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Sectoral Herding Contagion on Eve of New Year

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Abstract

The purpose of this study is to investigate herding contagion on the eve of the new year (2015-2019) last three years data excluding due to Covid 19 effect on stock markets. This research work focuses on the cross-country behavioural linkages of investors between US and Chinese stock markets. This study employs a return dispersion model to identify the consensus among the participants of the market (Chang et al., 2000). The first aim of this study is to examine herding contagion by Cross Sectional Absolute Deviation (CSAD) between domestic and foreign countries. The findings of this study depict that herding contagion appeared during the new year, however, the intensity of herding contagion negligible during the new year within the aggregate and sectoral data sets. This paper highlights stock markets and sectors for investors to get the maximum advantage of portfolio diversification. Therefore, stockholders require to alter their portfolios according to the situation in the market to diversify risk. The study suggests that investors and asset managers should analyse the sectoral performance of stock markets during such situations before making a portfolio.

Keywords: Herding contagion, Efficient market hypothesis, Portfolio diversification, New year.

1. Introduction

People celebrate the new year despite cultural differences and traditions, it provides an opportunity to come together. New year is celebrated on 1 January according to the Gregorian calendar and the optimistic mood is demonstrated in stock markets. Earlier studies capture abnormal returns during the new year, irregularities in returns contradict the efficient market hypothesis (Bergsma & Jiang, 2016). The Efficient Market hypothesis (EMH) of Fama (1970) explains that stock prices instantly absorb all available information and investor decisions are rational. Behavioral anomalies and excessive price movements oppose the efficient market hypothesis and lead to abnormal returns (Naz et al., 2023). As classical financial models fail to answer the stock price movements, as a result, researchers and practitioners are inclined toward behavioral finance (Messis & Zapranis, 2014). Behavioral finance deals with the psychological factors which influence investor decision-making. Physiological and sociological factors such as herding behavior, overconfidence, and risk-taking decrease with experience (Bukhari et al., 2021).

Herding behavior of investors is a social behavior, which occurs from the interaction of individuals in a social network. The social network aligns the thoughts of individuals in a manner that they act as a group (herd). Herding behavior of investors is a transmission of thoughts and patterns of relationships among investors at the workplace (Espinosa-Méndez, 2022). Herding behavior has a diverse background and this concept can influence individuals on a broader economic scale. In different subjects, herding behavior appears with diverse backgrounds. The presence of herding behavior has been studied with multiple frameworks in the field of finance and economics. Examples of herding behavior are financial market bubbles, customer preferences, financial speculation, and political choices. Herding is observed in financial markets due to two causes; the first is social pressure and the second is the common logic that group decisions are better than a single investor's choices. Similarly, investors with strong emotions, uneducated and ill-informed, follow the footsteps of prior investors (Choijil et al., 2022).

The existence of herding behavior and contagion has gained considerable attention in the last few decades. Dornbusch et al. (2000) argue that the spreading of shocks across countries is called financial contagion and further contagion is divided into two broad categories, fundamental and pure contagion. The interdependence such as shock transmitted through real and financial linkages is called fundamental contagion. Leung et al. (2017) claim that pure contagion transmits through irrational decisions of investors (herding behavior), panic in markets, and liquidity issues. In addition, religion and calendar events affect an investor's mood and behavior in financial markets. Investors during New Year and other events are motivated towards group behavior due to social interaction and optimism (Al-Hajieh et al., 2011).

Population of a country demonstrates similar conduct according to calendar events. Social interaction and homogenous sentiments guide investors towards herding (Gavriilidis et al., 2016). Intensity of herding mainly depends on the period and location. Hence, herding should be tested at different times and locations for in-depth examination. Previous research studies (Bergsma & Jiang, 2016; Yousaf et al., 2018) provide inconclusive results regarding the empirical association of herding and calendar events (new year). Unlike previous research studies, this study is a pioneer to examine herding contagion between US and Chinese stock markets on the eve of new year. The present study significantly contributes to the current literature by investigating the root cause of herding across the sectors. This study determines the countries / sectors with noticeable herding contagion during different timeframes. In addition, this study explores the uncorrelated sectors to attain the maximum benefits of diversification. This research further analyzes the contagion due to the homogeneous behavior of investors during calendar events. Our findings can generalize to other stock markets as the US is developed and China is an emerging market. Lastly, this study has a unique framework to bridge the gap between traditional finance, behavioural finance and religion.

Countable studies have been conducted on new year, however, no study investigated herding contagion across the sectors. The study significantly contributes to the existing literature and offers a comprehensive roadmap to all stakeholders for promoting a growth-oriented stock market. These guidelines enhance the quality of trading and attract investors. It further makes the utilization of resources more effective and efficient. Government authorities also benefit from this study as it provides a solution to crucial factors affecting stock market performance. The remaining parts of the paper are as follows. Section two presents Literature review - Herding Behavior and contagion. Section three explains Research Methodology. Section four deals with results and discussion. Section five presents' conclusions.

Literature review: Herding Behavior

In recent years, stock market prices kept on fluctuating and stock markets behave abnormally, which drew the attention of researchers to fix the issues. Studies of behavioral finance define the term "herding" in different ways and with different logic. The term herding has been described as "a crowd of peoples mimicking the actions of other peoples for a certain time period" (Nofsinger & Sias, 1999). Herding behavior is defined as a cluster of investors that follows the actions of other investors over a time period (Kizys et al., 2021). In all definitions, herding is defined as "action of a group of investors that has similarities". It has also been found that the herding behavior of investors exists for a short time in the market.

Marietza et al. (2021) have examined 98 research papers on herding behavior and concluded that articles published in quality journals have the most impact on researchers. In addition, studies explore that herding behavior has been on the higher side when the return on investment is low (Economou et al., 2018). Chiang et al. (2010) dug out the proof about the negative relationship between general market herding and return on cross-sectional standard deviation. Herding behavior had affected all stocks evenly and specifically when periods of stock had low return. This study takes data for a shorter period and interprets the lack of information in the market.

To measure the effects of herding behavior, different methodologies have been used with different conclusions in various studies. It has been observed that different methods employed in the same market with the same data achieved different results. These studies showed that the results lack consistency and require deep analysis. Espinosa-Méndez (2022) investigated herding with the help of the conditional Capital Asset Pricing Model. In this study, they explore that herding behavior has a significant impact on the movement of the stock market in the given market condition. Chiang and Zheng (2010) concluded that herding behavior does not exist in the participants of USA and Latin American countries. However, considerable evidence of herding exists in the participants of Asian countries. Studies note that investors' sentiments (optimism or pessimism) plays a vital role in the herding behavior (Sheikh et al., 2023).

Fang et al. (2021) claim that regional crises have a significant impact on domestic stock markets. However, the intensity of herding varies across markets with regard to time (Ferreruela & Mallor, 2021). Demirer and Kutan (2006) explore that herding behavior does not exist in the participants of the Chinese stock exchange. Contrary to the above, Chiang et al. (2010) also explored the evidence of herding behavior in market A. They did not find any evidence of herding behavior in market B. Narayan and Zheng (2011) explored two different stock exchanges (Shanghai Stock Exchange and Shenzhen Stock Exchange) and found that herding behavior intensity varies across the different sectors of market. Chen et al. (2017) found no proof of the spillover effect of herding behavior from the U.S stock market to the Chinese stock market. This study also claims that the intensity of herding behavior is different due to information efficiency, market integration, and effectiveness of regulation.

Chang et al. (2000) found herding behavior in two stock markets, i.e., South Korea and Taiwan, and no proof of herding behavior in the investors of Hong Kong and USA. Gebkaa and Wohar (2013) investigated herding behavior in national indices and sectors, the study hasn't found evidence of herding behavior in an entire sample of stock markets, but herding behavior is present in a few sectors. Ababio and Mwamba (2017) examined herding behavior in South African financial markets with two different approaches, a conventional approach and Bayesian linear regression model. The herding behavior is significantly present in all sectors of the market with both approaches under different market conditions except the insurance sector. Mertzanis and Allam (2018) examined herding behavior is a short-lived phenomenon. Calendar anomalies affect the stock market returns of both developed and emerging financial markets. Most countries follow religious calendars and observe rituals. However, the new year is celebrated across the world and abnormal returns in January are observed compared to other months of the calendar year (Haugen & Lakonishok, 1988). So, this study hypothesizes that

- *H1: Herding behaviour is significantly present in the aggregate and sector data sets of USA and Chinese stock market during the new year.*

2. Contagion

Contagion definitions varies across the financial literature. Forbes and Rigobon (2000, 2002) indicate that financial contagion occurs due to a significant increase in cross-capital market linkages between stock markets after the financial crisis. However, the World Bank describes financial contagion as a process of financial crisis transmitted / spread across the financial markets. Studies have defined different channels of financial contagion across the financial markets. Dornbusch et al. (2000) spotlight on the fundamental channel of financial contagion, for instance, financial links and trades among countries. Financial intuitions are the main source of spreading financial contagion among countries. In addition, trade agreements and financial transactions among countries are a source of transmitting fundamental contagion. BenSaïda (2017) defines pure contagion and provides empirical evidence of how irrational behavior of investors spreads pure contagion across the financial markets. When a large group of investors behave irrationally in search of safe heaven originate crisis in the financial market, as a result the crisis spreads to other markets and generates contagion.

Edward (2000) describes economic contagion terms as “situations where the extent and magnitude to which a shock is transmitted internationally exceeds what was expected ex-ante". Similarly, Bekaert et al. (2014) describe contagion as excess co-movement of financial markets across the borders during financial turmoil. Leung et al. (2017) define that irrational behavior of investors leads to pure contagion in financial markets and different channels are observed to transmit shocks across the economy, pure contagion, fundamental contagion and common cause contagion (Moser, 2003). Chittedi (2015) investigates the contagion effect of US (developed market) to Asian emerging stock markets, stock markets show high correction before and after volatility periods. Due to financial contagion or co-integration between markets, the benefits of diversification of stock portfolio considerably decrease (Wahyudi et al., 2018).

Chancharoenchai and Dibooglu (2006) argue that the Asian Financial crisis due to contagion effects is a proxy of the United States financial market this study provides evidence of Asian Financial contagion. Several researchers have provided evidence of integration among European financial markets (Zhang et al., 2020). Wahyudi et al. (2018) identified herding behavior as the main cause behind financial contagion, Sruthi and Shijin (2017) investigated that US market shocks transmitted to Asian financial markets due to international investor's reachability to Indian market. The correlation between US and Asian stock markets remains significantly high before and during the financial crisis. This study further suggests that contagion is transmitted from mature economy / market to emerging economy / market. Nath and Brooks (2020) explain that herding is the main reason behind financial contagion across the stock markets during periods of panic (Wahyudi et al., 2018). In recent years, requests for information access have decreased due to the integration of financial markets and globalization. Contagion effect frequently occurs because the flow of information across the markets increased rapidly (Calvo & Mendoza, 2000). Alqaralleh and Canepa (2021) differentiate between contagion and interdependence, claiming that frequent cross-correlation between stock markets is called pure contagion and low frequency of cross-correlation is called interdependence.

The social life and mood differentiate the societies from each other. However, different months and holidays attract researchers to explore the effects of calendar events on the financial market. Social values, previous beliefs, and investor's sentiments can affect the stock market prices (Edmans et al., 2007). However, previous studies have observed the herding behavior in stock markets, but ignore the sectoral contagion effect due to herding behavior during calendar events. So, this study hypothesizes

- *H2: Contagion effect due to herding behaviour is significantly present in sectors of stock markets during calendar events.*

3. Research Methodology

3.1. Research Approach and Data Source

Thomson Reuters Datastream was used to access daily stock prices of all companies. The study has taken the daily prices of stocks listed on the New York and Shanghai stock markets for analysis. Furthermore, the data is divided into 10 sectors according to Thomson Reuters industry classification. It classifies companies into sectors according to business activity, used for analytical and investment purposes by brokers, fund managers, stock holders, and research scholars. It is an efficient tool for all stakeholders for investment decisions and preparing investment portfolios in developed and emerging markets. This study utilizes the data of New year effect from 2015 to 2019 - last 9 days of December and 1st 9 days of January (Bergsma & Jiang, 2016), data of the last three years excluded to avoid the effect of COVID 19. Aggarwal and Rivoli (1989) describe the contagion cycle between USA and China during calendar events. The price movements in the New York stock market have a substantial impact on the Shanghai Stock market during calendar events. Furthermore, they claim that Chinese stock markets have a significant tendency to follow the New York stock market on a subsequent days.

3.2. Methodology to check Herding Behavior

In the first phase of testing, descriptive statistics of the data are calculated for general understanding and characteristics of stock returns. The approach of this study to examine herding behavior is consistent with previous research studies of (Chang et al. 2000). In this study, cross-sectional absolute deviation method is used to estimate the herding behavior of investors. Cross sectional absolute deviation is a measure of return dispersion. Chang et al. (2000) were a pioneer in employee CSAD to capture herding. Chang et al. (2000) model is more practical compared to Christie and Huang (1995) Cross Sectional Standard Deviation (CSSD) approach. Tan et al. (2008) claim that CSSD is a stringent model and requires a high magnitude of non-linearity to capture herding presence.

$CSAD_{t} = \alpha + \gamma_1 \mid R_{m.t} \mid + \gamma_2 R^2_{m.t} + e_t$ (1)

- $R_{m.t}$ = mean or average of all stock returns at a specific date
- $R^2_{m.t}$ = Square of (mean or average of all stock returns at a specific date)
- $CSAD_t$ = average of all $R_{i.t}$

In this equation, $R_{m.t}$ is the cross-sectional average returns of N stocks at time t and N is the number of companies in the portfolio. $\gamma_1$is the coefficient of the variable $R_{m.t}$ and shows whether $R_{m.t}$ & CSAD have positive or negative relationships. $\gamma_2$is the coefficient of the variable $R^2_{m.t}$ and shows that $R^2_{m.t}$ & CSAD have positive or negative relationships. Return on the dispersion is measured through the $CSAD_t$, which is cross-sectional absolute deviation.

$CSAD_{t} = 1/N£^{n}{}_{i}=1 \mid R_{i.t} - R_{m.t} \mid N$ (2)

In the above equation, $R_{i.t}$ is the stock return of company i at time t and return. $R_{m.t}$ is the average cross-sectional return of N stocks in the portfolio, N representing the number of companies. If the herding behavior in the market is present, then the coefficient y_2 will be negative. This model set thresholds of significance 1%, 5%, and 10%. The explanation of the above-mentioned statement is as follows.

When the market is uncertain and large (upwards and downward) price movements are observed, thus the herding behavior will appear in a consistent manner among the participants of the stock market. Nonlinear relationship between return dispersion and stock market returns shows the presence of herding. Therefore, when the stock markets experience herding, CSAD and stock market returns are not proportionally equal. However, an increase in the decreasing rate of CSAD is an indication of severe herding present in the participants of the market (Chang et al., 2000).

Return on stock is estimated by the following model.

$Rt = 100\times(\log (Pt) - \log (Pt-1))$ (3)

3.3. Tools and Technique to Determine Contagion Due to Herding

Tools and techniques employed to determine the contagion due to herding in stock markets are in line with (Galariotis et al., 2015; Wahyudi et al., 2018). They evaluate whether cross sectional absolute deviation (CSAD) of one country is influenced by the Cross-sectional absolute deviation of other markets. The co-movement between CSAD of both markets shows cross-country contagion effect.

3.4. Pearson Correlation Matrix

Correlation among different stock markets is calculated through Karl Pearson's coefficient of correlation. Correlation matrix will help us to identify the association between stock market series. Whether Asian stock markets have any association among them or not (as a whole and industry wise).

3.5. Using Cross Sectional Absolute Dispersion

In this technique, we calculate cross sectional absolute dispersion of all stock markets (aggregate data sets and sectoral data sets). Further, we use cross sectional absolute dispersion as an explanatory variable to check the dominance of one stock markets / sectors to the other stock market / sector. Example of the model explained is as under.

$CSAD_{i.t} = \gamma_0 + £^{n}_{j=1}\, \gamma_j\, CSAD_{f.t} + e_t$ (4)

$CSAD_{CHN.t} = \gamma_1 + \gamma_2\, CSAD_{USA\ t-1} + e_t$ (5)

In the above equation, no.5, CSAD in Chinese market is explained by CSAD in USA market. The is to check whether the herding behaviour of USA stock market is the influence herding activity in Chinese stock market.

$CSAD_{CHN\ (Financial).t} = \gamma_1 + \gamma_2\, CSAD_{USA(Financial)\ t-1} + e_t$ (6)

In the above equation no.6, after determining the sectoral herding behaviour of all stock markets. The above equation checks whether herding in the USA the financial sector affects financial sector trading in the Chinese stock market. For example, sectoral herding in the US stock market explains the sectoral herding behaviour of investors in the Chinese stock market (Chiang & Zheng, 2010). In order to examine this problem, this study used a cross-sectional return dispersion term in the regression equation to check the contagion effect. More specifically, in case of herding contagion, y_2 should be statistically significant.

4. Results and Discussion

Descriptive statistics for the New Year (9 trading days of December and 9 trading days of January=18 trading days) for the period from 2015 to 2019 are present in Table no.1. A closer examination of all countries the returns, it suggested that returns have both bullish and bearish trends. Means returns of all stock markets remain low (Negative) on New Year. It concludes that stock markets are sensitive during calendar events and abnormal returns are observed in both stock markets.

Table 1. Descriptive Statistics

	Countries	CSAD		Rmt		Rmt^2	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
2015	China	0.82	0.344	-0.054	0.642	0.392	0.524
	USA	0.445	0.19	0.013	0.474	0.072	0.120
2016	China	0.872	0.33	-0.057	1.461	2.348	4.422
	USA	0.564	0.248	0.008	0.541	0.242	0.363
2017	China	0.479	0.133	-0.005	0.388	0.082	0.10
	USA	0.396	0.157	0.01	0.309	0.049	0.074
2018	China	0.495	0.14	0.063	0.274	0.075	0.084
	USA	0.385	0.16	-0.012	0.229	0.027	0.051
2019	China	0.484	0.187	0.02	0.404	0.155	0.256
	USA	0.603	0.257	0.012	1.148	0.345	0.512

4.1. Estimates of Herding Behavior on New Year (2015 to 2019)

The results of herding on New Year from 2015 to 2019 are in table No.2. This study examines herding behavior during New Year among the stock markets of USA and China in an aggregated data sample, and it notices that herding exists among participants in the USA stock markets on new year 2016. The herding continued to disturb the stock market in 2017 - New Year, and investors in China and USA demonstrated irrational behavior. In 2018 and 2019, participants in the USA fell to the phenomena of herding behavior. However, the Chinese stock market shows anti-herding on New Year of 2018 and 2019.

Tables No.3 to 12 exhibit the sectoral results of US and Chinese stock markets - New Year from 2015 to 2019On the occasion of New Year 2015, five Industries (consumer, cyclical, energy, industrials, materials, and Non-cyclical) of the USA stock market display herding behavior. However, the Chinese stock market shows anti-herding behavior in all industries during the New Year 2015. As per results of the New Year of 2016, investors of five industries (financials, healthcare industries, materials, and utilities) of the USA stock market have made decisions in clusters. Healthcare, IT and materials of the Chinese stock market showed herding behaviour. The New Year event of 2017 was better for the stock market compared to other years with regard to information efficiency. Four industries (consumer, cyclical, financials, industries, and materials) of the USA demonstrate herding activities during New Year. Except investors of two industries (materials and utilities), all other investors have taken rational decisions in the Chinese stock market.

New Year of 2018 is moderate with respect to herding activities in the stock markets. Stock markets of the USA showed consistent behaviour compared to previous years and herding exists in five industry (energy, financials, industries, Non-cyclical, and telecommunication) of the USA stock market. Only the financial sector of the Chinese stock market displays herding behaviour. Herding increases during New Year of 2019 in contrast to the preceding years. Five industries (consumer, cyclical, IT, materials, and Non-cyclical) of the USA stock market display herding formation. The Chinese stock market suffered most in 2019 compared to other years, and herding appears in 4 X industries (consumer, cyclical, IT, Non-cyclical, and utility). Magnitude of herding behaviour is different across the markets and industries. Seldom studies have checked the herding behaviour on New Year. However, our hypothesis is accepted and significant empirical results have supported our assumption. This study highlighted the fact that herding is short-lived phenomenon and evidence of adverse herding present in the markets (developed and emerging). Thus, both developed and emerging markets have irrational investors. Further, seasonal patterns in investors effect the efficiency of the stock markets.

Table 2. Aggregate

	2015		2016		2017		2018		2019	
VARIABLES	**China**	**USA**	**China**	**USA**	**China**	**USA**	**China**	**USA**	**China**	**USA**
Rmt	0.609	1.371**	0.521**	1.316***	1.564**	2.550***	1.029	2.631***	0.920*	1.161***
	(0.481)	(0.535)	(0.243)	(0.373)	(0.662)	(0.507)	(0.616)	(0.676)	(0.435)	(0.273)
Rmt2	0.0781	-1.201	-0.0927	-0.752**	-2.219*	-3.633***	-1.196	-4.119**	-0.757	-0.529**
	(0.333)	(0.855)	(0.0642)	(0.345)	(1.189)	(0.940)	(1.214)	(1.551)	(0.473)	(0.207)
Constant	0.474***	0.266***	0.553***	0.260***	0.305***	0.125**	0.358***	0.182***	0.339***	0.264***
	(0.144)	(0.0600)	(0.124)	(0.0737)	(0.0655)	(0.0528)	(0.0629)	(0.0496)	(0.0726)	(0.0698)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.573	0.512	0.471	0.645	0.380	0.686	0.325	0.630	0.279	0.710

The Standard errors are reported in parentheses

****, ** and * denote Statistical Significance at p<0.01, p<0.05 and * p<0.1 levels.*

Table 3. Herding 2015 USA

VARIABLES	Con Cyclical	Energy	Financials	HealthCare	Industrials	IT	Materials	Con Non-cyclical	Utilities	Telecommunication
Rmt	1.912***	1.302***	1.538**	1.202**	1.786***	1.311*	1.311***	1.712***	0.776*	1.263*
	(0.563)	(0.372)	(0.546)	(0.505)	(0.550)	(0.698)	(0.406)	(0.544)	(0.402)	(0.719)
Rmt2	-1.893**	-0.699**	-1.526	-1.238	-1.562*	-1.202	-0.875**	-1.531**	-0.428	-0.748
	(0.766)	(0.306)	(1.114)	(0.794)	(0.733)	(1.046)	(0.359)	(0.709)	(0.576)	(1.119)
Constant	0.216***	0.303***	0.204***	0.211***	0.219**	0.376***	0.210***	0.160*	0.217***	0.293***
	(0.0693)	(0.0749)	(0.0509)	(0.0611)	(0.0758)	(0.0827)	(0.0653)	(0.0783)	(0.0595)	(0.0802)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.564	0.611	0.576	0.406	0.583	0.321	0.532	0.531	0.504	0.452

The Standard errors are reported in parentheses

****, ** and * denote Statistical Significance at p<0.01, p<0.05 and * p<0.1 levels.*

Table 4. Herding 2015 China

VARIABLES	Con Cyclical	Energy	Financials	HealthCare	Industrials	IT	Materials	Con Non-cyclical	Utilities	Telecommunication
Rmt	0.943***	0.620*	0.415	0.386	0.831*	0.458	1.167*	0.965	0.156	1.472**
	(0.314)	(0.318)	(0.553)	(0.337)	(0.445)	(0.290)	(0.639)	(0.621)	(0.765)	(0.652)
Rmt2	-0.250	-0.103	0.253	-0.0497	-0.183	-0.0730	-0.333	-0.0137	0.0238	-0.529
	(0.154)	(0.148)	(0.284)	(0.204)	(0.220)	(0.118)	(0.491)	(0.627)	(0.495)	(0.341)
Constant	0.268**	0.283*	0.625***	0.431***	0.408**	0.513***	0.331*	0.248*	0.697***	0.271
	(0.115)	(0.141)	(0.204)	(0.0971)	(0.172)	(0.123)	(0.179)	(0.139)	(0.227)	(0.198)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.558	0.482	0.584	0.307	0.411	0.308	0.469	0.552	0.040	0.418

The Standard errors are reported in parentheses

****, ** and * denote Statistical Significance at p<0.01, p<0.05 and * p<0.1 levels.*

Table 5. Herding 2016 USA

VARIABLES	Con Cyclical	Energy	Financials	HealthCare	Industrials	IT	Materials	Con Non-cyclical	Utilities	Telecommunication
Rmt	0.440	1.179**	1.513***	1.284***	1.468**	1.084**	1.268***	0.902*	1.603***	1.255*
	(0.461)	(0.434)	(0.330)	(0.379)	(0.508)	(0.399)	(0.311)	(0.447)	(0.491)	(0.653)
Rmt2	0.00420	-0.413	-1.048**	-0.755**	-0.782*	-0.514	-0.604**	-0.485	-1.263*	-0.808
	(0.396)	(0.266)	(0.360)	(0.348)	(0.383)	(0.297)	(0.222)	(0.460)	(0.601)	(0.722)
Constant	0.410***	0.394***	0.186***	0.192**	0.317**	0.311***	0.225**	0.277***	0.194**	0.354***
	(0.0972)	(0.126)	(0.0520)	(0.0790)	(0.117)	(0.101)	(0.0779)	(0.0866)	(0.0702)	(0.113)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.390	0.606	0.754	0.607	0.520	0.474	0.692	0.426	0.621	0.389

The Standard errors are reported in parentheses

****, ** and * denote Statistical Significance at p<0.01, p<0.05 and * p<0.1 levels.*

Table 6. Herding 2016 China

VARIABLES	Con Cyclical	Energy	Financials	HealthCare	Industrials	IT	Materials	Con Non-cyclical	Utilities	Telecommunication
Rmt	0.107*	0.157*	0.332***	0.0961*	0.138**	0.122**	0.177***	0.136**	0.197***	0.153
	(0.0575)	(0.0814)	(0.0500)	(0.0460)	(0.0598)	(0.0509)	(0.0566)	(0.0582)	(0.0478)	(0.141)
Rmt2	-0.0213	-0.0148	-0.0128	-0.0283**	-0.0235	-0.0238*	-0.051**	-0.00509	0.0286	0.00887
	(0.0135)	(0.0183)	(0.00994)	(0.0129)	(0.0153)	(0.0126)	(0.0193)	(0.0148)	(0.0188)	(0.0358)
Constant	0.866***	0.869***	0.535***	0.751***	0.766***	0.769***	0.783***	0.773***	0.445***	0.311
	(0.101)	(0.113)	(0.0681)	(0.0831)	(0.102)	(0.0924)	(0.0929)	(0.102)	(0.0621)	(0.205)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.340	0.237	0.759	0.408	0.342	0.347	0.504	0.269	0.688	0.096

The Standard errors are reported in parentheses

****, ** and * denote Statistical Significance at p<0.01, p<0.05 and * p<0.1 levels.*

Table 7. Herding 2017 USA

VARIABLES	Con Cyclical	Energy	Financials	HealthCare	Industrials	IT	Materials	Con Non-cyclical	Utilities	Telecommunication
Rmt	1.739***	1.896**	2.292***	1.479*	2.210***	1.503*	1.497**	1.400*	1.491	0.954
	(0.524)	(0.815)	(0.534)	(0.735)	(0.466)	(0.760)	(0.539)	(0.747)	(0.865)	(0.575)
Rmt2	-1.600**	-2.385	-3.876***	-1.853	-2.109***	-1.650	-1.523*	-1.604	-2.726	-0.0650
	(0.740)	(1.490)	(1.174)	(1.358)	(0.644)	(1.117)	(0.863)	(1.433)	(1.938)	(0.968)
Constant	0.168**	0.249**	0.150***	0.212**	0.117	0.294***	0.193**	0.194**	0.206***	0.222***
	(0.0743)	(0.0847)	(0.0418)	(0.0772)	(0.0733)	(0.0822)	(0.0674)	(0.0783)	(0.0527)	(0.0670)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.571	0.413	0.615	0.314	0.699	0.280	0.517	0.344	0.246	0.626

The Standard errors are reported in parentheses

****, ** and * denote Statistical Significance at p<0.01, p<0.05 and * p<0.1 levels.*

Table 8. Herding 2017 China

VARIABLES	Con Cyclical	Energy	Financials	HealthCare	Industrials	IT	Materials	Con Non-cyclical	Utilities	Telecommunication
Rmt	1.192*	1.020	0.880*	0.663	1.133*	0.503	1.386**	0.695	1.171**	0.266
	(0.671)	(0.712)	(0.465)	(0.545)	(0.614)	(0.726)	(0.604)	(0.578)	(0.502)	(0.356)
Rmt2	-1.373	-0.676	-0.996	-0.296	-1.374	-0.110	-2.076*	-0.531	-1.723*	-0.00461
	(1.057)	(0.542)	(1.223)	(1.164)	(0.922)	(1.239)	(1.072)	(0.939)	(0.917)	(0.131)
Constant	0.358***	0.401**	0.224***	0.261***	0.374***	0.339***	0.386***	0.406***	0.219***	0.326
	(0.0856)	(0.165)	(0.0337)	(0.0530)	(0.0731)	(0.0688)	(0.0617)	(0.0621)	(0.0488)	(0.187)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.266	0.127	0.478	0.379	0.238	0.356	0.306	0.307	0.344	0.246

The Standard errors are reported in parentheses

****, ** and * denote Statistical Significance at p<0.01, p<0.05 and * p<0.1 levels.*

Table 9. Herding 2018 USA

VARIABLES	Con Cyclical	Energy	Financials	HealthCare	Industrials	IT	Materials	Con Non-cyclical	Utilities	Telecommunication
Rmt	1.656**	1.378**	3.108***	1.295*	2.370***	1.134*	1.552**	2.357***	1.202	2.634**
	(0.687)	(0.502)	(0.918)	(0.714)	(0.628)	(0.638)	(0.688)	(0.769)	(0.727)	(0.953)
Rmt2	-1.764	-1.230*	-7.967**	-1.161	-2.676**	-0.684	-1.838	-4.640*	-1.769	-5.680*
	(1.097)	(0.620)	(3.269)	(1.391)	(0.959)	(1.097)	(1.214)	(2.259)	(1.402)	(2.793)
Constant	0.262***	0.305***	0.177***	0.240***	0.193**	0.282***	0.231***	0.167***	0.232***	0.208***
	(0.0764)	(0.0649)	(0.0403)	(0.0694)	(0.0666)	(0.0609)	(0.0763)	(0.0545)	(0.0697)	(0.0608)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.379	0.431	0.564	0.376	0.600	0.481	0.365	0.519	0.192	0.470

The Standard errors are reported in parentheses

****, ** and * denote Statistical Significance at p<0.01, p<0.05 and * p<0.1 levels.*

Table 10. Herding 2018 China

VARIABLES	Con Cyclical	Energy	Financials	HealthCare	Industrials	IT	Materials	Con Non-cyclical	Utilities	Telecommunication
Rmt	0.850	0.0873	1.645**	0.582	0.815	-0.176	0.850**	1.195	0.960	0.435
	(0.488)	(0.296)	(0.618)	(0.774)	(0.565)	(0.564)	(0.390)	(0.857)	(0.907)	(0.580)
Rmt2	-0.725	0.217	-2.919*	-0.539	-0.658	0.650	-0.667	-0.945	-0.872	0.129
	(0.872)	(0.161)	(1.433)	(1.421)	(0.861)	(0.748)	(0.518)	(1.827)	(1.659)	(0.398)
Constant	0.321***	0.408***	0.193***	0.403***	0.358***	0.556***	0.375***	0.298***	0.343***	0.0966
	(0.0554)	(0.0919)	(0.0599)	(0.0790)	(0.0661)	(0.0887)	(0.0583)	(0.0885)	(0.0830)	(0.178)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.396	0.599	0.396	0.115	0.340	0.170	0.386	0.368	0.284	0.503

The Standard errors are reported in parentheses

****, ** and * denote Statistical Significance at p<0.01, p<0.05 and * p<0.1 levels.*

Table 11. Herding 2019 USA

VARIABLES	Con Cyclical	Energy	Financials	HealthCare	Industrials	IT	Materials	Con Non-cyclical	Utilities	Telecommunication
Rmt	0.877***	0.677**	1.030***	0.726**	0.990***	1.126***	0.888***	0.869***	0.645	0.884**
	(0.225)	(0.288)	(0.330)	(0.294)	(0.268)	(0.269)	(0.196)	(0.286)	(0.428)	(0.337)
Rmt2	-0.337**	-0.207	-0.447	-0.286	-0.385**	-0.46***	-0.33***	-0.434**	-0.202	-0.391
	(0.140)	(0.171)	(0.329)	(0.175)	(0.173)	(0.151)	(0.106)	(0.200)	(0.323)	(0.268)
Constant	0.315***	0.426***	0.254***	0.353***	0.334***	0.277***	0.222***	0.329***	0.331***	0.308***
	(0.0700)	(0.0930)	(0.0662)	(0.0977)	(0.0804)	(0.0850)	(0.0625)	(0.0728)	(0.0903)	(0.0852)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.656	0.491	0.680	0.391	0.643	0.651	0.698	0.476	0.349	0.498

The Standard errors are reported in parentheses

****, ** and * denote Statistical Significance at p<0.01, p<0.05 and * p<0.1 levels.*

Table 12. Herding 2019 China

VARIABLES	Con Cyclical	Energy	Financials	HealthCare	Industrials	IT	Materials	Con Non-cyclical	Utilities	Telecommunication
Rmt	1.516***	0.385	0.799**	1.245**	0.521	1.236**	0.778*	1.318***	1.955***	0.813
	(0.440)	(0.391)	(0.350)	(0.501)	(0.484)	(0.531)	(0.437)	(0.349)	(0.554)	(0.592)
Rmt2	-1.559**	-0.134	-0.322	-0.969	-0.364	-0.850*	-0.823	-1.187**	-2.08***	-0.0951
	(0.549)	(0.366)	(0.304)	(0.554)	(0.506)	(0.465)	(0.528)	(0.403)	(0.681)	(0.341)
Constant	0.233***	0.247***	0.279***	0.246**	0.428***	0.353***	0.300***	0.243***	0.218**	0.277
	(0.0687)	(0.0676)	(0.0598)	(0.0889)	(0.0770)	(0.108)	(0.0594)	(0.0622)	(0.0843)	(0.211)
Observations	18	18	18	18	18	18	18	18	18	18
R-squared	0.480	0.254	0.481	0.415	0.124	0.320	0.186	0.529	0.473	0.469

The Standard errors are reported in parentheses

****, ** and * denote Statistical Significance at p<0.01, p<0.05 and * p<0.1 levels.*

These results are in line with previous studies, herding was detected due to information asymmetry and uncertainty in the stock markets. Overall, investors are not rational and display herding behaviour with different intensity during different periods (Yousaf et al., 2018; Wahyudi et al., 2018). Economou et al. (2018) suggested that financial system, regulatory system, speculation in the market, institutional investors and inflows & outflows from international financial markets are the main reasons behind the strong presence of herding in the stock markets.

4.2. Correlation (New Year 2015 to 2019)

The correlation coefficient values relate to New Year (2015 to 2019) between USA and China produced in table No.13. During New Years of 2016 and 2018, the correlation is significant between USA and China, the remaining years show insignificant results of correlation between USA and China. Results of this study are consistent with previous research study results, a correlation between USA and Asian countries exists with more or less intensity during calendar events (Aggarwal & Rivoli, 1989).

Table 13. Correlations

	2015	2016	2017	2018	2019
USA / China	-0.097	0.490*	-0.010	0.481*	0.223
	(0.701)	(0.039)	(0.970)	(0.044)	(0.373)

**** p<0.01, ** p<0.05, * p<0.1*

4.3. Herding Contagion during New Year (2015 to 2019)

Results of herding contagion of aggregate data sets during the occasion of New Year present at Table no.14. Only New Year 2017 reports that herding contagion presence from USA to Chinese stock market. The results of herding contagion within the industries of sample countries with New Year also produce at table no. 14. Moderate contagion effect observed during 2016 New Year, in the healthcare and material industry contagion effect observed from USA to Chinese stock market. The results of 2018 (new year) show weak form herding contagion and only financial sector shows herding contagion. The New Year of 2019 has affected most compared to other years. The consumer cyclical and non-cyclical sectors showed significant herding contagion. Thus, our hypothesis has accepted that the contagion effect of herding behavior exists in Asian markets during the occasion of New Year.

Table 14. USA to China - Herding Contagion

VARIABLES	2017 Aggregate	2016 Healthcare	2016 Materials	2017 Materials	2018 Financials	2019 Cyclical	2019 IT	2019 Non-cyclical
USA	0.425**	0.852***	0.867***	0.251	0.339*	0.295*	0.250	0.358*
	(0.182)	(0.220)	(0.248)	(0.182)	(0.187)	(0.165)	(0.236)	(0.190)
Constant	0.311***	0.351**	0.385**	0.419***	0.259***	0.276**	0.432**	0.267**
	(0.0774)	(0.122)	(0.160)	(0.0828)	(0.0643)	(0.109)	(0.167)	(0.112)
Observations	18	18	18	18	18	18	18	18
R-squared	0.253	0.485	0.433	0.106	0.170	0.166	0.066	0.182

Standard errors in parentheses

**** p<0.01, ** p<0.05, * p<0.1*

Herding exhibits different features in the cross-countries and cross-industries comparison. First, herding starts with imitative actions and the whole market draws a consensus to follow the market leaders. These behavioural aspects are more common, where investors give more importance to the psychological factors instead of fundamental forces. Besides behavioural and psychological forces, investor access to information, experience and reputation in the market also matters while taking any decisions. Therefore, herding behaviour can be the main root cause of contagion in financial markets. However, the variation in returns due to herding is a complex phenomenon to understand, since other factors contribute to the financial system (Espinosa-Méndez, 2022; Wahyudi et al., 2018).

Herding cannot be easily comprehended without linking with behavioural contagion across the stock markets. Therefore, this study examines herding contagion in cross markets and cross industries, the outcomes of this study suggesting that herding may be present in the specific industry rather than in the whole stock market. These findings show that herding contagion can be industry specific instead of the entire market. So, the lack of information or high cost of information is mostly industry specific / segment specific, and investors follow the herd due to reputation in the market. By analysing herding contagion in segments of the stock market, different dimensions and implications of variables have been assessed. It provides the opportunity to capture the intensity of herding behaviour of investors in a particular industries instead of a lengthy approach.

5. Conclusion

This research work examines herding contagion during calendar events between two leading economies of the world. This research work employed a return dispersion model proposed by Chang et al. (2000) to determine herding behaviour (non-linear term provides better results compared to other models). The findings of this research report significant herding behavior and weak herding contagion during the eve of the new year (aggregate vs industry data sets). These results are consistent with previous studies that herding is present in developed and emerging markets (Wahyudi et al., 2018). However, the results of aggregate data sets differ from the results of sectors in all stock markets, the intensity of herding behavior varies across the different years.

Results concluded that USA stock market was more sensitive due to major presence compared to Chinese stock markets. This study highlights the inefficiency of stock markets during extreme price movements. Our findings display stress and uncertainty, market consensus leads to inappropriate stock prices across the different industries in the selected stock markets. Blockage of information to investors, unmonitored stock market structure, and insecurity in the stock market are the basic reasons for incorrect stock prices (Chang et al., 2000). Market returns and specific industry returns meet at a certain point, where the dispersion in the market disappears and the stock shows an inappropriate price.

It further supports our literature that herding contagion may affect one or two industries of the market and have a modest effect on the overall performance of the market. This research work finds that herding has not completely removed from the market at any stage, however, the presence of herding may be negligible. This study highlights the behavioural factors of investors which further link with the contagion effect in the selected stock markets and sub-industries during the new year. After analysing these results, we explore that herding contagion is a complex phenomenon and shows different characteristics at the same time in a marketplace. It is very difficult to predict the magnitude of herding contagion across different stock markets / industries. This study provides in-depth analysis of selected stock markets with remedial measures required to overcome herding. Thus, investing in uncorrelated stock markets can benefit the investors and their risk will be decreased. Policy makers can benefit from this study by designing error-free policies and improvements in public rules. Limited literature is available with reference to herding contagion across different markets during the new year. COVID-19 situation is the primary opportunity for researchers to check the herding contagion effect on the stock markets.

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