

Social Factors and Herd Behaviour in Developed Markets, Advanced Emerging Markets and Secondary Emerging Markets

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This paper examines the existence of herd behaviour in fifteen (15) global stock markets, which consist of Developed Markets (Canada, Hong Kong, Japan, Singapore and the United Kingdom), Advanced Emerging Markets (Brazil, Malaysia, Mexico, Poland and South Africa) and Secondary Emerging Markets (Chile, China, Indonesia, the Philippines and Russia) by using Cross Sectional Absolute Deviation (CSAD) method of Chiang and Zheng (2010). It also seeks to explore the impact of social factors such as prosperity, education, ageing society, industry orientation and gender on the existence of market-wide herding. The findings of this paper indicate that herd behaviour exists in Singapore (Developed Market), Mexico, Poland and South Africa (Advanced Emerging Markets) and China and the Philippines (Secondary Emerging Markets). No evidence of herding is observed for Canada, Hong Kong, Japan, United Kingdom, Brazil, Malaysia, Chile, Indonesia and Russia. Ageing society is also found to have significant impact on the existence of herd behaviour. Nonetheless, prosperity, education, industry orientation and gender are found to be insignificant to herding. This study sheds some light on whether social factors determine herding behaviour in the 15 selected stock markets.

Keywords: Behavioural Finance, Herd Behaviour, Social Factor, Developed Markets, Advanced Emerging Markets, Secondary Emerging Markets

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Introduction

Financial market is a reflection of a society's aggregate behaviour. It is a platform in which people exchange financial commodities, securities and other fungible items of value at certain price, which reflects the supply and demand forces. Nonetheless, the question that bears to be answered is what has caused people to participate in market activities and why some investors are showing idiosyncratic behaviour by blindly following the investment decision of other investors? It is widely believed by most researchers that the stock market participation is correlated to social herd activity (Hong, Kubik, & Stein, 2004; Nofsinger, 2005). Due to the peer effect and social mood, investors are inclined to participate in the market when they have friends and/or family undertaking similar market activity. Nevertheless, the aggregate market activity can cause idiosyncratic behaviour among investors such as herding (Cont & Bouchaud, 2000).

The collective behaviour of a group of people relying on the decision of other investors without verifying the truth of information is known as crowd effects or herd behaviour. From sociology perspective, Raafat, Chater and Frith (2009) argue that herd behaviour is a form of convergent social behaviour that can be broadly defined as the alignment of thoughts or behaviours of individuals in a group (herd) through local interaction and without centralized coordination. From behavioural finance perspective, herding is a phenomenon that describes behaviour of a smaller group of investors that mimic or shadow the behaviour of a larger group of investors who have been identified as "informed investors" (Devenow & Welch, 1996). Nonetheless, major fluctuations in stock prices are not necessarily due to either arrival of new information or changes in fundamental economics (Cont & Bouchaud, 2000). In real market, fund managers tend to simply mimic the investment decision of other managers and ignore substantive private information (Scharfstein & Stein, 1990). This imitation game of idiosyncratic behaviour is known as herd behaviour.

The evidence of herd behaviour in global stock markets is widely detected by many authors (Lux, 1995; Economou, Kostakis & Philippas, 2010; Chiang, Jeon & Li, 2007). Brock, Lakonishok and LeBaron (1992) study the behaviour of money managers in investing associated with herd behaviour. They show that only 42% of money managers change their worst performers whereas the rest still follow the crowd in the market. In the study by Chiang and Zheng (2010), they found that herding exists in advanced and Asian markets but limited evidence of herding is detected in Latin American markets. It shows that different stock markets with dissimilar characteristics may result in different outcomes of herding.

Noticeably, numerous authors have found a few factors that can contribute to this idiosyncratic behaviour. Researchers (for example Gelos & Wei, 2002; Jaiswal & Kamil, 2012) found that social factors have a huge impact on the existence of herd behaviour. Social factor can be defined as the facts and experience that shape the psychology, behaviour and personality of individuals in a society (Kessler, Price & Wortman, 1985). A distinctive example of social factor is gender. Typically, men are exposed to higher degree of herding compare to women due to overconfidence. Hence, men tend to trade more excessively (herd) than women (Barber & Odean, 2001). Another example of social factor is education level. Using data from a national survey of

nearly 2000 mutual fund investors, Dwyer, Gilkeson and List (2002) examine the risk-taking behaviour of investors. They found that investors with higher financial knowledge are less exposed to risk-taking behaviour and do not blindly follow the investment decision of other investors (herding).

Previous literature related to herd behaviour mainly focus on the detection of herding and impact of non-social factors such as investors' psychology, market momentum and influence of United States (US) market (Yao, Ma & He, 2014; Chiang & Zheng, 2010; Nofsinger & Sias, 1999). However, literature looking at the impact of social factors on herd behaviour is still lacking. This current paper differs from previous studies in the sense that it examines social factors and their impact on herd behaviour. The originality of this paper could be a significant opportunity to assist academicians and practitioners in better understanding the existence of herd behaviour and social factors that relates to herding in global stock markets.

Literature Review

Herd behavior.

One of the pronounced studies relates to herd behaviour is the study of Chiang and Zheng (2010). They apply data from 1988 to 2009 for 18 countries and found that herding exists in Advanced and Asian Markets except for Latin America Market. It indicates that the different countries may result in different outcomes of herding in the markets. This finding is consistent with the study of Chang, Cheng and Khorana (2000) in which they examine the existence of herd behaviour in different international markets such as Hong Kong, Japan, South Korea and Taiwan. The study shows that no signal of herd behaviour is detected in the US and Hong Kong except for South Korea and Taiwan.

Chiang et al. (2007) argue that Malaysia, Philippines and Korea are found with the evidence of contagion effect by analysing 9 Asian daily stock-return data series from 1990 to 2003. The market's response is over-pessimistic and shows a continued high contagion effect, which is a characteristic of herding. Kaminsky and Schmukler (1999) study the Malaysian stock market performance during 1997 Asian Crisis and they found that the number of daily news and rumours increases dramatically and subsequently affects investors' behaviour by selling out their shares even though the initial market is considered as stable. Their study proves that herding exists in the early stage of 1997 Asian Crisis.

Undoubtedly, economic crises such as dotcom bubble and 1997 Asian crisis are the outcomes of herding. Lux (1995) studies the formation of herd behaviour in speculative markets and he argues that the emergence of bubble is a self-organizing process of infection among traders leading to equilibrium prices, which derivate from fundamental values. Herd behaviour occurred in the market because the optimistic attitude of investors has fostered the disposition to overtake other bullish beliefs. Likewise, Bowe and Domuta (2004) inspect Jakarta stock exchange to analyse the investment strategy of foreign and local investors before, during and after 1997 Asian

Crisis. The result shows that both types of investor herd in the market but foreigners herd more than local investors and foreign investors herd increases following the onset of the crisis. In the study of Guedj and Bouchaud (2005), they argue that the existence of herd behaviour in the United States, Europe, the United Kingdom and Japan stock markets are particularly stronger in the early nineties and during the Internet Bubble Crisis. The study of Barro (1990) also shows that black Monday on October 19, 1987, where the DJIA dropped by 508 points and did not regain its last closing high until almost two years later (October 1, 1987 – September 29, 1989). His study indicates that there was a strong signal of herding detected during and after Black Monday crisis.

Most of the literature (Chiang & Zheng, 2010; Christie & Huang, 1995) apply ordinary least squares (OLS) method to estimate the regression equations of herding. Nonetheless, there is an alternative estimator, which is quantile regression model (Koenker & Bassett, 1978) used to detect the evidence of herding in extreme market condition. Unlike OLS, the quantile regression model specifically targets the tails of distribution, which is the part of extreme market condition. Barnes and Hughes (2002) argue that quantile regression model is more suitable than OLS to examine herding under extreme up and down market. Pochea, Filip and Pece (2017) examine herding in ten Central and East European markets by using quantile regression model and the result shows that herding exists in all quantile levels of down markets. Another comparable study is Chiang et al. (2010) in which they apply OLS and quantile regression model to examine herding in Shenzhen A and Shenzhen B markets. Surprisingly, no evidence of herding is detected using OLS estimator while it is detected by using quantile regression model in the lower quantile region. These studies affirm that herding exist under extreme market condition by using quantile regression model.

Based on the review of previous literature, it seems that the findings are inconclusive because herd behaviour exists in certain stock markets but not necessarily in all global stock markets. The evidence of herding has to be further proven by applying latest market data.

Social factors and herd behavior.

England (1998) defines prosperity as the aggregate results of economic growth, safety, health and governance. In turn, prosperity affects social psychology of a country (Diener, Ng, Harter & Arora, 2010). In the study by Chen, Kim, Nofsinger and Rui (2007), they argue that investors in China as an emerging market are prone to the characteristics of herd behaviour. Chinese investors are found to be overconfident and associated with representative bias. Meanwhile, Chiang and Zheng (2010) show that the evidence of herd behaviour was not detected in Argentina, Brazil, Chile and Mexico as these countries are considered as lower prosperity markets compare to China. This literature indicates that prosperity may affect herd behaviour.

Education is no doubt a part of social factors. In the study of Altman (2012), he argues that higher level of education facilitates investors to make better financial decisions by utilising information on hand. Hong et al. (2004) reveal that societies with higher number of educated households tend to have higher stock market participation rate. Nonetheless, the high market

participation rate can lead to contagion effect, which may eventually cause herding to exist in the markets (Lux, 1995).

According to Ng (1998), the advents of ageing society lead to various social changes and affect beliefs and behaviour of individuals. Poterba (2004) argues that Japan is a highly ageing society and the ageing population has affected the aggregate investors' behaviour in the same market. Uchida and Nakagawa (2007) examined Japanese market and found that the evidence of herd behaviour is consistently detected in regional banks while city banks herd during economic crisis periods. Another evidence of the impact of ageing is proven by Suto and Toshino (2005). They argue that the existence of herd behaviour among Japanese pension fund managers is caused by short-term bias because they are under the pressure of elder clients to improve the appearance of their portfolio. The fund managers tend to mimic the investment behaviour of other fund managers due to asymmetric information. Likewise, Davis (2012) shows that ageing population brings major uncertainty to the stability of financial market as it involves major shift in financing, which may give rise to financial turbulence. He argues that herd behaviour of institutional investors can cause more financial instability when the market is occupied with elder investors.

In this paper, industry orientation is defined as the economic industry that acts as the key contributor to a society's financial development. Many authors argue that herd behaviour exists in the market and tends to appear in certain industry, which has greater impact on market index. One of the empirical evidences is documented in Gębka and Wohar (2013). They examine the occurrence of herd behaviour in global equity market across different sectors. Evidence of herd behaviour is only detected in specific sectors such as basic materials, consumer services, and oil and gas. Similar evidence is presented by Cakan and Balagyozyan (2014) where they found that herding exists in Turkish banking industry when the market is rising.

Gender as a social factor is widely believed by many authors (Barber & Odean, 2001; Dwyer et al., 2002) in causing herding due to differences in personality traits. Beckmann, Lütje and Rebeggiani (2011) examine Italian market to determine the impact of gender on risk-taking. They argue that women prefer a more passive investment strategy than men due to their higher level of risk aversion. Nonetheless, the risk averse attitude can lead to informational cascade that is subsequently advanced to herding (Decamps & Lovo, 2002). Another empirical result is proven by Beckmann and Menkhoff (2008) in which they analyse gender differences in risk taking and overconfidence. They argue that gender differences manifest themselves in the ways that are expected because the finding shows that women are more risk averse and tend to avoid competition in markets. A more risk adverse investment strategy can cause the existence of herd behaviour because they are afraid to get lost if they don't follow the crowd to make the same investment decision. Salem (2019) examines the investment behaviour of Arab women through online questionnaires of 600 Arab male and female individuals. Noticeably, he found that Arab women exhibit greater tendency of herd behaviour compared to Arab men.

Non-social factors and herd behavior.

Two non-social factors, namely market condition and influence of the US market, are included in this paper as control variables. These are variables known to influence herd behaviour from the previous studies. This will allow the tests to find out whether the variables of focus, i.e., the social factors identified above, significantly relate to herd behaviour.

As part of technical analysis, stock market condition is believed to be predicted based on different market volume, information precision and price movement (Blume, Easley & O'hara, 1994). The study of Yao et al. (2014) has demonstrated a great example of herd behaviour as they found that Chinese A and B markets exhibit different degree of herding due to dissimilar market conditions and herding is more obvious when the markets are declining. Chiang and Zheng (2010) examine the potential existence of herding in global stock markets and found that herd behaviour is triggered when the market is in crisis and the herding can be spread to other countries due to contagion effect.

In the same study of Chiang and Zheng (2010), they examine the impact of the US market on global stock markets. The result reveals that herding of Advanced markets and Asian markets except for Hong Kong and Chinese ones is affected by the US market's return. Similar result is proven by the study of Hwang and Salmon (2004) in which they study herd behaviour relationship across different markets and found that there is a correlation between herding of US market and United Kingdom (UK) market.

Based on the above discussion, this paper attempts to demonstrate the impact of social factors on the existence of herd behaviour in global stock markets with non-social factors act as control variables. In this context, this study proposes the following hypotheses:

H1. Herd behaviour exists in the Developed Markets, Advanced Emerging Markets and Secondary Emerging Markets

H2. There is a significant relationship between social factors and herd behaviour

H2(a). There is a significant relationship between prosperity and herd behaviour

H2(b). There is a significant relationship between education and herd behaviour

H2(c). There is a significant relationship between ageing society and herd behaviour

H2(d). There is a significant relationship between industry orientation and herd behaviour

H2(e). There is a significant relationship between gender and herd behaviour

Estimated Model

This paper adopts market-wide herding approach to detect the existence of herd behaviour because it allows this paper to capture the evidence of herding that exists in market-wide form instead of the herding of an individual or a small group of investors. In an earlier study of herd behaviour by

Christie and Huang (1995), they propose a method to detect the existence of herd behaviour, which is Cross-Sectional Standard Deviation (CSSD) as expressed below:

$$CSSD = \sqrt{\frac{\sum_{i=1}^N (R_{i,t} - R_{m,t})^2}{(N-1)}} \quad (1)$$

In a later study of Chang et al. (2000), they modified the CSSD to Cross-Sectional Absolute Deviation (CSAD) because they argue that CSSD tends to be sensitive to outliers. The formula of CSAD as proposed Chang et al. (2000) is measured by:

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

$$CSAD_t = \gamma_0 + \gamma_1 |R_{m,t}| + \gamma_2 R_{m,t}^2 + \varepsilon_t \quad (3)$$

Rational Asset Pricing Model assumes that equity return dispersion is linearly related to market return ($R_{m,t}$), which indicate that equity return dispersion is an increasing function of market return (eq. 3) if herding is presumed to be non-existence. This is because investors are rational and they do not follow the crowd to invest, the differences between equity return dispersion and market return should be increasing. In this context, Chang et al. (2000) argue that herding should be tested in a non-linear equation. If investors are herding and follow the crowd to invest, the relation between return dispersion and market return should be in a non-linear relation, either increasing at a decreasing rate or decreasing.

Chiang and Zheng (2010) modify the abovementioned CSAD to take care of the asymmetric investors' behaviour under different market conditions. The CSAD as proposed by Chiang and Zheng (2010) is written as below:

$$CSAD_t = \gamma_0 + \gamma_1 R_{m,t} + \gamma_2 |R_{m,t}| + \gamma_3 R_{m,t}^2 + \varepsilon_t \quad (4)$$

where, CSAD is the cross sectional absolute deviation, $R_{m,t}$ is the cross-sectional average return of the market portfolio consists of N shares at year t (linear), $|R_{m,t}|$ is the absolute term of the cross-sectional average return of the market portfolio consists of N shares at year t, $R_{m,t}^2$ is the squared term of cross-sectional average return of the market portfolio consists of N shares at year t (non-linear) and ε is the error term.

When herd behaviour is absent, one would expect a positive value of coefficient γ_1 . The absolute term of the cross-sectional average market return ($|R_{m,t}|$) is used to measure the distance of market return away from point zero. The significant negative value of the coefficient of squared term of the non-linear cross-sectional average market return ($R_{m,t}^2$), γ_3 indicates that the cross-sectional dispersion is becoming smaller or increasing at a decreasing rate and thus, it proves the presence of herding in the market.

The CSAD as proposed by Chiang and Zheng (2010) is criticised by Yao et al. (2014) and Filip, Pochea and Pece (2015). They claim that the CSAD suffers from serious heteroscedasticity and

autocorrelation due to insufficient independent variation in the explanatory variables and multiple market return ($R_{m,t}$) are applied in the same equation. They propose to include extra 1-day lag in the CSSD and CSAD equation to remove a large proportion of the multicollinearity between the explanatory variables in the regression equation. Nonetheless, the method of using lagged dependent variables is opposed by many authors (Grubb & Symons, 1987; McKinnish, 2005; Achen, 2001) as they claim that it may suppress the explanatory power of other independent variables and lagged dependent variable is only suitable for the modelling assuming that the forecast of the next period can be predicted by the past values.

Due to the critiques on lagged dependent variable, we adopt the CSAD (eq. 4) method of Chiang and Zheng (2010) and conduct further tests on multicollinearity and heteroscedasticity because it is one of the most recent methods proposed to detect the existence of market-wide herding and the equation covers the potential deficiencies of CSSD by Christie and Huang (1995) and CSAD by Chang et al. (2000).

For independent variables, this paper adopts the following measurements to detect their impact on herd behaviour:

Table 1

Measurement of Social Factors

Social Factors	Measurement	Formula	Previous literature/ Reference
Prosperity	GDP per Capita	$\frac{\text{Total Gross Domestic Products}}{\text{Total Population in the county}}$	Leamer (2009)
Aging Society	Aged Dependency Ratio	$\frac{\text{Number of people aged 65 and over}}{\text{Number of people aged 15-64}}$	d'Albis and Collard (2012)
Education	Education Index	$EI = \frac{MYSI + EYSI}{2}$ MYSI: Mean years of schooling index EYSI: Expected years of schooling index	McGillivray (1991); McGillivray and White (1993); and Cahill (2005)
Industry orientation	Value Added Method	$\frac{\text{Largest GDP composition by sector}}{\text{Total GDP (production approach)}}$	Nakagawa and Uchida (2011)
Gender	Sex Ratio	$\frac{\text{Total Population of Male (Age 21 and above)}}{\text{Total Population of Female (Age 21 and above)}}$	Clark (1978)

Table 2

Measurement of Non-Social Factors

Non-Social Factors	Measurement	Formula	Previous literature/ Reference
Market Condition	Market Composite Index	$\frac{\text{Market Index}_t - \text{Market Index}_{t-1}}{\text{Market Index}_{t-1}}$	Demirer and Kutan (2006)
Influence of U.S Market	U.S Market Index divided by $Market_i$ Index	$\frac{\frac{\text{NYSE Index}_t - 1}{\text{NYSE Index}_{t-1}}}{\frac{\text{Market Index}_t - 1}{\text{Market Index}_{t-1}}}$	Chang et al. (2000); Chiang and Zheng (2010)

Panel data regression is used to examine the relationship between social factors and herd behaviour as this paper requires analysis of cross-sectional and time-series analysis simultaneously for 15 global stock markets from 2007 to 2016. This paper proposes the following panel data regression:

$$HB_t = \alpha_i + \beta_1 P_{i,t} + \beta_2 AS_{i,t} + \beta_3 E_{i,t} + \beta_4 IO_{i,t} + \beta_5 G_{i,t} + \beta_6 MC_{i,t} + \beta_7 IM_{i,t} + \varepsilon_t \quad (5)$$

where, HB refers to the market-wide herd behaviour at time t, P refers to the prosperity of country i at time t, AS refers to the ageing society of country i at time t, E refers to the education of country i at time t, IO refers to the industry orientation of country i at time t, G refers to the gender of country i at time t, MC refers to the of country i market condition at time t, IM refers to the influence of US market of country i at time t, α refers to the unobserved individual effect, β refers to the slope of regression, ε refers to the error term, i refers to individual countries and t refers to the year.

Data

In this paper, the research timeframe is from 2007 to 2016. This paper selects 15 global stock markets based on FTSE Russell Country Classification Review, which is owned by London Stock Exchange Group. The FTSE country classification process is designed to be transparent and evidence-driven as well as ensuring the criteria used to determine country classification meet the needs of global investors. The guiding principles in classifying global stock markets are based on the quality of the market, materiality, consistency and predictability, cost limitation, stability and market access.

Based on the FTSE Annual Country Classification Review (September 2017), this study selects five countries from each market category, Developed Markets: Canada, Hong Kong, Japan,

Singapore and the UK; Advanced Emerging Markets: Brazil, Malaysia, Mexico, Poland and South Africa; Secondary Emerging Markets: Chile, China, Indonesia, Philippines and Russia.

The data related to stocks and indexes are collected from DataStream and data related to social factors are extracted from World Bank Database. To avoid representative bias, this paper only chooses the public listed companies, which were listed before 2007 and maintained its listing status as at 31 December 2016. A total number of 12,873 stocks from 15 global stock markets are selected as samples. The stock return is calculated as $R_{t=100} = 100 \times (\log(P_t) - \log(P_{t-1}))$, where P_t denotes the stock price.

Empirical Evidence

Descriptive statistic.

Prosperity is measured by GDP per capita in US dollar unit and Table 3 shows that the GDP per capita has a mean value of \$20,090.76. Singapore has the highest GDP per capita with a value of \$56,336.70 in 2014 while Philippine has the lowest GDP per capita in 2007 with a value of \$1,672.685. Although China has highest total GDP and GDP growth rate, the GDP per capita of China is lower than most of the 15 selected countries. It indicates that the prosperity of China is not well-distributed to each citizen. Another social factor is ageing society, which is measured by aged dependency ratio. Japan has the largest ageing society with a value of 0.65 aged dependency ratio recorded in 2016.

The higher value of education indicates that the citizens receive higher level of education. The United Kingdom and Canada are having higher Education Index with value of 0.90. On the other hand, China and Indonesia have Education Index with a value of 0.56. It shows that China and Indonesia are not providing sufficient education to their citizens when benchmarking to other countries. On the other hand, industry orientation has mean a value of 0.64, which means that the largest industries of the each 15 selected countries contribute around 64% to the total GDP on annually basis. The service sector of Hong Kong contributed more than 93% of GDP for the past decade.

Gender has a mean value of 0.96 and it allows this study to conclude that the 15 countries are having greater number of female compare to male. Malaysia, China and Indonesia are the countries having sex ratio more than 1, which means that the total number of male outnumbers the total number of female. Nevertheless, the other countries are having majority of female. Malaysia has recorded the highest value of sex ratio, which is 1.07 while Hong Kong has the lowest value of sex ratio, which is 0.83. Table 3. Descriptive Statistic of Variables

Table 3

Descriptive Statistic of Variables

Statistic	Mean	Median	Maximum	Minimum	Standard Deviation	Skewness	Kurtosis	Jarque-Bera	P-value
Dependent Variable									
Herd Behaviour	34.00	32.77	78.15	1.67	11.96	0.93	4.32	32.28	0.00
Independent Variables (Social Factors)									
Prosperity (USD, \$)	20090.76	11401.17	56336.07	1672.69	17241.08	0.75	21.10	21.10	0.00
Ageing Society	0.47	0.47	0.66	0.33	0.08	0.16	2.23	4.29	0.12
Education	0.73	0.74	0.90	0.56	0.09	0.01	1.73	10.14	0.01
Industry Orientation	0.64	0.64	0.93	0.41	0.13	0.24	3.06	1.51	0.47
Gender	0.96	0.96	1.07	0.83	0.06	-0.35	0.19	3.29	0.19
Control Variables (Non-Social Factors)									
Market Condition	0.07	0.05	1.29	-0.72	0.30	0.66	5.20	41.13	0.00
Influence of U.S Market	17.01	0.46	2397.88	-26.71	195.80	12.11	147.73	134572.30	0.00

Existence of herd behaviour in 15 global stock markets.

This paper uses CSAD regression model to determine the existence of herd behaviour. Using Eviews, the result of CSAD regression model (eq. 4) is tabulated below:

Table 4

CSAD Regression for 15 Global Stock Markets

Classification	Constant	R _{m,t}	R _{m,t}	R ² _{m,t}	R ²
Developed Markets					
Canada	57.8904	-0.0623	-0.1375	0.0029	0.0471
Hong Kong	36.2909	0.0579	0.1263	0.0005	0.4610
Japan	18.9638	-0.0729	0.1409	0.0027	0.8126
Singapore	27.1987	0.0070	0.2438	-0.0006	0.7923
United Kingdom	32.6136	0.0062	0.2297	0.0006	0.9834
Advanced Emerging Markets					
Brazil	33.8212	0.0267	-0.6601	0.0215	0.8661
Malaysia	24.6166	0.0471	0.1039	0.0021	0.5793
Mexico	19.6147	-0.2532	1.0344	-0.0195	0.6427
Poland	23.9689	0.0747	0.4173	-0.0010	0.4254
South Africa	26.8177	-0.2185	0.4253	-0.0111	0.4177
Secondary Emerging Markets					
Chile	16.5310	-0.0532	0.3639	0.0045	0.8636
China	19.5057	0.0229	0.5482	-0.0049	0.1352
Indonesia	29.9079	0.0033	0.2033	0.0030	0.9355
Philippines	19.3561	-0.0479	0.8590	-0.0063	0.8276
Russia	44.7881	0.3634	-1.1653	0.0204	0.8349

As mentioned previously, the coefficient of the squared term of cross-sectional average market return ($R^2_{m,t}$) in CSAD regression is used to examine the occurrence of herd behaviour. The negative coefficient of $R^2_{m,t}$ indicates that the cross-sectional dispersion is becoming smaller or increasing at a decreasing rate and the evidence of herd behaviour is detected in the specific market. From Table 4, Singapore (Developed Markets), Mexico, Poland and South Africa (Advanced Emerging Market) and China and Philippines (Secondary Emerging Markets) are detected with the existence of herding due to the negative coefficient of the squared term of cross-sectional average market return. This is because smaller group of investors follows the footsteps of larger group of investors and the dispersion of return becomes smaller. If herd behaviour does not exist in the market, the dispersion of return shall become bigger as it shows that the investors are not following the investment strategy of a larger group of investors. The result of Table 4 allows us to reject null hypothesis and accept the alternative hypothesis, hence confirms the evidence of herd behaviour in the 6 out of 15 global stock markets from 2007 to 2016.

A rather distinctive finding from Table 4 is that no evidence of herding is detected for Canada, Hong Kong, Japan, the United Kingdom, Brazil, Malaysia, Chile, Indonesia and Russia. It contradicts the study of Chiang and Zheng (2010) in which they found that herding exists in Canada, Hong Kong, Japan, the United Kingdom, Malaysia and Indonesia and no evidence of herding is detected in Latin American Markets such as Brazil and Chile. The summary of the evidence of herding in comparison with previous literatures is presented in Table 5.

This contradictory result can be explained by a few reasons: changes in social factors, short-lived herding and different methods used by previous studies. A few studies (Chiang & Zheng, 2010; Chang et al., 2000; Filip et al., 2015; Indārs, Savin & Lublóy, 2019), which use CSAD have presented contradictory result as well. One of the possible explanations is the changes in social factors that can affect the existence of herding in the markets. It is widely believed by many authors (Suto & Toshino, 2005; Beckmann & Menkhoff, 2008), that social factors can cause the existence of herding and Table 4 has also outlined huge dispersion of social factors. Another possible explanation is the fact that investors display short-lived herding. In the study of Christie and Huang (1995), they argue that herding is a short-lived phenomenon that can be changed over time. We understand that the data ranges of the abovementioned previous studies are dissimilar and the result should be insensitive to time period. Nevertheless, the short-lived herding may be the reason in causing all these discrepancies and indicates that herding may not permanently exist in the markets.

Previous studies (Chen, Rui & Xu, 2003; Iihara, Kato & Tokunaga, 2001) have proven the existence of herding in China and Japan. However, the methods used are relative cross-sectional dispersion of idiosyncratic return (RCSDI) and change in ownership as a proxy to herding, which are widely different from CSAD in detecting market-wide herding. Likewise, Demirer and Kutan (2006) argue that the evidence of herding is not detected in China by using CSSD, which is proven to be sensitive to outliers.

Hausman test: random effects vs fixed effects.

Prior to determining the relationship between social factors and herd behaviour, panel data regression should be examined with suitable model, either fixed effect model or random effect model. Fixed effect model assumes that unique attributes of individuals do not vary across time. These attributes may or may not be correlated to dependent variable. On the other hand, random effect model assumes that attributes of individuals are not correlated to dependent variable (Bell & Jones, 2015). In order to test for the suitable model, Hausman test is used. The hypotheses of the Hausman Test are:

$$H_0: \text{Cov}(\lambda_i, X_{it}) = 0 \text{ (No correlation between } \lambda_i \text{ and } X_{it} \text{)}$$

$$H_1: \text{Cov}(\lambda_i, X_{it}) \neq 0 \text{ (Correlation between } \lambda_i \text{ and } X_{it} \text{)}$$

Using Eviews, the p-value of the Hausman test is 0.0015, which is significant at 5%. The result indicates that the null hypothesis is rejected while alternative hypothesis is accepted. The preferred model is fixed effects.

Multicollinearity, heteroscedasticity and serial correlation tests.

A panel data regression model shall be examined with potential occurrence of multicollinearity, heteroscedasticity and serial correlation to avoid any bias in the model. For multicollinearity, this paper uses variance inflation factor (VIF) to examine its existence in the regression. According to the study of Belsley, Kuh and Welsch (2005), if the result of the VIF is higher than 10, the multicollinearity problem is detected in the regression. The result of the VIF of each variable is tabulated in Table 6.

Table 5

Comparison of the Evidences of Herding With Previous Studies

Current Study	Chiang and Zheng (2010)	Chang et al. (2000)	Filip et al. (2015)	Indars et al. (2019)	Demirer and Kutun (2006)	Chen et al. (2003)	Iihara et al. (2001)
Research Timeframe							
2007-2016	1988-2009	1963-1997	2008-2010	2008-2015	1999-2002	1996-2002	1975 to 1996
Methodology							
CSAD	CSAD	CSAD	CSAD	CSAD	CSSD	RCSDI	Change in Ownership
Existence of Herd Behaviour (Countries)							
<ul style="list-style-type: none"> ▪ Singapore ▪ Mexico ▪ Poland ▪ South Africa ▪ China ▪ Philippines 	<ul style="list-style-type: none"> ▪ Australia ▪ China ▪ France ▪ German ▪ Hong Kong ▪ Indonesia ▪ Japan ▪ Korea ▪ Malaysia 	<ul style="list-style-type: none"> ▪ Japan partial evidence ▪ South Korea ▪ Taiwan 	<ul style="list-style-type: none"> ▪ Romania ▪ Bulgaria ▪ Czech Republic ▪ Hungary 	-	-	<ul style="list-style-type: none"> ▪ China (Shanghai B and Shenzhen B) * Shanghai B and Shenzhen B are foreign investors predominate. 	<ul style="list-style-type: none"> ▪ Japan (Institutional and foreign investors)

- Singapore
- Taiwan
- Thailand
- United Kingdom

Non-existence of Herd Behaviour (Countries)

- | | | | | | | |
|------------------|-----------------|-----------------|----------|---------------------------------|-----------------------------------|---|
| ▪ Brazil | ▪ Argentina | ▪ Hong Kong | ▪ Russia | ▪ China (Shanghai and Shenzhen) | ▪ China (Shanghai and Shenzhen A) | - |
| ▪ Canada | ▪ Brazil | ▪ United States | ▪ Poland | | | |
| ▪ Chile | ▪ Chile | | | | | |
| ▪ Hong Kong | ▪ Mexico | | | | | |
| ▪ Indonesia | ▪ United States | | | | | |
| ▪ Japan | | | | | | |
| ▪ Malaysia | | | | | | |
| ▪ Russia | | | | | | |
| ▪ United Kingdom | | | | | | |
- *Shanghai B and Shenzhen B are local investors predominate

Table 6

Variance Inflation Factors (VIF)

Variables	VIF	1/VIF
Prosperity	4.00	0.25
Industry Orientation	3.69	0.27
Education	3.10	0.33
Gender	2.70	0.37
Ageing Society	1.13	0.88
Influence of U.S Market	1.06	0.94
Market Condition	1.02	0.98

This paper uses Modified Wald test to detect the group-wise heteroscedasticity in a fixed effect regression model. The result of heteroscedasticity test indicates that p-value is significant at 5% and thus, the signal of heteroscedasticity is detected. There is a need to perform remedial action by using the robust option to remove the heteroscedasticity. The result of the Modified Wald test is shown below:

Null Hypothesis, $H_0 \sigma_i^2 = \sigma^2$ all i (errors are homoscedastic)

chi2(1) = 63.11, Prob > chi2 = 0.0000

Wooldridge test is used to detect the existence of serial correlation (also known as autocorrelation) in this paper. In other words, serial correlation is a characteristic of data in which the correlations between the values of the same variables are based on related objects (Neville, Simsek & Jensen, 2004). The finding shows that serial correlation is significant at 5% and detected as there is potential correlation between the values of the variables. The results of the test are discussed below:

Null Hypothesis, H_0 : No first order autocorrelation

F(14, 128) = 2.15, Prob > F = 0.0132.

Relationship between social factors and herd behaviour.

By using the commands in the STATA 12, this paper rectifies heteroscedasticity and serial correlation. The corrected panel data regression is tabulated in Table 7:

Table 7

Panel Data Regression Corrected Model for Heteroscedasticity and Serial Correlation

Variables	Coefficient	Standard Error	T-Statistic	P-value
Constant	-0.42	4073.24	1.04	0.30
Prosperity	0.004	0.01	0.46	0.65
Ageing Society	-5706.89	2830.47	-2.02	0.04
Education	280.64	2276.05	0.12	0.90
Industry Orientation	-355.88	901.65	-0.39	0.69
Gender	-893.25	3183.65	-0.28	0.78
Market Condition	3205.38	808.59	3.96	0.00
Influence of U.S Market	4248.33	0.81	-0.31	0.75

As shown in Table 7 above, ageing society and market condition are the only two variables having p-values less than 0.05, which indicate that these two variables are significant at 5%. Nevertheless, the market condition is one of the control variables and it is considered as non-social factor. The result of the corrected model of the panel data regression shows that ageing society is the only social factor significant to herd behaviour.

This result is indirectly supported by the arguments of many studies (Poterba, 2004; Suto & Toshino, 2005) in which the authors argue that elder investors are changing financial markets and also are inclined to short-term bias including herding. Poterba (2004) examines the impact of changes in demographic, more specifically on age structure and population on financial markets. The study noted that the size of elder population can reshape U.S financial market and cause the asset prices to rise sharply due to contagion effect, which appears to be the characteristic of herding. It also argues that elder investors tend to have more preserved investment strategy as the provision of insurance for their late-life financial risks.

This result is comparable to the study of Suto and Toshino (2005) in which they found that Japanese institutional investors are exposed to short-term bias and herding based on the results of questionnaire survey. They argue that Japanese fund managers are more sensitive to the pressure

from customers, which is mainly constituted by elder investors to improve the portfolio appearance and follow the trading pattern of other institutional investors due to share-to-blame effect. The characteristics of elder investors in having short-term bias and boosting asset prices has no doubt become the reasons in causing herding in stock markets. Nonetheless, to the best of our knowledge, none of the previous studies have examined the impact of ageing society on market-wide herding in multiple stock markets by using CSAD method. In fact, previous studies are mainly focusing on the psychology of elder investors in explaining individuals' herd behaviour rather than using ageing society as a factor to determine its impact on market-wide herding. Thus, the result of this study provides new evidence on the impact of ageing society in shaping market-wide herding.

In this paper, prosperity is found to be insignificant with herd behaviour. One of the possible explanations of this phenomenon is the diversification of investment. Investors tend to seek for greater opportunity to earn “big” money by diversifying their investment (French & Poterba, 1991) instead of considering the prosperity of a country. It may trade off the effect of prosperity effect on herd behaviour.

Globalisation of stock markets may explain the reason of insignificant relationship between education and herd behaviour. The stock market does not comprise purely of local investors but it also comprises of foreign investors. Foreign investors may choose to diversify their investment to other countries in order to earn greater return because the market is more efficient (Singh, 2010). It may lead to a major improvement for a market development which eventually contributes to economy growth. Therefore, computing the education index of a country is hard to relate to the existence of herd behaviour as foreign investors play a crucial role in the stock market.

Industry orientation is found to be insignificant to herd behaviour. One of the possible reasons that may explain this phenomenon is that investors focus more on individual company rather than the whole industry. For the past decade, the companies listed in stock market have increased dramatically due to low entry requirement of securities exchange. Investors may focus on their interested company instead of the whole industry. Although some adverse incidents such as fluctuation in exchange rate, increase in tariff and change in government policy may affect the whole industry. Sophisticated investors are able to predict future skewness (Kumar, 2009) by considering future prospect of the individual company because some of the individual company may outperform the industry. If this is the case, this may offset the impact of industry orientation on the occurrence of herd behaviour in the market.

Although many authors (Barber & Odean, 2001) have supported the idea between gender and herd behaviour, the finding of this paper shows that gender is insignificant. One of the possible reasons that may explain this phenomenon is the smaller gap of characteristics between men and women. As awareness of feminism increases, the different characteristics between men and women have become blurred. There are some psychological similarities between men and women (Guimond, 2008). Scholars used to describe men as hot-temper, anxious, overconfident and educated. Men tend to herd compare to women. Nonetheless, the world is changing and women nowadays tend to explicit same characteristics and capabilities as men. If men can make investment mistake on stock market, women may have the same possibility of making wrong

investment strategy. Although men may exhibit higher characteristics of herd behaviour compared to women, the differences between men and women may become smaller in this new era with the improvement of education received.

Summary and Conclusion

There are two main objectives in this paper. The first objective of this study is to determine the existence of herd behaviour in stock markets. The second objective is to examine the impact of social factors on herd behaviour. Even though previous authors have pointed out some evidence of herd behaviour in global stock markets, this paper has gone a step further to examine the possibility of social factors in affecting the existence of herd behaviour by applying latest available market data from 2007 to 2016. Surprisingly, the empirical results of this paper show that herd behaviour exists in Singapore, Mexico, Poland, South Africa, China and Philippines while no evidence of herd behaviour is detected in Canada, Hong Kong, Japan, United Kingdom, Brazil, Malaysia, Chile, Indonesia and Russia. Noticeably, we found that ageing society is the only social factor found to be significantly correlated to herding, which may explain the existence of the behaviour in the markets. The other social factors such as prosperity, education, industry orientation and gender are found to be insignificant to herding.

Besides demonstrating the existence of herd behaviour in Developed Markets, Advanced Emerging Markets and Secondary Emerging Markets, this study determines the rationality of investors in making investment. The result of this study indicates that investors may be irrational. The occurrence of herd behaviour, which is idiosyncratic, shows that investors have exhibited behaviour of following the investment strategy of a bigger group of investors. They easily get affected by the other investors and this has impacted their own investment strategy. If investors are rational, herd behaviour shall not exist because investor shall not follow the behaviour of other investors and applying their informed, personal judgement in making independent decisions. Nonetheless, the evidence of herd behaviour is detected in this study and it shows that investors are potentially irrational in making investment in stock market.

For policy implication, we suggest that market regulators shall take the responsibility to identify and monitor the existence and trends of herding in particular stocks, industries and even the whole market as a signal of unusual market activity. A few studies (Kaminsky & Schmukler, 1999; Bove & Domuta, 2004) have showed that the evidence of herding is detected in the early stage of financial crisis. In this context, the supervision of herding is becoming crucial in preventing the markets from falling into panic and overreaction that may eventually lead to financial crash. We recommend the market regulators to impose a strict regulation of stop trading (buy, sell or both) order for specific stocks in the event of detecting high level of herding that may traumatize the markets due to contagion effect.

Although the study on herd behaviour is not new in the field of behavioural finance, studies on the relationships between social factors and herd behaviour are still lacking. The result of this paper may benefit individual investors, institutional investors and market regulators by assisting them in better understanding the existence of herd behaviour and the impact of social factors on the behaviour in the global stock markets.

This study may have some limitations. Firstly, the CSAD model restricts itself as it does not indicate the root causes of causing herd behaviour in the market. It does not distinguish between individual investors and institutional investors. By relying solely on CSAD, it is limited to only testing the existence of herd behaviour in the market but not the root causes. Secondly, the social factors are limited to the specific countries. Nevertheless, the stock markets comprise of local and foreign investors, who may not be the native of the country itself. Identifying and segregating the impact of local and foreign investors may shed some light on the cause of herding in the markets.

Few recommendations can be made here. Future studies may want to change the scope of the research to examine the existence of herd behaviour before recession, during recession and after recession such as subprime crisis in 2008 in order to determine other factors that can cause the herd behaviour in the market. In fact, other potential social factors such as ethnicity and religion can be selected as independent variables in the future study to examine the impact of other social factors on herd behaviour. It may provide new insight to the field of behaviour finance generally and herd behaviour specifically. Besides, future studies may account for globalization by determining the impact of multiple global stock markets such as U.S and China on the existence of herding in the local market. The other globalization factors such as changes in U.S interest rate, changes in US Dollar/ Chinese Yuan exchange rate and commodities' prices should also be considered for future studies to determine its impact on local herd behaviour and how the investors perceive the changes in globalization factors reflecting on stock prices.

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