. These results are matched with the expectation on herding behaviour in this market. Vietnamese stock market during this period is a frontier market characterized by frequent fluctuation without sudden shock, limitations of regulatory framework and frequent intervention of government, which result in the non-transparency problems in the market. These non-transparency problems, incorporated by the risks and volatility after the meltdown of the market during 2008, may cause risk- and regret-averse
investors to suppress their own information and analyses and make decisions following the performance of the market, leading to the prevalence of herding behaviours.

For the period 2016-2017, interestingly, the coefficients $\beta_2$ in both tables are not significant at any level while. These results indicate that market wide herding behaviours no longer exist among Vietnamese investors during the period 2016-2017. Furthermore, in this period, the $\beta_1$ estimated by EW CSAD is significant at 1% level and the one estimated by VW CSAD is significant at 5% level. From these results we can infer that investors seem to be more rational when making investment decisions as there exist a linear relationship between return dispersion and the market return. The possible explanation for this vanishing of market wide herding might be the issuance of new rules and regulations by Vietnamese government regarding the information disclosure of listed companies as well as the operation of the stock market. These regulations contributed to reduce the information asymmetry in the market. Since information asymmetry is one of the cause of herdin g behaviour, the reduction of this asymmetry will lead to the disappearance of herding behaviour.

In general, herding behaviour did exist in Vietnamese stock market during the "fluctuation" period 2009-2015, whereas there is no evidence of herding behaviour during the "bearish" period 2008 and "bullish" period 2016-2017. Noticeably, employing market value-weighted cross-sectional absolute deviation as proxy for return dispersion indeed leads to more prevalent results on the presence of herdings behaviours.

5.3 Herding under market conditions

5.3.1 Herding under up and down market

Table 5 below reports the estimation results of equation (4), which investigates the asymmetry effect of herding behaviour during market rising and declining days, using both EWCSAD and VWCSAD. From the regression results we can see that both $\beta_3$ (capturing herding prevalence during market rising days) and $\beta_4$ (capturing herding prevalence during market declining days) coefficients are highly significant at 1% level, in both cases using EW CSAD and VW CSAD. These results indicate that herding behaviour exist in Vietnamese stock market in both up market days and down market days.
Table 5: Herding under up and down market

The table reports the regression results of the equation:

\[
CSAD_t = \beta_0 + \beta_1 D^+ |R_{m,t}| + \beta_2 (1 - D^+) |R_{m,t}| + \beta_3 D^+ (R_{m,t})^2 + \beta_4 (1 - D^+) (R_{m,t})^2 + \epsilon_t
\]

In which \(CSAD_t\) in turn is equally-weighted (EWCSAD) and market value-weighted cross-sectional absolute deviation (VWCSAD) on day \(t\), \(R_{m,t}\) is the return on the market index and \(D^+\) is the dummy variable that takes the value of 1 when \(R_{m,t} \geq 0\) and zero otherwise.

The Wald statistics show the test statistics for the Wald coefficient test with null hypothesis:

\[ H_0: \beta_3 - \beta_4 = 0 \]

<table>
<thead>
<tr>
<th>( \beta )</th>
<th>EW</th>
<th>VW</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta_0 )</td>
<td>1.677423</td>
<td>1.094718</td>
</tr>
<tr>
<td>(0.0000)***</td>
<td>(0.0000)***</td>
<td></td>
</tr>
<tr>
<td>( \beta_1 )</td>
<td>0.312694</td>
<td>0.575249</td>
</tr>
<tr>
<td>(0.0000)***</td>
<td>(0.0000)***</td>
<td></td>
</tr>
<tr>
<td>( \beta_2 )</td>
<td>0.285642</td>
<td>0.466342</td>
</tr>
<tr>
<td>(0.0005)***</td>
<td>(0.0000)***</td>
<td></td>
</tr>
<tr>
<td>( \beta_3 )</td>
<td>-0.106172</td>
<td>-0.146453</td>
</tr>
<tr>
<td>(0.0000)***</td>
<td>(0.0000)***</td>
<td></td>
</tr>
<tr>
<td>( \beta_4 )</td>
<td>-0.073724</td>
<td>-0.099921</td>
</tr>
<tr>
<td>(0.0005)***</td>
<td>(0.0000)***</td>
<td></td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.07407</td>
<td>0.102702</td>
</tr>
<tr>
<td>Wald stat.</td>
<td>-1.793426</td>
<td>-3.104233</td>
</tr>
<tr>
<td>(0.0729)*</td>
<td>(0.0019)***</td>
<td></td>
</tr>
</tbody>
</table>

***: Significant at 1% level; **: significant at 5% level; *: significant at 10% level

Also, the asymmetric effect between herding behaviours in up and down market days will be tested using a Wald test with the null hypothesis: \( H_0: \beta_3 - \beta_4 = 0 \). The test statistics of the Wald tests in cases EW CSAD and VW CSAD are both negatively significant, with the former being significant at 10% level and the latter being significant at 1% level, thus rejecting the null hypothesis on the symmetry of herding behaviours. Furthermore, the differences between the two coefficients \( \beta_3 \) and \( \beta_4 \) are both negative (\( \beta_3 - \beta_4 = -0.032 \) in case of EW CSAD and \( \beta_3 - \beta_4 = -0.047 \) in case of VW CSAD), indicating that the magnitudes of the coefficients \( \beta_3 \) are higher than the magnitudes of the coefficients \( \beta_4 \). Since higher the magnitude of the coefficient, the
more prevalence of herding behaviour, we can infer that herding behaviours in Vietnamese stock market are stronger during the market rising days than during the market declining days. Thus, the hypothesis no 2 will be accepted.

The above findings are contradict to the previous findings of Vo and Phan (2016;2017), which showed that herding behaviour in Vietnamese stock market was more pronounced in declining market. The possible reason for the difference may be the employment of different dataset and measures of dispersion, as Vo and Phan (2017) employed equally-weighted CSAD and did not account for the potential impacts of IPOs and delistings anomalies. However, these above findings are consistent with the findings of Dang and Lin (2016) and other studies conducted on other Asian emerging financial markets such as Tan et al. (2008), Chiang and Zheng (2010), etc., which indicates that herdings in Asian emerging markets tend to be stronger in rising market. As discussed in the literature review section, the reasons for herding during rising market are the concerns for relative wealth and the “keeping up with the Joneses” preference whereas the reasons for herding during declining market are loss- and regret-aversion. Therefore, from the findings we can infer that in Vietnamese stock market, concerns for relative wealth and the “keeping up with the Joneses” preference are stronger drives that cause investors to employ herding strategy when making investment decisions.

5.3.2 Herding under high and low volatility

Table 6 below depicts the estimation results of the equation (5), which investigates the asymmetry effect of herding during market days with high and low intraday volatility, using both EWCSAD and VWCSAD as measures for return dispersion. From the regression results we can see that, in both cases using EW CSAD and VW CSAD, the coefficient $\beta_3$ (capturing herding prevalence during high volatility days) is negative and significant at 1% level, whereas the coefficient $\beta_4$ (capturing herding prevalence during high volatility days) is not significant at any level. The coefficient $\beta_4$ in case using EW CSAD is even positive (+0.021). These results indicate that, in Vietnamese stock market, herding behaviour only exists during days with high intraday volatility, but not exists during days with low intraday volatility.
Table 6: Herding under high and low volatility

The table reports the regression results of the equation:

\[ CSAD_t = \beta_0 + \beta_1 D_{HV}^{\text{t}} |R_{m,t}| + \beta_2 (1 - D_{HV}^{\text{t}}) |R_{m,t}| + \beta_3 D_{HV}^{\text{t}} (R_{m,t})^2 + \beta_4 (1 - D_{HV}^{\text{t}}) (R_{m,t})^2 + \epsilon_t \]

In which \( CSAD_t \) in turn is equally-weighted (EWCSAD) and market value-weighted cross-sectional absolute deviation (VWCSAD) on day \( t \), \( R_{m,t} \) is the return on the market index and \( D_{HV}^{\text{t}} \) is the dummy variable that takes the value of 1 when market volatility is high and zero otherwise.

The Wald statistics show the test statistics for the Wald coefficient test with null hypothesis:

\[ H_0: \beta_2 - \beta_4 = 0 \]

<table>
<thead>
<tr>
<th></th>
<th>EW</th>
<th>VW</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta_0 )</td>
<td>1.713398</td>
<td>1.098955</td>
</tr>
<tr>
<td></td>
<td>(0.0000)**</td>
<td>(0.0000)**</td>
</tr>
<tr>
<td>( \beta_1 )</td>
<td>0.231482</td>
<td>0.437459</td>
</tr>
<tr>
<td></td>
<td>(0.0001)**</td>
<td>(0.0000)**</td>
</tr>
<tr>
<td>( \beta_2 )</td>
<td>0.144091</td>
<td>0.473639</td>
</tr>
<tr>
<td></td>
<td>(0.0815)*</td>
<td>(0.0000)**</td>
</tr>
<tr>
<td>( \beta_3 )</td>
<td>-0.073385</td>
<td>-0.10086</td>
</tr>
<tr>
<td></td>
<td>(0.0000)**</td>
<td>(0.0000)**</td>
</tr>
<tr>
<td>( \beta_4 )</td>
<td>0.02192</td>
<td>-0.038248</td>
</tr>
<tr>
<td></td>
<td>(0.5032)</td>
<td>(0.2642)</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.07921</td>
<td>0.111481</td>
</tr>
<tr>
<td>Wald stat.</td>
<td>-3.031062</td>
<td>-1.932699</td>
</tr>
<tr>
<td></td>
<td>(0.0025)**</td>
<td>(0.0534)*</td>
</tr>
</tbody>
</table>

***: Significant at 1% level; **: significant at 5% level; *: significant at 10% level

Obviously, the above results indicate a clear asymmetry effect of market-wide herding behaviour between high and low volatility market conditions. The test statistics of the Wald test are significantly negative, again confirm this asymmetry effect, though this test result might be redundant since the coefficients \( \beta_4 \) are not significant. This is a new finding regarding the attribution of herding behaviour in Vietnamese stock market since there are no any previous studies in Vietnam context that investigated the prevalence of this behaviour in different market volatility conditions. In fact, this finding is consistent with the previous findings of other previous studies such as Tan et al. (2008), Economou et al. (2011) and Ouarda et al. (2013), which suggested that
herding behaviour is more prevalent in financial market during the high volatility conditions. This finding also agrees with the idea that investors tend to follow the market when they face huge uncertainty as they may feel more secured by doing so. Thus, as stronger volatility leads to higher uncertainty, investors are more likely to herd around the market when the market volatility is high, leading to the higher prevalence of herding.

5.3.3 Herding under high and low trading volume

The estimation results of the equation (6), which examines the prevalence of market wide herding during high and low trading days, are reported in the table 7 below. We can see from the results that both $\beta_3$ (capture herding prevalence in the market during day with high trading volume) and $\beta_4$ (capture herding prevalence in the market during day with low trading volume) coefficients are highly significant at 1% level, in both cases using EW CSAD and VW CSAD. These results indicate that herding behaviour exist in Vietnamese stock market under both high and low trading volume conditions.

The Wald test with the null hypothesis $H_0: \beta_3 - \beta_4 = 0$ is then used to test the asymmetric effect between herding behaviours between market days with high and low relative trading volume. Interestingly, there is difference between the test results on coefficients of estimations using EW CSAD and those using VW CSAD, with the former being not significant at any level and the latter being negative and highly significant. Thus, it can be inferred that when using EW CSAD as proxy for return dispersion, there will be no asymmetry effect of market-wide herding between high and low trading days. On the other hand, when using VW CSAD as proxy for return dispersion, there will be clear asymmetry effect, with the herding behaviour being more pronounced in days with high trading volume.

The above results are again contradict to the previous findings of Vo and Phan (2016;2017), which suggested that herding in Vietnamese stock market is more pronounced in low trading volume state than in high state. However, these results are consistent with findings of other studies such as Lao and Singh (2011) or T et al. (2013) about other Asian and European emerging markets. It is also worth to note that since the EW CSAD gives the equal weights to individual stocks whereas the VW CSAD gives larger weights to large stocks and smaller weights to small stocks, we may infer that the stronger force of herding in high volume trading day comes from herding towards large stocks.
Table 7: Herding under high and low trading volume

The table reports the regression results of the equation:

\[ CSAD_t = \beta_0 + \beta_1 D_t^{HT} |R_{m,t}| + \beta_2 (1 - D_t^{HT}) |R_{m,t}| + \beta_3 D_t^{HT} (R_{m,t})^2 + \beta_4 (1 - D_t^{HT})(R_{m,t})^2 + \epsilon_t \]

in which \( CSAD_t \) in turn is equally-weighted (EWCSAD) and market value-weighted cross-sectional absolute deviation (VWCSAD) on day \( t \), \( R_{m,t} \) is the return on the market index and \( D_t^{HT} \) is the dummy variable that takes the value of 1 when relative trading volume is high and zero otherwise.

The Wald statistics show the test statistics for the Wald coefficient test with null hypothesis:

\[ H_0: \beta_3 - \beta_4 = 0 \]

<table>
<thead>
<tr>
<th></th>
<th>EW</th>
<th>VW</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta_0 )</td>
<td>1.698794</td>
<td>1.115012</td>
</tr>
<tr>
<td></td>
<td>(0.0000)***</td>
<td>(0.0000)***</td>
</tr>
<tr>
<td>( \beta_1 )</td>
<td>0.358441</td>
<td>0.585525</td>
</tr>
<tr>
<td></td>
<td>(0.0000)***</td>
<td>(0.0000)***</td>
</tr>
<tr>
<td>( \beta_2 )</td>
<td>0.16603</td>
<td>0.393843</td>
</tr>
<tr>
<td></td>
<td>(0.0085)***</td>
<td>(0.0000)***</td>
</tr>
<tr>
<td>( \beta_3 )</td>
<td>-0.092524</td>
<td>-0.131698</td>
</tr>
<tr>
<td></td>
<td>(0.0000)***</td>
<td>(0.0000)***</td>
</tr>
<tr>
<td>( \beta_4 )</td>
<td>-0.065605</td>
<td>-0.097059</td>
</tr>
<tr>
<td></td>
<td>(0.0005)***</td>
<td>(0.0000)***</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.09605</td>
<td>0.114576</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Wald stat.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-1.334245</td>
</tr>
<tr>
<td></td>
<td>(0.1823)</td>
</tr>
</tbody>
</table>

***: Significant at 1% level; **: significant at 5% level; *: significant at 10% level
5.4 Herding towards firm characteristics

The table 8 below illustrates the estimation results of equation (1) using the EW CSAD for 8 sub-portfolios representing 8 different sets of firms’ characteristics. In these estimations only the equally-weighted version of the cross-sectional absolute deviation is employed as the potential size effect, which VW CSAD accounted for, has been captured by diving the whole sample into sub-portfolios based on different characteristics, including size. We can see from the results that all the coefficients \( \beta_1 \) and \( \beta_2 \) in these 8 estimations are significant, at least at 5% level. All the coefficients \( \beta_1 \) are positive whereas all the coefficients \( \beta_2 \) are negative, indicating increasing at decreasing rate relationships between the return dispersion and the market return and confirming that herding behaviour exists toward all 8 sets of characteristics.

Table 8: Herding toward different firms’ characteristics

<table>
<thead>
<tr>
<th></th>
<th>HHH</th>
<th>HHL</th>
<th>HLH</th>
<th>HLL</th>
<th>LHH</th>
<th>LHL</th>
<th>LLH</th>
<th>LLL</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta_0 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.773</td>
<td>1.0634</td>
<td>1.8785</td>
<td>1.228</td>
<td>2.1042</td>
<td>1.2002</td>
<td>2.0728</td>
<td>1.3314</td>
</tr>
<tr>
<td></td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
</tr>
<tr>
<td>( \beta_1 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.413933</td>
<td>0.50495</td>
<td>0.289393</td>
<td>0.381522</td>
<td>0.329985</td>
<td>0.598989</td>
<td>0.290342</td>
<td>0.458863</td>
</tr>
<tr>
<td></td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.03)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
</tr>
<tr>
<td>( \beta_2 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.12634</td>
<td>-0.10416</td>
<td>-0.10076</td>
<td>-0.09015</td>
<td>-0.11925</td>
<td>-0.10922</td>
<td>-0.11133</td>
<td>-0.10560</td>
</tr>
<tr>
<td></td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
<td>(0.00)***</td>
</tr>
<tr>
<td>R²</td>
<td>0.067494</td>
<td>0.136629</td>
<td>0.031228</td>
<td>0.030534</td>
<td>0.033485</td>
<td>0.076536</td>
<td>0.086646</td>
<td>0.067459</td>
</tr>
</tbody>
</table>

***: Significant at 1% level; **: significant at 5% level; *: significant at 10% level

At the first glance, we can see that the portfolio HHH has the highest magnitude of coefficient \( \beta_2 \) (0.12634) whereas the portfolio HLL has the lowest value (0.09015). Thus, we can infer that investors in Vietnamese stock market tend to herd the most towards stocks with large size (high capitalization), better prospect (high P/B) and
higher uncertainty (high volatility). In contrast, investors tend to herd the least towards stocks with large size (high capitalization), low prospect (low P/B) and less uncertainty (low volatility).

5.4.1 Herding and size of stocks

Then the impact of size will be examined separately by comparing the magnitudes of the coefficients $\beta_2$ of the portfolios with large market capitalization (H/-/-) with those of corresponding portfolios with small market capitalization (L/-/-). The table 9 below show the comparison results in details.

<table>
<thead>
<tr>
<th></th>
<th>High P/B and High volatility</th>
<th>High P/B and Low volatility</th>
<th>Low P/B and High volatility</th>
<th>Low P/B and Low volatility</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large size</td>
<td>0.1263</td>
<td>0.1042</td>
<td>0.1008</td>
<td>0.0902</td>
<td>0.1054</td>
</tr>
<tr>
<td>Small size</td>
<td>0.1193</td>
<td>0.1092</td>
<td>0.1113</td>
<td>0.1057</td>
<td>0.1114</td>
</tr>
<tr>
<td>Difference (large - small)</td>
<td>0.0071</td>
<td>- 0.0050</td>
<td>- 0.0106</td>
<td>- 0.0155</td>
<td>- 0.0060</td>
</tr>
</tbody>
</table>

From the table we can see that on average, the magnitudes of coefficients $\beta_2$ of portfolios consisting of large stocks are lower than those of portfolios consisting of small stocks, indicating that on average market wide herding is more prevalent toward small size stocks. This somehow agrees with the idea that the greater size of the firm, the better and more transparent information available and thus the lower prevalence of herding behaviour (Venezia et al. 2011).

When it comes to each pair of portfolios, interestingly, the magnitudes of $\beta_2$ of large size portfolios are, however, larger than the magnitudes of $\beta_2$ of small size portfolios when incorporated with high P/B and high volatility, whereas being smaller in three other cases. That means especially for the case of growth stocks with high return volatilities (High P/B and high volatility), investors in fact tend to herd towards large size stocks instead of small ones, as opposed to others cases.
5.4.2 Herding and P/B ratio

The table 10 below illustrates the comparison results regarding the magnitudes of coefficients $\beta_2$ of the portfolios with growth stock, which represented by high P/B ratio (-/H/-), with those of corresponding portfolios with value stocks (-/L/-).

<table>
<thead>
<tr>
<th>Table 10: Comparison results regarding P/B ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>The table reports the comparison between the magnitudes of coefficients $\beta_2$ of portfolios with high P/B ratios and those of portfolios with low P/B ratios</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>High Capitalization and High volatility</th>
<th>High Capitalization and Low volatility</th>
<th>Low Capitalization and High volatility</th>
<th>Low Capitalization and Low volatility</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth stock (High P/B)</td>
<td>0.1263</td>
<td>0.1042</td>
<td>0.1193</td>
<td>0.1092</td>
<td>0.1147</td>
</tr>
<tr>
<td>Value stock (Low P/B)</td>
<td>0.1008</td>
<td>0.0902</td>
<td>0.1113</td>
<td>0.1057</td>
<td>0.1020</td>
</tr>
<tr>
<td>Difference (high - low)</td>
<td>0.0255</td>
<td>0.0140</td>
<td>0.0079</td>
<td>0.0036</td>
<td>0.0128</td>
</tr>
</tbody>
</table>

We can see from the results that on average the magnitudes of coefficients $\beta_2$ of portfolios consisting of growth stocks are lower than those of portfolios consisting of value stocks, showing that in Vietnamese stock market on average market wide herding is more prevalent toward growth stock. Furthermore, when it comes to each pair of portfolios, the results are also consistent. In all four pairs the magnitudes of coefficients $\beta_2$ of portfolios with growth stocks are higher. These results indicate that in Vietnamese stock market, herding behaviours seem to be usually more pronounced towards growth stock with high P/B ratio than value stocks with low P/B ratio. Thus, the hypothesis 6 will be rejected.

It is worth to note that the above findings are quite opposite to the findings of Hwang and Salmon (2004). The findings of Hwang and Salmon (2004) suggested that in Korean stock market, which was an emerging market at that time, investors tend to herd towards value rather than growth firms. The explanation proposed by Hwang and Salmon was that value stocks with low P/B tend to be riskier, since these stocks usually have problems that affect their long-term prospects, thus the herding toward these stocks may be more prevalent. However, in the context of Vietnam, similar to the cases of herding under up and down market, Vietnamese investors tend to be affected more by "keeping up with the johnes" behaviours and concerns for relative wealth. Thus they
may herd more towards the high P/B stocks with bright prospects in order to avoid being left behind, leading to the higher prevalence of herding toward these stocks.

5.4.3 **Herding and return volatility**

The comparison results regarding the magnitudes of coefficients $\beta_2$ of the portfolios with high volatility stocks (-/-/H) with those of corresponding portfolios with low volatility stocks (-/-/L) are reported in the table 11 below.

**Table 11: Comparison results regarding return volatility**

The table reports the comparison between the magnitudes of coefficients $\beta_2$ of portfolios with high volatility and those of portfolios with low volatility.

<table>
<thead>
<tr>
<th></th>
<th>High Capitalization and High P/B</th>
<th>High Capitalization and Low P/B</th>
<th>Low Capitalization and High P/B</th>
<th>Low Capitalization and Low P/B</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High volatility</strong></td>
<td>0.1263</td>
<td>0.1008</td>
<td>0.1193</td>
<td>0.1113</td>
<td>0.1144</td>
</tr>
<tr>
<td><strong>Low volatility</strong></td>
<td>0.1042</td>
<td>0.0902</td>
<td>0.1092</td>
<td>0.1057</td>
<td>0.1023</td>
</tr>
<tr>
<td><strong>Difference (high - low)</strong></td>
<td>0.0221</td>
<td>0.0106</td>
<td>0.0100</td>
<td>0.0057</td>
<td>0.0121</td>
</tr>
</tbody>
</table>

On average, the magnitudes of coefficients $\beta_2$ of portfolios of high volatility stocks are higher than those of portfolios of low volatility stocks, indicating that in Vietnamese stock market, the higher the return volatility of stocks, the higher the prevalence of herding toward these stocks. The comparison results are also consistent when it comes to each pair of portfolios. The magnitudes of coefficients $\beta_2$ of portfolios of high volatility stocks are higher than those of corresponding portfolios of low volatility stocks in all four pairs. These results indicate that in Vietnamese stock market, herding behaviours are usually more prevalent towards high return volatility than towards stocks with low return volatility. The results above agree with the findings of Venezia et al. (2011) and Lin and Lin (2014), which suggested that herding behaviour of investors tend to be lower toward low volatility stocks and higher toward high volatility stocks. Thus, based on the above results the hypothesis 7 will be accepted.
6 CONCLUSION

This study examines the presence and attribution of market wide herding behaviour in Vietnamese stock market. Herding behaviour, as one of key concepts in the field of behavioural finance, in recent decades has become the topic for much research. However, most of previous research focuses developed markets or large emerging market such as China; whereas the amount of published studies conducted on frontier markets like Vietnamese stock market is not large. Therefore, this paper is expected to contribute to the literature of herding behaviour in frontier financial market in general and in Vietnamese stock market in particular.

Vietnamese stock market is a young frontier market which is characterized by illiquidity problem, lack of foreign investments and the slow pace of privatization of state-owned enterprises. These characteristics, together with the deficiency of legal framework and frequent intervention of the government, lead to causing non-transparency and information asymmetry problems in Vietnamese stock market. As information asymmetry is one of the key reasons leading to herding behaviour, this market will be a good subject to study about herding behaviour.

This study follows the method introduced by Chang et al. (2000) with some modifications in the measures of return dispersion to examine the market wide herding behaviour in Vietnamese stock market using the financial data from stocks listed on Ho Chi Minh City stock exchange from the beginning of 2008 to the end of 2018. All IPOs and delisted stocks during this period will be excluded in order to separate the herding behaviour from potential IPOs/Delisting anomalies.

The results of this study confirm the existence of market wide herding behaviour in Vietnamese stock market, especially during the “fluctuation” period 2009-2015. The findings also point out that, during the “bearish” period the year 2008, herding behaviour did not exist in Vietnamese stock market. However, during this period Vietnamese investors were not rational when making investment decisions either. These findings are consistent with the findings of previous research in the context of Vietnam. An interesting new finding is that, during the “bullish” period 2016-2017, Vietnamese investors were indeed more rational when making investment decision, and herding behaviour did not exist anymore. The issuance of many regulations regarding the information disclosure of listed stocks and the operation of the market, which contributes to the reduction of information asymmetry in the market, is the
possible explanation for the vanishing of herding behaviour during this period. Furthermore, it is worth to note that, as expected, employing equally-weighted cross-sectional absolute deviation as proxy for return dispersion indeed exaggerate the dispersion in the market, thus leading to less prevalent results on the presence of herdings behaviours.

Regarding the prevalence of herding under up and down market, the findings of this study indicate that herding behaviour is more pronounced during rising market days than in declining market days, suggesting that in Vietnamese stock market, concerns for relative wealth and “keeping up with the Joneses” preference may be stronger drives that cause investors to employ herding strategy when making investment decisions. When it comes to the prevalence of herding under market volatility and trading volume conditions, this study shows evidences that herding is more prevalent when market volatility is strong and trading volume is high, which agree with previous studies conducted in other similar markets.

The results of this study also reveal that Vietnamese investors tend to herd around the market more when they face investment decision towards stocks with certain characteristics. The findings suggest Vietnamese investors tend to herd more toward firms with higher P/B ratio and stronger return volatility; however the impact of size is somehow not consistent. More specifically, herding behaviour is most prevalent towards firms with high capitalization, high P/B ratio and high return volatility; and is least pronounced towards firms with high capitalization, low P/B ratio and low return volatility.

Although several studies have been conducted regarding herding behaviour in Vietnamese stock market, few of them have examined how certain market conditions affect herding and none of them have examined how firm characteristics may encourage herding behaviour. Thus, this study will contribute to the existing literature by examining the prevalence of herding and its attribution under different market conditions, namely up and down market, high and low volatility and high and low market trading volume. In addition, this study will be the first study to examine how certain firm characteristics can affect the prevalence of herding behaviour in this particular market. Furthermore, by employing modified measure for return dispersion and different dataset, which account for the potential impacts of size effects and IPOs/Delisting anomalies on examination results, this study is expected to provide
more correct results regarding the presence and attribution of herding in Vietnamese stock market.

Finally, future research may extend this study in several directions. As in this study, due to the unavailability of historical data on ownership structure of Vietnamese listed firms on Datastream, the impacts of ownership structure (state-owned, foreign-owned, etc) on the prevalence of herding towards these firms cannot be tested. Thus, future research may extend this study by collecting this data from other source and examining this matter, maybe by manually collecting ownership data from firms’ financial reports. Second, since this study employs only stocks listed on the Ho Chi Minh stock exchange as the representative for Vietnamese stocks market, together with the exclusion of IPOs and delisted stocks, the number of stocks in the final sample is quite small. Therefore, further research may include the stocks listed on the Ha Noi stock exchange into the sample as well. This expansion of the sample may help to improve the regression quality and allow the sample to be divided into more than only 8 portfolios when examining the impacts of firms’ characteristics on herding, thus provide clear results on the prevalence of herding behaviour towards different firms’ characteristics.
REFERENCES


APPENDICES

A1. List of portfolios and the characteristics of stocks in each portfolio:

(1) - H/H/H: stocks have high capitalization, high P/B and high volatility
(2) - H/H/L: stocks have high capitalization, high P/B and low volatility
(3) - H/L/H: stocks have high capitalization, low P/B and high volatility
(4) - H/L/L: stocks have high capitalization, low P/B and low volatility
(5) - L/H/H: stocks have low capitalization, high P/B and high volatility
(6) - L/H/L: stocks have low capitalization, high P/B and low volatility
(7) - L/L/H: stocks have low capitalization, low P/B and high volatility
(8) - L/L/L: stocks have low capitalization, low P/B and low volatility

A2a. Graphical illustration of the relationship between EWCSAD and Rm:
A2a. Graphical illustration of the relationship between VWCSAD and Rm: