The effects of national culture and behavioral pitfalls on investors' decision-making: Herding behavior in international stock markets☆

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A B S T R A C T

The purpose of this study is to explore the determinants of investor decision-making in international stock markets. Unlike previous literature, this study provides insight into the effects of national culture and behavioral pitfalls on investors’ decision-making processes in international stock markets. Its empirical results provide evidence that herding behaviors occur in Confucian and less sophisticated equity markets. Additionally, it finds that some national culture indexes are closely correlated with the exhibition of herding. Finally, it shows that investors’ behavioral pitfalls dominate their herding tendency, as shown in cross-sectional absolute deviations of returns.

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1. Introduction

With the goal of examining herding behavior in international stock markets in depth, this study looks at the effects of national culture and behavioral pitfalls on irrational decision-making by investors. Since the 1980s, various studies have identified irrational investment behaviors in markets. Of these, herding behavior has been a subject of particular concern. Herding behavior is when the same investment strategy is adopted by a majority of investors during the same period of time, in that they sell or buy the same or similar stocks during that time. Previous literature has provided evidence of herding behavior among investors. For example, Choi and Sias (2009) discover that institutional investors sell and buy stocks in the same industries during the same periods of time, leading to herding behavior. Venezia, Nashikkar, and Shapira (2011) find strong herding tendencies among investors in small-cap companies and those facing low systematic risk, and have determined that professional investors demonstrate weaker herding tendencies than amateur (retail) investors. Demirer, Kutan, and Zhang (2014) and Yao, Ma, and He (2014) indicate that herding...
behavior is more widespread at the industry (sector) level than at the market (country) level. Lin and Lin (2014) show significant herding tendencies of institutional investors and margin traders on sharp price movements.

In addition to demonstrating the existence of herding behavior, previous studies have attempted to examine the causes of this behavior. Scharfstein and Stein (1990) argue that fund managers ignore private information in order to maintain their reputations, and instead imitate others’ investment strategies. Banerjee (1992) suggests that investors observe others’ behaviors to gain implied information content, and then follow their leads. This imitative herding behavior is like a waterfall, and results in an informational cascade. Hirshleifer, Subrahmanyam, and Titman (1994) suggest that the employment of the same investment strategies among investors occurs due to the acquisition of similar or identical information, based on which investors develop herding behaviors. Dass, Massa, and Patgiri (2008) suggest that reputation and relative performance among mutual funds result in herding behavior among fund managers, and contributed to the dot com bubble at the end of the 1990s. Yang (2011) argues that information externality of the second decision-maker plays a major role in the efficiency of herding behavior among subsequent decision-makers.

Although investors’ herding behavior has been identified by earlier studies, which have explored its causes, most have been based on the theoretical approaches of standard (traditional) finance. Herding is irrational behavior and so can be better examined through the lens of behavioral finance, which primarily examines investors’ decision-making based on irrational or long-term market inefficiency. Hirshleifer et al. (1994) indicate that when investors believe that they are acquiring information quicker than others, they demonstrate overconfidence and herding behavior. Nofsinger and Sias (1999) find close ties between herding and positive feedback trading, as well as a positive correlation between the herding tendency of institutional investors and previous returns. Demarzo, Kaniel, and Kremer (2004) point out how the major influence of the community affects investment decision-making, and explain that the need to “keep up with the Joneses” (compare oneself with one’s neighbors) results in herding behavior among communities, as members follow others’ investment strategies. Brown, Ivkovic, Smith, and Weisbenner (2008) and Shemesh and Zapatero (2014) also provide, respectively, evidence of significant community effect for stock market participation decisions and the decision to buy a car. Moreover, Hong, Kubik, and Stein (2005) suggest the use of a contagion model to describe the information acquisition of investors through word of mouth, as well as the influence on fund managers of counterparts in the same city who buy or sell the same stocks. Venezi et al. (2011) reveal herding behavior for both amateur and professional investors and the tendency to herd among amateurs is higher as a result of their financial illiteracy and inexperience.

Factors that influence the levels of irrationality of investors and the degree of inefficiency of stock markets in different countries mainly involve external environments and inner psychology. As such, it is beneficial to discuss the causes of herding and the determinants of investors’ irrational decision-making based on an examination of external national cultures and internal behavioral pitfalls. Hofstede (2001) addresses national culture in terms of the five dimensions of power distance, individualism, masculinity, uncertainty avoidance, and long-term orientation, which he has also quantified. Schmeling (2009) uses individualism and uncertainty avoidance as proxies for herding behavior and overreaction, and has pointed out the strong influence of investor sentiment on stock returns in countries that are more likely to demonstrate herding behavior or overreaction. Chui, Titman, and Wei (2010) adopt Hofstede’s (2001) individualism index to conduct an empirical study, and find that a positive correlation exists between individualism and the profits of momentum strategy.

Differences in national culture are worthy of notice when investigating why investor herding tendency differs across countries. National culture refers to the behavioral norm and conventional beliefs of the majority of people in a certain country. It dominates the investors’ behavioral reaction to an information shock and the decision-making for an investment. Further, it may cause the exhibition of same or similar investment strategies for the majority of investors in the stock market indicating herding behavior. In other words, differences in national culture may shed insight into the reasons for herding and cross country culture comparisons are crucial for the examination of herding behavior in international stock markets. Specifically, Confucian culture emphasizes ethics, obedience, humanism, and collectivism, indicating that a Confucian society may have a high power distance, low individualism, high masculinity, low uncertainty avoidance, and low long-term orientation. On the other hand, western culture is based on science, reality, individualism, and happiness. Its core ideals are the requirements of human’s fundamental rights. This may imply a prevention of the emergence of herding behavior in western countries. Previous literature has also found that cross country culture comparisons justify the differences in the human’s behavior and investor right protection across countries. For example, Stulz and Williamson (2003) show that Protestant countries protect the creditors’ rights better than Catholic countries. Nabar and Boonlert-U-Thai (2007) present that differences in national culture are one of the determinants of manager’s accounting choice across countries.

In addition to national culture, another indicator used to measure the irrationality of investors and inefficiency of markets is investors’ inevitable tendency toward errors (i.e., behavioral pitfalls). Among the behavior pitfalls discussed in existing behavioral finance literature, excessive optimism, overconfidence, and the disposition effect have been shown to exist. Excessive optimism refers to the inclination of people to prefer the probability of occurrence of favorable outcomes to that of unfavorable outcomes. Brown and Cliff (2005) conclude that lower returns result from investors’ excessive optimism, while Kutsuna, Smith, and Smith (2009) report that investors’ excessive optimism causes underwriters to adjust IPO offer prices upwards.

Overconfidence refers to the perception of people that they are more competent than average. Gervais and Odean (2001) point out that although overconfident investors are more likely to have a superior ability to collect information, they fail to make the best use of this information, and thus receive lower returns. Gervais, Heaton, and Odean (2011) find that overconfident managers try their best to collect information that will improve their success rates and the values of projects, and so tend to accept compensation contracts that involve excessive risk.

The disposition effect refers to the tendency of investors to sell gaining investments too soon and hold losing investments too long. Frazzini (2006) shows that the underreaction of investors to news is due to the disposition effect. Grinblatt, Keloharju, and...
Linnainmaa (2012) discover the impact of the disposition effect on capital loss, and have pointed out that investors with high IQs are less likely to be affected by the disposition effect in their trading behaviors.

This study aims to investigate the influence of national culture and behavioral pitfalls on the herding tendency of investors in international stock markets, as well as to examine herding behavior in international equity markets. This study has four features that distinguish it from previous studies. First, since investors inevitably imitate public herding behavior, and this imitating behavior is influenced by national culture, this study examines the influence of national culture on investor herding behavior in the international stock markets based on cross country culture comparison. Second, although earlier studies of behavioral finance have described the various types of behavioral pitfalls made by investors, they have less frequently examined the influence of behavioral pitfalls on herding behavior. In order to completely understand the causes of herding behavior, this study investigates the influence of investors’ behavioral pitfalls on their herding tendencies. Third, for the implications of empirical results, this study discusses the relationship between cultural indexes and macro indexes, as well as the effect of Confucian philosophy on investor herding behavior. Finally, this study investigates the herding behavior of investors in more stock markets and for longer intervals than previous studies, covering 50 stock markets over 46 years.

The empirical results of the study first show that a lower percentage of stock markets exhibit significant herding behavior than was found by Chiang and Zheng (2010) and that a number of stock markets demonstrating herding behavior are concentrated in Confucian and less mature countries. Second, our findings demonstrate that national culture is one of the determinants of investors’ herding behavior and that, among the aspects involved in culture, power distance, individualism, and masculinity are the most important in this regard. Finally, we find that behavioral pitfalls not only play a dominant role in investors’ herding tendencies, in terms of the cross-sectional absolute deviation of returns, but are also the key factors that lead to investors’ irrational behaviors.

The structure of the rest of this paper is as follows. We introduce our data and methodologies in Section 2, below, while Section 3 presents our empirical results. Section 4 offers robust analysis including the examination of applying Granger’s (1969) causality test and the study of using Tang and Koveos (2008) national cultural indexes, in addition to those proposed by Hofstede (2001). We discuss further the empirical results in Section 5 and conclude the paper in Section 6.

2. Data and methodologies

2.1. Data sources and research interval

This study uses the returns of market and industrial indexes to calculate cross-sectional absolute deviation of returns, and examines the existence of herding behavior in various markets. In order to explore the influence of national culture on investors’ herding tendency, it adopts the national culture indexes proposed by Hofstede (2001) for empirical analysis. Hofstede (2001) investigates 88,000 IBM employees in 72 countries around the world, using a questionnaire, and quantified the five dimensions of national nature: Power distance, individualism, masculinity, uncertainty avoidance, and long-term orientation. In terms of behavioral

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pitfall data, the price-to-book ratios of each industry in a stock market (daily data) were used as proxies for excessive optimism, while the trading volumes of each industry in a stock market (daily data) were used as proxies for overconfidence and the disposition effect. The data on price-to-book ratio, trading volume, market indexes, and industrial indexes were collected from the Datastream database from January 6, 1965 to May 31, 2009, as well as from the Datastream database, Taiwan Economic Journal databank, Mergent Online databank, Yahoo Finance website, and Business Week website from June 1, 2009 to July 12, 2011.

The research subjects of this study include 50 stock markets. Due to the features of the data acquired, the research intervals for individual stock markets are inconsistent, with the longest interval lasting from January 6, 1965 to July 12, 2011. Table 1 shows the research interval for each stock market.

2.2. Investigation of investor herding behaviors in individual stock markets

This study uses the methods of Chang, Cheng, and Khorana (2000) and Chiang and Zheng (2010) to examine investors’ herding behaviors in 50 stock markets. Chang et al. (2000) argue that when herding behavior exists, investors will abandon information that they possess and follow market trends in making investments. Chang et al. (2000) also use the interrelationship between cross-sectional absolute deviation of returns and market return volatility to judge the existence of herding behavior, as shown in Eq. (1).

\[
CSAD_{it} = \gamma_{i0} + \gamma_{i1}R_{it} + \gamma_{i2}|R_{it}| + \gamma_{i3}R^2_{it} + \epsilon_{it},
\]

where \(CSAD_{it}\) is cross-sectional absolute deviation (CSAD) in stock market \(i\) for day \(t\). As such, \(CSAD_{it} = \sum_{j=1}^{n_i} R_{ijt} - R_{it}/n_iR_{it}\) is the sector index returns on industry \(j\) in stock market \(i\) for day \(t\). \(R_{it}\) is the market index return in stock market \(i\) for day \(t\), and \(n_i\) is the number of industries in stock market \(i\). \(\gamma_{i0}, \gamma_{i1}, \gamma_{i2}, \text{and } \gamma_{i3}\) are regression coefficients, while \(\epsilon_{it}\) refers to error term.

Chang et al. (2000) argue that although the return dispersion among stocks based on the capital asset pricing model (CAPM) increases along with the increase of absolute value of market returns, this involves a linear correlation. If herding behavior exists in a market during stock market fluctuation, there is no linear incremental correlation between the return dispersion among stocks and market returns. Chiang and Zheng (2010), based on the suggestions of Chang et al. (2000), further conclude that when a stock price change expands and the difference between industrial and market returns narrows, investors demonstrate herding behavior. As a result, in Eq. (1) when coefficient \(\gamma_{i3}\) has a significant negative value, it indicates the existence of investor herding behavior.

2.3. Examining the effect of national culture on investor herding behavior

In addition to confirming investor herding behavior in particular stock markets through the use of coefficient \(\gamma_{i3}\) in Eq. (1), this study explores the influence of internal behavioral pitfalls and external national cultures on investors’ decision-making processes. With regard to the effects of national culture, it aims to investigate whether differences in national cultures among international stock markets are determinants of investor herding behavior.

For indexes of national culture, this study refers to Chui et al. (2010) and uses indexes constructed by Hofstede (2001). Unlike Chui et al. (2010), who only use an individualism index, we use five indexes of national culture, as suggested by Hofstede (2001), to investigate the relationship between national culture and investor herding behavior. Hofstede’s (2001) five indexes of national culture are described in more detail below:

1. Power distance index (PDI): PDI refers to the expectation and acceptance of unequal power distribution among the disadvantaged members of national institutions and organizations. In a high power distance environment, society is unequal and investors acquire information in unequal conditions. In such cases, investors are more likely to accept implied information of transactions made by others and to follow their leads, which fosters herding behavior.

2. Individualism index (IDV): IDV refers to the extent to which the people of a society are loosely connected and care only about themselves and their core families. Thus, in a society with a lower level of individualism, investors are more likely to care more about public opinion than their own opinions, and their trading behavior will thus be more influenced by market consensus and will trend toward herding.

3. Masculinity index (MAS): MAS concerns the clear distinction between gender roles, which regards masculinity as arbitrary, strong, and focused on material achievement, while femininity is modest, tender, and focused on life quality. Thus, in countries with high masculinity levels, people care about materialism more and are more likely to engage in opportunistic behaviors of buying high and selling low. This means that when investors are very focused on earning a greater profit to satisfy their greed, they are more likely to develop herding behavior.

4. Uncertainty avoidance index (UAI): UAI refers to the level of threat perceived by members of a certain culture when they face an uncertain or unknown situation. We assume that investors with low UAI have lower awareness of risk, and thus, regardless of the deviation of current share prices from fundamentals will blindly follow the market in buying or selling stocks, developing herding behavior.

5. Long-term orientation index (LTO): LTO refers to virtues, and especially persistence and frugality, which promote and encourage the search for the orientation of future returns. A society with a low LTO is more concerned with current returns, and investors...
are easily influenced by market opinion and thus blindly engage in short-term profitable herding trading rather than holding stocks for a longer term.

In terms of the effects of national culture on investor herding behavior, when coefficient $\gamma_{i,3}$ in Eq. (1) has a significant negative value, it indicates the existence of significant herding behavior in stock market $i$. This study thus uses $D_{\gamma_{i,3}}$ as the dependent variable (if $\gamma_{i,3}$ has a significant negative value, then $D_{\gamma_{i,3}} = 1$; if $\gamma_{i,3}$ has a significant positive value, then $D_{\gamma_{i,3}} = -1$; otherwise, $D_{\gamma_{i,3}} = 0$), and also conducts a multinomial logistic regression analysis. The description of this is shown below:

$$D_{\gamma_{i,3}} = \alpha_0 + \alpha_1 PHI_i + \alpha_2 IDV_i + \alpha_3 MAS_i + \alpha_4 UIAI_i + \alpha_5 LTO_i + \xi_i.$$  \hspace{1cm} (2)

$$\sum_{h=1}^{3} \pi_h = 1. \hspace{1cm} (3)$$

where $PHI_i$, $IDV_i$, $MAS_i$, $UIAI_i$, and $LTO_i$ are respectively the power distance index, individualism index, masculinity index, uncertainty avoidance index, and long-term orientation index in stock market $i$, as proposed by Hofstede (2001), and where, $\pi_1 = P(D_{\gamma_{i,3}} = 1)$, $\pi_2 = P(D_{\gamma_{i,3}} = 0)$, and $\pi_3 = P(D_{\gamma_{i,3}} = -1)$. $\{\pi_1, \pi_2, \pi_3\}$ represents response probability. $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ and $\xi_i$ are regression coefficients, and $\xi_i$ is an error term. According to Eq. (2), if coefficient $\alpha_1, \alpha_2, \alpha_3, \alpha_4$, or $\alpha_5$ is statistically and significantly different from zero, it indicates that a national cultural index significantly influences investors’ herding behaviors.

2.4. Examining the effect of investors’ behavioral pitfalls on their herding tendencies

Although we are not able to independently judge whether investors significantly demonstrate herding behavior according to CSAD, CSAD represents return dispersion between industry sectors and market indexes, as well as the common rising and falling trends of stocks. A smaller CSAD, therefore, indicates high investor herding tendency. Chiang and Zheng (2010) also argue that CSAD refers to the investor herding formation. Based on the aforementioned arguments, this study uses the CSAD as a proxy for investor herding tendency, and then investigates the effect of investors’ behavioral pitfalls on their herding tendencies.

Chui et al. (2010) contest the influence of overconfidence and self-attributed bias on profit from momentum strategy. Because herding behavior may result in abnormal profit from momentum strategy, behavioral pitfalls will not only affect momentum strategy but also impact herding tendency. This study examines the influence of investors’ behavioral pitfalls, such as excessive optimism, overconfidence, and the disposition effect, on their herding tendencies. Notably, it is helpful to explore the effect of excessive optimism on investors’ herding tendency under the condition of having measured overconfidence. Shefrin (2007) argues that although excessive optimism often comes with overconfidence, there are differences between excessive optimism and overconfidence. Shefrin (2007) thinks that the degree of excessive optimism for a human is not always positively associated with his/her overconfidence. For example, an investor who is pessimistic about the prospect of the stock market may still actively buy certain stocks because of his/her overconfidence in selecting stocks. Based on Shefrin’s (2007) argument, this study measures both overconfidence and excessive optimism. The proxies for excessive optimism, overconfidence, and the disposition effect are described below in more detail:

1. Excessive optimism (EO)
EO refers to the tendency of people to overestimate the probability of favorable outcomes but underestimate that of unfavorable outcomes. Investors with higher EO are more likely to demonstrate the transaction behavior of buying high and selling low, and to imitate others’ decision-making processes and develop herding behaviors. Yi, El-Badawi, and Lin (2008) demonstrate the significant positive correlation between investors’ excessive optimism and the poor performance of stocks after being issued. Based on the definition of EO above, this study uses $EO_{it}$ to measure the tendency of EO. The calculation method is as follows. First, to avoid the influence of industrial difference, this study defines $PB_{it}^{d,i}$ as the division of the price-to-book ratio of industry $j$ with the declined industrial index in stock market $i$ for day $t$ by the average daily price-to-book ratio of industry $j$ during the research interval. Then, we use the average $PB_{it}^{d,i}$ (that is, $\overline{PB}_{it}^{d,i}$) of all industries with declined industrial indexes in stock market $i$ for day $t$ as a proxy for EO in stock market $i$ for day $t$; the larger the value of this proxy, the stronger the demonstrated tendency of investors toward excessive optimism:

$$EO_{it} = \overline{PB}_{it}^{d,i} \hspace{1cm} (4)$$

where $EO_{it}$ is investors’ excessive optimism tendency in stock market $i$ for day $t$. $\overline{PB}_{it}^{d,i}$ is the average $PB_{it}^{d,i}$ of all industries with decreased industrial indexes in stock market $i$ for day $t$. That is, $\overline{PB}_{it}^{d,i} = \sum_{j=1}^{q_{it}} PB_{it}^{d,i}/q_{it}$; $q_{it}$ is the number of industries with decreased industrial indexes in stock market $i$ for day $t$.

2. Overconfidence (OC)
OC is investors’ tendency to perceive their abilities as above average. Investors’ OC makes them less likely to imitate others’ decision-making processes, or to develop the herding behavior of selling low and buying high. Menkhoff, Schmeling, and Schmidt (2010) suggest that significant differences exist among the OC levels of institutional investors, investment advisers, and retail investors, and have found significant negative correlations between investor characteristics (experience and age)
and OC level. In accordance with the above definition of OC, this study uses OC_{it} to measure the tendency of OC. The calculation method is as follows. First, in order to avoid the influence of industrial difference, this study defines V_{it,j}^d as the division of the trading volume of industry j with decreased industrial indexes in stock market i for day t by the average daily trading volume of industry j during the research interval. Then, we use the average V_{it,j}^d (that is, \overline{V}_{it,j}^d) of all industries with decreased industrial indexes in stock market i for day t as a proxy for OC in stock market i for day t. The larger the value of this proxy, the stronger the tendency of investors toward OC.

\[
OC_{it} = \overline{V}_{it}^d
\]

(5)

where OC_{it} is investors' OC tendency in stock market i for day t. \overline{V}_{it}^d is the average V_{it,j}^d of all industries with decreased industrial indexes in stock market i for day t. That is, \overline{V}_{it}^d = \sum_{j=1}^{q_{it}} V_{it,j}^d / q_{it}.

3. Disposition effect (DE)

DE refers to investors' tendency to hold losing stocks too long and sell gaining stocks too early. A strong DE prevents investors from using the trading strategy of selling low and buying high, making it less likely that they will follow the majority when buying and selling. Barber, Lee, Liu, and Odean (2007) find the existence of DE among investors in the Taiwanese stock market. Employing the above definition of DE, this study uses DE_{it} to measure the strength of DE. The calculation method is as follows. First, in order to avoid the influence of industrial difference, this study defines V_{it,h}^u as the division of the trading volume of industry h with increased industrial indexes in stock market i for day t by the average daily trading volume of industry h during the research interval. Then, we use the average V_{it,h}^u (that is, \overline{V}_{it,h}^u) of all industries with increased industrial indexes in stock market i for day t to divide \overline{V}_{it}^d as a proxy for DE in stock market i for day t. When this proxy is larger than 1, it indicates that investors demonstrate DE. The larger the proxy value, the stronger the DE.

\[
DE_{it} = \frac{\overline{V}_{it}^d}{\overline{V}_{it}^u}
\]

(6)

where DE_{it} is the strength of DE in stock market i for day t. \overline{V}_{it}^d is the average V_{it,h}^u of all industries with increased industrial indexes in stock market i for day t. In other words, \overline{V}_{it}^d = \sum_{h=1}^{Q_{it}} V_{it,h}^u / Q_{it}, Q_{it} refers to the number of industries with increased industrial indexes in stock market i for day t.

This study uses pooling regression to investigate the influence of investors’ behavioral pitfalls on their herding tendencies (or CSAD). The pooling regression model is:

\[
CSAD_{it} = \beta_0 + \beta_1 EO_{it} + \beta_2 OC_{it} + \beta_3 DE_{it} + \varsigma_{it},
\]

(7)

where \beta_0, \beta_1, \beta_2, and \beta_3 are regression coefficients, and \varsigma_{it} is an error term. According to Eq. (7), if coefficient \beta_1, \beta_2, or \beta_3 is statistically different from zero, it indicates a significant influence of a certain type of behavioral pitfall on investor herding tendency.

3. Empirical results

3.1. Herding behavior in international stock markets

As shown in Table 2, in the 18 stock markets of Australia, Austria, Chile, China, Hong Kong, Hungary, Ireland, Japan, Malaysia, Poland, Portugal, Switzerland, Taiwan, Thailand, Turkey, the UK, the US, and Venezuela, the coefficient \gamma_{it,3} has a significant negative value, indicating that among 50 major global stock markets, these 18 involve significant herding behavior. Moreover, Table 2 indicates that among five markets under the influence of Confucian culture (China, Hong Kong, Japan, South Korea, and Taiwan), four demonstrate significant herding behavior (even for South Korea, without demonstrating significant herding behavior, the coefficient \gamma_{it,3} is still a negative value having a t-statistic of -1.61), with percentages of up to 80%, which indicates a tie between investors from Confucian cultures and herding behavior. In the end, the stock markets under the influence of Western culture emerge with obviously a different picture in comparison with those of Confucian culture. As shown in Table 2, only nine markets (Australia, Austria, Hungary, Ireland, Poland, Portugal, Switzerland, the UK, and the US) with percentages of 37.5% among twenty-four markets (Australia, Austria, Belgium, Canada, Czech, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, the UK, and the US) under the influence of Western culture exhibit evidence of herding behavior.

Confucian culture emphasizes ethics, obedience, humanism, and collectivism indicating a high power distance, low individualism, high masculinity, low uncertainty avoidance, and low long-term orientation society. The aforementioned behavioral norm and
conventional beliefs may facilitate the formation of herding. That is, Confucian cultural characteristics may lead to the tendency toward errors (behavioral pitfalls), and to have an indirect influence in the stock market.

In addition to cultural factors, investor sophistication is rationally assumed to have a direct influence in the stock market.
Table 2 also indicates that in 39 of 50 stock markets, coefficient γ1,3 has a statistically significant positive value, suggesting that in the majority of stock markets, the CSAD (investor herding tendency) of market index underperformance is lower (higher) than the CSAD of market index outperformance. That is to say, when there is a bear market, investors are more likely to follow the trading behavior of the majority due to panic, and thus to demonstrate a high level of herding tendency.

Overall, Table 2 shows evidence of significant herding behavior in stock markets under the influence of Confucian culture and those with low sophistication. Like Chiang and Zheng (2010), who investigated 18 stock markets, we discovered more significant herding behavior in Asian stock markets (most of which are under the influence of Confucian culture) than in other continents. This study, however, identifies more significant herding behavior in stock markets with low sophistication, as well as insignificant herding behavior in major stock markets around the globe with higher percentages (64% = 32/50), than that of Chiang and Zheng (2010). This result is consistent with Venezia et al.’s (2011) findings that the herding tendency is negatively correlated with investors’ financial training. There are two possible causes for this result. First, this study investigates a longer research interval and includes more recent data than that of Chiang and Zheng (2010). Another reason is that, compared to those of Chiang and Zheng (2010), our research subjects include more stock markets with low sophistication. This study finds that differences vary in investor herding tendencies in stock markets around the world, in how national cultures are involved, and in investors’ inevitable tendency toward errors in stock markets. As such, in order to gain a more comprehensive understanding of these differences, we attempt to examine the causes of herding behaviors, and how they are based on national cultures and behavioral pitfalls.

3.2. The effect of national culture on investor herding behavior

As shown in Table 3, a simple logistic regression from Models (1) to (5) shows that the regression coefficient of masculinity (α3) is statistically different from zero, indicating more significant investor herding behavior in countries with high masculinity indexes. Additionally, in the multiple logistic regressions in Model (7), the regression coefficient of masculinity has a significant positive value. This again indicates the dominance of the cultural feature of masculinity in investors’ herding behavior. When the masculinity index in a country is high, male investors in that country are inclined to be arbitrary, strong, and materialistic (while female investors are modest, tender, and focused on life quality). Therefore, in stock markets with a high level of masculinity, investors are more likely to care for material things, to imitate other investors’ strategy and to engage in buying high and selling low, thus developing herding behavior.

In Section 3.1, a cross country comparison of herding by culture indicates that the majority of the markets under the influence of Confucian philosophy display evidence of herding while a lower percentage of Western culture countries exhibit herding behavior. One of the significant differences between Confucian culture and Western culture is the distinction between gender roles. Although Confucian culture countries have emphasized gender equality in recent years, the arguments of Confucian philosophy require a clearer distinction between gender roles than those of Western culture. Therefore, the markets under the influence of Confucian culture exhibit a higher masculinity index than Western countries. The markets with a higher masculinity index may demonstrate investor herding.

In addition to the regression coefficient of masculinity, Table 3 indicates that the regression coefficients of the other four national cultural indexes in Models (1) to (7) are all insignificantly different from zero. However, Hofstede’s (2001) investigation of national
cultural indexes was carried out in 1973, and is now 40 years old. At present, the national cultures in each country are different from what they were 40 years ago. As a result, we are not able to exclude the possibility of a stronger influence of national cultural factors than what is shown by the empirical findings of investors’ herding behavior in Table 3.

Overall, Table 3 shows that national cultural factors may play an important role in investors’ decision-making processes, with a positive relationship between masculinity and herding. In addition, our empirical results indicate the need for the national cultural indexes of Hofstede (2001) to be updated. In order to clearly understand whether investor behavior is dominated by national cultural differences, recent literature on national cultural investigations is needed for empirical analysis.

3.3. The relationship between investor herding tendency and behavioral pitfalls

As shown in Table 4, the regression coefficients of excessive optimism (β1) in Models (1) to (4) have significant negative values, while those of overconfidence (β2) and disposition effect (β3) have significant positive values, indicating that when investors in a stock market are characterized by excessive optimism, overconfidence, and a weaker disposition effect, the CSAD is smaller (higher investor herding tendency). In other words, when investors incorrectly perceive a higher probability of favorable outcomes than unfavorable outcomes (excessive optimism) they will demonstrate a higher herding tendency. Moreover, when investors incorrectly perceive that the probability of them making a mistake is much lower than the actual occurrence of an error (overconfidence) or they are eager to sell gaining stocks and unwilling to sell losing stocks (the disposition effect), they will demonstrate lower herding tendency.

A comparison of Tables 3 and 4 shows that behavioral pitfalls have a more significant influence on investor herding tendency than national cultural factors, there are two possible causes for this. First, internal psychological factors (investors’ behavioral pitfalls) are more helpful than external environmental factors (national culture) in explaining differences in investor herding tendency in each national stock market. Second, it has been a long time since Hofstede (2001) proposed the national cultural indexes used in this paper, so the relationship of these indexes with herding behavior is less significant and more up-to-date national cultural indexes are needed for empirical analysis.

According to Table 4, behavioral pitfalls have a significant, or even dominant, influence on investor herding tendency. This indicates that the inevitable inclination of humans toward error is the key factor that influences herding behavior. Because behavioral pitfalls are irrational behaviors influenced by psychological factors, and herding behavior is an irrational phenomenon of human behavior, herding behavior is inevitably influenced by behavioral pitfalls.

4. Robust analysis


In Section 3.2, we find that, in addition to the regression coefficient of masculinity, the other four national culture indexes are insignificantly different from zero, but this may be because we use the national culture indexes proposed by Hofstede (2001) from 1973. The current national culture of each country is different from what it was 40 years ago. As a result, in this section, we use the five dimensions proposed by Tang and Koveos (2008) in 2007 in response to those of Hofstede (2001), which are power distance, individualism, masculinity, uncertainty avoidance, and long-term orientation, to update the national cultural indexes for empirical analysis. The empirical results are shown in Table 5.

Table 5 shows that although in the simple logistic regression in Models (1) to (5), only the regression coefficient of masculinity is significantly greater than zero, in the multiple logistic regressions in Models (6) and (7), the regression coefficients of power distance (α1) and masculinity are both significantly larger than zero, while the regression coefficient of individualism (α2) is significantly below zero. The above results mean that when a country has a high power distance index, low individualism index, or high masculinity index, investors in its stock market are more likely to pay attention to implied informational content in the transaction activities of

Table 4

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Model (1)</th>
<th>Model (2)</th>
<th>Model (3)</th>
<th>Model (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>β0</td>
<td>0.012251*** (618.43)</td>
<td>0.012195*** (673.69)</td>
<td>0.012315*** (740.35)</td>
<td>0.012125*** (576.72)</td>
</tr>
<tr>
<td>β1</td>
<td>−0.000071*** (−6.37)</td>
<td>0.000142*** (16.68)</td>
<td>0.000150*** (17.61)</td>
<td>0.000073*** (−6.51)</td>
</tr>
<tr>
<td>β2</td>
<td>6.13 × 10−10** (2.49)</td>
<td>6.19**</td>
<td>6.25 × 10−10*** (2.62)</td>
<td>119.19***</td>
</tr>
<tr>
<td>F-statistic</td>
<td>40.60***</td>
<td>278.30***</td>
<td>6.19**</td>
<td>119.19***</td>
</tr>
</tbody>
</table>

** Indicate significance at 5% level.
*** Indicate significance at 1% level.

The effect of investors’ behavioral pitfalls on their herding tendencies. This table reports the effect of investors’ behavioral pitfalls on their herding tendencies (or CSAD). This study uses pooling regression to investigate the influence of investors’ behavioral pitfalls on their herding tendencies. The pooling regression is:

CSADit = β0 + β1EOit + β2OCit + β3DEit + α1Iit

If coefficient β1, β2, or β3 is statically different from zero, it indicates a significant influence of a certain type of behavioral pitfall on investor herding tendency. Figures in parentheses are the t-statistic.
others than to care for their own thoughts or material approaches (more likely to imitate the strategies of investors earning profit). These cultural characteristics may result in investor herding behavior.

In general, Table 5 shows that national cultural factors of power distance, individualism, and masculinity are closely associated with the exhibition of herding. People with the influence of Confucian culture focusing on ethics, obedience, humanism, and collectivism display the acceptance of unequal power distribution among the disadvantaged members of national institutions and organizations, close connection with the public, and the clear distinction between gender roles. In other words, investors in the market under the influence of Confucian culture demonstrate a high power distance, low individualism, and high masculinity, indicating that there is a greater possibility of exhibiting herding behavior. Hence, the results in Table 5 are consistent with the explanations and arguments in Section 3.1.

When Tables 3 and 5 are compared, we find that when we use the more recently updated national culture indexes of Tang and Koveos (2008), rather than those proposed by Hofstede (2001) in 1973 for empirical analysis, a more significant influence of national cultural indexes on investor herding behavior is identified. In addition to internal behavioral pitfalls, external national culture is also one of the important factors affecting investor decision-making processes.

4.2. The causal relationships between investor herding tendency and behavioral pitfalls

In Section 3.3, this study shows that proxies of behavioral pitfalls are significantly correlated with investor herding tendency and the inevitable inclination of humans toward error plays an important role in investors’ decision-making. In order to explore whether behavioral pitfalls have a significant, or even dominant, influence on investor herding tendency, it is necessary to examine the causal relationships between investor herding tendency and behavioral pitfalls.

This study uses Granger’s (1969) causality test with panel data to investigate the causal relationships between CSAD and proxies of behavioral pitfalls. The causality test fitting a vector autoregressive model is:

\[
CSAD_{it} = \tau_0 + \sum_{l=1}^{5} \alpha_l CSAD_{it-l} + \sum_{l=1}^{5} \lambda_l B_{k,1t-l} + \phi_{1t}, \quad k = 1, 2, 3, \tag{8}
\]

\[
B_{k,1t} = \varphi_0 + \sum_{l=1}^{5} \kappa_l CSAD_{it-l} + \sum_{l=1}^{5} \psi_l B_{k,1t-l} + \phi_{2t}, \quad k = 1, 2, 3, \tag{9}
\]

where \(\tau_0, \varphi_0, \alpha_l, \lambda_l, \kappa_l, \psi_l, \) and \(\phi_{1t}, \phi_{2t}\) are regression coefficients; \(\phi_{1t}, \phi_{2t}\) and \(\psi_l\) are error terms; \(B_{1,1t} = EO_{it}; B_{2,1t} = OC_{it}; \) and \(B_{3,1t} = DE_{it}.\) According to Eqs. (8) and (9), if \(\sum \lambda_l\) is significantly different from zero, it indicates that proxies of behavioral pitfalls Granger cause investor herding tendency. Additionally, if \(\sum \kappa_l\) is statistically different from zero, it indicates that investor herding tendency Granger causes proxies of behavioral pitfalls.

The F-statistic in Table 6 indicates that proxies of excessive optimism, overconfidence, and disposition effect (i.e., \(EO_{it}, OC_{it}, \) and \(DE_{it}\)) Granger cause investor herding tendency (i.e., \(CSAD_{it}\)) and investor herding tendency Granger causes proxies of excessive optimism, overconfidence, and disposition effect. This implies that there is a feedback relationship between proxies of behavioral pitfalls

<table>
<thead>
<tr>
<th>Table 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The effect of Tang and Koveos (2008) national culture indexes on investor herding behavior. This table reports the effect of Tang and Koveos (2008) national culture indexes on investor herding behavior. This study thus uses (D_{Y,1}) as the dependent variable (if (Y_{1}) has a significant negative value, then (D_{Y,1} = -1); if (Y_{1}) has a significant positive value, then (D_{Y,1} = -1); otherwise, (D_{Y,1} = 0)), and also conducts a multinomial logistic regression analysis. The description of this is shown below:</td>
</tr>
<tr>
<td>(D_{Y,1} = \alpha_0 + \alpha_1 PHI + \alpha_2 IDV + \alpha_3 MAS + \alpha_4 UAI + \alpha_5 LTO + \xi_i.)</td>
</tr>
<tr>
<td>(\sum_{i=1}^{3} \pi_i = 1.)</td>
</tr>
</tbody>
</table>

If coefficient \(\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \text{ or } \alpha_5 \) is statistically and significantly different from zero, it indicates that a national cultural index significantly influences investors’ herding behaviors. Figures in parentheses are the t-statistic. Pseudo \(R^2\) refers to the pseudo coefficient of determination.

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Model (1)</th>
<th>Model (2)</th>
<th>Model (3)</th>
<th>Model (4)</th>
<th>Model (5)</th>
<th>Model (6)</th>
<th>Model (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\alpha_0)</td>
<td>1.372 (1.40)</td>
<td>0.565 (0.67)</td>
<td>-1.192 (1.81)</td>
<td>0.518 (1.23)</td>
<td>1.534 (1.84)</td>
<td>-7.286 (1.54)</td>
<td>-25.197 (2.26)</td>
</tr>
<tr>
<td>(\alpha_1)</td>
<td>2.08 \times 10^{-4} (0.02)</td>
<td>-0.015 (1.03)</td>
<td>0.055 (1.72)</td>
<td>-0.007 (0.33)</td>
<td>0.006 (0.24)</td>
<td>0.023 (0.73)</td>
<td>-0.030 (0.91)</td>
</tr>
<tr>
<td>(\alpha_2)</td>
<td>(\alpha_3)</td>
<td>(\alpha_4)</td>
<td>(\alpha_5)</td>
<td>(\alpha_6)</td>
<td>(\alpha_7)</td>
<td>(\alpha_8)</td>
<td>(\alpha_9)</td>
</tr>
<tr>
<td>Pseudo (R^2)</td>
<td>0.000</td>
<td>0.027</td>
<td>0.083</td>
<td>0.002</td>
<td>0.000</td>
<td>0.128</td>
<td>0.363</td>
</tr>
<tr>
<td>(\chi^2)</td>
<td>0.000</td>
<td>1.1</td>
<td>3.34</td>
<td>0.11</td>
<td>0.01</td>
<td>5.13</td>
<td>14.57</td>
</tr>
</tbody>
</table>

* Indicate significance at 10% level.

** Indicate significance at 5% level.
5. Discussions

5.1. The relationship between cultural indexes and macro indexes

This study shows that some national cultural indexes (i.e., power distance, individualism, and masculinity) are correlated with the exhibiton of herding. The aforementioned findings imply that cultural factors are crucial to investment decision-making. National culture determines the human perception of a certain event and frames the behavioral reaction to an information shock. The majority of investors in a stock market inevitably tend toward the normative belief arising from the national culture.

Previous studies have indicated the significant influence of cultural factors on human decision-making behavior. Siegel, Licht, and Schwartz (2011) reveal the negative correlation between egalitarianism distance and international portfolio distribution. Aggarwal, Kearney, and Lucey (2012) show that the aspects of culture can promote foreign portfolio management. Ferris, Jayaraman, and Sabherwal (2013) report that individualism and long-term orientation increases and decreases the CEO’s overconfidence tendency, respectively. Holderness (in press) finds the interdependence between culture and ownership concentration of public corporations. According to the findings of previous studies, national culture dominates the individual’s investment and financing decisions. It should be reasonable to conclude that national culture may be correlated with the aggregate economic activities in a certain country.

As a result of the possibility of a close connection between national culture and economic activities, earlier studies were devoted to the examination of the role of national culture in the economic growth in a certain country. Chow, Shields, and Chan (1991) report the significant influence of individualism in employees on manufacturing performance. Peters (2001) states that both enterprise culture and enterprise education are an attempt to blend the public concept of person. Li, Griffin, Yue, and Zhao (2013) indicate that both individualism and uncertainty avoidance are significantly positively correlated with country GDP per capita. Xue and Cheng (2013) argue that national culture and credit market conditions are correlative. These earlier studies shed some insight on the direct effect of national culture on humans’ behavioral decisions and the indirect effect of national culture on aggregate economic activities.

Herding refers to the decision of adopting the investment strategies that are the same or similar to the majority of investors in the market. It is also the behavioral reaction to following the trend. Culture is the exhibition of human’s subjective feeling, common habit, shared beliefs, and consistent perception of a society. The effect of culture on our society is extensively presented in the various kinds of human’s activities including investment, economic, education, politics, and religion. Therefore, cultural indexes are closely correlated with some macro indexes such as GDP per capita and education. In other words, the macro indexes may also be the determinants of herding.

5.2. The effect of Confucian philosophy on investors’ herding behavior

Confucian philosophy attaches very great importance to the morality, ethics, obedience to elders, and respect for ancestors. The society under the influence of Confucian philosophy builds the behavioral norm of meeting the requirements of loyalty, filial piety, credibility, fraternity, courtesy, justice, uprightness, and forbearance. The core ideals of Confucian philosophy are charity, forgiveness, and sincerity. People embracing the Confucian philosophy are overwhelmed with longing for their ancestors and hometowns. They are also proud of their culture and custom. Although people in the Confucian culture society are willing to absorb the essence of foreign cultures, they do not allow foreign influence to destroy their culture. In a society under the influence of Confucian philosophy, people not only help each other but also seek a good reputation by abiding to Confucian ethics.

Table 6

The causal relationships between investor herding tendency and behavioral pitfalls. This table reports the results of applying Granger's (1969) causality test with panel data to investigate the causal relationships between CSAD and proxies of behavioral pitfalls. The causality test fitting a vector autoregressive model is:

$$ CSAD_{i,t} = \tau_0 + \sum_{l=1}^3 \phi_l CSAD_{i,t-l} + \sum_{k=1}^5 \lambda_k B_{k,t-l} + \phi_{1,t}, \quad k = 1, 2, 3,$$

$$ B_{k,t} = \phi_0 + \sum_{l=1}^3 \mu_k CSAD_{i,t-l} + \sum_{l=1}^3 \psi_k B_{k,t-l} + \phi_{2,t}, \quad k = 1, 2, 3.$$  

If $\sum_{i=1}^3 \lambda_i$ is significantly different from zero, it indicates that proxies of behavioral pitfalls Granger cause investor herding tendency. Additionally, if $\sum_{i=1}^3 \phi_i$ is statistically different from zero, it indicates that investor herding tendency Granger causes proxies of behavioral pitfalls.

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Independent variables</th>
<th>F-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSAD_{i,t}</td>
<td>CSAD_{i,t-1} + B_{1,t-1} - (EO_{i,t-1})</td>
<td>3293.02***</td>
</tr>
<tr>
<td>B_{1,t}(EO_{i,t})</td>
<td>CSAD_{i,t-1} + B_{1,t-1} - (EO_{i,t-1})</td>
<td>3185.59***</td>
</tr>
<tr>
<td>CSAD_{i,t}</td>
<td>CSAD_{i,t-1} + B_{1,t-1} - (OC_{i,t-1})</td>
<td>3293.55***</td>
</tr>
<tr>
<td>B_{1,t}(OC_{i,t})</td>
<td>CSAD_{i,t-1} + B_{1,t-1} - (OC_{i,t-1})</td>
<td>51.12***</td>
</tr>
<tr>
<td>CSAD_{i,t}</td>
<td>CSAD_{i,t-1} + B_{1,t-1} - (DE_{i,t-1})</td>
<td>3292.53***</td>
</tr>
<tr>
<td>B_{1,t}(DE_{i,t})</td>
<td>CSAD_{i,t-1} + B_{1,t-1} - (DE_{i,t-1})</td>
<td>2.64***</td>
</tr>
</tbody>
</table>

*** Indicate significance at 1% level.
The founder of Confucianism is Confucius, who is one of the greatest educators and philosophers in Chinese history. Confucianism is the mainstay of Chinese culture and the ethical system of Chinese society. Although Confucian philosophy is derived from China, it not only dominates the core value of global Chinese people but also influences the humans’ behavioral norm in adjacent countries. Overall, countries under the influence of Confucian philosophy include China, Hong Kong, Japan, Korea, Macau, Taiwan, and Vietnam.

According to the arguments of Confucian philosophy, this study concludes that investors in the stock markets under the influence of Confucian philosophy are living in a society with a high power distance, low individualism, high masculinity, low uncertainty avoidance, and low long-term orientation. The aforementioned culture characteristics of Confucian countries may cause the investors in these countries to exhibit visible herding behavior. In Section 3.1, our empirical results show that the majority of Confucian countries display significant herding behavior (note: Macau and Vietnam under the influences of Confucian culture were not the research subjects of this study). Moreover, this study indicates that power distance, individualism, and masculinity are significantly associated with the formation of investors’ herding behavior. These results are consistent with the aforementioned conclusions.

According to the above discussion and our empirical results, this study argues that investors in stock markets dominated by Confucian philosophy emphasize public morality and follow the behavior of the majority of people. This not only impacts investors’ decision-making but also frames their reaction to a certain informational shock. In other words, this affects how investors in the stock markets invest. Therefore, Confucian philosophy may trigger investors’ herding behavior.

6. Conclusions

This study aims to investigate investor herding behavior in international stock markets, as well as examine the influence of internal behavioral pitfalls and external national culture on herding behaviors and tendencies. Unlike previous literature, this study has four unique features. First, in lieu of addressing the cause of imitating public behavior, this study examines the causes of herding behavior from the perspective of a cross country culture comparison. Second, while herding behavior among investors is irrational and behavioral pitfalls have been identified in existing behavioral finance literature, the causes of herding tendency have seldom been addressed from the perspective of behavioral pitfalls. With this in mind, this study examines the causes of herding tendency from that perspective. Third, this study discusses whether macro indexes are the determinants of herding and why Confucian philosophy may lead to herding. Finally, this study explores more subjects and uses a longer interval than the majority of earlier studies, covering 50 stock markets over 46 years.

Our empirical results show that first, among 50 stock markets, only 18 exhibit significant herding behavior, but that among Confucian stock markets and those with low sophistication, herding behavior is significantly more common. Second, our findings show that national cultural factors influence herding behavior to some degree, and that aspects such as power distance, individualism, and masculinity have more dominant influences than others. Finally, we find that behavioral pitfalls, including excessive optimism, overconfidence, and the disposition effect, significantly dominate investors’ herding tendencies.

Based on the empirical results of this study, we find that investor herding tendency varies among stock markets. The causes of differences in investors’ herding tendencies, in addition to those described in previous literature, include internal behavioral pitfalls and external national cultures, and especially investors’ inevitable tendency toward error (behavioral pitfalls) in decision-making processes. As a result, when engaging in international portfolio management, mutual fund managers should consider differences in national cultures and the sophistication of investors in particular stock markets.

References
